



Nortek Internal Processor

NIP

(and online data collection)

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Plan

Introduction

Features

How does it work

NIPTalk

Basic usage

Other uses

Introduction – what is it?

- **A wave processing module**
- **An online module**
- **Small computer**
- **Between user and AWAC electronics**





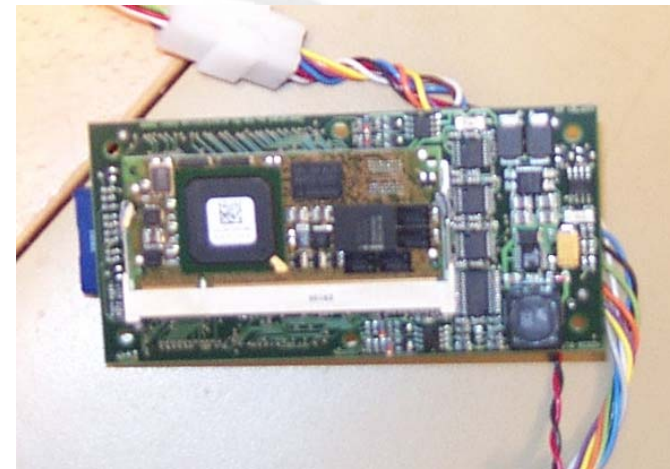
Introduction – what does it do?

- **Transforms raw data to wave estimates**
- **Reducing data : ~ 50 kbyte to ~ 100 byte**
- **Available data**
 - Sensor
 - Profile
 - Wave parameters (hight, period, direction)
 - Wave spectra (energy, direction)
 - Time series
- **ASCII and binary data**
- **Polled mode or master mode**



Features - hardware

- **Small single board computer**
- **Powerfull processor**
 - Intel XScale PXA 270 at 312MHz
- **Very low power consumption**
 - Sleep : 10mW
 - Active: 650mW
 - Ultra low : 120mW
- **Support for SD-Card**
- **Extra com-port for external device.**



Features - software

- **Sleeps most of the time (~95%)**
 - Average : 25mW
 - 5-10% of AWAC
- **Flexible user specified data formats**
 - Binary data
 - ASCII data
- **Designed for online applications**
 - Not sensitive to long timeouts
 - Reduces data (~50 kbyte → ~100 byte)
 - Polled mode
 - ASCII data for data loggers



Features - software

- **Double datastorage**
 - AWAC
 - NIP
- **Polled mode / master mode**
 - Data is indexed on time
- **Transparent mode**
 - Asynchronous
- **More easy to tailor to customer needs**



9600 -- NIP -- 57600

How does it work

- **Synchronized to AWAC**
- **Retrives data from AWAC recorder**
 - Less time spent operational
- **Will not collect data if kept alive by user**



ASCII interface

- **Human readable commands**

```
SET CELLSIZE 1
```

```
GET NCELLS
```

```
START
```

```
STOP
```

```
SHOW VARIABLE
```

- **Short versions**

```
SE CZ 1
```

```
GE NC
```

```
ST
```

```
SO
```

```
SW VA
```



NIPTalk

- **Terminal emulator**
- **Command wrapper for easy use**
- **Configuration tool**
- **Upgrading**
- **Simple logging**
- **Protect user**

The screenshot shows the NIPTalk application window with a menu bar (File, Edit, View, Communication, Deployment, Window, Tools, Help) and a toolbar. The main area displays a terminal window with various commands and their outputs. Blue arrows point from text labels to specific buttons and menu items in the interface.

- Stop deployment
- Start deployment
- Save the active configuration
- Choose a preset and activate it
- Deployment planning menus
- Connect COM port
- Get present status from NIP
- Set the clock on NIP
- Get all help files from NIP
- Locally echoing what you are typing
- View binary file and ASCII equivalent
- Clear screen
- Log the terminal emulator to file

The Properties window shows hardware configuration details for the NIP device.

Hardware Configuration	
NIP version	1.02
Frequency	600kHz
Hardware ID	WPR 0024
Head ID	WAV 5141
Firmware version	0.14

The Properties window will collect the different properties as they are requested

Nortek AS For Help, press F1

Connected Logging off COM1 - 9



Basic operation

Master

- 1. Configure**
- 2. Turn on data reporting**
- 3. Set clock**
- 4. Start**

Slave

- 1. Configure**
- 2. Turn off data reporting**
- 3. Set clock**
- 4. Start**
- 5. Read new data**



NIPTalk - Configuration

- **AWAC operation**
- **NIP operation**
- **Validates all user setting**

The screenshot shows the 'Deployment Planning' software interface. The 'Configuration' tab is selected and highlighted with a red box. The settings are as follows:

Section	Parameter	Value
Instrument	Frequency	1 MHz
	Current profile	Interval (s): 600
	No of cells	20
	Cell size (m)	1
	Waves	Ng. of samples: 1024
Waves	Sampling rate	1 Hz
	Interval (s)	3600
Acoustic Modem	Acoustic Modem	NONE
	High power	<input type="checkbox"/>
Advanced Settings	Advanced Settings	<input type="checkbox"/>
	Sampling	Average interval (s): 60
	Blanking distance (m)	0.4
	Coordinate system	ENU
	Power level	(low) to (high)
	Speed of sound	Meas. Salinity (ppt): 35
	Analog inputs	Input 1: NONE
	Analog inputs	Input 2: NONE
	Output power	<input type="checkbox"/>
	Summary	Assumed duration (days)
Estimated depth (m)		20
Horizont. vel. prec. (cm/s)		2.2
Min. wave period (s)		1
Min. period direction (s)		3.1
Battery utilization (% of 540 Wh)	AWAC	57
	NIP	34
	Acoustic modem	0
	Total	91

Buttons: Done, Cancel



NIPTalk - Configuration

- Data formatting
- NIP settings

The screenshot shows the 'Deployment Planning' window with the 'Configuration' tab selected. The 'Data Output' sub-tab is active, displaying a list of sensors and their parameters. The 'Markers' section is also visible.

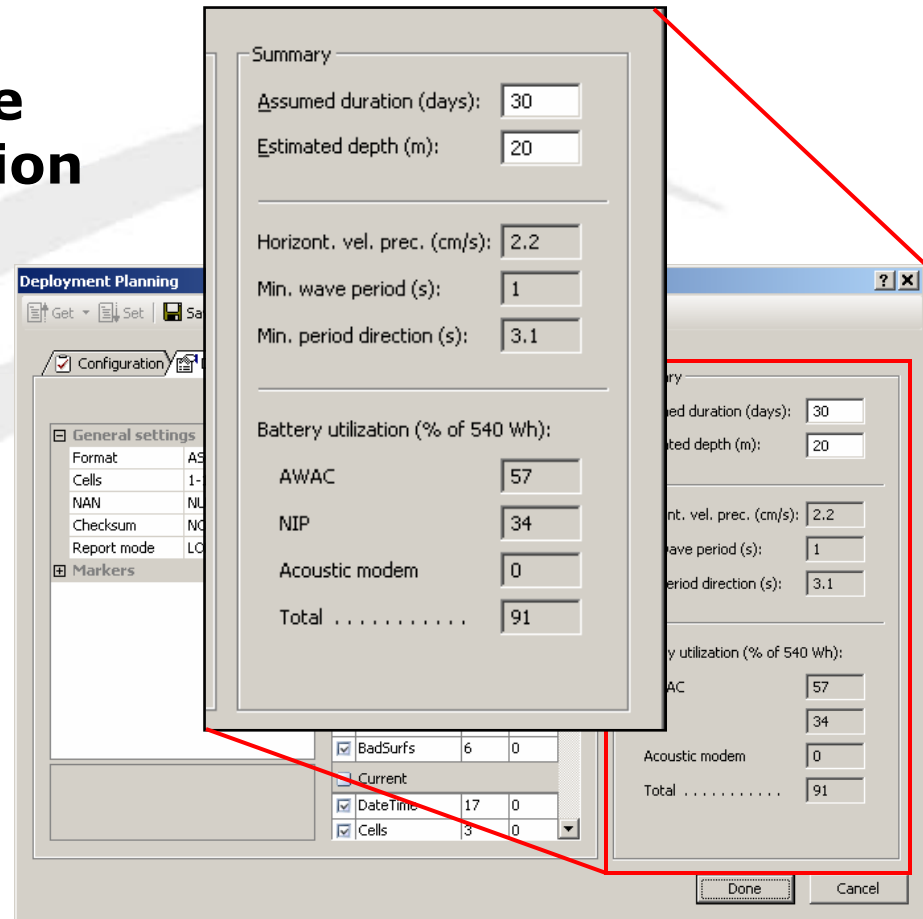
Type	Size	Dec.
<input checked="" type="checkbox"/> DateTime	17	0
<input checked="" type="checkbox"/> Temp	4	1
<input checked="" type="checkbox"/> Press	8	3
<input checked="" type="checkbox"/> Pitch	6	2
<input checked="" type="checkbox"/> Roll	6	2
<input checked="" type="checkbox"/> Heading	5	1
<input checked="" type="checkbox"/> Battery	4	1
<input checked="" type="checkbox"/> SoundSpeed	4	0
<input checked="" type="checkbox"/> Analog1	3	0
<input checked="" type="checkbox"/> Analog2	3	0
<input checked="" type="checkbox"/> Error	6	0

Markers	
Sensor	S
Current	C
Wave	W
Error	E
Delimiter	,
End of Data	\r\n

Summary	
Assumed duration (days):	10
Estimated depth (m):	10
Horizont. vel. prec. (cm/s):	2
Min. wave period (s):	1
Min. period direction (s):	2.2
Battery utilization (% of 540 Wh):	
AWAC	31
NIP	17.2
Acoustic modem	0
Total	48.2

NIPTalk - Configuration

- Estimate performance and power consumption



The screenshot shows the 'Deployment Planning' application with the 'Configuration' dialog box open. The 'Summary' section contains the following fields:

- Assumed duration (days): 30
- Estimated depth (m): 20
- Horizont. vel. prec. (cm/s): 2.2
- Min. wave period (s): 1
- Min. period direction (s): 3.1

The 'Battery utilization (% of 540 Wh):' section shows the following values:

- AWAC: 57
- NIP: 34
- Acoustic modem: 0
- Total: 91

The background window shows a table with the following data:

Item	Value	Unit
BadSurfs	6	0
Current		
DateTime	17	0
Cells	3	0



NIPTalk - Configuration

- Wave parameters
 - **Processing method**
 - **Smoothing**
 - **Distance from bottom**
 - **Frequency range**

The screenshot shows the "Deployment Planning" software interface. It has a menu bar with "Get", "Set", and "Save" options. Below the menu bar are three tabs: "Configuration" (selected), "Wave Processing", and "Data Output".

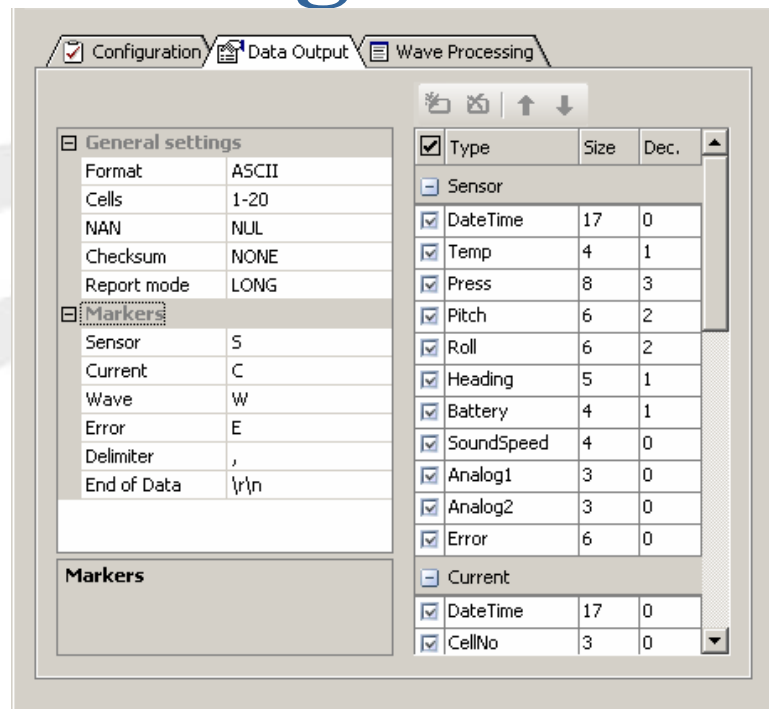
The "Configuration" tab is active and contains several sections:

- Local settings:**
 - Distance off bottom (m): 0.5
 - Pressure offset (m): 0
- Frequency range:**
 - Start frequency (Hz): 0.02
 - Frequency step (Hz): 0.01
 - End Frequency (Hz): 1
- Processing:**
 - Method: MLMST (dropdown menu)
 - Frequency smoothing (FFT bins): A slider set to 64, with markers at 16, 32, 64, and 128.
 - Direction smoothing (FFT bins): A slider set to 64, with markers at 16, 32, 64, and 128.



ASCII - formatting

- **Start marker**
 - SensorMarker
 - CurrentMarker
 - WaveMarker
- **End marker**
 - '\r\n'
- **Delimiter**



Data:

```
s,29.03.05 22:36:00,24.0, 0.501, 7.5,15.1,1530, 0, 0,0030,0000<cr,nl>
C,29.03.05 22:36:00, 1, 0.731, 0.221, 2.806, 2.908, 73.2,0000<cr,nl>
C,29.03.05 22:36:00, 2, 0.918, 0.400, 2.816, 2.989, 66.5,0000<cr,nl>
W,24.03.05 01:37:07, 2.35, 2.64, NUL, 0.49, 0.63, 2.54, 2.54, 37.41, 0,0298<cr,nl>
```



ASCII - formatting

- **Content**

- Space delimited
- Identifier
- Size
- Precision
- [ID]:[SIZE]:[PRECISION]

- **Checksum**

- **At the end**
- **In HEX**
- **Preceded by ***
- **crc16/crc32/nortek/nmea**
- **NaN indicator**
 - **Text**
 - **MIN/MAX**

Example format:

se sf 'DT:17 TE:4:1 PR:8:3 HE:5:1 BT:4:1 SS:4:0 O1:3 O2:3 ER:6 ST:4'

Data:

S,29.03.05 22:36:00,24.0, 0.501, 7.5,15.1,1530, 20, 0,0030,0000,*AC93<cr,nl>
C,29.03.05 22:36:00, 1, 0.731, 0.221, 2.806, 2.908, 73.2,0000,*2BB3<cr,nl>
C,29.03.05 22:36:00, 2, 0.918, 0.400, 2.816, 2.989, 66.5,0000,*7D23<cr,nl>
W,24.03.05 01:37:07, 2.35, 2.64, NUL, 0.49, 0.63, 2.54, 2.54, 37.41, 0,0298,*651A<cr,nl>

Other uses

- **Processing of current data**
 - Vector statistics
 - Transformation of beam arrays
 - "from surface" measurement
- **Data logger**
- **Tide measurement**
- **Use extra com port for GPS data
compass correction or other
instruments**

Data collection

- **Data format**
 - ASCII
 - Binary
- **Mode**
 - Autonomous
 - Polled
- **Tools and software**
 - Direct commands
 - SeaState
 - ActiveX



ASCII - binary

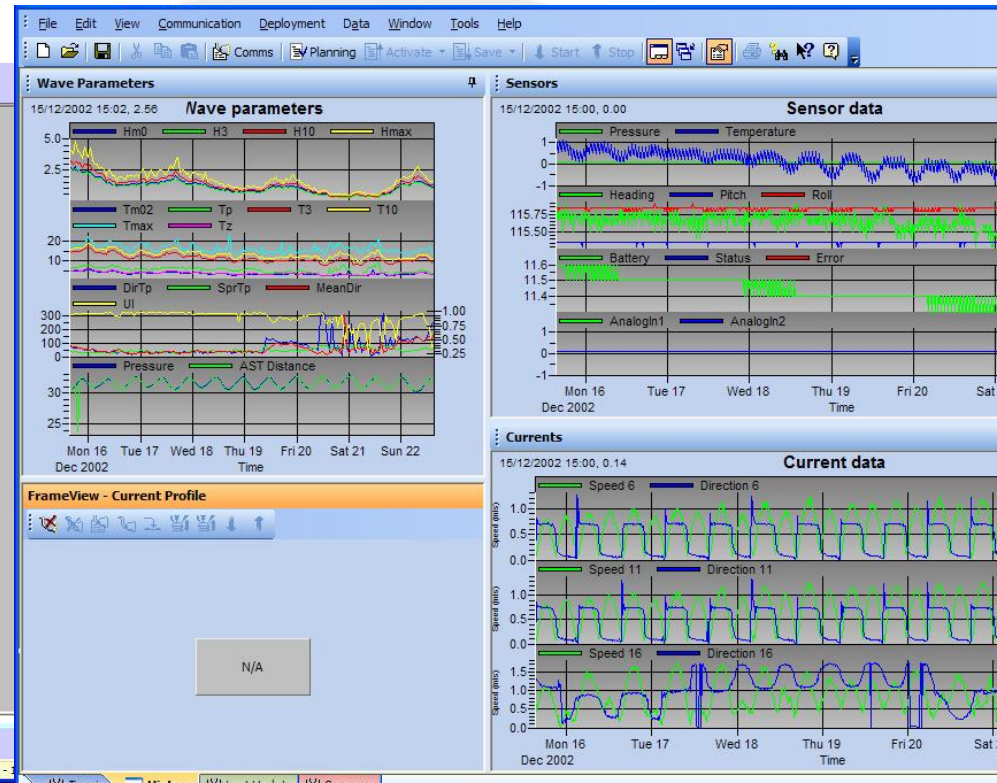
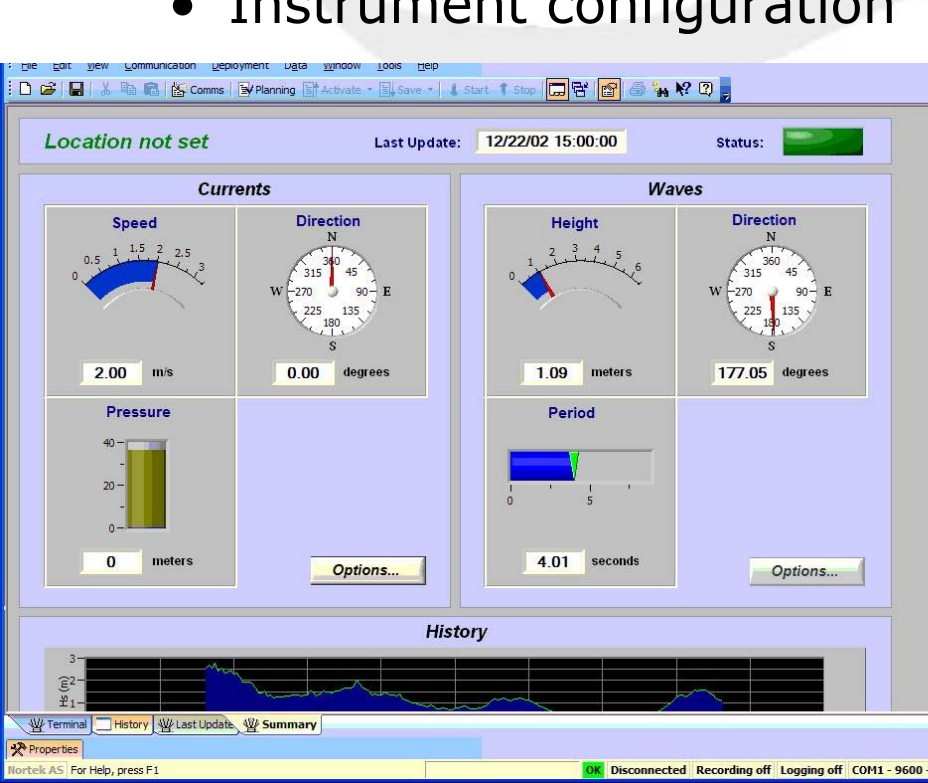
03 15 2003 16 30 00 0 48 -0.008 0.142 0.017 91.0 92.0 86.0 11.5 1464.8 254.5 -3.8 0.0 218.486 5.26
03 15 2003 16 45 00 0 48 -0.009 0.128 0.007 91.0 90.0 85.0 11.5 1464.8 258.6 -3.8 0.0 218.396 5.25

Here is the format:

pos	Value	units
1	Month	(1-12)
2	Day	(1-31)
3	Year	
4	Hour	(0-23)
5	Minute	(0-59)
6	Second	(0-59)
7	Error code	
8	Status code	
9	Velocity (Beam1 X East)	(m/s)
10	Velocity (Beam2 Y North)	(m/s)
11	Velocity (Beam3 Z Up)	(m/s)
12	Amplitude (Beam1)	(counts)
13	Amplitude (Beam2)	(counts)
14	Amplitude (Beam3)	(counts)
15	Battery voltage	(V)
16	Soundspeed	(m/s)
17	Heading	(degrees)
18	Pitch	(degrees)
19	Roll	(degrees)
20	Pressure	(m)
21	Temperature	(degrees C)

SeaState

- **Online software**
 - Data collection
 - Data presentation
 - Instrument configuration





ActiveX

- **Programming interface**
- **For windows**
- **Hides complexity**
 - Configuration
 - Data decoding
 - Handshaking
 - Comm control



-- Thank you --