BEVER CONTROL AS

User manual BeverDrill

BeverWIN2010

Version 1.0

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User manual for program made by Bever Control AS.

BeverDrill User Manual

BeverDrill
User Manual
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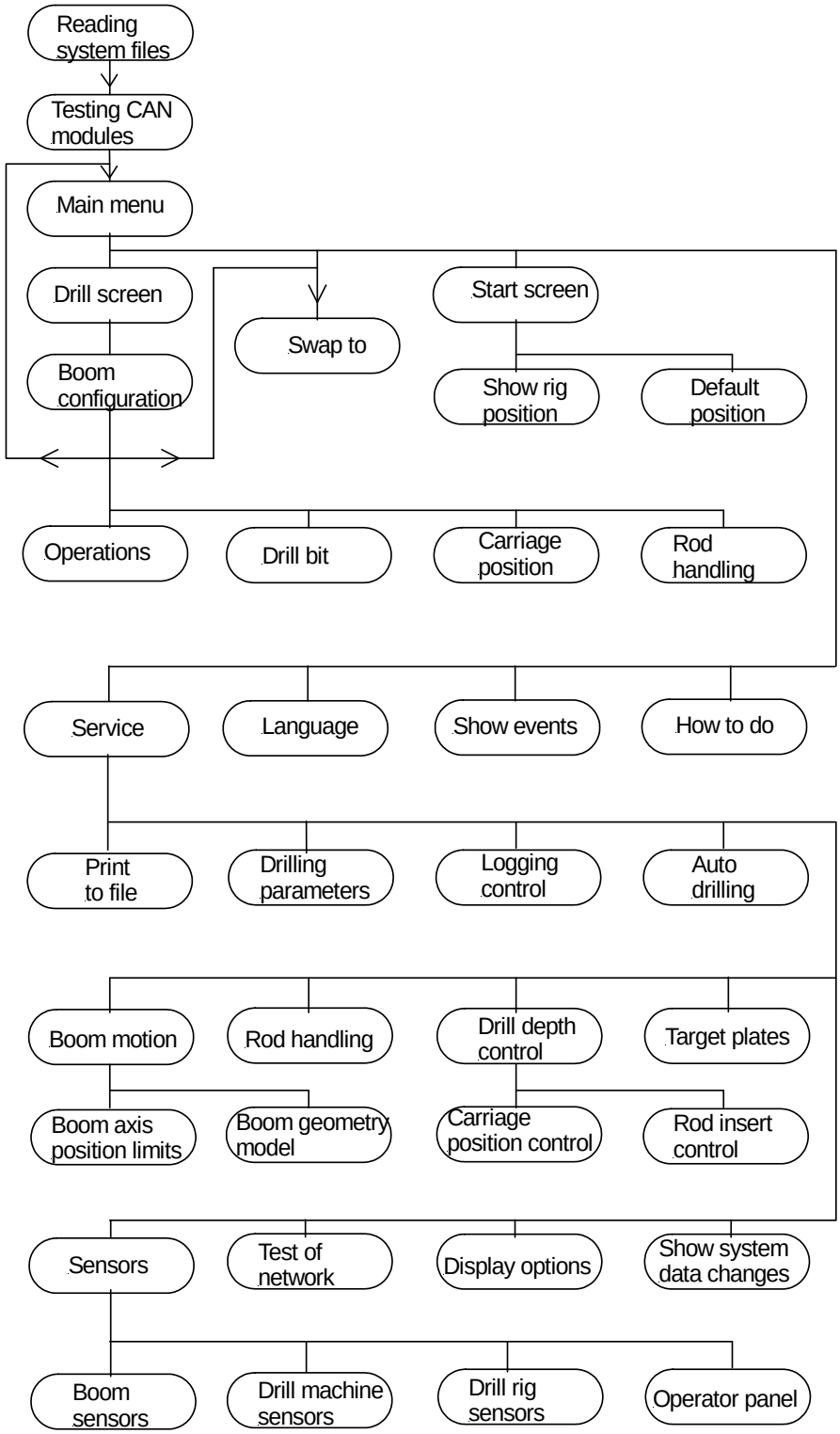
CONTENTS

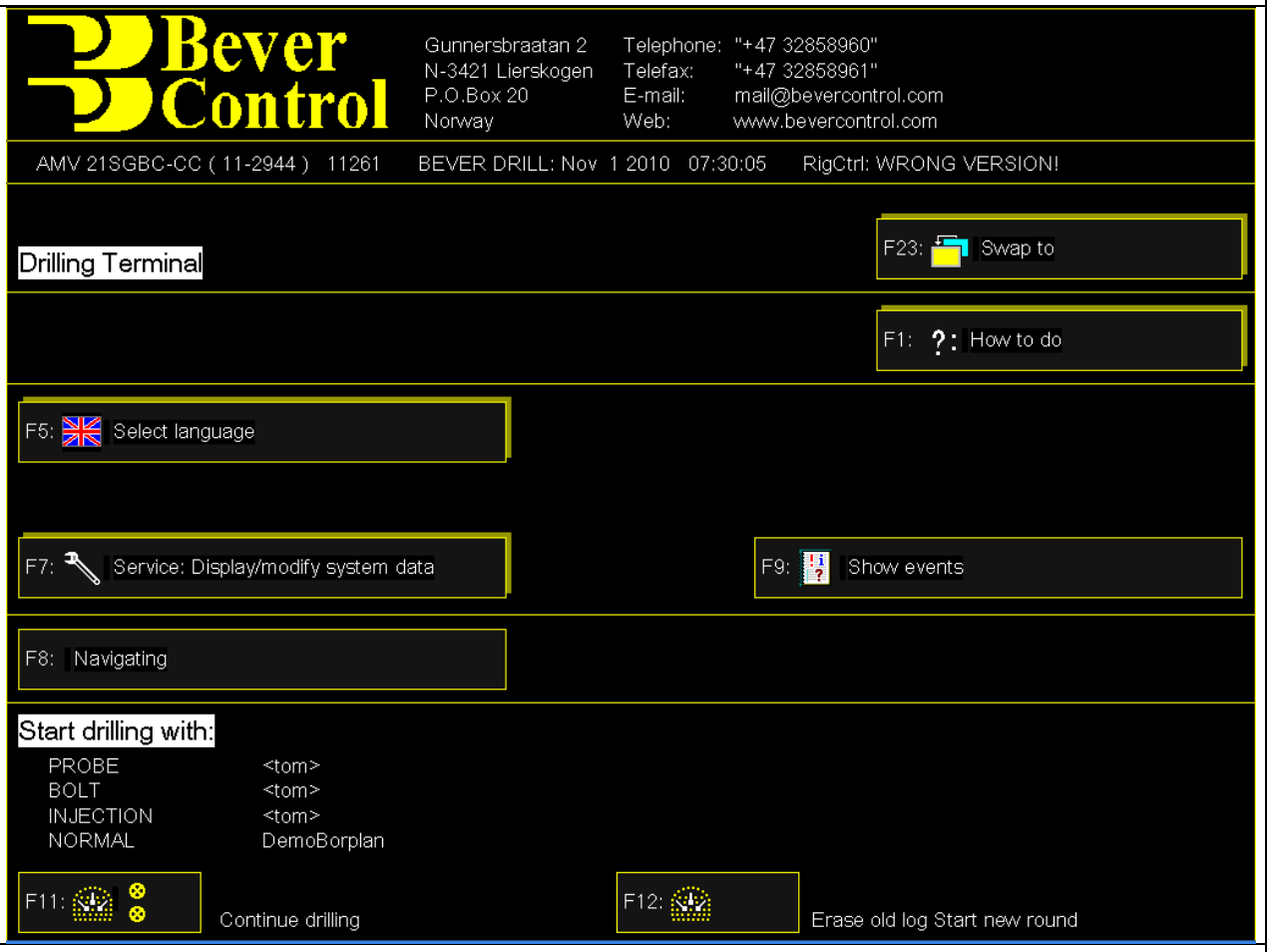
1 BeverDrill

1.1 General information for the menus

The menus in BeverDrill are connected together as shown below. From a menu it's possible to get back to the previous one except for the ones marked with arrows.



1.2 Main menu



F11: Continue drilling
Enters drill screen without erasing logged holes. Used when part of the round is already drilled.

F12: Erase old log. Start new round
Enters drill screen with all logged holes erased. Used when starting a new round.

F7: Service
Sensor surveillance and parameter settings. See Service Manual for details.

F8: Navigating
Shows navigated position, or jumbo can be navigated to standard position (face straight in front of jumbo, used for test purpose)

F9: Show events
Shows the list of events like error messages, warnings and system information

F23: Swap to
Swap to BeverPlan and BeverProfiler programs.

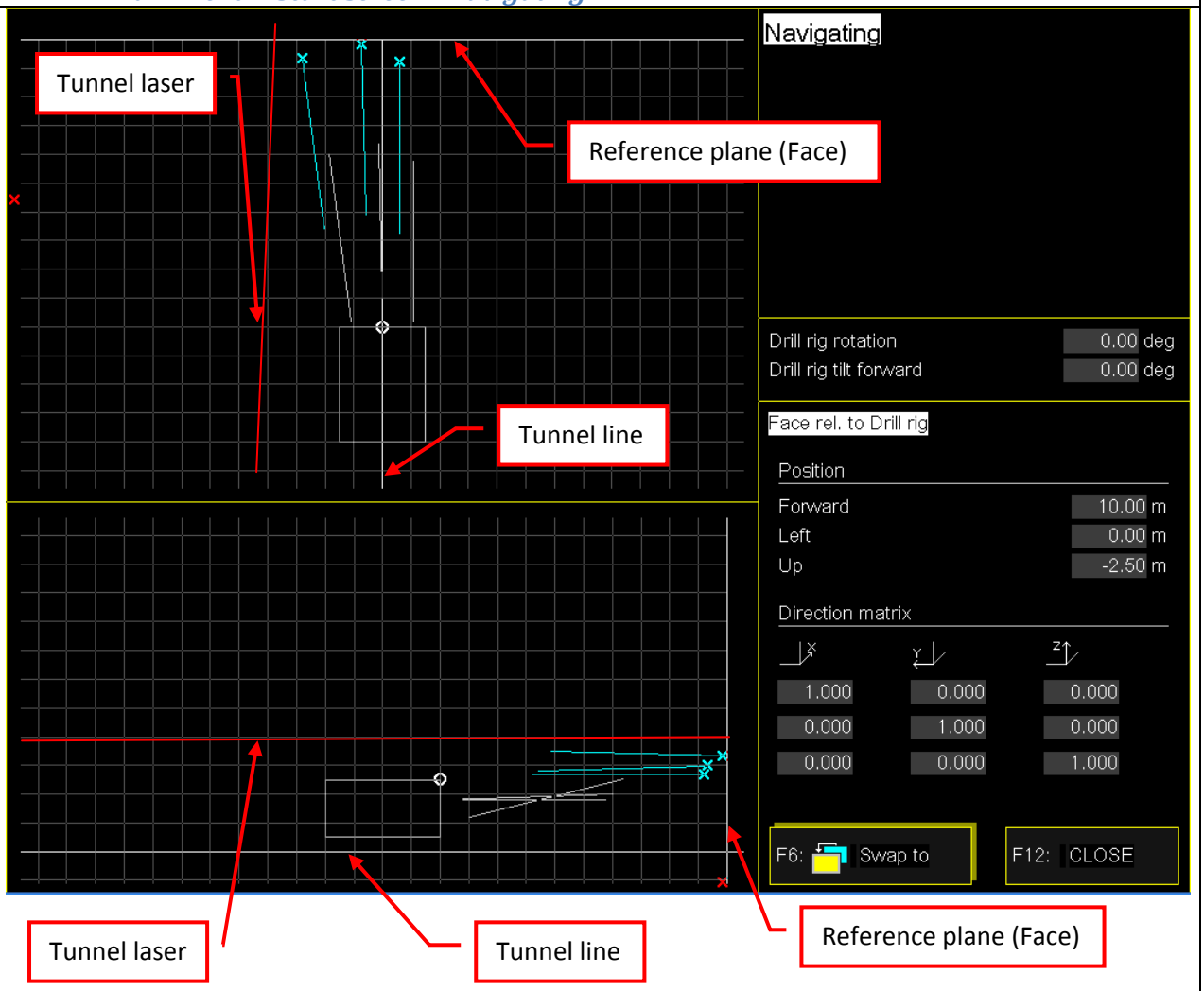
1.2.1 Main menu – Start screen

This start screen appears if there is no communication with BeverPlan during start-up. It's also possible to get to this menu if BeverPlan has been started but no other menus have been chosen, and F8:Navigating has been selected in the main menu in BeverDrill.

F1:Show drill rig position
Shows how the drill rig is navigated. Same screen is shown during navigation in BeverPlan.

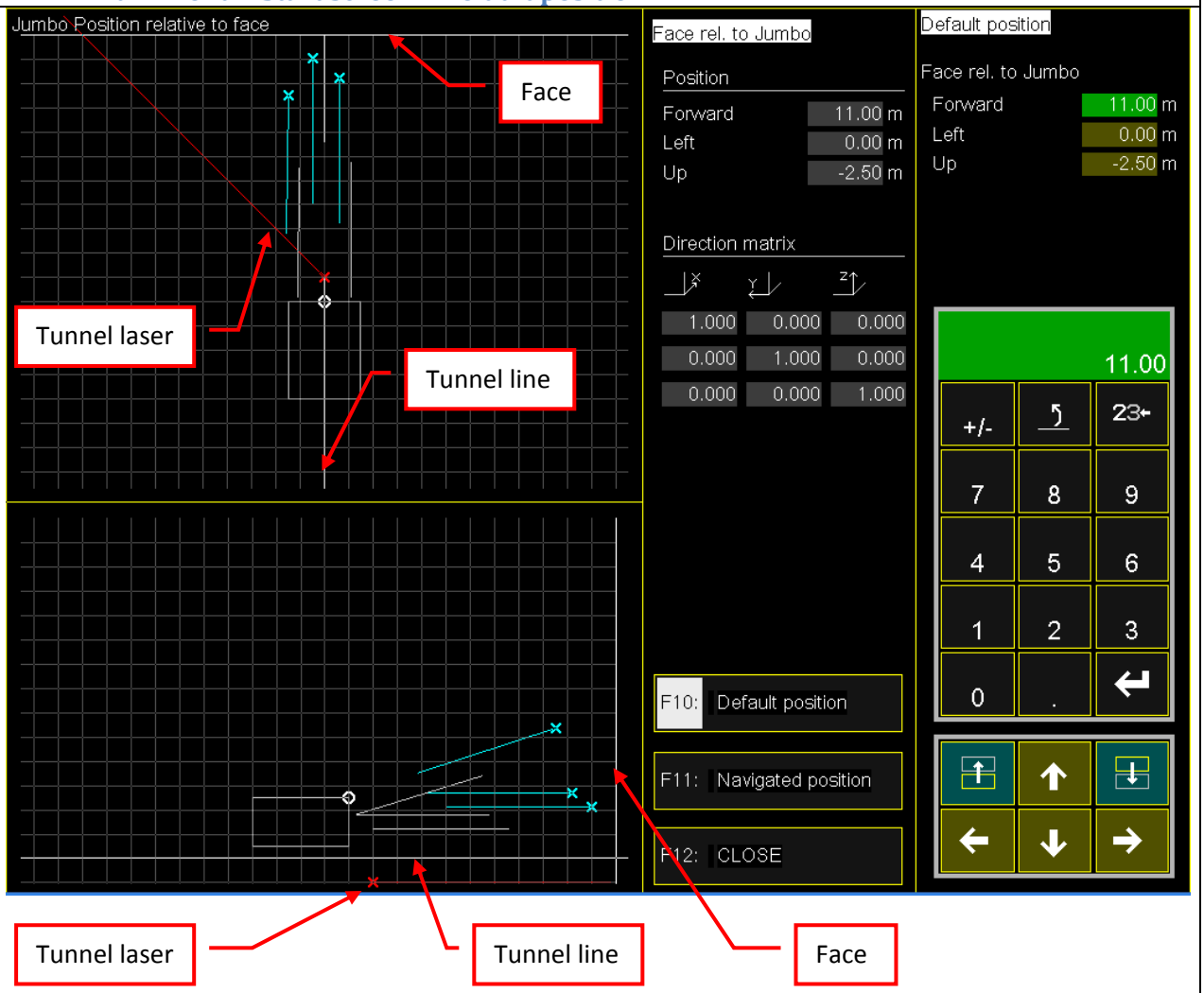
F10:Default position
It's possible to navigate the drill rig to a default position. The face is defined at a given distance and height straight in front of the rig.

1.2.1.1 Main menu – Start screen - Navigating



This screen shows the navigation of the jumbo. It's shown during the navigation in BeverDrill or if chosen as described in the previous chapter.

1.2.2 Main menu – Start screen – Default position



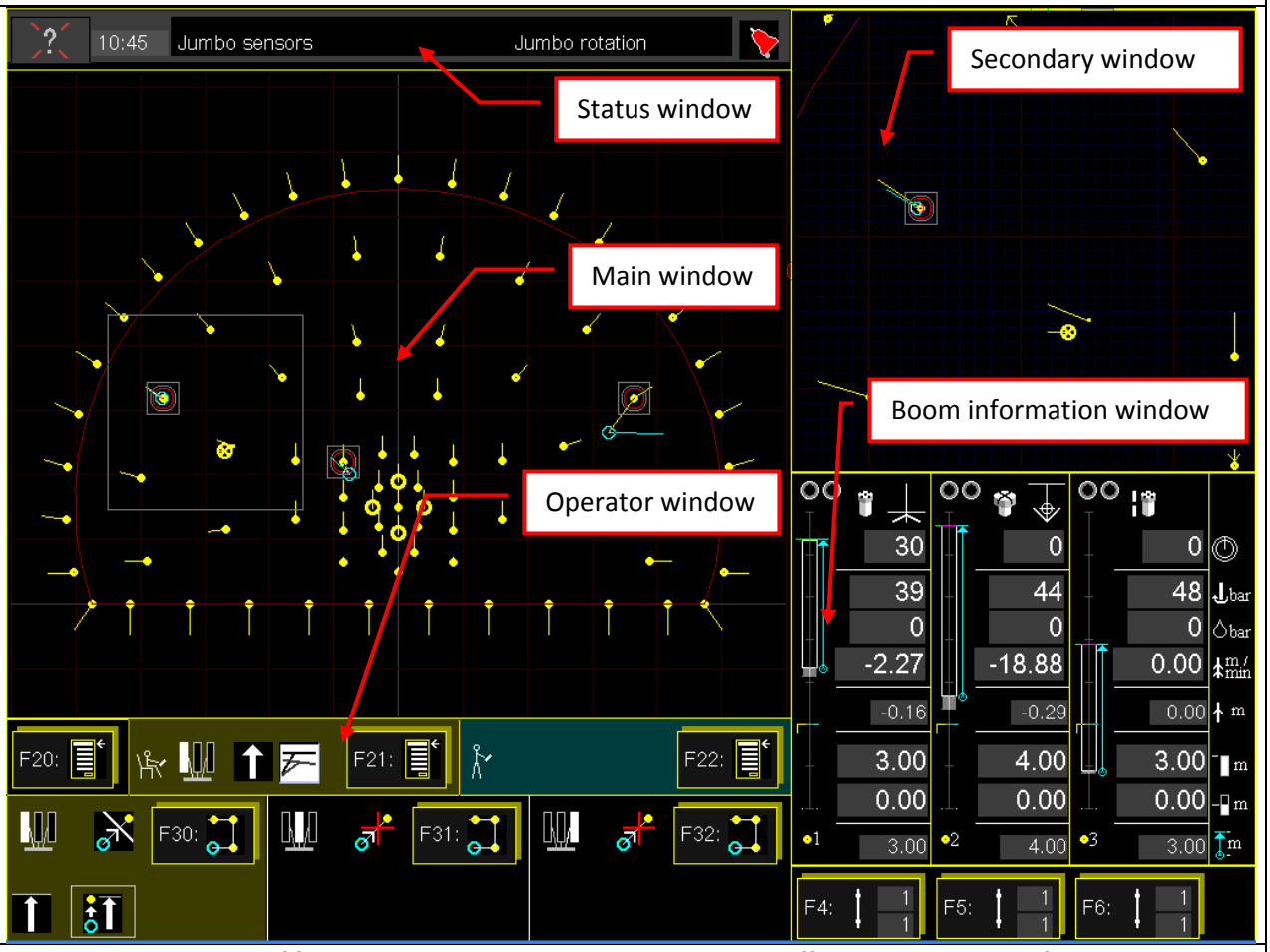
This screen shows the navigation of the drill rig. It's possible to switch between last rig navigation and default navigation. For default navigation the face is defined at a given distance and height straight in front of the rig.

F10:Default position
The rig is navigated with the face position according to the numbers for Forward, left and Up in upper right corner.

F11:Navigated position
Navigates to the last received navigation from BeverPlan

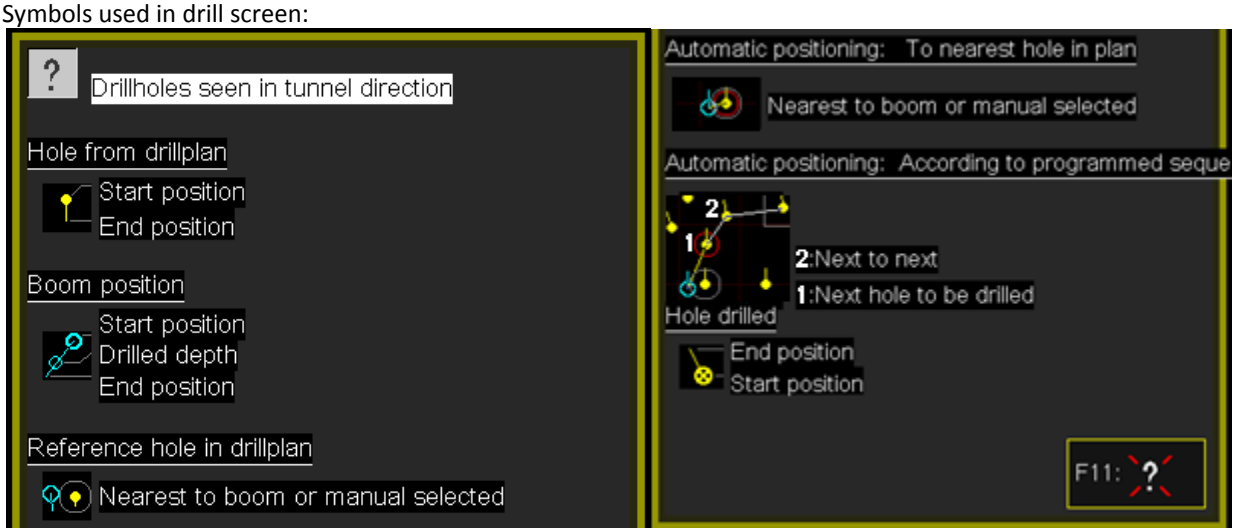
F12:Close
Returns one level up in the menus.

1.3 Drill screen

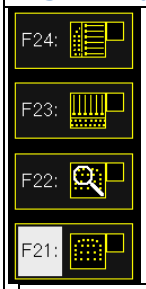


The drill screen consists of five parts as shown above. There are several different layout options for the main and secondary windows. Different setup for each boom through buttons F4:, F5: and F6:. See next chapters for details.

Symbols used in drill screen:



1.3.1 Main window

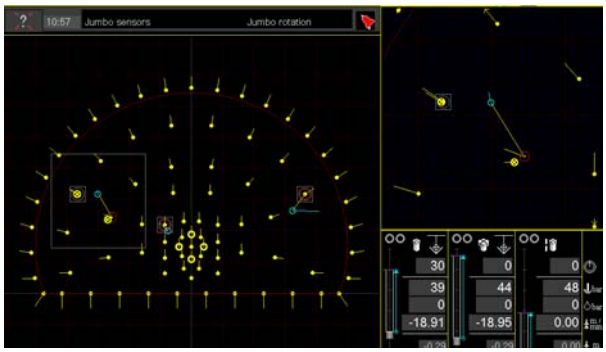


Main window can display the drill pattern in four different ways.
The different views are selected in the boom configuration menu. Use F21: to F24: as shown to the left.

See chapter 1.3.6 Boom configuration menu.

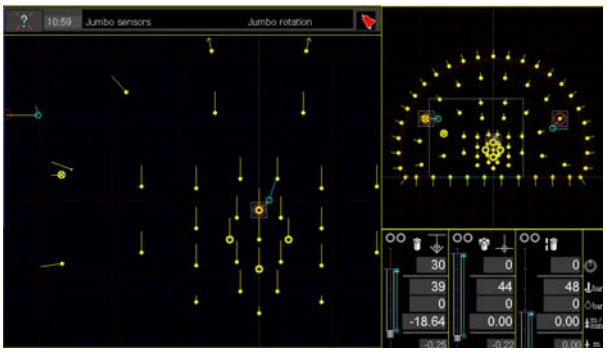
The different views are shown below.

F21: Normal view



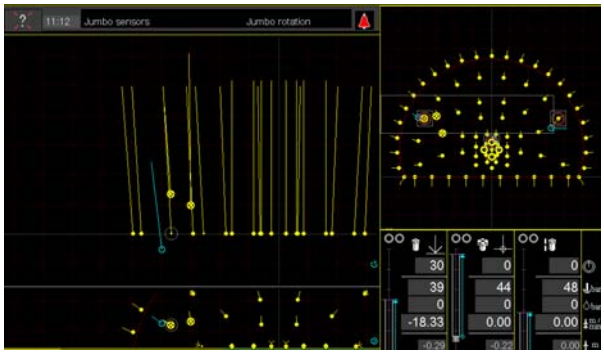
The complete drill pattern is shown. Normal view for the side booms.

F22: Zoomed in



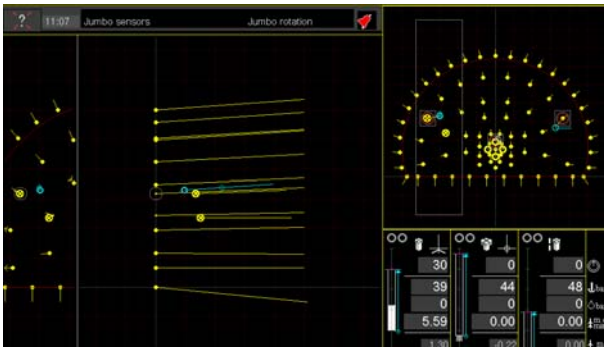
The area around the boom is zoomed in. Often used for the centre boom when drilling the cut.

F23: From above



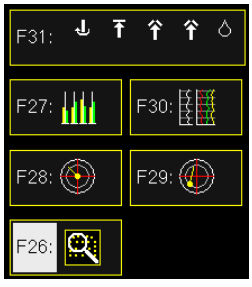
The holes inside the gray frame in the secondary window are zoomed in the bottom of the main window. In the top of the main window are the same holes shown from above. The blue mark for the boom shows that the feeder is behind the reference plane and the holes are drilled a fixed length.

F24: From the side



The holes inside the gray frame in the secondary window are zoomed in on the left side in the main window. To the right in the main window are the same holes shown from the side. The blue mark for the boom shows that the feeder is forward of the reference plane and the holes are drilled a fixed length.

1.3.2 Secondary window



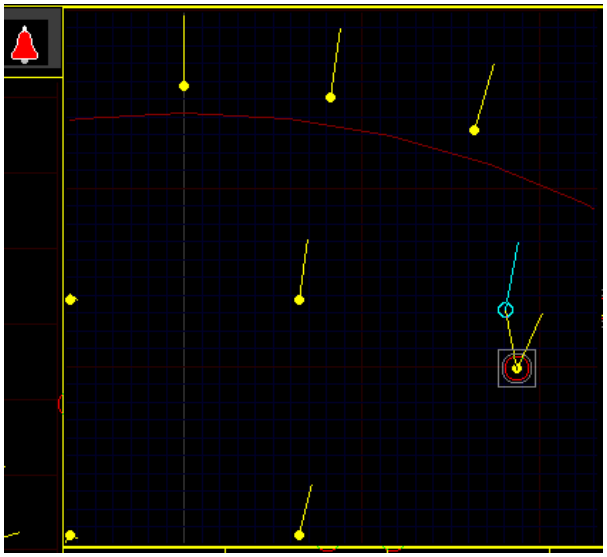
The secondary window can display the drill pattern or a zoomed in part of it. Other alternatives are two different sight views, drifter parameters, pressure trends and pressure values as numbers.

The different views are selected in the boom configuration menu. Use F26: to F31: as shown to the left.

See chapter 1.3.6 Boom configuration menu.

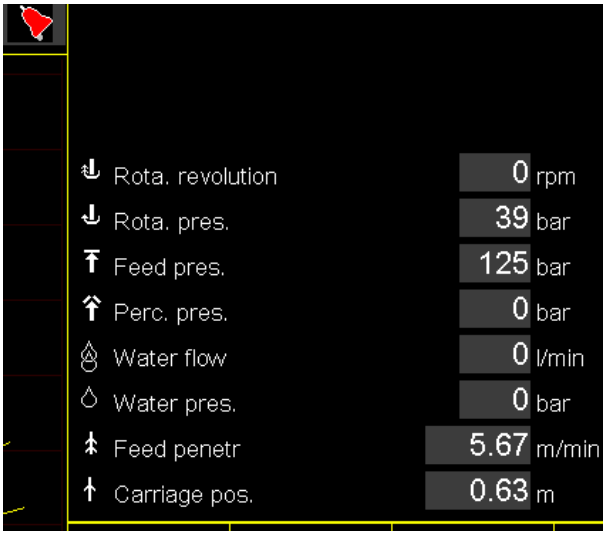
The different views are shown below.

F26: Zoomed in view



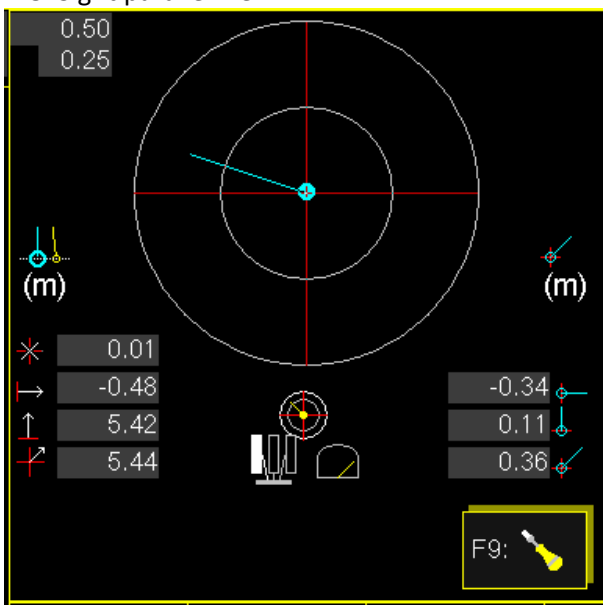
The area around the boom is zoomed in. Normal view for the side booms.

F31: Drill sensor values



Shows current values for all drill sensors for the boom.

F28: Sight parallel view



Shows the angle between the feeder and a reference. See details to the right for reference explanation.

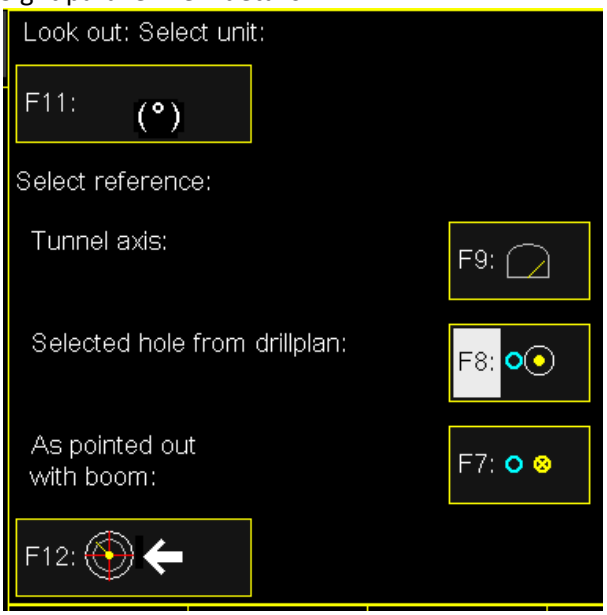
The numbers in the view are:

Top Left: Radius outer and inner circle

Left side: Deviation in position(from top)
- Forward
- Sideways
- Up
- Vector sum

Right side: Deviation in direction (deviation in bottom of hole)
- Sideways
- Up
- Vector sum

Sight parallel view details



F11: Select unit degrees or meter for deviation in direction

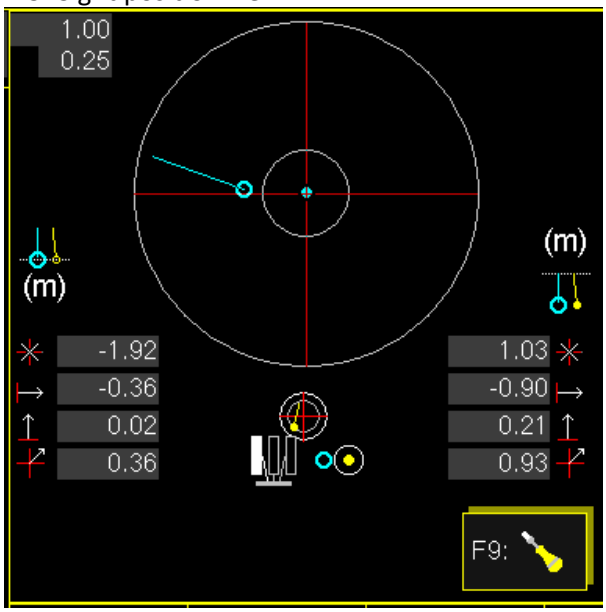
F7: Reference is set to current feeder direction Used when drilling a cut without using the drill pattern. The first hole is set as a reference, then the values in the Sight parallel view are used to control the distance between the holes in the cut.

F8: Reference is set to nearest hole in drill pattern

F9: Reference is set to tunnel line

F12: Activates the new reference. Must be pressed when a new reference is selected.

F29: Sight position view



Shows deviation in position and angle between the feeder and a reference. See details to the right for reference explanation.

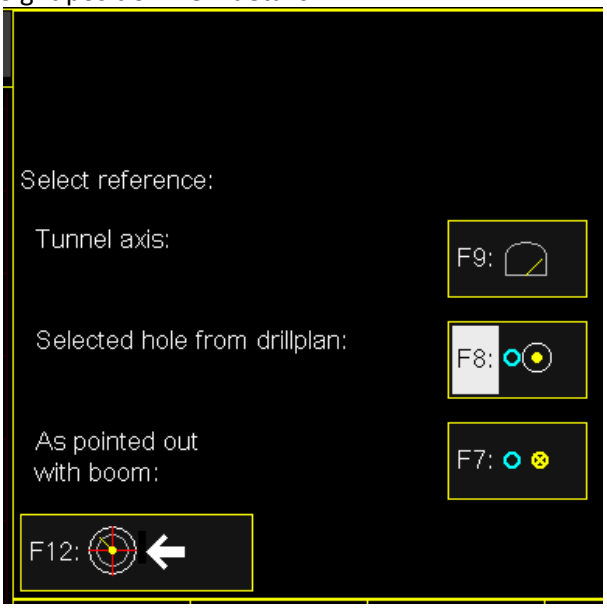
The numbers in the view are:

Top Left: Radius outer and inner circle

Left side: Deviation in position (from top)
- Forward
- Sideways
- Up
- Vector sum

Right side: Deviation in bottom of hole)
- Forward
- Sideways
- Up
- Vector sum

Sight position view details



F7: Reference is set to current feeder direction

F8: Reference is set to nearest hole in drill plan
Used to drill very accurate. Can effectively be combined with zoomed view in main window when drilling the cut.

F9: Reference is set to tunnel line

F12: Activates the new reference
Must be pressed when a new reference is selected.

F27: Drifter control view

The view shows (from left) rotation pressure, feeder pressure, feeder speed and percussion pressure. The yellow bar on the left is the valve opening and the blue bar on the right is the measured value. More details below.

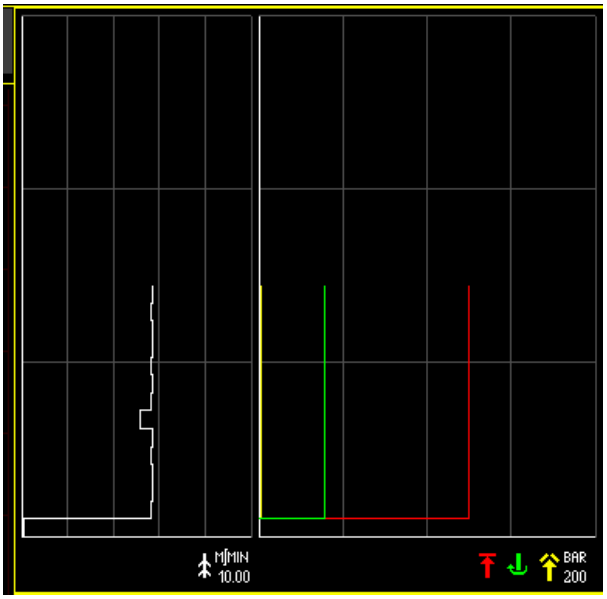
The view shows (from left) rotation pressure, feeder pressure, feeder speed and percussion pressure

F7: Increase valve opening

F8: Decrease valve opening

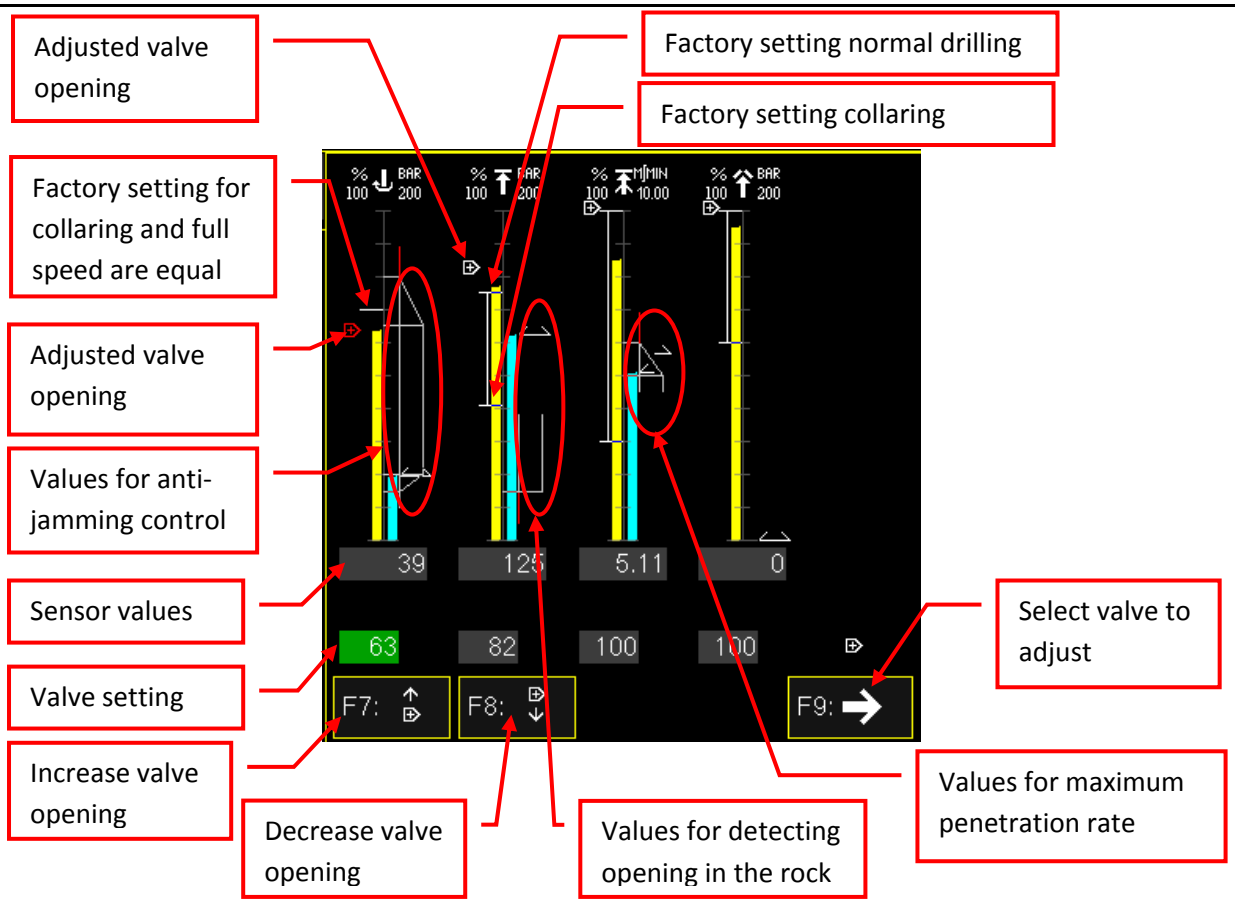
F9: Select valve

F30: Drifter trend view



Shows the variations in sensor values as trends when drilling. The sensors are:

Red	Feeder pressure
Green	Rotation pressure
Yellow	Percussion pressure
White	Penetration rate



1.3.3 Status window

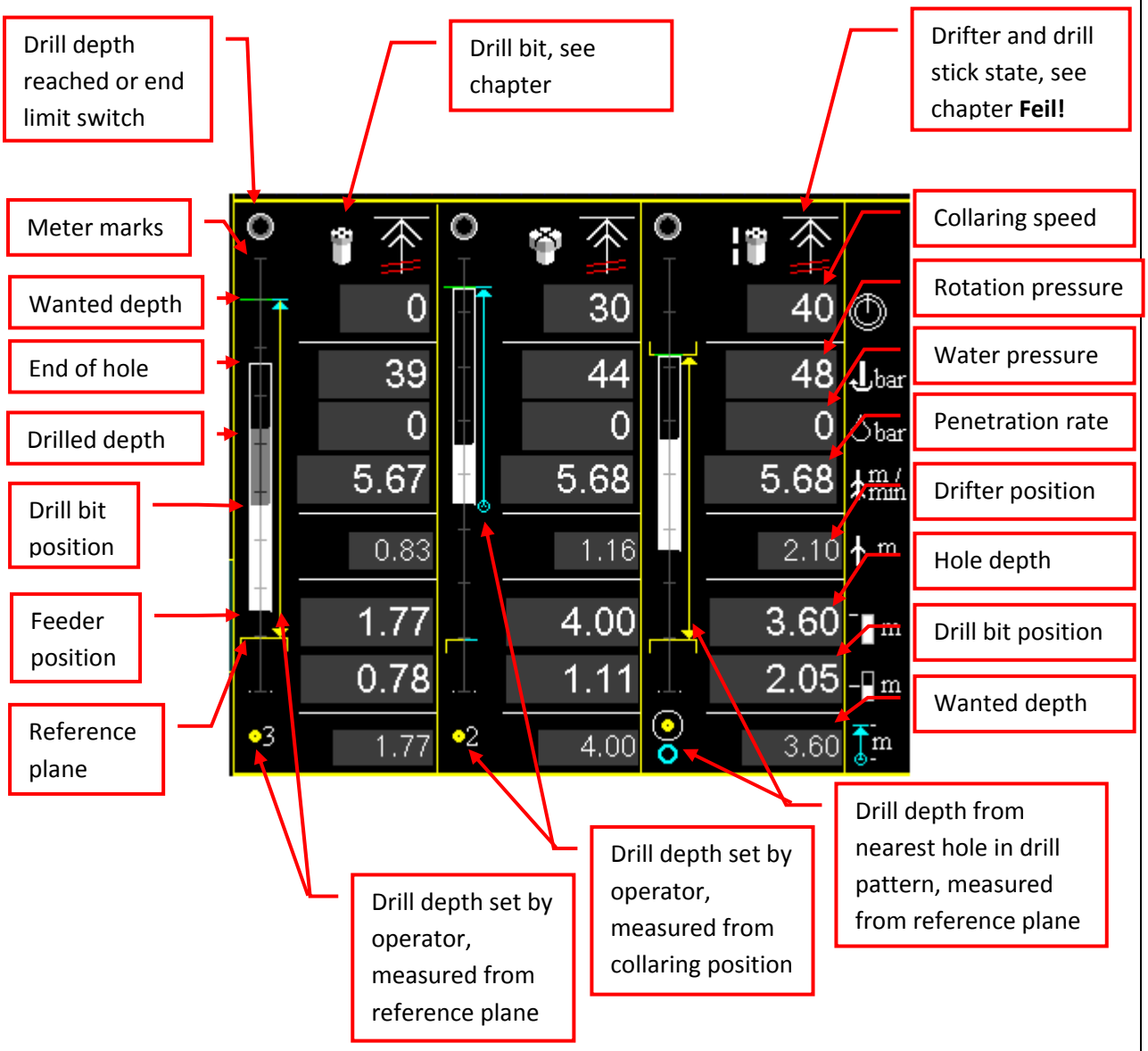
The status window has a "?" field that activates help. Touch the mark and then the window in question.

The last alarm is shown and if there is an unacknowledged alarm the bell will move. There are different type of alarms like:

Angle sensor input
Angle sensor range
Pressure sensor input
PVG valve errors
Shank oil errors
Water flow
Emergency stop
AMV system errors

1.3.4 Boom information window

The drill data window shows a lot of information about the drilling and the configuration of each boom. In the upper part is the lamp for hole finished, selected drill bit and drifter state. On the left side is a graphical presentation of the hole being drilled. On the right side is the numbers for the same.

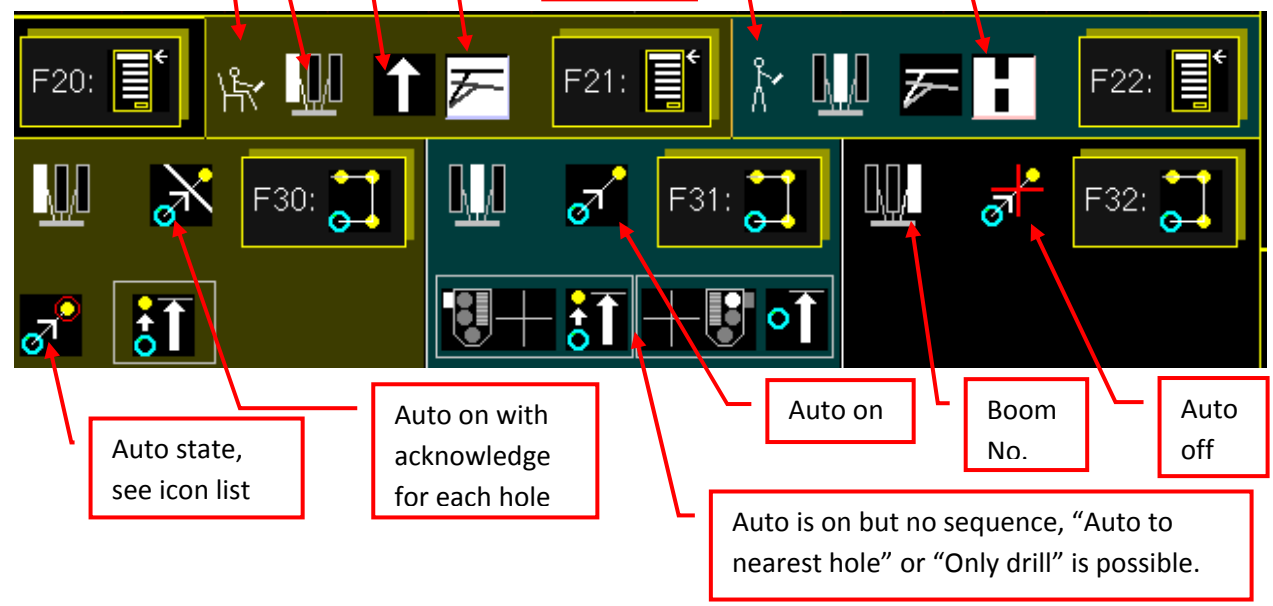


1.3.5 Operator window

The upper line of the operator window shows current operations for the chair and standing consol. The highlighted icon shows what's currently activated. If the background is black, the panel is not connected to a boom.

To the left is a general information button (F20:) and for each operator there are context sensitive information buttons (F21: and F22:). The information depends on the current operation of the joysticks, if boom movement, drilling or rod changing is selected. See chapter 1.3.5.2 to **Feil! Fant ikke referansekilden.** for details.

The lower part shows automatic drilling information for each boom and possible operations. The background colour for a consol and the connected boom is the same. If the background is black the boom is not connected to a operator panel.



F20: General information joysticks, see chapter See 1.3.5.1

F21: - F22: Menu description, changes with activated joystick function. See chapter 1.3.5.2 to 1.3.5.4

F30: - 32: Auto menu for each boom, see **Feil! Fant ikke referansekilden.**

1.3.5.1 General information

Below is a description of the icons in the following chapters. The highlighted (white) button is the function key used for the activating a joystick menu or operation.


Left hand joystick


Right hand joystick


Function key F1


Function key F1


Function key F2


Function key F2

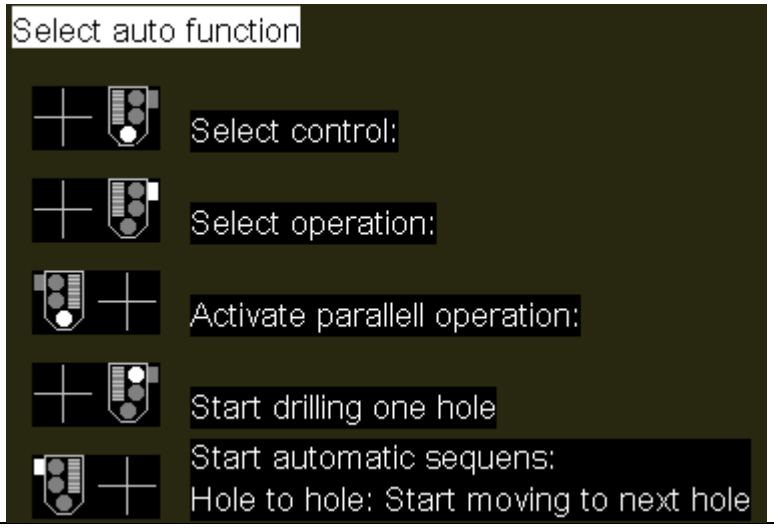

Function key F3


Function key F3 (joystick menu)

 Function key F4

 Function key F4 (joystick menu)

Independent of the state of the joysticks, the options shown in the figure below always have the same meaning. This does not imply that they will always generate a response. The meaning is as described in the following chapters.



1.3.5.1.1 Select control

Activates the control select menu. Press the button, release it and then do one of the following movements with the right hand joystick. The control selected is based on the position of the joystick when returned to the neutral position.

 Press the same button and the menu closes

 Select boom 1

 Select boom 2

 Select boom 3

 Select the basket

 Select left hand search light (option)

 Select right hand search light (option)

 Not in use

 Not in use

1.3.5.1.2 Select operation

Activates the select operation menu. This menu will only work if a boom is already selected. Press the button, release it and then do one of the following movements with the right hand joystick. The operation selected is based on the position of the joystick when returned to the neutral position.


Press the same button and the menu closes


Activates drilling with moving as parallel operation


Activates rod handling with moving as parallel operation


Move bolting axis to the end position or enables moving of the bolting axis


Water in auto, on and off is controlled by the drilling system

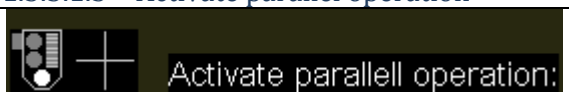

Water on


Water off


Not in use

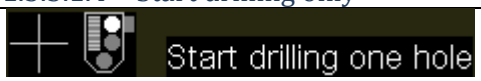

Not in use

1.3.5.1.3 Activate parallel operation



Changes joystick mode between drilling and moving or rod handling and moving.

1.3.5.1.4 Start drilling only



Starts collaring and changes automatically to normal drilling after a preset distance. The distance is set in the service menu.

1.3.5.1.5 Start automatic movement

When system power is turned on, automatic drilling is default off. In this case this button does not work. With automatic drilling enabled this button works as follow:

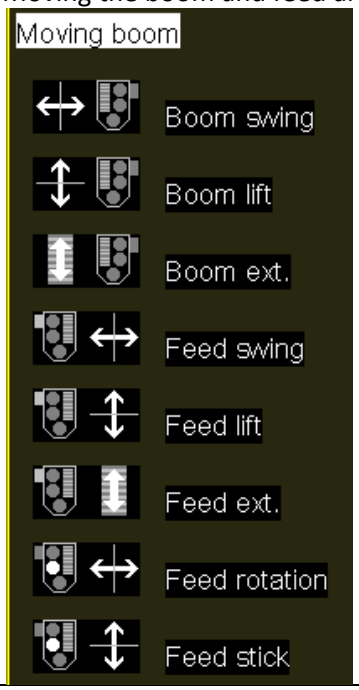
No sequence	The boom will move in front of the closest hole in the drill pattern. Then move forward to the rock, drill the hole and retract from the rock. When the hole is finished, a small movement of the boom in direction of the next hole to be drilled is enough to select a new hole.
Sequence with confirmation	The boom drills the first hole in the sequence as described above, then wait for the button to be pressed again before moving to the next hole in the sequence.

Sequence without confirmation	All holes in the sequence are drilled continuously.

The distance to and from the rock is set in the service menu.
Automatic drilling can always be aborted by moving the drill stick for the boom backwards.
The operator can always override the machine and do for instance the positioning himself if the rock condition is tricky. The sequence is continued when the button is pressed again.

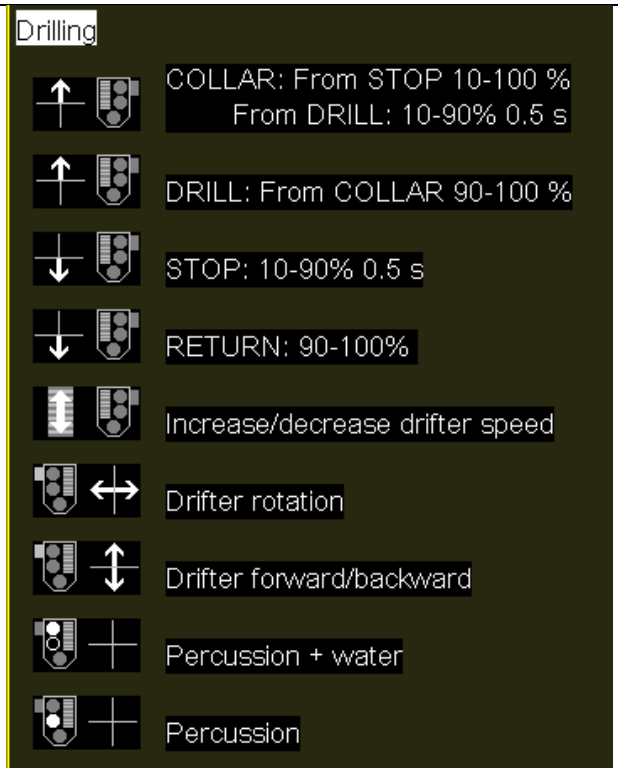
1.3.5.2 Movement information

Moving the boom and feed are done as follow:



1.3.5.3 Drifter functions

When the joysticks are in drilling mode, there are the following possible operations:



It is possible to combine drifter rotation, forward/backward movements, percussion and water.

In this mode the drifter will always rotate when operations are finished. To change drill bit use rod handling mode.

1.3.5.4 Rod handling functions

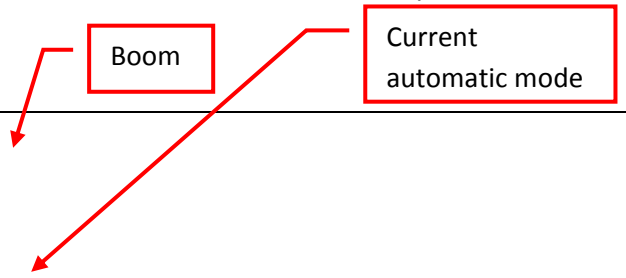
When the joysticks are in rod handling mode, there are the following possible operations:

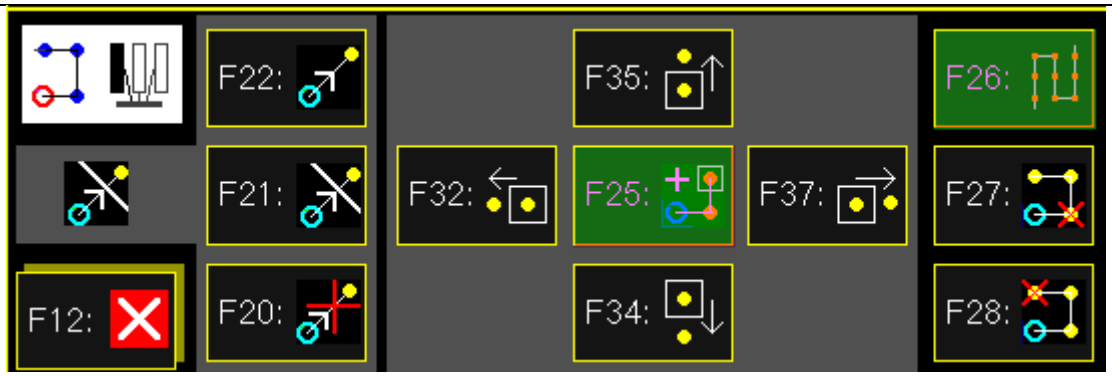
It is possible to combine drifter rotation, forward/backward movements, percussion and water.

To disconnect drill bit or rod string, rod handling is used because in this mode the drifter is not rotating when operation is finished.

1.3.5.5 Auto menu

Auto drilling is default off when system is powered on. When one of the auto menu buttons F30:, F31 or F32: in the **Feil! Fant ikke referansekilden.** (see chapter **Feil! Fant ikke referansekilden.**) is pressed you get the menu shown below. The menu automatically closes after 10 seconds of inactivity.





F12: Closes the menu

F20: Automatic mode off

F21: Automatic mode with confirmation for each hole

F22: Automatic mode without confirmation for each hole

F32:, F34:, F35:, F37: Moves the sequence cursor

F25: Adds the hole to the sequence for the boom

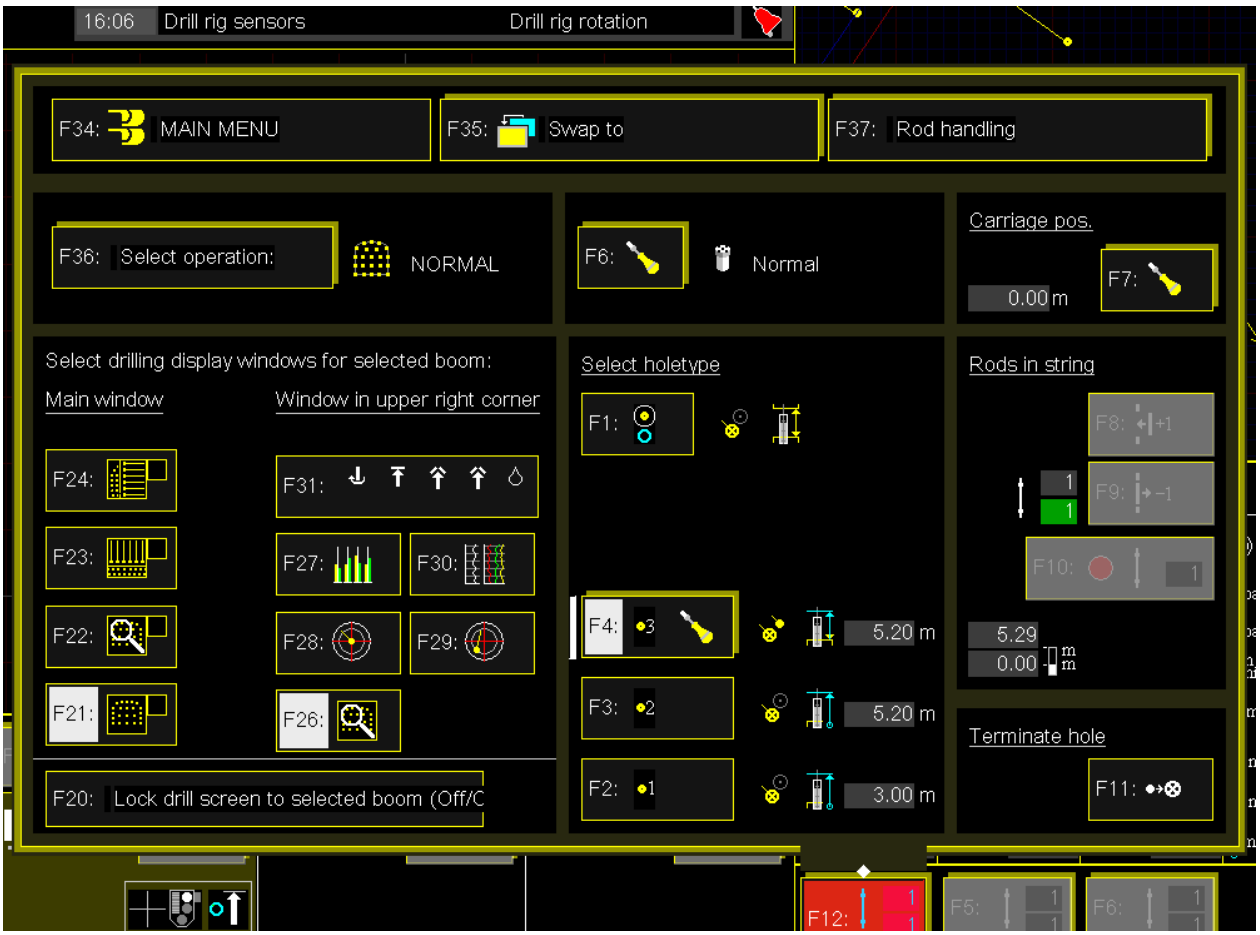
F26: Adds 5 next holes from sequence generated in the office

F27: Delete first hole in sequence

F28: Delete last hole in sequence

1.3.6 Boom configuration menu

For each boom it is possible to set different parameters. To configure settings for a boom press button F4: - F6: in the Drill data window.



F21: - F24: Selects the view for the main window, see chapter 1.3.1

F26: - F31: Select view for secondary window, see chapter 1.3.2

F20: Locks the screen to this boom

F1: - F4: sets the drill depth. This can be selected independently for each boom, but the settings for extra holes type 1 - 3 (buttons F2: - F4:) are similar for all booms. See next chapter for more details.

F34: Go to main menu, see chapter 1.2

F35: Change to BeverPlan if only one computer

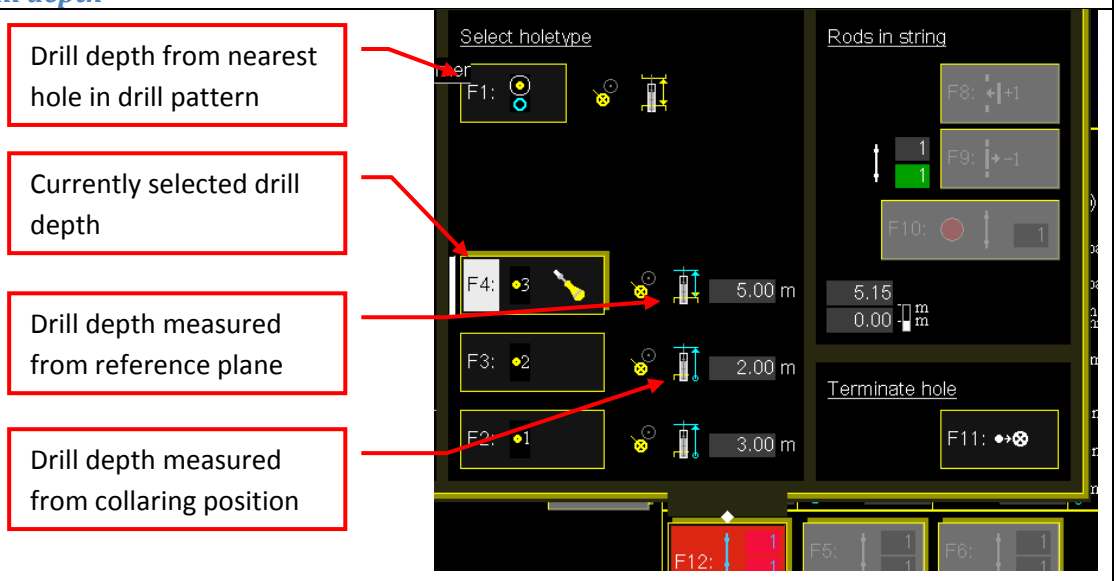
F36: Select between normal drilling, bolting, injection and probe

F6: Current drill bit (parameter set)

F7: Reset drifter position

F11: Terminates and logs the hole on command. This is done automatically when drilling depth is achieved and the drifter is fully returned. For a hole that is aborted by the operator before the full depth is achieved a hole is logged when feeder is moved 20 centimetres to the side. F11: should be used when a long hole is aborted and should be pressed before removing rods start.

1.3.6.1 Drill depth



F1: Drill depth is controlled by nearest hole in the drill pattern and depth is measured from the reference plane. It is possible to have different depths for different holes to make a curved bottom for the round.

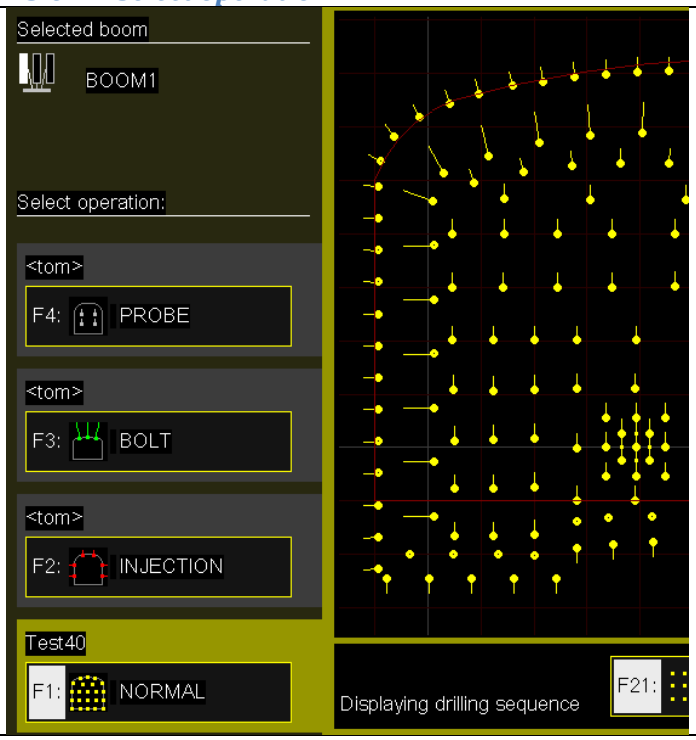
F2: - F4: Hole parameters are selected by the operator. The settings for these three are the same for all three booms, but the selection is independent for each boom . Operator can select drilling depth, if the depth shall be measured from collaring position or reference plane, and if the nearest programmed hole in the plane shall be removed or not. The currently selected one is highlighted, and can be adjusted by touching the button. How to adjust is described below.

F1: Toggles between measuring from collaring position and reference plane.

F2: Toggles removing of the nearest hole in the drill plan on and off.

To change the drill depth, type the new value and press Enter. The press F11: to close the keyboard or F12: to close Boom configuration menu.

1.3.6.2 Select operation

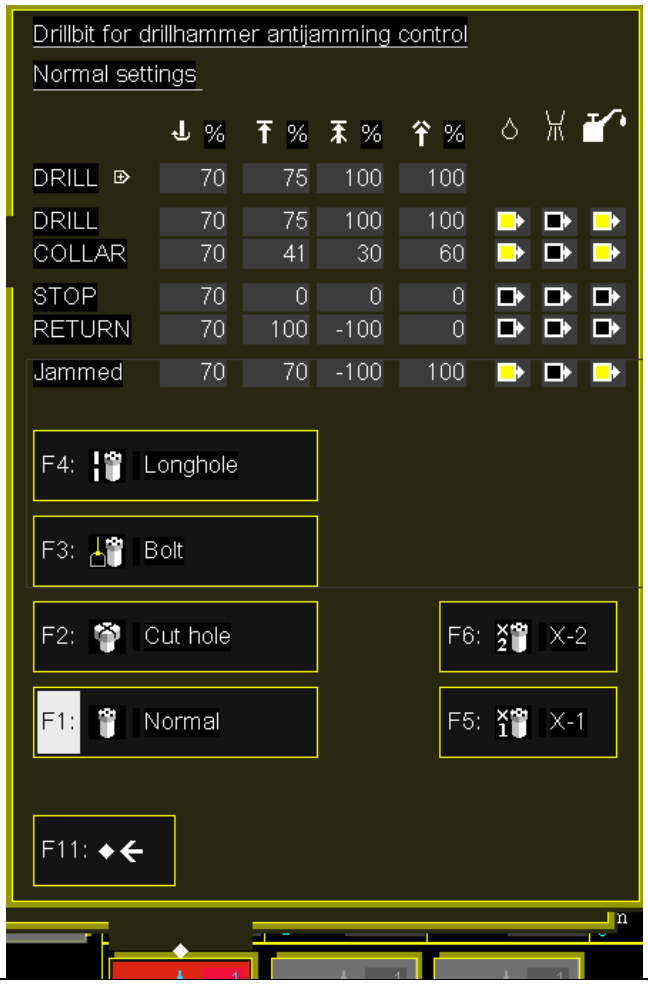


There are four different types of operations. These are normal drilling, injection, bolting and probe drilling. It is possible to use one drill plan for each operation and different operations for each boom.

Drill pattern and logged holes are coloured as shown below.

- Normal
- Injection
- Bolt
- Probe

1.3.6.3 Select drill bit

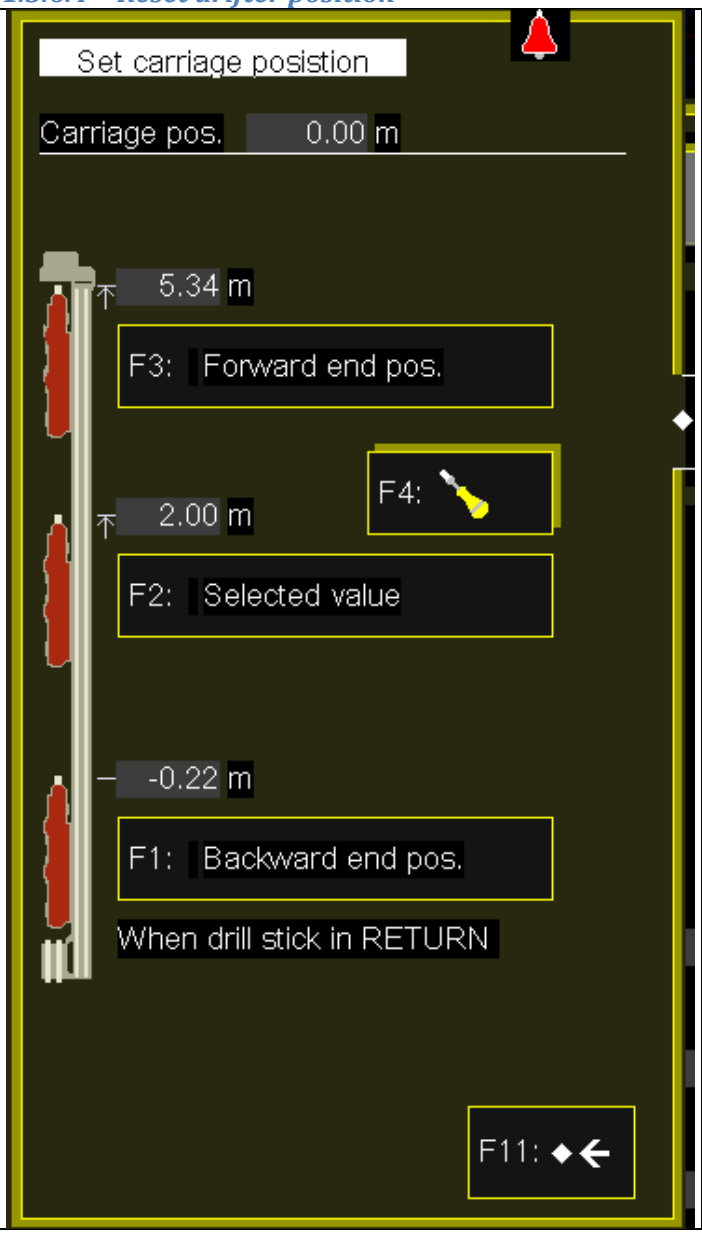


There are four standard drill bits, or more correctly parameter sets for drill bits. These are normal drilling, cut hole, bolting and long hole.

In addition there are two more sets that can be used for special purpose or testing named X-1 and X-2.

The parameters for the chosen drill bit is shown, changing the parameters are done in the Service menu.

1.3.6.4 Reset drifter position



F1: Resets the drifter position in the backward position. The return pressure must be on. The reset value is approximately -20 centimetres.

A negative value is used because the sensor for the drifter position is measuring the oil flow in the return oil line. When the drifter stops in backward position with pressure on the return line is filled with excess oil. When the pressure is released, oil will flow through the sensor without moving the drifter. This oil volume represents a movement of approximately 20 centimetres.

F3: The drifter position can also be reset in its forward position.

1.4 List of status icons

	1.4.1 Drilling
	Drifter stopped
	Drifter in collaring
	Drilling with reduced power because of speeding up from collaring to normal drilling mode or reduced because of to high rotation pressure.
	Drifter in normal drilling
	Drifter returning

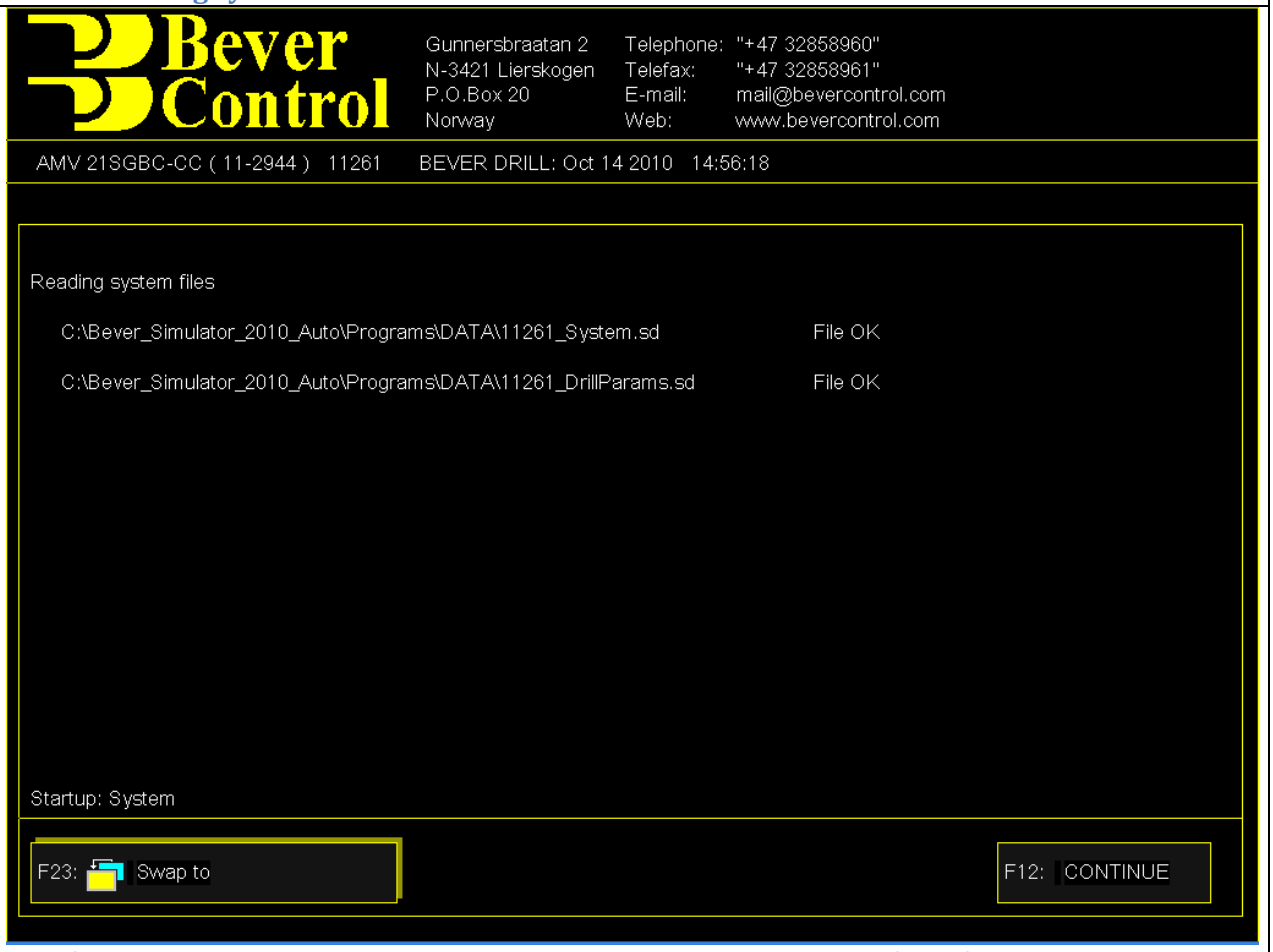
	Drifter returned automatically when hole depth was achieved and then stopped	
	1.4.2 Anti jamming	
	Drifter moves back because of jamming	
	Drifter has moved back because of jamming and is now flushing hole with water a preset time.	
	Drifter has moved back and flushed hole with water because of jamming and is moving forward in collaring again.	
	Maximum time for anti jamming has run out. Start again manually.	
	1.4.3 Drill speed control	
	Drilling with reduced power because of to high penetration rate.	
	An opening in the rock has been detected (feed pressure to low) and drifter is drilling in collaring until feed pressure is above limit for normal drilling.	
	Maximum time for feed pressure control has run out. Start again manually.	
	1.4.4 Other icons	
	Blowing air a set time in the bottom of the hole	
	Flushing with water a set time in the bottom of the hole	
	Water flow is to low, drilling is stopped	
	No shank oil, drilling is stopped	
	1.4.5 Auto drilling	
	Auto is off	
	Auto is on. Acknowledge before moving to next hole.	
	Auto is on. Sequence is run continuously.	
	Boom is movint towards a hole	
	Feeder moves against the rock	
	Boom is drilling in auto	

	Feeder moves away from the rock
	Auto drilling is in progress.
	“Drill only” is in progress. Drills in collaring, speeds up to normal drilling after a set distance and retracts the feeder a set distance when drifter has returned. Different parameters for different hole types.

1.5 Startup screens

Before the main menu appears the system shows two start-up screens. If everything is ok the program continue automatically to the main menu.

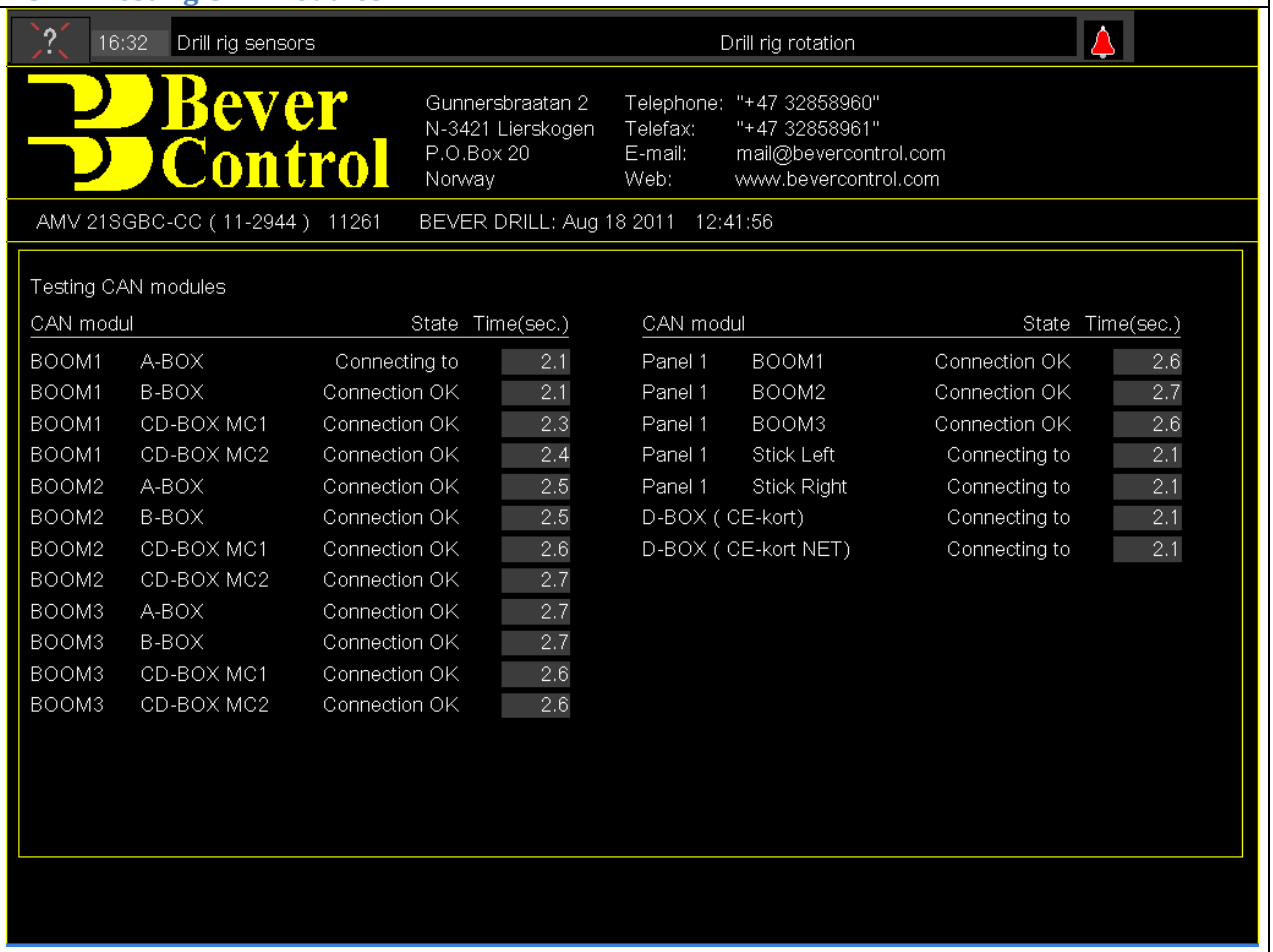
1.5.1 Reading system files



Just after starting up the system the program reads two important system files. If anything is wrong with these files, the program stops and an error message is printed on the screen.

If this happens the defect file must be reloaded from the system file menu in BeverPlan. In BeverPlan do:
F2:To start - F11:Operations - F8:System files
Use F4:Open to reload system data
Use F7:Open to reload drill data

1.5.2 Testing CAN modules



When the program has verified the system files, it will continue with connecting to all CAN modules. The program waits until all modules have answered. If a module is not responding it is possible to continue to the main menu by pressing F12:Continue as long as it's not the D-box that failed.

Depending of the module that is not responding, the system can still be operated.

This screen appears automatically if a module stops communicating during drilling.

It's recommended to navigate the drill rig before continuing to the drill screen if the rig has been moved. If the rig has not been moved it's not necessary to navigate again, but it's recommended to press F29:Log in BeverPlan before starting the drilling.

1.6 Operator panel

The system can be operated with the joysticks and the switch panel. Both are active all the time so it's possible to use a mixed combination if wanted.

1.6.1 Switch panel

Left row of buttons have the following functions:

- Select boom, connects the joysticks to this boom.Light is on when boom is selected.
- Rod handling activated, the light intensity is low if rod handling functions for this boom is activated but not connected to the joysticks. Light intensity is high if connected to the joysticks.
- Bolting axis to end position, if light is off the bolting axis is pressurised so that it's in the normal position. If light is on it's possible to move the axis with the joystick.
- Water state, light is on if enough water, light is off if not. It's blinking if the water guard is turned off.

Right row of buttons have the following functions:

- Collaring speed, can be adjusted in steps of 3% from 0 to 100%.
- Drilling activated, the light intensity is low if drilling functions for this boom is activated but not connected to the joysticks. Light intensity is high if connected to the joysticks.
- Air on and off, light is on when air is on.
- Water is off, on or in auto. The button is used to step through the three different states. Rapid blinking is water valve manually set to open, slow blinking is water valve manually closed. Light on means that the water flow is controlled by the system and the valve is open, if the light is off the water flow is controlled by the system and the valve is closed.

1.6.2 Drill stick

The drill stick works as follow when drilling is activated:

- ↑ 10-90 % = Collaring
- ↑ 90-100 % = Drilling
- ↓ 10-90 % = Stop
- ↓ 90-100 % = Return

If one want to change from drilling to collaring one must hold the drill stick a little forward for half a second. Same with stop, the on has to hold the drill stick a little backward for half a second.
If drifter is in state stop and the drill stick is moved fully forward the state will become collaring anyway. To get drilling state the drill stick has to be moved forward twice.

When drilling is not activated the drifter can be moved by moving the drill stick forward and backward. The speed is proportional to the position of the drill stick.