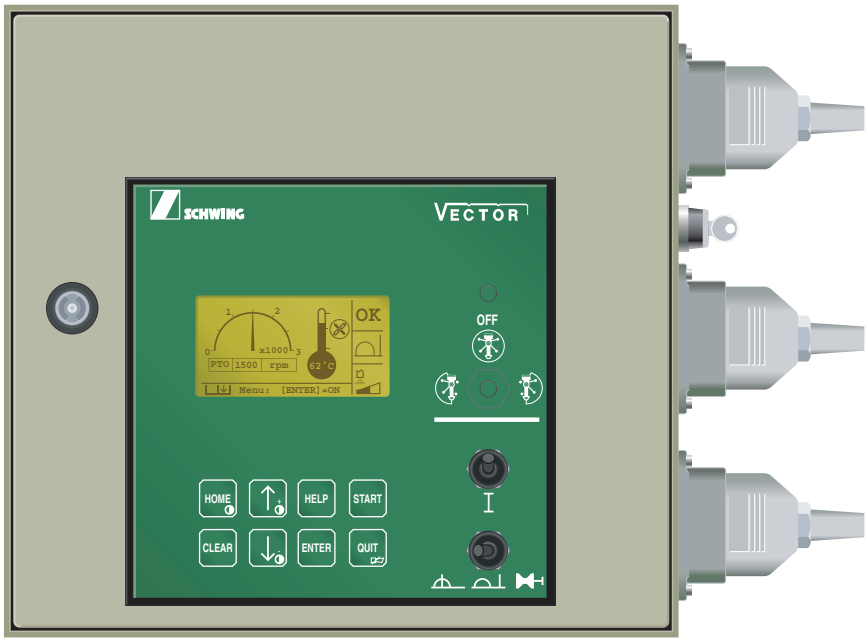
SCHWING Control system “VECTOR”
SERVICE MANUAL

Part Number 30100425



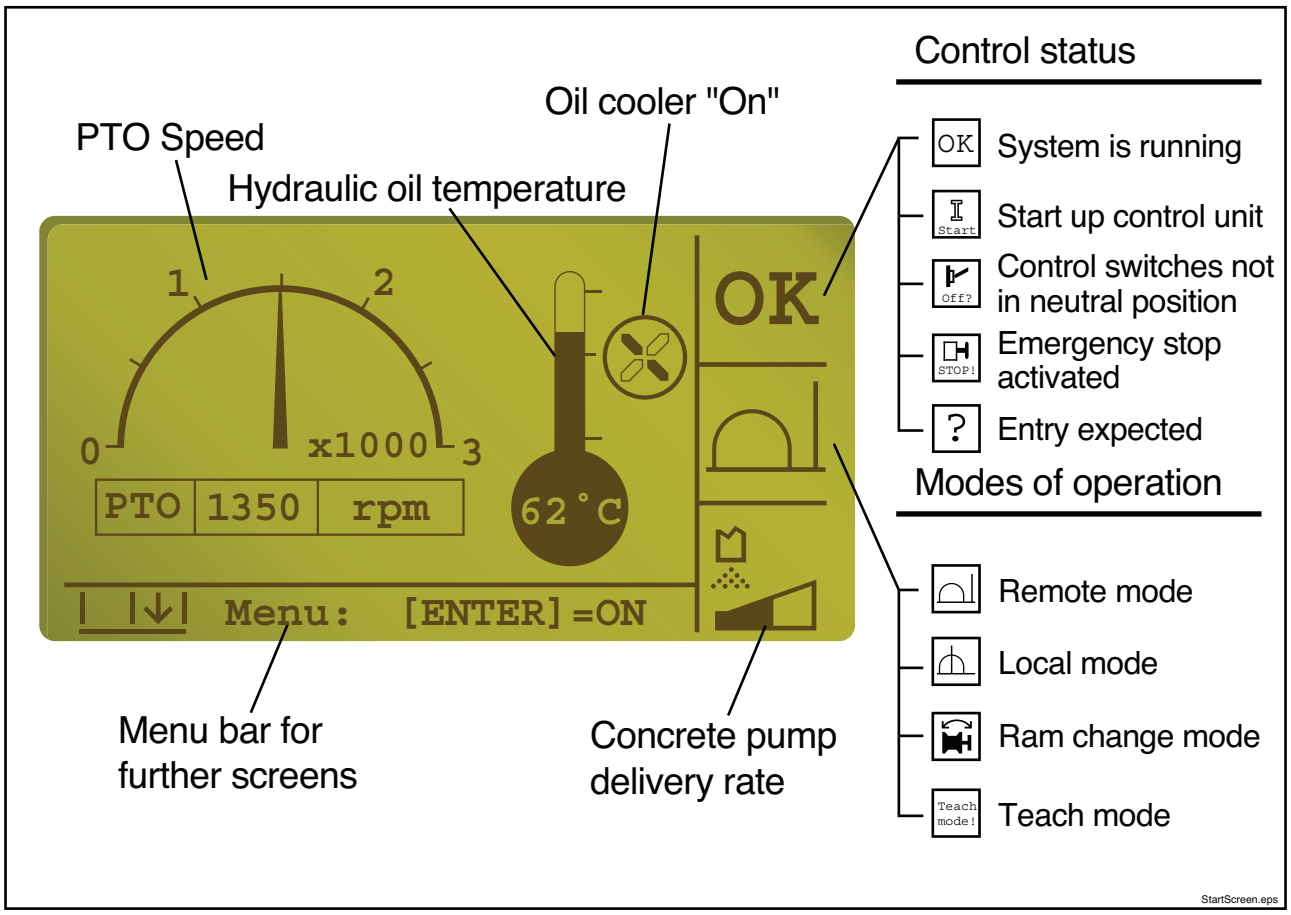
PART 1: OPERATION

PART 2: TEACH MODE

PART 3: EASy MODE (SHORT INSTRUCTIONS)

SCHWING AMERICA INC.
5900 Centerville Road
White Bear, Mn. 55127
Tel. (651) 429-0999
Fax (651) 429-3464
www.schwing.com

START SCREEN:



PART 1

SCHWING control system 'VECTOR'

OPERATION

The present instructions are intended to serve as a 'memory aid'. They do not refer to any particular type of machine and do not relieve the user of familiarizing himself with the operating manual of the machine in question.

CONTENTS

Commissioning 4
Selecting local control 5
Selecting remote control 6
Selecting ram change mode: 7
Emergency stop buttons 8
Override of the E-stop manifold 8
Options box 9
Control and monitoring components 10
Menu control 11
Local control 12
Remote control 13
Menu overview - Main menu 14
Menu overview - Submenus 18
Menu operation - Example 19
Diagnostic system/ “Fault handling” 20
Acknowledging faults 22
Fault definition 22
Summary of messages 30

Part 1 Operation

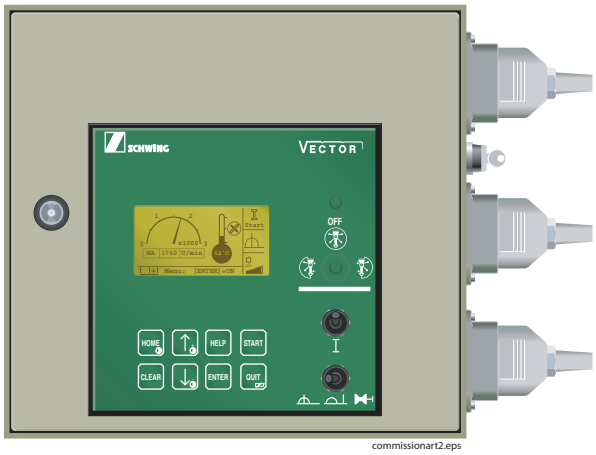
Commissioning

The electrical machine control system can only be activated if the drive configuration has been properly selected:

- Set the parking brake.
- Turn the ignition key on, and run the engine at idle.
- Put the transmission in neutral.
- Activate the PTO switch
- When Indicator light comes on, put transmission in proper pumping gear.

A bar graph on the display will indicate that the system is being initialized.

The start screen (Figure 1) will be displayed after initialization.



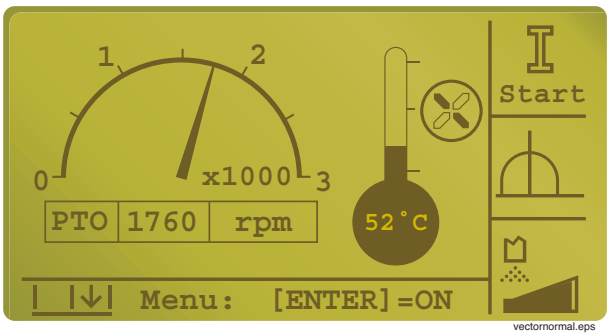


Figure 1
Vector start screen

- Select the desired mode of operation with the switch in the lower right corner of the vector cover.

- When the control mode is selected, the display will indicate that with one of the pictures (Figure 2) on the right side, center of the start screen (Figure 1).

Figure 2
Vector control mode display, local (top) remote (center) ram change (bottom)

Selecting local control

Figure 3
Local/remote/ram change switch in "local" mode

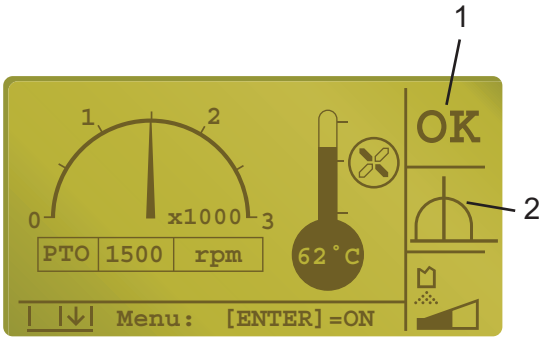


Figure 4
Vector display window

This symbol is displayed in section #2 of Figure 4 when local control is selected.

This symbol will flash in section 1 of Figure 4 when any E-stop on the machine is activated. Check that all E-stop buttons are released.

This symbol flashes in section 1 when a switch on the rear operator's panel is on.

Set all switches to neutral.

This symbol flashes in section 1 of Figure 4 when the system is ready for start-up.

Start up the system by activating the "I" switch on the front panel of the controller (Figure 1 top).

Starting is confirmed by a brief beep and the symbol below is displayed in section 1 of Figure 4.

Selecting remote control

Figure 5
Local/remote/ram change switch in "remote" mode

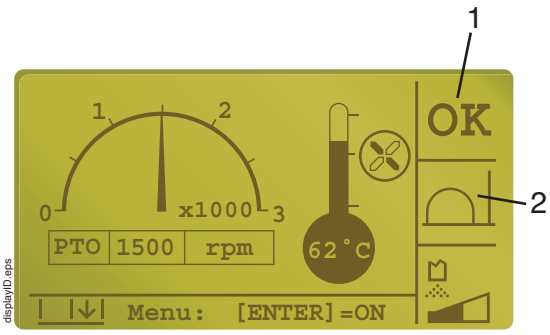


Figure 6
Display screen for remote control

This symbol is displayed in section 2 of the screen (Figure 6).

This symbol flashes in section 1 (Figure 6) when an emergency stop button on the machine or on the remote control box has been pressed.

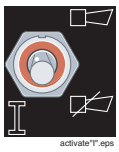
The symbol flashes also when the remote control box is off.

Unlock all E-stops or turn on the remote.

This symbol flashes in section 1 (Figure 6) when a switch on the remote control box is on.

Set all switches to neutral.

This symbol flashes in section 1 (Figure 6) when the system is ready for start-up:



Start up the control with this switch on the remote control box.

The starting is confirmed by a brief beep, and the symbol on the left is displayed in section 1 (Figure 6).

Selecting ram change mode:

Figure 7
Local/remote/ram change switch in "ram change" mode

This symbol is displayed in section 2 of the screen (Figure 6).

This symbol flashes in section 1 (Figure 6) when any E-stop on the machine is pushed. Unlock all E-stops.

This symbol flashes in section 1 (Figure 6) when the system is ready for start-up.

Start up the controller with the "I" switch in (Figure 8).

Starting is confirmed by a brief beep and the symbol on the left is displayed in section 1 (Figure 6).

The ram change position disables both local (rear panel) and remote control, brings the engine to idle, reduces the stroke limiter to minimum output, and gives complete concrete pump control to the concrete pump forward/reverse switch located at the ram change station (Figure 9). See the *Maintenance* section of the operation manual for ram change instructions.

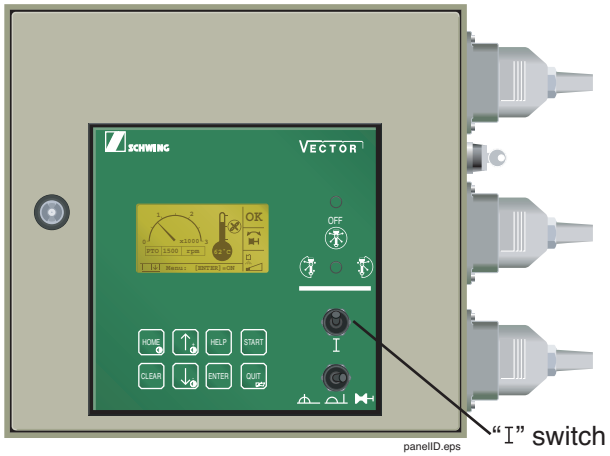


Figure 8
Vector control panel

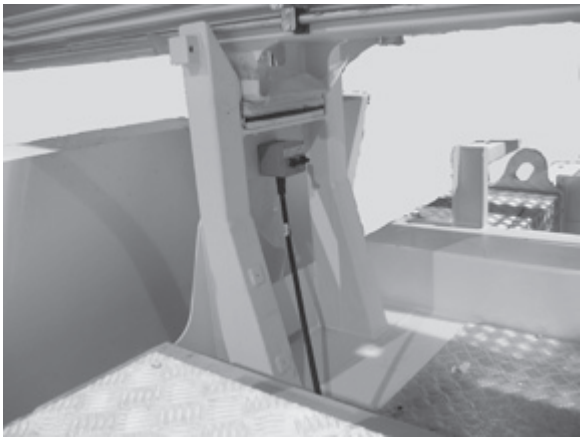


Figure 9
Ram change station

Emergency stop buttons

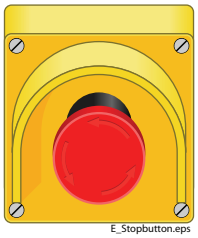


Figure 10
E-stop button

When an E-stop is pushed, all hydraulic functions of the machine will stop. Do not use the emergency stop button as an on/off switch. It is for emergencies only.

In normal operating conditions, always stop the machine functions with the controls provided for that purpose.

Override of the E-stop manifold

Bypass mode

⚠ WARNING

Emergency stop switches are disabled when manual override is activated. Use the by-pass key switch only for folding the boom in an emergency and for clean out

000360.eps

- **Use override only for emergency fold-up and cleaning.**
- **Emergency stop buttons do not function when the *bypass* mode is used.**

If there is a malfunction in the E-stop circuit and the dump valves (in the E-stop manifold) open, oil will be routed from the hydraulic pump directly back to the tank. The dump valves also open when any emergency stop button is pushed.

If the dump valves open and the machine cannot be repaired immediately, the power supply to the dump valves can be reactivated by using the bypass switch (Figure 11).

By activating the bypass key switch to the bypass position, you send power to the solenoid of the normally open dump valve. If the solenoid is functional the dump valve will close and you should be able to fold up the boom and outriggers with the manual controls.

If the problem is actually a bad solenoid, the pilot signal to the dump valve can be overridden by having one person push and hold the override handle on the E-stop manifold while the other person activates the manual controls for the nonworking system.

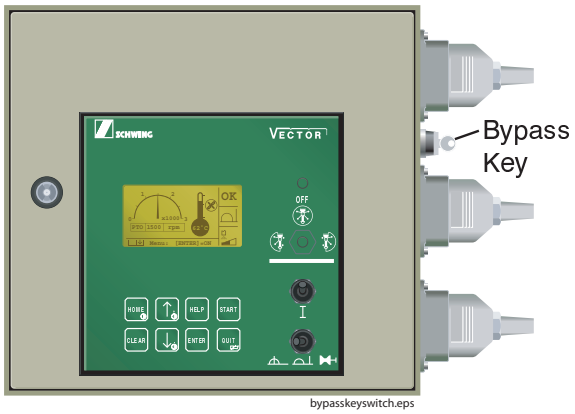


Figure 11
Bypass key switch location

Options box


optionsbox.eps

Figure 12
Electrical options box for Vector units

Night light switch

The switch shown in Figure 13 is used to activate the optional night light kit.

Figure 13
Switch to activate the night light kit

Concrete shut-off valve switch

Figure 14
Concrete shut-off valve switch

The bottom of the two switches (Figure 14) is used to control the function of the optional concrete shut-off valve.

The three position switch allows the operator to control the function of the valve in three different modes:

- Position number “1” is “Auto-mode”. This mode should be used for normal operation. The shut-off valve will work in relationship to the concrete pump on-off switch. When the machine is pumping, the concrete shut-off valve is open; when the pump is stopped, power is removed from the solenoid, and the valve inflates to stop concrete from draining out of the boom. The valve can be overridden via the remote box. If you are standing near the boom with the remote box and wish to drain the concrete from the boom, activate the switch in Figure 15 to the down position, which is the concrete shut-off icon, and the valve will open. The switch is located to the left of the E-stop button on the remote box.

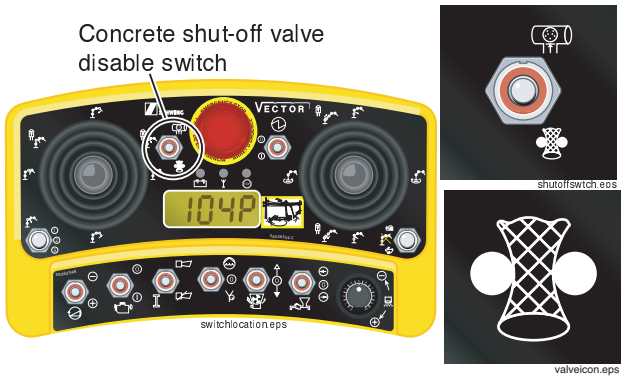


Figure 15
Switch on the remote box (left) shut-off valve icon (right)

- Position number “2” closes the valve full time.

NOTE!

Do not activate the concrete pump in this mode with full air pressure on the valve. Damage could occur!

- Position number “3” supplies power to the concrete shut-off valve full time and disables the valve. This position can be used instead of the *disable switch* shown in Figure 15 to allow the boom to drain prior to inserting a cleanout ball or any time the concrete needs to be removed from the boom by gravity.

Control and monitoring components

Controller cabinet (Figure 16)

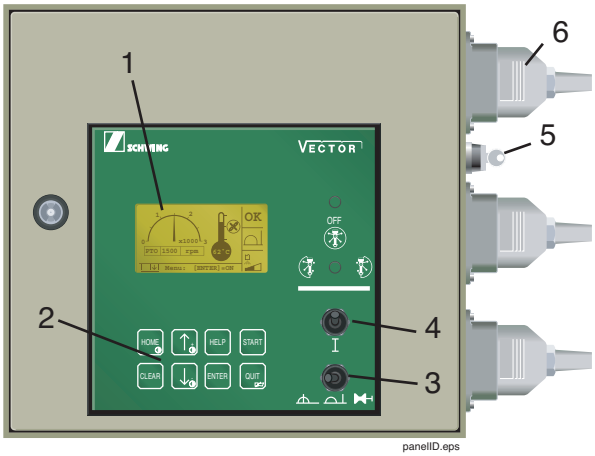


Figure 16
Component locations on the controller cabinet

1. Display window
2. Key: menu control
3. Operating mode selector
   - Local mode
   - Remote mode
   - Ram change mode
4. Momentary contact "I" switch (Start switch)
5. Key switch: E-stop bypass
6. Connector: radio or remote control

Display window (Figure 17)

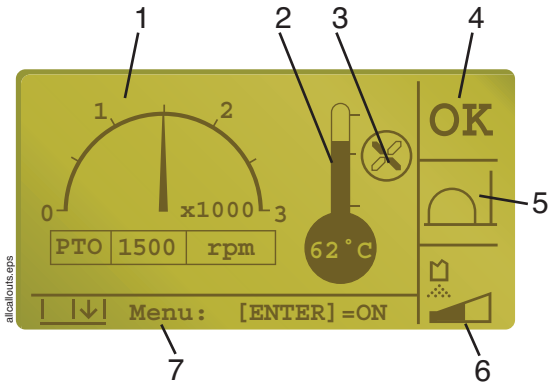


Figure 17
Display window data information

On start-up, the following data is displayed on screen (Figure 17):

1. PTO speed
2. Hydraulic oil temperature
3. Oil cooler "ON"
4. Control status
5. Selected mode of operation
6. Concrete pump delivery rate
7. Menu options

NOTE!

After pressing "down arrow" key on the menu control panel, further operational data will be displayed:

- Concrete pump hydraulic oil pressure

- Hydraulic oil level indication (optional equipment)

- Engine load factor (optional equipment)


menuarrowdwn.eps

Control status indications

Section 4 (Figure 17) of the screen displays the following conditions:

Control system is running.

!start.eps

System is ready for start up.

Starting is not possible: switches are not in neutral position.

estop.eps

Starting is not possible: an emergency stop is activated

Operating mode display

Section 5 (Figure 17) of the screen displays one of these modes of operation: Local/Remote/Ram change


localcontrol.eps


remotecontrol.eps

Menu control

Basic functions of the keys (Figure 18)

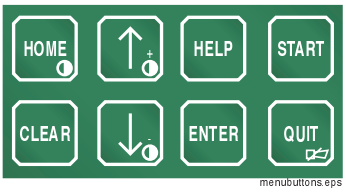


Figure 18
Menu Keys

Each key performs a different function as follows:

Full return to start screen

Up one item in the menu selection list

Down one item in the menu selection list

Supplementary information for certain screens of the diagnostic function (Presently not implemented)

Execution of certain actions, e.g. resetting of the concrete pump delivery rate counter

One step back in menu

Select indicated menu item or activate change

Confirmation and reset of diagnostic messages

Fast selection/abbreviated function keys (shortcuts):

Press the following keys at the same time:

and

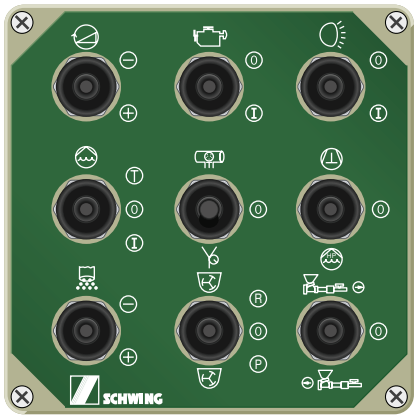
or

- To set the contrast of the LCD display manually. During setting, the contrast is indicated on display between 0 and 99%.

and

- To go to the manual language selection for all displays

Local control



RPM engine
(-) = down
(+) = up

Vehicle engine
(0) = stop
(I) = start

Work light
(0) = off
(I) = on

Water pump
(T)= momentary (special control)
(0) = off
(I) = locked (continuous)

Vibrator

Ball injection system

High-pressure water pump

Compressor

Concrete pump delivery rate
(-) = decrease
(+) = increase

Agitator
(R) = reverse (suction)

R

Agitator
(P) = forwards (pumping)

P

Concrete pump
reverse (suction)

Concrete pump
forwards (pumping)

Remote control

RPM engine
(-) = down
(+) = up

Vehicle engine
(0) = off (stopping)
(I) = on (starting)

Control on
Diagnostic horn signal confirm (shut-off)

Vehicle signal horn on

End hose shutoff valve

Ball injection system

Concrete pump delivery rate
(-) = decrease
(+) = increase

Vibrator in automatic mode (on)

Water pump

Agitator in:
( ) = forward
( ) = reverse

Concrete pump
forwards (pumping)

Concrete pump
reverse (suction)

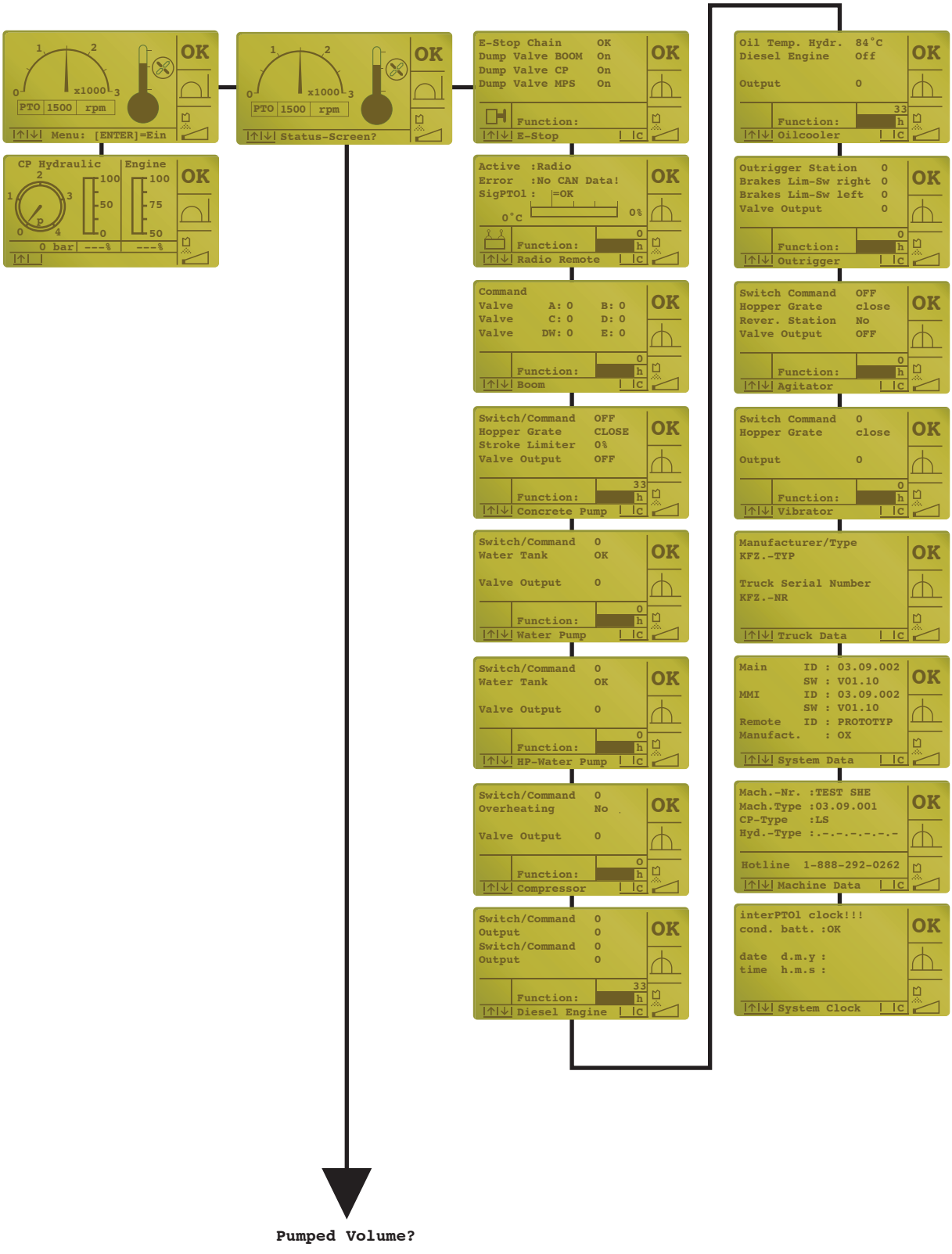
boom speed slow (placing operations)
(0) boom functions off
boom speed fast (set-up and take-down)

Radio remote control only:

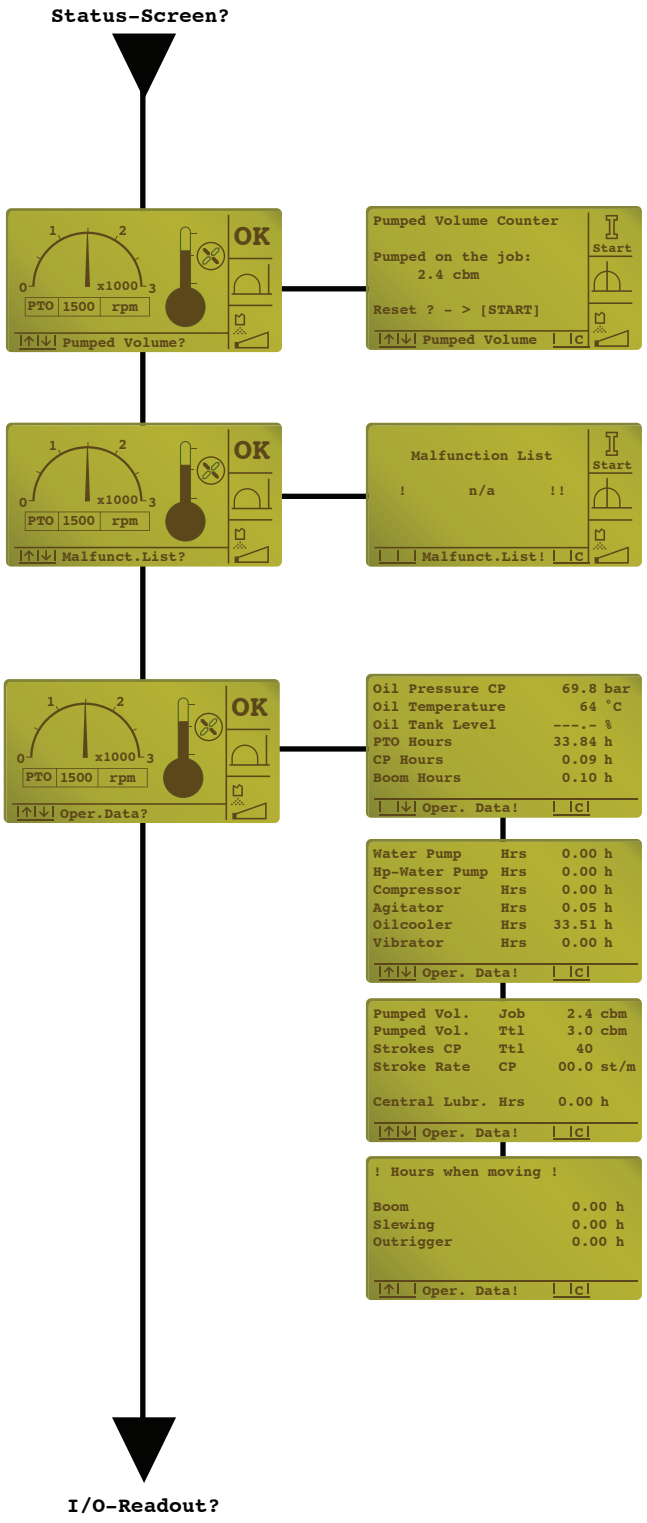
LED:
charge condition of transmitter battery

LED:
tansmitter state of operation:
continuously on = transmitter ready
flashing = transmitting control signals

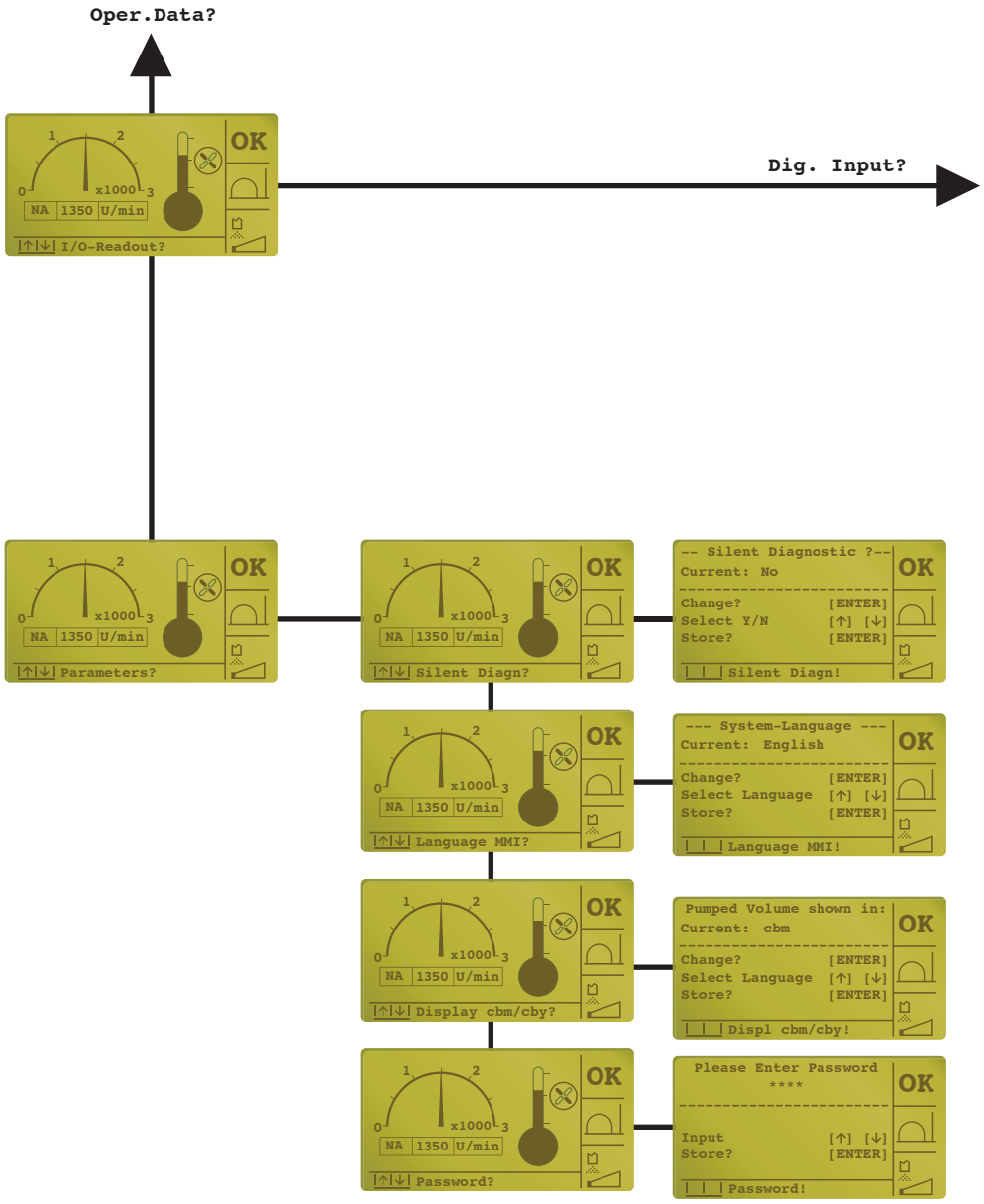
Menu overview - Main menu



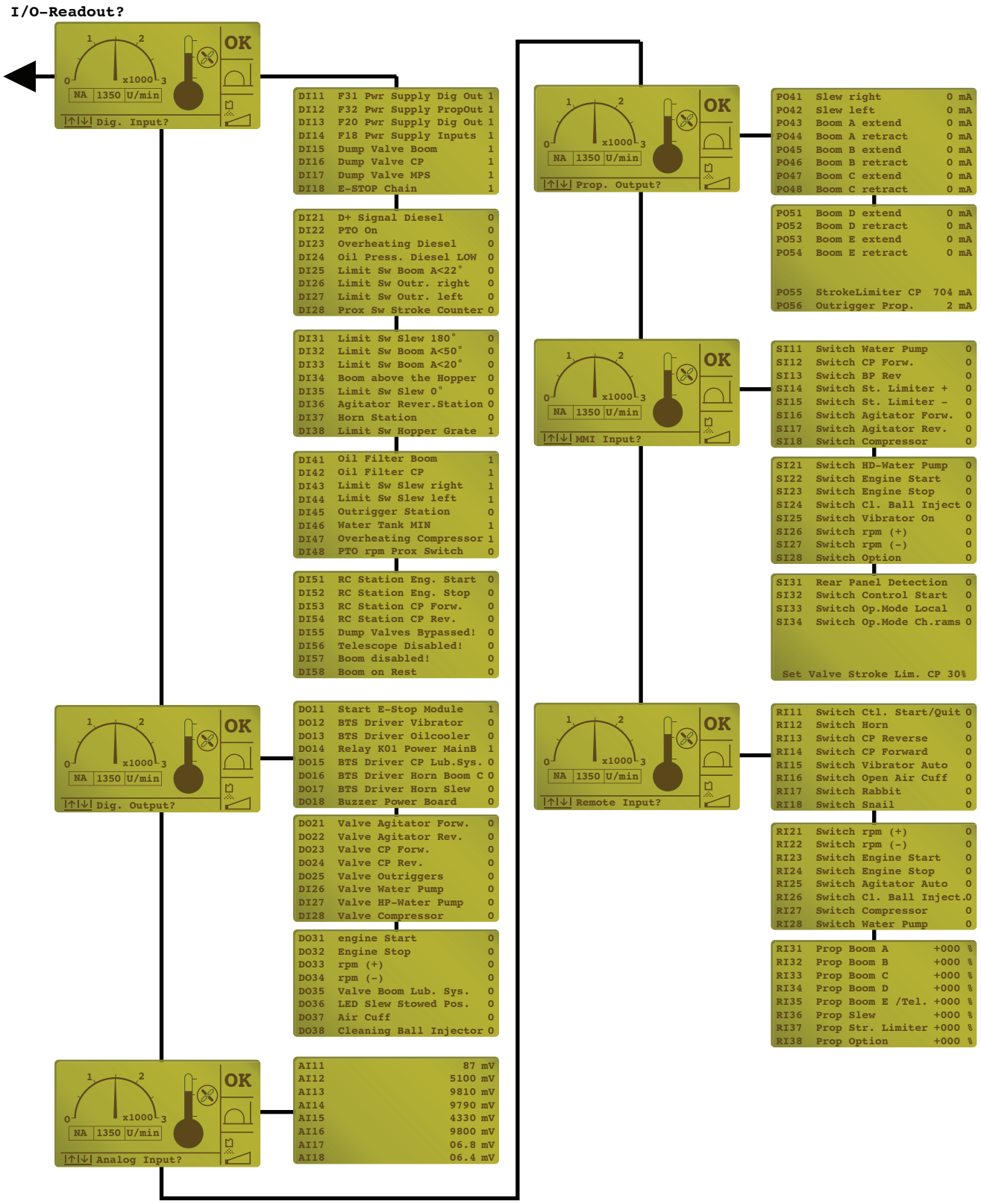
Menu overview - Main menu (continued)



Menu overview - Main menu (continued)



Menu overview - Main menu (continued)



Menu overview - Submenus

Status Screen?	Pumped Volume?	Fault list?	Oper. data?	I/O readout?	Parameters?
• E-stop • remote control • boom • concrete pump • water pump • high-pressure water pump • compressor • diesel engine • oil cooler • outrigger • agitator • vibrator • machine data • truck data • system data • system clock	• pumping volume counter	• Malfunction list	• oil parameters • operating hours: - P.T.O - CP - boom • operating hours: - other • CP delivery rate: - day / total - strokes • moving hours: - boom - slew drive - stabilizers	• digital input? - DI11-DI58 • digital output? - DO11-DO38 • analog input? - AI11-AI22 • prop output? - PO41-PO56 • MMI input? - SI11-SI34 • remote control? - RI11-RI38	• silent diagnostic • language MMI? • display - cbm / cby? • password: - limit SR CP - Efficiency CP?

Menu operation - Example

RESETTING THE CONCRETE PUMP DAILY DELIVERY RATE

ACTION:		RESULT:
Press:		menu line on opening screen: **• • • • • Menu: [ENTER] = ON**
Press:		next menu line: **• • • • Status Screens? • E• C•**
Press:		next menu line: **• • • • • Pumped Volume?• E• C•**
Press:		display of daily pumping rate, e.g.: 18.0 m³
Press:		daily pumping rate reset to 0.0 m³
Press:		return to opening screen

Diagnostic system/ “Fault handling”

The integrated diagnostic system informs the operator about certain operating states, displays faults, and indicates the possible causes.

The corresponding messages are displayed on the screen of the control unit 1 (Fig. 1).

The information displayed is always composed of a code and the corresponding message.

MESSAGE

CODE

CODE

The four-digit code is composed as follows:

X xx X

X.....: Origin of message
xx.....: Number of message
X : Type of message

Example:

P01M

P.....: Pump (concrete pump)
01.....: Number of message
M.....: Message

The following message origins are available (1st column):

B = Boom (placing boom control)

D = Diesel engine (truck diesel engine)

M = Machine
(general machine control)

0 = Optional
(Optional control functions)

P = Pump (concrete pump)

R = Remote (remote control system)

S = System

The following types of message are existing:

M = Message

L = Low-level fault (minor fault)

H = High-level fault (severe fault)

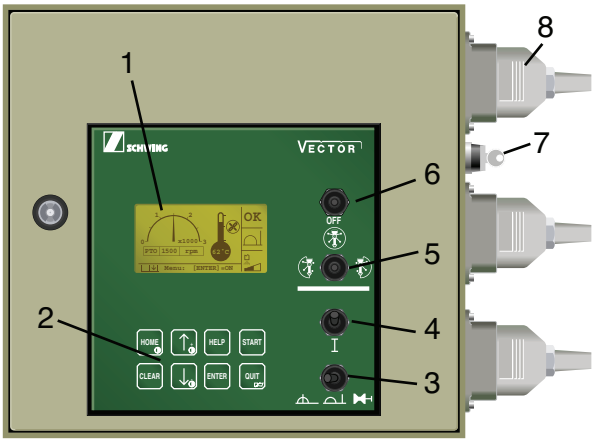


Fig. 1

Display language

Texts can be displayed in three languages; English, German, and Spanish.

The language of text displays can be selected in the "**Parameter?"** menu under **"Language MMI?"**.

If "**International"** is selected, the messages are displayed without text by means of symbols.

The "*Summary of Messages"* section of this book contains a complete list of the text messages together with the international symbols.

The messages are sorted by their code in alpabetical order.

Example 1: Text display

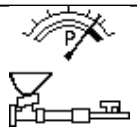
Message:

```
Pressure Limiter
Concrete Pump
Activated !
```

Code: **P01M**

Example 2: International display

Message:



Code: **P01M**

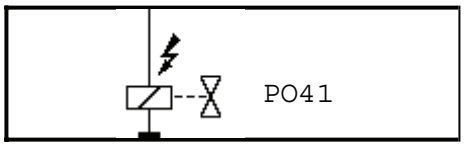
Important:
Since the international display makes multiple use of the various symbols, it is absolutely essential to consult "Summary of Messages" for a clear identification of the message.

Text messages, as well as international symbols, may include additional information for service personnel.

Example 1: Text display

```
Disconnected / Overload
Solenoid Slewing Right
- PO41 !
```

Example 2: International display



PO41 designates, for instance:

Proportional **O**utput 41

The following additional information is possible:

PO = Proportional Output

DO = Digital Output

K = Relay

F = Fuse

Acknowledging messages

NOTE!

Messages are not faults! They are announced only visually on the display and can be acknowledged with the "CLEAR" key.

Acknowledging faults

Low-level faults are announced visually on the screen and acoustically by an intermittent tone from the controller and the warning horn. These faults can be acknowledged via remote control or directly on the control cabinet.

High level faults are also announced visually on display and acoustically by an intermittent tone from the controller and the warning horn. They can only be acknowledged on the control cabinet.

NOTE!

In both cases, the acoustic signal can be shut off via remote control.

Fault definition

Low level fault

In the event of a low-level fault, the job can still be finished even if only with certain restrictions.

High-level faults

High-level faults can cause direct damage to the machine. The control system will go to E-stop mode. The operator must then decide if the fault displayed will affect operational safety.

NOTE!

The operator is responsible for rectifying any fault reported as soon as possible in order to prevent possible damage to the machine. After a fault message has been canceled, it will not be repeated.

Schwing assumes no liability for damage caused by faults that have not been rectified. When a low-level fault is reported, this does not mean that it can be ignored completely, only that the job can be finished with possible restrictions.

Silent diagnostic

In the **"Parameter?"** menu under **"Silent diag?",**
the operator can select whether a fault is signalled in
the **"REMOTE"** mode of operation by the horn or with the buzzer in the control cabinet.

MENU OVERVIEW – Silent diagnostic

Display menu line / Key:

• • • • • Menu: [ENTER] = EIN
[ENTER]
• • • • Status screen? • E• C•
[▯]
• • • • • Pumped Volume?• E• C•
[▯]
• • • • • Fault list? • E• C•
[▯]
• • • • • Oper. data? • E• C•
[▯]
• • • • • I/O display? • E• C•
[▯]
• • • • Parameter? • E• C• [ENTER] > **• • • • Silent diagnostic? • E• C•**
[ENTER]

Current : No	
Change?	[ENTER]
Select y/n	[▯] [▯]
Store?	[ENTER]
• • • Silent Diagn?	**• E• C•**

Silent diagnostic: **Yes**

– message displayed on the screen

– acoustic signal from buzzer

Silent diagnostic: **No**

– message displayed on the screen

– acoustic signal from horn

Reporting and acknowledging faults

The way faults are acknowledged depends on the selected mode of operation (LOCAL or REMOTE) and on the severity of the fault:

1. Mode of operation	: **LOCAL**
Silent diagnostic	: **Yes** or **No**
Minor fault	

In the **LOCAL** mode of operation, minor faults are reported and acknowledged in the same way, irrespective of whether **Yes** or **No** has been selected for the silent diagnostic.

The fault is displayed on the screen and announced by the buzzer in the control cabinet.

- Depress the "QUIT" key on the control panel (Fig. 1) **once.**

  The buzzer stops sounding.

  The message continues to be displayed and can be read without hurry.

- Depress "QUIT" once more.

  The fault message is definitely acknowledged.

  The message is deleted from the display and logged in the faults list.

2. Mode of operation	: **LOCAL**
Silent diagnostic	: **Yes** or **No**
Severe fault	

In the **LOCAL** mode of operation, severe faults are reported and acknowledged in the same manner as described for minor faults.

In addition, the control system goes to e-stop mode.
Optional shutdown of the engine is also possible.
A severe fault can only be acknowledged from **LOCAL**.

ATTENTION:
RISK OF ACCIDENT AND DAMAGE

After shut-off by a severe fault, the control system and, if applicable, the drive engine must be restarted.

- **It is absolutely vital to have a severe fault rectified before re-starting. Otherwise there is the risk of irreparable damage to the machine.**

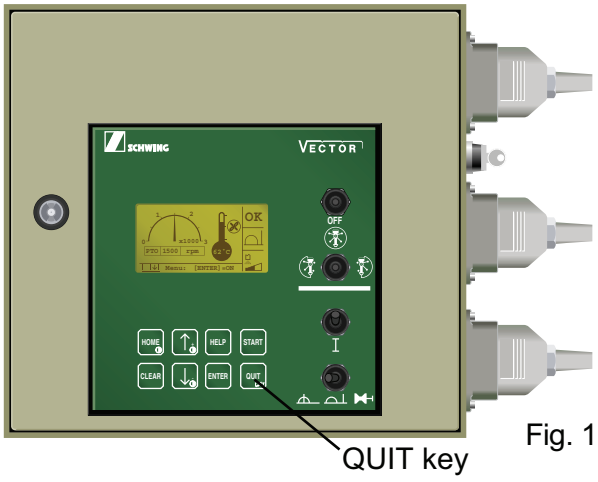


Fig. 1

3. Mode of operation	: **REMOTE**
Silent diagnostic	: **No**
Minor fault	

The fault is displayed on the screen and announced by a horn signal.

- Activate "QUIT" on the remote control box (Fig. 1) once.

  The horns stop sounding.

  The message is deleted from the display.

- After switching the mode of operation from **Remote** to **Local**, the fault is displayed on the screen and announced by the buzzer in the control cabinet.

- Depress the "QUIT" key on the control cabinet (Fig. 2) once.

  The buzzer stops sounding.

  The message continues to be displayed and can be read without hurry.

- Depress "QUIT" once more.

  The fault message is definitely acknowledged.

  The message is deleted from the display and logged in the faults list.

Important:

Minor faults acknowledged immediately with the "QUIT" key on the control cabinet in the REMOTE mode are not reported again when changing modes.

Fig. 1

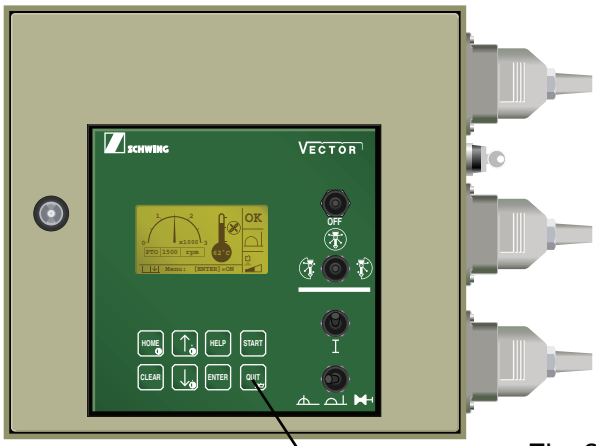


Fig. 2

4. Mode of operation	: **REMOTE**
Silent diagnostic	: **Yes**
Minor fault	

The fault is displayed on the screen and announced by the buzzer in the control cabinet.

- Activate "QUIT" on the remote control box (Fig. 1) once.

  The buzzer stops sounding (if not switched off manually, the buzzer will be stopped automatically after 60 seconds).

  The message is deleted from the display.

- After switching the mode of operation from **REMOTE** to **LOCAL**, the fault is displayed on the screen and announced by the buzzer in the control cabinet.

- Depress the "QUIT" key on the control cabinet (Fig. 2) **once.**

  The buzzer stops sounding.

  The message continues to be displayed and can be read without hurry.

- Depress the "QUIT" key on the control cabinet (Fig. 2) once more.

  The fault message is definitely acknowledged.

  The message is deleted from the display and logged in the faults list.

Important:

Low-level faults acknowledged immediately with the "QUIT" key on the control cabinet in the REMOTE mode are not reported again when switching over from LOCAL to REMOTE mode.

Fig. 1

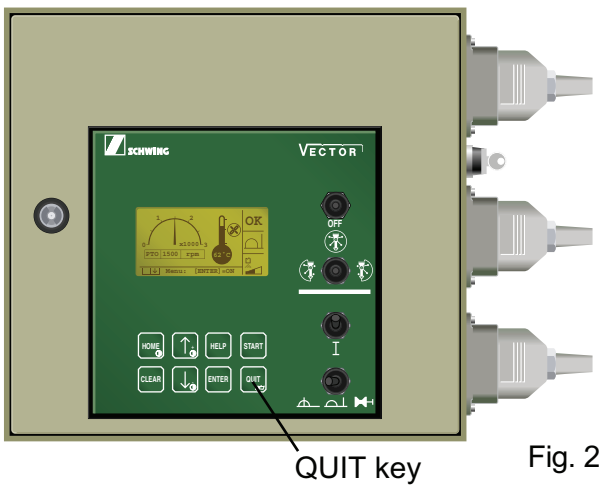


Fig. 2

5. Mode of operation	: **REMOTE**
Silent diagnostic	: **No**
Severe fault	

The fault is displayed on the screen and announced by the horns.
In addition, the control system goes to e-stop mode.
Optional shutdown of the engine is also possible.

- Activate "QUIT" on the remote control box (Fig. 1) **once.**

  The horns stop sounding.

  The message continues to be displayed and can be read without hurry.

- Depress the "QUIT" key on the control cabinet (Fig. 2).

  The fault message is definitely acknowledged.

  The message is deleted from the display and logged in the faults list.

ATTENTION:
RISK OF ACCIDENT AND DAMAGE

After shut-off by a high- level fault, the control system and, if applicable, the drive engine must be restarted.

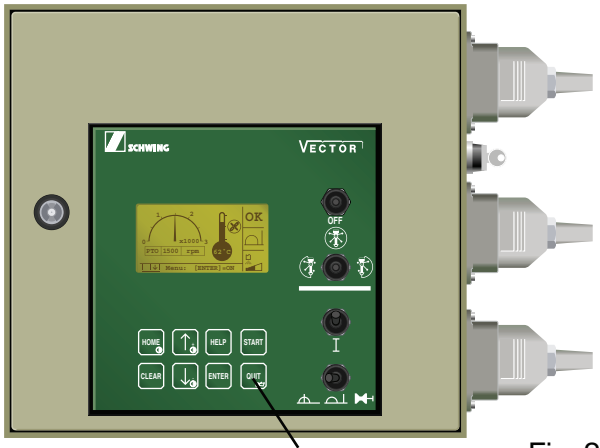
- **It is absolutely vital to have a severe fault rectified before re-starting. Otherwise there is the risk of irreparable damage to the machine.**

Important:

High-level faults can only be acknowledged with the "QUIT" key on the control cabinet, irrespective of the selected mode LOCAL or REMOTE.

QUIT switch

Fig. 1



QUIT key

Fig. 2

6. Mode of operation	: **REMOTE**
Silent diagnostic	: **Yes**
Severe fault	

The fault is displayed on the screen and announced by the buzzer in the control cabinet.

In addition, the control system goes to e-stop mode.
Optional shutdown of the engine is also possible.

- Activate "QUIT" on the remote control box (Fig. 1) **once.**

  The buzzer stops sounding (if not switched off manually, the buzzer will be stopped automatically after 60 seconds).

  The message continues to be displayed and can be read without hurry.

- Depress the "QUIT" key on the control cabinet (Fig. 2).

  The fault message is definitely acknowledged.

  The message is deleted from the display and logged in the faults list.

ATTENTION:
RISK OF ACCIDENT AND DAMAGE

After shut-off by a high- level fault, the control system and, if applicable, the drive engine must be restarted.

- **It is absolutely vital to have a severe fault rectified before restarting. Otherwise there is the risk of irreparable damage to the machine.**

Important:

Severe faults can only be acknowledged with the "QUIT" key on the control cabinet irrespective of the selected mode LOCAL or REMOTE.

Fig. 1

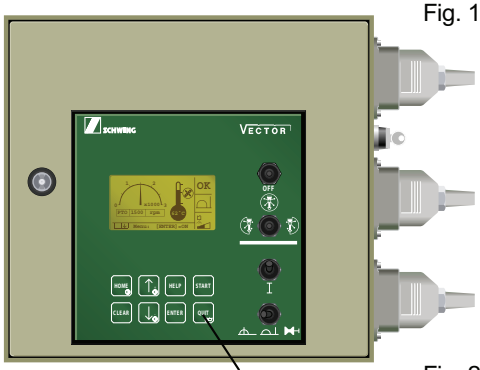


Fig. 2

VECTOR REMOTE DATA ABBREVIATIONS

---	= NO DATA SEND
104P	= HYD. PRESSURE IN BAR
1780	= PTO RPM (all digits are numbers)
12r	= STROKES/MINUTE
34c	= HYD. OIL TEMP (Degrees Celsius)
StoP	= EMERGENCY STOP ACTIVATED
Strt	= START CONTROL SYSTEM
Loc	= MACHINE in LOCAL MODE
rcon	= MACHINE in RAM CHANGE MODE
tEcH	= MACHINE in TEACH MODE
Cln	= MACHINE IN CLEANING MODE
ntr l	= PUT SWITCHES TO NEUTRAL
HOPr	= HOPPER GRATE OPEN
tlo	= WATER TANK LOW

30364527

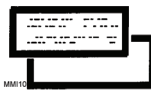
Fig. 3

• The LCD window on the Radio remote will have abbreviated codes which are explained in Figure 3.
NOTE:
Cable remote has no LCD window.

Acknowledging several faults

ACKNOWLEDGING SEVERAL FAULTS

If several messages are existing, a symbol appears in the lower right-hand corner of the display:



– Acknowledge the first message as usual.

  The next message appears and the buzzer sounds.

– Acknowledge this as well as any following message until no further message is displayed.

Switching off the control system

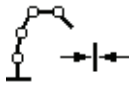
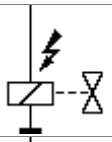
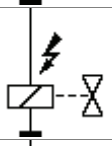
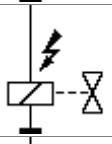
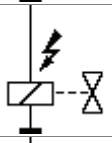
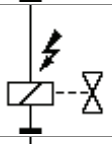
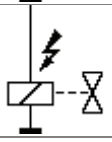
If you switch off electrical control to the system, any existing faults will be stored to memory.

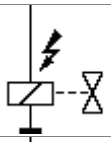
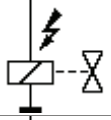
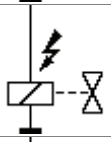
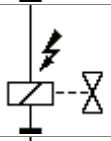
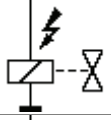
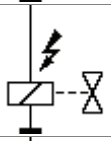
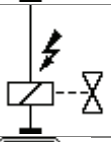
Any fault will be re-detected and reported again when the diagnostic system is restarted.

Summary of messages

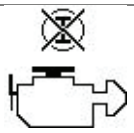
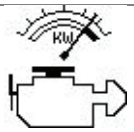
Code	international version (symbolic)	plain text messages

B = Boom

B01M		Limitation Slewing Gear Activated !
B02M		BOOM Limitation Activated !
B04L		Disconnected / Overload E-Stop Solenoid BOOM !
B05L	 PO41	Disconnected / Overload Solenoid Slewing Right - PO41 !
B06L	 PO42	Disconnected / Overload Solenoid Slewing Left - PO42 !
B07L	 PO43	Disconnected / Overload Solenoid BOOM A extend - PO43 !
B08L	 PO44	Disconnected / Overload Solenoid BOOM A retract - PO44 !
B09L	 PO45	Disconnected / Overload Solenoid BOOM B extend - PO45 !

B10L		PO46	Disconnected / Overload Solenoid BOOM B retract - PO46 !
B11L		PO47	Disconnected / Overload Solenoid BOOM C extend - PO47 !
B12L		PO48	Disconnected / Overload Solenoid BOOM C retract - PO48 !
B13L		PO51	Disconnected / Overload Solenoid BOOM D extend - PO51 !
B14L		PO52	Disconnected / Overload Solenoid BOOM D retract - PO52 !
B15L		PO53	Disconnected / Overload Solenoid BOOM E extend - PO53 !
B16L		PO54	Disconnected / Overload Solenoid BOOM E retract - PO54 !
B17H			! Machine Safety Stop ! BOOM Control Fault !

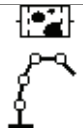
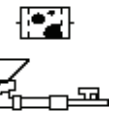
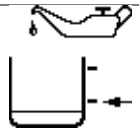
D = Diesel Engine

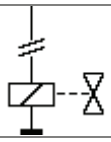
D01M		Some Hydraulic Functions Not In Neutral! Diesel Start Disabled!
D02M		Power Limitation Diesel Engine Activated !
D03L		PTO is not working or Prox-Switch PTO-RPM Fault !

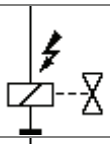
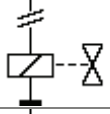
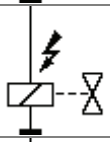
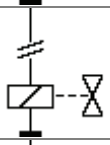
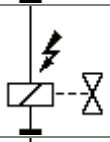
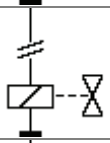
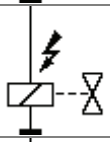
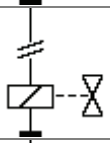
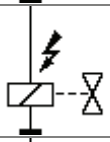
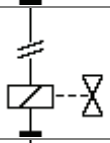
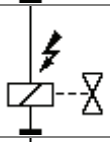
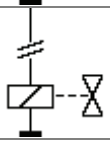
D04L			PTO RPM-Limit exceeded !
D05L			Indicator-Switch PTO = ON/OFF Fault !
D06L			Indicator-Signal Engine Load Fault !
D07L			Indicator Lvel Diesel-Reservoir Fault !
D08L		DO31	Disconnected Truck Interface Diesel Start - D031 !
D09L		DO31	Overload Truck Interface Diesel Start - D031 !
D10L		DO32	Disconnected Truck Interface Diesel Stop - D032 !
D11L		DO32	Overload Truck Interface Diesel Stop - D032 !
D12L		DO33	Disconnected Truck Interface RPM (+) - D033 !
D13L		DO33	Overload Truck Interface RPM (+) - D033 !
D14L		DO34	Disconnected Truck Interface RPM (-) - D034 !
D15L		DO34	Overload Truck Interface RPM (-) - D034 !

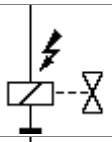
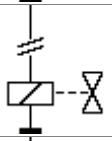
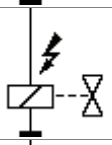
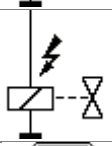
D16H		! Machine Safety Stop ! High Truck Coolant Temperature !
D17H		! Machine Safety Stop ! Low Truck Oil Pressure !
D18H		! Machine Safety Stop ! Low Level Hydraulic Oil !
D19H		! Machine Safety Stop ! Battery charging On Truck Fault !

M = Machine

M01M		Ball Injector Activated !
M02M		End-Hose Shut-Off Activated !
M03L		Temperature Transmitter Hydraulic Oil Fault !
M04L		Hydraulic Oil Filter BOOM Contaminated ! Please Exchange Filter!
M05L		Hydraulic Oil Filter CP Contaminated ! Please Exchange Filter!
M06L		Low Level Hydraulic Oil Reservoir !
M07L		High Temperature Air Compressor !

M08L			Level Transmitter Hydraulic Reservoir Fault !
M09L			Transmitter Oil Pressure Service Fault !
M10L			Transmitter Cleaning Ball Detection Fault !
M11L		DO13	Disconnected PowerOutput Oil Cooler - DO13 !
M12L		DO13	Overload / Fuse PowerOutput Oil Cooler - DO13 !
M13L		DO12	Disconnected PowerOutput Vibrator - DO12 !
M14L		DO12	Overload / Fuse PowerOutput Vibrator - DO12 !
M15L		DO16	Disconnected PowerOutput Horn Boom C - DO16 !
M16L		DO16	Overload / Fuse PowerOutput Horn Boom C - DO16 !
M17L		DO17	Disconnected PowerOutput Horn Slew - DO17 !
M18L		DO17	Overload / Fuse PowerOutput Horn Slew - DO17 !
M19L		DO38	Disconnected Solenoid Ball-Injector - DO38 !

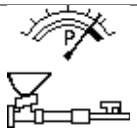
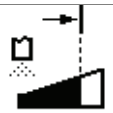
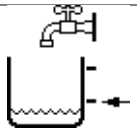
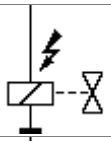
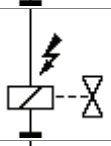
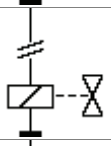
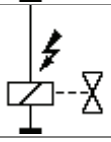
M20L		DO38	Overload Solenoid Ball-Injector - DO38 !
M21L		DO26	Disconnected Solenoid Water Pump - DO26 !
M22L		DO26	Overload Solenoid Water Pump - DO26 !
M23L		DO28	Kabelbruch Schaltventil Kompressor - DO28 !
M24L		DO28	Disconnected Solenoid Air-Compressor - DO28 !
M25L		DO21	Disconnected Solenoid Agitator Forward - DO21 !
M26L		DO21	Overload Solenoid Agitator Forward - DO21 !
M27L		DO22	Disconnected Solenoid Agitator Reverse - DO22 !
M28L		DO22	Overload Solenoid Agitator Reverse - DO22 !
M29L		DO25	Disconnected Solenoid Hydraulic On Outriggers - DO25 !
M30L		DO25	Overload Solenoid Hydraulic On Outriggers - DO25 !
M31L		DO27	Disconnected Solenoid High Pressure Water Pump - DO27 !

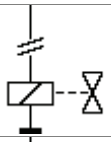
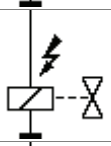
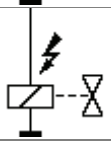
M32L		DO27	Overload Solenoid High Pressure Water Pump - DO27 !
M33L		DO37	Disconnected Solenoid End-Hose Shut-Off - DO37 !
M34L		DO37	Overload Solenoid End-Hose Shut-Off - DO37 !
M35L		PO56	Disconnected / Overload Solenoid Hydraulic On Outrigger - PO56 !
M36H			! Machine Safety Stop ! Hydraulic Oil Temperature Exceeded !

O = Optional

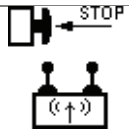
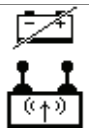
O01L		DO15	Disconnected PowerOutput Central Lubrication CP active / Pump - DO15!
O02L		DO15	Overload PowerOutput Central Lubrication CP active / Pump - DO15!
O03L		DO35	Disconnected Output Central Lubrication BOOM active - DO35 !
O04L		DO35	Overload Output Central Lubrication BOOM active - DO35 !
O05L		DO36	Disconnected LED-Output BOOM above rest - DO36 !
O06L		DO36	Overload LED-Output BOOM above rest - DO36 !

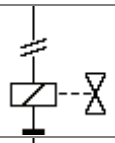
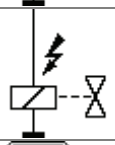
P = Pump

P01M		Pressure Limiter Concrete Pump Activated !
P02M		Stroke Rate Limitation Concrete Pump Activated !
P03M		Hopper Grate Open !
P04M		Low Level Water Reservoir !
P05L		Oil Temperature High, Power Limiter Concrete Pump Activated !
P06L		Transmitter Oil Pressure Concrete Pump Fault !
P07L		Prox-Switch Stroke Counter Fault or CP jammed !
P08L		Disconnected / Overload E-Stop Solenoid CP !
P09L		Disconnected / Overload E-Stop Solenoid MPS !
P10L	 DO23	Disconnected Solenoid Concrete Pump Forward - DO23 !
P11L	 DO23	Overload Solenoid Concrete Pump Forward - DO23 !

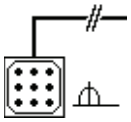
P12L		DO24	Disconnected Solenoid Concrete Pump Reverse - DO24 !
P13L		DO24	Overload Solenoid Concrete Pump Reverse - DO24 !
P14L		PO55	Disconnected / Overload Solenoid Stroke Limiter - PO55 !

R = Remote

R01M		Emergency-Stop On Radio Control Box Activated !
R02M		Low Battery In Radio Control Box !
R03M		CAN-FST / Transmission With Remote Control Fault !
R04M		No Radio Control Transmission !
R05L		Joy-Stick 1 From Remote Control Fault !
R06L		Joy-Stick 2 From Remote Control Fault !
R07L		Joy-Stick 3 From Remote Control Fault !
R08L		Emergency-Stop Switch On Radio Control Box Fault !

R09L		Radio Control Signal With Faulty Address Received !
R10L		Disconnected Boom Release Solenoid !
R11L		Overload Boom Release Solenoid !
R12H		! Machine Safety Stop ! Hydraulic Enable Fault!

S = System

S01M		Disconnected Rear Panel !
S02L		Power Supply MAIN-Board Fault !
S03L		Power Supply MMI-Board Fault !
S04L		CAN-Communication to MMI or MMI-Board Fault !
S05L	 K 13	Relay Contact K 13 Override / Fault !
S06L	 F 18	Fuse F 18 Fault !

S07L		F 20	Fuse F 20 Fault !
S08L		F 16	Fuse F 16 Fault !
S09L		F 31	Fuse F 31 Fault !
S10L		F 32	Fuse F 32 Fault !
S11L		MF1	MF1 : Power Supply Diagnosis E-Stop Board DI15 - DI18 Fault !
S12L		MF2	MF2 : Power Supply Truck Interface etc. DI21 - DI27 Fault !
S13L		MF3	MF3 : Power Supply DI28,DI38,DI46,DI48 Fault !
S14L		MF4	MF4 : Power Supply DI31-DI37,DI43,DI44 Fault !
S15L		MF5	MF5 : Power Supply DI36,DI37,DI45 Fault !
S16L		MF6	MF6 : Power Supply DI41,DI42,DI47,AI21,AI22 Fault !
S17L		MF7	MF7 : Power Supply RAM-Change Station DI51-DI54 Fault !
S18L		MF8	MF8 : Power Supply DI55 - DI58 Fault !

S19L		Reference Voltage for analog Sensors AI12, AI13,AI14,AI16 Fault !
S20L		Multi Fuse MMI-Board Fault !

PART 2

SCHWING control system 'VECTOR'

TEACH MODE

NOTE!

Setting the parameters in "Teach Mode" should only be done by persons with a complete understanding of the Vector control system.

Teach mode offers the user the opportunity to teach the main controller how he or she would prefer to have the boom respond to the remote control joystick movements by setting parameters for minimum and maximum response times of each boom movement. MIN is the amount of signal it takes to start boom movement, and MAX the signal required to make the boom manual control handle travel all the way to the mechanical stop. Setting these parameters requires setting up the unit and unfolding the boom. Be certain that the boom has room to move safely during this procedure.

NOTE!

When the unit is in teach mode, the concrete pump and agitator are disabled to prevent the operator from accidentally trying to pump while the teach mode key is installed.

⚠ WARNING

Improper setup causes job site accidents:
• Look for power lines before unfolding
• Be sure of unit's stability

W024.eps

Heat the oil first

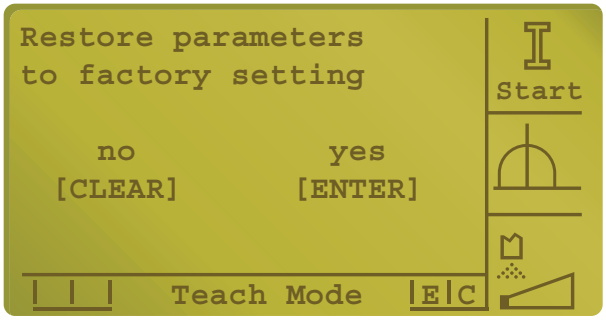
When setting the boom parameters, the hydraulic oil temperature must be at least 50° C and the engine RPM should be increased to normal operating speed.

Restore original factory settings

When setting parameters, you will need to take your remote control with you and go to the main controller.

If your boom parameters have been changed and you would like to have them revert to where they were originally, you can perform a simple procedure to restore the original factory settings.

1. Open the front cover and, without activating the "I" switch, insert the "Teach Key" into the connector shown in Figure 20.
2. The display window on the front cover should now be showing you the screen shown in Figure 19.



vectorrestore.eps

Figure 19
Vector display window for restoring to factory settings

3. Push the *ENTER* button to select yes. The controller will then restore the parameters to the values set in the Schwing Test Department. After about 10 seconds, the system will reset itself.

NOTE!

When the system restart screen appears after setting the parameters, allow the controller time to complete the process before performing any other system functions in order to prevent losing your stored information.

4. Select the *Remote* mode, and activate the reset "I" switch on the remote box.
5. Operate each function of the boom to see if it is now responding the way you prefer. If it is, no further action is required.

NOTE!

The boom operates normally while in teach mode, so the key can be left in while testing each boom function.

6. If the boom is still not performing as you prefer, it will be necessary to continue with setting each parameter individually by completing the steps that follow.

Setting parameters

1. Place the controller in *Remote* mode, and activate the "I" switch on the remote box.
2. Open the front cover of the Vector controller, and plug in the hardware "Teach Key" to the connector shown in Figure 20.

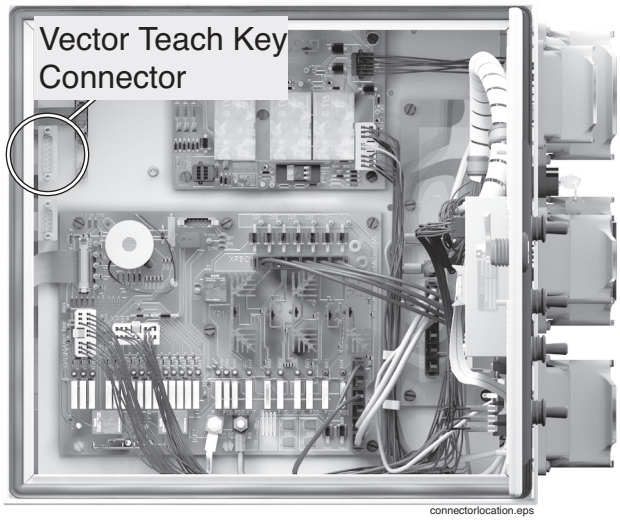


Figure 20
Location of "Teach key" connector

3. The display window on the controller cover will show that the unit is in teach mode and the "I" in the upper right hand corner will be flashing, which indicates that you need to activate the reset "I" switch to start the "*Teach* mode" process (Figure 21).

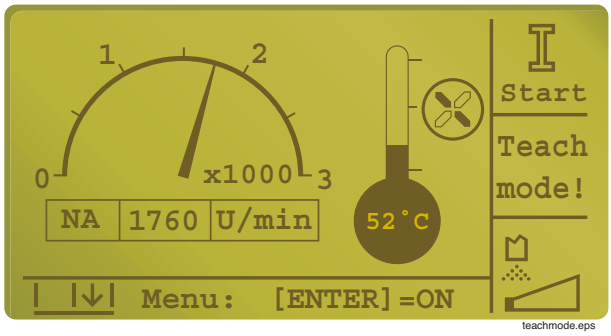


Figure 21
Teach mode screen

NOTE!

If the unit is in local control when the teach key is inserted, the display will tell you that you must change to remote control to enter the teach mode. Switch the local/remote switch to the *remote* position, and activate the "I" switch on the remote box. If the display again asks the question "Restore the parameters to factory setting?", press the *CLEAR* button to say no.

4. The display on the radio remote will display the code shown in Figure 22.

Figure 22
Teach mode display

5. After activating the "I" switch, the display window will show you the screen in Figure 23. This chart shows you RPM, oil temperature, a picture of a boom cylinder, and six different boom options. The far left column is where the boom slewing adjustment will show, while columns A through E represent each boom section (A=1, B=2, C=3, D=4, and E=5 if you have a five section boom).

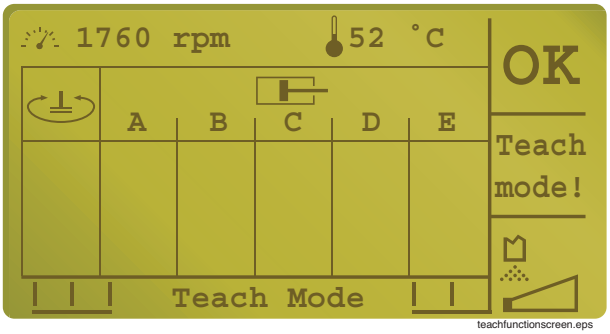


Figure 23
Teach mode parameter screen

6. You are now ready to teach the controller what parameters you prefer. We'll use boom #1 *extend* as an example. Before you activate the function to be adjusted, you must decide which parameter you want to adjust (MIN or MAX). The selection is made with the "Rabbit/Off/Snail" switch. Choose *Rabbit* for MAX or *Snail* for MIN. So to set the #1 boom *extend* MIN, you must first place the switch to the *Snail* position (Figure 24).

Figure 24
Choose *Snail* speed to set MIN

7. Start by holding down the "I" switch on the remote box while you activate the right hand joystick forward to the extend positon.

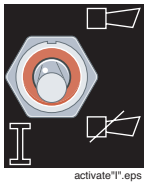


Figure 25
Activate "I" switch and hold

NOTE!

Boom movement is not proportional in "Teach mode", so the joystick can be moved all the way to extend or half way; it doesn't matter as long as the boom function is activated.

8. When the joystick is activated and the "I" switch is still being held down, the display will show a bar graph like the one shown in Figure 26, at which time the "I" switch can be released. The joystick, however, must remain activated or the screen will revert to the one shown in Figure 23 and you will need to start over at the previous step. The percentage shown on the graph indicates the amount of signal to this particular function (45%).

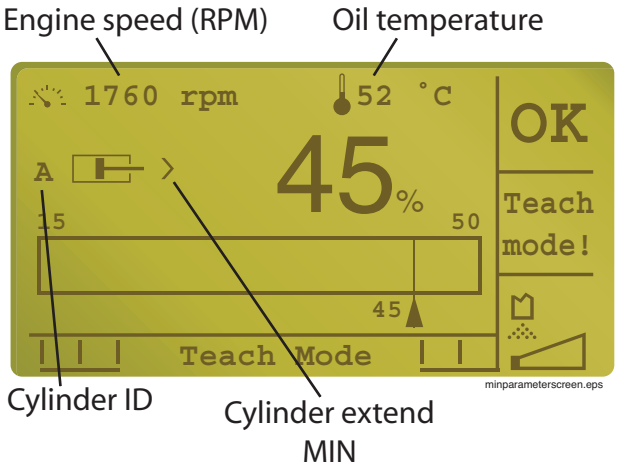


Figure 26
#1 boom extend MIN screen

9. If the boom is not moving, you should increase the percentage to this function by activating the throttle switch (Figure 27) to the "+" position. Each time you tap the switch the duty cycle percentage will increase by 1%.

Figure 27
Throttle switch on remote box

10. When the boom **just begins** to move, you have attained the required MIN signal, and you will be required to push up on the horn switch (Figure 25) to store the number. If you release the joystick before beeping the horn, the percentage will revert to where it was when you began. After you store the information for "#1 boom extend MIN" the screen will display a single mark in the "A" column as shown in Figure 28.

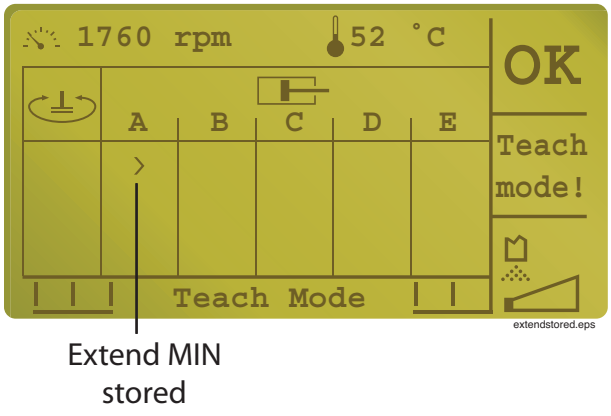


Figure 28
Boom #1 extend MIN stored

11. If you felt that the boom took off too fast when the joystick was activated and the percentage needs to be decreased, tap the throttle switch (Figure 27) to the "-" position until the boom responds as you like and store with the horn button as explained in the previous step before releasing the joystick.
12. You should now activate the #1 boom joystick to the retract position and adjust the percentage the same way you did for extend. After storing the parameter with the horn switch, the display should look like Figure 29.

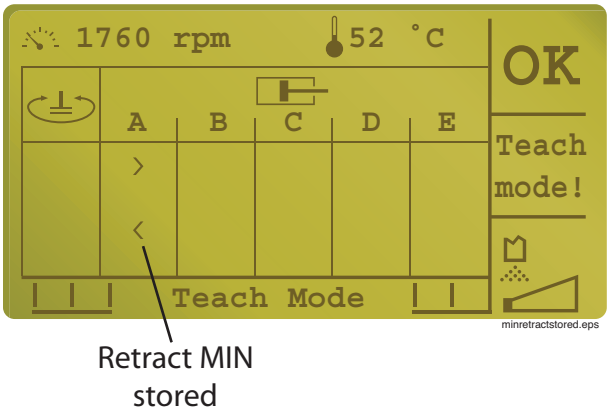


Figure 29
Boom #1 retract MIN stored

13. You now have the option of continuing on to set the MIN on the other boom sections or moving the Rabbit/Snail switch to the *Rabbit* position (Figure 30) and set the MAX for boom #1 as follows.

Figure 30
Rabbit speed

NOTE!

Setting the MAX parameters requires opening the hydraulic enclosure to gain access to the boom hand valve (Figure 31). This procedure applies to all units except the 45/47 meter units, which have no visible hand valve handles to view. The MAX parameter on those units must be set by checking the boom times found in the *Specification* section of the operation manual and operating each boom section to monitor those times.

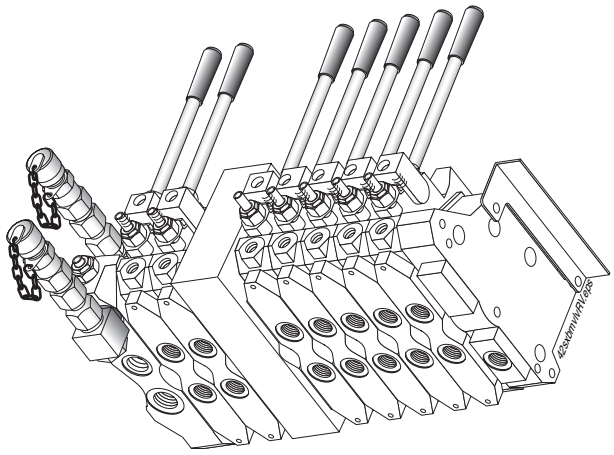


Figure 31
Manual boom control handles

14. Activate the “I” switch on the remote box, and hold it down. Move the right hand joystick to the extend position.

NOTE!

Boom movement is not proportional in “Teach mode”, so the joystick can be moved all the way to extend or half way; it doesn’t matter as long as the boom function is activated.

15. When the joystick is activated (Figure 31) and the “I” switch is still being held down, the display will show a bar graph like the one shown in Figure 32, at which time the “I” switch can be released. The joystick, however, must remain activated or the screen will revert to the one shown in Figure 29 and you will need to start over at the previous step.

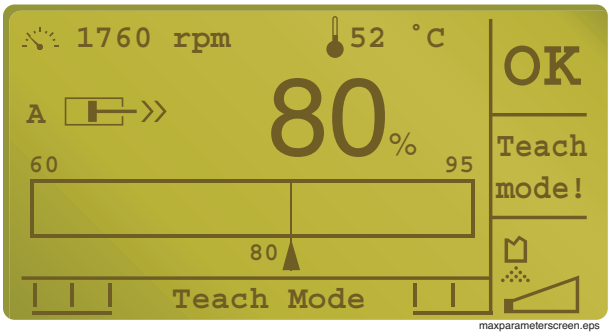


Figure 32
MAX parameter screen

16. The handle on the boom valve should now have moved to the *full* extend position. Grab the handle and pull or push it in the same direction it has already moved. If the handle will not move any further, it has reached the mechanical stop. If you feel it is solidly against the stop and should be backed off slightly, tap the throttle switch to the “-” position until the pressure is relieved from the mechanical stop. If, on the other hand, the handle moves freely and is not in contact with the mechanical stop, tap the throttle switch to the “+” position until the handle comes in light contact with the stop. When you feel that the handle is properly adjusted, activate the horn button to store the parameter and release the joystick. The display should now look like the one in Figure 33.

NOTE!

With the apitech hand valve, it is necessary to have pulsation in the handle after MAX parameter is set. If pulsation stops, the MAX is too high.

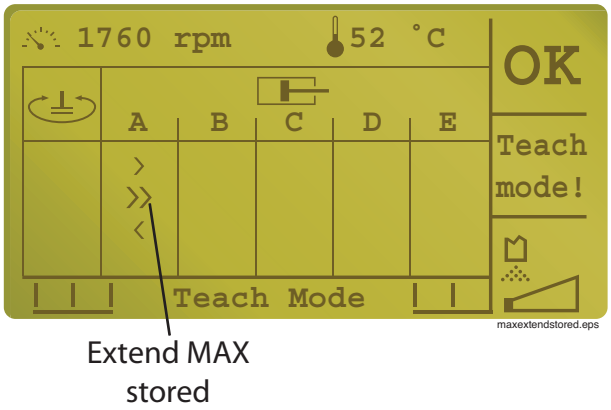


Figure 33
Boom #1 MAX extend stored

17. Now activate the "I" switch again, and move the right hand joystick to the retract position. Follow the same procedure, adjusting the manual control handle to the mechanical stop on the opposite side. When the adjustment is complete and you have stored the information by sounding the horn, release the joystick, and the display window should look like the one in Figure 34.

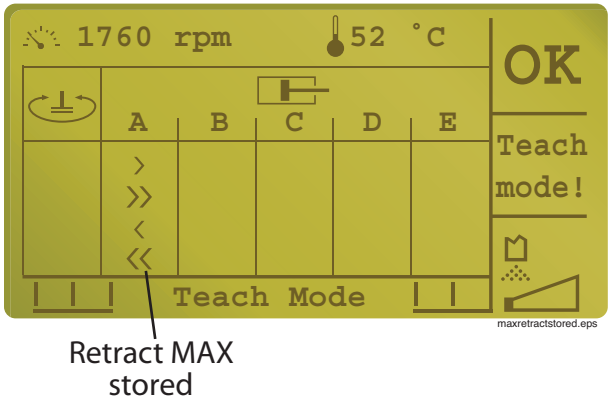


Figure 34
Boom #1 MAX retract stored

18. The procedure is the same for all functions, so activate the "I" switch and move to the next function until you have completed all parameter settings. Any time you have entered information and then change the position of the local/remote switch, the controller will first ask if you want to store the new parameters (Figure 35).

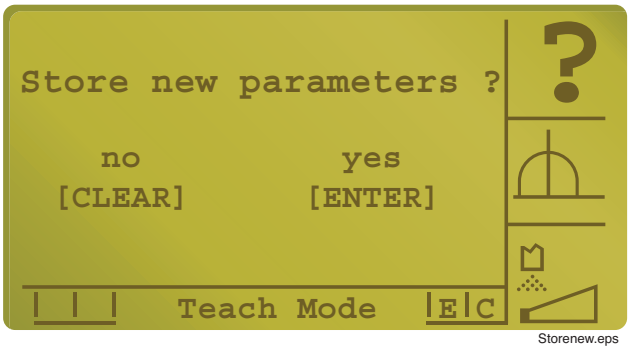


Figure 35
Window for storing new parameters

19. If you answer "yes", the system will restart and store the new parameters (Figure 36). If you answer "no", the window will ask If you want to restore to the original factory settings. If you answer "no" to that question, the system will remain unchanged.

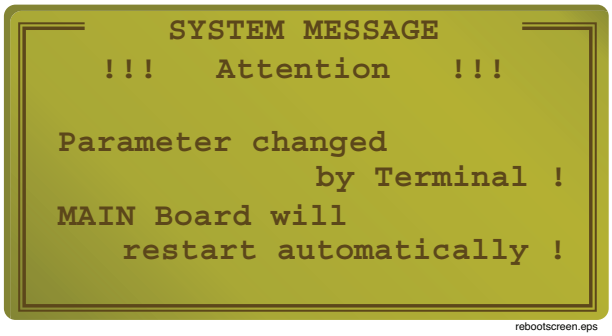


Figure 36
System restart screen will appear when the local/remote switch is moved

NOTE!

When the system restart screen appears after setting the parameters, allow the controller time to complete the process before performing any other system functions in order to prevent losing your stored information. The restart takes only seconds, and when completed the display will again show the screen below (Figure 37).

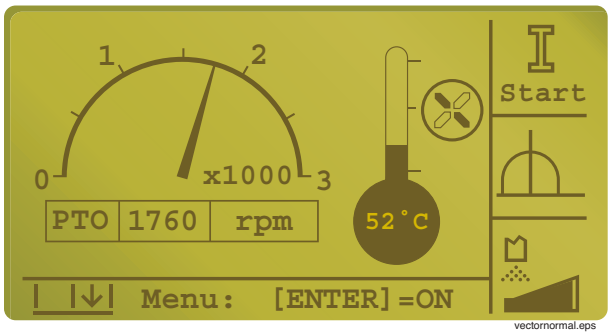


Figure 37
Vector normal operation screen

PART 3

SCHWING control system 'VECTOR'

EASy MODE Short Instructions

Operational Components

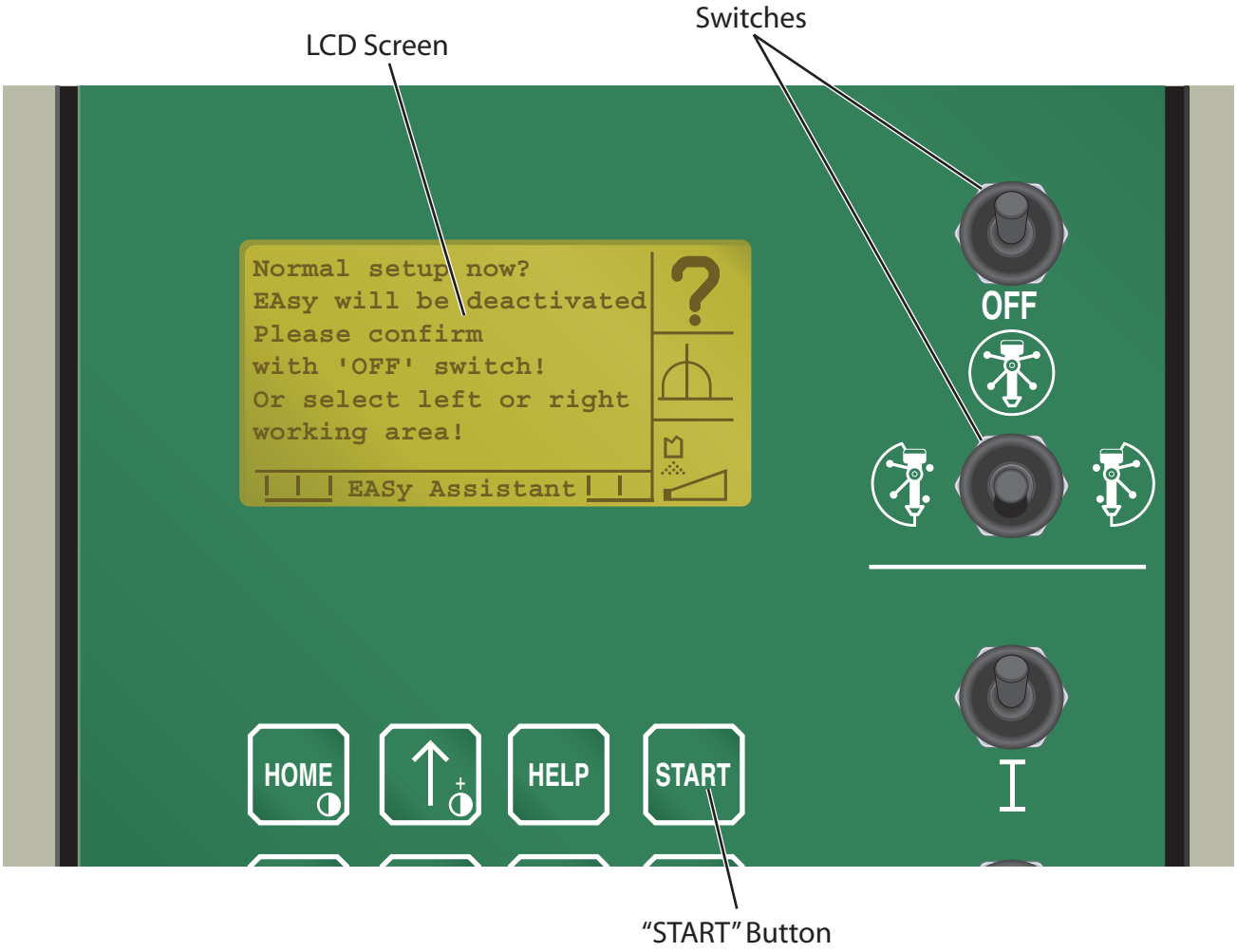


Figure 38
Operational Components

Activating full outrigger extension setup

Step 1

Put the “working area selection switch” to the center position.

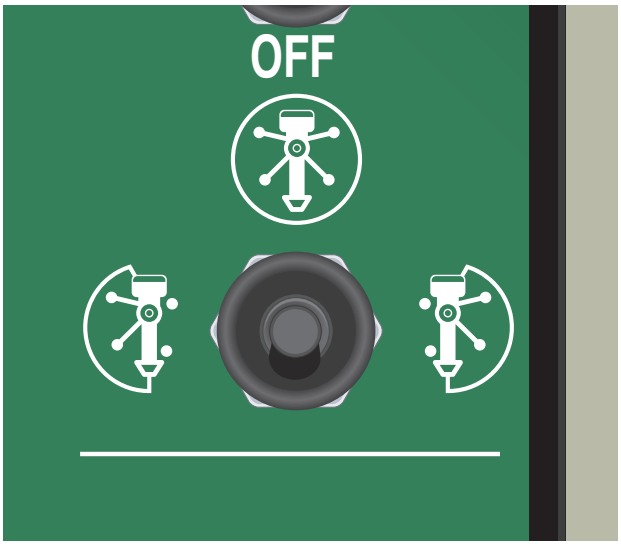


Figure 39
Working area selection switch in the “center” position

The assistant describes the selected area and guides you to the next step.

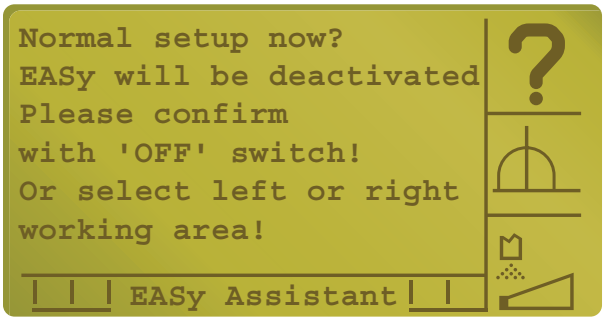


Figure 40
Assistant Setup Screen

Step 2

The system is waiting for a command.

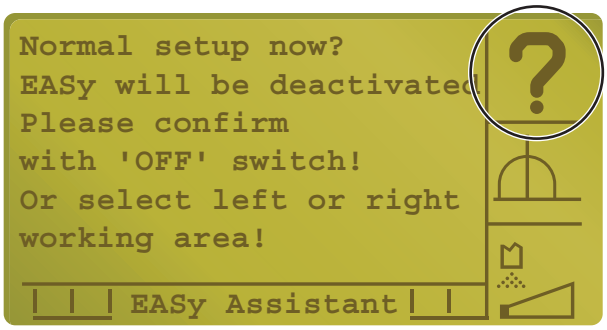


Figure 41
“Entry expected” symbol

To confirm full outrigger extension setup activate the “OFF” switch which will deactivate EASy.

Step 3

Activate the “OFF” switch

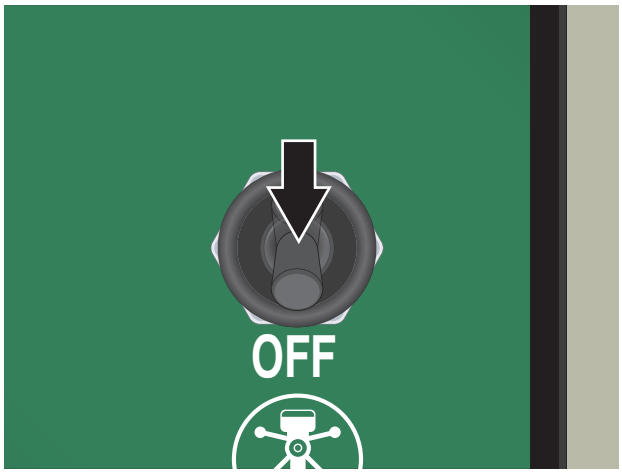


Figure 42
“OFF” switch

You have now deactivated EASy and may proceed with full outrigger extension.

EASy Assistant: Operating one side only

Step 1

Put the “working area selection switch“to the desired position. (in this case left.)

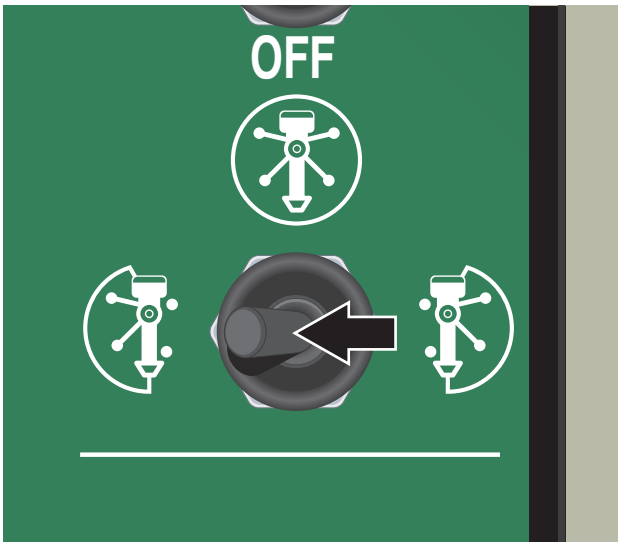


Figure 43
Working Area Selection Switch in the “Left” position

The assistant describes the selected area and guides you to the next step.

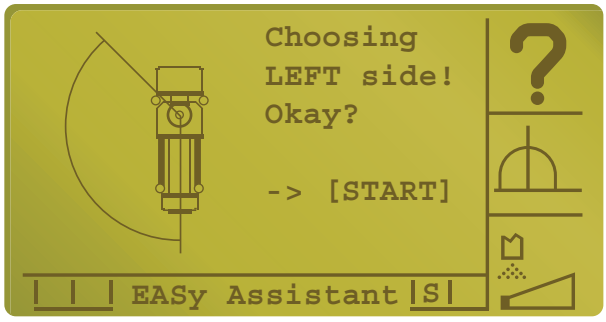


Figure 44
EASy Assistant Screen

Step 1b

Push the “START“button to confirm left side setup.

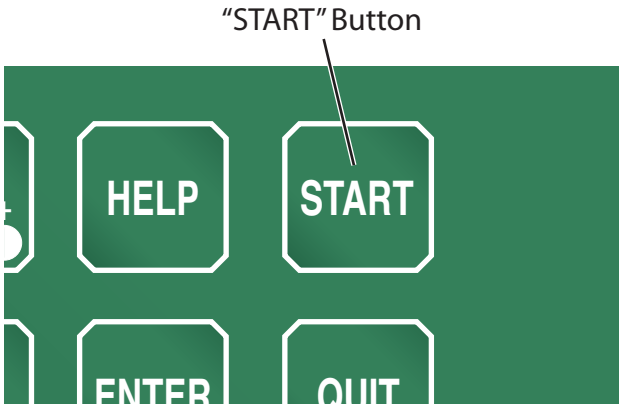


Figure 45
“START Button”

Step 1c

The assistant shows the properly extended outriggers.

Figure 46
“Extend Outriggers Now” screen

The outriggers may now be extended. (in “Local mode“ only.)

Step 2

After outriggers are extended the display will tell you to jack them.

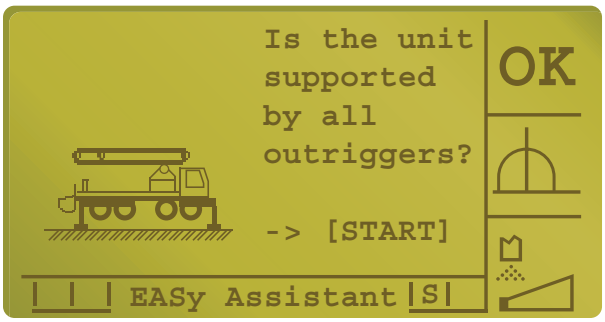


Figure 47
Outriggers supported screen.

NOTE!

By pushing the "START" button the operator is confirming that all outriggers are supporting the unit properly.

For roll & fold™ units There are no further steps.

The assistant is finished now and the Display shows the normal Vector screen.

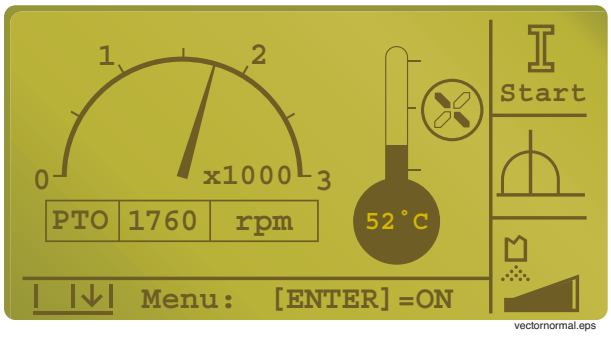


Figure 48
Normal operation screen

With the roll & fold™ boom it is now safe to operate in the selected working area

Step 3

The assistant explains that boom #1 & #2 should now be extended VERTICAL ONLY!

Figure 49
"Extend vertical only" screen

During this step all other boom functions are disabled.

NOTE!

Cab protection is still active.

Step 3b

The system recognizes that boom #1 is vertical but the operator must now confirm that #2 is vertical as well.

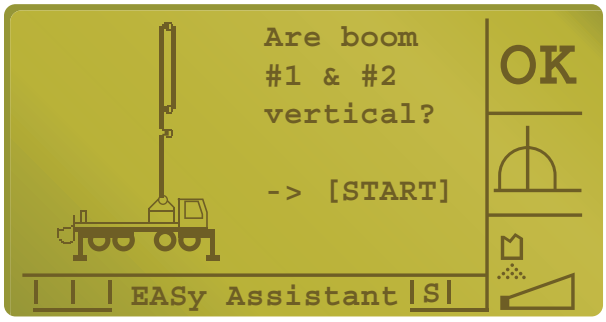


Figure 50
"Are boom #1 & #2 vertical?" screen

Push the "START"button to confirm that both booms are vertical.

Step 4

It is now safe to rotate the boom into the selected working area.

Figure 51
"Rotate boom to working area" screen

Slewing to the opposite side of the selected working area has been disabled.

Step 4b

The system has recognized that the boom is now in the selected working area.

Figure 52
"Boom in working area" screen

The operator must confirm that he is ready to begin by pushing the "START"button.

For overhead roll & fold ™ units the setup procedure is now complete.

The assistant is finished now and the Display shows the normal Vector screen.

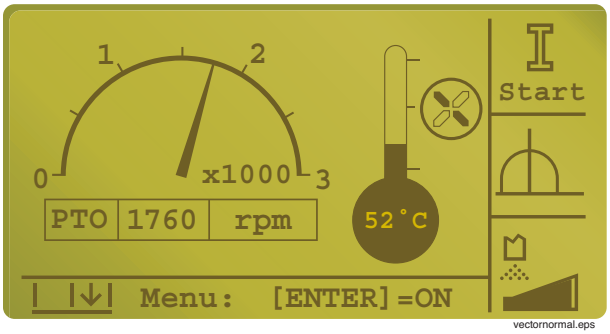


Figure 53
Vector normal operation screen

Functional limitation of boom slewing

During operation boom slewing is restricted to the selected working area.

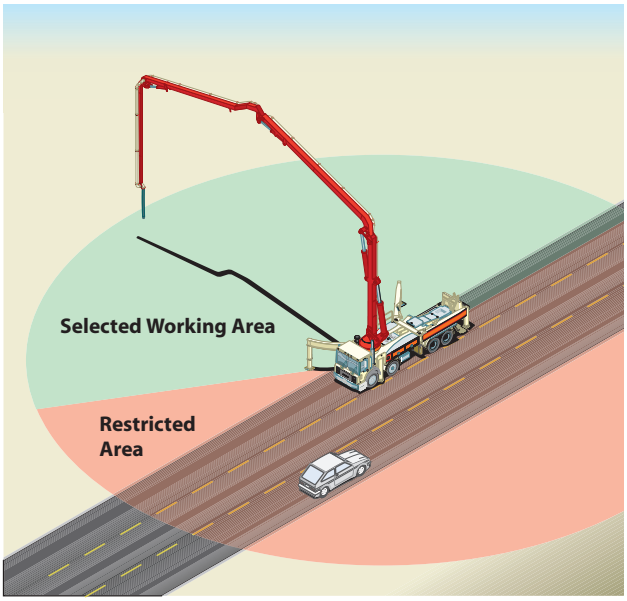


Figure 54
Slewing limitation

Maximum slewing speed is automatically reduced before stopping when the boom approaches the restricted area.

Boom slewing safety shut-off

If any functional limitation system failure occurs a redundant safety circuit is activated to prevent the boom from entering the restricted area.

Functional limitation of main boom

During operation the main boom is restricted from going beyond 90 degrees.

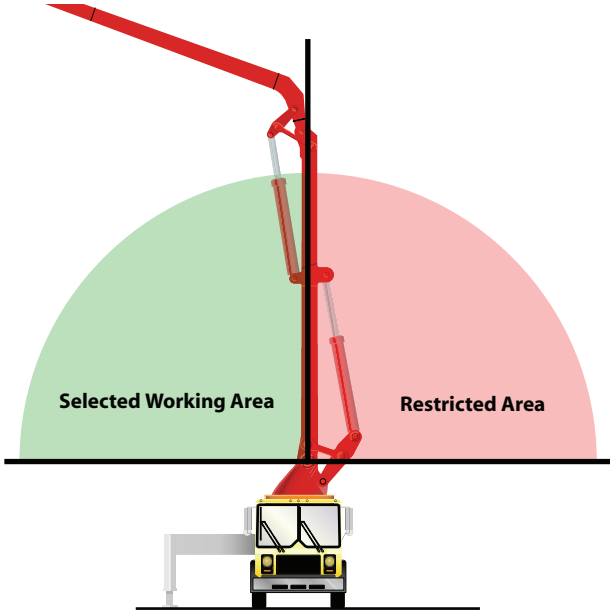


Figure 55
Boom limitation

Maximum speed for boom #1 retract is automatically reduced before stopping when the boom approaches the restricted area.

Main boom safety shut-off

If any functional limitation system failure occurs a redundant safety circuit is activated to prevent the boom from entering the restricted area.

Preparing to stow boom

The system has recognized that you have folded boom #3 and #4.

The assistant asks you if you wish to stow the boom now.

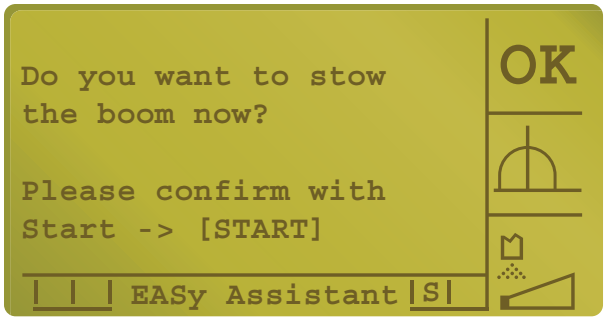


Figure 56
“Stow the boom” screen

If you wish to move the boom down to the travel position push “START“button now

Moving boom to travel position

Step 1

After pushing the “START“button the operator is asked to extend boom #1 and #2 vertically!

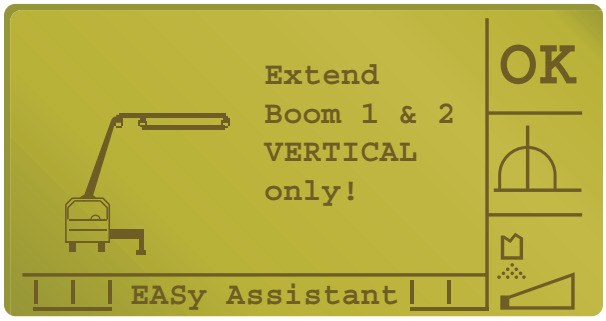


Figure 57
“Extend vertical only” screen

During this step all other boom functions are disabled!

Step 1 b

The system recognizes that boom #1 is vertical but the operator must now confirm that #2 is vertical as well.

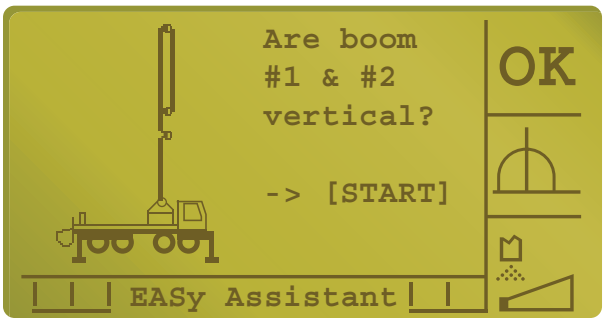


Figure 58
Vector normal operation screen

Push the “START“button to confirm that both booms are vertical

Step 2

It is now safe to rotate the boom back to the zero position.

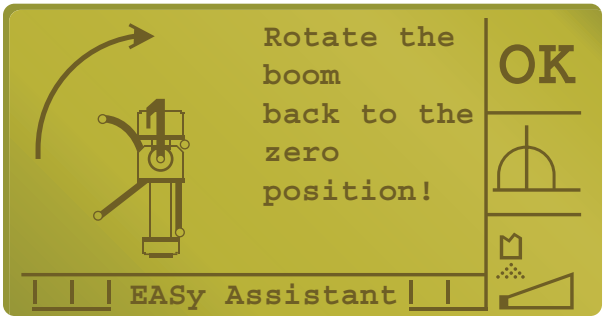


Figure 59
"Diasabled slewing” screen

Slewing the opposite direction is disabled.

Step 3

The system recognizes when the zero position has been reached and you may now lower the boom to the travel position.

Figure 60
Placing the boom in stowing position screen

The operator is guided to lower the boom

Step 3 b

After the system recognizes that boom #1 is in the boom rest the cab protection system allows boom #2 to be stowed.

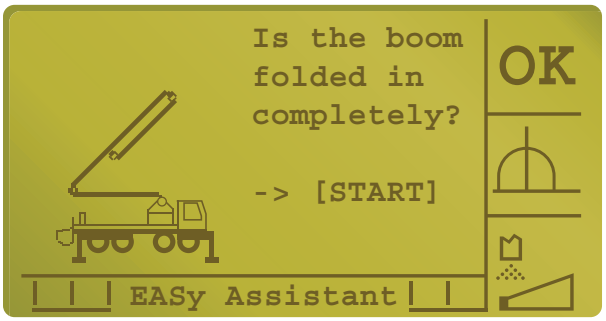


Figure 61
Boom folded in screen

Step4

After pushing the “START“button the operator should select the center position of the “working area selection switch“to enable the outriggers so that they can be fully retracted.

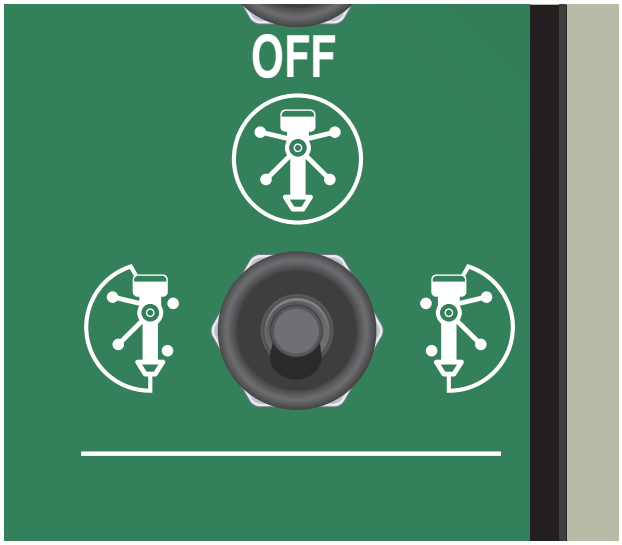


Figure 62
Working Area Selection Switch