



# **MARITIME UNIVERSITY IN SZCZECIN**

## **ORGANIZATIONAL UNIT:**

FACULTY OF NAVIGATION - DEPARTMENT OF NAVIGATION DEVICES

## **Instruction**

### **PRINCIPLE OF OPERATION AND HANDLING OF THE NAVIGATION ECHOSOUNDER (Echosonda Lowrance LCX 19c)**

#### **Lab**

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## Purpose of the exercise

The purpose of this exercise is to understand the operation of the navigation sonar and how to use the device during navigating. Familiarization with the construction of the navigation sonar: Lowrance LCX 19c, and the adjustment and placement of controls available to the operator.

## Preliminary information, knowledge test and report.

For a third class, a brief knowledge check will take plac.

**Scope of preparation: the issues are in the introductory part, the theory of literature on the next page.**

Report writing on your computer will not be accepted

The reports are written individually!

The report consists of 2 parts:

- Part A - Preliminary
- Part B - Exercise course see details below) and additionally:

Measurement Cards: signed by the teacher; own conclusions

\*) On the measurement card (exercise diary) the actions are recorded - then they are rewritten purely in the report.

\*\*) Reports of repeated applications from other students will be rejected !!!

**Part A** - In the introductory part shall be included:

- Purpose of the exercise;
- Tables with IMO, PRS, and PKN required for the sonar;
- Basic specifications: Lowrance LCX19C;
- Description of the measuring system: Lowrance LCX19C;
- measuring board for 30 measurements;

**Part B** preparation of report (course of the exercise) describing its individual stages:

- Describe all activities performed on the exercise;
- Translate the names of the used sonar functions and describe how they affect the operation of the sonar.
- Own conclusions;

(!) Be sure to include a complete measurement card signed by the instructor

(!) At the end, write the conclusions - an individual report of the exercise.

Conclusion should include: own comments on: device operation, interface comfort, presentation of data, etc.

*No requests - report rejected*

*Conclusions borrowed - report rejected;*

Complete reports must be submitted to the next class - to the teacher, from which classes were held.

**The exercises include:**

1. Presence in the class;
2. Pass the test;
3. All reports must be positively approved

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Literature:

„**Urządzenia Nawigacji Technicznej**”, Autorzy: M. Gućma, J. Montewka, A. Zięziula.  
wyd. Fundacja AM Szczecin, 2005.

**Emulator urządzenia LCX 19c na komputer PC:**

[http://www.lowrance.com/Software/PCSoftware/Install/LCX-19C/LCX-19C\\_demo.asp](http://www.lowrance.com/Software/PCSoftware/Install/LCX-19C/LCX-19C_demo.asp)

## **1. Description of the measuring system**

The Lowrance ® LCX19c is a popular device for small vessels. However, it has all the functions necessary to navigate (including vector map plotter and GPS). Figure 1 shows the general appearance and Figure 5 describes the individual keys.



Fig. 1 LCX-19C sonar/GPS unit, front view, showing sonar screen



Fig.2 Description of the keys on the interface LCX 19c

1. PWR/LIGHT (Power & Light) – The PWR key turns the unit on and off and activates the backlight.
2. PAGES – Pressing this and the ← → arrow keys switches the unit between the four different page screens. (Satellite Status Page, Navigation Page, Map Page and Sonar Page.) Each page represents one of the unit's major operation modes.
3. MENU – Press this key to show the menus and submenus, which allow you to select a command or adjust a feature. This also accesses search functions for streets, intersections, addresses and highway exits.
4. ARROW KEYS – These keys are used to navigate through the menus, make menu selections, move the map and sonar chart cursors and enter data.

5. ENT/ICONS (Enter & Icons) – This key allows you to save data, accept values or execute menu commands. It is also used to create event marker icons.
6. EXIT – The Exit key lets you return to the previous screen, clear data or erase a menu.
7. WPT – (Waypoint) The Waypoint key is used to save and recall waypoints, search for waypoints and access the waypoint list. It also launches the Point-of-Interest (POI) search menus and is involved in some navigation functions.
8. ZOUT – (Zoom Out) – This key lets you zoom the screen out. On the Sonar Page, this key returns you to a full sonar chart display, showing the entire water column from surface to bottom. On the Map Page, this lets you see a larger geographic area on the map. Less detail is seen as you zoom out.
9. ZIN – (Zoom In) – This key lets you zoom the screen in. On the Sonar Page, this key enlarges fish signals and bottom detail. On the Map Page, zooming in lets you see greater detail in a smaller geographic area on the map.

## Power/lights on and off

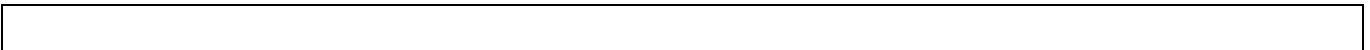
To turn on the unit, press **PWR**. As the unit powers up, the Map Page is displayed first. To switch to the Sonar Page, press **PAGES**|→|**EXIT**.

To turn on the backlight, press **PWR** again. The unit has three backlight levels to select from. Repeatedly pressing **PWR** will cycle through the backlight settings and turn off the backlight.

Turn off the unit by pressing and holding the **PWR** key for 3 seconds.


## SPECIFICATIONS




- 17.8 cm color display
- Full VGA TFT LCD screen
- Scale 256 color palette
- Resolution of 640 x 480 (width x height)
- Fluorescent / Fluorescent 3 levels
- Ability to split screen and monitor sonar / sonar and GPS
- Up to two 50-200 kHz frequencies
- Signal power of 1000 watts RMS (8000 watts peak-to-peak)
- Maximum penetration depth of 915 m (50 kHz transducer)
- GPS. Precision 12-channel satellite receiver
- MapCreate® software for embedded maps and modifications • 1000 waypoints / 1000 event markers / 100 roads with up to 100 waypoints
- 10 scanned plots of 10,000 points per route
- Plotter scaling in the range of 0.05 - 4000 miles. Record on MMC cards
- Possibility to record both sonar sequence as well as GPS. Information is collected on MMC cards. Ability to load all information into the computer for further analysis.
- Classification: Not compatible with IMO, intended for: smaller units.



- Time for exercise: 90min
- The keys are marked with the following characters: **PWR**
- The menu items are marked with the following characters: **Sonar**

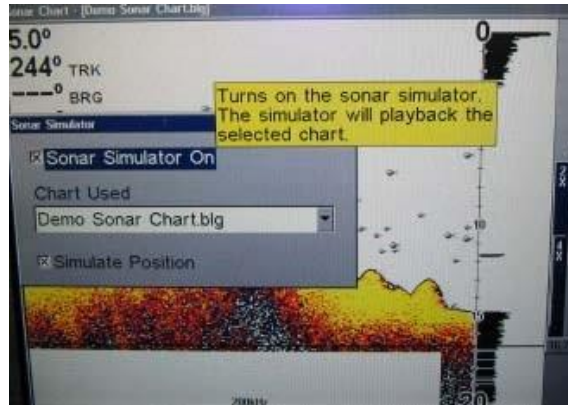
1. Start the echo sounder with the **PWR** key
2. Confirm the alarm with the **EXIT** key
3. Confirm the GPS alarm with the **EXIT** key
4. Prepare the sonar for work. Reset settings: **MENU x2**, cursor select **System setup ENT** with cursor select sub-tab Reset options, press **ENT**, and re-confirm **ENT**
5. Prepare the sonar for work. Turn off the sound of the keys: **MENU x2**, cursor select **Sounds**, confirm **ENT**, press **sound KEY** and confirm **ENT**
6. Preparing for sonar work. Unit settings: **MENU x2**, cursor select **System setup** with cursor select the **Units of measure** sub-tab, press **ENT**, and set










*Speed: Nautical; Depth: Meters; Temperature: Celsius* //  Move the cursor over the option and confirm the **ENT**

7. Select the sonar display, press **PAGES**, the cursor  select tab **Sonar** and again with the cursor  **Full Sonar Chart**, confirm **ENT**. See Fig. 



8. Run the sonar simulator: Press **MENU x2**, select the **Sonar Setup** cursor, select the **Sonar Simulator** sub-tab, press the **ENT** key, set the cursor to the **Sonar Simulator On** field (highlight in blue) and mark the **ENT** (should look like in the picture). . Exit with the **EXIT** key.




9. Having started simulator you have to describe and redraw the information on the following screens: Sonar - press '**PAGE**' (move cursor  and confirm **ENT** in sequence: **Full Sonar Chart, Split Zoom Sonar Chart, Split Frequency Sonar Chart i Digital Data**). Moving the cursor  to the Map and next  to the **Map with Sonar**. Confirm **ENT** (Attention! Finally the report should include 5 redrawn screens!).
10. Move the cursor to the tab **Full Sonar** i **ENT**.
11. Select **MENU**, set the cursor to the **Colorline** and confirm **ENT**. Use cursor  to select 40%, 100% and 75% values, redraw the screen for each value. Compare.
12. Select **MENU**, set the cursor - **Depth Range** and confirm **ENT**. Use cursor  to select values of 15m, 20m and 100m, redraw the screen for each draft. Compare.
13. Select **MENU**, move the cursor to **Upper Lower Limits** and confirm **ENT**. Use cursor  to select value upper 11m and lower 14m, Compare. *What this function is, what it is a practical use?*
14. Select **MENU**, move the cursor to **Chart speed** and confirm **ENT**. Use cursor  to select value 25% i 75%. Compare. *What is the meaning of this setting?*
15. Select **MENU**, move the cursor to **Depth cursor** and confirm **ENT**. Use cursor  to select value 10m. *What is the meaning of this setting?* Press **ENT**
16. Select **MENU**, move the cursor to **Overlay data** and confirm **ENT**. Use cursor  to select **Ground Speed**. Press **ENT, EXIT**. *Where did the information appear on the screen? What is the meaning of this setting?*



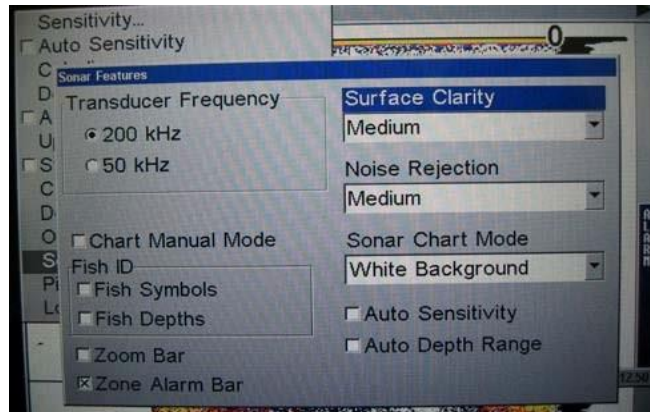
17. Go to **MENU**x2, use the cursor to press **Alarms** and confirm **ENT**. Use the cursor to select **Sonar**. Press **ENT**. *What are the alarms available? What is the purpose?*


Press **ENT**

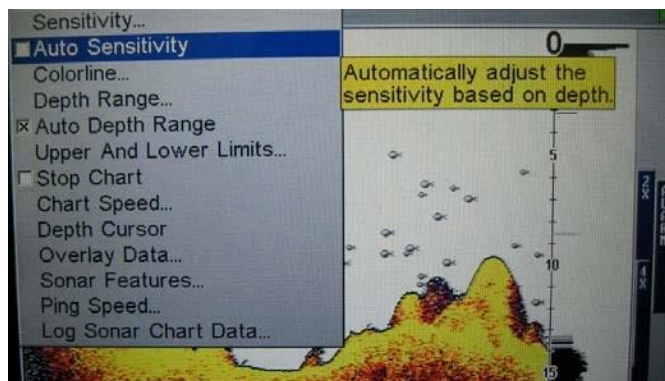
18. Go to **MENU**, use the cursor  to press **Sonar Features** and confirm **ENT**.

19. On the screen **Sonar Features** go to **Surface Clarity** press **ENT** and select **Off** value and press **ENT**. Next, select **Noise Rejection** press **ENT** and select **Off** value and confirm **ENT**. See fig. below— instead of Medium has to be **Off**.


Press **EXIT** x2.

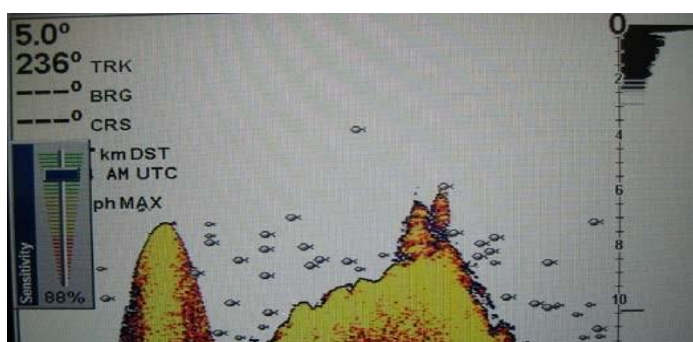


20. Go to **MENU** use the cursor  to select **Auto Sensivity** and confirm **ENT** (turn off aut Gain (sensitivity). See fig. below .



21. Next, go to **Sensivity** and confirm **ENT**. A slider appears, so you can gain control by the

cursor , see fig. below.



22. Redrawing the bottom echogram for the **Sensitivity** Setting: 100%, 85%, 50%, 25%.

Finally set to 85% and press **EXIT**

23. Proceeding as in step 19), set the value of the **Noise Rejection High**, and confirm ENT and EXIT 2x. Redraw the echogram. The report compares with the echogram with step # 22) for gain - 85%.

24. Proceeding as in step 19), set the value of the **Surface Clarity High**, and confirm ENT and EXIT 2x. Redraw the echogram. The report compares with the echogram with step # 12) for gain - 85%.

25. When all menu windows are off, for 5 minutes, write down the depth reading every 10 seconds to the table:

measurement #	time	depth
1	00	14.3
2	10	13.2
...	..	..

*after class, count the value of the average depth.*

26. Switch off **PWR**.