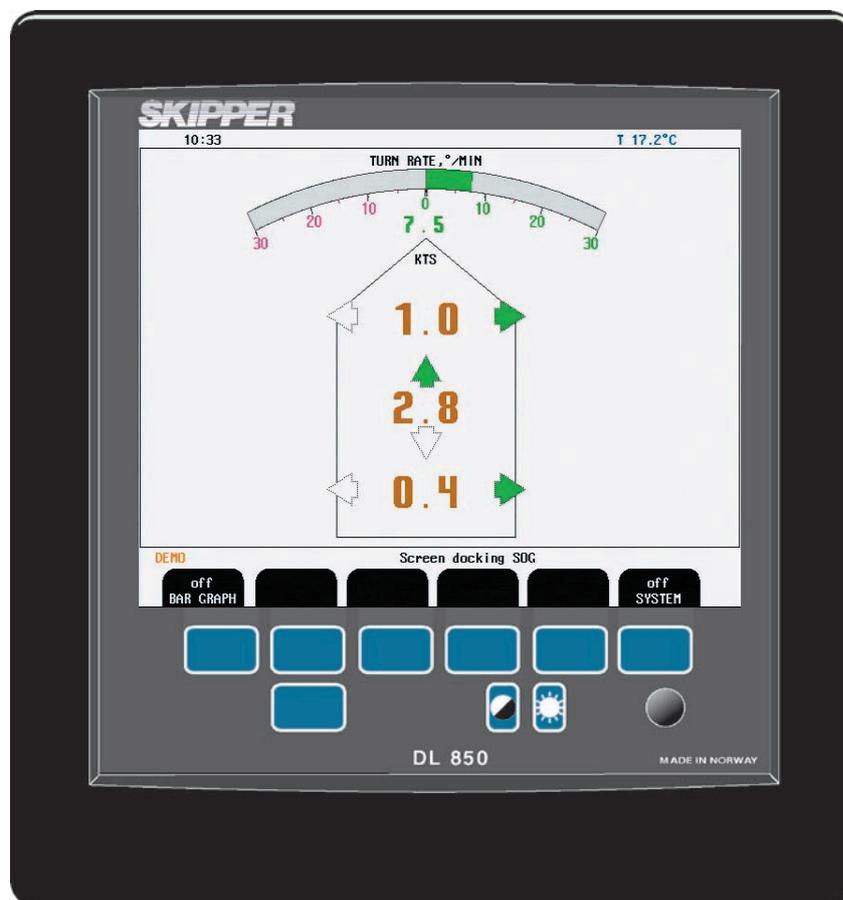


SKIPPER DL850

2 Axis Doppler Log Operation And Installation Manual

Edition 20070109sw4.01.03



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1. INTRODUCTION

SYSTEM SUMMARY.

DL850 is a navigation, 2 Axis Doppler Log with a large, high resolution graphic LCD. An auxiliary, shallow water echo sounder function is included. The display graphics is continuously shown on the LCD along with complete navigation details. Comprehensive interfaces are available including NMEA0183 input and output.

All IMO requirements for speed logs are met or exceeded. The echo sounder feature is however is not approved for navigation.

TRANSDUCER AND TRANSCEIVER.

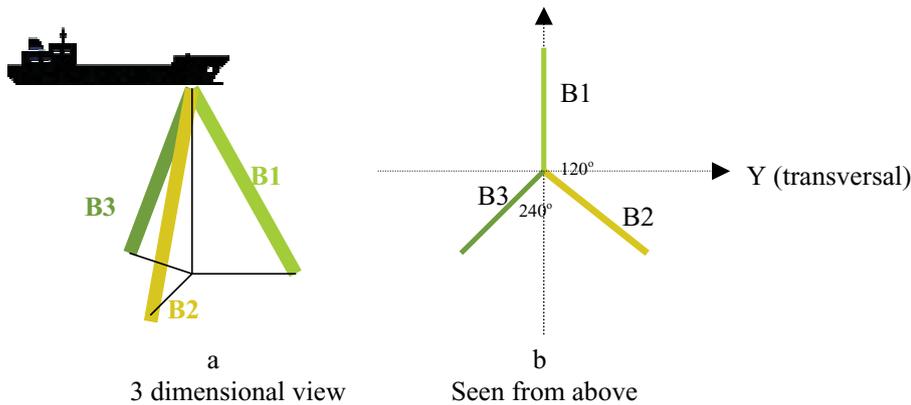
DL850 transducer consists of a head with hydro-acoustic elements:

There exist two different versions of the transducer head, both with 2 axis log function but one version do also have one element for the auxiliary echo sounder function. The Transducer is connected to a Transceiver electronics cabinet located within 40 m of the transducer. Note that the two transducers are connected differently to the transceiver. See connection diagrams in the appendix.

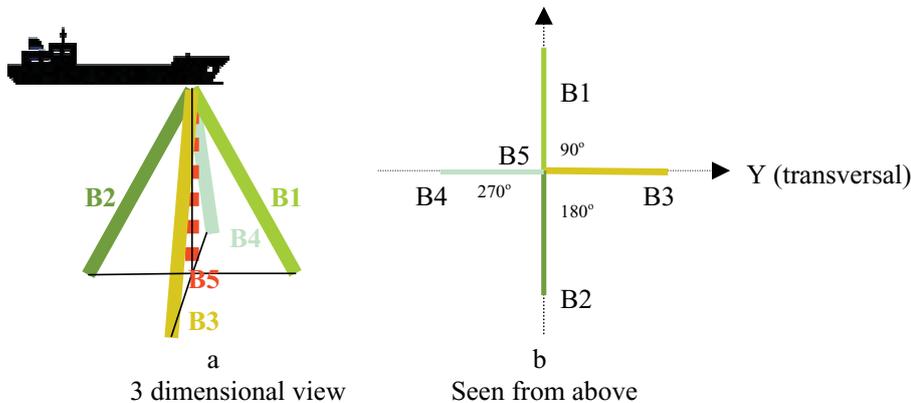
The connection from the transceiver to the operator unit is via a serial RS-422 data link and may be up to 300 m.

Transceiver power supply options are 230V AC or 24V DC. The power consumption is appx.. 80 Watts at 115/230V AC or 60 Watts at 24V DC.

Three beam sensor



Five beam sensor



OPERATOR UNIT.

The operator unit contains a graphic dot-matrix colour TFT LCD display and a keyboard with fixed keys, soft-keys and a rotating encoder. The function of each soft key button depends on the active screen, and the buttons are labelled on the lower rim of the LCD.

The display is back light, and back light intensity may be adjusted by the user. Various user-selectable information layouts, adapted to typical operational situations, may be displayed continuously on the LCD screen. The operator unit can be flush mounted, wall mounted or bracket mounted.

Operator Unit power supply options are 230V AC or 24V DC. The power consumption is appx. 70 Watts at 115/230V AC or 50 Watts at 24V DC.

INTERFACING.

The DL850 has various interface possibilities.

Outputs.

3 Log Outputs 10/100/200/400/1000 Pulses per nautical Mile. 2 outputs also gives speed direction.

3 Analogue Outputs 0 - 10 V or 4 - 20 mA.

NMEA0183 Interface Output of Speed and Depth Information

Functional Alarm Relay Output.

Power Failure Alarm Output

Inputs

NMEA0183 Interface Input of Position, Heading, Depth, UTC.

Alarms.

High and low speed alarms may be selected from the menus. Alarms are provided on both a potential free relay contact and as NMEA messages. Both ways could be used for interface to external alarm systems.

An optocoupler output is used as a separate output for Power failure alarm.

2. OPERATION

When the installation is complete, and power is connected to the operator unit, the system is switched on-off by a power switch inside the cabinet.

The unit can also be switched off by pressing the “SYSTEM off” soft key button.

Note the unit is still energized. Do not perform any re-connections before switching off the mains on the terminal PCB inside the cabinet.

PARAMETER ENTRY

The fixed function buttons and the soft key buttons of the various screens along with the rotating encoder, facilitates entry of parameters, set points and other data. The following flow chart illustrates the procedure for changing settings and entering data. The various screens are shown in detail in the Operation Section.

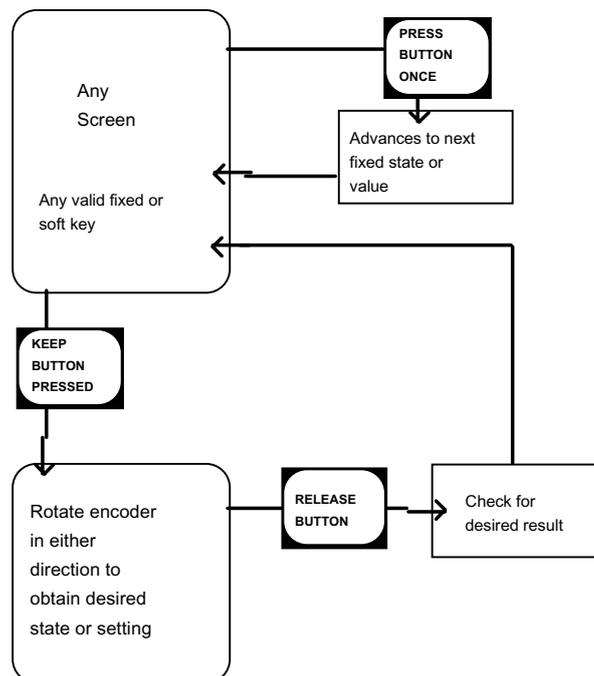


Fig. 2.1 Setting and Parameter Entry Flowchart

Example of parameter entry.

Let us say you want to enter a value of **15 kts.** for the High Speed Alarm.

Press a High Speed Alarm Soft Key, e.g. in Screen Pilot, Menu 1, and keep it pressed while you turn the encoder until you reach 15 kts, let go of the encoder and release the High Speed Alarm button.

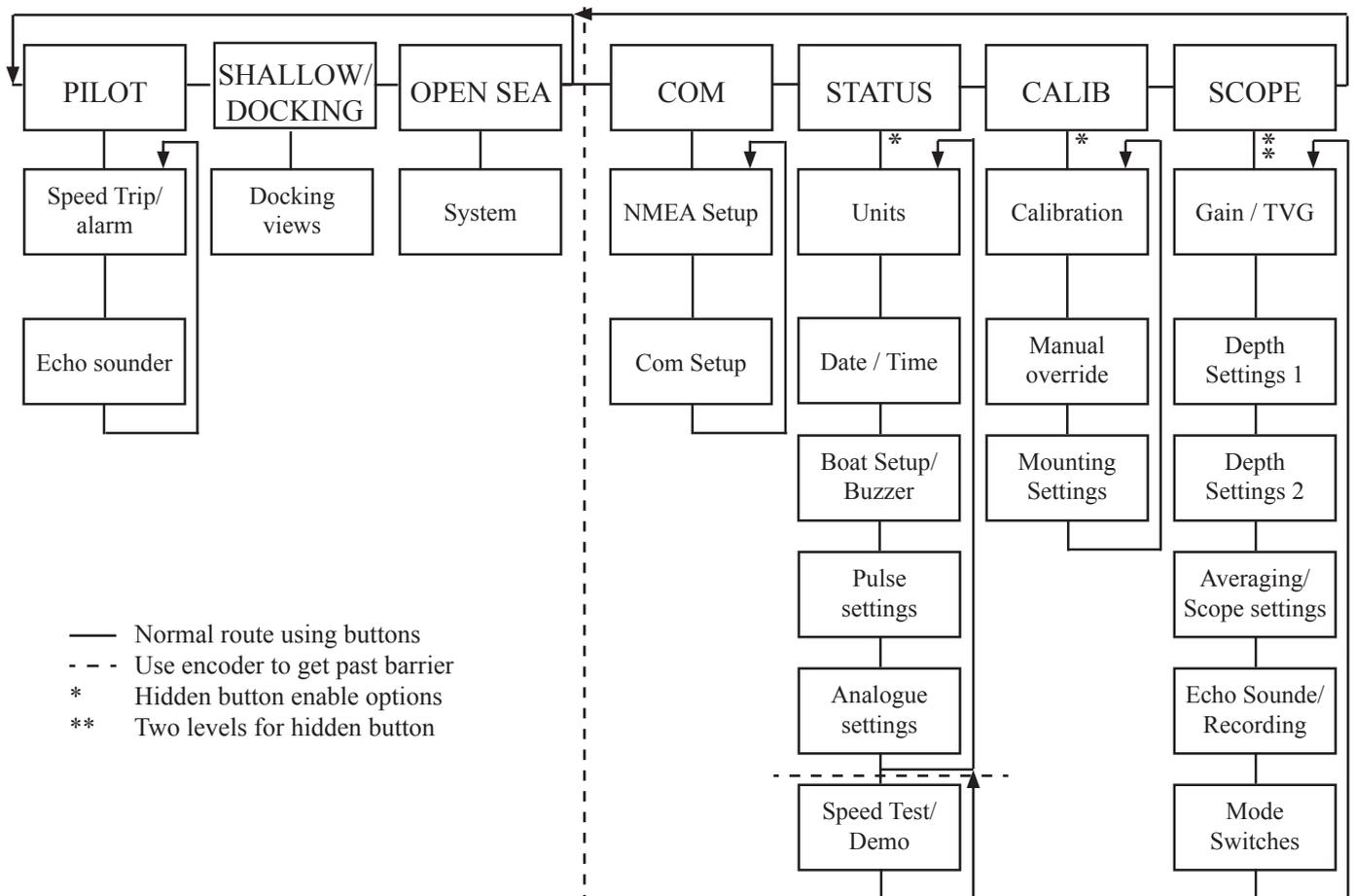
Buttons with less than 6 possible states or values can be operated without using the encoder at all.

PRIMARY SCREENS

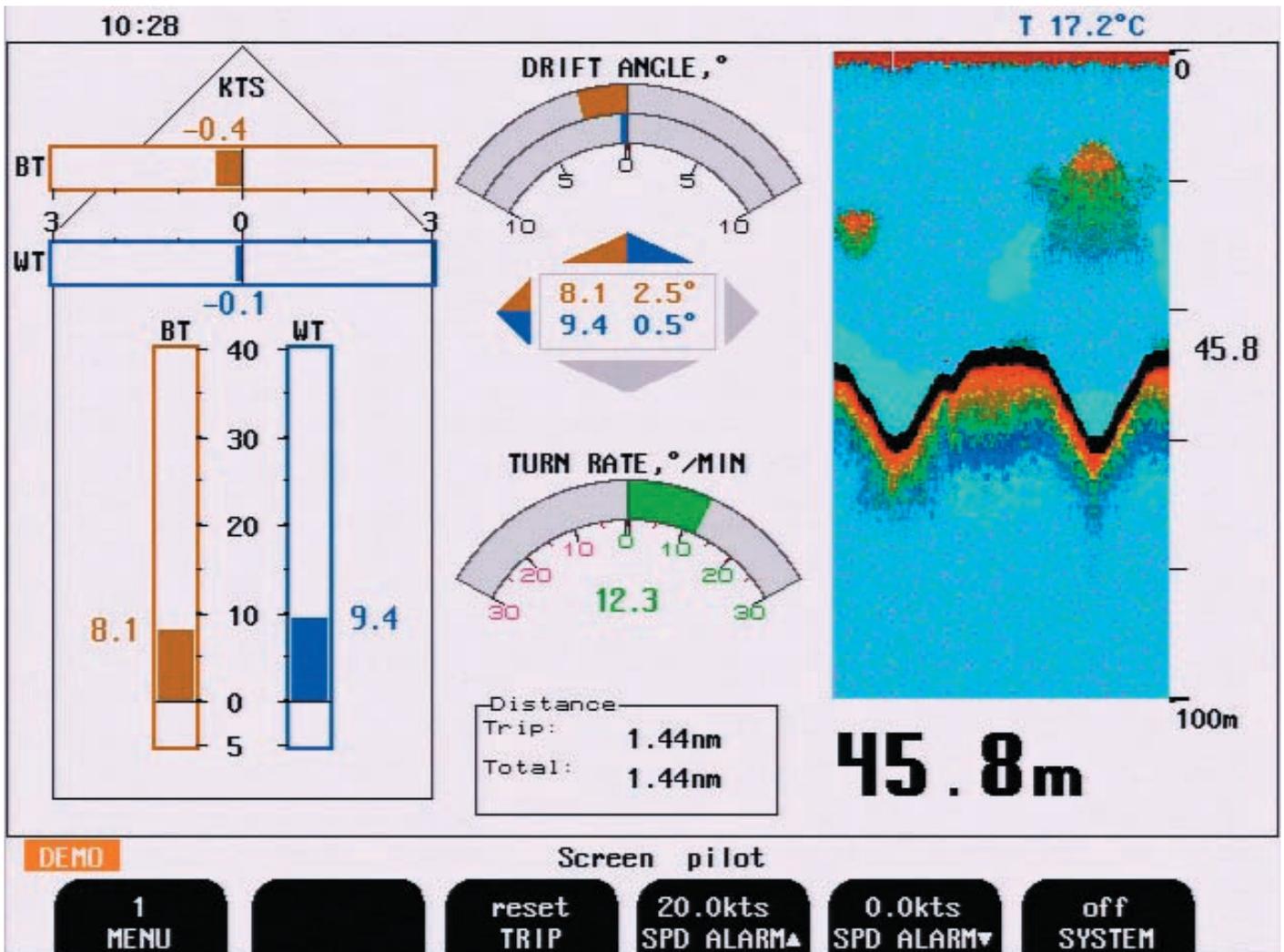
Each of the operation screens contains a graphic picture and one or more Menu sets configured on the 6 soft key buttons. The three first screens covering the primary functions. Manoeuvring within these screens are easily done by pressing the SCREEN SELECT button.

The various screens can also be selected by keeping the SCREEN SELECT button pressed and rotating the encoder in either direction. Turning the encoder clockwise cycle the screens as shown in figure below, and counter clockwise rotation cycles the screens in the opposite direction.

The screen layouts are outlined in the following screens. The various Menus and Soft Key button functions are described with each screen



Screen Pilot

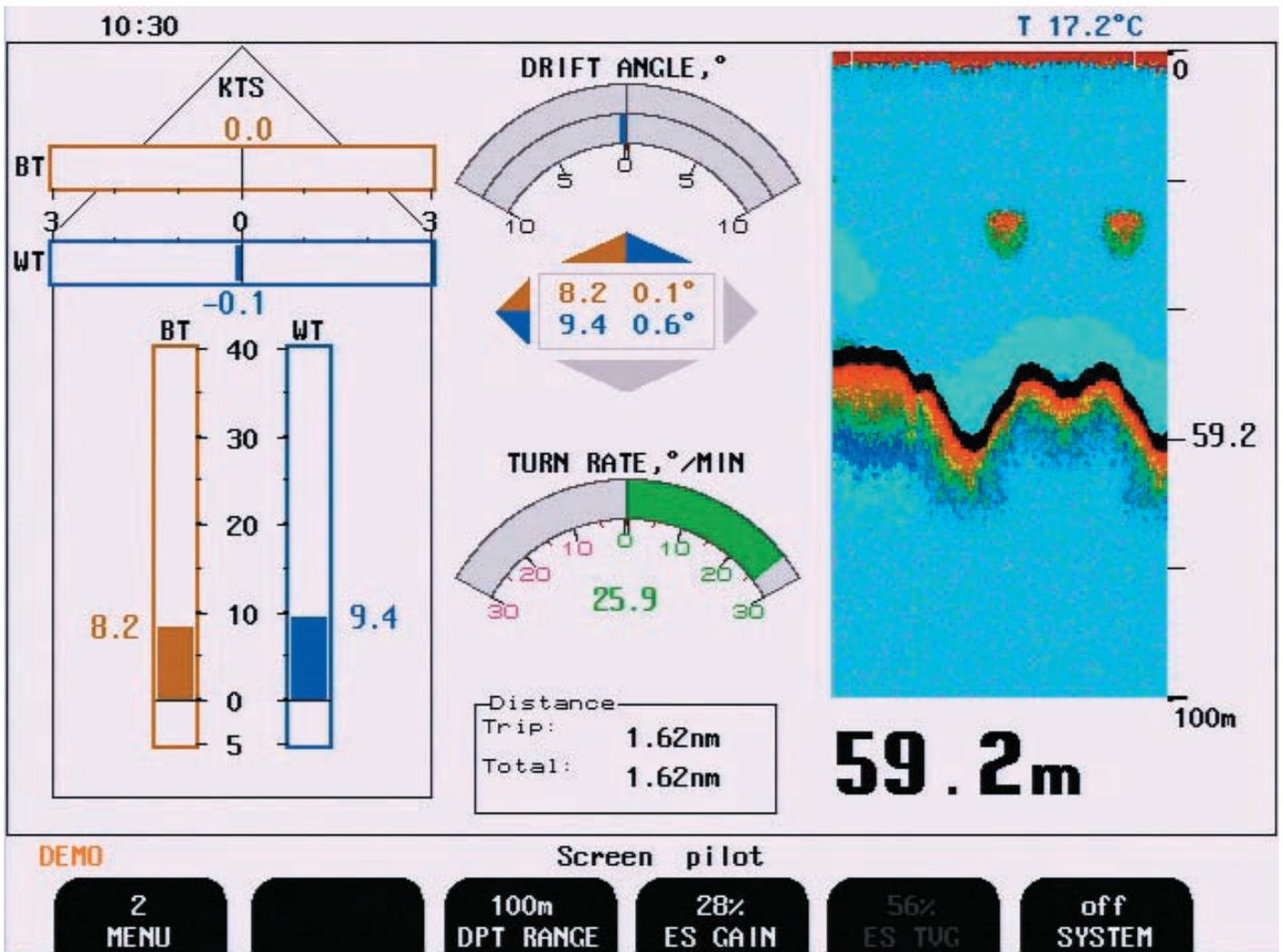


The various soft key menus are selected by pressing repeatedly the MENU button on the left side of the soft key menu. The number on the button (1 –6) indicates which of the menus are active.

Screen Pilot, Menu 1:

Soft key 1: MENU	Chosen menu number 1.
Soft key 2: Not used	
Soft key 3: TRIP	Trip Distance Counter Reset
Soft key 4: SPD ALARM	High Speed alarm
Soft key 5: SPD ALARM	Low Speed Alarm
Soft key 6: SYSTEM	System OFF.

Note: Limited detail level in the echo sounder window with a three beam transducer.



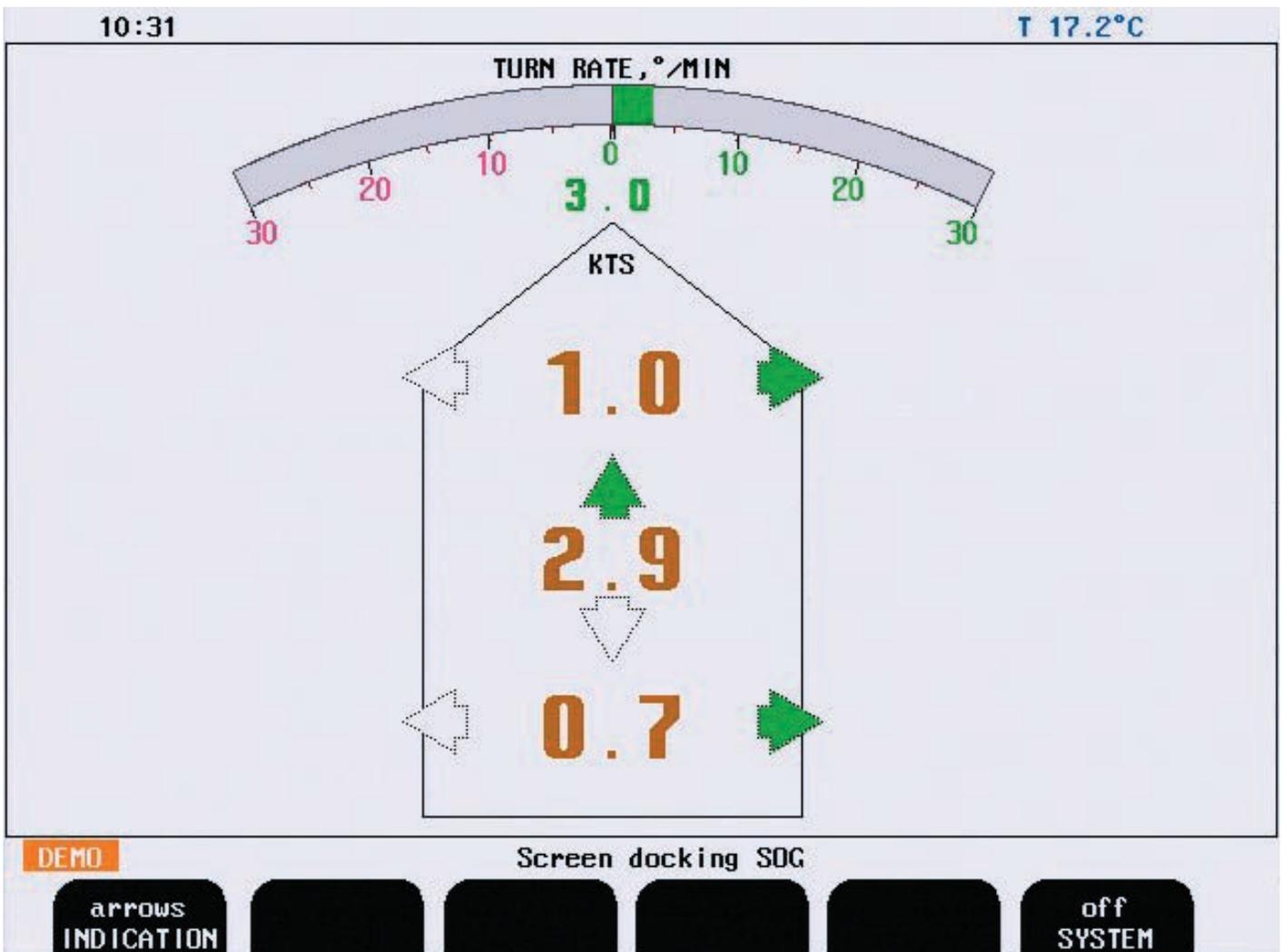
Screen Pilot, Menu 2:

Soft key 1: MENU	Menu 2 is selected
Soft key 2: Not used	
Soft key 3: DPT RANGE *	Echo sounder Range
Soft key 4: ES GAIN *	Echo sounder Gain.
Soft key 5: ES TVG *	Echo sounder TVG (Time Variable Gain)
Soft key 6: SYSTEM	Turn System OFF

* Only available for system using a five beam transducer.

Note: Limited detail level in the echo sounder window with a three beam transducer.

Screen Docking - option

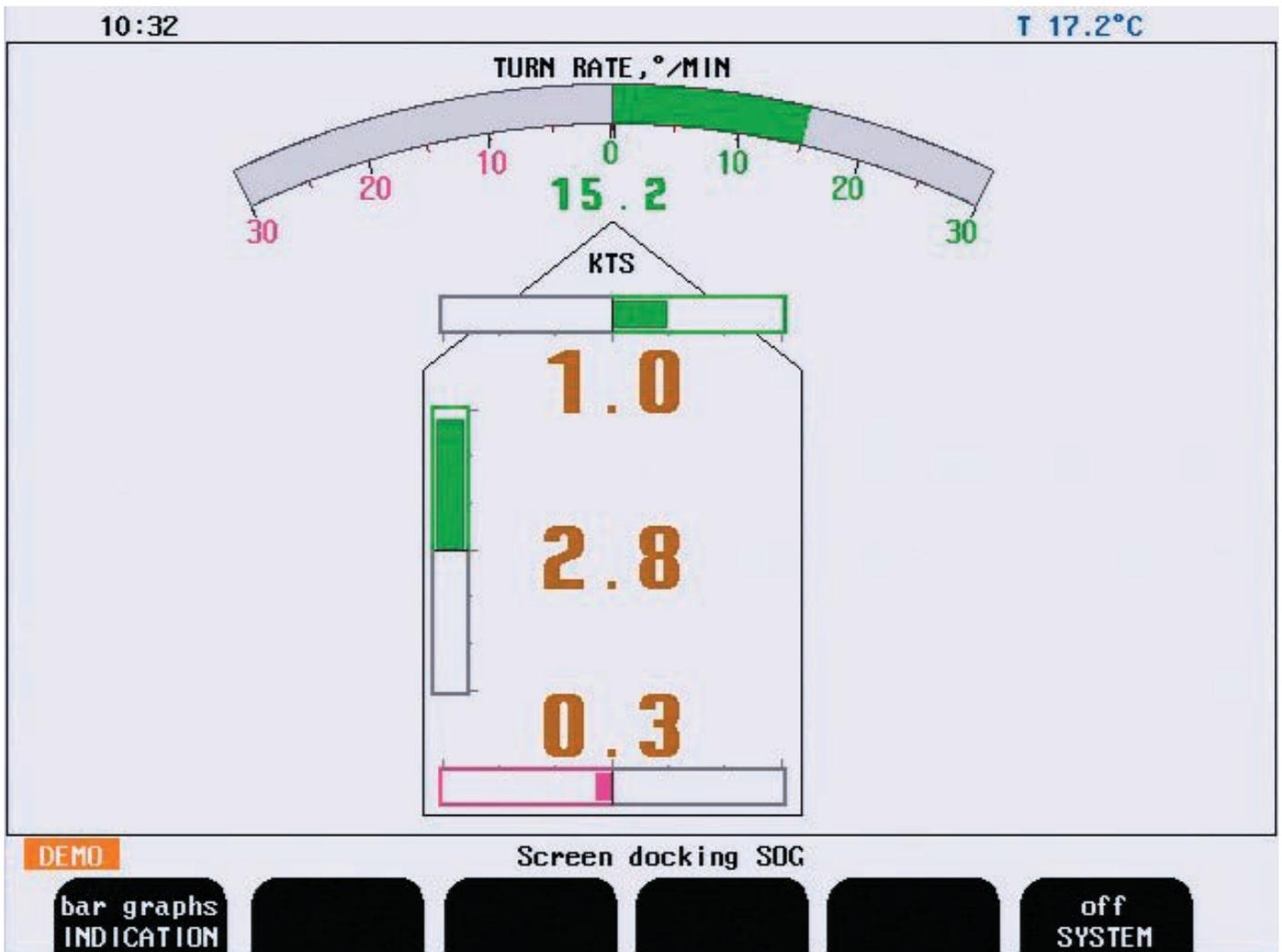


If bottom track is present will the docking screen show measured longitudinal and transversal speed at fore and calculated speed at stern point.

Speed indication may either be presented by values and directions for arrows or values and bars.

Screen Docking, Arrow view:

- Soft key 1: **INDICATION** Arrow indication is selected
- Soft key 2: **Not used**
- Soft key 3: **Not used**
- Soft key 4: **Not used**
- Soft key 5: **Not used**
- Soft key 6: **SYSTEM** Turn System OFF



Screen Docking, Bar graph view

- Soft key 1: **INDICATION** Bar graph indication is selected
- Soft key 2: **Not used**
- Soft key 3: **Not used**
- Soft key 4: **Not used**
- Soft key 5: **Not used**
- Soft key 6: **SYSTEM** Turn System OFF

Screen Open Sea



Screen Open Sea, Menu: 1

Soft key 1: **Not used**

Soft key 2: **Not used**

Soft key 3: **Not used**

Soft key 4: **Not used**

Soft key 5: **Not used**

Soft key 6: **SYSTEM**

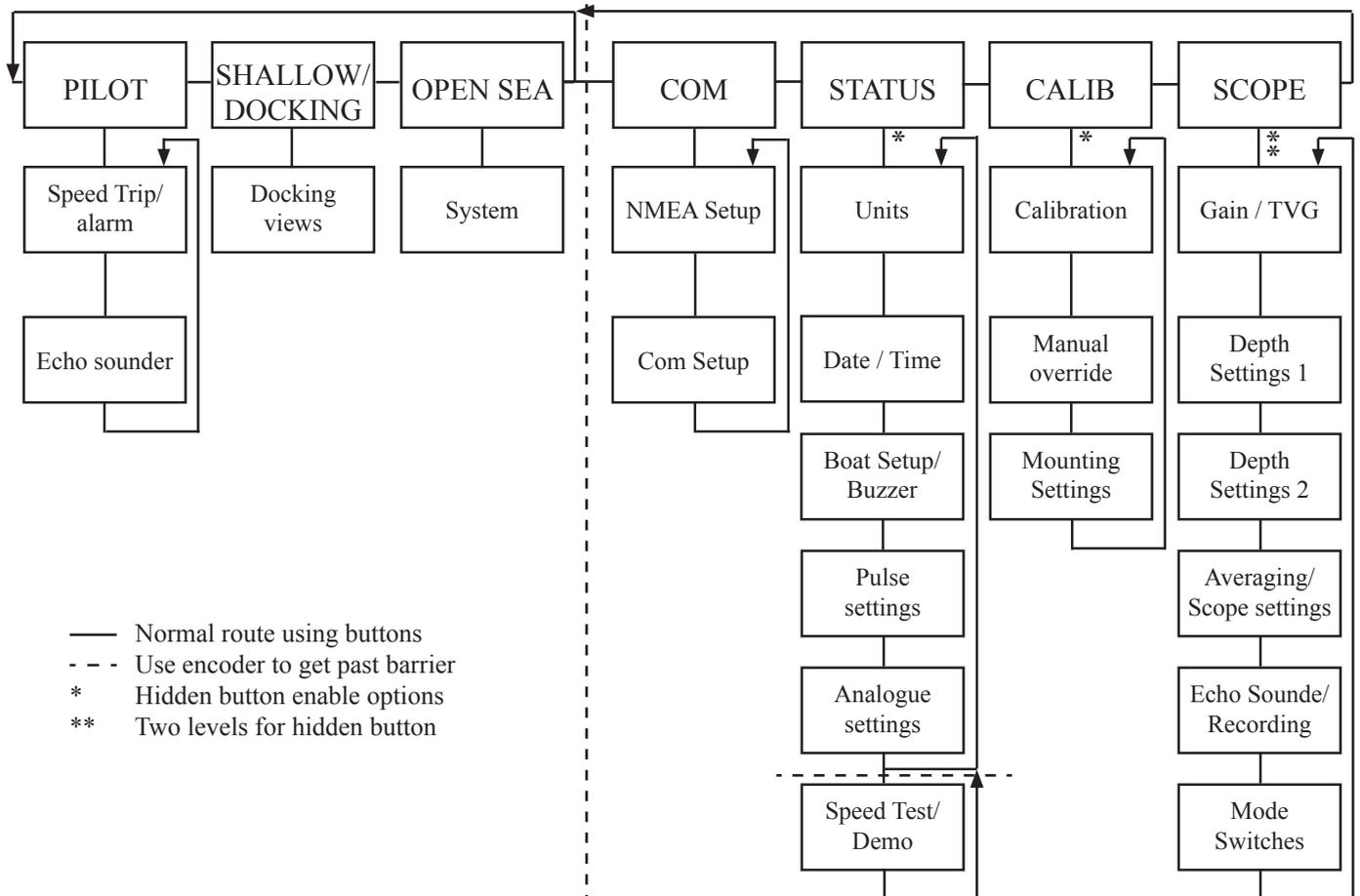
Turn System off

SETUP AND FUNCTION CONTROL SCREENS

Each of the operation screens contains a graphic picture and one or more Menu sets configured on the 6 soft key buttons. Manouver to the Setup and Function Control screens by keeping the SCREEN SELECT button pressed and rotating the encoder in either direction. Turning the encoder clockwise cycle the screens as shown in figure below, and counter clockwise rotation cycles the screens in the opposite direction.

The screen layouts are outlined in the following screens. The various Menus and Soft Key button functions are described with each screen.

The various Menus and Soft Key button functions are described with each screen.



11:18 T 17.2°C

NMEA sentences transmit, COM1	NMEA COM ports info	
	COM 1	COM 2
\$UDVLW,8.8,N,8.88,N*67J	Base addr	3f8h 2e0h
\$UDMTW,17.2,C*05J	IRQ	4 5
\$UDVHW,,,,,9.3,N,17.1,K*63J	BAUD	4800 ---
\$UDVLW,8.8,N,8.88,N*67J	DATA	None,8,1 ---
\$UDMTW,17.2,C*05J	Input XJ402	A=6,B=7 Not inst.
\$UDVHW,,,,,9.3,N,17.1,K*63J	Rx status	No signal Not inst.
\$UDVLW,8.8,N,8.88,N*67J	Data err	0 0
\$UDMTW,17.2,C*05J	Overrun err	0 0
\$UDVHW,,,,,9.3,N,17.1,K*63J	Output XJ402	A=8,B=9 A=4,B=5
\$UDVLW,8.8,N,8.89,N*66J	DPT	off ---
\$UDMTW,17.2,C*05J	DBS	off ---
\$UDVHW,,,,,9.3,N,17.2,K*60J	DBT	off ---
\$UDVLW,8.8,N,8.89,N*66J	DBK	off ---
\$UDMTW,17.2,C*05J	VTG	off ---
\$UDVHW,,,,,9.3,N,17.3,K*61J	VHW	on ---
\$UDVLW,8.8,N,8.89,N*66J	VLW	on ---
\$UDMTW,17.2,C*05J	VBW	off ---
\$UDVHW,,,,,9.3,N,17.3,K*61J	MTW	un ---
\$UDVLW,8.8,N,8.89,N*66J	ALR	off ---
\$UDMTW,17.2,C*05J	9.4kts 0.1kts 0.6°	8.1kts -0.1kts 0.8°

DEMO Screen com

2 MENU	1 COM	4800 BAUD	None,8,1 DATA	reset COM ERROR
-----------	----------	--------------	------------------	--------------------

Screen COM. Menu2.

Soft key 1: **MENU**

Menu 2 is selected.

Soft key 2: **Not used**

Soft key 3: **Not used**

Soft key 4: **BAUD**

Baudrate for Com Port #n

[1200, 2400, 9600, 19200, 38400, (57600, 115200)]

Soft key 5: **DATA**

Data Format for Com Port #n (Parity-Data Bits-Stop Bits)

[None-7-1, Even-7-1, Odd-7-1, None-7-2, Even-7-2, Odd-7-2, None-8-1, Even-8-1, Odd-8-1, None-8-2]

Soft key 6: **COM ERROR**

Reset fields for com errors.

NOTE! Baudrate and data settings apply to both input and output for selected channel, except 57600 and 115200 baud which only work for output.

The program memorizes the latest occurred NMEA input error for further analysis (error code presented on the Status and Com screens). By the mean of this soft key it is possible to reset the error.

Screen status

06:34 T 17.2°C

SKIPPER DL850, software version 4.01.01 PR, October 2006
06.11.10

Display Voltages	Installation Settings	Installation Settings
+5V10 : 5.10V	Pulses ch1: 200/nm	Analogue ch1: 0-10V
+12V10 : 12.04V	Speed ForAftWT	Min limit: 0.0kts
+5UCPU : 5.10V	Pulses ch2: 200/nm	Max limit: 20.0kts
+12UCPU : 12.16V	Speed ForAftWT	Speed ForAftWT
Ambient t: Low	Pulses ch3: 200/nm	Analogue ch2: 0-10V
	Speed ForAftWT	Min limit: 0.0kts
	Language: English	Max limit: 20.0kts
Link No test data	Vess. spd.un.: knots	Speed ForAftWT
Valid WT 25/25%	Dist units: nm	Analogue ch3: 0-10V
Valid BT 25/25%	Depth units: meters	Min limit: 0.0kts
Signal WT 25%	Sound spd.un.: m/sec	Max limit: 20.0kts
Signal BT 49%	Alarm buzzer: off	Speed ForAftWT
False BT 0%	Spd alarm ▲: 20.0kts	
	Spd alarm ▼: 0.0kts	

DEMO Screen status

1 MENU English LANGUAGE knots VESSEL SPD meters ES RANGE nm DISTANCE m/sec SOUND SPD

The status screen contains information that will facilitate analysis and correction of several problems. All installation settings are displayed on this screen.

Refer trouble-shooting guide, describing status information, indicated in the first column.

Screen status, Menu 1

Soft key 1: MENU	Menu 1 is selected
Soft key 2: LANGUAGE	Select Display Language: [English]
Soft key 3: VESSEL SPD	Select Speed Unit [Knots, Km/h, Mi/h, m/sec]
Soft key 4: ES RANGE	Select Depth Unit [Meters, feet, fathoms, breccias]
Soft key 5: DISTANCE	Select Distance Unit [NM, Km, Mi]
Soft key 6: SOUND SPD	Select Sound Speed Unit [m/sec, ft/sec]

DEMO Screen status

2 MENU 06.10 YR. MONTH 30 DAY 13 HOURS 16 MINUTES

Screen status, Menu 2

Soft key 1: MENU	Menu 2 is selected
Soft key 1: Not used	
Soft key 3: YR.MONTH	Year and month setting
Soft key 4: DAY	Day setting
Soft key 5: HOURS	Hours setting
Soft key 6: MINUTES	Minutes setting

Note: if time and data information provided on the NMEA input, it has highest priority and all above time & date functions are not available.



Screen status, Menu 3

- Soft key 1: **MENU** Menu 3 is selected
- Soft key 2: **SHIP LEN** Overall ship length (Used for docking mode)t
- Soft key 3: **BOW<->SENS** Distance from bow to sensor (Used for docking mode)t
- Soft key 4: **DRAUGHT *** Echo sounder Draught
- Soft key 5: **Not used**
- Soft key 6: **BUZZER** Enable or disble the alarm buzzer

* Only available for system using a five beam transducer.



Screen status, Menu 4

- Soft key 1: **MENU** Menu 4 is selected
- Soft key 2: **OUT NUM** Pulse Output Channel to be configured by Keys 3 & 4 [ch1, ch2, ch3]
- Soft key 3: **PULSES NUM** Number of pulses per nautical mile at this channel (key 2) [10, 100, 200, 400,1000].
- Soft key 4: **OUT MODE** Type of speed value to be output at this channel (key 2):[ForAftWT, LateralWT, ResultWT, ForAftBT, LateralBT, ResultBT]
- Soft key 5: **Not used**
- Soft key 6: **Not used**



Screen status, Menu 5

- Soft key 1: **MENU** Menu 5 is selected
- Soft key 2: **OUT NUM** Analogue Output Channel to be configured by Keys 3-6 [ch1, ch2, ch3]
- Soft key 3: **OUT MODE** Select Output Mode for this channel (key 2) [0-10V, 4-20mA]
- Soft key 4: **OUT MODE** Type of speed value to be output at this Channel (key 2): [ForAftWT, LateralWT, ResultWT, ForAftBT, LateralBT, ResultBT]
- Soft key 5: **ANA MIN** Speed Value, corresponding to minimum analogue value at this channel (key 2): [-30 - +30kts]
- Soft key 6: **ANA MAX** Speed Value, corresponding to maximum analogue value at this channel (key 2): [-30 - +30kts]



Screen Status. Menu 6.

Described below functions can be used during commissioning period to exercise different DL850 outputs with a constant, user adjustable speed values. Note: when the test mode is activated, this will be indicated by flashing “TEST” label in the lower right part of the screen.

Soft key 1 : MENU	Press soft key and turn encoder to select menu 6
Soft key 2 : SPD TEST, on/off	Toggling test mode.
Soft key 3 : LONG. SP	Select test value of longitudinal speed
Soft key 4 : TRANSV.SP	Select test value of transversal speed
Soft key 5 : DISTANCE	Select test value of distance.
Soft key 6 : SIMULATE	Simulator on/off

Note: during normal operation SPD TEST soft key is disabled and can be activated by the mean of “hidden” button (ref “Activation of the calibration mode”).

Screen calibration

11:27 T 17.2°C

SKIPPER DL850, software version 4.01.01 beta2, September Calibration **disabled**
06.10.06

Calibration trip

	Leg 1	Leg 2	Average Leg 1+ Leg 2
Measured distance:	0.000km	0.000km	0.000km
Real speed:
Measured speed WT:
Measured speed BT:

Calibration settings

	1	2	3	4	5
Real speed WT:	empty	empty	empty	empty	empty
Measured speed WT:	empty	empty	empty	empty	empty
Real speed BT:	empty	empty	empty	empty	empty
Measured speed BT:	empty	empty	empty	empty	empty

Measured speed			Calibrated speed			Averaged drift
9.5kts	0.1kts	0.6°	9.5kts	0.1kts	0.6°	0.0°
8.3kts	0.0kts	0.0°	8.3kts	0.0kts	0.0°	

DEMO Screen calibration

1 MENU	leg 1 START	activate CALIBR	0 TRIPS LIST	1853m CALIBR DIS
-----------	----------------	--------------------	-----------------	---------------------

The various soft key menus are selected by pressing repeatedly the MENU button on the left side of the soft key menu. The number on the button indicates which of the menus is active.

For calibration see : DL850 calibration procedure

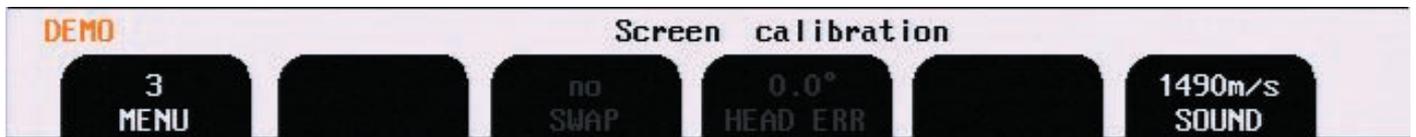
Screen calibration, Menu 1

- Soft key 1: **MENU 1** Menu 1 is selected
- Soft key 2: **START/FINISH leg1 /leg2.** Used to start/finish test trip.
- Soft key 3: **CALIBR activate** Used to move data, collected during test trip into calibration table.
- Soft key 4: **TRIPS LIST** Used to list between different test trip data sets. Only one test trip is displayed on the screen at a time.
- Soft key 5: **Not used**
- Soft key 6: **CALIBR DIS** Used to adjust length of the test leg.



Screen calibration, Menu 2

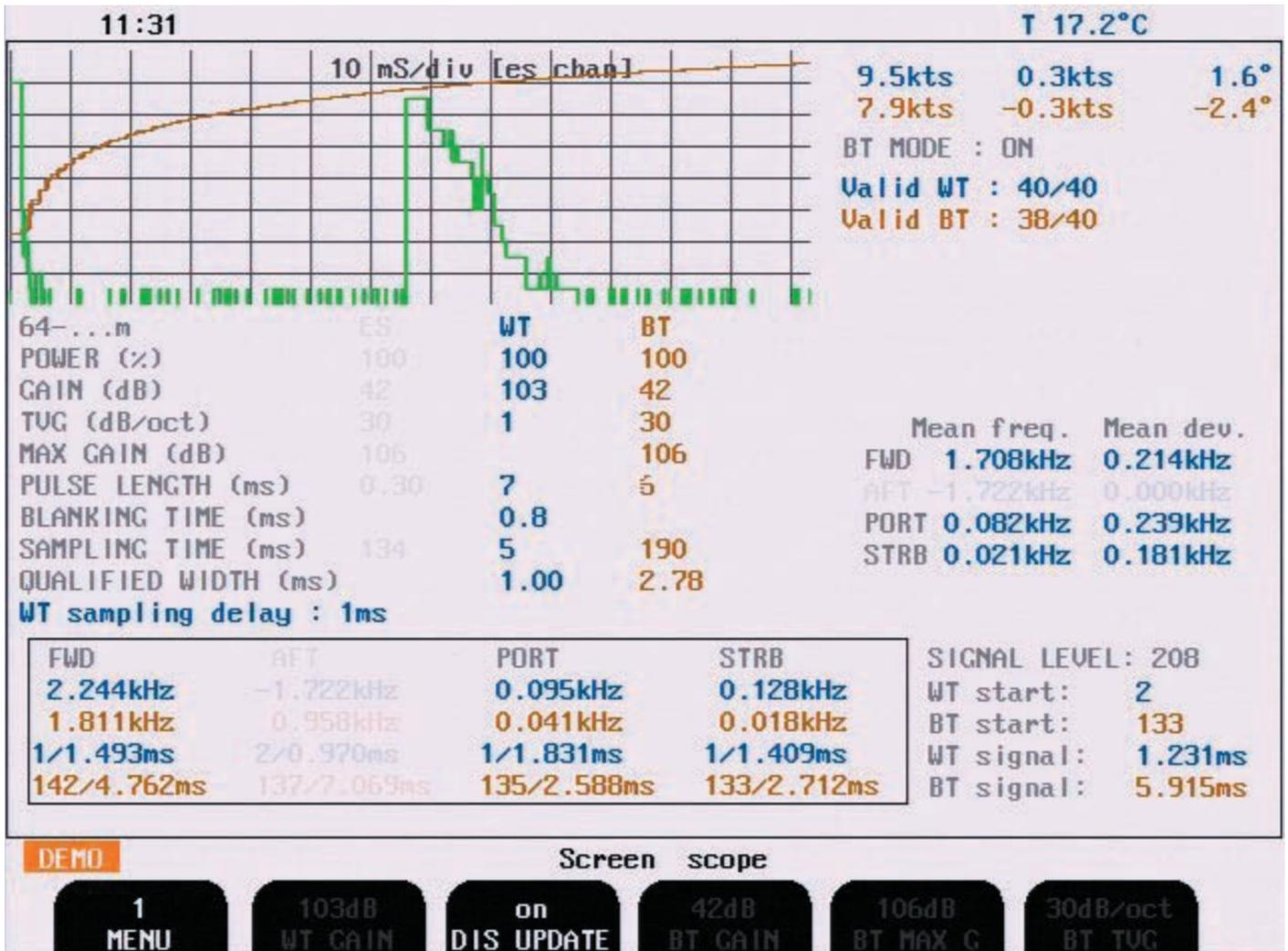
Soft key 1: MENU 2	Menu 2 is selected
Soft key 2: CALIBR NUM	Number of the calibration, data set currently available for adjustments. In the calibration table it is marked by the frame.
Soft key 3: WT REAL	Real ship's WT speed (Reference speed)
Soft key 4: WT MEASUR.	WT speed, measure by the system (not calibrated)
Soft key 5: BT REAL	Real ship's BT speed (Reference speed)
Soft key 6: BT MEASUR.	BT speed, measure by the system (not calibrated)



Screen calibration, Menu 3

Soft key 1: MENU 3	Menu 3 is selected
Soft key 2: Not used	
Soft key 3: SWAP	Transducer elements swap.
Soft key 4: HEAD ERR	Installation angular error correction
Soft key 5: Not used	
Soft key 6: SOUND	Speed of sound 1400 - 1550 m/s

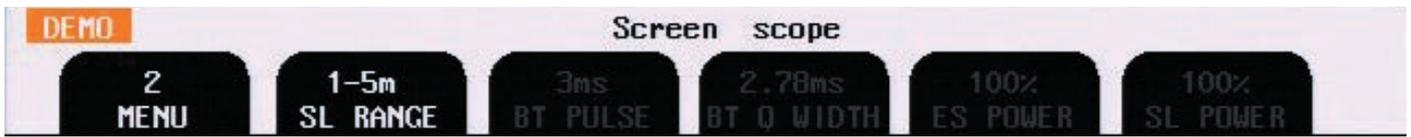
Screen Scope



The scope screen will differ depending if a three beam or a five beam sensor is installed. Screens here are shown with five beams.

Screen Scope, Menu1:

Soft key 1: MENU	Menu 1 is selected
Soft key 2: WT GAIN	Water Track start Gain (at a time, when receiver is open)[0-255 of relative units]
Soft key 3: WT AUTOG	Toggle Water track autogain mode [on/off]
Soft key 4: BT GAIN	Bottom Track start Gain (at a time when receiver is open) [10-240 of relative units]
Soft key 5: BT MAX G	Max Gain for bottom track.
Soft key 6: BT TVG	Time interval of incrementing receiver gain. [100-3000us] After each interval the amplifier gain is increased by 0.4 db.



Screen Scope, Menu2:

- | | |
|-------------------------------|---|
| Soft key 1: MENU 2 | Menu 2 is selected. |
| Soft key 2: SL RANGE | Select speed log range for adjustments of the transceiver parameters, which will be activated, when speed log turns automatically selects this range during operation. [1-5m, 5-10m, 10-15m, 15-25m, 25-40m, 40-64m, 64...]
Note, that when the operator changes SL RANGE, the rest of the soft keys will change their values according to the currently set SL RANGE. |
| Soft key 3: BT PULSE | Pulse Length during bottom track sample [1-30 ms] |
| Soft key 4: BT Q WIDTH | Bottom track signal WIDTH discrimination factor. (Minimal echo signal width in BT mode to qualify this signal as acceptable for further calculations.)
This parameter shouldn't be set too low to avoid lock on the acoustical and electrical noise and at the same time too high, when there is a possibility to filter out all useful signals. |
| Soft key 5: ES POWER * | EchoSounder power setting [25-50-100%] |
| Soft key 6: SL POWER | Speed log power. |

* Only available for system using a five beam transducer.



Screen Scope, Menu3:

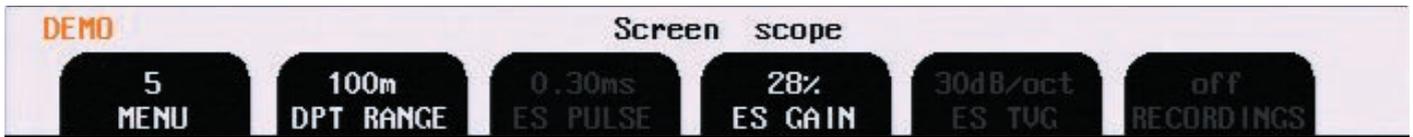
- Soft key 1: **MENU 3** Menu 3 is selected.
- Soft key 2: **SL RANGE** Select speed log range for adjustments of the transceiver parameters, which will be activated, when speed log turns automatically selects this range during operation. [1-5m, 5-10m, 10-15m, 15-25m, 25-40m, 40-64m, 64...] Note, that when the operator changes SL RANGE, the rest of the soft keys will change their values according to the currently set SL RANGE.
- Soft key 3: **WT PULSE** Pulse Length during water track sample [1-30 ms]
- Soft key 4: **WT Q WIDTH** Water track signal length discrimination factor. (Minimum echo signal width of signal in WT mode to qualify this signal as acceptable for further calculations.) This parameter shouldn't be set too low to avoid lock on the acoustical and electrical noise and at the same time too high, when there is a possibility to filter out all useful signals.
- Soft key 5: **WT BLANK** Time delay between end of transmission and opening receiver. Actually this parameter defines the distance from the hull, where speed measurements begin. The factory setting is 2ms for all speed log ranges apart from extremely shallow range 1.5m, here it is set to 1.5 ms to avoid lock to the bottom reflection during WT sample.
- Soft key 6: **WT SAMPLE** Period of time, when receiver is kept open. This value should be as large as possible to provide better accuracy, but at the same time it should depend on the operating depth to prevent receiving of bottom signal in more shallow waters.

Example: if it necessary to adjust WT BLANK parameter, when the boat is operating at 15-25m depth range, one should first select this range by the mean of SL RANGE "soft key" and set the desired value. Same procedure should be repeated for another ranges (if required)



Screen Scope, Menu4:

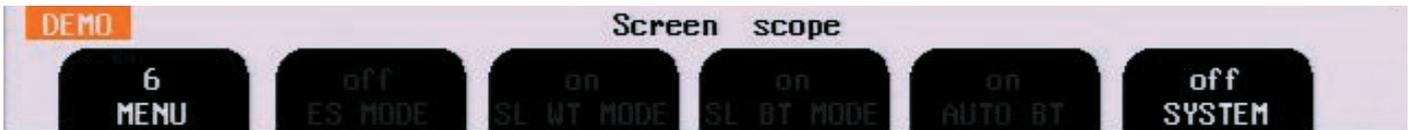
- Soft key 1: **MENU 4** Menu 4 is selected.
- Soft key 2: **FILTER** Speed filtering function; hasn't been tested properly yet, should be switched off
- Soft key 3: **ECHO CHAN** this function allows to display echogram in the oscilloscope window from any channel in any operating mode. Toggle between echosounder/WTchannels1..4/Btchannels1..4 It will allow examining shape and amplitude of the returned signal in each individual channel.
Note1 During normal operation it must be set to "es chan".
Note2 There is a hardware error in the present system, due to which the signal timing parameters (described in section "Signal characteristics, timing parameters") of the displayed channel are not correct (set to 0). Otherwise this function can help to judge the quality of the returned signal in each channel. As noticed before the optimal depth range (in Menu 5) should be set for better signal resolution.
- Soft key 4: **WT AVERAGES** Number of individual samples to be averaged in WT mode to provide better accuracy.
- Soft key 5: **BT AVERAGES** Number of individual samples to be averaged in BT mode to provide better accuracy.
- Soft key 6: **MEAN VALUE** **WT/BT** Factory function (used for adjustments of playback speed, when analyzing test results). Should be set "on"
 Mean frequency for WT/BT signal for last 100 samples.



Screen Scope, Menu5, optional echo sounder functions

- Soft key 1: **MENU** Menu 5 is selected.
- Soft key 2: **DPT RANGE** Depth range to be used in the oscilloscope window and conventional echo sounder picture (when enable)
- Soft key 3: **ES PULSE *** Echo sounder pulse length
- Soft key 4: **ES GAIN *** Echo sounder start gain
- Soft key 5: **ES TVG *** Echo sounder TVG parameter
- Soft key 6: **RECORDINGS** On / Off recording. Used if an optional extra compact flash is installed.

Note: Echo sounder function is normally disabled to provide better efficiency of the speed log operation and should be switched on in case of no any other navigational type echo sounder available on board. Normally detectable range is 80-100m, depending on bottom and sea conditions.



Screen Scope, Menu6,

- Soft key 1: **MENU** Menu 6 is selected.
- Soft key 2: **ES MODE *** Toggle echo sounder function on/off. It is advisable to switch echo sounder off in case another navigational type echo sounder is available onboard.
- Soft key 3: **SL WT MODE** Toggle WT function on/off. Used for factory testing and control. During normal operation should be switched on
- Soft key 4: **Not used**
- Soft key 5: **AUTO BT** Toggle AutomaticBottom track. Useful, when sailing in open sea, when Bottom Track is not available. If this parameter switched on, Bottom Track samples automatically activated for short period of time after each 10 WT samples. If bottom is not available it is deactivated. Bottom track will start indicate speed in case of stable lock on the bottom signal. If AUTO BT is switched off, bottom track will operate continuously, but no BT speed indications provided on the screen

Note: In case of loosing BT indications, DL850 will provide (D)GPS speed value on the NMEA output, if (D)GPS is connected.

- Soft key 6: **SYSTEM** Turn System OFF

IMPORTANT NOTE : in case of accidental changing of some parameters, which causes serious malfunction, one should reset all parameters to factory defaults. To do this, it is necessary to switch power off, on again, press to most left and right buttons in the upper row and keep them pressed until the graphic picture appears on the screen. 4 beeps are provided; signaling that master reset operation has been completed. One should remember, that in this case all previously set parameters (speed calibration, analog calibration etc) all calibration must be repeated.

* Only available for system using a five beam transducer..

PRINCIPAL FUNCTIONS

Doppler Log Principle

The doppler log works on the principle of detecting doppler frequency shifts, i.e the phenomena of a perceived frequency being dependant on the relative speed of the emitting and receiving systems.

$$\Delta f = \frac{2v}{c} f$$

Observed Frequency Δf ,
Emitted frequency f ,
Measured velocity, v ,
Speed of Sound in Water, c .

A short burst of a known frequency is emitted into the water, and the frequency of received echoes is measured. The difference between the emitted frequency and the received frequency makes it possible to calculate the relative speed. If the reflecting body is the bottom, the measured speed will be relative to ground, unaffected by wind and current drifts. By measuring the reflections from a near water layer, a water relative speed may be obtained.

To compensate for vessel movements (heeling and rolling) and loading attitude, each axis is measured in two angels.

Bottom Track Characteristics

DL850 will try to acquire a bottom track when the depth is between 2 and appx. 70 m, depending on the bottom conditions. If conditions for Water Track operations are also within the operation parameters, both Bottom Track and Water Track data will be acquired.

Water Track Characteristics

Water relative speed is measured at a depth of appx. 1 m, in correspondence with the ARPA requirements for radar speed interfaces. If conditions for Bottom Track operations are also within the operation parameters, both Water Track and Bottom Track data will be acquired.

Docking Function - Option

Docking function is a feature for vessels which have a need to see the behaviour of the vessels aft. Instead of installing a second sensor aft (which will normally cause problems due to turbulence under the sensor) the movement of the aft is calculated using the forward sensor and the gyro compass's rotation signal. Provided the ROT signals fulfill the IMO standards (IMO Resolution A.526(13)) and the Doppler sensor is installed and operating correctly, the aft Transversal can be calculated to the required accuracy of 0.2 kn.

The longer the vessel the more accurate the requirement of the Doppler sensor. The accuracy of the sensor can be increased by increasing the averaging time of the system, or the size of the measurement sample (cell). The software will calculate the optimum averaging and cells size, based on the requirement spec of the system and set this as the default value. It is likely the averaging can be reduced to give a faster response as most systems have an actual performance better than the requirements.

During installation parameters for the over all ship length and distance between the bow and sensor must be enter into the log. These parameters are used for calculating the aft speed.

Echo sounder operation

Presentation of depth data will depend on which sensor that is installed.

With the three beam sensor the depth will be shown as a thick black line in the echo sounder window, just showing the bottom contour.

The five beam sensor, with a dedicated echo sounder channel, will if possible draw a more detailed echogram. DL850 employ a bottom detection algorithm that will try to extract the bottom signal from all kinds of noise and secondary echoes. When DL850 is tracking the bottom normally, a thick black line is shown, and below that, a ribbon with a hatched pattern. This pattern has two levels of hatching. The darkest represent strong and unambiguous bottom echoes. The lighter hatching represents weaker signals possibly occasional detection misses. If the software can detect no bottom for several pings, the hatched ribbon disappears.

During normal bottom tracking, a digital value is shown by the bottom contour at the right side of the screen. Part of the bottom detection algorithm is the ping to ping filtering. The next bottom is searched for in a time and strength window based on the strength and timing of the previous bottom echoes. This procedure reduces the probability of tracking schools of fish or secondary echoes as bottom.

If no bottom is detected in the calculated window, the window is gradually increased in size until the full time and strength window is used.

Non-volatile Parameter Memory.

The system contains non-volatile memory to maintain installation and user parameters like Language and unit of measurement selection, Back light settings, etc.

These parameters are kept in EEPROM memory and are automatically restored on power up. If the user parameters have never been set, default values are used.

FIXED KEY FUNCTIONS.

Screen Select

The SCREEN SELECT button facilitates selection of one of the 7 screen and soft key layouts. The 3 primary operation screens may be cycled by repeatedly pressing the SCREEN SELECT button. Access to the remaining screens is through encoder operation. The screens are cycled in an endless, bi-directional loop, e.g. turning the encoder counter-clockwise, will open Screen 7 after Screen 1.

Contrast & Back light adjustment

Back light may be continuously controlled by means of the appropriate buttons and the encoder. Press the back light button and rotate the encoder until a satisfactory setting is obtained, then release the button. The settings are maintained in the non-volatile memory, and the last settings are restored on power up.

If the back light setting is reduced too much, the panel illumination may become uneven due to the LCD tubes not being properly ignited. Increase the setting until the illumination is even across the screen.

SOFT KEY FUNCTIONS.

Menu

If several menus are available is the leftmost soft key always used for selecting the desired menu, i.e. soft key layout within a screen. The different screens have a different number of menus, and some of the menu functions may be available on more than one menu.

Keys in operation screens:

Trip Reset

This key is used to reset the trip distance log.

Sp(ee)d Alarm Δ

Set a Speed High Alarm Limit

Sp(ee)d Alarm ∇

Set a Speed Low Alarm Limit

S(speed)L(og) Power

Speed log Power may be adjusted at Auto, 25%, 50% or 100 %. Power adjustment is normally automatic, but may be manually overridden under certain circumstances in case of difficult water or bottom conditions. Too high power in such cases may possibly saturate the receiver or cause detection of unwanted secondary bottom or surface echoes.

Alarm settings

The local alarm buzzer may be disabled from screen status, but the external alarm relay will always operate. The only way to disable the alarms completely, is to reduce the Low speed alarm to zero and increase the High Speed alarm to maximum range.

Alarm acknowledgement.

When any alarm is activated, the alarm may be acknowledged by pressing any button. Alarm relay and audio alarm may be acknowledge by sending the "ACK" NMEA message from a alarm handling system, or by operating a remote button that shorts the INHIBIT+ and INHIBIT- lines on the terminal board.

Clock and Calendar Settings

Manual Clock and Calendar adjustments are carried out in the Screen Status, menu 5. If a Satellite navigator giving UTC messages is connected to the NMEA input, the clock and calendar will be automatically updated and manual adjustment is not required.

Status Screen

The Status Screen shows a list of various system parameters useful for documenting system set-up and system operating status. The contents of this screen will be valuable information in situations where manufacturer support is required.

Oscilloscope Screen

The Oscilloscope screen is useful when monitoring transducer performance. The oscillogram shows the signal returned from the transceiver plotted against time and will enable service personnel to evaluate system performance and facilitate any troubleshooting.

System ON/OFF

During normal daily operation, the system may be switched off from all operation menus. This operation does not disconnect the system from the power supply, but all power consuming components are switched off. The system may be switched on again by pressing any button.

Warning! the unit is still energized!!! Do not perform any reconnections or service procedures before switching off the mains on the terminal PCB inside the cabinet.

Do not run the Speed Log without a submerged transducer connected.!

D(e)pt(h) Range *

Set the Depth Range of the Echo sounder.

E(cho)S(ounder) Gain *

Echo sounder Gain may be adjusted from 0 to 100% to allow for optimal echo levels from bottom and other objects. The GAIN setting affects signals from all depths.

E(cho)S(ounder) T(ime) V(aria)ble G(ain) *

Time Variable Gain may be adjusted from 0 to 100 % to allow for detailed echo control from the 0 - 50 m depth range.

A low setting will reduce the gain in the area near the surface to suppress noise and unwanted echoes from this area.

* Only available for system using a five beam transducer.

3. USER MAINTENANCE

TRANSDUCER MAINTENANCE.

The transducers are virtually maintenance free, but occasional cleaning may be necessary depending on sea water conditions.

OPERATOR UNIT MAINTENANCE.

The operator unit contains no user serviceable parts, and requires no maintenance apart from occasional cleaning of the front panel. Please use a soft cloth and **no chemicals** except **cleaning alcohol**.

4. INSTALLATION

STANDARD SYSTEM SUPPLY.

A Basic DL850 system consists of the following units (See drawing in Appendix):

- Display / Operator Unit
- Communication cable (if ordered, else yard supply)
- Transceiver Unit
- Sensor cable
- Transducer (sensor)
- Bottom parts, usually a Gate valve assembly

For Bottom part Installation see separate Manuals.

TRANSDUCER INSTALLATION.

Location.

The Transducer is normally installed in the foreship.

If docking function is necessary it is recommended to install Transducer in foreship.

Optimal system operation is achieved by fitting the transducer as deep as possible on the hull.

The transmitting surface of the transducer must be installed horizontal.

Do not mount transducers close to the bow thruster propeller outlets, or aft of other hull installations (outlets, vents or other protruding details).

It is of course necessary to select a part of the hull that is submerged under all load and speed conditions, and to avoid positions where air is trapped in heavy weather.

If a flat, horizontal section is not available for transducer fitting, the shipyard must construct a suitable bed.

Protect the active element of the transducer and **do not paint the surface.**

Installation Details.

Refer to SKIPPER's standard installation procedures in the appendix regarding hull valve installation, welding, Cable glands etc.

OPERATOR UNIT INSTALLATION.

Select a position to provide free view of the panel as well as easy access during operation and service. The operator unit may be mounted flush in a panel or directly onto a bulkhead. See appendix Installation Drawings.

Shows the operator unit along with the main installation dimensions.

If the unit is to be flush mounted, the shown cut-out and recession depth dimensions must be observed.

Remember to leave room in front of the unit to open the door a full 90°.

Do not perform installation work with system power applied!!

Cables are led through the appropriate cable glands as follows:

The cable from the transceiver unit should normally occupy the left gland. The right gland is used for power supply connection whereas the centre ones are used for any interface signals connected.

Power supply may be either 230V/115V AC or 24V DC. Power consumption is appx. 50 W at 24V, appx. 70W at 115/230V.

If the AC power system is 115V, DL850 may be prepared for 115V AC by re-connecting the connectors J102, J103 as shown in appendix drawing DL8-B-002

Fuses is shown in fig.4.4 for 230/115 VAC and 24 V DC. These fuses are normal 5 x 20 mm glass fuses.

AC supply: FS100, FS101 : 230V 0.5A / 115V 1A

DC supply: FS102 : 24VDC 3.15A

When the installation is complete, and power is connected to the Operator Unit, the appropriate power switch by the power terminals is switched on. For daily operation, these switches may stay on and the unit is switched off by pressing the “SYSTEM off” button on Screen 2. The unit is switched on by pressing any button.

Both 230/115 VAC and 24V DC power may be connected and switched on at the same time. If one of these supplies shuts down, change over is automatic.

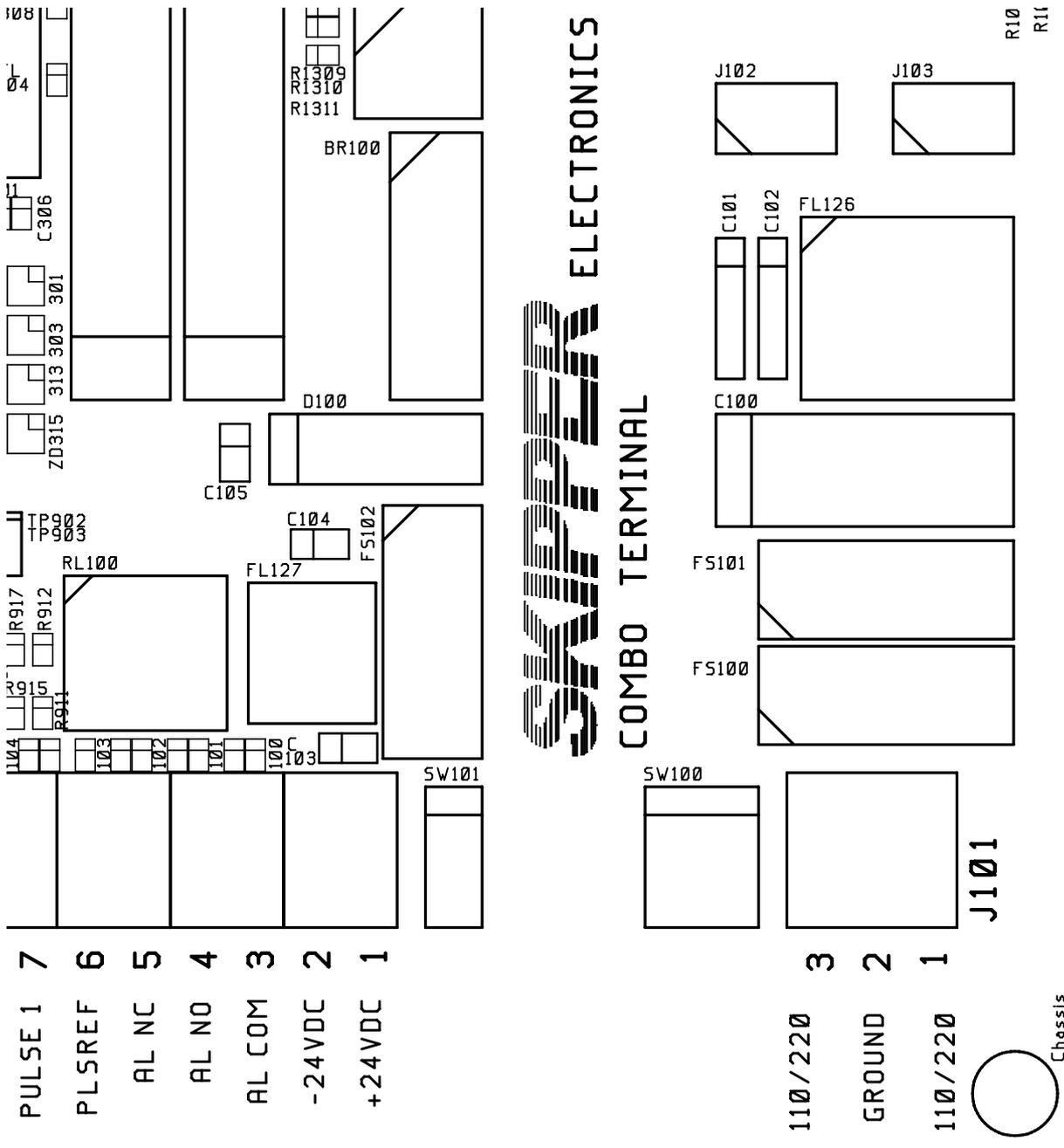


Fig.4.4 Voltage selection connectors and fuses, Terminal Board

AC Voltage selection :

Transformer Primary to : J102 for 230V and J103 for 115V

Fit dummy Plug on opposite Connector for Protection

Fuses : 230VAC FS100 and FS101 must be 0,5 Amp.slow blow

115VAC FS100 and FS101 must be 1,0 Amp.slow blow

24VDC FS102 must be 3,15 Amp. slow blow

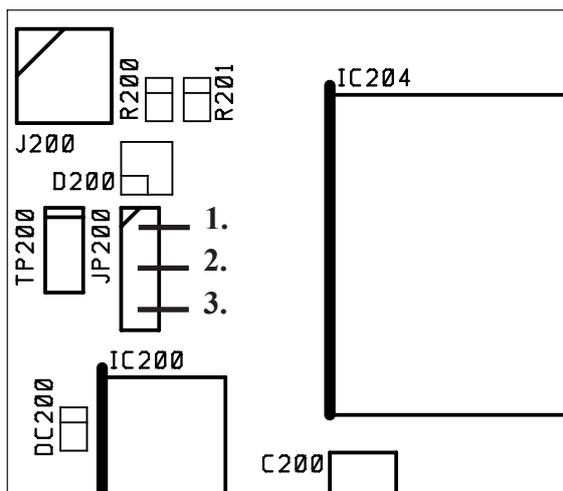
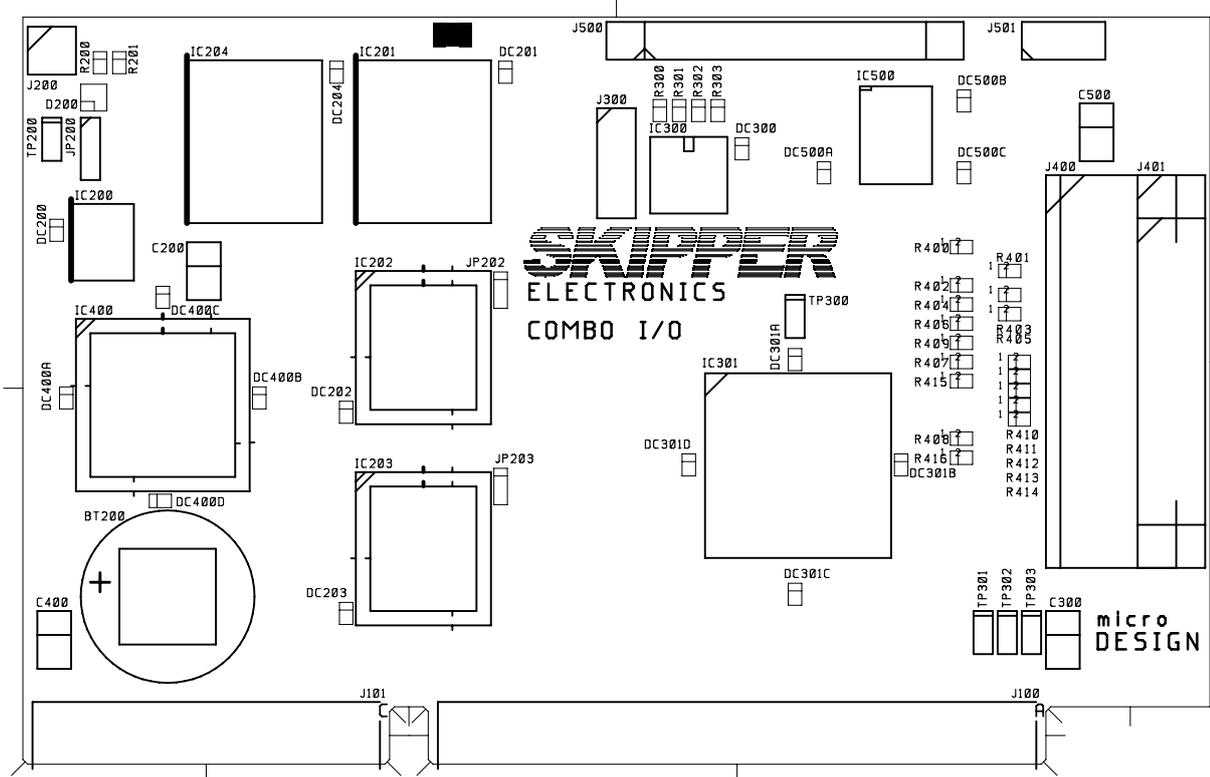


Fig. 4.5 History Memory Battery Jumper, I/O Board.

Back-up Battery Jumper 200

NOTE!

After installation is complete and system power is applied, it is necessary to connect the history memory battery to provide power to the user parameters during system power failure.

Refer to Fig. 4.5 for the correct setting of the battery jumper “ON” position 2-3. This jumper should be set to the “OFF” position 1-2 only during extended unit storage periods. The onboard battery is loaded only when no power is applied to the power terminal.

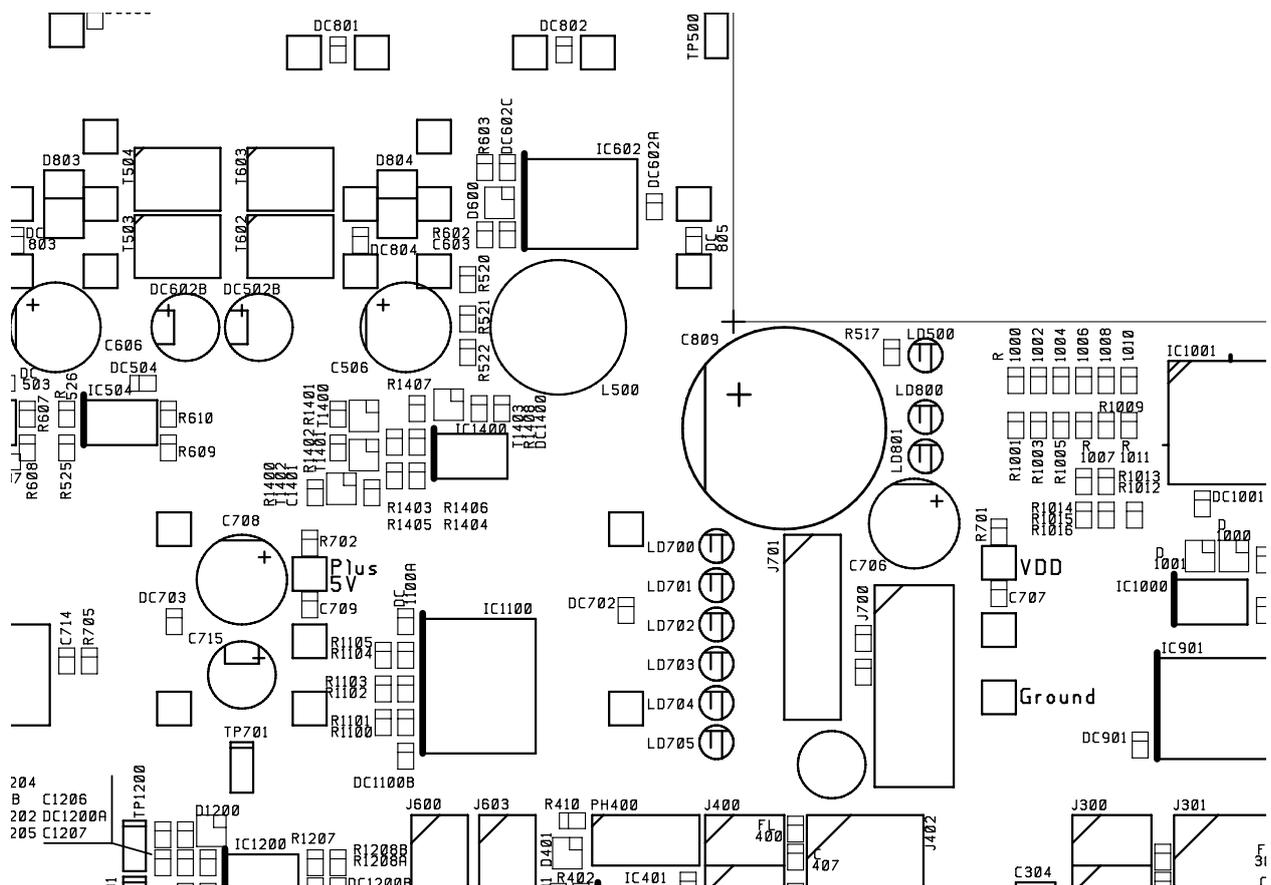


Fig. 4.6 Function LED's, on Terminal board .

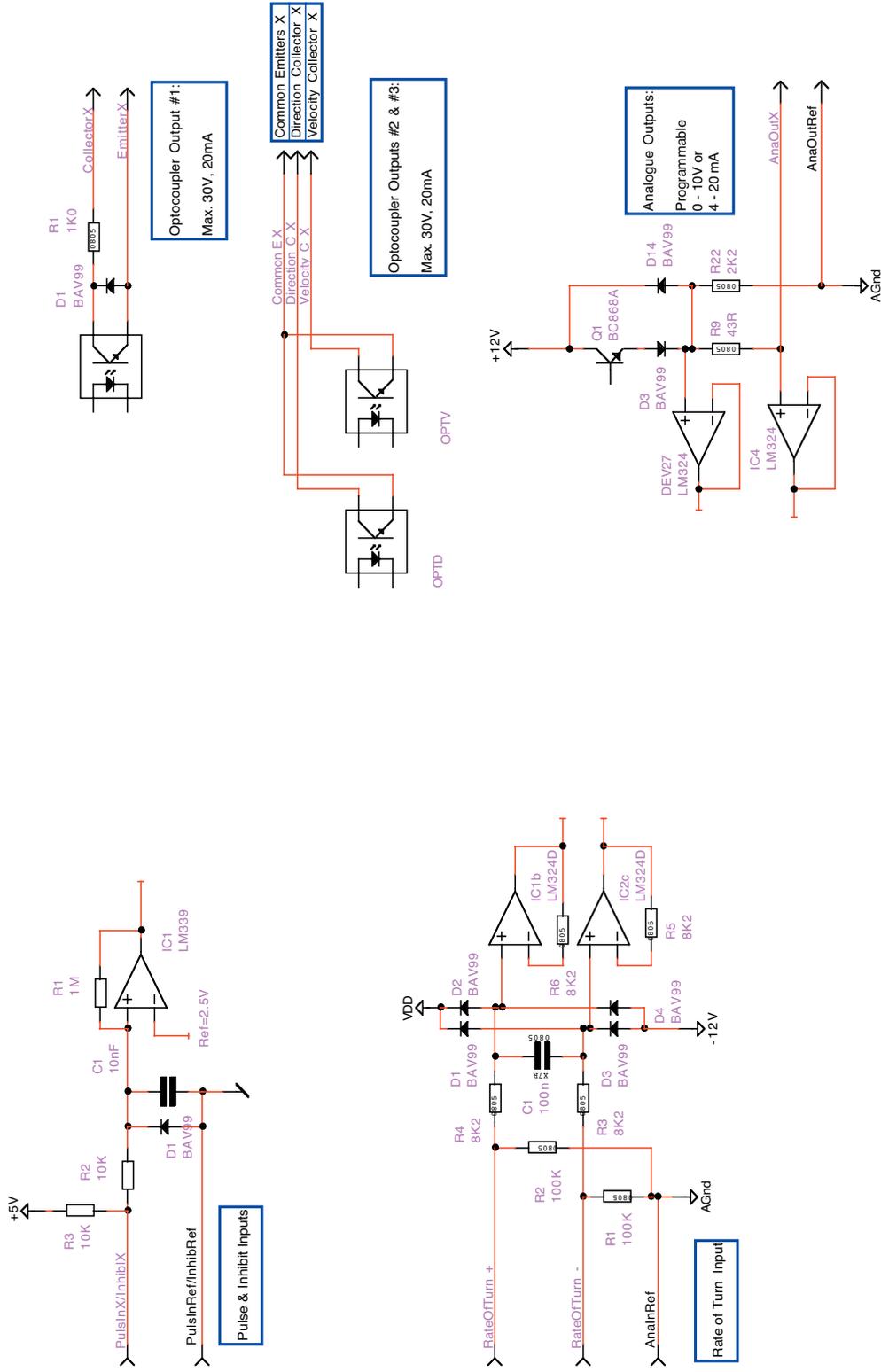
Power Indication and function LED's.

The following LED's are located on the Terminal Board:

- LD700 +5V#1/VCC (Board External and CPU)
- LD701 +12V#1/VDD (Board External)
- LD702 +5V#2 (Board Internal)
- LD703 +12V#2 (Board Internal)
- LD704 -12V
- LD705 -5V

Fig. 4.6 indicates position of these LED's.

INPUT/OUTPUT CIRCUITRY.



CREATED	1997.03.06 ØK	REPLACED	2001.09.04 ØK
PROJNO		PROJNAME	DL850 Wir B B
ARCHIVE REF.		DOC TYPE	SCHEMATIC
PAGE	5 / 6	DESC.	I/O Circuitry Details

INTERFACING.

Alarm relay

An alarm relay is provided for interconnection to external alarm systems. This relay is normally energised, and is released by alarm conditions or power failure/power off. See Appendix drawing DL8-B-002

The terminals have the following significance:

ALCOM	Common Terminal.	Combined operational alarm and power failure alarm
ALNC	Normally closed Contact (Normal = "No alarm" condition)	
ALNO	Normally open Contact	
OPTDC	Separate power failure alarm +	
OPTDE	Separate power failure alarm -	

Short between INHIB 2 and INHIBREF can be used for remote silence of buzzer.

Log Pulse Outputs

Pulse output terminals are as follows. Each group of pulse outputs are galvanically separated. All pulse outputs are Opto Couplers. The Opto Couplers may be used for any pulse rate. The pulse rates and velocity vectors to output are programmable in Status Screen, Menu 2 : (possible settings are 10/100/200/400/1000)

OP3DC	Optocoupler#3	Direction collector
OP3VC	Optocoupler#3	Velocity collector
OP3EE	Optocoupler#3	Common emitters
OP2DC	Optocoupler#2	Direction collector
OP2VC	Optocoupler#2	Velocity collector
OP2EE	Optocoupler#2	Common emitters
OPTVC	Optocoupler#1	Velocity Collector
OPTVE	Optocoupler#1	Velocity Emitter

Pulse output is default set to Water Track in Fore Aft direction (ForAftWT). For special purposes as ship maintenance or measuring of travelled distance in rivers may the pulse output set to give other types of speed as ResultWT, ForAftBT or ResultBT. This option is protected and can be activated by using the hidden button as described in the chapter for calibration.

Analogue interfaces

DL850 is equipped with 3 analogue outputs to supply analogue repeaters or other equipment with analogue inputs. The signals are galvanically connected to the DL850. Standard range is 0 - 10V or 4 - 20mA.

The velocity vectors and output modes are programmable from Status Screen, Menu 5:

ANAOUTREF	System Ground, common negative Reference for Analog Outputs
ANAOUT1	Analog Output #1
ANAOUT2	Analog Output #2
ANAOUT3	Analog Output #3

NMEA interface

The NMEA output provides NMEA0183 format depth information for other equipment with NMEA0183 inputs. Baud rate is 4800 or 9600, 8 bit, No parity. Several messages may be selected on Com Screen and the enabled messages are transmitted with **maximal interval** of 1.8 seconds.

The NMEA inputs accept position, heading and UTC time messages from various navigators and compasses.

There is one output that will drive minimum of 10 standard NMEA0183 inputs.

The NMEA0183 output and inputs are available on the J303 connector according to the diagram in appendix.

See Section 5, **Start-up and system adaption**, for a complete list of transmitted and received messages.

OPTIONS.

Repeaters/Slaves

Graphic CRT(VGA) or LCD displays or digital depth slave repeaters may be connected to the system. Skipper IR300 speed repeaters may also be connected, interface NMEA0183

External Interface Ports



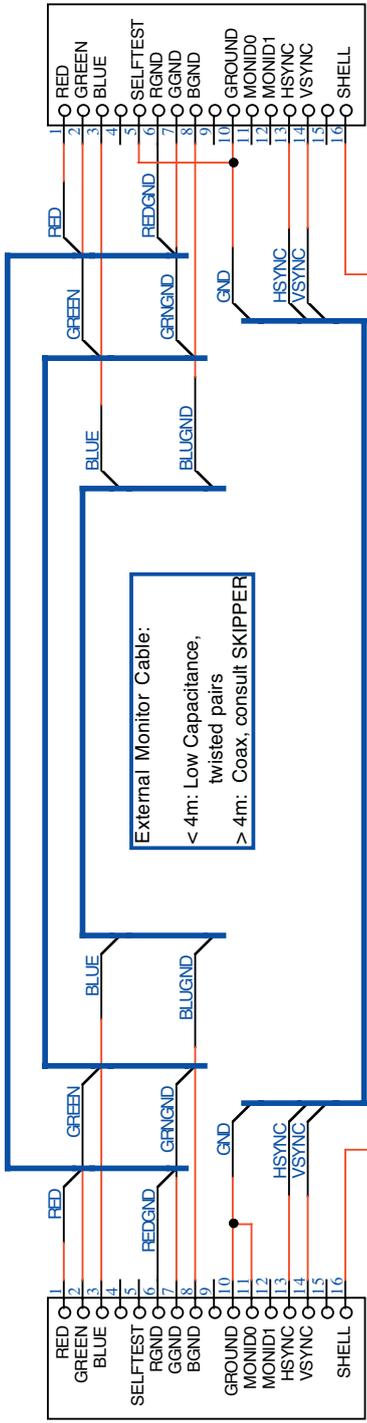
SKIPPER DL 850
 DOPPLER SPEED LOG Operator Unit
 Type / Part no : DL850-DD-SA Rev : 01
 Serial number : DOU-06293
 COMPASS SAFE DISTANCE
 STEERING : 0.25m STANDARD : 0.5m
 SUPPLY VOLTAGE : 20 - 32 VDC
 115 / 230 VAC
 DNV GS7506
 MADE IN NORWAY
 SKIPPER ELECTRONICS AS

5 (+6) x PG 13,5 cable entry 10-12mm

Ground Stud

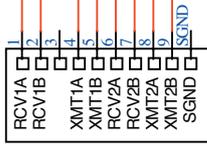
XJ402 :	NMEA ports	DSUB	9 pin female
XCN6 :	VGA terminal	HDDSUB	15 pin female
XCN3 :	Printer port	DSUB	25 pin female

VGA Video Port
Use Twisted pair
LOW CAPASITY
DATA Cable or
COAX for Red/Green/Blue
15 pin HDDSUB Connector
in External Panel



XCN6
HDDSUB 15 Female
CPU/VGA Board

NMEA 0183 Ports
Use Twisted pair
DATA Cable
9 pin DSUB Connector
in External Panel

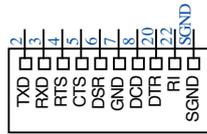


XJ402
DSUB 9 Female
Terminal Board

Optional NMEA 0183 Input A=+, B=-
NMEA 0183 Output A=+, B=- (JP400: 2-3)
Standard NMEA 0183 Input A=+, B=-
Standard NMEA 0183 Output A=+, B=-

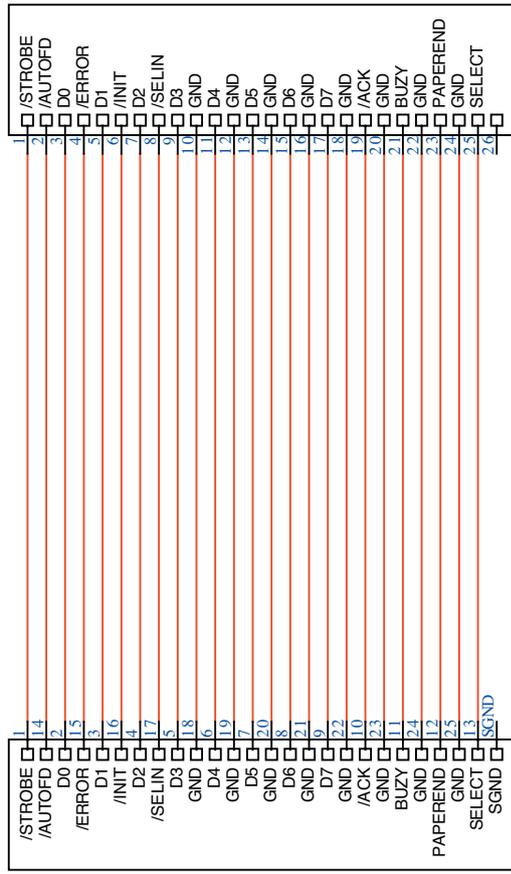


Optional RS 232C Port
Use Twisted pair
DATA Cable
25 pin DSUB Connector
on Terminal Board



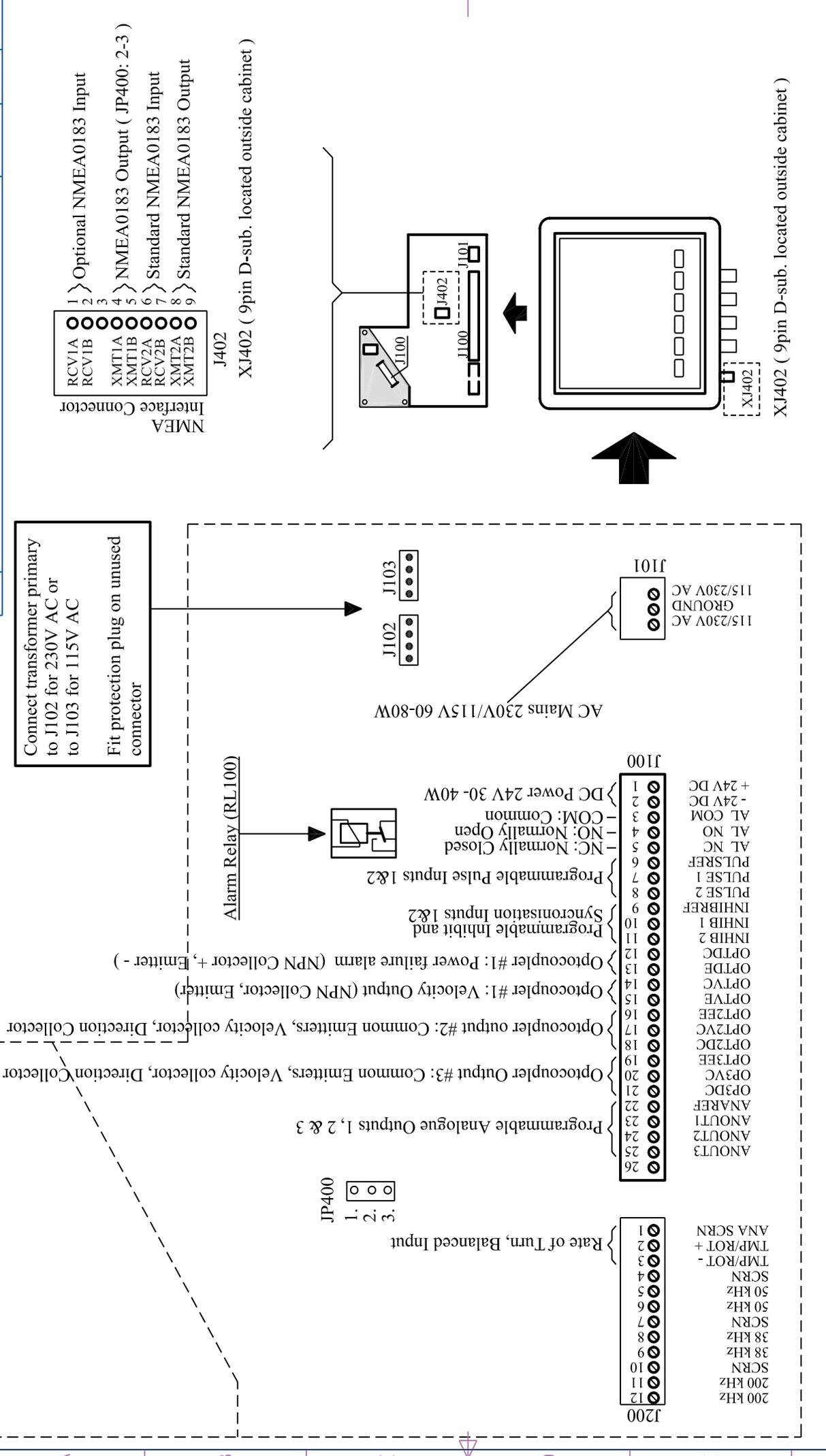
J302
DSUB 25 Female
Terminal Board

Parallel Printer Port
Use Twisted pair
DATA Cable
25pin DSUB Connector
in External Panel



XCN3
CPU/VGA Board DSUB 25 Female

CREATED	1993.04.22 ØK	REPLACED	2002.05.29 ØK
PROJNO		PROJNAME	DL850 WirC
ARCHIVE REF.		DOC TYPE	SCHEMATIC
PAGE	2 / 3	DESC.	Communication



Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
Designed by Arne Maitre	Checked by SG	Approved by - date SG-15.03.01	Date 14.03.01
Skipper Electronics A/S		File name	Scale
DL850 Operator Unit Connection		SC-2023-Rev-00	Edition 0
1/1		8	1/1

Connections in Display / Operator Unit Combo Terminal PCB Versjon C

5. START-UP AND SYSTEM ADAPTION.

SYSTEM ADAPTION

Analogue Outputs And Log Pulse Outputs Range Selection.

From Screen status it is possible to set number of pulses per nautical mile (10/100/200/400/1000) for the log pulse outputs.

Language and Units of Measure

From Screen 5 it is possible to select different languages and units of measure for the screen and printer character strings.

The available languages are: English, French, Spanish, Russian, German and Norwegian.

Units of measure may be selected for:

Depth: meters, feet, fathoms, braccias.
Vessel Speed: knots, km/h, miles/h.
Sound Speed: m/s, feet/s.

NMEA Setup

Com screen is used for verification of received NMEA messages and control of transmitted NMEA depth messages. The baud-rate may be set to 4800 or 9600, 4800 being the more common.

When a NMEA talker is connected to one of the DL850 inputs, all received messages will be displayed on the screen.

If no messages are displayed, check the signal polarity and the baud-rate. If messages are marked red check message protocol.

The following messages are accepted for input to DL850 and interpreted by the program. The talker identifier is ignored:

Time

Day, Month, Year ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>

Position

Geographical Lat/Lon GLL,llll.ll,a,yyyy.yy,a,hhmmss.ss,A,a*hh<CR><LF>

GPS Position GGA,hhmmss.ss,llll.ll,yyyy.yy,a,x,xx,x.x,x.x,M,x.x,xxxx*hh<CR><LF>

Rate of Turn

Rate of Turn ROT,x.x,A*hh<CR><LF>

Alarm

Acknowledge Alarm ACK,xxx*hh<CR><LF>

Heading

Heading, true, present HDT,xx.x,T*hh<CR><LF>

Composite

Loran C specific RMA,a,xxxx.xx,N,xxxxx.xx,W,,,xx.x,xxx.,,*xx<CR><LF>

GPS, Transit specific RMC,hhmmss.ss,A,llll.ll,a,yyyy.yy,a,x.x,x.x,xxxxxx,,*hh<CR><LF>

DL850 Transmitted(Originated) NMEA0183 Messages

Depth

DPT - Depth & Draught	\$VDDPT,x.x,x.x*hh<CR><LF>
DBS - Depth Below Surface	\$VDDBS,x.x,f,x.x,M,x.x,F*hh<CR><LF>
DBT - Depth Below Transducer	\$VDDBT,x.x,f,x.x,M,x.x,F*hh<CR><LF>
DBK - Depth Below Keel	\$VDDBK,x.x,f,x.x,M,x.x,F*hh<CR><LF>

Speed and distance

VTG - Track Made Good and Ground Speed	\$VDVTG,,,,,x.x,N,x.x,K,a*hh<CR><LF>
VHW - Boat Speed and Heading	\$VDVHW,,,,,x.x,N,x.x,K*hh<CR><LF>
VLW - Distance Travelled through the Water	\$VDVLW,x.x,N,x.x,N*hh<CR><LF>
VBW - Dual Doppler Vector	\$VDVBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A*hh <CR><LF>

Temperature

MTW - Water Temperature	\$VDMTW,x.x,C*hh<CR><LF>
-------------------------	--------------------------

Alarm

ALR - Alarm State	\$VDALR,hhmmss.ss,xxx,A,A,<Alarm message> *hh<CR><LF>
-------------------	--

All data fields are free format.

Values will be preceded with sign as needed (e.g “-“ = Astern, Port)

*hh = Checksum

Docking option parameter setup

Two parameters must be set to ensure that the docking option is showing the correct stern speed.

Sensor to Bow: Total length from sensor location to the bow

Ship Length: Over all ship length, bow to stern.

6. CALIBRATION PROCEDURE

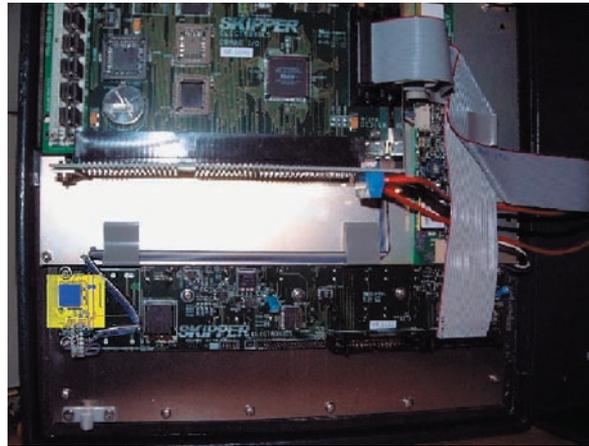
DL850 speed error can be caused basically by 2 reasons: angular sensor installation error and different way of water propagation along the hull, which depends on the hull's shape and vessel's speed.

All calibration functions are concentrated on the **Calibration** screen. In order to select this screen, push "screens" button in the lower row of the panel buttons and keeping it pressed, turn encoder until desired screen appears on the display.

ACTIVATION OF THE CALIBRATION MODE.

To avoid accidental access to the internal settings by unqualified personal, all calibration functions are disabled during normal operation. In order to activate them, one should do the following:

- Open front door of the cabinet and find a "secure" key on the component side of the keyboard PCB



(upper/left corner of the PCB).

- Press mentioned above key and keep it pressed for 2-3 seconds, until "Calibration on" message is observed in the right/upper corner of the screen. The text on the "soft" keys will change colour from grey to white, which indicates availability of the corresponding functions.

***Note:** after calibration is finished, disable access to the calibration functions simply by pushing mentioned above button. Calibration mode is also disabled after power down.*

INSTALLATION ANGULAR ERROR CORRECTION.

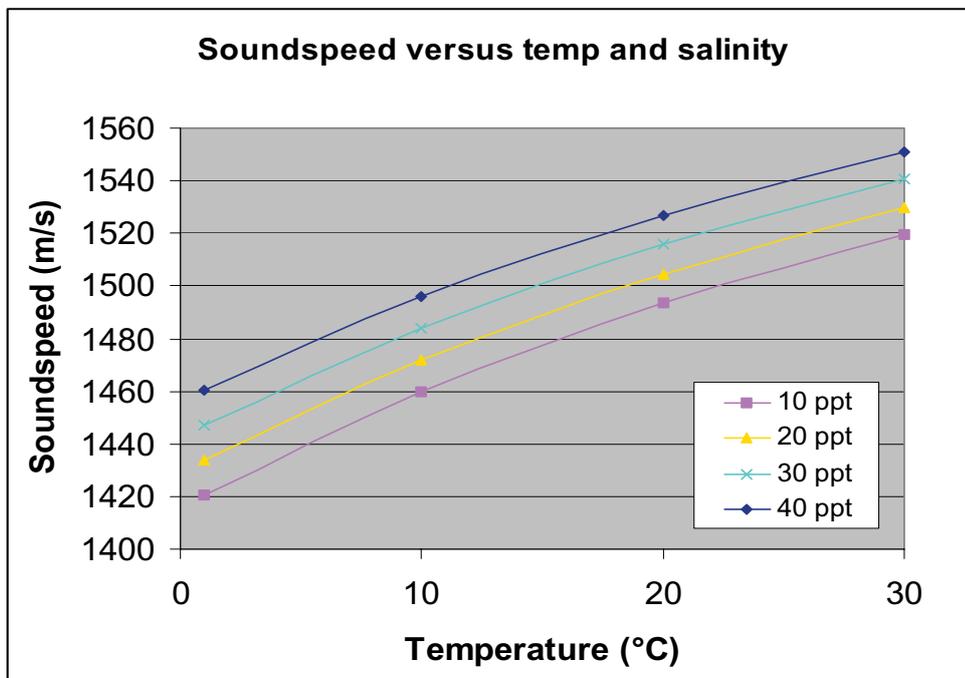
Before conducting speed calibration trips, it is recommended to set compensation for installation angular error. To do this, the vessel should go with a constant speed (preferably 50% of full speed or higher) at constant direction for 2-3 minutes. The impact of wind and waves must be minimal. The averaged measured drift angle is indicated in the lower/right part of the calibration screen.

- Remember the value of the averaged drift angle
- Select **MENU 3** of the calibration screen (most left “soft key”)
- By the mean of “**HEAD ERR**” button set the value of the drift angle, (the sign must be the same).
- Make sure, that averaged drift angle now is slightly fluctuating around 0. If necessary, adjust **HEAD ERROR** parameter accordingly.

The speed correction is conducted based on the information in the calibration table, which is displayed on the **Calibration** screen (**Calibration settings**). Each table entry consists of 2 pairs (WT and BT) of reference (**Real speed WT/BT**) and speed, measured by the log (**Measured speed WT/BT**). There are 5 entries in the table; therefore it is possible to calibrate speed log indication at 5 different speeds, which is more important for WT speed and advisable for some installations, to avoid the effect of different manner of water propagation along the hull at different ship’s speed. The current table entry is marked by the frame. One should use “**CALIBR NUM**” soft key to advance to the next table entry. There are 2 ways of entering data into this table: conducting calibration trip and manual adjustment.

SOUND SPEED CALIBRATION

This option will enable adjustment of the sound speed value used for the speed and depth calculations. The user may set values from 1400 to 1550 m/s to accommodate accurate propagation speed in known water conditions.



SPEED CALIBRATION TRIP.

Speed calibration during the test trip can consist of 2 steps:

1. Collect calibration data set during test trip. This data is:
 - real (reference) speed of vessel, calculated as a ratio of known distance to known time,
 - averaged measured WT and BT speeds by the log over the whole test trip.
2. If the result of the test trip is satisfactory, currently received trip data set must be stored in the calibration table.

To conduct the calibration during a speed log calibration trip, follow instructions below.

- Select **MENU 1** of the calibration screen.
- Find out the distance length of the test trip and adjust the value accordingly by the mean of “**CALIBR DIS**” button. The preset (single touch activated) values of this button correspond to $\frac{1}{4}$, $\frac{1}{2}$, 1 and 2 NM. It is possible to enter any value by means of the encoder.
- Check the status of soft key number 2. Before forward leg, the setting must be **START/leg1**
- When passing the start mark of the calibration trip, push **START/leg1** button. Button will change the value to “**FINISH/leg1**”. The trip start date/time will be indicated and the distance ran since the start of the trip will be counted in the “Calibration trip” screen area. Push the same button second time after reaching the finish mark. The calculated and measured averaged speeds are printed on the screen in the calibration trip area.

Note: If due to wrong settings or incorrect operation, calculated speed occurs to be higher than possible maximum speed (40kts), all information is considered as incorrect, which is indicated by question marks on the screen. The trip must be repeated in this case.

- For more accurate speed calibration it is necessary to proceed a backward trip to exclude possible influence of wind and current in the test area. Just repeat the previous step by pressing **START/leg2** and **FINISH/leg2** when passing the start and finish marks accordingly.

Note: if for some reason only one leg is used, it is necessary to skip the second one just by pressing 2 times mentioned above button.

*Note: if it is necessary to repeat backward leg, while keeping forward leg information unchanged, press **START/leg1** button and keep it pressed 3-4 seconds until the button changes its status to **leg2**. Then it is possible to proceed backward leg as described above.*

- The both-ways average speeds are calculated now, and available for setting in the calibration table. To enter the scope of trip data into calibration table, press “**CALIBR/activate**” button. The frame in the calibration table is a graphic presentation of currently available entry in calibration table.

*Note: It is possible to store the same data set in the calibration table only once, that's why the “**Calibr/activate**” button changes its status to “unavailable”, which is indicated by a grey colour of text on the soft key. This button has also “unavailable” status, if there is no trip data, or data is not correct.*

Note: Trip data set becomes active and is used for calculations of calibration factor, ONLY AFTER storing it in the calibration table.

- To achieve more accurate indication, it is recommended to run calibration trips at several different speeds, normally 25%, 50%, 80% and full speed. It is possible to enter up to 5 different settings in the calibration table. Piece-wise linear interpolation is used for speed correction at other, than calibrated values.

Note: If it is required to replace one of the existing calibration settings by another trip data set, it is

necessary to delete existing one first. Ref “Manual adjustment of calibration table”

- The speed log memorizes information about five last test trips (including date and time, when they were conducted). It is possible to display them one by one on the screen later (even after power was OFF) by the mean of “**TRIPS LIST**” button. Once trip data set is called on the screen, it is possible to store it in the calibration table (if it has not been entered before and there is available entry in the table).

MANUAL ADJUSTMENT OF CALIBRATION TABLE.

If it is required to make changes in the calibration table, received after calibration trips, or for some reason calibration trips haven't been conducted, it is possible to adjust calibration settings manually. In last case, DGPS speed can be used as a referenced (real) speed, but the impact of wind, waves and current must be insignificant.

To use this functions,

- select menu 2 by **MENU** button.
- Select any of the entries in the calibration table by the mean “**CALIBR NUM**” soft key. The frame in the “Calibration settings” table will indicate currently selected entry.
- If DGPS speed is used as a reference, this value should be entered by “**WT REAL**” button. Corresponding measured speed must be entered by the mean of “**WT MEASUR.**” or “**BT MEASUR.**” button. The present measured (non-calibrated) speed values are displayed in the bottom/left corner of the screen. Make sure, that “Calibrated speed” value corresponds now to reference value.
- If more, than one calibration value is required, select another entry and repeat the step above. Maximum possible settings is 5

CALIBRATION, USING GPS AS A REFERENCE SPEED.

If GPS source is connected to the log, it is possible to enter calibration settings in an easier way.

- Select empty entry in the table by the mean of “**CALIBR NUM**” soft key
- While sailing at a constant speed, press “**BT REAL**” or “**BT MEASUR.**” button and keep it pressed for 2 seconds. The present GPS and measured speeds will appear on the soft key and in the table. The same procedure is valid for WT speeds, but one should be aware, that WT speed can differ in general from GPS indication because of currents in the area.
- If necessary, above procedure can be repeated at another ship's speed.

To reset the entire entry in the calibration table, select it by “**CALIBR NUM**” soft key, push this key again and keep it pressed for 3 seconds, until settings change to “**empty**”.

Once calibration are completed, it is advisable to write down calibrations settings in the table, attached to the operator manual and keep it for later reference.

7. TROUBLE SHOOTING

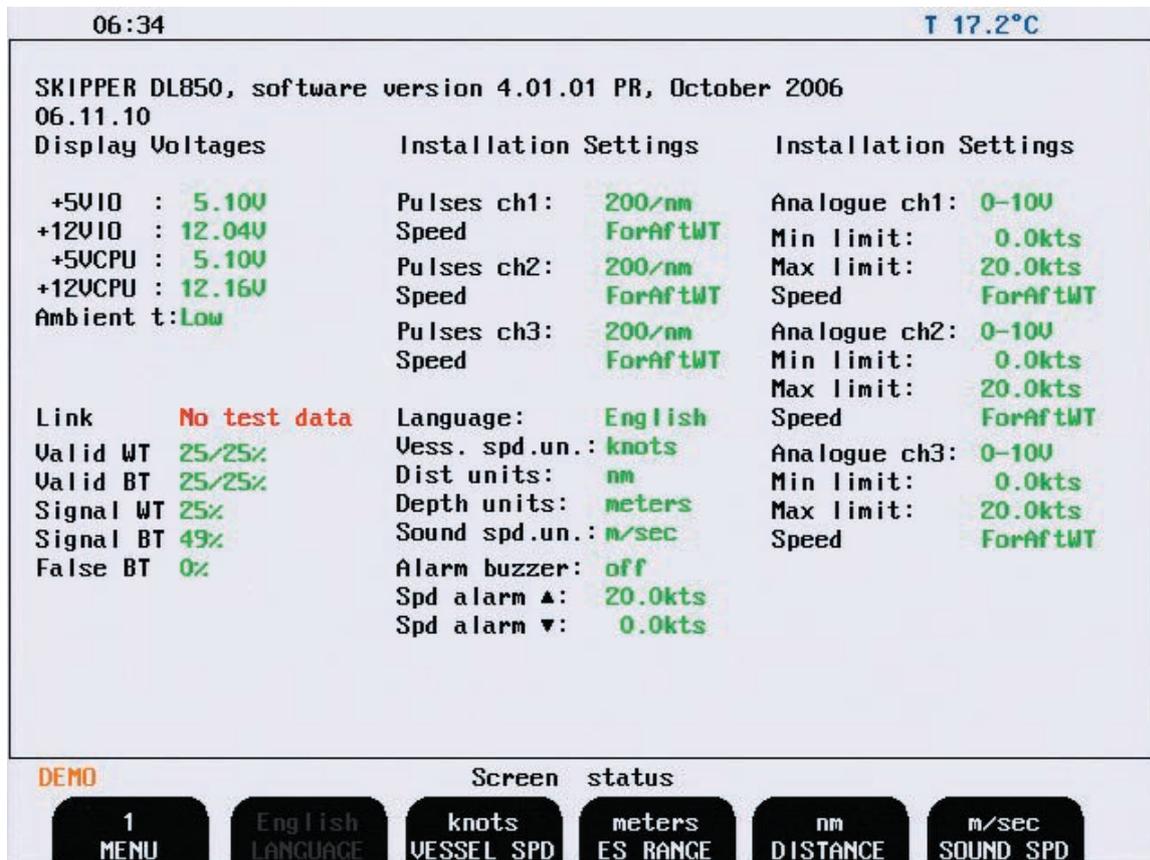
Symptom	Cause	Remedy
BASIC SYSTEM INTEGRITY		
No picture on LCD screen	<ul style="list-style-type: none"> No AC or DC power to the system System is on Standby Too low screen contrast Defective LCD module Voltage(s) out of range. 	<ul style="list-style-type: none"> Check switches and fuses on the Terminal Board inside the DL850 cabinet. Press any button on the panel. Increase contrast settings or replace Keyboard PCB. Replace LCD module Replace Terminal PCB
Picture is difficult to read	<ul style="list-style-type: none"> Too low or high screen contrast Back light is too weak. 	<ul style="list-style-type: none"> Increase or decrease contrast settings. Increase back light settings.
Display Back light malfunctions. Display picture is visible	<ul style="list-style-type: none"> DL850 Initialisation. Defective back light tubes Defective Back light power inverter. 	<ul style="list-style-type: none"> Turn off power and wait for 5 sec. before restart. Replace Back light tubes. Replace Inverter PCB.
Rotary Encoder malfunctions	<ul style="list-style-type: none"> Defective Encoder or interface SW problem 	<ul style="list-style-type: none"> Replace Keyboard PCB. Recycle power.
Panel buttons malfunctions	<ul style="list-style-type: none"> Defective buttons or interface One button stuck SW problem 	<ul style="list-style-type: none"> Replace Keyboard PCB or interface PCB. Check key switches or replace Keyboard PCB. Recycle power
Loose user setup and calibration data	<ul style="list-style-type: none"> Battery backup not enabled. Battery empty 	<ul style="list-style-type: none"> See chapter for Installation for instructions. Replace battery or I/O board.
Ambient t in Status screen shows Too High.	<ul style="list-style-type: none"> Obstructed Air flow. Defective Fan 	<ul style="list-style-type: none"> Check installations for obstructions of vent holes. Replace fan.

Symptom	Cause	Remedy
INSTALLATION PROBLEMS		
Status screen shows Link: No handshake. The leds on the power and transmitter PCBs inside transceiver cabinet never turns on.	<ul style="list-style-type: none"> • Transceiver unit power is off • A pair HSOUTA/HSOUTB on the display side or HSINA/HSINB on the transceiver side is not connected properly to the terminals or wrong polarity of the connection • Damaged communication cable 	<ul style="list-style-type: none"> • Switch on the power of the transceiver unit or check fuses. • Check connection and polarity of the handshake lines. • Test/replace cable.
Status screen shows Link: No handshake. The leds on the power and transmitter PCBs are periodically turning on and off.	<ul style="list-style-type: none"> • A pair HSINA/HSINB on the display side or HSOUTA/HSOUTB on the transceiver side is not connected properly to the terminals or wrong polarity of the connection • Damaged communication cable • Bad connection of the transducer cable 	<ul style="list-style-type: none"> • Check connection and polarity of the handshake lines. • Test/replace cable. • Check if the transducer is connected on the transceiver unit terminal according to colour diagram and transducer cable connector is properly mated to the receptacle of the transducer top flange.
Status screen shows Link: No test data	<ul style="list-style-type: none"> • No connection data lines to the terminal (XMITA/ZMITB, RCEIVEA/RCEIVEB) or wrong polarity of the connection • Damaged communication cable 	<ul style="list-style-type: none"> • Check connection and polarity of the XMIT and RECEIVE data lines. • Test/replace cable.
Status screen shows Link: Test data error, or Link: Data error	<ul style="list-style-type: none"> • Cable is not connected to Ground or 0 Volt terminal. • Missing connection of one of the RCEIVEA/RECEIVEB wires on the display side or XMITA/XMITB on the transceiver side 	<ul style="list-style-type: none"> • Check cable screen. • Check connection of data lines.
Status screen shows Link: Self test error, or Link: Bad checksum	<ul style="list-style-type: none"> • Defective receiver PCB 	<ul style="list-style-type: none"> • Replace receiver PCB.
Status screen shows Link: No data	<ul style="list-style-type: none"> • Lock up of the transceiver micro controller due overheat or strong source of noise close to transceiver unit. Note: Display cabinet will restart process automatically. 	<ul style="list-style-type: none"> • Check environmental and noise conditions in the area.

Symptom	Cause	Remedy
INTERFACE PROBLEMS		
NMEA input signals are not listed in the NMEA Input screen.	<ul style="list-style-type: none"> • Wrong of input signals. 	<ul style="list-style-type: none"> • Swap NMEA0183 input lines.
NMEA input signals are listed in the NMEA Input screen, but not accepted by the DL850..	<ul style="list-style-type: none"> • DL850 Initialisation • Irregular Message Mnemonic 	<ul style="list-style-type: none"> • Cycle DL850 power after NMEA Connection is established. • Check remote (talker) setup.
NMEA output signals are not accepted by the remote system	<ul style="list-style-type: none"> • Remote (Listener) setup. 	<ul style="list-style-type: none"> • Verify correct remote (Listener) setup.
Analogue output malfunctions	<ul style="list-style-type: none"> • Incorrect Range Settings 	<ul style="list-style-type: none"> • Verify upper & lower limits in status screen.
Pulse output malfunctions	<ul style="list-style-type: none"> • Incorrect Pulse Frequency settings 	<ul style="list-style-type: none"> • Verify Pulse settings in Status screen.
Power failure alarm output do not work.	<ul style="list-style-type: none"> • Incorrect polarity • Defective output 	<ul style="list-style-type: none"> • Swap input lines. • Replace Terminal PCB
Operational alarm output do not work.	<ul style="list-style-type: none"> • Incorrect terminal • Defective output 	<ul style="list-style-type: none"> • Check use of NC and NO terminals. • Replace Terminal PCB
BASIC FUNCTIONALITY		
Constantly wrong speeds or no speed.	<ul style="list-style-type: none"> • Wrong calibration • Damaged sensor 	<ul style="list-style-type: none"> • Check calibration/recalibrate. • Replace sensor
No Bottom tracking	<ul style="list-style-type: none"> • Too deep water. • Too low Gain or Power settings. 	<ul style="list-style-type: none"> • See specifications for depth range. • Increase Gain and Power settings.
Bottom tracking is intermittent or erroneous	<ul style="list-style-type: none"> • Marginal Gain or power settings. • Weather conditions. • Transducer installation faulty 	<ul style="list-style-type: none"> • Adjust settings. • Try adjusting Gain and Power settings. • Check transducer wiring, receiver LED on interface board or Oscilloscope screen.
Bottom tracking is masked by high noise level	<ul style="list-style-type: none"> • Too high Gain or power settings 	<ul style="list-style-type: none"> • Decrease Gain and/or power settings.
No Echogram contour	<ul style="list-style-type: none"> • Echo sounder is switched off • Too low Gain/TVG or Power settings 	<ul style="list-style-type: none"> • Echo sounder can be switched on in Scope screen. • Note : Not recommended used if other echo sounders are in operation. • Increase Gain/TVG and/or Power settings.
Unrealistic aft speed values in docking mode	<ul style="list-style-type: none"> • Wrong setup of ship parameters. 	<ul style="list-style-type: none"> • Check installation values for Over All Length and Bow to Sensor.

TYPICAL STATUS SCREEN CONTENTS.

The Status Screen contain information that will facilitate analysis and correction of several problems. Information from the Status and Oscilloscope Screens should be sent by fax with any report about functional Disturbances. This will greatly facilitate remote failure Analysis.

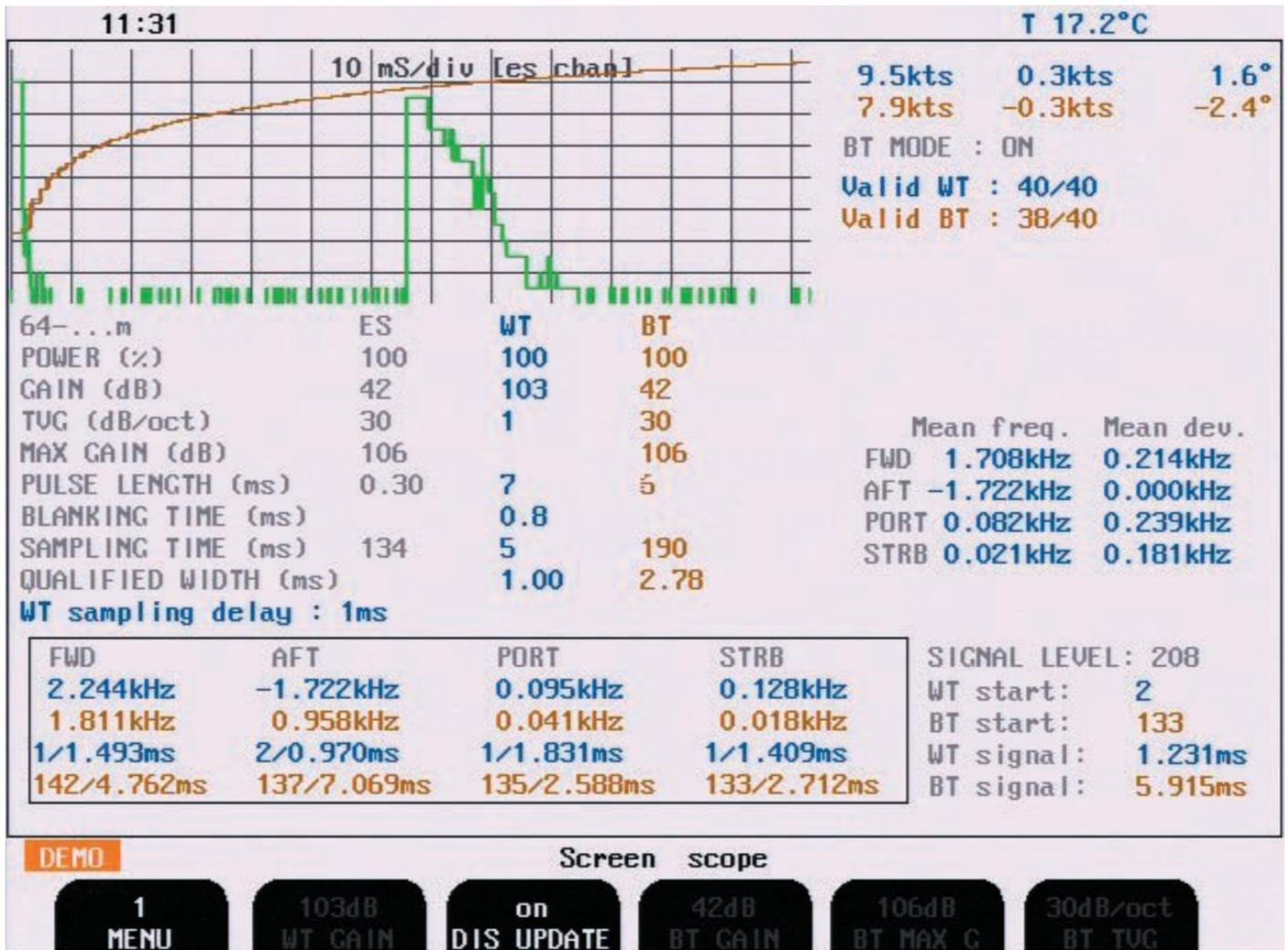


If it is at all possible to cycle through the screens and observe this information, several assumptions may be made regarding operation of the DL850 System. Although some of the subsystems necessary for this basic system operation may still suffer from minor or intermittent operation disorders, the fact that it is possible to select and observe this screen, indicate correct operation of the following DL850 Subsystems:

1. The Computer is operating.
2. The Screen Interface (VGA) Board is working.
3. The Keyboard interface Board with Back light and LCD power supplies is working.
4. The Keyboard Interface Part of the I/O Board is working.
5. The Power Supplies on the terminal board are basically working.

The other information on the Status screen is a collection of information which may be observed and manipulated with the various screen soft key selections. As a reference, it will often be more convenient to observe the various settings together on this screen than to cycle from screen to screen to check on the soft key texts.

TYPICAL OSCILLOSCOPE SCREEN CONTENTS.



The scope screen will differ depending if a three beam or a five beam sensor is installed. Screens here are shown with five beams.

This Oscilloscope Screen show oscillograms from the various transducers. The horizontal axis represent time for the sound to travel down and back from an object or water layer. The vessel is located at the edge of the grid, and the right edge represent the range. The vertical axis represent the magnitude of the echo signal received.

Note that appearance of the oscilloscope screen will differ depending on if a three beam or a five beam transducer is installed.

8. SPECIFICATIONS

DIMENSIONS

Transducer, 3 beam 3*270 kHz, Beam Angle 10°	D * H Mounting Cable length Weight	99 * 115 mm Gate valve. Tank 40m appx. 10 kg (inc. cable)
Transducer, 5 beam 4*540/1*270 kHz, Beam Angle 10°	D * W * L Mounting Cable length Weight	101 * 206 * 255 mm Gate valve (dry comp.) 30 or 40m appx. 10kg (ex. cable)
Transceiver Cabinet	H * W * L Weight	450 * 300 * 260 mm appx. 15 kg
Operator unit cabinet	Height, front Width Depth Weight	340 mm 320 mm 170 mm appx. 10 kg
Operator Unit Cabinet, Cut-out for flush Mounting	H x W Corner Radius	322 x 302 mm 4 mm

FUNCTIONAL PROPERTIES

Display:	150 x 200 mm graphic Dot-Matrix TFT Colour LCD Screen with adjustable Back light. 640 x 480 pixels.
Supply voltage:	230V or 115V AC, 24V DC (20-32V)
Power consumption Display:	50W at 24V, 70W at 230V
Speed Alarms	High and Low Limits.
Calendar/Clock	Year-Month-Day / Hours-Minutes-Seconds (24 hour system).
Interface Outputs	10/100/200/400/1000 Pulses . Analogue 4-20 mA and 0 - 10 V NMEA 0183 (RS422) or optional RS232 Alarm Relay Change-over contact, max. 24V 300 mA Output for VGA Repeater.
Interface Inputs	NMEA0183 (RS422) or optional RS232
Languages	English
Options	SKIPPER IR300 digital Repeater.

PERFORMANCE

1. Speed range	+/- 40 kts (under favourable installation and sea conditions up to +/- 50 kts)
Depth range for Water track	> 1,5m
Maximum roll angel	+/- 10 degrees
Maximum pitch angel	+/- 5 degrees
Depth Range for Bottom Track:	2 - 130 m (2-70 m w/ 5 beam sensor, 2-100 m Echo sounder)
Digital resolution:	0.1 kts
2. Speed and distance accuracy	0.2 kts or 2% whichever is greater.

3. The performance widely depends on the hydro acoustic properties of the water column (aeration turbulence, depth, etc), bottom conditions (sea-bed material, steepness of topography) and vessels rolling and pitching. These effects can lead to occasional failure of the system or to incorrect indication of speed and distance (unstable or too low values).

The stated data for depth ranges and accuracy are not valid for unfavourable conditions.

Since the speed accuracy depends on the sound speed (affected by salinity and water temperature), it is important to adjust (manually) this parameter for particular operation area.

ENVIRONMENTAL

Transducer and Transceiver Cabinet

Operating temperature	0 - 50°C
Storage temperature:	-20 - 70°C
Protection, Transducer:	6 bar
Protection, parts inside hull:	IP66
Transceiver Cabinet :	IP42

Operator Unit Cabinet

Operating temperature:	0 - 40 °C
Storage temperature:	-20 - +70 °C
Humidity:	10 - 90% relative, no condensation.

9. SERVICE

All service requests should be made to the local SKIPPER representative.

Adjustments and repairs should only be performed by qualified service engineers, and unqualified repair attempts will void the warranty.

10. APPENDIX

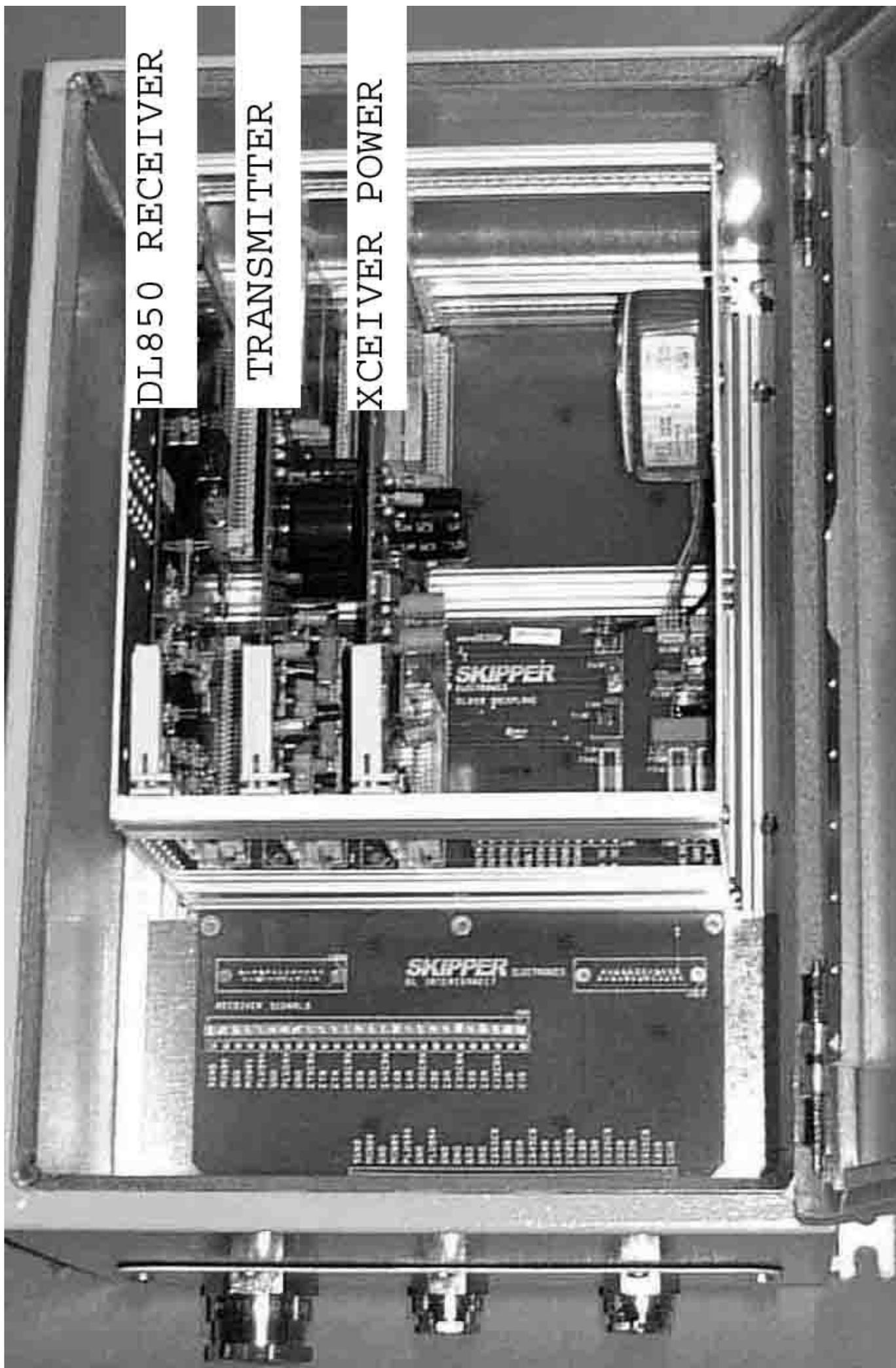
MISCELLANEOUS INSTALLATION DRAWINGS

For Bottom part Installation see separate Manuals

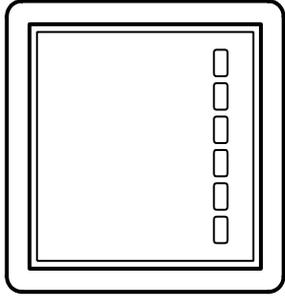
DL850 RECEIVER

TRANSMITTER

RECEIVER POWER



Display / Operatot Unit

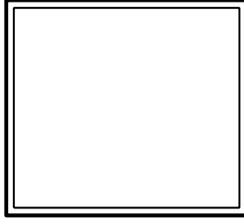


220VAC/24VDC 2 x 1.5 sq.mm.Screened.
Yard Supply.

SCREENED CABLE:

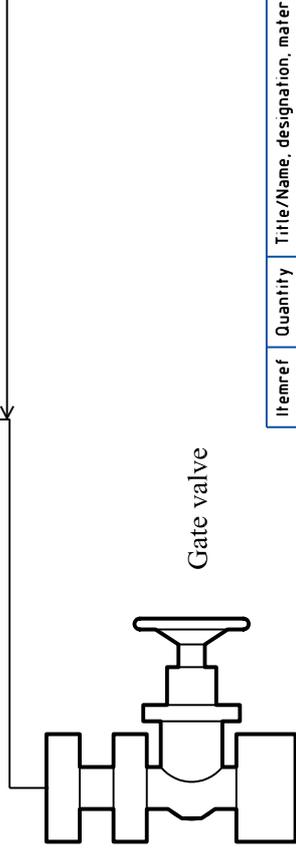
Minimum : 4 twisted Pairs and 0.325mm²
with individual screens.
Yard Supply.

Transceiver Unit



220VAC/24VDC 2 x 1.5 sq.mm.Screened.
Yard Supply.

Transducer Cable 30 meters : Diam. 19 mm Part.no.SC30-SA
 Transducer Cable 40 meters : Diam. 19 mm Part.no.SC40-SA
 Transducer with Cable 40 meters : Diam. 10 mm Part.no.DL850S27G-SA
 Supplied by SKIPPER

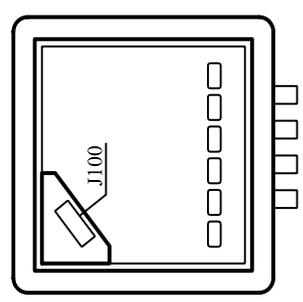


Gate valve

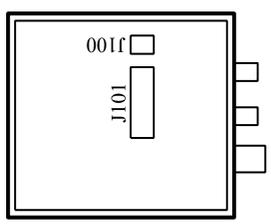
For details,
refer to connection
diagrams and outline
dimensions drawings

Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
Designed by Arne Matre	Checked by SG	Approved by - date SG-15.03.01	Date 14.03.01
Skipper Electronics A/S		File name DL850 Overview	Scale
		SC-2024-Rev-01	Edition 0
			Sheet 1/1

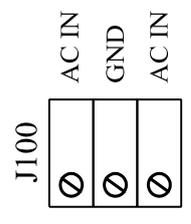
Display/Operator Unit



Transceiver Unit



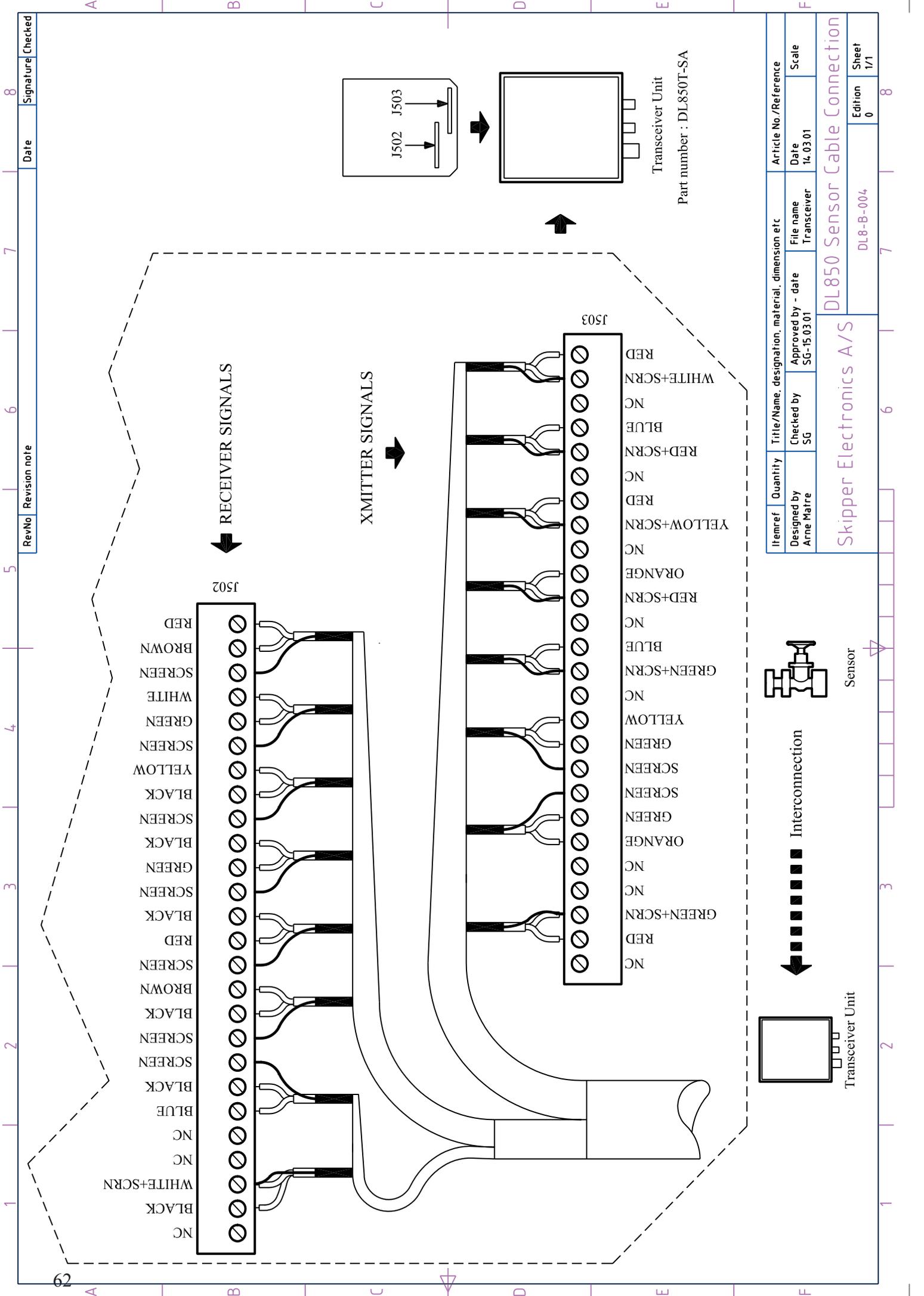
Consumption 40W



	J100		J101
HSINA	Ø	HSOUTB	Ø
HSINB	Ø	HSOUTA	Ø
RCEIVEA	Ø	XMITB	Ø
RCEIVEB	Ø	XMITA	Ø
GROUND	Ø	0 VOLT	Ø
		Note:	
XMITA	Ø	RCVEB	Ø
XMITB	Ø	RCVEA	Ø
HSOUTA	Ø	HSINB	Ø
HSOUTB	Ø	HSINA	Ø
		-24V DC	Ø
		+24V DC	Ø

Note: Connect all individual screens between Ground and 0-volt.

Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
Designed by Arne Matre	Checked by SG	Approved by - date SG-15.03.01	Date 14.03.01
Skipper Electronics A/S		File name	Scale
DL850 Interconnection		DL850 Interconnection	
SC-2022-Rev-00		Edition	Sheet
		0	1/1



RevNo	Revision note	Date	Signature	Checked

Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
Designed by	Checked by	Approved by - date	Date
Arne Maitre	SG	SG-15 03 01	14 03 01
		File name	Scale
		Transceiver	
DL850 Sensor Cable Connection			
Skipper Electronics A/S			
DL8-B-004			Edition
			0
			Sheet
			1/1

Part number : DL850T-SA

Transceiver Unit

Transceiver Unit

Sensor

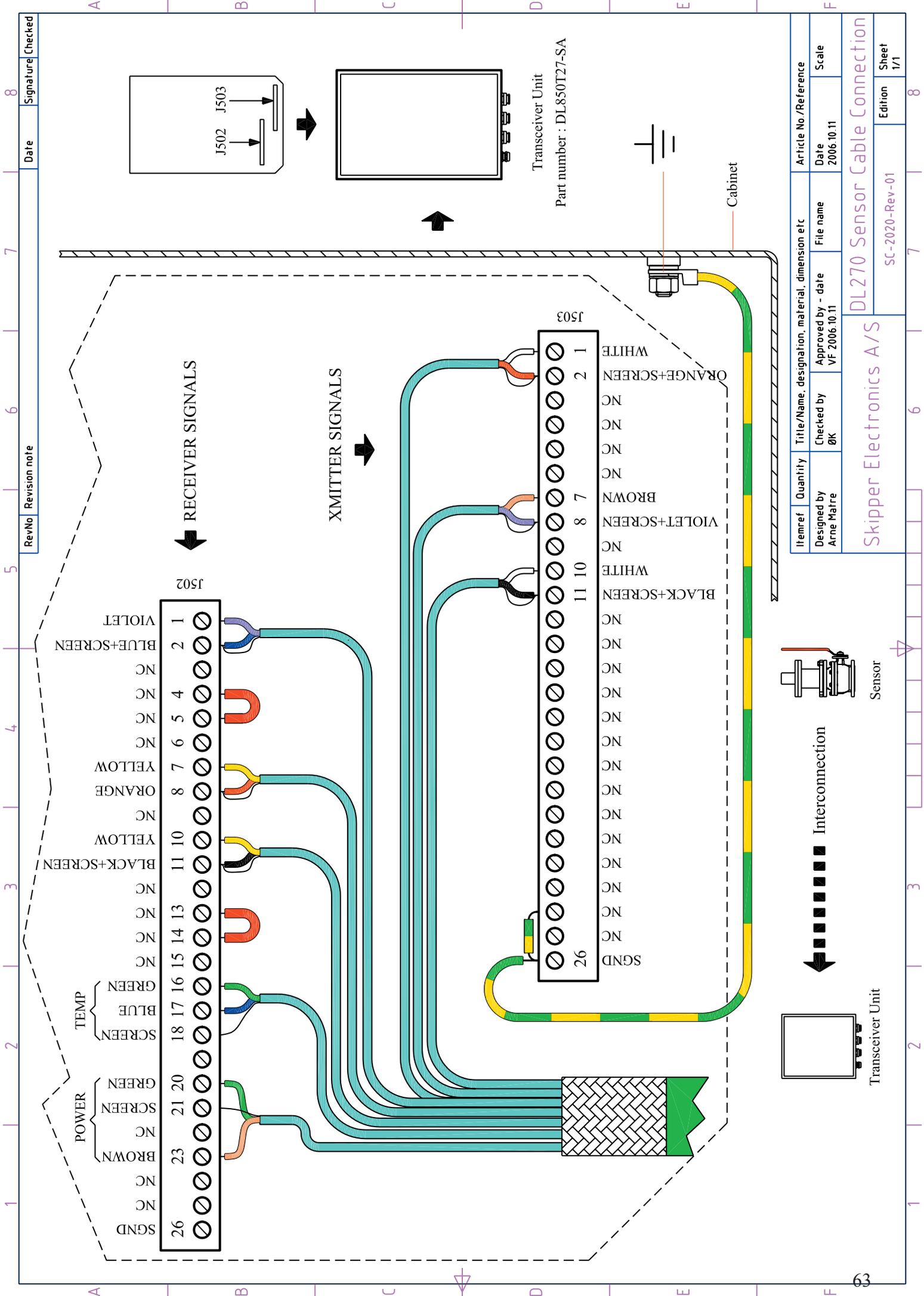
Interconnection

RECEIVER SIGNALS

XMITTER SIGNALS

J502

J503



RevNo	Revision note	Date	Signature	Checked

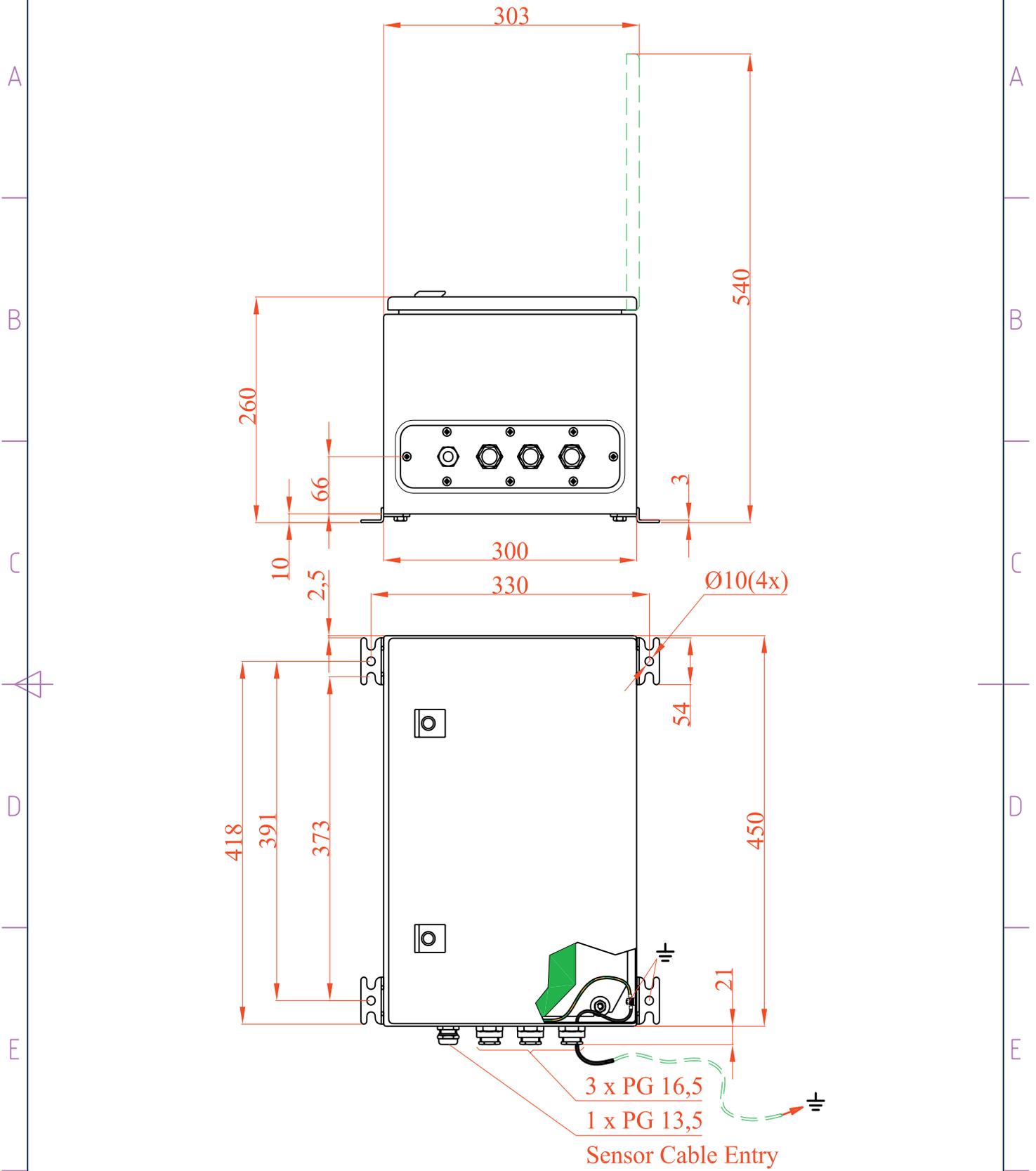
Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference

Designed by	Checked by	Approved by - date	File name	Date	Scale
Arne Matre	ØK	VF 2006.10.11		2006.10.11	

DL270 Sensor Cable Connection

Edition	Sheet
SC-2020-Rev-01	1/1

1	2	3	4
RevNo	Revision note	Date	Signature
			Checked

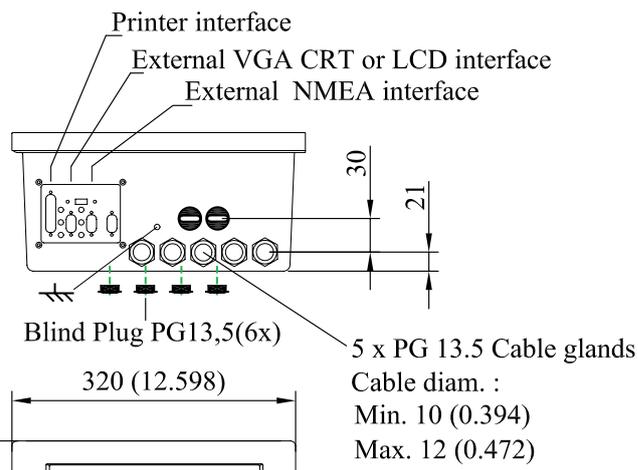


Itemref	Quantity	Title/Name, designation, material, dimension etc		Article No./Reference	
Designed by A.Matre	Checked by VF	Approved by - date VF - 2006.12.14	File name	Date 2006.12.14	Scale
SKIPPER Electronics A/S			DL850Tranceiver Outline Dimensions		
			SC-2025-Rev-01	Edition	Sheet 1/1

1	2	3	4
RevNo	Revision note	Date	Signature
			Checked

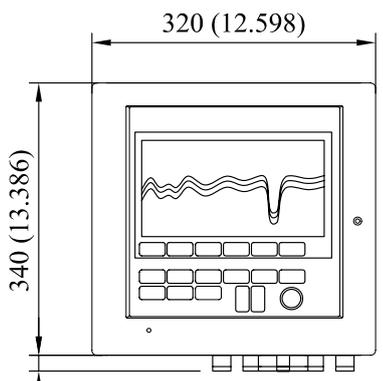
A

A



B

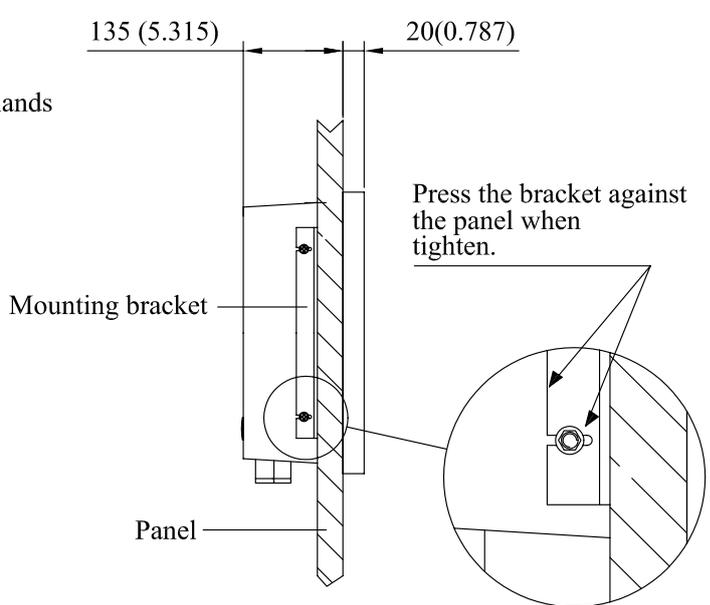
B



C

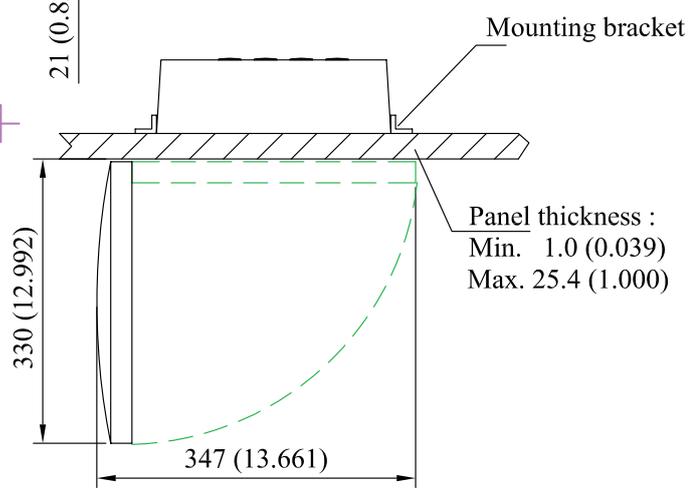
C

Console mounting



D

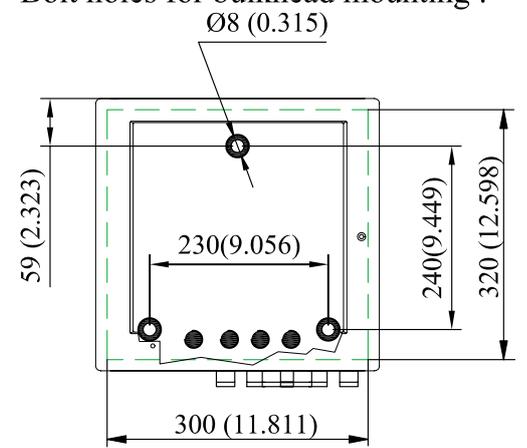
D



E

E

Bolt holes for bulkhead mounting :



Panel Cut Out for console mounting:
300 wide x 320 high
(11.811) x (12.598)

F

F

Itemref	Quantity	Title/Name, designation, material, dimension etc			Article No./Reference	
Designed by AM	Checked by VF	Approved by - date VF - 2006.12.14	File name	Date 2006.12.14	Scale	
Skipper Electronics			Dimentional Drawing Cabinet			
			TB3007-02	Edition	Sheet 1/1	