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NEFSC *Ichthystick II* Electronic Fish Measuring Board

Users Manual

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1.0 Introduction:

In the past, NOAA Fisheries used two types of electronic fish measuring boards (Scantrol and Limnoterra) to electronically record fish lengths on research surveys. The Scantrol fish measuring board is manufactured in Norway, and is very expensive (approximately $15,000.00 each). This measuring board can only measure lengths in centimeters. The Limnoterra board was manufactured in the United States, but the company is no longer manufacturing measuring boards. The older Limnoterra board could produce measurements in the millimeter range (+/- 1.0 mm), but the board had many water intrusion problems which damaged the sensitive electronics inside.

Because of the problems stated above, NOAA's Alaska Fisheries Science Center developed a low cost electronic fish measuring board called the ***Ichthystick*** which was based on the Temposonic Linear-Position EP2D Sensor. This measuring board was an all-in-one design which incorporated the electronics as well as the Temposonic Linear sensor into a watertight case, similar to the Limnoterra design (see Figure 1). The Alaska Fisheries Science Center freely distributed the plans and software to the various NOAA NMFS science centers for their use.

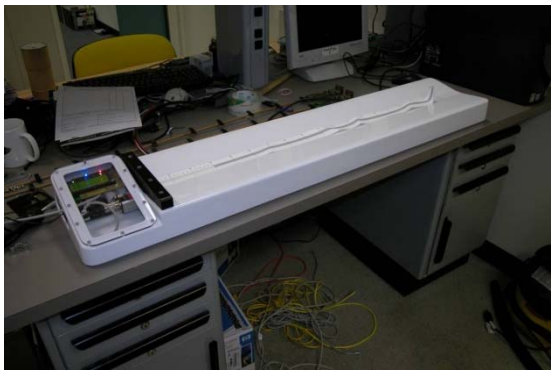


Figure 1. AFSC Ichthystick Fish Measuring Board

The Northeast Fisheries Science Center modified these plans, and developed a measuring board that consists of a separate Display Assembly (P/N IFMB-10100) which houses all of the sensitive electronics in a watertight case that can be mounted off of the work surface to prevent water from wreaking havoc with the internal components (see Figure 2). The Temposonic Linear Sensor is housed in a separate watertight case (IFMB-10110). This new design is called the ***Ichthystick II*** to show its roots in the original *Ichthystick* design. The *Ichthystick II* Electronic Fish Measuring Board is a millimeter electronic measuring board that can be inexpensively produced for fisheries research applications.

Figure 2. NEFSC Ichthystick II Fish Measuring Board

2.0 Design Specifications:

The *Ichthystick II* Electronic Fish Measuring Board consists of a Display Assembly (P/N IFMB-10100) and a Watertight Sensor Case (P/N IFMB-10110). The Display Assembly is connected to the Watertight Sensor Case using a Brad-Harrison Micro-Change 6 pole Male/Female cable assembly (P/N 7776030D02F1201).

Power Supply:	12.0 VDC
Power Consumption:	Average 200 mA
Operating Temperature:	0 to 40 degrees C
Resolution:	0.5 mm
Measurement Range:	
36 inch Sensor	0 to 85 cm max
42 inch Sensor	0 to 109 cm max
Accuracy:	0.5 mm
Bluetooth Wireless Range:	100 m (Indoor, direct line of sight)
	1.0 km (Outdoor, direct line of sight)

3.0 Ichthystick II Fishboard Installation:

4.0 Fishboard Operation:

4.1 Display Assembly:

The Display Unit (P/N IFMB-10100) consists of a Power Button and four Menu Buttons (**MENU**, **NEXT**, **PREV**, and **ENTR**). These menu buttons provide access to various sub-menus which control functions for the Ichthystick II fish measuring board. The Display unit houses all of the sensitive electronics which make the measuring board operational.

```
- - - >      M E A S U R I N G    < - - -

                          7 4 9 . 8
L E N G T H  =            5 9 9 . 2    M M
```

Parallax 4x20 Serial LCD display module:

A 4 x 20 character LCD display provides visual feedback to the operator as to length measurements that are being made. It also displays the various sub-menus that control functions in the measuring board. (See "Menu System" section below for descriptions of the various sub-menus.)

4.2 Menu System:

The Ichthystick II menu system allows the operator to adjust parameters for fishboard operation, as well as perform a calibration on the linear sensor. The various sub-menus can be accessed by pressing the **MENU** button. The **NEXT** and **PREV** buttons allow the operator to move between sub-menu items. The **ENTR** button toggles between values associated with each sub-menu item. The following is a description of all of the sub-menus for the Ichthystick II fish measuring board:

Main Display (Default):

```
- - - >        M E A S U R I N G    < - - -

                              7 4 9 . 8
L e n g t h     =             5 9 9 . 2    m m
```

- Default display active during length measurements.
- This display shows the current and previous length measurements.
- It shows length units in either millimeters (mm) or centimeters (cm).

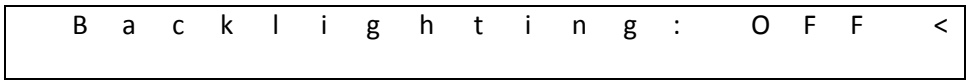
Communication Menu:

```
C o m m u n i c a t i o n    M e n u :
  P r o t o c o l :          R S - 2 3 2    <
  B A U D   R a t e :        9 6 0 0
  F o r m a t :              I c t h y s k
```

- Accessed by pressing the **MENU** Button.
- Has three menu items: “Protocol”, “BAUD Rate”, and “Format”.
- The **PREV** and **NEXT** buttons switch between these three menu items.
- A flashing “**<**” character indicates which menu item is currently active.
- The “Protocol” menu item has two settings: “RS-232” or “BlueTH”. These items will control whether the measuring board will output the length values through the RS-232 COM port or the wireless Bluetooth port. The operator can cycle through the items by pressing the **ENTER** button.
- The “BAUD Rate” menu item is hard coded at 9600 BPS.
- The “Format” menu item has three settings: “Icthysk”, “Limno”, and “Scantrl”.
    - “Icthysk” setting is the default format. This is the native format for the Ichthystick II fish measuring board. It is a NEMEA ASCII data output string with the following format:
        - $IFMB001, xxxx.x, yy
          where IFMB001 = the serial number of the Ichthystick II fish measuring board,
          xxxx.x = decimal value of the length measurement,
          yy = millimeter (mm) or centimeter (cm) indicator.
    - “Limno” setting simulates the output of a Limnoterra fish measuring board. This format was included to allow the Ichthystick II fish measuring board to communicate with the older version of the Fisheries Scientific Computer System (FSCS ver 1.6). This setting outputs length measurements in millimeters, and has a set BAUD rate of 1200 BPS.
    - “Scantrl” setting simulates the output of a Scantrol fish measuring board. This format was included to allow the Ichthystick II fish measuring board to communicate with the older version of the Fisheries Scientific Computer System (FSCS ver 1.6). This setting outputs length measurements in centimeters, and has a BAUD rate of 9600 BPS.

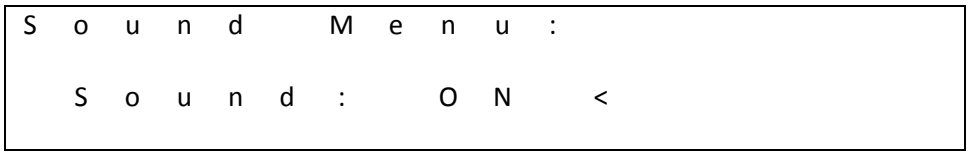
Display Menu:

```
D i s p l a y    M e n u :
```



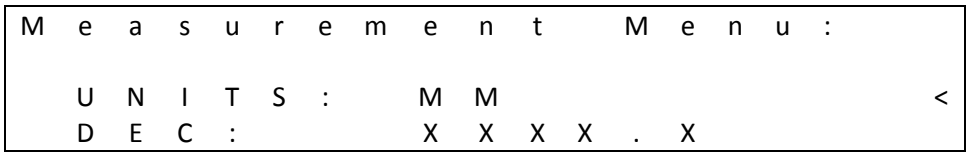
- Accessed by pressing the **Menu** Button.
- The operator can turn LCD backlighting ON/OFF using the **Enter** Button. This can be helpful if the fishboard is running off of a battery power supply. By turning of the LCD backlighting, you can extend the battery life.

Sound Menu:



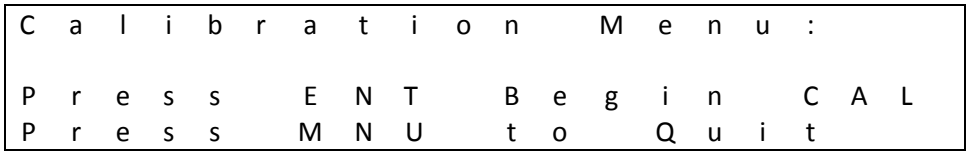
- Accessed by pressing the **Menu** Button.
- The operator can turn the sound ON/OFF using the **Enter** Button.

Measurement Menu:



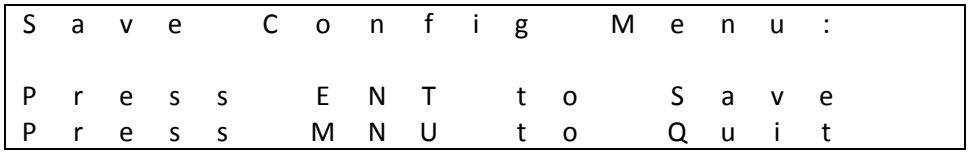
- Accessed by pressing the **Menu** Button.
- Operator can select either millimeter (MM) or centimeter (CM) measurement units using the **Enter** button.
- The operator can also select whether they want one decimal precision (XXXX.X) or NO decimal precision (XXXXX).

Calibration Menu:



- Accessed by pressing the **Menu** Button.
- Operator can start the Calibration Routine by selecting the **Enter** Button.
- Pressing the **Menu** Button will quit the Calibration Menu.

Save Configuration Menu:



- Accessed by pressing the **Menu** button.
- Operator can save all configuration changes by selecting **Enter** Button. All configuration changes will be saved to EEPROM.

- Pressing **Menu** Button will quit the **Save Config** menu without saving any changes.

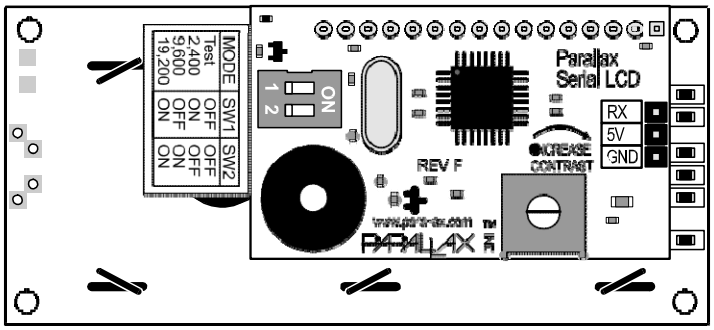
5.0 Programming the Ichthystick II Fish Board:

5.1 Installing Display Assembly Firmware:

Setup LCD Display Prior to initial use:

New LCD components from Parallax are set to "Test" mode from the factory. The baud rate for the LCD component will need to be set correctly for use in the Ichthystick II Fish Board Display Assembly. There are three choices for the baud rate: 2400, 9600, and 19200. For the Ichthystick II Fish Board display, the baud rate should be set to 19200. To set the baud rate, move the dip switches on the back of the LCD into the correct positions according to the following diagram.

MODE	SW1	SW2
Test	OFF	OFF
2,400	ON	OFF
9,600	OFF	ON
19,200	ON	ON



Programming the Firmware on the Display Assembly:

Using the "Propeller" program from Parallax.com, open the main file "FMB_digital_length.spin". With this file open in the editor window, click on the "Run" menu item, and select "Compile Current", "Load EEPROM F11" from the menu item. (See Fig 3.) This command should load the whole program into the EEPROM on the fishboard. Note: You need to hookup the fishboard to your PC through the RS232 interface. Before you load the EEPROM, try the "Identify Hardware" menu item under the "Run" menu to verify that you are properly hooked up to the microcontroller in the fishboard display. (Again, see Fig 3.) The fishboard defaults to the following Serial Port parameters:

Baud = 9600
Data Bits = 8
Parity = None
Stop Bits = 1
Flow control = None

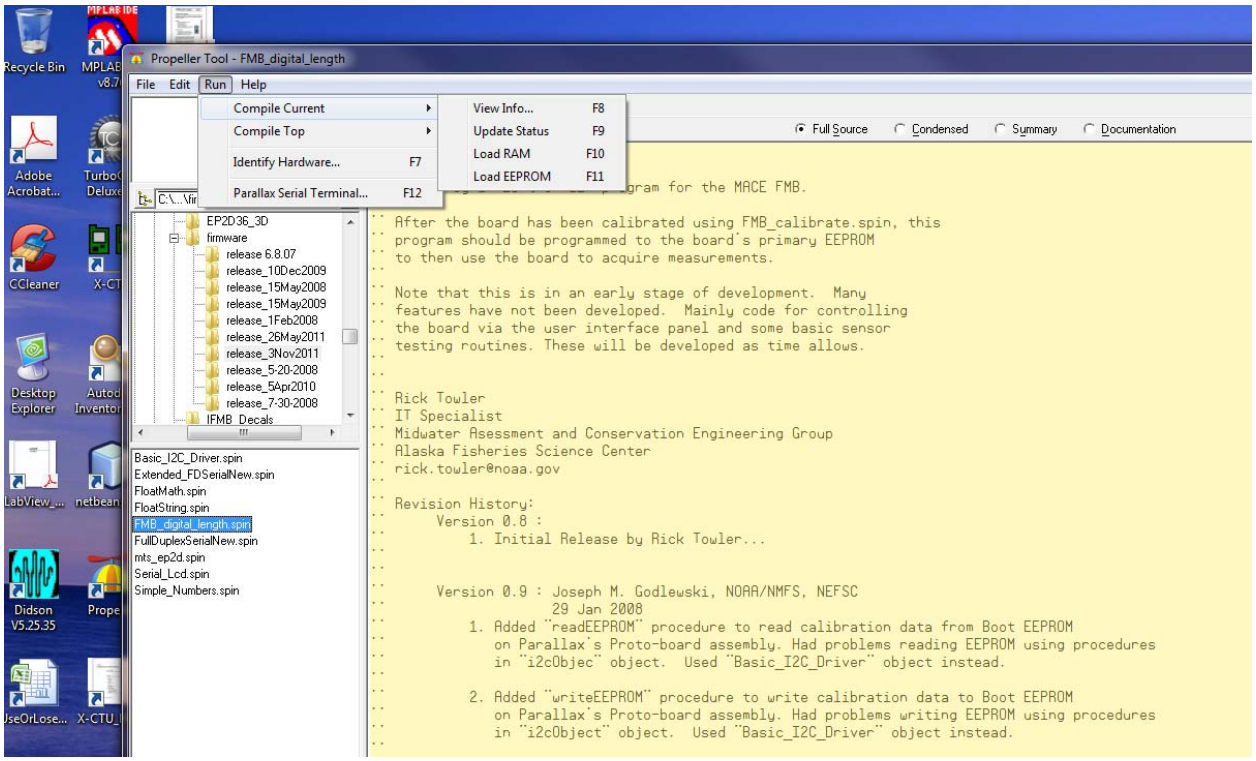


Figure 3. Propeller Tool IDE for Ichthystick II firmware.

Programming in a Serial Number for the Fishboard:

To access this feature on the display, with the display hooked up to a PC running a terminal emulation program such as Hyperterminal, turn on the power to the Display. During the initial boot up of the Display, press and hold the "NEXT" key for about 10 seconds. After 10 seconds, release the "NEXT" key. The Display's LCD panel should show the "Programming" menu. At this point, the Display Assembly is sitting and waiting to receive commands from the PC. Using the "Hyperterminal" type program, connect to the COM port that the Display Assembly is attached. Enter the character "**A**" without the quotes. The Display Assembly will send back the following menu:

```
---------------------------------------------------
1: Change Device Serial Number.
2: Change ESD110 Mode Number.
3: Quit Menu and return.
---------------------------------------------------
Enter Menu number and press return key.
>>
```

At this point, enter **1** to change the serial number. Next, enter **2** to update the serial number and "Mode #" of the Parani ESD110 Bluetooth transceiver. Finally, enter **3** to exit this menu. Once the menu is exited, the Display Assembly will continue its boot cycle and enter into its default "Measurement Menu" mode.