

Clearwater Instrumentation, Inc.
NetSensor Technical Manual

Clearwater Instrumentation, Inc.
22 September 2000

Table of Contents

1	Technical Description	1
2	Equipment Installation.....	1
2.1	DeckMate Installation	1
2.2	NetSensor Installation.....	1
3	NetSensor and DeckMate Developer's Kit.....	1
3.1	What is included in the NetSensor Developer's Kit.....	1
3.2	What is required to operate the NetSensor Developer's Kit.....	1
3.3	Testing the NetSensor.....	1
3.4	Running NetSensor through DeckMate	2
4	DeckMate Command Structure.....	4
5	NetSensor Format	6
	Table 1 NetSensor Data Format	1
	Table 2 NetSensor Sample Data	2
	Table 3 Reduction of Sample NetSensor Data	4

1 Technical Description

NetSensor, a FleetLink instrument, is a temperature profiling device that is intended for installation on the head rope of so that temperature profiles can be obtained as the net descends, while the trawl is conducted, and as the net is retrieved. DeckMate the companion module located on the wheelhouse of the fishing vessel automatically retrieves via a high frequency radio link NetSensor's temperature and depth information. DeckMate stores this information, which it transmits to the FleetLink wheelhouse computer upon its command.

2 Equipment Installation

2.1 DeckMate Installation

2.2 NetSensor Installation

3 NetSensor and DeckMate Developer's Kit

3.1 What is included in the NetSensor Developer's Kit

- 1 – NetSensor
- 1 – NetSensor pressure-temperature probe
- 1 – DeckMate
- 1 – Level converter attached to NetSensor

3.2 What is required to operate the NetSensor Developer's Kit

- 2 – 9 volt DC power supplies (these may be batteries). You must use two separate supplies (see comments below about radio interference).
- 1 – DB9 connector cable (two is you wish to monitor both componenets simultaneously).
- 1 – recording device with RS-232 terminal program (e.g., a laptop running HyperTerminal). A second set of DB9 cables and second terminal device is required if you wish to log both the NetSensor and DeckMate simultaneously

3.3 Testing the NetSensor

1. Connect NetSensor to 9 volt DC supply. **DO NOT POWER UP AT THIS TIME.**
2. Connect the pressure-temperature probe to J13.
3. Connect NetSensor RS232 J2 (DB9) to serial input of terminal device. Configure serial device to 19200 8-N-1.
4. Power up NetSensor. You should observe this input on the screen of your terminal device that indicates that the radio is activated:

Testing Pressure

CurrentScaledPressure 985 Temp = 29.63

Checking for command

Testing Pressure

CurrentScaledPressure 982 Temp = 29.63

Checking for command

5. Remove the jumper from pins 3 and 4 of J9 you will notice that NetSensor now is in debug mode and the radio is turned off. This mode is used to save battery power when NetSensor is being powered by a battery:

Testing Pressure

CurrentScaledPressure 985 Temp = 29.63

Testing Pressure

CurrentScaledPressure 982 Temp = 29.63

6. Replace the jumper onto pins 3 and 4 of J9 and turn off the power unless you will be testing the combined system of NetSensor and DeckMate.

3.4 Running NetSensor through DeckMate

General Comments: although the transmitters handling communication between NetSensor and DeckMate are not very powerful, their radios are very sensitive. NetSensor and DeckMate must be placed a sufficient distance apart so that communications are not confused by reflected signals (multi-path effects). You probably will need to experiment a little to get a configuration that works for your set up.

1. Connect NetSensor to 9 volt DC power supply; this may be a battery. **DO NOT POWER UP AT THIS TIME.**
2. Check NetSensor to ensure that the jumper on pins 3 and 4 of J9 is in place; otherwise NetSensor radio will be turned off.
3. Connect DeckMate to a 9 volt DC power supply; this may be a battery. **DO NOT POWER UP AT THIS TIME.**
4. Connect DeckMate to RS232 input of terminal device: 9600 8-N-1.
5. Power up DeckMate which responds:

Ready !!!

6. Try another command:

#STA01C

AAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAA

7. Power up the NetSensor.
8. Test the DeckMate to NetSensor connection with the NetSensor Status Check command:

#STS01C

Status report from Netsensor is good.

Current Pressure 981 Temp = 30.52 Dive Number 0

Or, if there is no communication between the two units:

No response from radio Dive Number 0

9. Try another sending another command to the NetSensor that instructs it to take 60 samples at the rate of 1/2 seconds. NetSensor activity can be monitored on a terminal device:

#STT01C

Status report from Netsensor is good.

Current Pressure 980 Temp = 30.53 Dive Number 1

[Or "No response from radio Dive Number 0" if there is no communication between the units.]

After two minutes have passed, query the NetSensor if it has new data:

#STN01C [Y = yes; N = no]

If NetSensor has new data, retrieve the data with the data retrieval command (obtain format information from NetSensor Format Document:

#STP01C

255,clearwater,1

3,60,2,0,60,0,2,160

30.50,980

.

[This goes on until 60 pairs have been received.]

.

30.43,983

0,0

44917

10. To obtain 2 minutes of real pressure and temperature data send the "T" command:

#STT01C

Status report from Netsensor is good.

Current Pressure 983 Temp = 30.12 Dive Number 6

{If communications have not been established: No response from radio
Dive Number [N]}

After two minutes query the DeckMate whether new data has been received from NetSensor:

#STN01C [Y = yes; N = no]

If the answer is yes, retrieve the data:

#STP01C
255,clearwater,1
3,60,2,0,60,0,2,160
30.50,980

[This goes on until 60 pairs have been received.]

30.43,983
0,0
44917

4 DeckMate Command Structure

DeckMate will respond to commands of the following configuration:

#ST[X]01C, where [X] is replaced by one of the parameters described below. To correct a typographical error, type several carriage returns (at least 6).

- **S**, status check of NetSensor and DeckMate:

#STS01C

Requesting Data from NetsensorStatus is good.

Current Pressure 2566 Dive Number 3 Temp = 30.38

- **D**, toggle debug mode on, which gives more verbose comments including data packet information, and causes data from “2 minute sample” command to be downloaded automatically (If data do not appear after two minutes send the “New” command to see if data have arrived, the send the “P” command to retrieve the data.) Archive bit is not reset.

#STD01C

- **d**, toggle debug mode off, which stops reporting verbose information.

#STd01C

- **A**, prints many “A’s.” Debugging command

#STA01C
AAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAA
3AAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAA[,,,,,,etc.]

- **L**, returns 1800 data pairs from NetSensor memory. Testing command (example with debug active):

```
#STL01C  
segment1 1800,segment2 0,segment3 0, age of the data 132  
dive number 1, number of packets 57
```

```
Packet 1 !  
29.28,2714  
29.30,2706  
29.31,2790  
29.31,2781  
29.32,2775
```

```
Packet 2 !  
28.77,2567  
28.74,2565  
28.73,2563  
28.72,2566  
28.73,2565  
.....etc
```

```
Packet 57 !  
24.94,213  
24.94,213  
24.94,213  
24.94,212  
24.94,214
```

```
12345,clearwater  
3,1800,2,0,60,0,2,132  
29.28,2714  
29.30,2706  
29.31,2790  
29.31,2781  
29.32,2775  
29.33,2796  
29.33,2777  
29.31,2772  
29.29,2768  
29.27,2764  
29.24,2761  
.....etc
```

```
40.95,4095  
40.95,4095  
40.95,4095  
40.95,4095  
40.95,4095  
40.95,4095
```

40.95,4095
0,0
55471

- **P** "last dive", instructs DeckMate to return last dive data. This command does not clear NetSensor memory. This command may be sent multiple times

#STP01C

[Output like *#STL01C*, except with data from last dive.

- **T**, instructs NetSensor to take 2 minutes of real data; data are retrieved over the serial interface by sending the "last dive" command.

#STT01C

- **M**, instructs NetSensor to send 100 data pairs from NetSensor memory. These are not real data, but only what is in memory. These data may contain errors if they are from unused memory.

#STM01C

5 NetSensor Format

Table 1 explains NetSensor data format. Table 2 is real data from NetSensor. Table 3 is evaluated data from the Table 2 sample data.

Table 1 NetSensor Data Format

NetSensor Cast Temperature Data Format		
Parameter	Bytes	Notes
Note		All data on a line are comma separated; all lines are terminated with <CR><LF>
Line 1, cast header		
NetSensor ID, clearwater, Cast number, NetSensor ID	1, ASCII, 2	Cast number automatically sequenced; NetSensor ID fixed.
Line 2, cast data		
Cast segments		1 Usually three (net down, fishing, net up)
Cast segment 1 count of temperatures, pressures		2
Cast segment 1 sample rate, seconds		1 Net down, usually 2s.
Cast segment 2 count of temperatures, pressures		2
Cast segment 2 sample rate, seconds		1 Fishing, usually 60s.
Cast segment 3 count of temperatures, pressures		2
Cast segment 3 sample rate, seconds		1 Net up, usually 2s.
Age of first value, seconds	3	Actual time of first sample is data logging time at host less age of first value.
Lines 3 to total count, temperature/pressure data		
Temperature, pressure	ASCII	Temperature plus 5C, 0 - 50.00 (subtract 5 for in situ temperature). Absolute pressure in decibars, 0 - 340 db (subtract 10 for atmospheric pressure; divide by 10 for meters).
Cast data terminator line	0,0	
Checksum Line		2 Sum of temperature times 100 and pressures, modulo 65536.

Table 2 NetSensor Sample Data

255,clearwater,1
3,43,2,0,60,0,2,93
20.33,141
19.82,155
19.53,168
19.36,180
19.23,181
19.15,193
18.94,205
18.63,196
18.45,210
18.06,216
17.69,205
17.64,214
17.52,227
17.30,227
17.14,247
17.03,252
16.97,253
16.91,265
16.85,278
16.78,292
16.70,295
16.64,302
16.60,308
16.56,305
16.54,298
16.54,303
16.54,307
16.53,299
16.53,304
16.53,305
16.52,303
16.53,291

16.56,275

16.63,263

16.70,245

16.79,229

16.89,209

17.34,198

18.01,182

18.49,168

18.76,152

18.92,140

19.04,126

0,0

20198

Table 3 Reduction of Sample NetSensor Data

NetSensor Data Reduction												
Line Number	NetSensor Data							Comments				
1	255	clearwater	1						255: serial number; "clearwater": dummy NetSensor ID; cast number			
2	3	43	2	0	60	0	2	93	3 cast segments; cast segment 1, 43 samples taken at 2 seconds; 0 samples cast segment 2 taken at 60 seconds; 0 cast samples segment 3 taken at 2 seconds; the age of the first data is 93 seconds. Cast date captured 4/27/00 1:08:00 pm.			
3	20.33	141							15.33	4.1	0	4/27/00 13:06:27
3	19.82	155							14.82	5.5	2	4/27/00 13:06:29
3	19.53	168							14.53	6.8	4	4/27/00 13:06:31
3	19.36	180							14.36	8.0	6	4/27/00 13:06:33
3	19.23	181							14.23	8.1	8	4/27/00 13:06:35
3	19.15	193							14.15	9.3	10	4/27/00 13:06:37
3	18.94	205							13.94	10.5	12	4/27/00 13:06:39
3	18.63	196							13.63	9.6	14	4/27/00 13:06:41
3	18.45	210							13.45	11.0	16	4/27/00 13:06:43
3	18.06	216							13.06	11.6	18	4/27/00 13:06:45
3	17.69	205							12.69	10.5	20	4/27/00 13:06:47
3	17.64	214							12.64	11.4	22	4/27/00 13:06:49
3	17.52	227							12.52	12.7	24	4/27/00 13:06:51
3	17.3	227							12.30	12.7	26	4/27/00 13:06:53
3	17.14	247							12.14	14.7	28	4/27/00 13:06:55
3	17.03	252							12.03	15.2	30	4/27/00 13:06:57
3	16.97	253							11.97	15.3	32	4/27/00 13:06:59
3	16.91	265							11.91	16.5	34	4/27/00 13:07:01
3	16.85	278							11.85	17.8	36	4/27/00 13:07:03
3	16.78	292							11.78	19.2	38	4/27/00 13:07:05
3	16.7	295							11.70	19.5	40	4/27/00 13:07:07
3	16.64	302							11.64	20.2	42	4/27/00 13:07:09
3	16.6	308							11.60	20.8	44	4/27/00 13:07:11
3	16.56	305							11.56	20.5	46	4/27/00 13:07:13
3	16.54	298							11.54	19.8	48	4/27/00 13:07:15
3	16.54	303							11.54	20.3	50	4/27/00 13:07:17
3	16.54	307							11.54	20.7	52	4/27/00 13:07:19

3	16.53	299						11.53	19.9	54	4/27/00 13:07:21
3	16.53	304						11.53	20.4	56	4/27/00 13:07:23
3	16.53	305						11.53	20.5	58	4/27/00 13:07:25
3	16.52	303						11.52	20.3	60	4/27/00 13:07:27
3	16.53	291						11.53	19.1	62	4/27/00 13:07:29
3	16.56	275						11.56	17.5	64	4/27/00 13:07:31
3	16.63	263						11.63	16.3	66	4/27/00 13:07:33
3	16.7	245						11.70	14.5	68	4/27/00 13:07:35
3	16.79	229						11.79	12.9	70	4/27/00 13:07:37
3	16.89	209						11.89	10.9	72	4/27/00 13:07:39
3	17.34	198						12.34	9.8	74	4/27/00 13:07:41
3	18.01	182						13.01	8.2	76	4/27/00 13:07:43
3	18.49	168						13.49	6.8	78	4/27/00 13:07:45
3	18.76	152						13.76	5.2	80	4/27/00 13:07:47
3	18.92	140						13.92	4.0	82	4/27/00 13:07:49
3	19.04	126						14.04	2.6	84	4/27/00 13:07:51
Cast data terminator	0	0						Cast data terminator			
Cast data checksum	20198							Cast data checksum			

