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IBoaT-Report

The ComfoDrive Concept

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IBoaT-Report

Report on the results of the Institute for Boat-Tourism

The Institute for Boat-Tourism (IBoaT) is a private, independent scientific research- and consulting-institution.

ComfoDrive

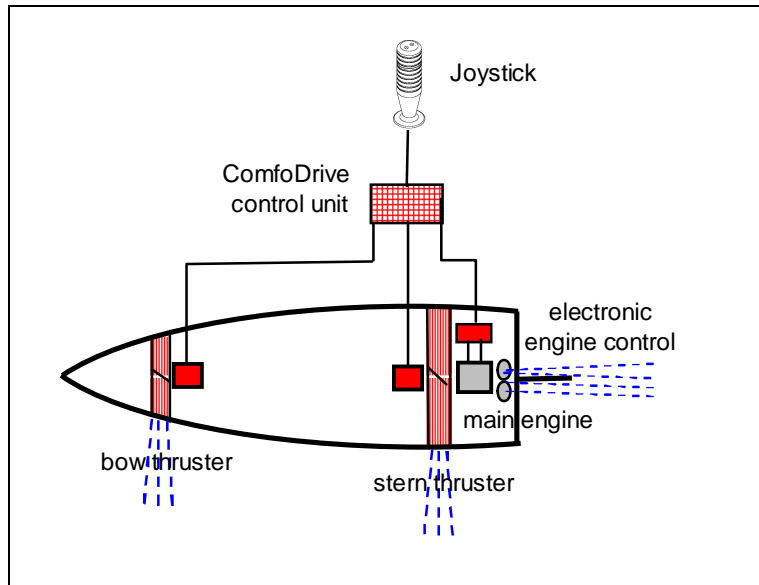


ComfoDrive

Maneuver a yacht under engine power like the helmsman on a cruise liner:

**With just one joystick,
in all directions,
precise, secure, convenient**

The concept:



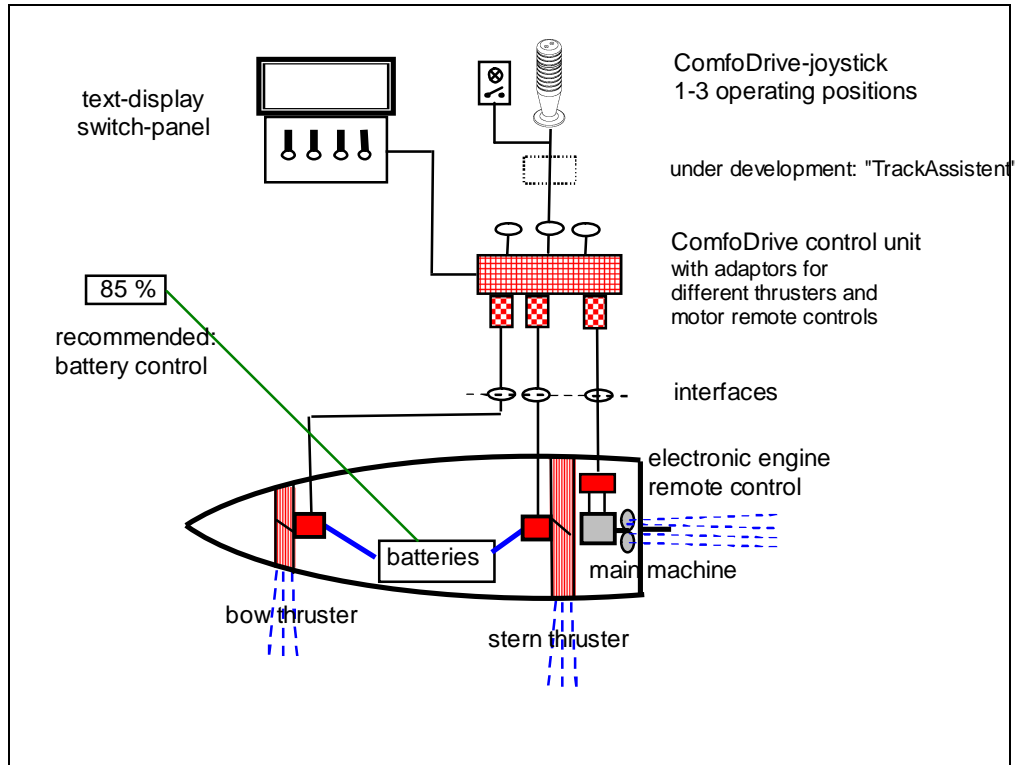
- The standard main engine is supplemented with
 - o a standard electronic engine control
 - o a simple standard (electric) bow and stern thruster,
- the three engines are connected to the ComfoDrive control unit^{*)},
- maneuver the ship with the special large 3-axis joystick^{*)}:
 - o forwards - reverse (as with a standard engine control)
 - o sideways port or starboard (tilt the joystick to the left or the right)
 - o rotation counter-clockwise or clockwise (rotate the head of the joystick),
- linear control of thrust strength proportional to the tilting angle of the joystick, not only for the main engine but also for the thrusters by switching them with pulses of variable length (ComfoDrive control unit).

Test results for difficult maneuvers in confined harbors, locks and narrow canals, especially at very slow speed and with crosswind or drift:

- Reliable control over the ship under all conditions.
- Especially for the helmsman: Great increase in security, great reduction in the stress levels.

^{*)} Patent pending

Overview: Configuration, wiring and interfaces



ComfoDrive-interfaces:

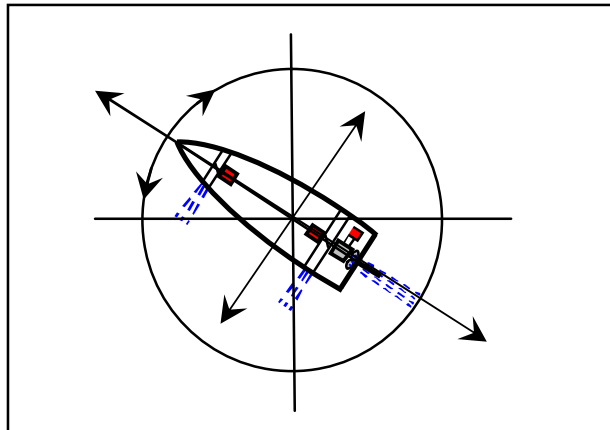
- **Bow and stern thruster:**
original interface:
Electric switch (button, mini-joystick): thrust right / thrust off / thrust left
if needed: buttons to activate retractable thrusters
- **Electronic engine remote control:**
original interface:
Potentiometer in the handle of the electronic engine control or CAN-Bus
- up to 3 Joysticks for different operating positions with "active here"-button.
- **switch panel with a 4-lines text-display**
for activating the subsystems and to signal the actual status of
the ComfoDrive-system,
the engine remote control,
the bow thruster,
the stern thruster.
- **under development: "Track-Assistant":**
The system controls by help of a GSP-module the position, the direction of the track and the speed of the boat and by help of a compass-module the bow-direction.
Functions:
electronic anchor, electronic mooring, joystick-controlled precise-tracking autopilot.

ComfoDrive

Concept "TrackAssistant"

Assisting system for the ComfoDrive

Mell / 15.7.2008



Function:

The system controls by help of a GPS-module the position, the direction of the track and the speed of the boat and by help of an compass-module the bow-direction.

The measured values will be converted to boat-coordinates.

- GPS coordinates: true geographic position,
- zero position of the coordinate-system,
- actual position of the boat within this coordinate-system,
- coordinate "ahead" (comes from the bow-direction),
movement forward - backward,
- coordinate "sideways" (laterally to the bow-direction),
movement right - left,
- coordinate "bow-direction",
rotation to the right or the left.

By pushing a button the function will be switched on. The joystick stays active. The system reads and stores the boat-coordinates for witch the joystick is in the "zero-position" and the ComfoDrive will automatically hold these coordinates exactly.

If you tilt the angle of the joystick for one ore more axis, the system will standby for these axis and the boat will move controlled by the joystick. As soon as an axis of the joystick goes back to zero, the system and the ComfoDrive will keep and hold the related coordinates of the boat.

ComfoDrive

Example 1: Electronic ancor electronic mooring

The joystick is positioned to "zero" for all axis, the main engine is switched on, the sails are down, the boat moves without thrust.

After pushing the button, the boat will hold the actual position and the bow-direction.

By using the joystick, you can correct the position and the bow-direction.

If you stop the boat e.g. during a mooring-maneuver (all joystick-axis in zero-position), the boat will stay exactly in this position and the skipper can look around relaxed, prepare the next steps or bring the mooring-ropes ashore.

This function solves e.g. the problem, to hold a boat in the mooring-position (e.g. with crosswind), without handling the joystick, e.g. to fasten the mooring-ropes one-hand.

Example 2: Precise-tracking autopilot,

The boat runs ahead under main engine, controlled by the joystick.

After pushing the button, the boat-coordinates "sideways" and "bow-direction" as well as the GPS-position (as the zero-point of the coordinate-system will be stored.

The system will hold the boat exactly on the line of the coordinate "ahead" (referring to coordinate "ahead" stored when pushing the button), drift or rotation of the boat will be automatically adjusted.

If the bow-direction is changed with the joystick while moving forward, the new coordinates for "ahead" and "sideways" will be calculated and the boat will move exactly in line of the new direction. The same procedure happens, if you give the boat a sideways-thrust with the joystick.

So the boat will be navigated by a joystick-controlled precise-tracking autopilot.

Concept of realization:

The system will be designed as a separate little box with own sensor-electronic and plugs for the "button", a switch for function-modes and for the antennas.

The system will be plugged in between the joystick and the ComfoDrive control unit. The power comes from the control unit.

The projects **Fit & Sail** and **ComfoDrive** are cooperative research-projects of the Bundesverband Wassersportwirtschaft e.V. (BVWW) in Cologne, the Institute for Sport and Sports science at the university of Kiel and the Institute for Boat-Tourism (IBoaT) in Bonn, supported by the French "Connect to Sailing" task force of the Fédération Française de Voile (FFVoile), Paris.

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In the **IBoaT-Report**, reports on the results of the Institute for Boat-Tourism, (ISSN: 1860-7888, 1860-7896) (www.iboat.de/iboat-report/) there have been published on the topic Fit & Sail until August 2007:

IBoaT-Report 3.1

Wolf-Dieter Mell: Studie: Langzeitmessungen Herz-Kreislaufbelastungen Fahrtensegeln und Alltagsaktivitäten, 2005

IBoaT-Report 3.2:

Wolf-Dieter Mell: Pilotstudie: Vergleich der Wirkungen von Vibrations-training und Fahrtensegeln auf die Sprungkraft, 2006

IBoaT-Report 3.3:

Burkhard Weisser, Wolf-Dieter Mell: Methodische Hinweise zur Diagnostik von Veränderungen der körperlichen Leistungsfähigkeit älterer Segler durch Fahrtensegeltörns, 2007

IBoaT-Report 3.4:

Wolf-Dieter Mell: Konzept ComfoDrive: Dynamik, Ergonomie und Sicherheit des Manövrierens von Segelyachten unter Motor, 2007

IBoaT-Report 3.5:

Jürgen Büddefeld: Studie: Stand der Entwicklung von Assistenzsystemen und deren Technologien zur Unterstützung von Navigation und Manövern im Nahbereich u.a. in der Berufsschiffahrt, 2007