

Procedure Title:

BEP Instrument Integration Testing Procedures

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Test Description

Communications to each instrument is established through PuTTY, a client program that allows remote sessions to be established with the low power junction box (LJ01). PuTTY is used to establish both a data and control session for each instrument, and allows each data session to be logged. TightVNC, a client program, is used to open and close the LP01 ports.

Test Safety

All electrical equipment shall be handled and operated by qualified personnel in a manner consistent with the best safety practices.

Test equipment

#	Equipment
1	Lower Power Junction Box (LJ01)
2	MHDXL to MHDXL green cable
3	MHDXL Cable Breakout Test Box (in Orange Pelican case)
4	Secondary Node Pressure Housing Assembly Configuration Sheet
5	Netgear Port Switch
6	48 V Power Supply
7	Laptop for Management port to run VNC for LPJ01
8	Laptop for Data port to run PuTTY for Digi control to instruments
9	DE9 to Ethernet Switch test cable
10	Instruments cable to LPJ01
11	Instrument to be tested

Test set up

- Connect Junction to Breakout box
- Connect Breakout box to power supply, set power supply to 48 Volts
- Connect Breakout box to Network Netgear switch to Port **8** (see procedure **XXXXXX** for setting up Netgear switch if this has not been done previously, a Netgear switch is designated for each LPJ01).
- Connect Computer 1 (controls the LPJ01 ports) to Netgear switch Port **1** labeled "Management" (714 or 712 port)
- Connect Computer 2 (controls Digi and instruments communications) to Netgear Switch Port **2** labeled "Data" (3314 or 3312 port)
- Connect Instrument to appropriate Junction port

Place LF diagram/photos here of connections (in Linda's RSN testing document 3315-00015, she has original drawing somewhere that can be altered to exclude the surge testing part of set up)

Set up network connection

- Computer 1 (VNC client control)
 - Right click on **open network sharing center** icon in lower right corner
 - Click on **change adapter settings** on left panel
 - Right click Ethernet icon, select Properties from the pull down menu, scroll in menu down to **IPv4 (TCP/IPv4)**, select this item (should be highlighted), click Properties button
 - Enter the addresses below:
 - IP **10.7.14.99**
 - Subnet **255.255.255.0**
 - Gateway **10.7.14.50**
 - Click OK button then close that window
- Computer 2 (Digi client control)
 - Right click on **open network sharing center** icon in lower right corner
 - Click on **change adapter settings** on left panel
 - Right click Ethernet icon, select Properties from the pull down menu, scroll in menu down to **IPv4 (TCP/IPv4)**, select this item (should be highlighted), click Properties button
 - Enter the addresses below:
 - IP **10.33.14.99**
 - Subnet **255.255.255.0**
 - Gateway **10.33.14.50**
 - Click OK button then close that window
 - When testing the hydrophone the Computer 2 IP addresses will need to be changed to:
 - IP **10.156.4.99**
 - Subnet **255.255.255.0**
 - Gateway (leave blank)

Set up PuTTY Port Configuration (or have this as separate procedure document too?)

- Open PuTTY on Computer 2
- Configure PuTTY port settings for each instrument using the Secondary Node Pressure Housing Assembly Configuration Sheet specific for each LJ01 box.
- Name Port: Example “LJ01D_Ch1J5_CTRL”, for LP01D Channel 1 Port 5, in this case the ADCP is on Ch1 (controlled by TightVNC client) and physically connected to LP01 Port 5.
- Configure Digi Control PuTTY Port:
 - Enter Control IP address and Port ID # (example IP “10.33.14.5” and port ID “2102” for Digi Control; note that LP01-**J5** corresponds to end of IP address 10.33.14.**5**)
 - Enter Digi Control Port name, example: **LJ01D_Ch1J5_CTRL** (port for ADCP Digi control).
 - On left under Window select Behavior and label the window e.g.: “**10.33.14.5 ADCP Control**” (this allows for multiple windows to be open and know which is which)
 - Other port settings should be default
 - Go back to session and press save
- Configure Instrument Data PuTTY Port:
 - Enter Instrument Data Port IP address and Port ID # (example IP “10.33.14.5” and port ID “2101” for Instrument Data)
 - Enter Instrument Data name, example note: **LJ01D_Ch1J5_DATA** (ADCP)
 - Select Logging under Session, make sure that all session output is selected, select browse and name your log file and choose where you want to save it (log folder), click save (logging is only for data instrument ports)

- Select Window/Behavior and name Window title eg: “10.33.14.5 ADCP Data”
- Select Terminal check for Local Echo should be Force OFF, Local Editing is in Force Off **(troubleshooting alert: has caused problems before)**
- If the instrument requires LF & CR check these as well (example CTD-Dosta)
- Remaining settings should be default
- Go back to session and press save
- Continue to define the remaining PuTTY control and data ports for each instrument

Establishing Communications Between Instrument and LJ01 Box (this example LJ01D)

- On Computer 1 go to TightVNC open remote host: **10.7.14.51:1** then select connect, enter password “pass4root” (see Secondary Node Pressure Housing Assembly Configuration Sheet).
- Turn off all unused channels to decrease LJ01 heat, the channels should appear greyed out in the display windows when turned off, remember to click on the IIB2 tab as well and turn off all channels (1-7)
- In the channel you are using replace the Over Current Detection value in the left hand window with the value FF, then press the Set button
- Select Channel ON then Port ON, the window should indicate the correct voltage and current level draw
- Minimize the TightVCN window
- Open PuTTY on computer 2 and load and open the control and data ports for the instrument to be tested see **table XX** to locate testing procedures for each instrument:

Insert table with procedure #s for each instrument unless we decide to keep it as one document

TESTING AND CONFIGURING INSTRUMENTS SUMMARY

Shelf BEP Instrument Testing Set Up and Commands											
Port #	Port ID	Instrument	Instrument type	Firmware Version	Nominal Voltage [VDC]	Baud rate	Junction serial comms Digi = RS232	Digi IP Address	Instrument programs	Test Commands via LP-J	
J5	IP1	ADCPT-B	TRDI Workhorse	50.4	48	9600	Digi	10.33.14.5	Bbtalk	Break 500 (sent to Digi Control for wakeup) CS (start), break, CZ (stop)	
J6	IP2	CTDBP-N	Sea Bird 16.0	2.5	24	9600	Digi	10.33.14.6	SeaTermV2	DS (check status) Dcal (verify setup) StartNow (start) Stop	
J7	IP3	VEL3D-C	Nortek Vector	V3.36	12	19200	Digi	10.33.14.7	Vector Nortek	(break command)@@@@@ K1W%!Q ST (start) MC (stop)	
J8	IP4	OPTAA-D	Wet labs ACS	1.11	12	115200	Digi	10.33.14.8	Hypterm and Wetview	(will automatically start in sampling, does not take commands)	
J9	IP5	PC02W-B	Sunburst SAMI-CO2	54	12	57600	Digi	10.33.14.9	SAMI-Client1.28	FSA (stop 1 Hz status updates) R (sample) R1 (run pump) F5B (start 1 Hz status updates)	
J10	IP6	PHSEN-D	Sunburst SAMI-PH	54	12	57600	Digi	10.33.14.10	SAMI-Client1.28	FSA (stop 1 Hz status updates) R (sample) F5B (start 1 Hz status updates)	
J11	IP7	HYDBB-B	Ocean Sonics	1.7.00	24	9600	Ethernet (no Digi)	10.156.4.109	Marco/Lucy	Use Marco to change IP address and use Lucy to connect/start/stop data collection	

Slope BEP Instrument Testing Set Up and Commands											
Port #	Port ID	Instrument	Instrument type	Firmware Version	Nominal Voltage [VDC]	Baud rate	Junction serial comms Digi = RS232	Digi IP Address	Instrument programs	Test Commands via LP-J	
J5	IP1	ADCPT-B	TRDI Workhorse	50.4	48	9600	Digi	10.33.12.5	Bbtalk	Break 500 (sent to Digi Control for wakeup) CS (start), break, CZ (stop)	
J6	IP2	CTDBP-N	Sea Bird 16.0	2.5	24	9600	Digi	10.33.12.6	SeaTermV2	DS (check status) Dcal (verify setup) StartNow (start) Stop	
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OOI General LPJ Digi commands for instrument communications

```
OOI - Digi Command Interface
help
baud 9600/19200/38400/57600/115200
timestamping 0/1/2 (0=off, 1=ASCII, 2=binary)
tinfo - print clock sync info
break duration (duration in ms 100-4000)
cinfo - print data connection info
stopbits 1/2
numbits 5/6/7/8
parity 0/1/2 (0=off,1=odd,2=even)
flowControl 0/1/2 (0=off,1=hardware,2=software)
setrts 0/1 (only valid when NOT using hardware flow control)
getmodem
saveconfig
getver
gettime
replicate 0/1/2/3 (0=off, 1=hex, 2=ascii, 3=both)
power 0/1 (0=off, 1=on) Valid on PIP Only
```

Digi Time Stamp Procedures

- In PuTTY Control OOI window enter “time 1 or 2” depending on desired format, see table XXX below for a summary of which instruments need a digi time stamp and format.

Table XXX – Instrument Time stamping summary here

Instrument specific set up procedures:

ADCP (Port 5)

- ADCP can be programmed via the instrument test cable, power supply and a hyperterminal program or directly through the LJ01.
- Reference **table xxx** for settings of the specific ADCP.
- Check compass calibration to determine if new calibration needs to be conducted.

**Need to include table of settings/ commands from Steve for each ADCP here ,
Compass Calibration procedures here or separate form?**

Connecting ADCP to LJ01:

- Connect Instrument to designated LJ01 port using appropriate cable.
- On Computer 1 open TightVNC turn off all unused channels, remember to change “Over Current Detection value” to FF as described previously, open channel and port 1.
- On Computer 2 Load ADCP PuTTY ports, select LJ01D_Ch1J5_CTRL, once loaded check settings are set as follows:
 - Connection/Serial to check settings
 - Terminal, check implicit CR in every LF and LF in every CR.
- Open control port, should have OOI flag appear
 - Change break length by typing “break 500”, then “saveconfig” to save settings; the ADCP needs a longer break period for initial communications.
- Open data port, test communications by typing in **CS** for start and **CZ** for sleep, note need to enter long break for these commands to work

CTDBP-N (Port 6)

The CTDBP can be programmed using SeaTermV2 software or through the LJ01. Need test cable, original pump and comms cable, computer and power supply if programming via SeaTermV2.

Connecting CTDBP to LJ01:

- Connect CTD Comms cable to CTD port J3 and pump to LP-J port 6 using appropriate Y-cable, connect Dosta using to CTD using secondary Y-cable to CTD ports J1 and J5.
- Choose TightVNC Channel 2, turn off all other channels, remember to change “Over Current Detection value” to FF as described previously, open channel, open port.
- Select and load appropriate control port from PuTTY, LJ01D_Ch2J6_CTRL, open.
- Select and load appropriate data port from PuTTY, LJ01D_Ch2J6_DATA, open.
- Use following commands for instrument settings (note that settings can also be done prior to LP-J connection using SeaTerm software).
- Enter settings and testing commands:
 - >Echo=y //Turns on character echo
 - >Outputformat=3 //Changes output format so we can read it during set up
 - >getCD // To get display configuration data type
 - >navg=2 // Changes scan setting (Scans to average should be=2 because of the quartz pressure sensor requires at least 2 samples to integrate)

```

>pumpdelay=5 //Sets pump delay to 5 sec.
>outputsal=n //Sets salinity to no output
>mincondfreq=2500 //Sets salinity to 2500 for in lab FW testing
>ignoreswitch=y // Turns magnetic switch off
>getHD //To get hardware data information
>ds // To get instrument information and save settings
>autorun=y //Sets to autorun, turns on whenever power is applied
*Note* If this step is skipped, then the CTD will not run when powered up, do
not enter stop or other commands after this command has been entered

```

Example output:

20.5848, 0.00002, 0.102, 1.6800, 3.0631, 266.88

Temp, cond, pressure, (analog 1;voltage=0), (analog 2; voltage=1), optaa oxygen (uM)

Where voltage=0, analog signal 1 for dosta phase and voltage=1, analog signal 2 is dosta temp

```

>ts // Takes sample
>minconfreq=3200 // Resets conductivity to 3200 so pump will not operate unless in SW

```

- Add DOSTA and check comms through CTD:

```

>optode=y
>optode=y
>volt0=y //turns on voltage channel for additional optode information
>volt0=y
>volt1=y
>volt1=y
>sendoptode=setpasskey(1)
>sendoptode=set interval(1)
>getall //to check settings
>sendoptode=save

```

- After optode has been added change data format:

```

>outputformat=0 //Puts CTD data format into Hex

```

```

S>ds
SBE 19plus V 2.5.2 SERIAL NO. 7248 02 Jun 2014 08:17:04
vbatt = 22.9, vlith = 8.5, ioper = 51.6 ma, ipump = 114.4 ma,
iext01 = 0.3 ma, iserial = 26.2 ma
status = not logging
number of scans to average = 2
samples = 5112, free = 3650340, casts = 5
mode = profile, minimum cond freq = 3200, pump delay = 5 sec
autorun = yes, ignore magnetic switch = yes
battery type = alkaline, battery cutoff = 7.5 volts
pressure sensor = quartz with temp comp, range = 200.0
SBE 38 = no, WETLABS = no, OPTODE = yes, SBE63 = no, Gas Tension Device = no
Ext Volt 0 = yes, Ext Volt 1 = yes
Ext Volt 2 = no, Ext Volt 3 = no
Ext Volt 4 = no, Ext Volt 5 = no
echo characters = yes
output format = raw HEX

```

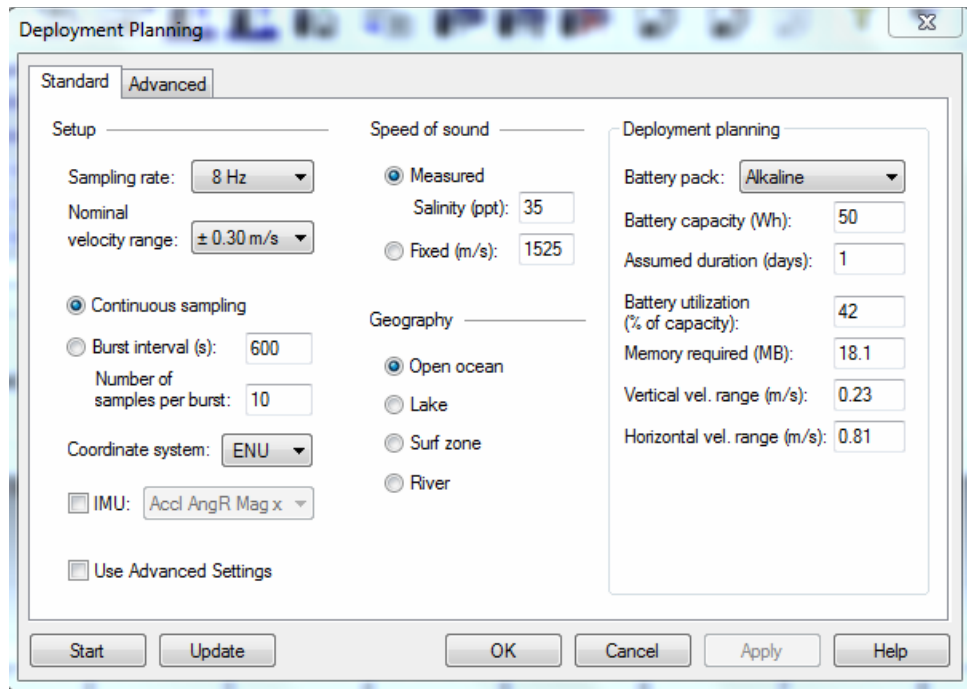
DOSTA Set up w/o CTD

- Use DOSTA test cable to connect to computer and power supply
- Use hyperterminal program like terraterm or PuTTY
 - Set Port to baudrate: 9600 bps
 - Data: 8 bit
 - Parity: None
 - Stop: 1 bit
 - Flow: xon/xoff
 - Set terminal to send and receive "CR+LF" and turn on echo commands
- Commands for set up:

>set passkey(1)	//sets the protection level for the following commands
>set interval(1)	//sets interval
>set mode(analog output)	//sets mode to analog
>set analog output(calphase)	//sets analog output 1 to phase
>set enable text(no)	//does not display descriptive text
>set enable airsaturation(no)	// does not display airsaturation
>set enable rawdata(no)	//does not display rawdata
>set enable temperature(no)	//does not display temperature
>save	//saves changes

VEL3D (Port 7)

Use test cable to connect vector to computer and power supply. Open vector software, go to deployment (Baud rate 19200), select use existing deployment settings, set to the below settings and then press **Apply**.



- Calibration vector's compass, go to online tab, select compass calibration, hang vector and rotate evenly 360 degrees and save.



Connecting Vector to LJ01:

- Connect Vector to LPJ port 7 with appropriate cable.
- Choose TightVNC Channel 3, turn off all other channels, remember to change "Over Current Detection value" to FF as described previously, open channel, open port.
- Select and load appropriate control port from PuTTY, LJ01D_Ch3J7_CTRL, open.
- Set Baud rate in OOI Digi Control window to 19200


```
baud
Current Baud Rate = 9600
baud 19200
Set New Baud Rate = 19200
saveconfig
Configuration Saved
█
```

- Select and load appropriate data port from PuTTY, LJ01D_Ch3J7_DATA, open.
- Test communication and control by sending break command @@@@ K1W%!Q then ST for start, wait for confirmation then enter MC to stop

OPTAA (Port 8)

Add calibration and setting info here

Connecting OPTAA to LJ01:

- Connect ACS to LJ01 port 8 with appropriate cable.
- Choose TightVNC Channel 4, turn off all other channels, remember to change “Over Current Detection value” to FF as described previously, open channel, open port.
- Select and load appropriate control port from PuTTY, LJ01D_Ch4J8_CTRL, open.
- Select and load appropriate data port from PuTTY, LJ01D_Ch4J8_DATA, open.
- Should start sampling, verify that pump is operational, need to have tubing to apply enough resistance, otherwise pump gets decoupled.

PCO2 (Port 9)

- Connect PHSEN, computer, power supply with test cable and connect using SAMI client software (Tough book, used port on right side, second to back, which is COM 5)
- Go to Settings tab
- Select GMT time in start/stop panel
- Select further date/time out from current date for start time (~4 yrs.)
- Go to SAMI/AFT panel and select SAMI/AFT CO2 (A+) from scroll menu
- Enter 60 for Sample interval (mins) – note that reagent lasts for ~416 days at this setting
- Enter 84 for Cycles Between Blanks
- Go to Control page and select Launch (may need to erase any existing data first)

PCO2 pump settings:

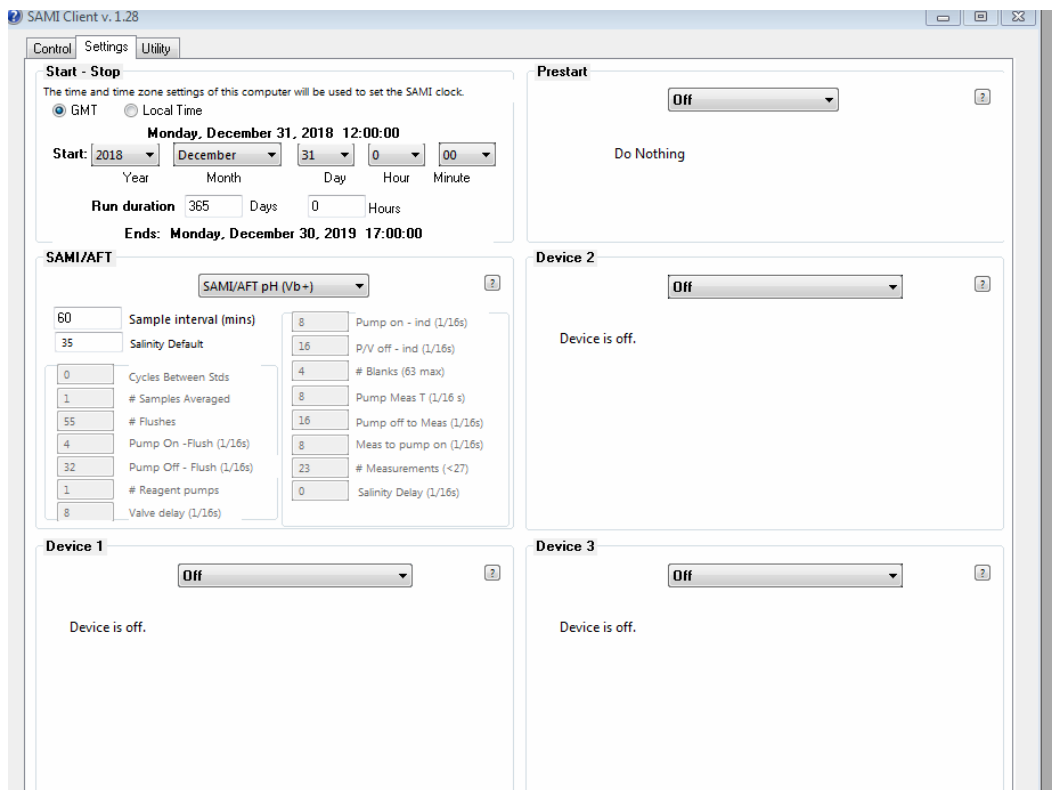
- In Device 1 panel Select Power Out
- Deselect “After SAMI/AFT”
- Enter 10 for interval minutes
- Enter 10 for Power on interval seconds
- Select use 12V power under power select in device 1 panel

Connecting PCO2 to LJ01:

- Connect PCO2 to LJ01 port 9 using appropriate cable.
- Choose TightVNC Channel 5, turn off all other channels, remember to change “Over Current Detection value” to FF as described previously, open channel, open port.
- Select and load appropriate control port from PuTTY, LJ01D_Ch5J9_CTRL, open.
- In PuTTY digi window:
 - >Change baud rate to 57600: **baud 57600**
 - >Need to set the Request to send line: **Flowcontrol=0**
 - >**Saveconfig**
- Select and load appropriate data port from PuTTY, LJ01D_Ch5J9_DATA, open.
- Test control by entering on PuTTY:
 - >**F5A** which will turn off the one hertz status updates
 - >**L** which will get the current configuration in hex format
 - >**B** which will get the current battery voltage in hex format
 - >**F5B** which will turn on the one hertz status updates

PHSEN (Port 10)

- Connect PHSEN, computer, power supply with test cable and connect using SAMI client software (Tough book, used port on right side, second to back, which is COM 5)
- Go to Settings tab
- Select GMT time in start/stop panel
- Select further date/time out from current date for start time (~4 yrs.)
- Go to SAMI/AFT panel and select SAMI/AFT CO2 (A+) from scroll menu
- Enter 60 for Sample interval (mins) – note that reagent lasts for ~416 days at this setting
- Enter 35 for Salinity
- Go to Control page and select Launch (may need to erase any existing data first)



Connecting PHSEN to LJ01:

- Connect PHSEN to LJ01 port 9 using appropriate cable.
- Choose TightVNC Channel 6, turn off all other channels, remember to change “Over Current Detection value” to FF as described previously, open channel, open port.
- Select and load appropriate control port from PuTTY, LJ01D_Ch6J10_CTRL, open.
- In PuTTY digi window:
 - Change baud rate to 57600: **baud 57600**
 - Need to set the Request to send line: **Flowcontrol=0**
 - **Saveconfig**
- Select and load appropriate data port from PuTTY, LJ01D_Ch6J10_DATA, open.
- Test control by entering on PuTTY:
 - **F5A** which will turn off the one hertz status updates
 - **L** which will get the current configuration in hex format
 - **B** which will get the current battery voltage in hex format
 - **F5B** which will turn on the one hertz status updates

HYDBB (Port 11)

- Use test cable and connect directly to computer and power supply
- Open Marco, search for network devices, should find it, change address, select properties enter:
 - IP **10.156.4.99**
 - Subnet 255.255.255.0
 - Gateway leave blank
- Select Apply, then search network for device again, should find it, and be green

- Open Lucy select enquire, set connection type to Ethernet, enter IP address and select manual connect, then start up
- Stop operation

Connect HYDBB to LJ01:

- Connect hydrophone to LJ01 port 11 using appropriate cable.
- Choose TightVNC Channel 7, turn off all other channels, remember to change “Over Current Detection value” to FF as described previously, open channel, open port.
- Select and load appropriate control port from PuTTY, LJ01D_Ch7J11_CTRL, open.
- Select and load appropriate data port from PuTTY, LJ01D_Ch7J11_DATA, open.