Checklists: DASBR SWFSC

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1. Pre-Cruise Maintenance and Storage Checklist

Proper maintenance of your DASBR unit will help it stay in good condition and lower the risk of leaks during future deployments.

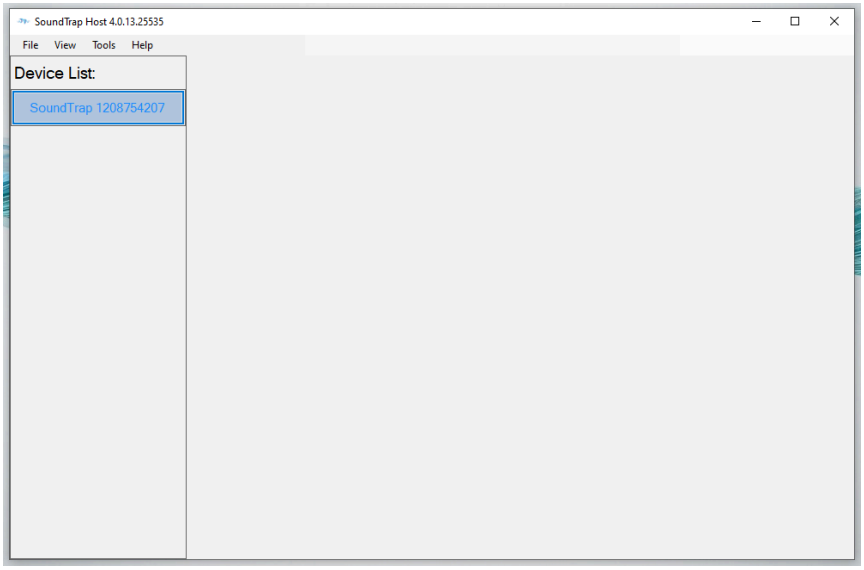
1. Inspect parts and remove dust and debris:
    a. Prior to taking your DASBR unit into the field, you will want to be sure the unit and its components are in good condition. Inspect all threadings on the PVC parts for wear and remove any dust or debris.
2. Replace O-rings and lubricate:
    a. We recommend replacing the PVC Union O-ring to mitigate against issues associated with compression of the o-ring material or the age of the material.
    b. It is also advised to lubricate the O-ring with Molykote 55
3. Replace nylock nuts and lubricate:
    a. We recommend replacing the nylock nuts prior to deployment to mitigate against issues associated with wear and tear of the nylon material.
    b. It is also advised to lubricate the nylock nuts with anti-seize lubricant.
4. Conduct water intrusion testing on main bodies:
    a. It is highly recommended that you conduct a 24-hr water submersion test of the main bodies prior to each deployment to mitigate any potential loss of equipment or data.
    b. Check for leaks. For any main bodies that encounter leaks, apply appropriate repairs / sealant etc. as needed, and retest prior to deployment.
5. Before deployment on the cruises, the DASBRs should remain in storage and protected from the sun and the surrounding environment.

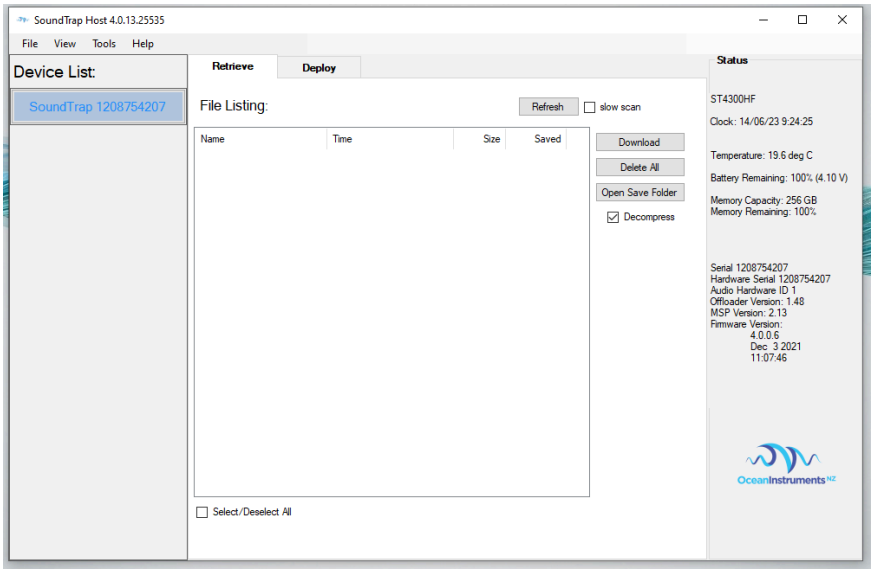
2. Deployment Checklist

1. SELECT ALL of the following components to build out a DASBR and record their ID's in the Excel file on the DASBR computer. Every component has a unique identifier.
    a. Satlink buoy
        i. Check battery level within OceanManager software
        ii. Needs a minimum of 2 hours of sunlight to charge
        iii. Confirm it has checked in
        iv. Set transmission rate: 1 hours
    b. Spar buoy
        i. Make sure top is sealed
        ii. Attached yellow float
        iii. Confirm if lost info is readable on the side of the buoy
    c. Back Bone
        i. Pull a trash can with 130 m of back bone line
    d. Hydrophone array
        i. Confirm it has an orange subsurface float
        ii. 2 hydrophones with white mounts in place
    e. Weight
        i. Select a 45 lb weight and they don't have ID numbers ;)
    f. SoundTrap
        i. Confirm charge value and memory available is 100%
        ii. Deployment settings complete using ***SoundTrap Setup Download Instructions DASBR***
        iii. Plug in hydrophones to SoundTrap before mounting to array (Channels 1 and 2). Hydrophone 1 = Top Hydrophone (**yellow** tape), Hydrophone 2 = Bottom Hydrophone (**Blue** tape)
        iv. Attach to hydrophone array with 18" zip ties mounted with the data port down
        v. All ports should have something plugged into them. (2) hydrophones and (3) dummy plugs
        vi. If collars are available, put them over the dummy plugs. Make sure to remove them after every deployment.
    g. TDR
        i. Complete setup with ***TDR Setup Download Instructions DASBR***
        ii. Encase in the metal mount using (2) 4" zip ties
        iii. Attach to the blue steel line of the hydrophone array using the metal mount and (2) 8" zip ties between bottom hydrophone and nylon thimble
2. Deployment and Recovery
    a. See ***DASBR Deployment-Retrieval Instructions***
    b. See ***DASBR Deployment/Retrieval Instructions for Ship's officers***

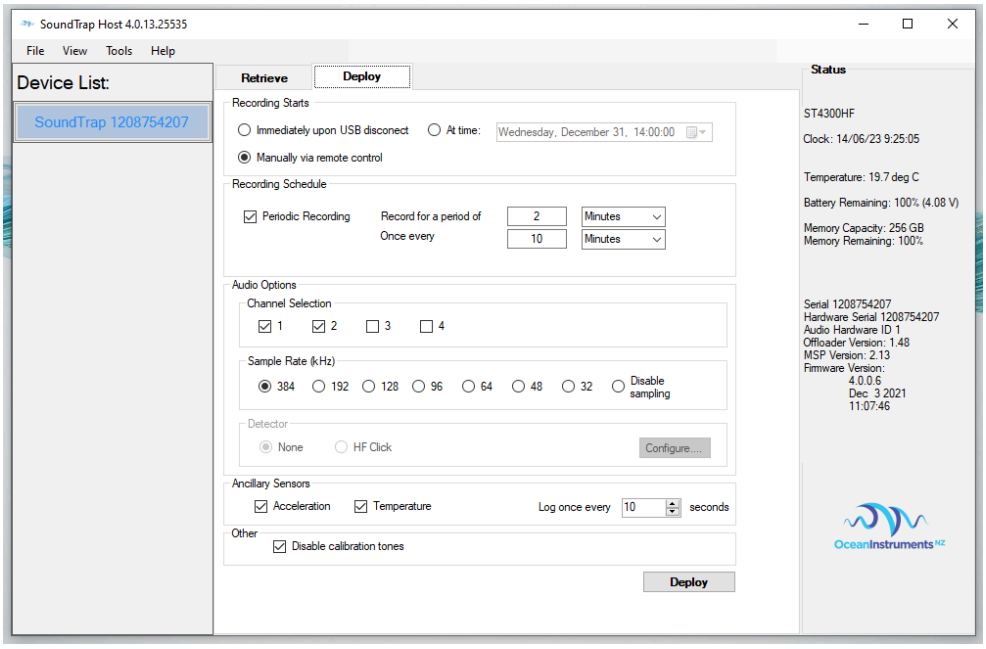
3. SoundTrap Setup Download Instructions DASBR

START UP (For Deployment)

1. Plug SoundTrap data cable into computer first
2. Make sure your computer's clock is in the time zone you want data recorded in (Local vs. UTC).
3. Startup "SoundTrap Host" by OceanIstruments
4. Attach SoundTrap via data port (end of SoundTrap with a single port)
5. Standby mode with one SoundTrap attached. Serial numbers are on the left of the screen.
   a. 

6. Click on serial number on the left of the screen. Once connection has been made the screen will look like this now.
   a. 

7. Check battery level on right panel is at 100%
8. Check Memory Remaining is 100%
   a. If data remains on the instrument, select all files and press delete.
9. Change to Deploy tab and set to these settings…

a. 

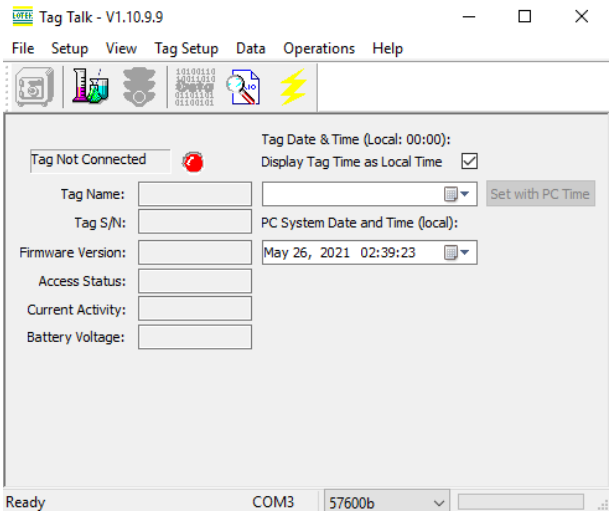
10. Once completed click Deploy at the bottom and unplug the instrument.

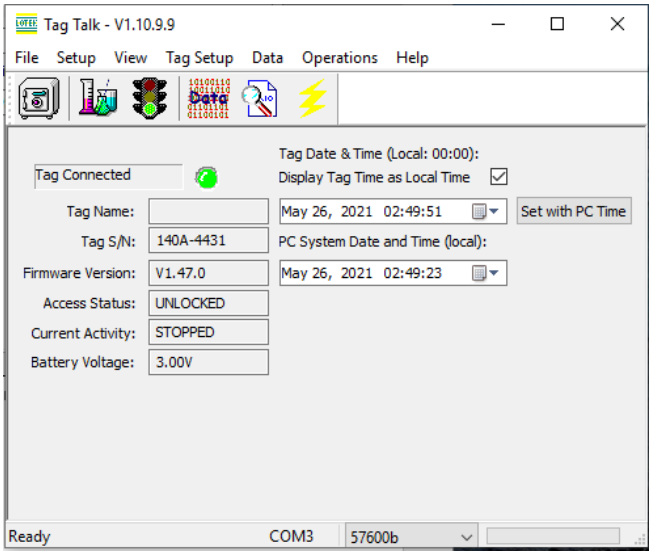
DOWNLOAD

1. Plug SoundTrap data cable into computer first
2. Make sure your computer's clock is in the time zone you want data recorded in (Local vs. UTC).
3. Startup "SoundTrap Host" by OceanIstruments
4. Attach SoundTrap via data port (end of SoundTrap with a single port)
5. Click on the serial number of the SoundTrap
6. Under Tools, set the Save folder location to the Synology
7. Select all data and click Download
    a. Make sure the Decompress option is checked.

4. TDR Setup Download Instructions DASBR

START UP

1. Plug TDR data cable into computer first
2. Make sure your computer's clock is in the time zone you want data recorded in (Local vs. UTC).
3. Startup "Tag Talk" by Lotek
4. Standby mode with no TDR attached.
   a. 

   b. Attach TDR (Red to Red cable; Black to Black cable). Once connection has been made the screen will look like this now.
   c. 

5. Green light is a good connection and Battery Voltage is full at 3V. Do not deploy if voltage is below 2V.
6. Click the "Set with PC Time" button on the right.
7. Click on "Tag Program Editor"
   a. 

8. Select “Get Program from File”. Select “SoundTrap_TDR_Settings.prg”
    a. Make sure the start date is set. Three data points are being collected (temp, pressure, wet/dry state) and memory is maximized.
    b. Select “Send to Tag”
    c. Select “Save” to have the program settings for future reference.
    d. Select “Exit”
9. Click on “Start Logging”
    a. 
    b. It will then turn to Red and you will be ready to go. It will start recording data based on the data you set.

DOWNLOAD

1. Make sure connectors are dry and attach to data cable.
2. Click the stoplight button to make it change from Red to Green.
3. Click on “Get Data”
    a. 

    b. A window will pop up to ask where you want the data saved to. Find an appropriate folder.
    c. It will look like nothing is happening at first. All the other buttons will gray out and then you will see a progress bar move in green on the bottom right hand corner.
    d. Once data processing is done then all the buttons will be active again.
4. Click on “View Log”
    a. 
    b. Select the bin file you just saved (the one without the “o” at the end).
    c. Data will appear in the window.
    d. Use default settings and select “Save All Logs” in the Excel format. It will be csv files in the location you pulled the bin file from.

5. DASBR Deployment and Retrieval Instructions

INTRODUCTION

Drifting Acoustic Spar Buoy Recorders (DASBRs) include a single recording device known as a SoundTrap. Deployment/retrieval occurs at specific locations, and therefore may occur at various times of day or night. This requires that preparation for deployment/retrieval should be considered ~ 1 day prior to the activity.

- **Spar Buoy**. The spar buoys are made of white PVC plastic and have a subsurface recorder (a SoundTrap 4300 4-channel recorder).
- **Satellite Tracker- Iridium**. All DASBRs have an Iridium geo-locator buoy connected to the spar buoy that transmits GPS locations every 2 hours.
- **Bucket**. Contains the backbone of the DASBR (135 m of line and a subsurface float).
- **Anchor**. A 35-45lb anchor is attached to reduce the movement of the array in rough seas.
- **Hydrophones**. All DASBRs have two hydrophones configured as a vertical array with 10-m separation at 150 m depth.
- **Depth/Tilt Sensors**. DASBRs have a depth and tilt sensor (TDR) attached immediately below the lower hydrophone. All SoundTrap recorders have an internal tilt sensor but not a depth sensor.

DEPLOYMENT

Make sure that all personnel involved with deployment (including scientists, deck crew, and officers) have a clear idea of the deployment procedure and their roles. Have a meeting with the bos'n, deck crew, and officers who will be on watch before attempting any deployments. Remember that personnel safety is the highest priority. Equipment can be replaced. Make sure the bridge crew knows **to never back down when the line is in the water**. During deployments, ask for one deck crew to be stationed next to you to relay messages to the bridge. Experience has shown that the safest way to deploy is off the stern while the vessel is moving forward slowly. Resist any suggestion that you deploy mid-ship, explain that there will be loose line in the water that will be sucked into the props. Equipment cannot be dropped or thrown into the water without damage. Lower equipment carefully using lines in addition to the anchor.

- **Meeting**. Meet w/ officers, crew, etc. to discuss protocol for deploying buoy off the stern. Identify the person responsible for deck communications, and ideally an independent person to deploy.
- **Prep Gear on Back Deck**. Ensure that all gear is secured in place (spar buoy, satlink buoy, bucket, array w/ SoundTrap, and anchor. Make sure there are no loops or tangles.
- Double check that SoundTrap is ON (see buoy preparation guide).
- **Dead Slow & Wind at Ship's Beam**. As you approach the deployment site, ask the officers to bring the ship to dead slow and to tell you by radio when they reach 1-2 knot speed. If possible, have the wind at the beam (to help blow the float away from the spar buoy).
- **Anchor Ready**. Have one person hold onto the line w/ the anchor, and lower until the weight is over the water but close to railing level. Use an extra line to loop through the anchor as a leash. They should not lower the buoy into the water until all of the line is paid out.
- **Lower Spar Buoy**. Once the ship is at dead slow, one scientist should lower the DASBR spar buoy into the water using the backbone line. [The DASBR will lie horizontally until the anchor applies tension to the line.] Lower the Satlink buoy **downwind** of the spar buoy so that its line does not tangle with the DASBR.

- **Pay out Line**. Pay out line only as fast as the vessel moves away from the buoy (avoid loose lines in the water that could get sucked into the propellers). A second scientist can lower the anchor and hydrophone array over the side until it is just above the water's surface, but should not lower it into the water until all the line is paid out. Once all the line is paid out, the anchor can be lowered and the array released, but try to not let the recorder splat into the water.
- **Confirm Spar Buoy Stays Upright**. As the anchor sinks, it will help the spar buoy float vertically. Confirm that this happens. This is easier done in daylight, of course.
- **Enter Deployment in PAMGuard**. At any point after the spar buoy has entered the water. Check on the Iridium device to ensure that you are receiving updates on the buoy.

RETRIEVAL

Make sure that all personnel involved with retrieval (including scientists, deck crew, and officers) have a clear idea of the procedure and their roles. Have a meeting with deck crew and officers who will be on watch before attempting any retrieval. Remember that personnel safety is the highest priority. Equipment can be replaced. Wear gloves. During retrievals, ask for one deck crew to be stationed next to you to relay messages to the bridge. You will need to work with the deck crew to establish the best method of grappling for the line between the spar buoys and the orange floats. The best retrieval location may be from a mid-ship station, but extreme care is needed to ensure that the vessel does not drift over the top of the line. Try approaching slowly from an upwind direction (going downwind). Toss the grappling hook and snag the floating line. Ask the vessel to turn broadside to the wind with the buoy on the upwind side of the vessel, so that you will drift away from the buoy.In rough weather, it might not be practical to turn broadside to wind and waves. The alternative is to approach in an upwind direction and to maintain station next to the buoy as it is retrieved. This requires a more skilled vessel operator to avoid the wind catching the bow and pushing the ship over the top of the line being retrieved. If the officer in charge is inexperienced, it may be better to ask the Captain to intervene or just to wait until a more skilled officer is on watch.

- **Ship approaches last known location.** Give bridge last Iridium location so they can position ship to intercept buoy.
- Prepare ahead and have two scientists for every retrieval.
- **Aid in location of buoy using binoculars.** The buoys can be located easily using big-eyes during daylight hours. Use the ship's spotlight to illuminate reflective tape during night time pickups and flashing lights on Satlink Iridium buoy will be activated.
- Grapple for the floating line.
- **Retrieve the grappling hook, Satlink buoy, and line**. Pulling by hand with gloves.
- **Bring spar buoy aboard.** Lift over rail and set on deck.
- **Retrieve 1/2" line, then hydrophone array.** Hold hydrophone array away from vessel lip as you are retrieving it. Avoid bumping the hydrophone elements against the ship. Lift the recorders gently over the rail.
- Retrieve anchor.
- **Restack in bucket after retrieval.**

Wash, clean and dry all equipment. Remove any marine fouling and rinse everything with fresh water. Buckets have drain holes in the bottom, so you can fill them with fresh water and they will drain. Stack line on a dry deck in the sun to dry. Return recorders to their storage case.

6. DASBR Deployment/Retrieval Instructions for Ship's officers

INTRODUCTION

Deployment occurs at predetermined locations and therefore may occur at various times of day or night. Recoveries will occur when nearest the DASBRs current location or when convenient, also possibly at day or night. This requires that preparation for deployment/retrieval should be considered ~ 1 day prior to the activity.

The DASBR components:

- **Spar Buoy**. The spar buoys are made of white PVC plastic and have a line ~160m in length with a subsurface recorder (a SoundTrap 4300 4-channel recorder) mounted at 150m depth.
- **Orange float.** Orange Satlink buoy connected to the spar buoy with floating polypro line to facilitate retrieval.
- **Buoyline.** ~140m of line connecting the spar buoy and the sub-surface float.
- **Anchor**. A 35-45lb anchor is attached at the deep end of the buoy to reduce the movement of the array in rough seas.
- **Hydrophones and Soundtrap**. All DASBRs have a Soundtrap 4300 and two hydrophones configured as a vertical array with 10-m separation at 150 m depth.

DEPLOYMENT

Make sure that all personnel involved with deployment (including scientists, deck crew, and officers) have a clear idea of the deployment procedure and their roles. Meet with the bos'n, deck crew, and officers who will be on watch before attempting initial deployment. Remember that personnel safety is the highest priority; equipment can be replaced. The bridge watch should know **to never back down once deployment and recovery operations are underway.**

Personnel required:
2-3 Science party to deploy gear.
1 Ship's crew to act as a safety watch and relay communications to the Bridge.

Operation:
Experience has shown that the safest way to deploy is off the stern while the vessel is moving forward slowly (1-2kts). Assign specific roles to each scientist participating in the operation (spar buoy, anchor, line, etc.)

- **Approach the deployment location and slow to 1-2 kts with the wind on the ship's beam.** The OOD should relay to the deck when the ship's speed is <2kts and they are ready for deployment. The deck crew assisting with the operation will alert the Bridge that the DASBR deployment is commencing.
- **Stage weights**. Using the DASBR line, lower the weight over the stern until it is just above water level.
- **Deploy Spar Buoy**. Lower the DASBR spar buoy into the water using the attached line. The spar buoy will lie horizontally on the surface until the anchor applies tension to the line.
- **Deploy orange float**. Lower Satlink buoy **downwind** of the spar buoy so that its line does not tangle with the spar buoy line.
- **Pay out Line**. One scientist pay out line only as fast as the vessel moves away from the buoy (avoid loose line in the water that could get sucked into the propellers or create a tangle). A second scientist can assist with deployment of the hydrophone array and Soundtrap as needed once all buoy line is paid out.
- **Release weight.** Once all line is in the water, release the weight avoiding any parts hitting the ship.
- **Confirm Spar Buoy Turns Upright**. As the anchor sinks, it will help the spar buoy float vertically. Confirm that this happens.
- **Enter Deployment in PAMGuard and check Iridium**. At any point after the spar buoy has entered the water. Check on the Iridium device to ensure that position updates are being received.

RETRIEVAL

Make sure that all personnel involved with retrieval (including scientists, deck crew, and officers) have a clear idea of the procedure and their roles. Meet with deck crew and officers who will be on watch before attempting any retrieval. Remember that personnel safety is the highest priority; equipment can be replaced.

Personnel required:

1-2 Science party to move gear from the longline pit to the aft deck 2-3
Ship's crew to recover gear using the pot hauler and by-hand

Operation:

Experience has shown that retrieval is best accomplished on *Sette* from the forward station in the longline pit. The retrieval operation is primarily conducted by ship's crew. Extreme care is needed to ensure that the vessel does not drift over the top of the line. Try approaching slowly from an upwind direction. Scientists should be ready in the longline pit to assist with disassembly of the DASBR and movement of parts to the aft deck.

- **Update Iridium transmit frequency and provide locations to the OOD for DASBR tracking.** The iridium should be updated to report every 30 minutes and buoy flashers turned on for the 2-3 hours prior to retrieval. Each position should be relayed to the OOD.
- **(At night).** Request assistance of observers to watch for the DASBR from the flying bridge. Use

- the ship's spotlights to locate the DASBR. DASBRs are often seen up to ~1mi from the ship at night due to reflections from the tape on the spar buoy. Flashing lights should be visible from >1mi.
- **Approach with the floating DASBR along the port side.** When the DASBR is abeam of the forward longline pit station, toss the grappling to snag the floating line between the spar buoy and orange float.
- **Grapple for the floating line.** Ship's crew will throw the grappling hook between the spar buoy and Satlink buoy to bring the DASBR alongside.
- **Bring spar buoy aboard.** Lift over rail and set on deck. Science party may disassemble the DASBR float from the buoy line.
- **Retrieve buoy line with the pot hauler.** Place the spar buoy line in the pot hauling winch to retrieve the bulk of the buoy. A small orange float above the hydrophones notes the end of the static line. At the float, retrieval must commence by hand to avoid damaging equipment.
- **Carefully retrieve sensor package.** Hold hydrophone array away from vessel as it is being retrieved to avoid damaging the sensitive electronics. Lift the recorders gently over the rail. Lift the anchor over the rail.
- **Wash, clean and dry all equipment.** Remove any marine fouling and rinse everything with fresh water.

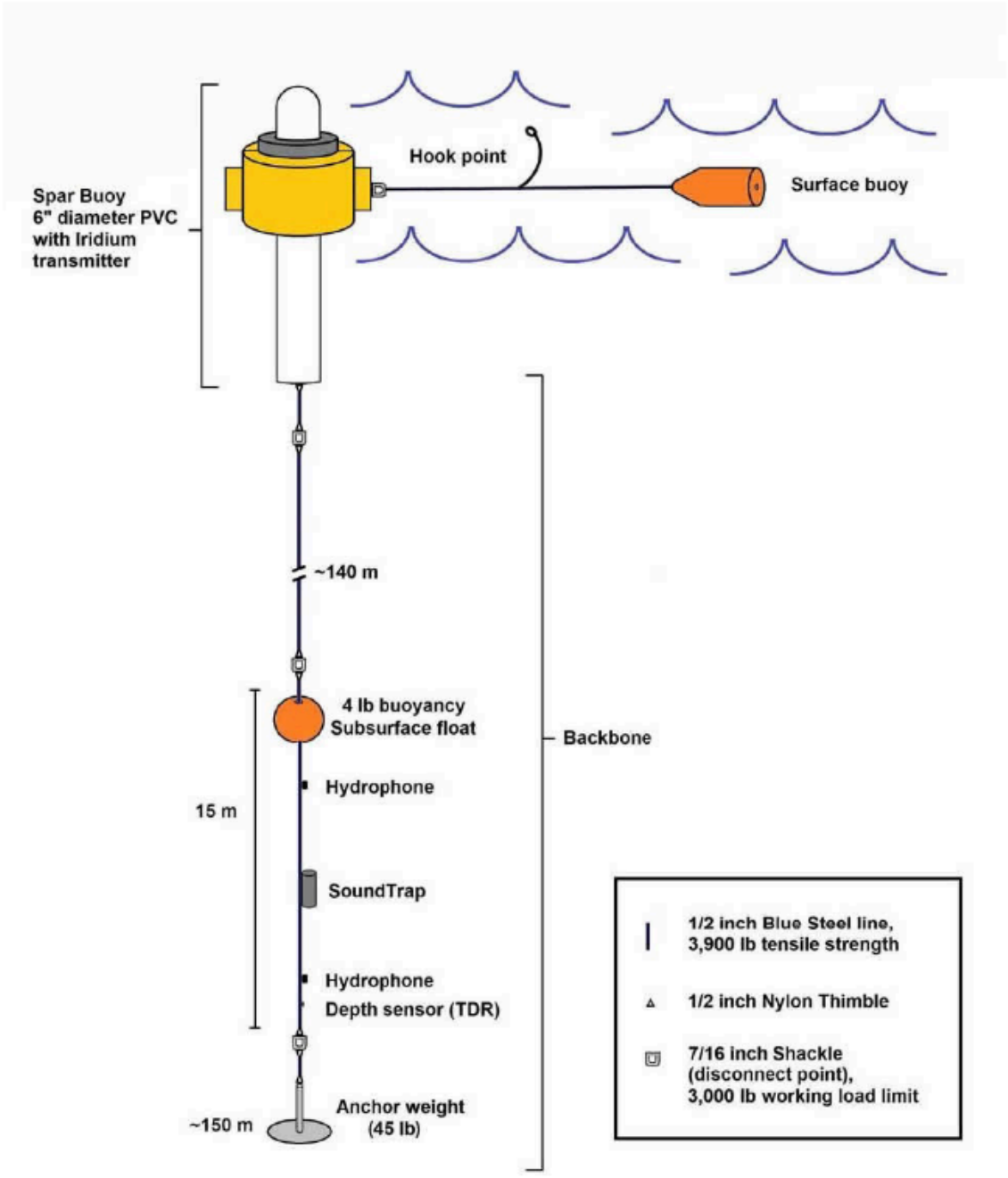


Figure 1. Diagram of the 6" DASBR unit.

7. Post-Cruise Maintenance and Storage

Proper maintenance of your DASBR unit will help it stay in good condition and lower the risk of leaks during future deployments.

1. After the cruise, wash down the entire unit including the Backbone and allow it to dry.
2. Once dry, open the cap to remove the Spot transmitters.
3. To open the main section of the DASBR, you may have to put the DASBR in a vice and use two strap wrenches (make sure the vice is not so tight as to crack the DASBR).
4. Once open, inspect and clean all pipe fittings and threads.
5. Reassemble the head unit and attach it back onto the main body.
6. For storage, the fittings should not be fully tightened so that the O-ring and threadings do not get damaged or compressed.
7. Disconnect the Backbone and securely store the Spar Buoy.
8. After rinsing the Backbone, inspect its components (hardware, line, etc.) for wear or damage.
9. Once completely dry, store in the 20 gallon barrel, inside a separate tote.