SKIPPER DL850

2 Axis Doppler Log
Operation And Installation Manual

Edition 20050126Csw3.26
Valid from SN: DOU-03137

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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. All IMO requirements are met or exceeded. Comprehensive interfaces are available including NMEA0183 input and output.

Transducer and Transceiver.

DL850 transducer consists of a head with a total of 5 hydro-acoustic elements:
4 off 540 kHz elements for the 2 axis log function and 1 off 270kHz element for the auxiliary echo sounder function. The Transducer is connected to a Transceiver electronics cabinet located within 30 m of the transducer. 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.

Operator Unit.

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

Data Entry.

Several screens may be selected to enter various settings and calibration parameters. Each screen has one or more softkey button menus, selectable with the leftmost “Menu” Softkey.
Screens 1 through 3 are primary operation screens with appropriate operator controls. Screens 4 through 6 are calibration setup and system supervision screens.
The various screens will be described in detail later.

The following pages illustrate the main DL850 operating facilities and comprise a Quick Operation Guide including a System Configuration diagram.

INTERFACING.

The DL850 has various interface possibilities.

Outputs.

3 Log Outputs 100/200/400 Pulses per nautical Mile.
3 Analogue Outputs 0 - 10 V or 4 - 20 mA.
NMEA0183 Interface Output of Speed and Depth Information
External Alarm Relay Output.

Inputs

NMEA0183 Interface Input of Position, Heading, Depth, UTC.
“Rate of turn” analogue input. (OPTION)

Alarms.

High and low speed alarms may be selected from the menus. A potential free relay contact is provided in DL850 for interface to external alarm systems.

2. OPERATION

When the installation is complete, and power is connected to the Operator Unit, the system is switched on by pressing any button. The unit is switched off by pressing the “SYSTEM off” soft key button on Screen 2.

Parameter entry

The fixed function buttons and the soft key buttons of the various screens along with the rotating encoder, facilitates entry of parameters, setpoints 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.

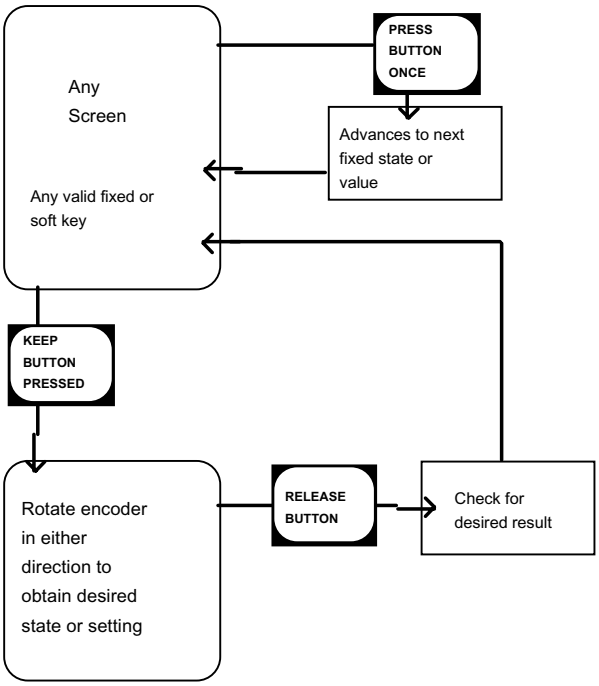


Fig. 2.1 Setting and Parameter Entry Flowchart

Example of parameter entry.

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

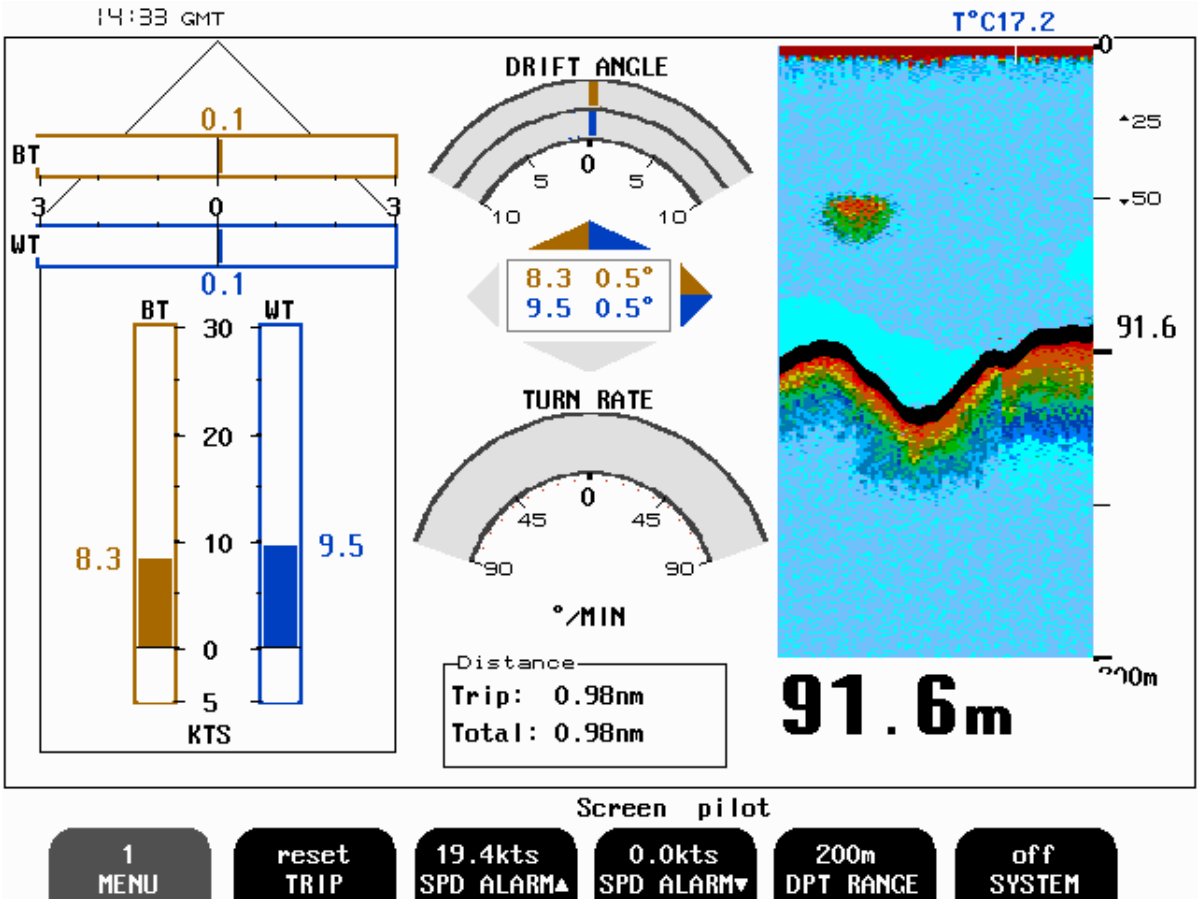
Press a High Speed Alarm Soft Key, e.g. in Screen Pilot, Menu 1, and keep it pressed while you turn the encoder until you reach 15 kts, let go of the encoder and release the High Speed Alarm button.

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

Operation Screens

Each of the operation screens contains a graphic picture and one or more Menu sets configured on the 6 soft key buttons. The various screens are selected by keeping the SCREEN SELECT button pressed and rotating the encoder in either direction. Turning the encoder clockwise cycle the screens in the sequence 1 to 7, and counter clockwise rotation cycles the screens in the sequence 7 - 1. Screens no. 1 - 3, covering the primary functions, may also be cycled by repeatedly pressing the SCREEN SELECT button.

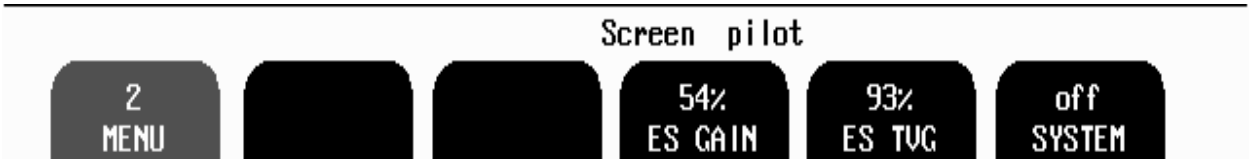
The screen layouts are outlined in the following screens. The various Menus and Soft Key button functions are described with each screen.



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 –3) indicates which of the menus are active.

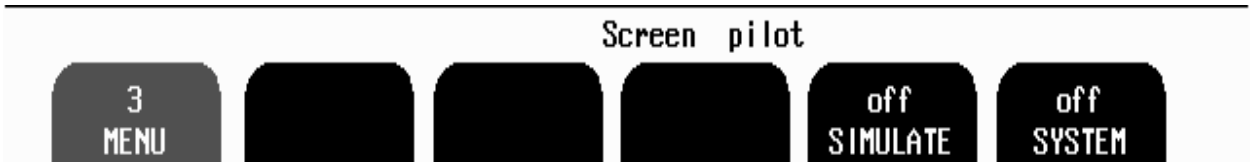
Screen Pilot, Menu 1:

Soft key 1 : MENU	Chosen menu number 1.
Soft key 2 : TRIP	Trip Distance Counter Reset
Soft key 3 : SPD ALARM	High Speed alarm
Soft key 4 : SPD ALARM	Low Speed Alarm
Soft key 5 : DPT RANGE	Echosounder Range
Soft key 6 : SYSTEM	System OFF.



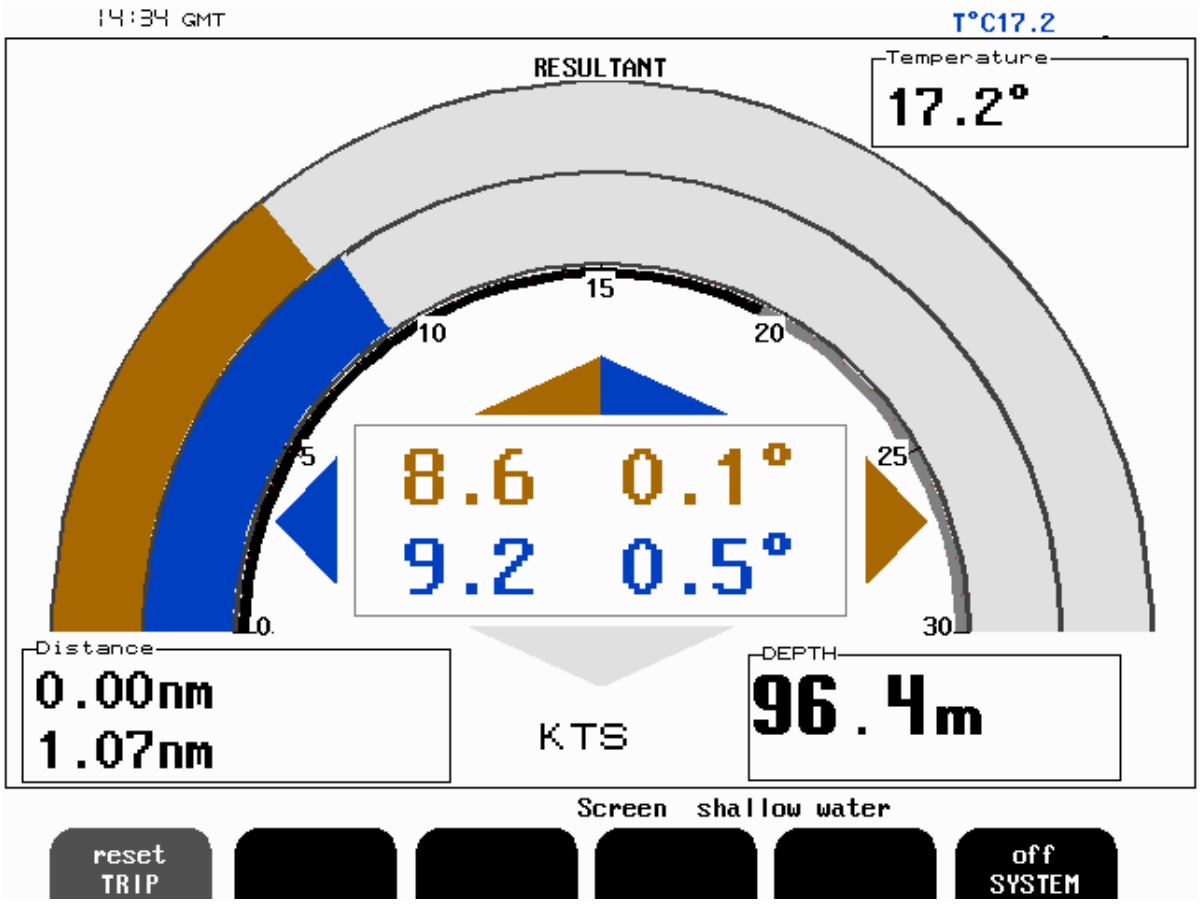
Screen Pilot, Menu 2:

Soft key 1 : MENU	Chosen menu number 2
Soft key 2 : Not used	
Soft key 3 : Not used	
Soft key 4 : ES GAIN	Echosounder Gain
Soft key 5 : ES TVG	Echosounder TVG (Time Variable Gain)
Soft key 6 : SYSTEM	System OFF



Screen Pilot, Menu 3:

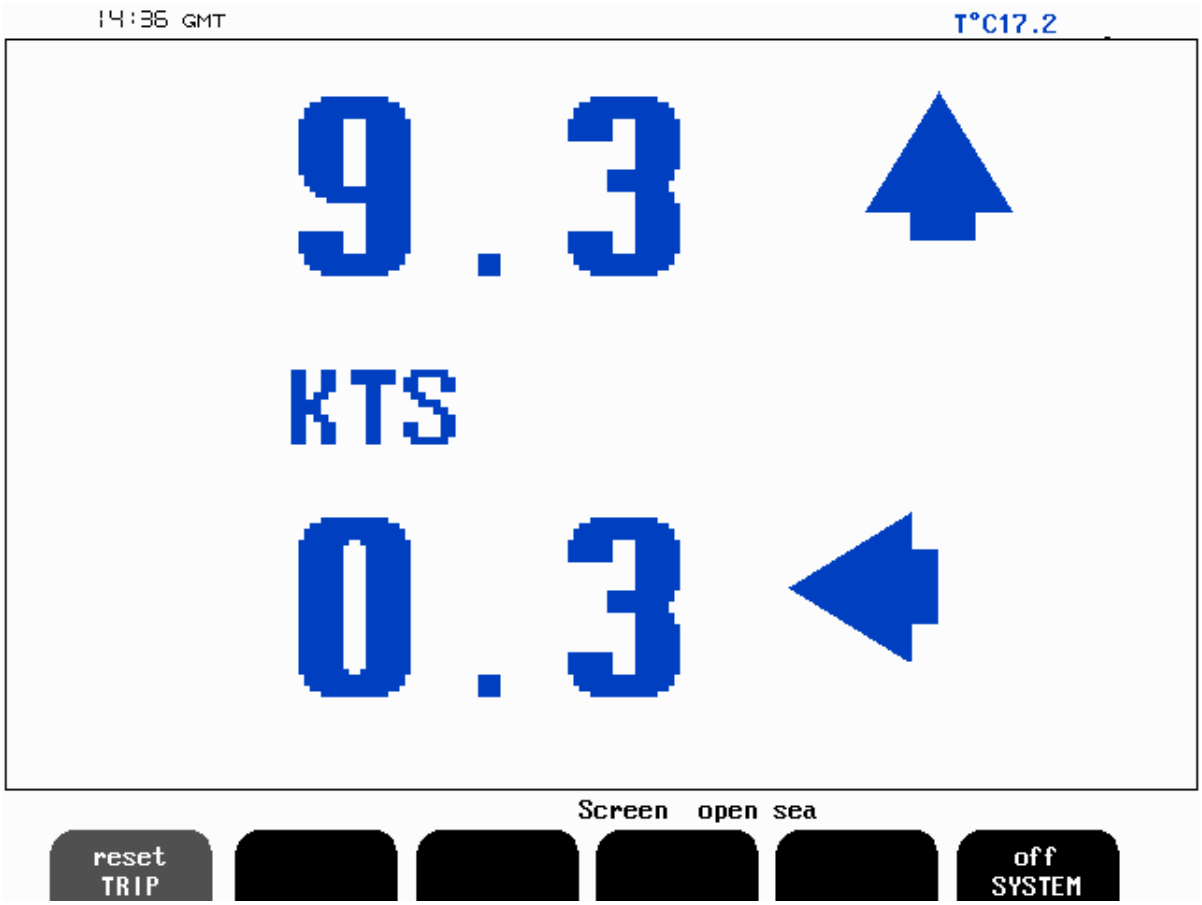
Soft key 1 : MENU	Chosen menu number 3
Soft key 2 : Not used	
Soft key 3 : Not used	
Soft key 4 : Not used	
Soft key 5 : SIMULATE	on / off simulate
Soft key 6 : SYSTEM	System OFF



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 –3) indicates which of the menus are active.

Screen shallow water 1, Menu 1:

Soft key 1 :TRIP	Trip Distance Counter Reset
Soft key 2 : Not used	
Soft key 3 : Not used	
Soft key 4 : Not used	
Soft key 5 : Not used	
Soft key 6 : SYSTEM	System OFF



Screen Open Sea, Menu: 1

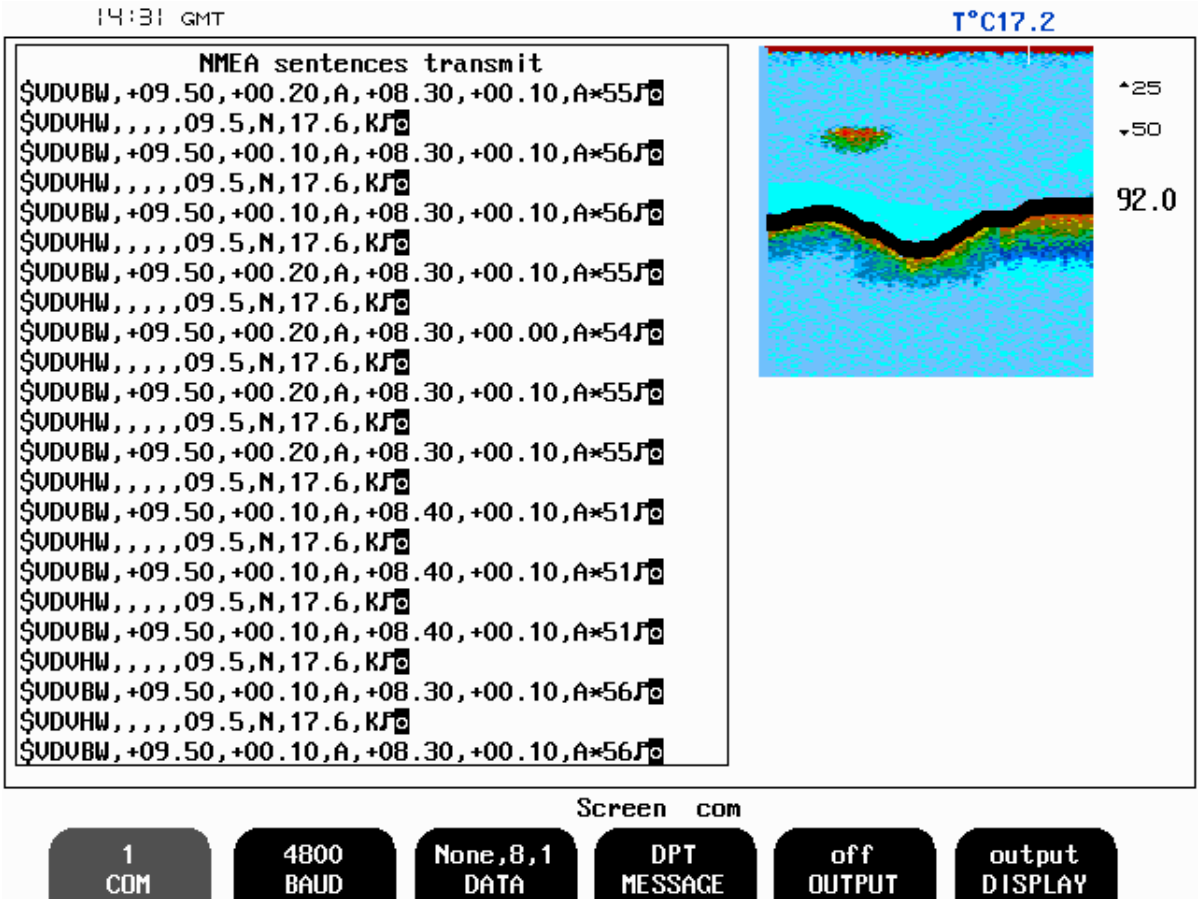
Soft key 1 : TRIP	Trip Distance Counter Reset
Soft key 2 : Not used	
Soft key 3 : Not used	
Soft key 4 : Not used	
Soft key 5 : Not used	
Soft key 6 : SYSTEM	System off

Setup and Function Control Screens

Each of the setupscreens contains a graphic picture and one or more Menu sets configured on the 6 soft key buttons. The various screens are selected by keeping the SCREEN SELECT button pressed and rotating the encoder in either direction. Turning the encoder clockwise cycle the screens in the sequence 1 to 7, and counter clockwise rotation cycles the screens in the sequence 7 - 1. Screens no. 4 - 7, is mainly used for Setup and Function Control, and may only be accessed by the rotating encoder.

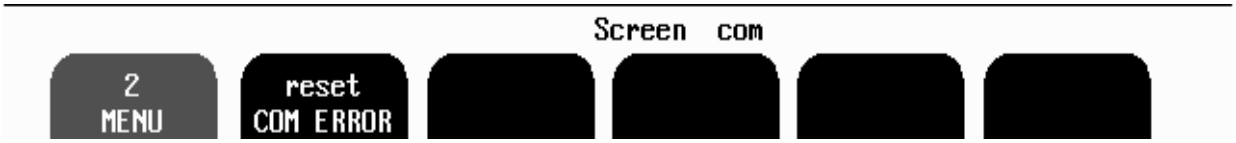
The screen layouts are outlined in the followings screens.

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

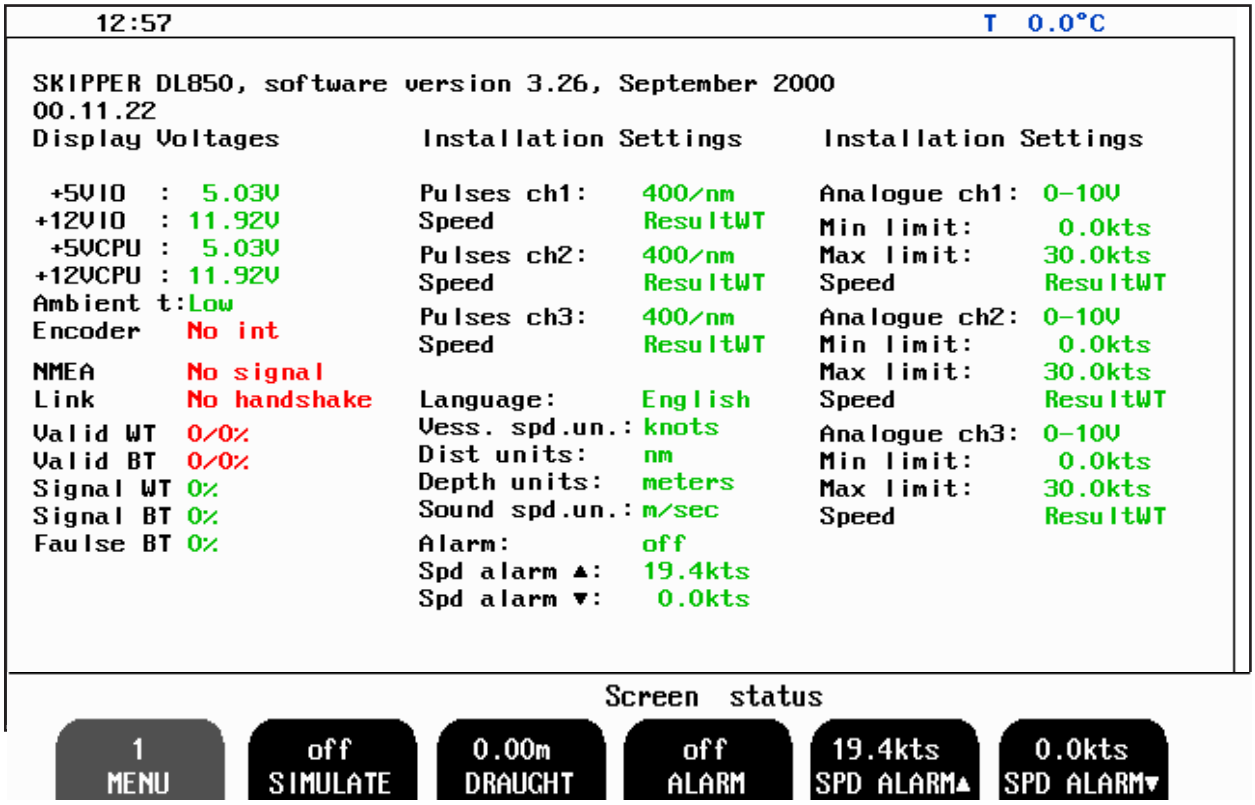


Screen NMEA/Communication, Menu 1

Soft key 1 : Menu	Menu 1 is selected.
Soft key 2 : BAUD	Baudrate for Com Port #n [1200, 2400, 9600, 19200, 38400, 76800, 115200
Soft key 3 : 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 4 : MESSAGE	NMEA Message Selector. Each Message may be controlled individually by Softkey 5 [DPT, DBS, DBT, DBK, VTG, VHW, VLW, VBW].
Soft key 5 : OUTPUT	Setting for the Message in Softkey 4 [On/Off] Note : To configure the serial output of the system go through all the messages by pressing soft key 4 and set on/off value of the softkey 5 to disable/enable a message as required.
Soft key 6 : DISPLAY	Selects the information (received from the external source or transmitted by the DL850) to be displayed in the “TEXT” window. [Input, output, off].



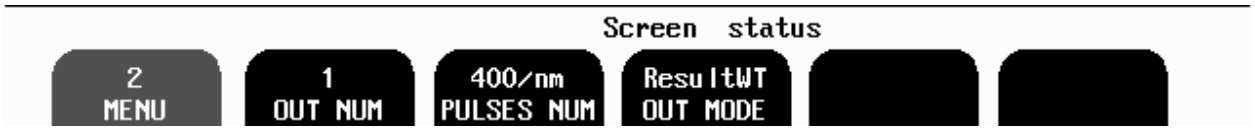
Screen COM. Menu2.
Soft key1. Menu 2….
Soft key2 COM ERROR reset.
The program memorizes the latest occurred NMEA input error for further analysis (error code presented on the Status and Com screens). By the mean of this soft key it is possible to reset the error.



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.

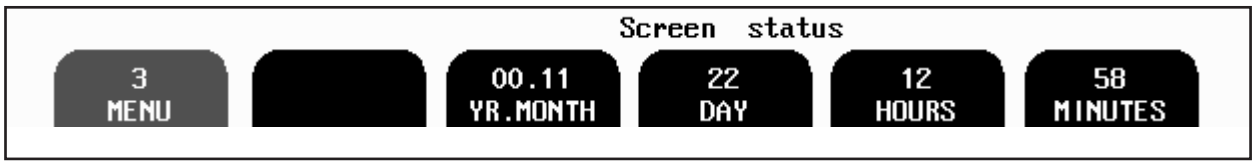
Screen status, Menu 1

Soft key 1: **MENU 1** Chosen Menu number 1
Soft key 2: **SIMULATOR** Simulator on/off
Soft key 3: **DRAUGHT** Echo sounder Draught
Soft key 4: **ALARM** Audio alarm on/off
Soft key 5: **SPD ALARM** High speed alarm
Soft key 6: **SPD ALARM** Low speed alarm



Screen status, Menu 2

Soft key 1: **MENU 2** Chosen Menu number 2
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]. Note that for output 3 it is possible to select 1000 and 20000 pulses per nautical mile.
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**



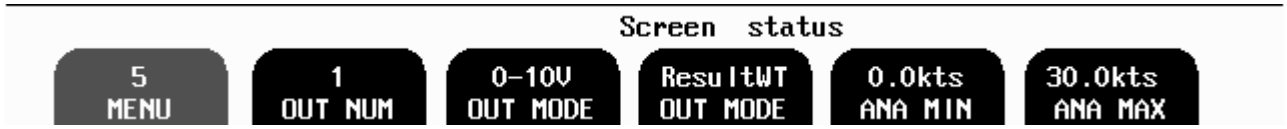
Screen status, Menu 3

Soft key 1: **MENU 3** Chosen Menu number 3
Soft key 2: **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.

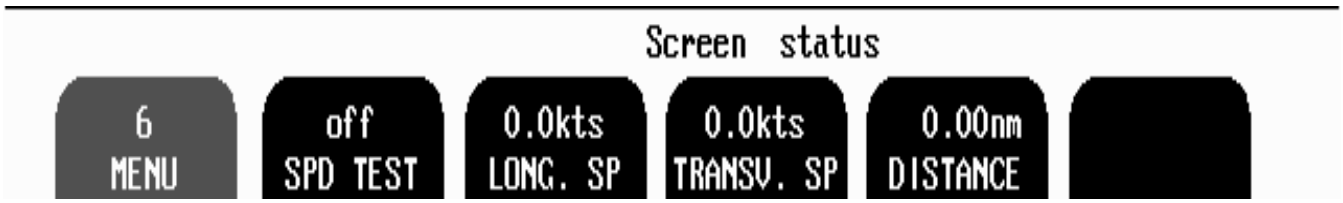
Screen status, Menu 4

Soft key 1: **MENU 4** Chosen Menu number 4
Soft key 2: **LANGUAGE** Select Display Language: [English, Norwegian, French, Spanish, German]
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]



Screen status, Menu 5

Soft key 1: **MENU 5** Chosen Menu number 5
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]

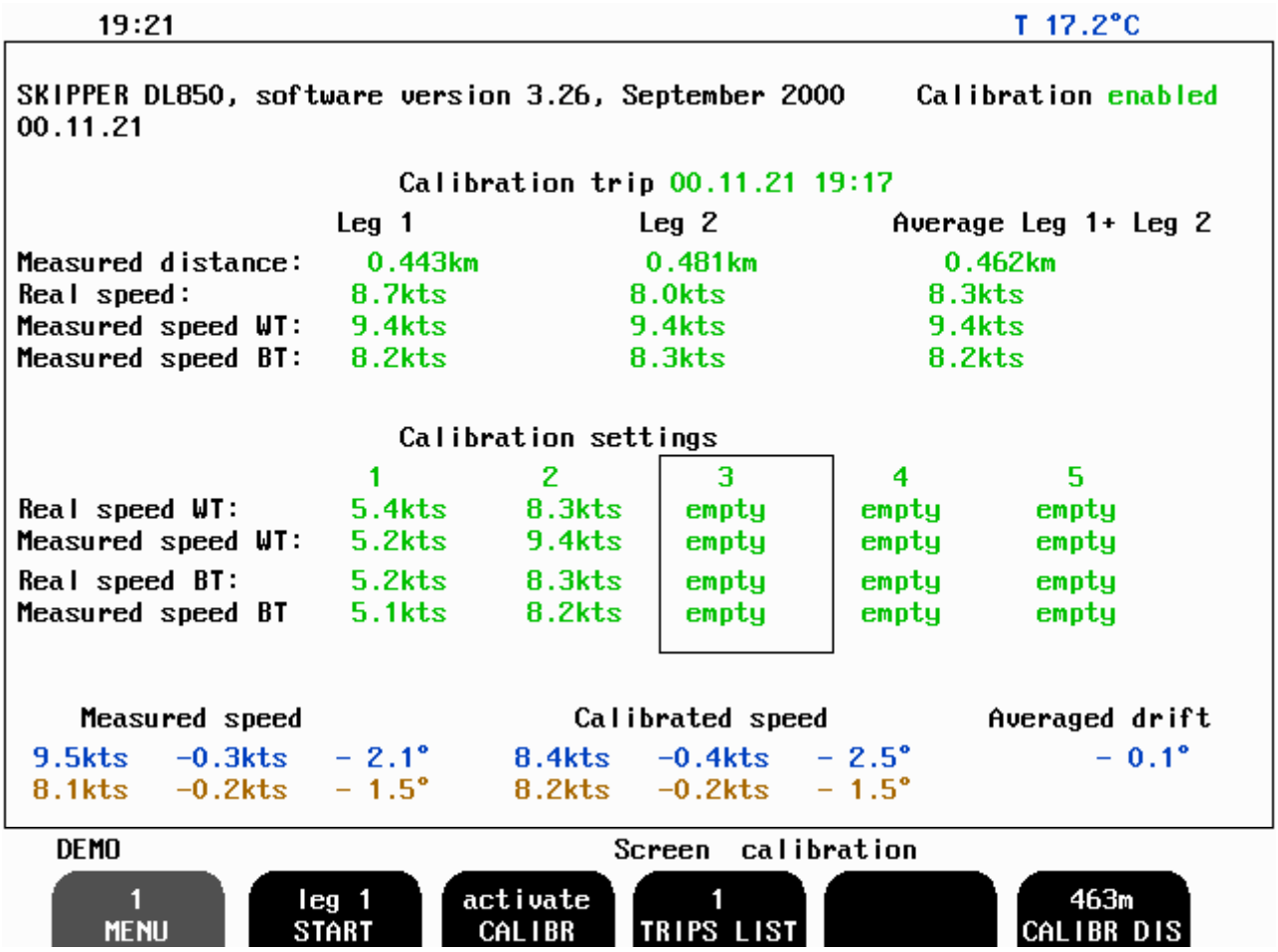


Screen Status. Menu 6.

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 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 : **not used**

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”).

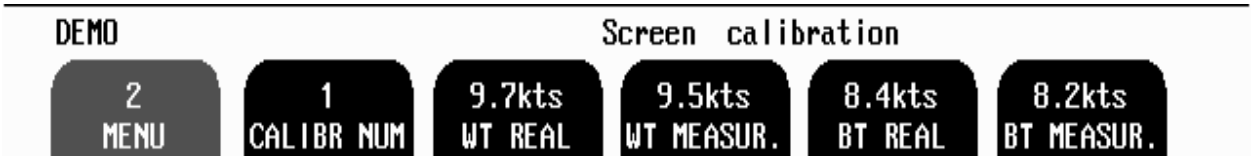


The various soft key menus are selected by pressing repeatedly the MENU button on the left side of the soft key menu. The number on the button indicates which of the menus is active.

For calibration see : DL850 calibration procedure

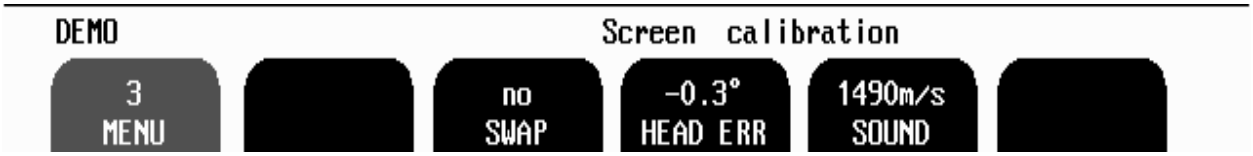
Screen calibration, Menu 1

Soft key 1: **MENU 1**	Chosen Menu number 1
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: **empty**	
Soft key 6: **CALIBR DIS**	Used to adjust length of the test leg.



Screen calibration, Menu 2

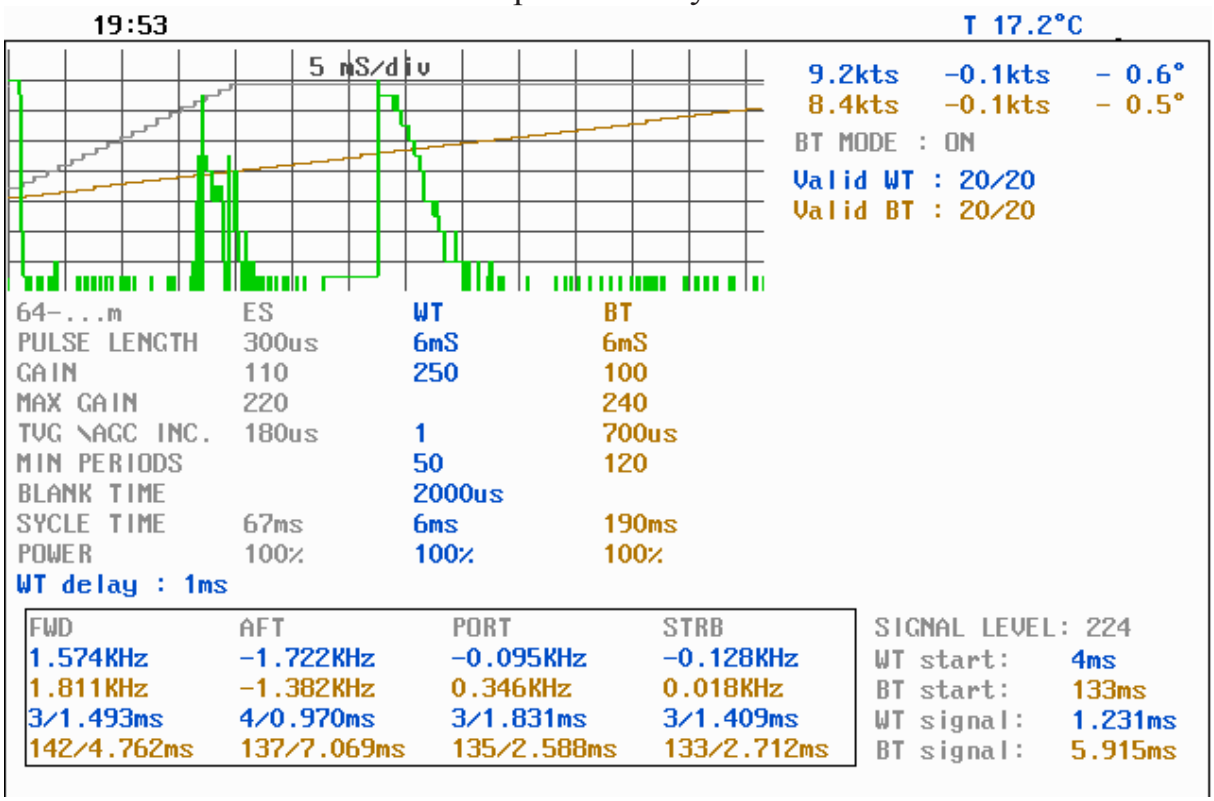
Soft key 1: **MENU 2**	Chosen Menu number 2
Soft key 2: **CALIBR NUM**	Number of the calibration, data set currently available for adjustments. In the calibration table it is marked by the frame.
Soft key 3: **WT REAL**	Real ship's WT speed (Reference speed)
Soft key 4: **WT MEASUR**.	WT speed, measure 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**	Chosen Menu number 3
Soft key 2: **empty**	
Soft key 3: **SWAP**	Transducer elements swap.
Soft key 4: **HEAD ERR**	Installation angular error correction
Soft key 5: **SOUND**	Speed of sound
Soft key 6: **empty**	

Scope screen layout



Screen Scope, Menu1:

Soft key 1: **MENU**	Chosen Menu number 1
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: **empty**	
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** Chosen Menu number 2.

Soft key 2: **SL RANGE** Select speedlog range for adjustments of the transceiver parameters, which will be activated, when speedlog 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 PERIODS** Bottom track signal length discrimination factor. (Minimum number of periods of signal 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** Speedlog power.

Screen Scope, Menu3:

Soft key 1: **MENU** Chosen Menu number 3.

Soft key 2: **SL RANGE** Select speedlog range for adjustments of the transceiver parameters, which will be activated, when speedlog 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 PERIODS** Water track signal length discrimination factor. (Minimum number of periods 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 speedlog 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 CYCLE** 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** Chosen Menu number 4.

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: **FAST REFRESH** Factory function (used for adjustments of playback speed, when analyzing test results). Should be set "on"

Screen Scope, Menu5, optional echosounder functions

Soft key 1: **MENU** Chosen Menu number 5.
Soft key 2: **DPT RANGE** Depth range to be used in the oscilloscope window and conventional echosounder picture (when enable)
Soft key 3: **ES PULSE** Echosounder pulse length
Soft key 4: **ES GAIN** Echosounder start gain
Soft key 5: **ES TVG** Echosounder TVG parameter
Soft key 6: empty

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

Screen Scope, Menu6,

Soft key 1: **MENU** Chosen Menu number 6.
Soft key 2: **ES MODE** Toggle echosounder function on/off. It is advisable to switch echosounder off in case another navigational type echosounder 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: empty
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, SAM4682 will provide (D)GPS speed value on the NMEA output, if (D)GPS is connected.
Soft key 6: **SYSTEM OFF.**

IMPORTANT NOTE : in case of accidental changing of some parameters, which causes serous 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. On should remember, that in this case all previously set parameters (speed calibration, analog calibration etc) all calibration must be repeated.

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 beeing dependant on the relative speed of the emitting and receiving systems.

$$fo = fs\frac{1 \pm vo/v}{1 \mp vs/v}$$

Observed Frequency fo,
Emitted frequency fs,
Speed of observer, vo,
Speed of emitter, vs,
Speed of Sound in Water, v.

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 aquire 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 aquired.

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 aquired.

Echosounder operation

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.

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

Alarm acknowledgement.

When any alarm is activated, the alarm may be acknowledged by pressing any button.

Fixed Key Functions.

Screen Select

The SCREEN SELECT button facilitates selection of one of the 6 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 6 after Screen 1.

Turning the encoder with no buttons pressed always force Screen 1.

Contrast & Backlight adjustment

Backlight may be continuously controlled by means of the appropriate buttons and the encoder. Press the backlight 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 backlight setting is reduced too much, the panel illumination may become uneven due to the CCT tubes not being properly ignited. Increase the setting until the illumination is even across the screen.

Soft Key Functions.

Menu

The leftmost softkey is always used for selecting the desired menu, i.e. softkey layout within a screen. The different screens have a different number of menues, and some of the menu functions may be available on more than one menu. Below is a list of all menu functions, not neccessarily in the sequence the appear with the 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

D(e)pt(h) Range

Set the Depth Range of the Echosounder.

E(cho)S(ounder) Gain

Echosounder 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(ariable) 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.

S(peed)L(og) Power

Speedlog 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.

Clock and Calendar Settings

Manual Clock and Calendar adjustments are carried out in the Status Screen, menu 3. 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.

Simulator

The DL850 contains a built in simulator to exercise the screen and various interface signals. The simulator may be switched on and off on several screens by the Simulate softkey.
When the simulator is operating, “Demo” is flashing at the bottom of the screen.

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.

Non-volatile Parameter Memory.

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

Sound speed calibration

This option will enable adjustment of the sound speed value used for the speed and depth calculations. The standard value is 1500 m/s, but the user may set values from 1400 to 1550 m/s to accommodate accurate propagation speed in known water conditions.

Options.

Repeaters/Slaves

Graphic display or digital speed slave repeaters may be connected to the system.

3. USER MAINTENANCE

Transducer Maintenance.

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

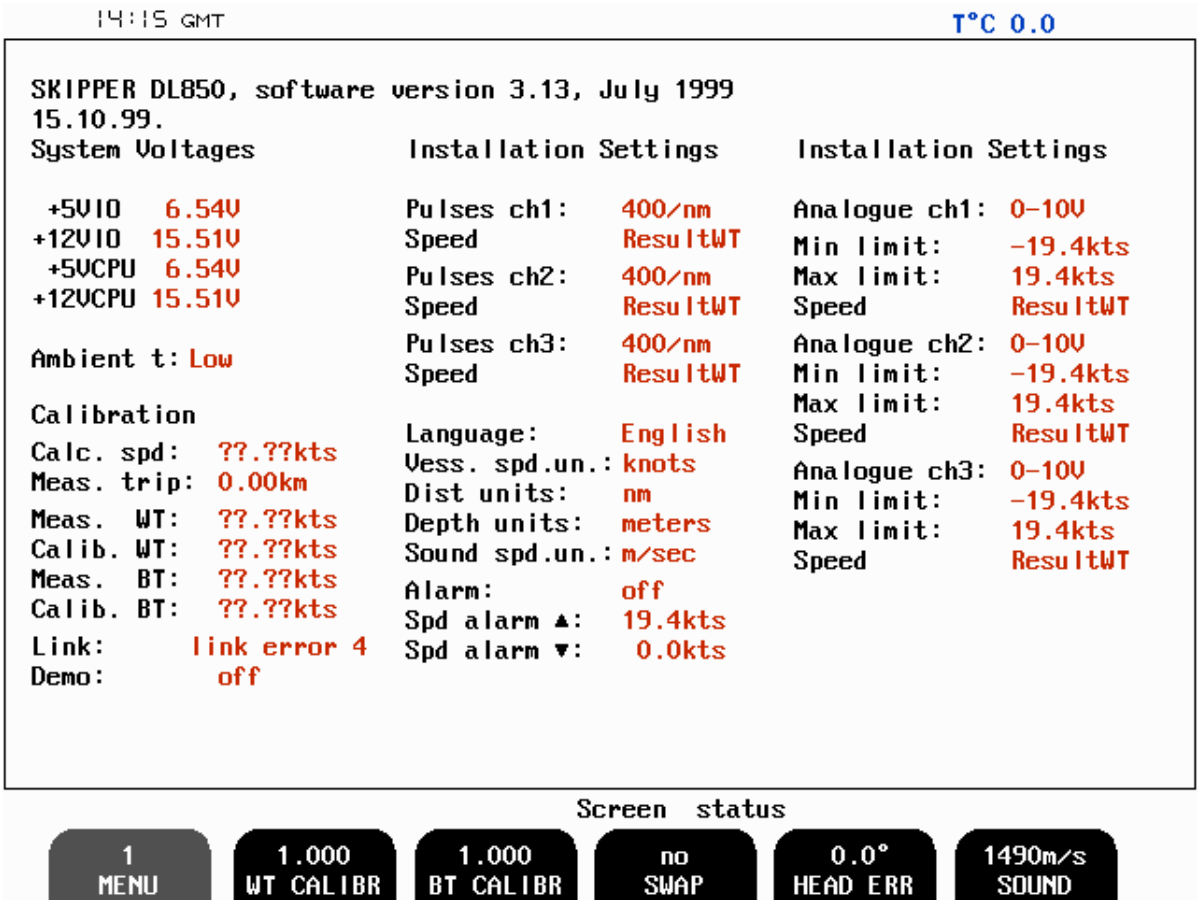
Operator Unit Maintenance.

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.

Symptom	Cause	Remedy
Basic System Integrity		
No Picture on LCD Screen	No AC or DC power to the system	Check Switches and Fuses on the Terminal Board inside the DL850 Cabinet
	System is in Standby	Press any Button on Panel
	Too low Screen Contrast	Increase Contrast Setting
	Defective LCD module or Interface	Replace Module or Interface PCB
	Voltage(s) out of Range	Replace Terminal PCB
Picture is difficult to read	Too low or high Screen Contrast	Increase or decrease Contrast Setting
	Backlight is too weak	Increase Backlight Setting
Display Backlight malfunctions, Display picture is visible	Defective Backlight tubes	Replace Tube Assembly
	Defective Backlight power inverter	Replace Keyboard PCB
Rotary Encoder malfunctions	Defective Encoder or interface	Replace Keyboard PCB or Interface PCB
Panel Buttons malfunction	Defective Buttons or interface	Replace Keyboard PCB or Interface PCB
	One button stuck	Check Key Switches or Replace Keyboard PCB

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.



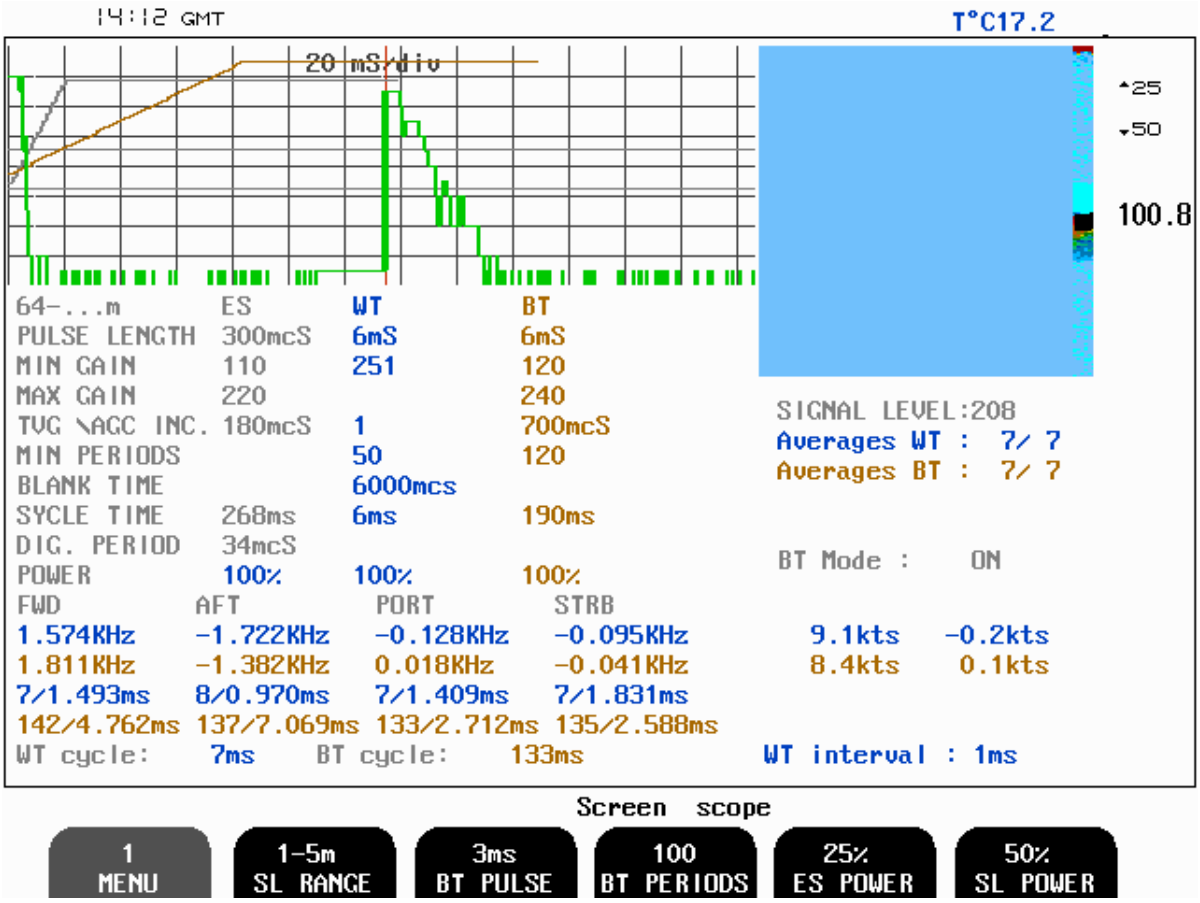
If it is at all possible to cycle through the screens and observe this information, several assumptions may be made regarding operation of the DL850 System. Although some of the subsystems necessary for this basic system operation may still suffer from minor or intermittent operation disorders, the fact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

Symptom	Cause	Remedy
Status Screen Diagnosis		
Main Voltages out of Range	Defective Power Supply Power Supply Overload	Replace Terminal Board

The other information on the Status screen is a collection of information which may be observed and manipulated with the various screen softkey 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 softkey texts.

Typical Oscilloscope Screen Contents.



This Oscilloscope Screen show oscillograms from the varios transducers. The horisontal 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 vertcal axis represent the magnitude of the echo signal received.

Symptom	Cause	Remedy
Basic Functionality		
No Bottom Detection or Bottom Contour	Too low Gain Setting Too low TVG Setting Too low Power Setting Wrong Frequency Selection	 Adjust Settings Select correct frequency
Bottom tracking is intermittent or erroneous	Marginal Gain, TVG or Power Settings Weather Conditions Transducer installation faulty	Adjust settings Try adjusting Gain, TVG or Power Settings Check transducer wiring, Receiver LED on interface Board or Oscilloscope Screen.
Bottom tracking is masked by high noise levels	Too high Gain Setting Too high TVG setting To high Power Setting	 Adjust settings

Symptom	Cause	Remedy
NMEA Interface etc.		
NMEA input signals are not listed in the NMEA Screen (8).	Wrong Polarity input Signals	Swap NMEA0183 Input wires
NMEA input signals are listed in the NMEA Screen (8), but not accepted by the DL850	DL850 Initialisation Irregular Message Mnemonic	Cycle DL850 power after NMEA Connection is established Check Remote (Talker) Setup.
NMEA output signals are not accepted by the remote system	Remote (Listener) Setup	Verify correct Remote (Listener) Setup
Analogue output malfunctions.	Incorrect Range Setting.	Verify upper & lower Limits in Screen 6
Pulse output malfunctions	Incorrect Pulse Frequency Setting.	Verify Pulse Setting in Screen 6

4. INSTALLATION

Standard System Supply.

A Basic DL850 system consists of the following units.
See Appendix drawing DL8-B-101 :

Description :

Display / Operator Unit
Transceiver Unit
Sensor cable
Gate valve with transducer (sensor)
For Bottom part Installation see separate Manuals

Transducer Installation.

Location.

The Transducer is normally installed in the 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. Se 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, changeover is automatic.

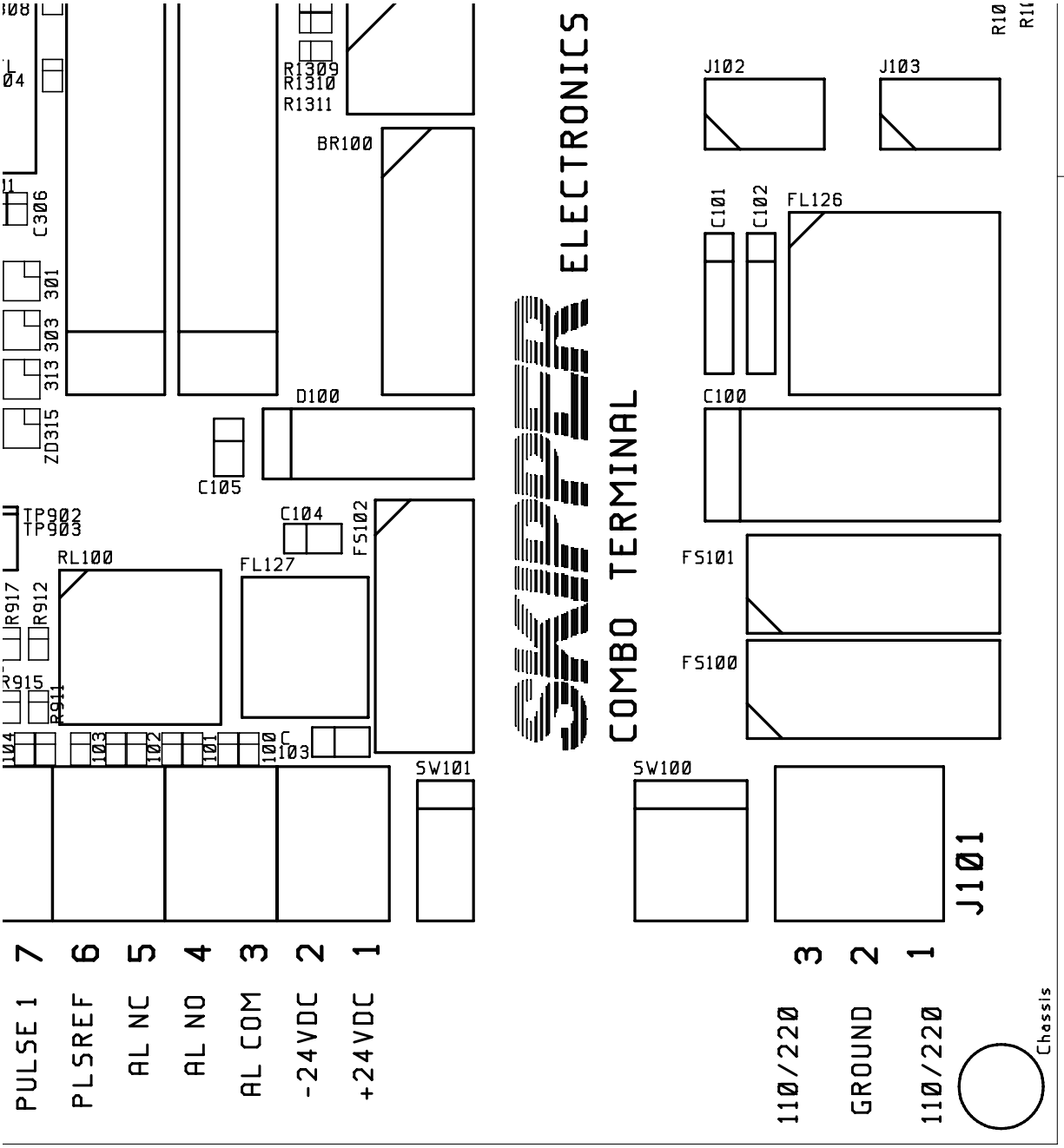


Fig.4.4 Voltage selection connectors and fuses, Terminal Board

AC Voltage selection :
Transformer Primary to : J102 for 230V and J103 for 115V
Fit dummy Plug on opposte 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

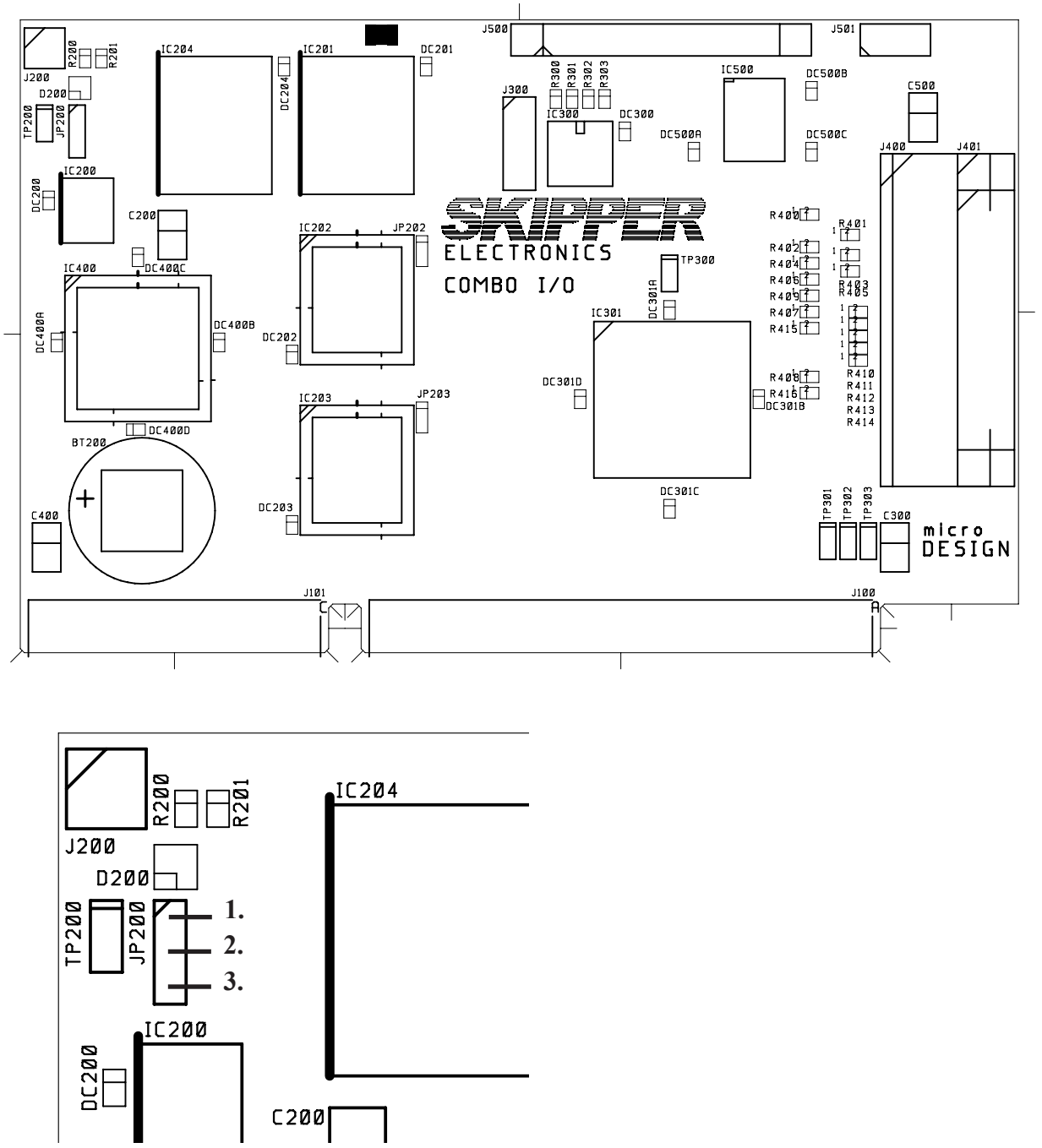


Fig. 4.5 History Memory Battery Jumper, I/O Board.

Back-up Battery Jumper 200

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 termin.

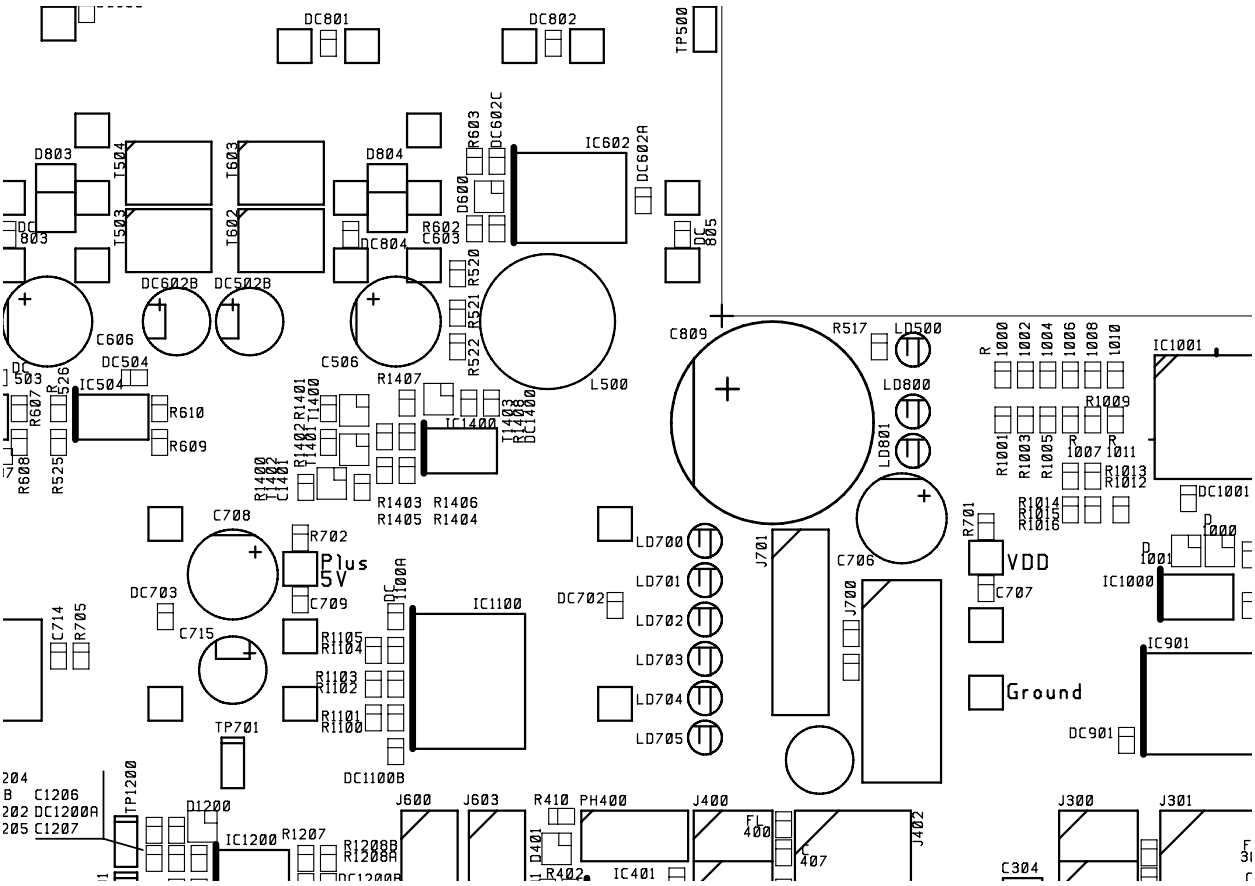


Fig. 4.6 Function LED´s, on Terminal board .

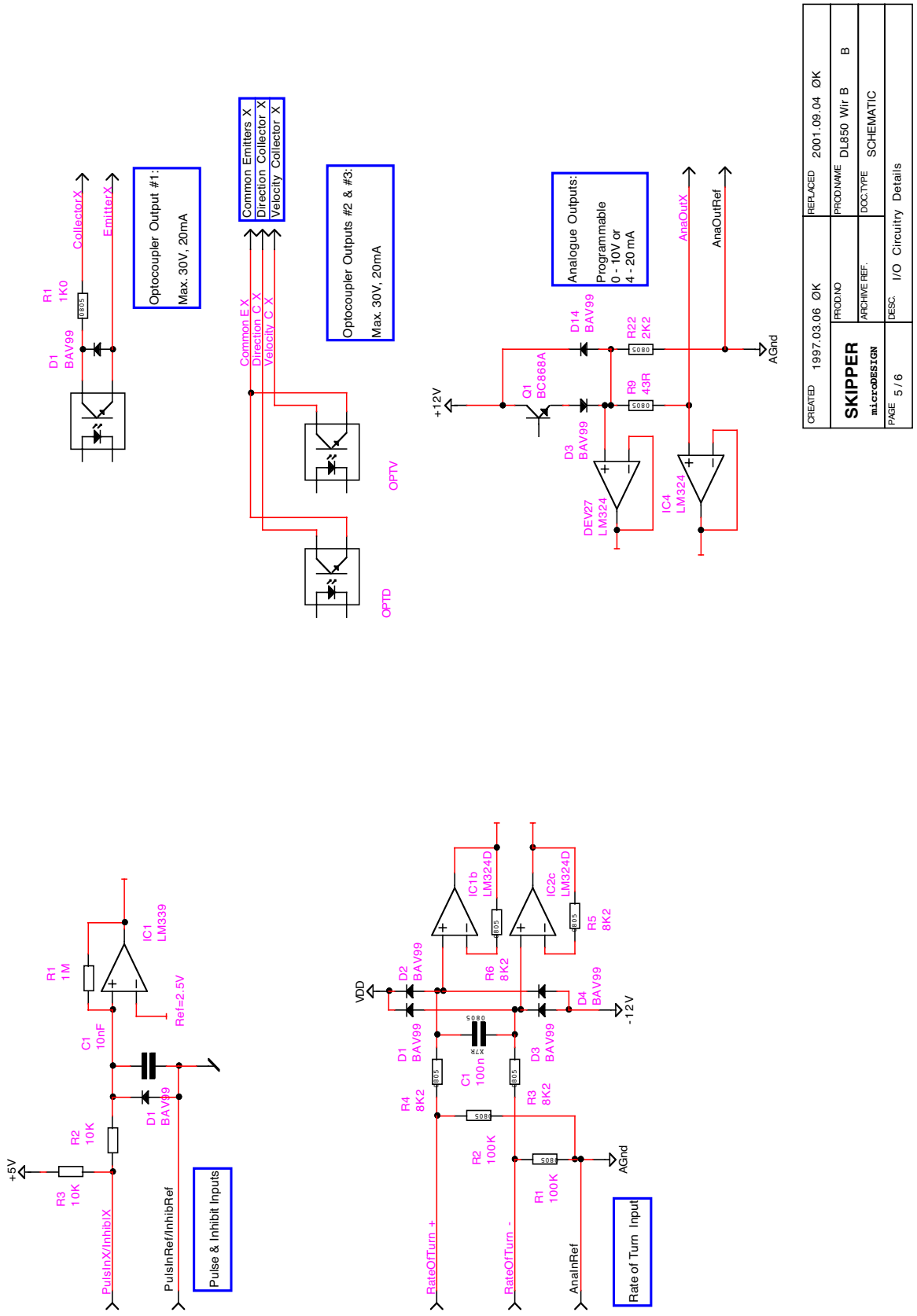
Power Indication and function LED´s.

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.



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.
ALNC	Normally closed Contact (Normal = “No alarm” condition)
ALNO	Normally open Contact

Log Pulse Outputs

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

Opto Coupler Direction Output, Transistor Off = AHEAD or STARBOARD

EMITTER	Direction Opto Coupler Emitter
COLLECTOR	Direction Opto Coupler Collector

Opto Coupler Velocity Output

EMITTER	Velocity Opto Coupler Emitter
COLLECTOR	Velocity Opto Coupler Collector

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 Screen 7 and the enabled messages are transmitted with maximal internal 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

Ground Stud

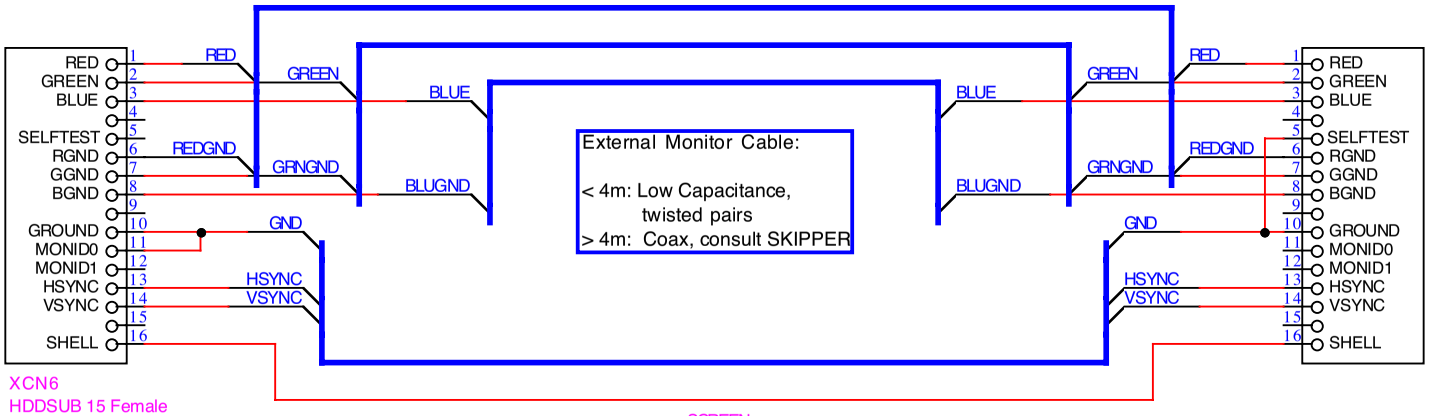
4 x PG 13,5 cable entry 10-12mm

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

SEE PAGE 45 J402 for connections of NMEA ports.

VGA Video Port
Use Twisted pair
LOW CAPASITY
DATA Cable or
COAX for Red/Green/Blue

15 pin HDDSUB Connector
in External Panel

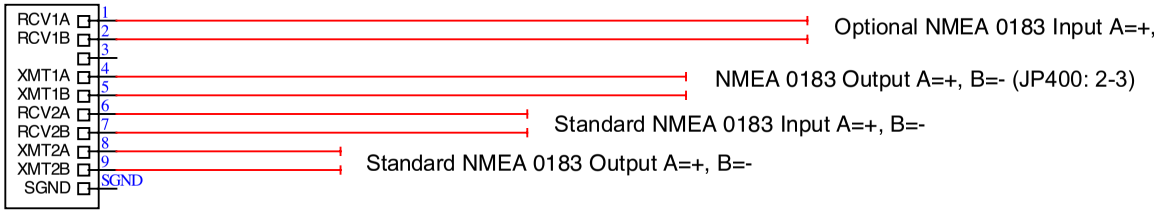


XCN6
HDDSUB 15 Female
CPU/VGA Board

External
VGA
Monitor

NMEA 0183 Ports
Use Twisted pair
DATA Cable

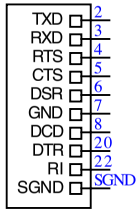
9 pin DSUB Connector
in External Panel



XJ402
DSUB 9 Female
Terminal Board

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

CPU/VGA Board XCN3
DSUB 25 Female

CREATED 1993.04.22 ØK		REPLACED 2002.05.29 ØK
SKIPPER microDESIGN	PROD.NO	PROD.NAME DL850 WirC
	ARCHIVE REF.	DOC.TYPE SCHEMATIC
PAGE 2 / 3	DESC. Communication	

RevNo	Revision note	Date	Signature	Checked

Connect transformer primary
to J102 for 230V AC or
to J103 for 115V AC

Fit protection plug on unused
connector

Alarm Relay (RL100)

JP400
1.
2.
3.

J200
12 11 10 9 8 7 6 5 4 3 2 1
200 kHz
200 kHz
SCRN
38 kHz
38 kHz
SCRN
50 kHz
50 kHz
SCRN
TMP/ROT -
TMP/ROT +
ANA SCRN
Rate of Turn, Balanced Input

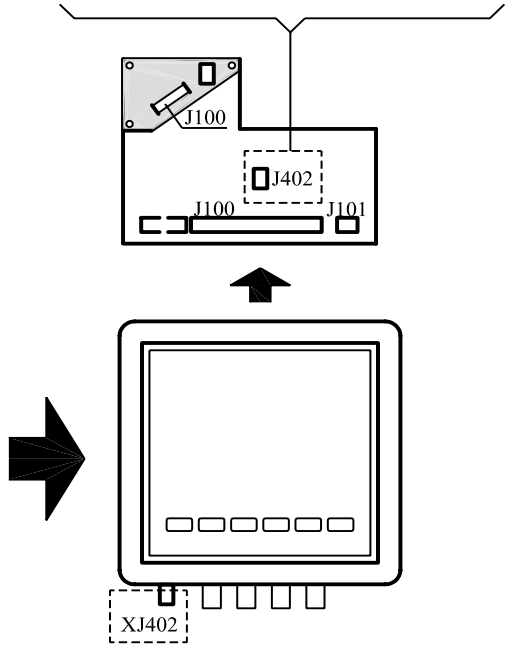
J100
26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
ANOUT3
ANOUT2
ANOUT1
ANAREF
OP3DC
OP3VC
OPT3EE
OPT2DC
OPT2VC
OPT2EE
OPTVE
OPTVC
OPTDE
OPTDC
INHIB 2
INHIB 1
INHIBREF
PULSE 2
PULSE 1
PULSREF
AL NC
AL NO
AL COM
- 24V DC
+ 24V DC
Programmable Analogue Outputs 1, 2 & 3
Optocoupler Output #3: Common Emitters, Velocity collector, Direction Collector
Optocoupler output #2: Common Emitters, Velocity collector, Direction Collector
Optocoupler #1: Velocity Output (NPN Collector, Emitter)
Optocoupler #1: Direction Output (NPN Collector, Emitter)
Programmable Inhibit and
Syncronisation Inputs 1&2
Programmable Pulse Inputs 1&2
– NC: Normally Closed
– NO: Normally Open
– COM: Common
DC Power 24V 30- 40W

J102 J103

AC Mains 230V/115V 60-80W

J101
115/230V AC
GROUND
115/230V AC

NMEA Interface Connector
RCV1A 1
RCV1B 2
3
XMT1A 4
XMT1B 5
RCV2A 6
RCV2B 7
XMT2A 8
XMT2B 9
Optional NMEA0183 Input
NMEA0183 Output (JP400: 2-3)
Standard NMEA0183 Input
Standard NMEA0183 Output
J402
XJ402 (9pin D-sub. located outside cabinet)



XJ402 (9pin D-sub. located outside cabinet)

Connections in
Display / Operator Unit ComboTerminal PCB Versjon C

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	File name Oper.Unit-ExtC	Date 14.03.01	Scale
Skipper Electronics A/S		DL850 Operator Unit Connection				
		DL8-B-002			Edition 0	Sheet 1/1

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INSTALLATION TROUBLE SHOOTING

If the problem with communication between cabinet and transceiver unit occurs, the display unit will always come up with Status Screen after switching on power, and red color message is displayed, following “Link” text in the left column of the status screen.

Symptom	Cause	Remedy
Link: No handshake, The leds on the power and transmitter PCBs inside transceiver cabinet never turns ON.	1. Transceiver unit power is off 2. 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. 3. Damaged communication cable	1. Switch on the power of the transceiver unit. 2. Check connection and polarity of handshake lines 3. Test cable
Link: No handshake, the leds on the power and transmitter PCB’s are periodically turning on and off	1. A pair of HSINA/HSINB on the display side or HSOUTA/ HSOUTB on the transceiver side is not connected properly to the terminals or wrong polarity of connection 2. Damaged communication cable 3. Bad connection of the transducer cable.	1 Check connection and polarity of handshake lines 2. Test cable 3. Check if the transducer is connected on the transceiver unit terminal according to colour diagram (page60) and transducer cable connector is properly mated to the receptacle on the transducer top flange.
Link: No test data	1. No connection data lines to the terminals (XMITA/XMITB, RCEIVEA/RCEIVEB) or wrong polarity of connection. 2. Damaged communication cable	1. Check connection and polarity of XMIT and RECEIVE data lines. 2. Test cable
Link: Test data error, **Link: Data error**	1. Cable screen is not connected to Ground or 0 Volt terminal. 2. Missing connection of one of the RCEIVEA/RCEIVEB wires on the display side or XMITA/XMITB on the transceiver side	1. Check cable screen. 2. Check connection of data lines.
Link: Self test error **Link: Bad check sum**	Defective receiver PCB	Replace receiver PCB
Link: No data	Lock up of the transceiver micro controller due to overheat or strong source of noise close to transceiver unit Note: display cabinet will restart process automatically	Check environmental and noise conditions in the area.

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

Screen 7 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.
The following messages are accepted for input to DL850 and interpreted by the program. The talker identifier is ignored:

Time

Universal Time	ZZU,xxxxxx
Universal Time & Local	ZLZ,xxxxxx,xxxxxx,-xx
Day, Month, Year	ZDA,xxxxxx,xx,xx,xxxx,-xx

Position

Geographical Lat/Lon	GLL,xxxx.xx,N,xxxxx.xx,W
Geographical Fix, present	GXP,xxxxxx,xxxx.xx,N,xxxx.xx,W,cccc,x
Omega Fix, present	GOP,xxxxxx,xxxx.xx,N,xxxx.xx,W,cccc
Loran C Fix, present	GLP,xxxxxx,xxxx.xx,N,xxxx.xx,W,cccc
GPS Position	GGA,xxxxxx,xxxx.xxx,N,xxxxx.xxx,W,x

Heading	
Heading, true, present	HDT,xxx.,T
Heading, magnetic, present	HDM,xxx.,M
Heading, compass	HCC,xxx.
Composite	
Loran C specific	RMA,a,xxxx.xx,N,xxxxx.xx,W,,,xx.x,xxx.,,*xx
GPS, Transit specific	RMC,xxxxxx,a,xxxx.xx,N,xxxxx.xx,W,xx.x,xxx., xxxxxx,,*xx
Vessel Identification	IMA,aaaaaaaaaaaa,aaaxxxx,xxxx.xx,N,xxxxx.xx,W, xxx.x,T,xxx.,M,xx.x,N

DL850 Transmitted(Originated) NMEA0183 Messages

DPT
Depth & Draught
$SDDPT,x.x,x.x<CR><LF>

DBS
Depth Below Surface
$SDDBS,x.x,f,x.x,M,x.x,F<CR><LF>

DBT
Depth Below Transducer
$SDDBT,x.x,f,x.x,M,x.x,F<CR><LF>

DBK
Depth Below Keel
$SDDBK,x.x,f,x.x,M,x.x,F<CR><LF>

VTG
Track Made Good and Ground Speed
$VDVTG,,,,,x.x,N,x.x,K<CR><LF>

VHW
Boat Speed and Heading
$VDVHW,,,,,x.x,N,x.x,K<CR><LF>

VLW
Distance Travelled through the Water
$VDVLW,x.x,N,x.x,N<CR><LF>

VBW
Dual Doppler Vector
$VDVBW,x.x,x.x,A,x.x,x.x,A*hh<CR><LF>

All data fields are free format.
Values will be preceeded with sign as needed (e.g "-" = Astern, Port)
*hh = Checksum

6.DL850 CALIBRATION PROCEDURE

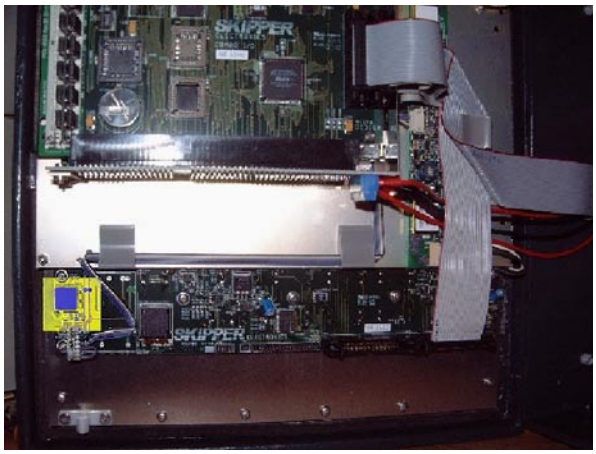
DL850 speed error can be caused basically by 2 reasons: angular sensor installation error and different way of water propagation along the hull, which depends on the hull's shape and vessel's speed.

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 speedlog 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.

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 speedlog 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 ¼, ½, 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 speedlog 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. SPECIFICATIONS

Dimensions

Transducer, 540/270 kHz	H * W * L	101 * 206 * 255 mm
	Mounting	Gatevalve
	Cable length	40m
	Weigth	appx. 14kg
Transceiver Cabinet	H * W * L	450 * 300 * 260 mm
	Weight	appx.14 kg
Operator unit cabinet	Height, front	340 mm
	Width	320 mm
	Depth	170 mm
	Weight	appx.10 kg
Operator Unit Cabinet, Cut-out for flush Mounting	H x W	322 x 302 mm
	Corner Radius	4 mm

Functional Properties

Display:	150 x 200 mm graphic Dot-Matrix TFT Color LCD Screen with adjustable Backlight. 640 x 480 pixels.
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 for Speed. Analogue 4-20 mA and 0 - 10 V for Speed. NMEA 0183 for Speed. Alarm Relay. Output for VGA Repeater. RS-232 C as option.
Interface Inputs	NMEA0183 for Position, Heading and Time. Rate of turn Sensor Input.
Languages	English, French, Spanish, Russian, German and Norwegian.
Options	SKIPPER IR300 digital Repeater.

PERFORMANCE

1. Speed range	+/- 50 kts (under favourable installation and sea conditions up to +/- 50 kts)
Depth range for Water track	2.5m - 6m
Maximum roll angel	+/- 10 degrees
Maximun pitc angel	+/- 5 degrees
Depth Range for Bottom Track:	2 - 70 m
Depth Range for Echosounder:	2 - 100 m
Digital resolution:	0.1 kts

2. Speed and distance accuracy 0.1 kts or 2% whichever is greater.

3. The performance widely depends on the hydroacoustic properties of the water column (aeration turbulences, depth, etc), bottom conditions (seabed 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.

Transducer, 4*540/1*270 kHz Beam Angle 10°

ENVIRONMENTAL

Transducer and Tranceiver Cabinet

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

Operator Unit Cabinet

Supply voltage:	230V or 115V AC, 24V DC (20-32V)
Power consumption:	50W at 24V, 70W at 230V
Alarm relay:	Change-over contact, max. 24V 300 mA
RS232 port:	Standard 25 pin D-Sub Connector.
NMEA port:	9 pin D-Sub. 2 Inputs, 1 Output.
Operating temperature:	0 - 40 °C
Storage temperature:	-20 - +70 °C
Humidity:	10 - 90% relative, no condensation.

4. Transducer must be installed in dry compartment.

8. SERVICE

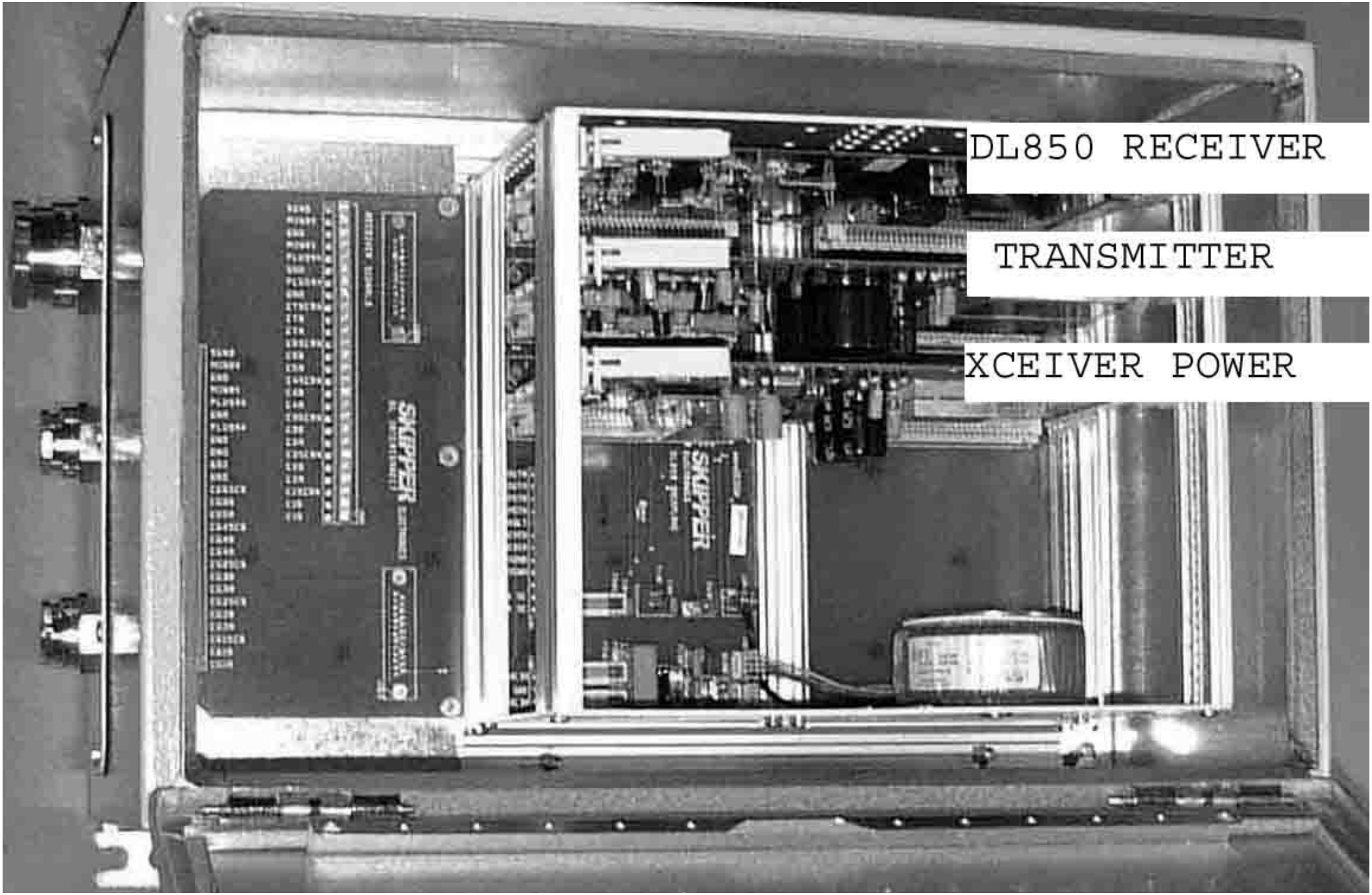
All service requests should be made to the local SKIPPER representative.

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

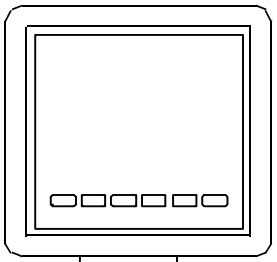
9. APPENDIX

Miscellanous Installation Drawings

For Bottom part Installation see separate Manuals


DL850 RECEIVER
TRANSMITTER
XCEIVER POWER
SKIPPER
SKIPPER

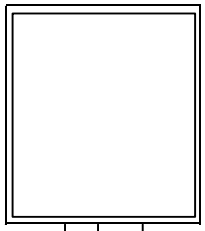
RevNo	Revision note	Date	Signature	Checked
01	Special Cable info	28-03-01	VF	THA



Display / Operatot Unit

220VAC/24VDC 2 x 2.5 sq.mm.Screened.
Yard Supply.

SCREENED CABLE:
Minimum 4 twisted Pairs, 0.5sq.mm.
with individual screens.
Yard Supply.



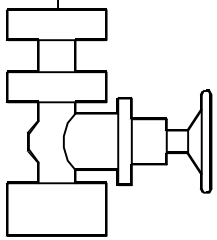
Transceiver Unit

220VAC/24VDC 2 x 2.5 sq.mm.Screened.
Yard Supply.

For details,
refer to connection
diagrams and outline
dimensions drawings

Transducer (sensor) Cable 30 meters : Diam. 19 mm
Supplied by SKIPPER

Plug at sensor end of cable :
Diam. 45 mm



Gate valve with transducer (sensor)

Itemref	Quantity	Title/Name, designation, material, dimension etc			Article No./Reference	
Designed by Arne Matre		Checked by SG	Approved by - date SG-15.03.11	File name Overview	Date 14.13.11	Scale
Skipper Electronics A/S				DL850 Overview		
				DL8-B-101	Edition 1	Sheet 1/1

RevNo	Revision note	Date	Signature	Checked

Connect transformer primary
to J102 for 230V AC or
to J103 for 115V AC

Fit protection plug on unused
connector

NMEA Interface Connector

J402

RCV1A	1	Optional NMEA0183 Input
RCV1B	2	
	3	
XMT1A	4	NMEA0183 Output (JP400: 2-3)
XMT1B	5	
RCV2A	6	Standard NMEA0183 Input
RCV2B	7	
XMT2A	8	Standard NMEA0183 Output
XMT2B	9	

XJ402 (9pin D-sub. located outside cabinet)

Alarm Relay (RL100)

JP400
1.
2.
3.

J102 J103

AC Mains 230V/115V 60-80W

J200

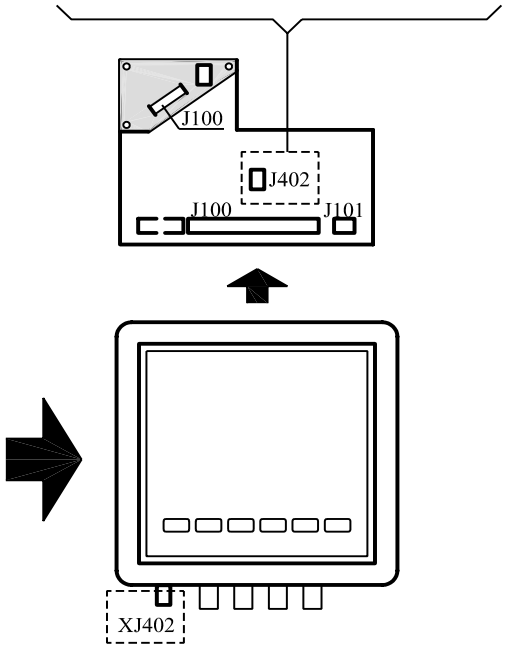
12	200 kHz	Rate of Turn, Balanced Input
11	200 kHz	
10	SCRN	
9	38 kHz	
8	38 kHz	
7	SCRN	
6	50 kHz	
5	50 kHz	
4	SCRN	
3	TMP/ROT -	
2	TMP/ROT +	
1	ANA SCRN	

J100

26	ANOUT3	Programmable Analogue Outputs 1, 2 & 3
25	ANOUT2	
24	ANOUT1	
23	ANAREF	
22	OP3DC	
21	OP3VC	Optocoupler Output #3: Common Emitters, Velocity collector, Direction Collector
20	OP3VC	
19	OPT3EE	
18	OPT2DC	
17	OPT2VC	Optocoupler output #2: Common Emitters, Velocity collector, Direction Collector
16	OPT2EE	
15	OPTVE	Optocoupler #1: Velocity Output (NPN Collector, Emitter)
14	OPTVC	
13	OPTDE	Optocoupler #1: Direction Output (NPN Collector, Emitter)
12	OPTDC	
11	INHIB 2	Programmable Inhibit and Syncronisation Inputs 1&2
10	INHIB 1	
9	INHIBREF	
8	PULSE 2	Programmable Pulse Inputs 1&2
7	PULSE 1	
6	PULSREF	
5	AL NC	NC: Normally Closed
4	AL NO	NO: Normally Open
3	AL COM	COM: Common
2	- 24V DC	DC Power 24V 30- 40W
1	+ 24V DC	

J101

3	115/230V AC	AC Mains 230V/115V 60-80W
2	GROUND	
1	115/230V AC	



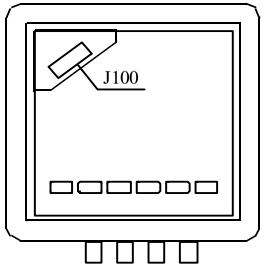
XJ402 (9pin D-sub. located outside cabinet)

Connections in
Display / Operator Unit ComboTerminal PCB Versjon C

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	File name Oper.Unit-ExtC	Date 14.03.01	Scale
Skipper Electronics A/S				DL850 Operator Unit Connection		
				DL8-B-002	Edition 0	Sheet 1/1

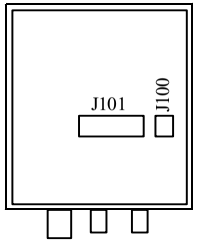
RevNo	Revision note	Date	Signature	Checked

Display/Operator Unit



Interconnection

Transceiver Unit



Consumption 40W

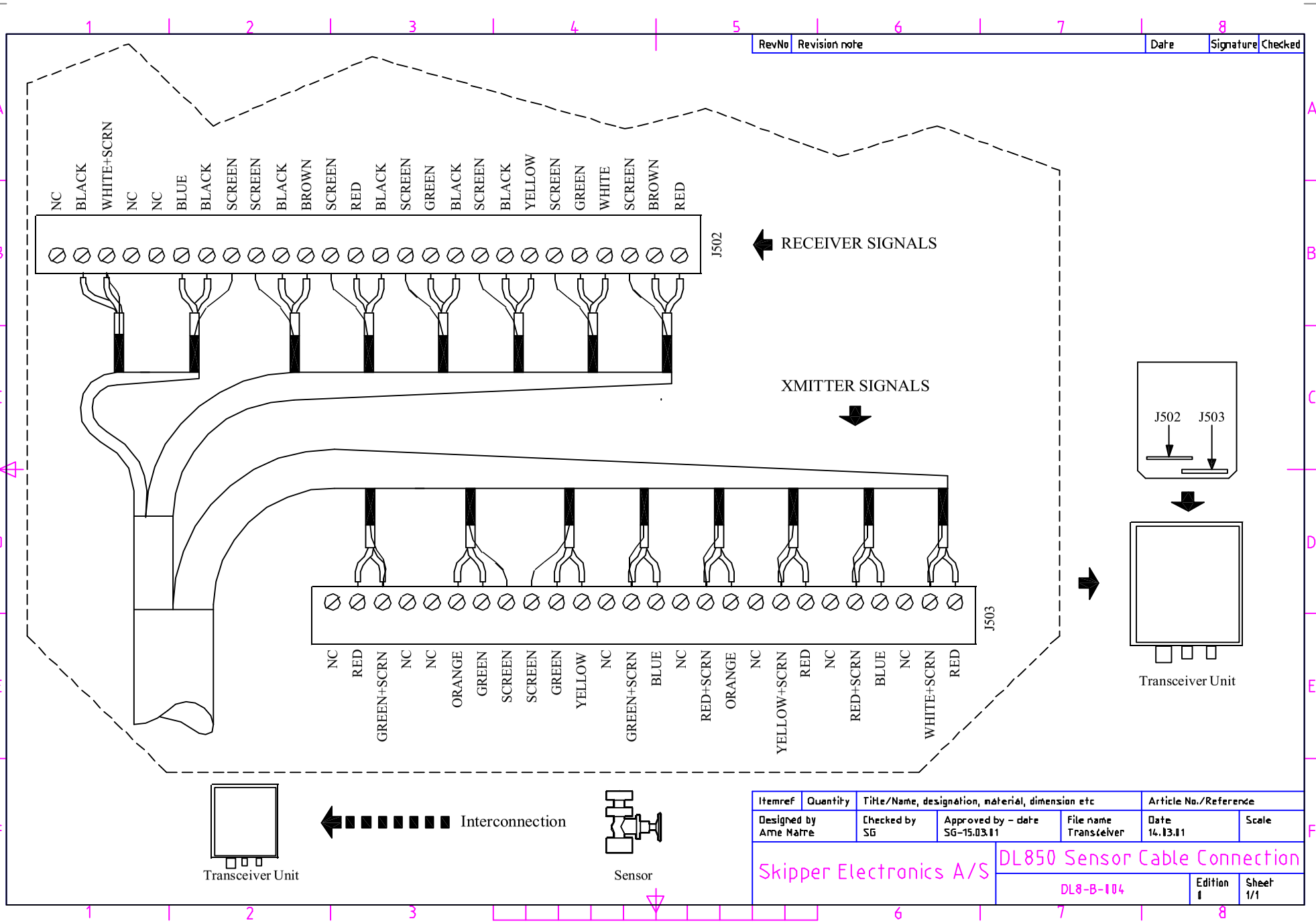
J100

∅	AC IN
∅	GND
∅	AC IN

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

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-15.03.11	File name Interconnection	Date 14.13.11	Scale
Skipper Electronics A/S		DL850 Interconnection				
		DLB-B-103			Edition 1	Sheet 1/1


RevNo
Revision note
Date
Signature
Checked
NC
BLACK
WHITE+SCRN
NC
NC
BLUE
BLACK
SCREEN
SCREEN
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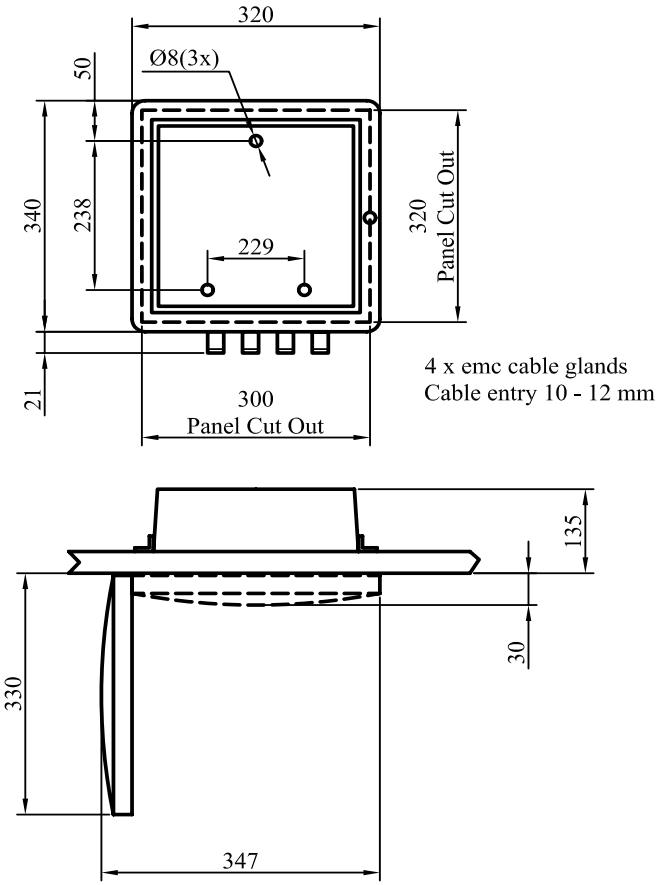
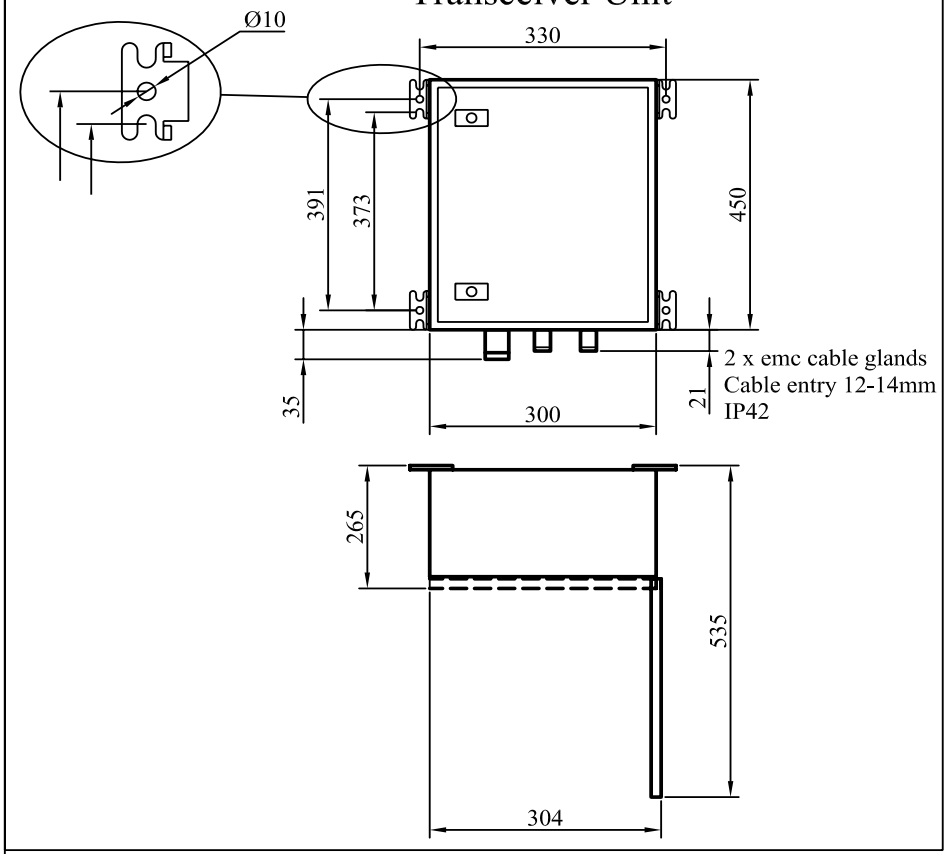
SCREEN
RED
BLACK
SCREEN
GREEN
BLACK
SCREEN
BLACK
YELLOW
SCREEN
GREEN
WHITE
SCREEN
BROWN
RED
J502
RECEIVER SIGNALS
XMITTER SIGNALS
J502
J503
Transceiver Unit
NC
RED
GREEN+SCRN
NC
NC
ORANGE
GREEN
SCREEN
SCREEN
GREEN
YELLOW
NC
GREEN+SCRN
BLUE
NC
RED+SCRN
ORANGE
NC
YELLOW+SCRN
RED
NC
RED+SCRN
BLUE
NC
WHITE+SCRN
RED
J503
Transceiver Unit
Interconnection
Sensor
Itemref
Quantity
Title/Name, designation, material, dimension etc
Article No./Reference
Designed by
Arne Matre
Checked by
SG
Approved by - date
SG-15.03.11
File name
Transceiver
Date
14.03.11
Scale
Skipper Electronics A/S
DL850 Sensor Cable Connection
DL8-B-104
Edition
1
Sheet
1/1

RevNo	Revision note	Date	Signature	Check
01	cable glands info	28-03-01	VF	TH

Display/Operator Unit



Transceiver Unit



Outline Dimensions for Display/Operator Unit and Transceiver Unit

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	File name Outline dim	Date 14.03.01	Scale
Skipper Electronics A/S		DL850 Outline Dimensions				
		DL8-B-005			Edition 0	Sheet 1/1