

SYSTEM MANUAL

COLOMBI SPRING COILING MACHINE

COLOMBI ORBIT



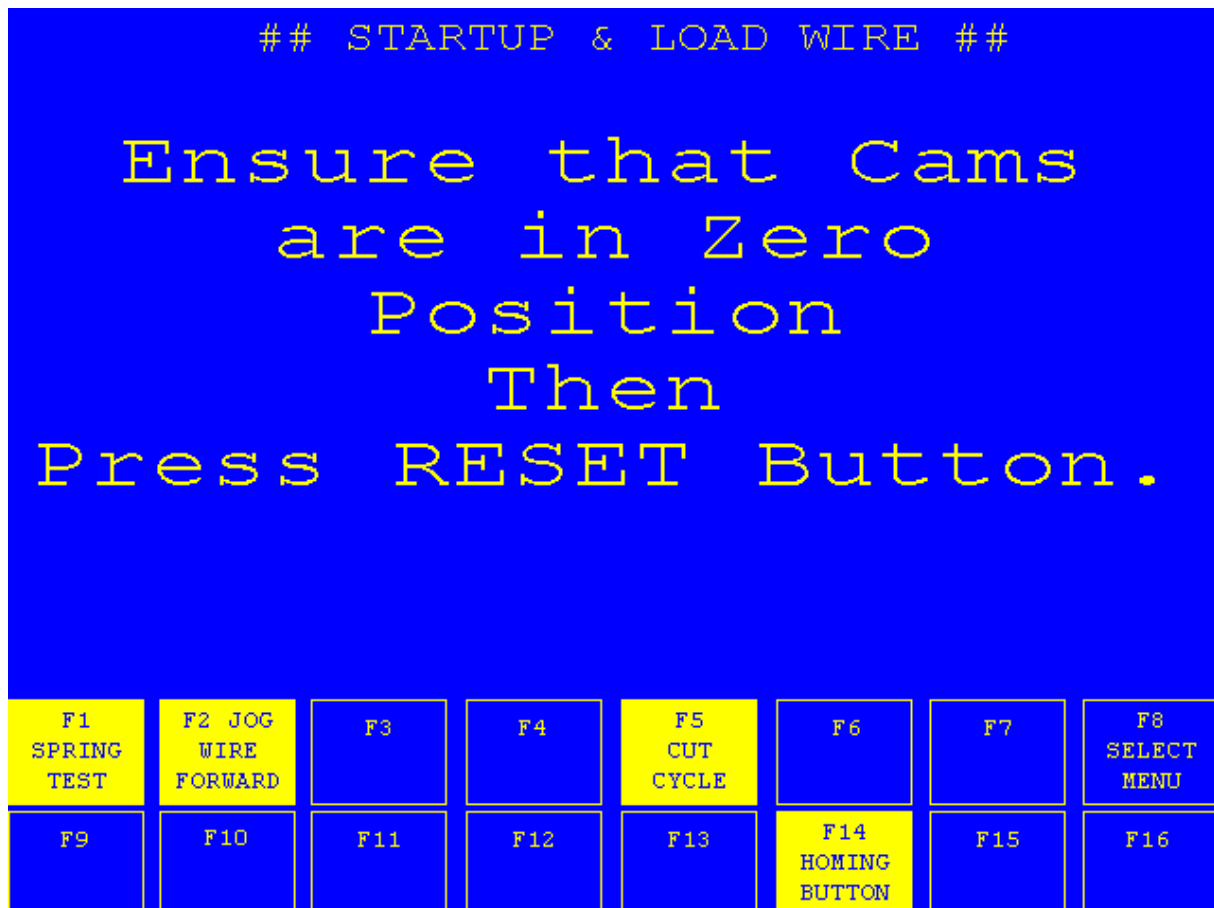
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1 START OF THE SYSTEM

1.1 Power up and prepare for production

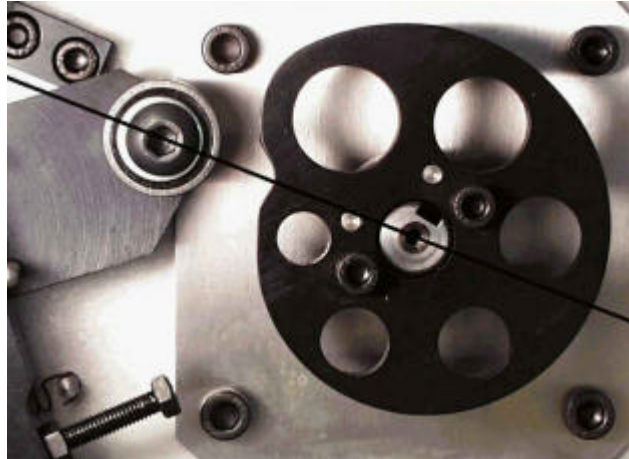
To change menu, press **F8 SELECT MENU** and use **?** or **?** to move cursor to desired menu, then press **?** enter password if required, followed by **?**. For further details see menu descriptions in section 3.

1.2 Startup menu



- 1) Turn on the main power switch on the side of the machine.
- 2) Press the blue **ENABLE** button on the panel and the air pressure will be activated.
- 3) Wait for the system to boot properly, showing a blue menu, possibly hidden behind some error messages.
- 4) Turn the key to the **SERV** position.
- 5) Open front doors.
- 6) Turn the pitch tool and coiling pin cams counter-clockwise to their respective zero-positions. Figure 1.

Figure 1. Notch in diameter cam centered to axle and roller. Pitch cam centered similar.



- 7) Reset any alarms by pressing **F16** (several times if necessary).
- 8) Change menu to **STARTUP & LOAD WIRE MENU**, if not present, and activate the motors by pressing the **F14 HOMING BUTTON**.
- 9) Remove the fixed position spring collector (PP1) to get access to coiling area.
- 10) Inspect the wire track and check if the wire is correctly positioned in the tools, by feeding a small amount of wire forward and look if a coil is formed. If not, select an appropriate wire speed (see section 3.2.2 for details) and feed 30–50 mm of wire forward with the **F2 JOG WIRE FORWARD** button, bend the wire and place it in the tracks in the coiling pins. Feed the wire slowly forward until the wire forms a full loop and cut it manually by pressing the **F5 CUT CYCLE** button.
- 11) Put the spring collector back in its fixed position.
- 12) Close the doors and turn the key to **AUTO** position.
- 13) Go to **MAIN MENU** and select desired production alternative as described in section 2.

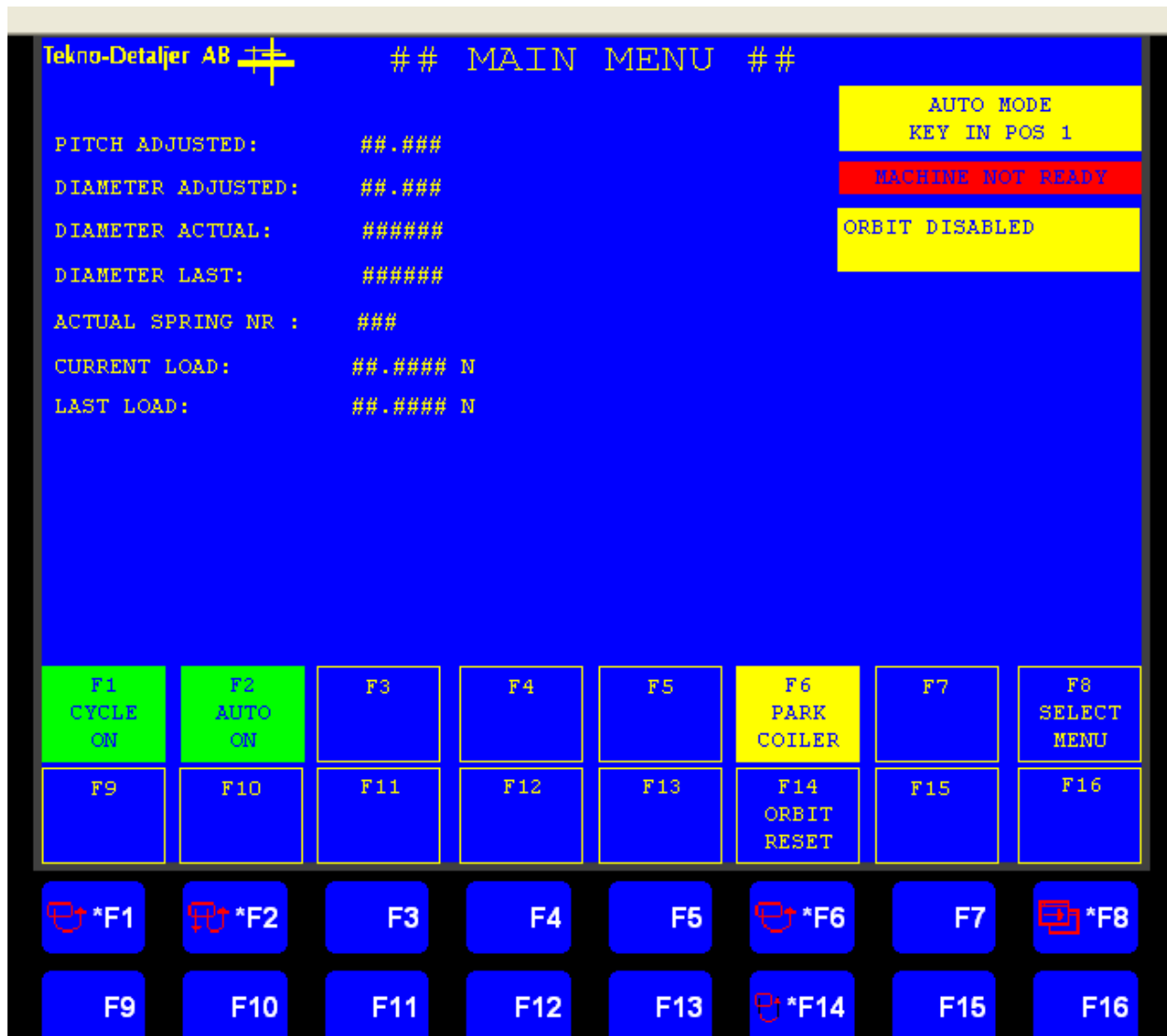
2 PRODUCTION ALTERNATIVES

The spring coiling machine can be run either from the control panel or, in AUTO mode, with an external start signal to the user interface connector that also provides a ready signal when a spring is in position to be delivered, and an error signal if anything is wrong in the coiling system.

To change menu, press F8 and use ? or ? to move cursor to desired menu, then press ? and enter password, followed by ? if required. For further details about the different menus see menu descriptions in section 3 of this manual.

2.1 Production in AUTO mode

- 1) Check that all doors are closed.
- 2) Turn the key to the **AUTO** position.
- 3) Change to menu **MAIN MENU**, if not already selected.



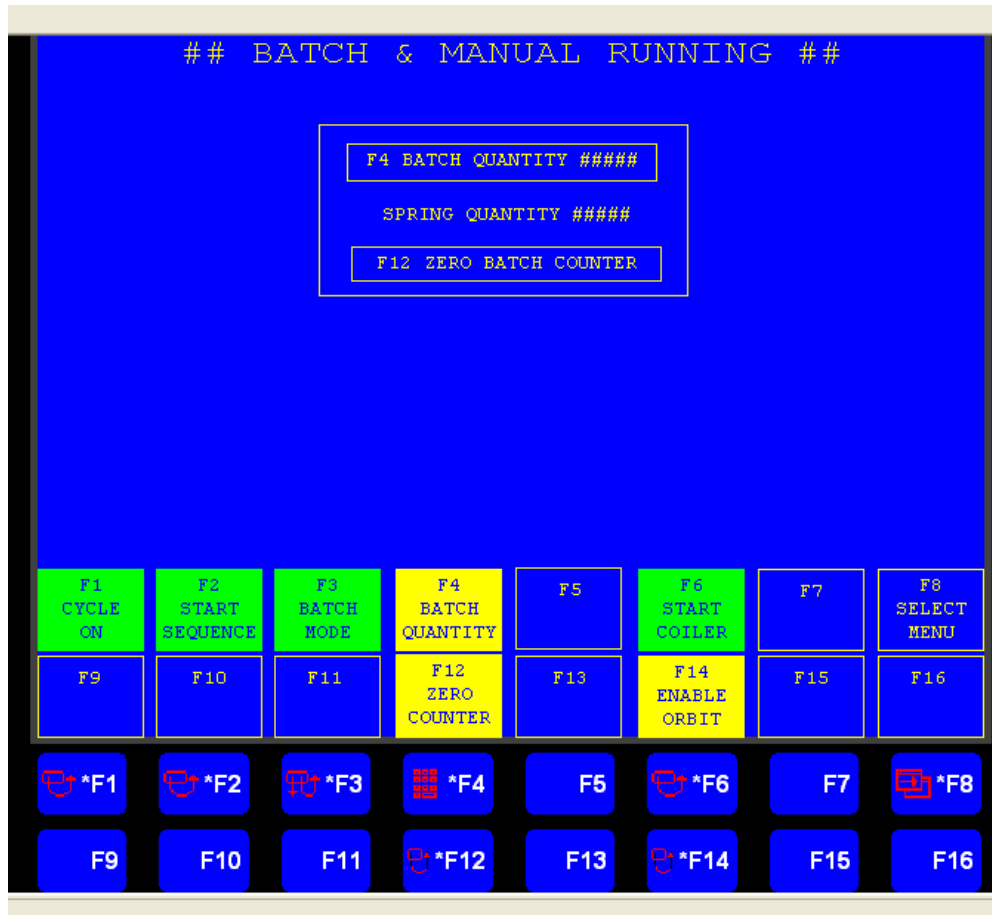
- 4) Press the button **F1 CYCLE ON**, **F1** turns green.
- 5) Check the button **F2**, if the text reads **AUTO**, press the button, **F2** turns green and the text **AUTO MODE** appears in the status indicator.
- 6) The text **MACHINE READY** appears in the status indicator.
- 7) There is a green light on top of the machine that indicates ready status.

The machine is now ready to receive external signals.

When a signal is received from the user interface, one spring is delivered and the coiler produces one spring. The next signal starts over again with one spring delivered and one produced etc.

2.2 Production in MANUAL mode, BATCH production

- 1) Turn the key to the **SERV** position.
- 2) Change to menu **BATCH MENU**, if not already selected.



- 3) Check the button **F14**, if the text reads **ENABLE ORBIT**, press the button, **F14** turns green.
- 4) Press the button **F1 CYCLE ON**, **F1** turns green.
- 5) Press the **F3** button to choose **BATCH** if **SINGLE MODE** is preset.
- 6) Press the **F4 BATCH QUANTITY** button and enter the total number of springs that are to be produced in each batch and press ? .
- 7) Press **F12 ZERO COUNTER** to reset the counter.
- 8) Press the button **F5 IPP2 POS** to select delivery tube for batch running.
- 9) Press the button **F2 START SEQUENCE**.

The machine produces the total number of springs entered.

ORBIT ENABLED: Orbit in working mode, set with F14.

ORBIT DISABLED: Orbit disabled with F14.

In this position it is possible to run coiler continuously with F6 START COILER.

CAUTION: No alarms or control functions are active when Orbit is disabled; do not leave coiler running and unattended for more than very short periods.

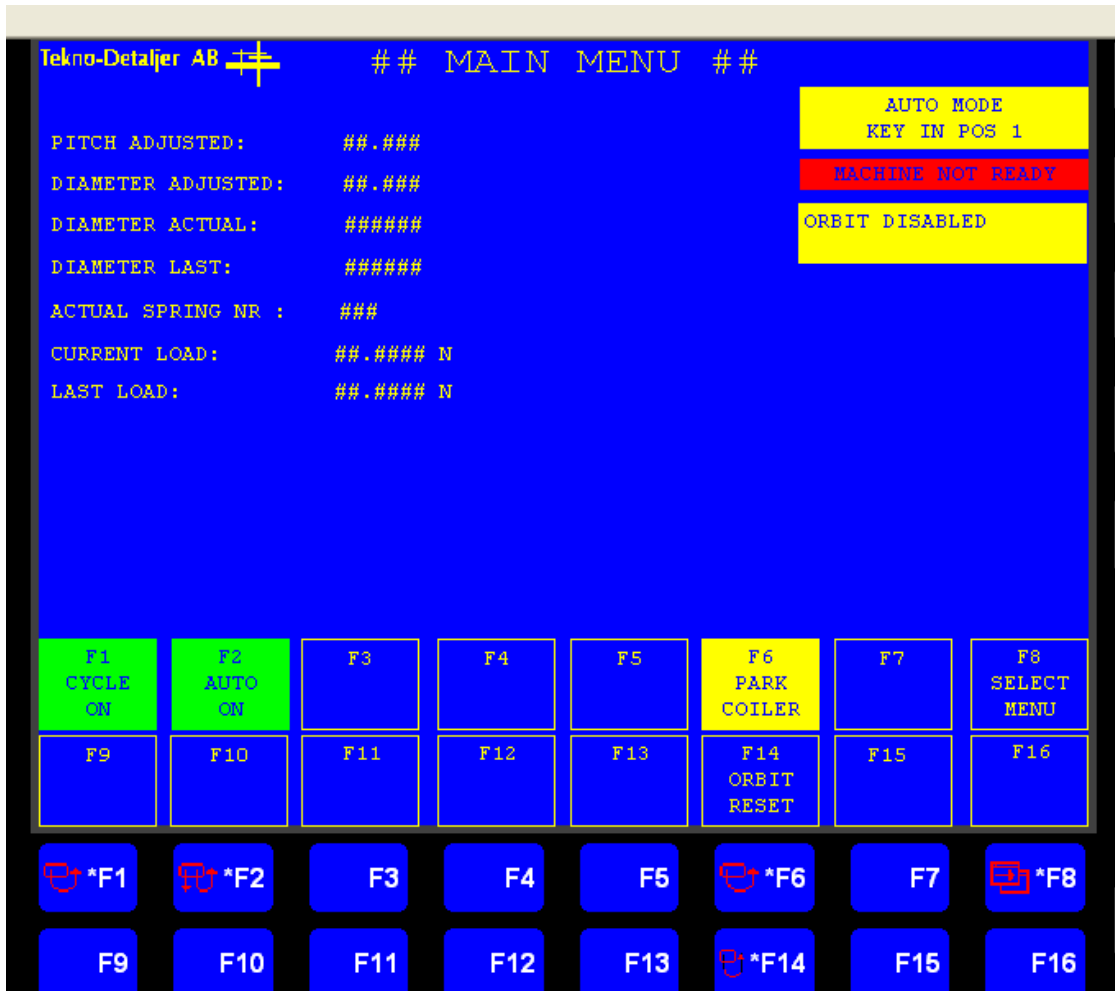
2.3 Parking the coiler

This operation is mainly used before shutting the main power off to ensure a safe position of the coiler tools.

- 1) In **MAIN MENU** the production can be interrupted by pressing the **F1** button. Ongoing spring production is stopped when the most recent spring is coiled, but not cut.
- 2) Now press **F6 PARK**; the servomotors return to their home positions.
- 3) The coiler pins move apart, the pitch tool goes down, a few millimeters of wire are fed forward and the power to the servo motors is disabled.
- 4) The text **COILER IS PARKED** is shown on the display.
- 5) To restart, press **F6 UNPARK**.
- 6) The power to the servo motors is enabled, the coiler pins move inwards, the pitch tool moves up and the wire is fed forward.
- 7) Turn key to **SERV** position and open the doors.
- 8) Remove the fixed position spring collector (PP1) to get access to coiling area.
- 9) Change menu to **STARTUP & LOAD WIRE MENU** and cut the wire by pressing **F5**. Check that the wire is correctly positioned in the tools, otherwise follow parts 9-11 in section 1.2
- 9) Put the spring collector back in its fixed position.
- 10) Select a production mode as described in sections 2.1 to 2.2.

3 MENU DESCRIPTIONS

3.1 Main menu



3.1.1 Load info

Load info

CURRENT VALUE: Actual load on load cell.

LAST VALUE: Latest load value sent to the control system.

3.1.2 Automatic length control information

PITCH ADJUSTED: Offset of pitch tool when coiling spring, adjusted by feedback from length control.

Reset can be made in **COILING MACHINE TEST** and **SPRING CONFIG** menus.

3.1.3 Spring receipt information

ACTUAL SPRING NR: Spring configuration selected in **SPRING CONFIG** menu.

3.1.4 Status indicators

AUTO MODE: Auto mode selected and machine is controlled from customer interface if **MACHINE READY** and **ORBIT ENABLED**.

MACHINE NOT READY: Cycle off or machines not ready if in **AUTO MODE**

MACHINE READY: Machine ready to deliver springs in **AUTO MODE**.

COILER IS PARKED: Servomotors moved to absolute zero position after pressing **F6 PARK COILER**.

COILER PARK DISABLED: servomotors moved to working position with **F6 DISABLE PARK**.

KEY IN POS 1: Key in **SERV** position, machine not able to run in **AUTO MODE**.

CAUTION: No alarms or control functions are active when orbit is disabled; do not leave coiler running and unattended for more than very short periods.

3.1.5 OK

Press cycle on/off to continue : Appears after stops caused by alarms.

3.1.6 Function buttons in main menu

F1: **ON** prepares for spring delivery, **OFF** stops machine at end of cycle.

F2: Toggles man/auto mode.

F3: Set allowed rejects percentage for totally made springs.

F4: Set allowed rejects percentage for the last 100 made springs.

F6: Parks / unparks coiler (See 2.3).

F8: Menu select.

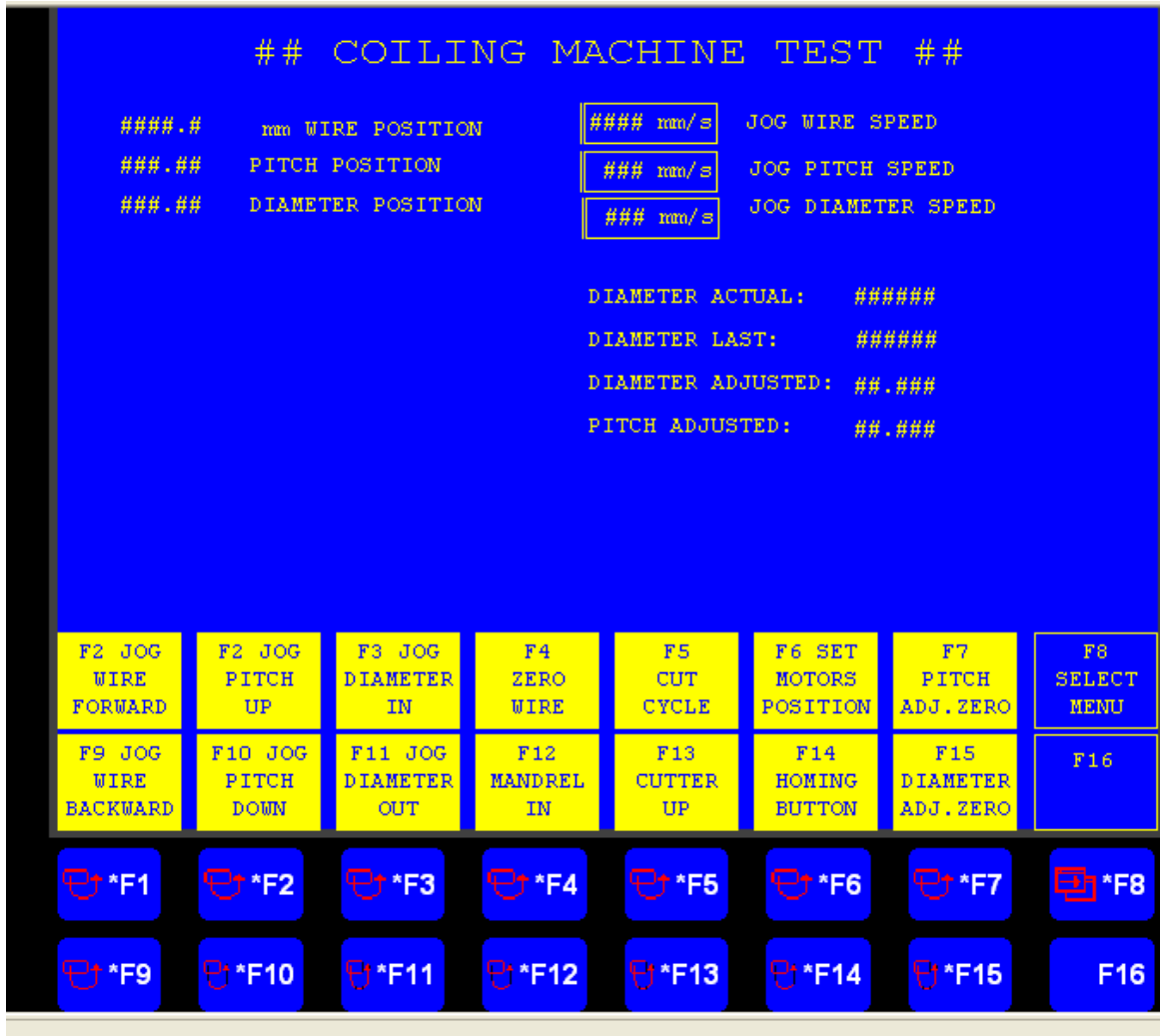
F10: Reset counters.

F11: Reset actual total reject %.

F12: Resets actual last 100 reject %.

F14: If pressed before **F1 CYCLE ON**, resets Orbit and stops when ready to deliver a spring in good spring eject.

3.2 Coiler test



Accessing this menu puts machine in **CYCLE OFF** mode.

3.2.1 Manual coiling positions

WIRE POSITION: Moved with **F1 JOG WIRE FORWARD** and **F9 JOG WIRE BACKWARD**, zero counter with **F4 ZERO WIRE**. Can be used to determine the length of wire needed to get a certain number of coils at a certain diameter.

PITCH POSITION: Actual position of pitch tool, adjusted with **F2 JOG PITCH UP** and **F10 JOG PITCH DOWN**. Position only valid in this menu but can be used to determine the appropriate start/lower position for the pitch tool related to the coil, to be used in **SPRING CONFIG** menu.

DIAMETER POSITION: Actual position of coiler pins, adjusted with **F3 JOG DIAMETER IN** and **F11 JOG DIAMETER OUT**. Position only valid in this menu but can be used to get an approximate value for the desired coil diameter, to be used in **SPRING CONFIG** menu.

3.2.2 Manual coiling speeds

JOG WIRE SPEED: Speed when using **F1 JOG WIRE FORWARD** or **F9 JOG WIRE BACKWARD** for manual wire feed. A speed of 50-200 mm/s is recommended to retread or change the wire. Higher speeds, up to 3000 mm/s are used to check the quality of the coil when the wire is properly positioned in the coiling tools.

JOG PITCH SPEED: Speed of pitch tool movement when using **F2 JOG PITCH UP** or **F10 JOG PITCH DOWN** for manual pitch adjustment.

JOG DIAMETER SPEED: Speed of coiler pins movement when using **F3 JOG DIAMETER IN** or **F11 JOG DIAMETER OUT** for manual diameter adjustment.

To change speeds above, move cursor with **?** or **?** arrow, press **?** Enter new value and press **?** again.?

CAUTION! Be careful with manual wire feed at higher speeds and open doors.

3.2.3 Function buttons in coiler test

F1/F9: Manual wire feed.

F2/F10: Manual pitch tool adjustment.

F3/F11: Manual coiling pins adjustment.

F4: Zero wire position value.

F5: Make a complete cut cycle.

F6: Set motors position, used to set motors for pitch and diameter to zero position when cams are to be mounted or checked. Pressing once moves motor to zero position and once more to run position.

F7: Zeros automatically adjusted pitch.

NOTE: When pressing F7 spring may be out of range, regarding the free length.

Spring should be adjusted so that the pitch adjust is close to zero when correct springs are produced

F8: Select menu.

F12: Toggle mandrel in/out.

F13: Toggle cutter up/down.

F14: Homing button, used to activate motors after emergency stop or when main power is switched on.

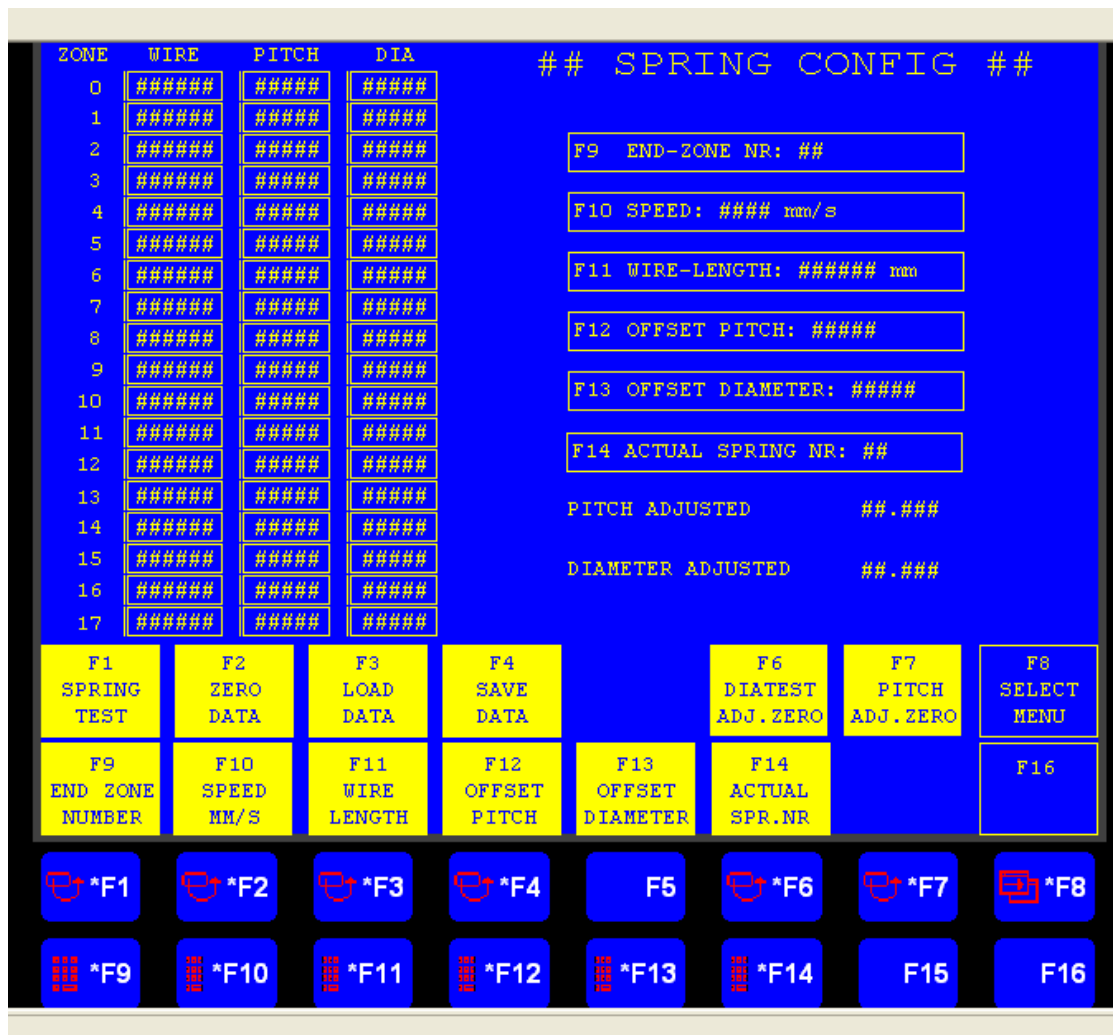
F15: Zeros automatically adjusted diameter.

NOTE: When pressing F15 spring may be out of range, regarding the outer diameter.

Spring should be adjusted so that the diameter adjust is close to zero when correct springs are produced

F16: Resets alarms if present.

3.3 Spring config



SPRING CONFIG

ZONE	WIRE	PITCH	DIA
0	#####	#####	#####
1	#####	#####	#####
2	#####	#####	#####
3	#####	#####	#####
4	#####	#####	#####
5	#####	#####	#####
6	#####	#####	#####
7	#####	#####	#####
8	#####	#####	#####
9	#####	#####	#####
10	#####	#####	#####
11	#####	#####	#####
12	#####	#####	#####
13	#####	#####	#####
14	#####	#####	#####
15	#####	#####	#####
16	#####	#####	#####
17	#####	#####	#####

F9 END-ZONE NR: ##

F10 SPEED: #### mm/s

F11 WIRE-LENGTH: ##### mm

F12 OFFSET PITCH: #####

F13 OFFSET DIAMETER: #####

F14 ACTUAL SPRING NR: ##

PITCH ADJUSTED ##.###

DIAMETER ADJUSTED ##.###

F1 SPRING TEST	F2 ZERO DATA	F3 LOAD DATA	F4 SAVE DATA	F6 DIATEST ADJ. ZERO	F7 PITCH ADJ. ZERO	F8 SELECT MENU
F9 END ZONE NUMBER	F10 SPEED MM/S	F11 WIRE LENGTH	F12 OFFSET PITCH	F13 OFFSET DIAMETER	F14 ACTUAL SPR.NR	F16

*F1 *F2 *F3 *F4 F5 *F6 *F7 *F8

*F9 *F10 *F11 *F12 *F13 *F14 F15 F16

3.3.1 Spring parameter table

ZONE: Sections of the spring between which changes of parameters are done.

WIRE: Absolute position on wire.

PITCH: Relative position of pitch tool.

DIA: Relative position of coiler pins.

To change settings above, move cursor with \leftarrow or \rightarrow arrow, press \rightarrow enter new value, and press \rightarrow again.

3.3.2 Automatic offset information

PITCH ADJUSTED: Offset position of pitch tool when coiling spring, adjusted by feedback from length control. Reset with **F7 PITCH ADJ. ZERO**.

DIAMETER ADJUSTED: Offset position of winding pins when coiling spring, adjusted by feedback from diatest. Reset with **F6 DIATEST ADJ. ZERO**.

3.3.3 Function buttons in spring config menu

F1: Makes a test spring with actual parameters. Status indicator, described in section 3.1.4, in **MAIN MENU** must be “**OK**” and key in **SERV** position.

F2: Deletes all values in zone table. If pressed by mistake, press **F3 LOAD DATA** to restore data from memory.

F3: Loads parameters from memory for actual spring nr. Make sure that the right spring is selected with **F14 ACTUAL SPRING**.

F4: Saves present parameters to memory for actual spring nr. Make sure that the right spring is selected with **F14 ACTUAL SPRING**.

Must be pressed before any springs with new parameters can be produced outside this menu.

F6: Resets automatic diatest adjustment value.

F7: Resets automatic pitch adjustment value.

F8: Select menu

F9: End zone in zone table. Must be the same as the last zone containing data in zone table.

F10: Wire speed for actual spring.

F11: Wire length for actual spring. Must be the same as wire value in the last zone containing data in zone table.

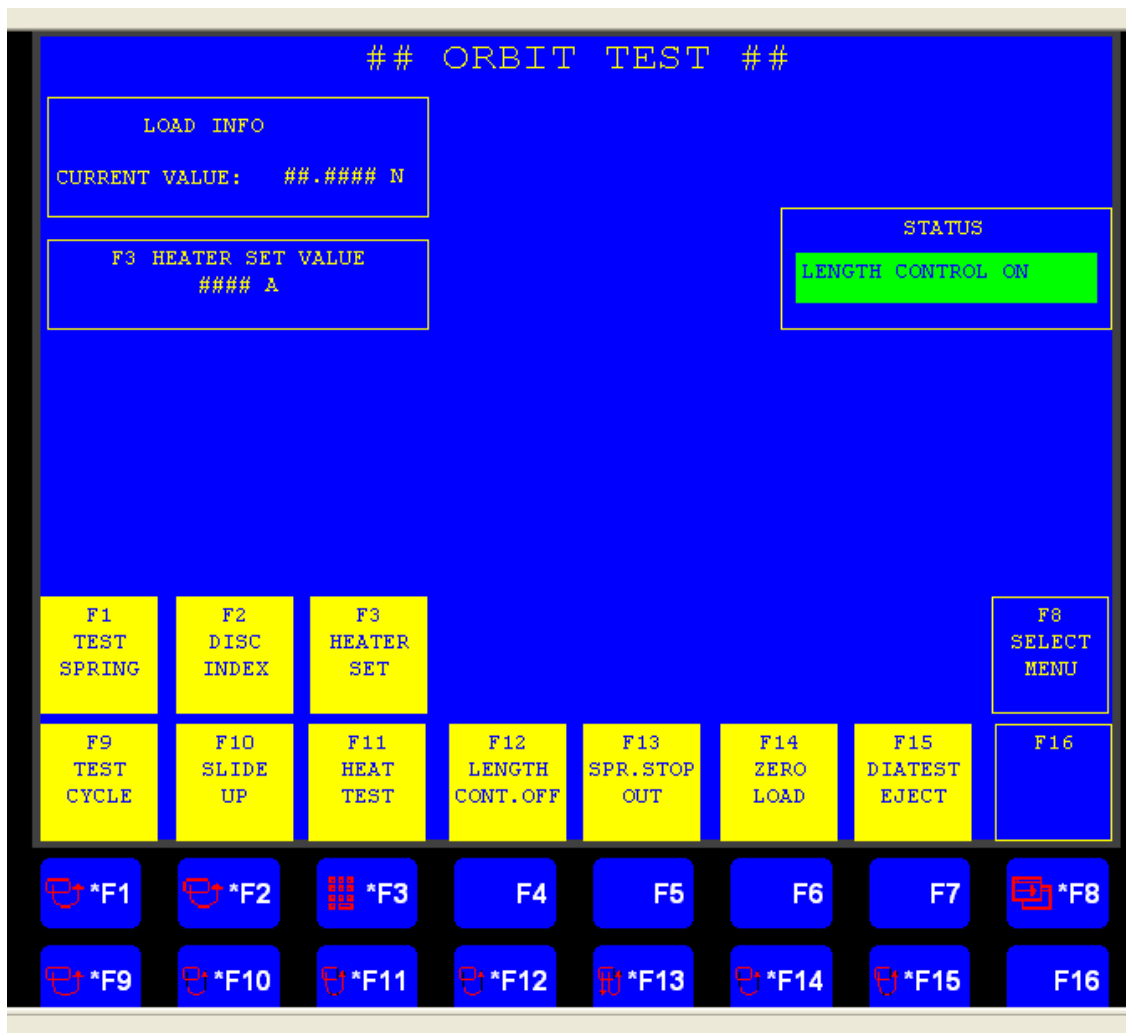
F12: Manually entered offset position of the pitch tool. Normally not used for permanent adjustment of spring length.

F13: Manually entered offset position of the coiler pins. Normally not used for permanent adjustment of diameter.

F14: Select spring receipt. **F3 LOAD DATA** is then used to load parameters for selected spring from memory.

F16: Resets alarms if present.

3.4 Orbit test



Accessing this menu puts machine in cycle off mode.
Key must be in SERV position to enable use of some functions.

NOTE: After having returned to the menu **MAIN MENU** from **ORBIT TEST** and pressing the button **F1 CYCLE ON**, ORBIT resets itself by emptying all of the revolver test sockets of springs through the outlet for faulty springs. The revolver is then filled until two approved springs are in the delivery position.

3.4.1 Heater info

HEATER

F3: Sets current for the heater.

3.4.2 Load info

LOAD

CURRENT VALUE: Actual load on load cell.

3.4.3 Status indicators

3.4.4 Function buttons in Orbit test menu

F1: Makes one test spring.

F2: Moves Orbit nest one position.

F3: Sets current for the heater.

F4:

F5:

F6:

F8: Select menu.

F9:

F10: Slides Orbit head up/down.

F11: Heats spring in nest, if Orbit head is down.

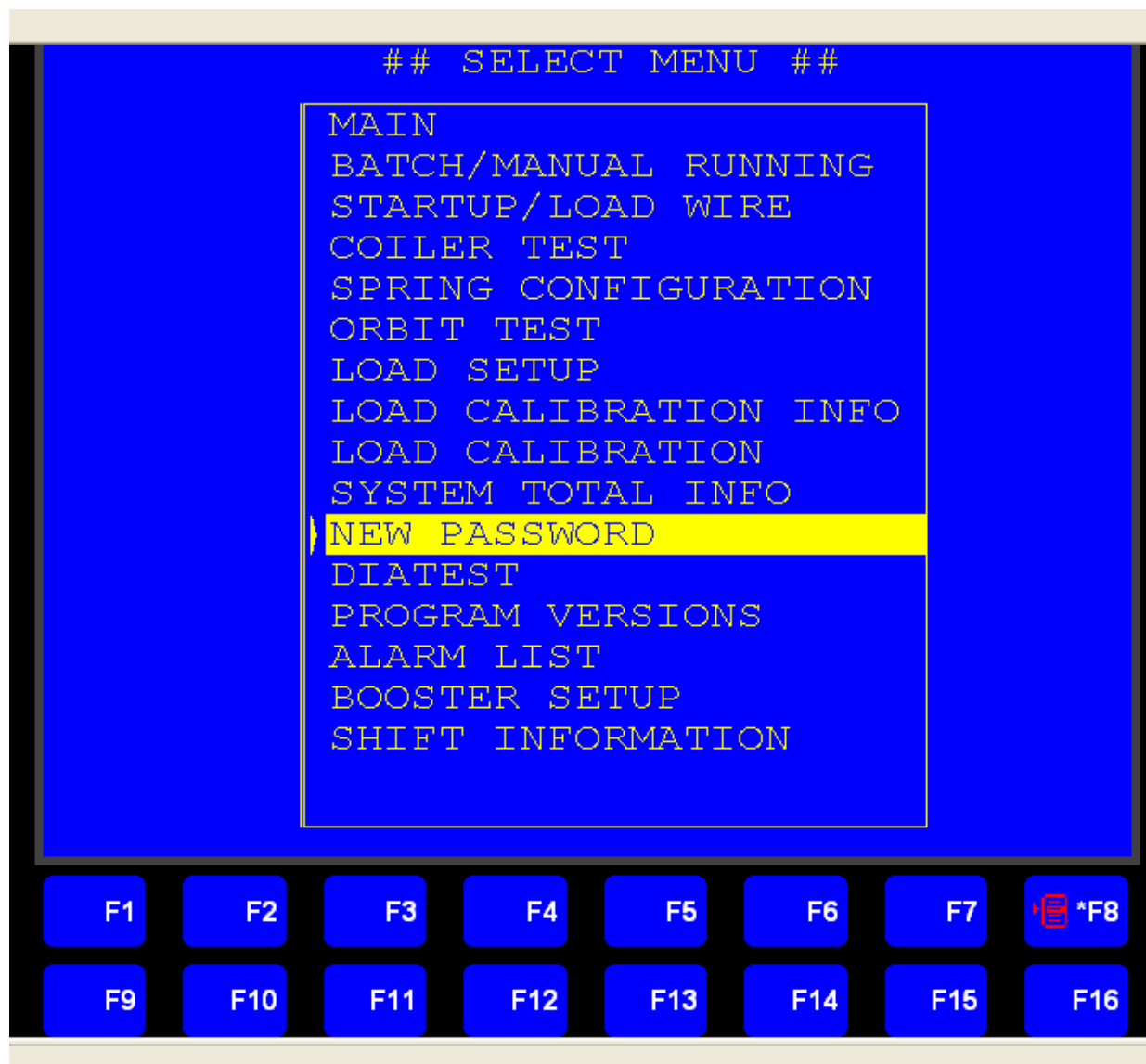
F13: Opens diatest for spring eject.

F14: Resets load value.

F15: Eject spring in diatest.

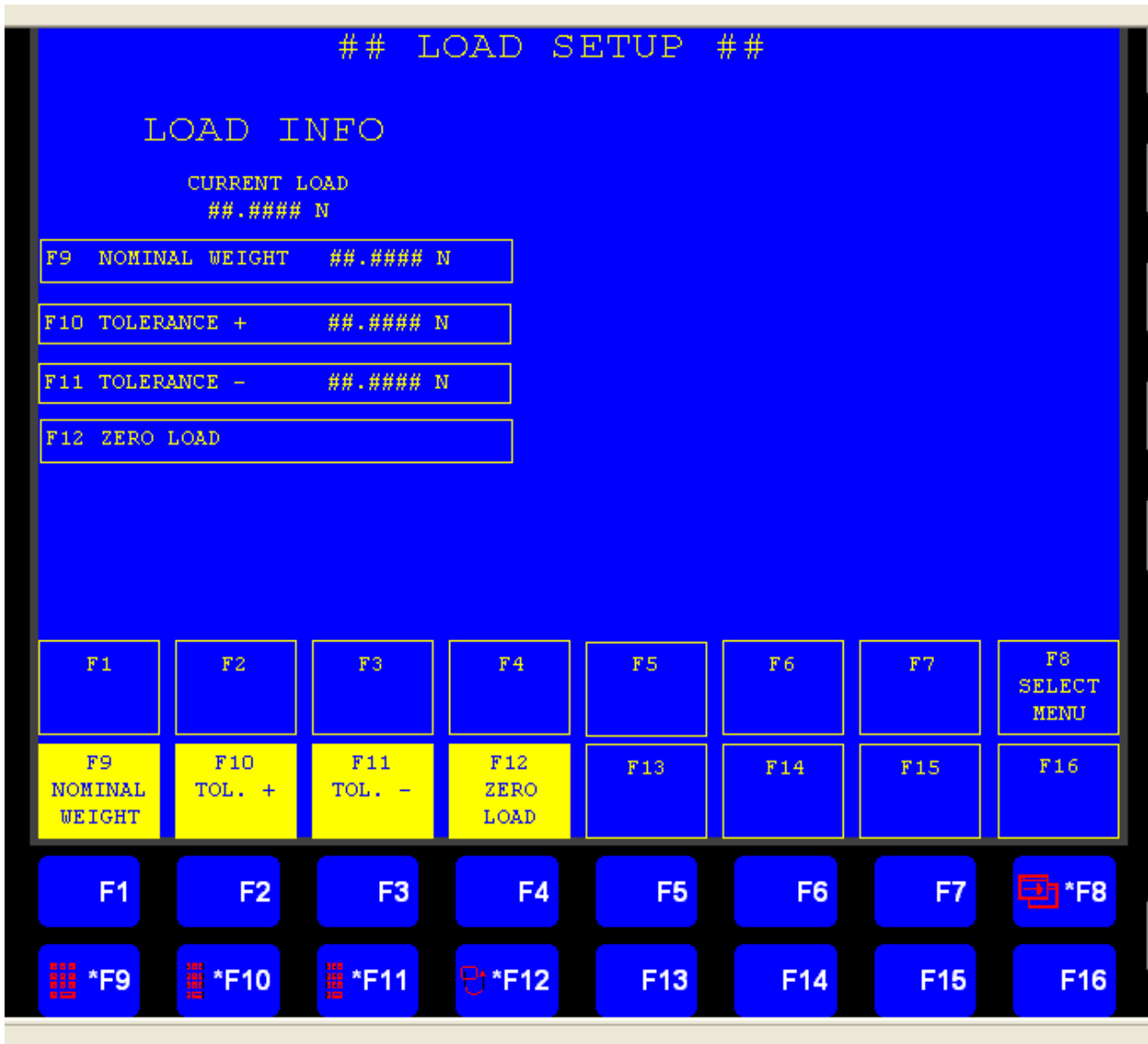
F16: Resets alarms if present.

3.5 Select Menu



Move cursor to desired menu and press ?, enter password if required, see section 3.11.2, followed by ? .

3.6 Load setup



3.6.1 Load info

CURRENT LOAD: Actual load on load cell.

F9 NOMINAL WEIGHT: Desired spring force for spring.

F10 TOLERANCE +: Maximum force tolerance for spring, force outside this value rejects measured spring.

F11 TOLERANCE -: Minimum force tolerance for spring, force outside this value rejects measured spring.

F12 ZERO LOAD: Tares load cell, if pressed with a spring in position over load cell.

3.6.2 Function buttons in Load setup menu

F8: Select menu

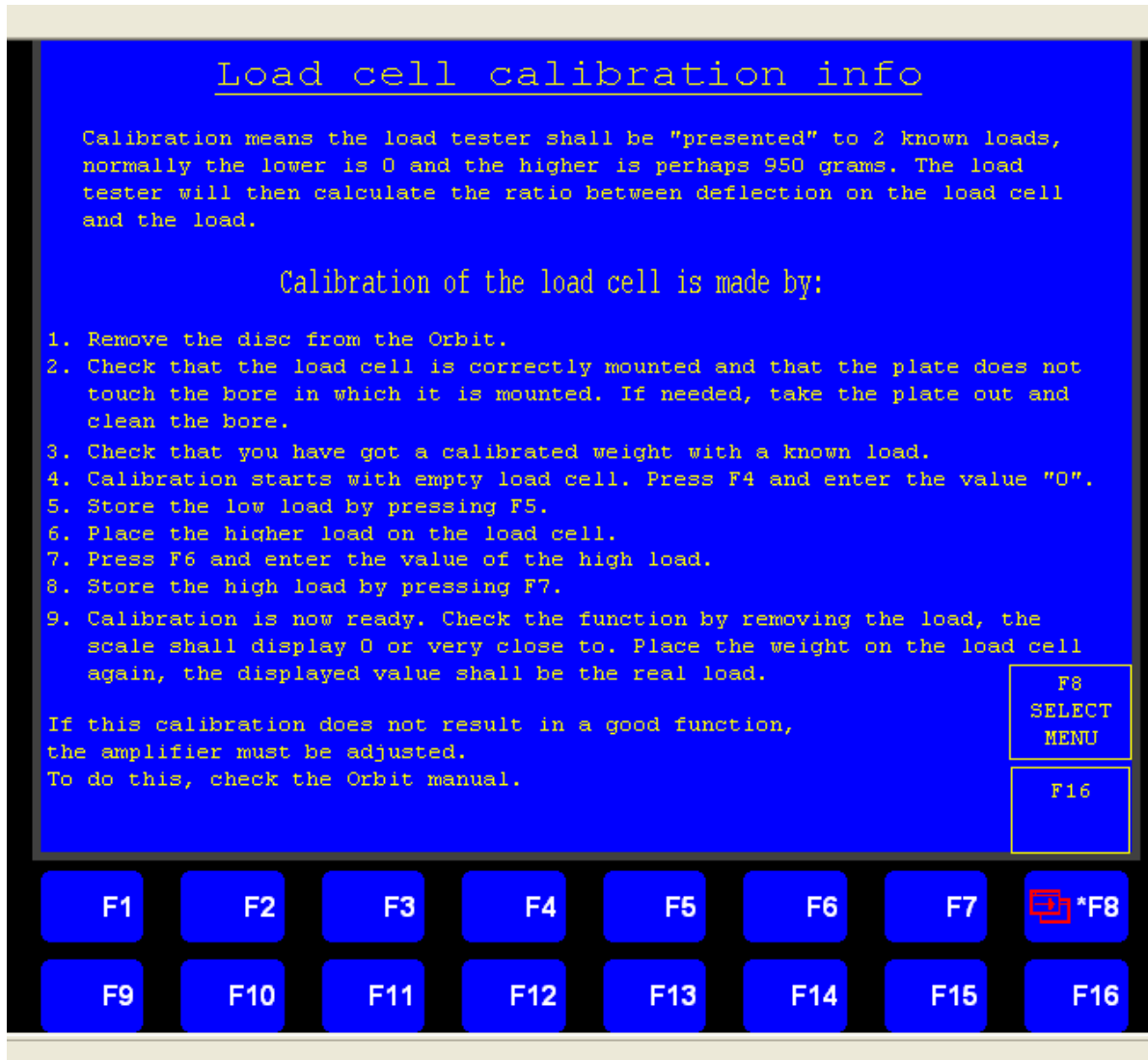
F9: Load nominal weight

F10: Load + tolerance

F11: Load – tolerance

F12: Tare or zero load

3.7 Load calibration info



Load cell calibration info

Calibration means the load tester shall be "presented" to 2 known loads, normally the lower is 0 and the higher is perhaps 950 grams. The load tester will then calculate the ratio between deflection on the load cell and the load.

Calibration of the load cell is made by:

1. Remove the disc from the Orbit.
2. Check that the load cell is correctly mounted and that the plate does not touch the bore in which it is mounted. If needed, take the plate out and clean the bore.
3. Check that you have got a calibrated weight with a known load.
4. Calibration starts with empty load cell. Press F4 and enter the value "0".
5. Store the low load by pressing F5.
6. Place the higher load on the load cell.
7. Press F6 and enter the value of the high load.
8. Store the high load by pressing F7.
9. Calibration is now ready. Check the function by removing the load, the scale shall display 0 or very close to. Place the weight on the load cell again, the displayed value shall be the real load.

If this calibration does not result in a good function, the amplifier must be adjusted. To do this, check the Orbit manual.

F8
SELECT
MENU

F16

F1

F2

F3

F4

F5

F6

F7

*F8

F9

F10

F11

F12

F13

F14

F15

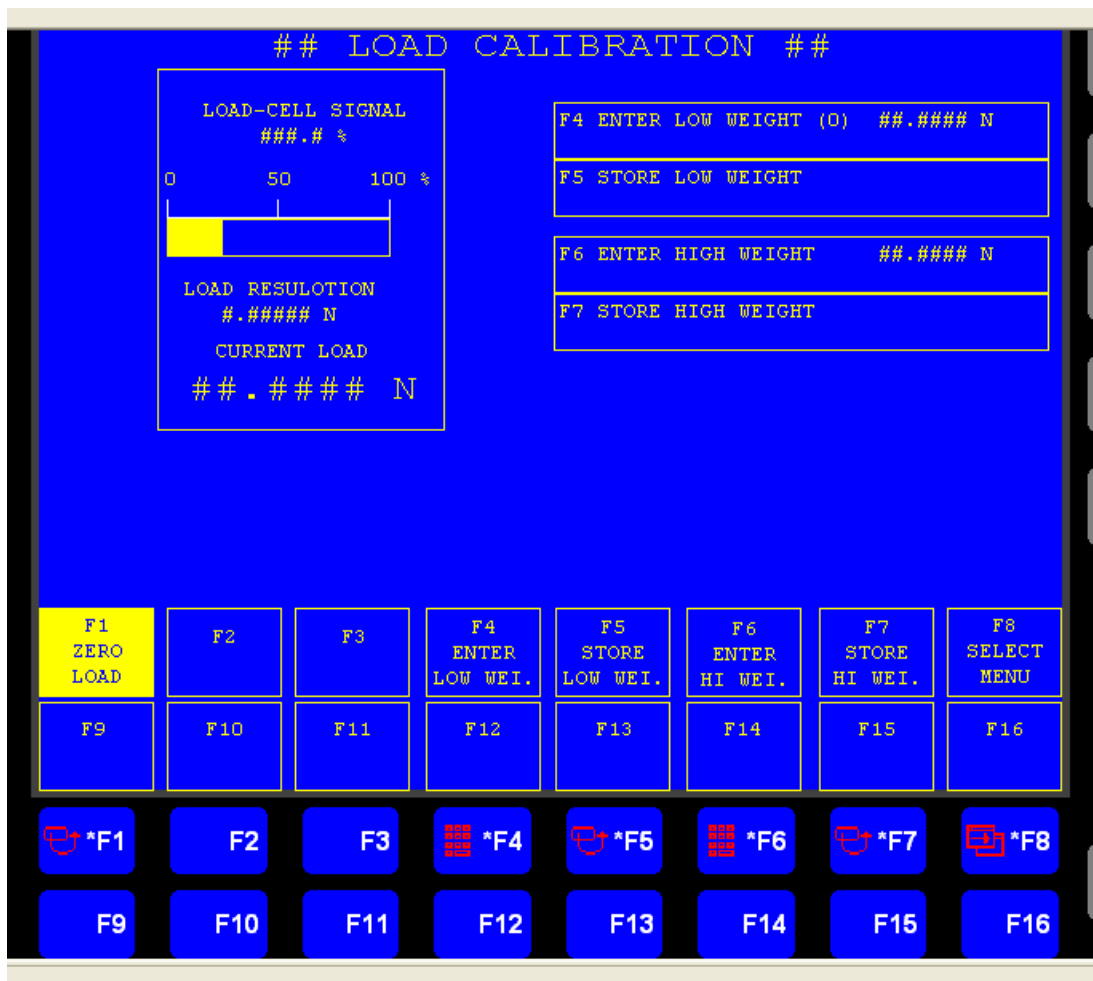
F16

This procedure is also described in section 7 of the user manual for Colombi Orbit.

3.7.1 Function buttons in Load calibration info menu

F8: Select menu.

3.8 Load calibration



Go to **LOAD CALIBRATION INFO** menu or section 7 of the user manual for Colombi Orbit for a detailed description of the calibration procedure.

3.8.1 Load cell

LOAD-CELL SIGNAL: Actual signal from load cell in % of span, set to ~10% without load. Refer to Colombi Orbit manual, section 7.2.1 for adjustment.

LOAD RESOLUTION: Max. resolution with actual setup and calibration of load cell.

CURRENT LOAD: Actual load on load cell.

F4 ENTER LOW WEIGHT (0): Normally set to zero.

F5 STORE LOW WEIGHT: Press **F5** without any weight on loadcell to store zero point.

F6 ENTER HIGH WEIGHT: Check that this corresponds to the calibration weight you intend to use on load cell 1 (approx 250 grams), if not, press **F6** and enter correct value.

F7 STORE HIGH WEIGHT: Press **F7** with calibration weight on load cell to store high weight.

3.8.2 Function buttons in Load calibration menu

F1: Zero load.

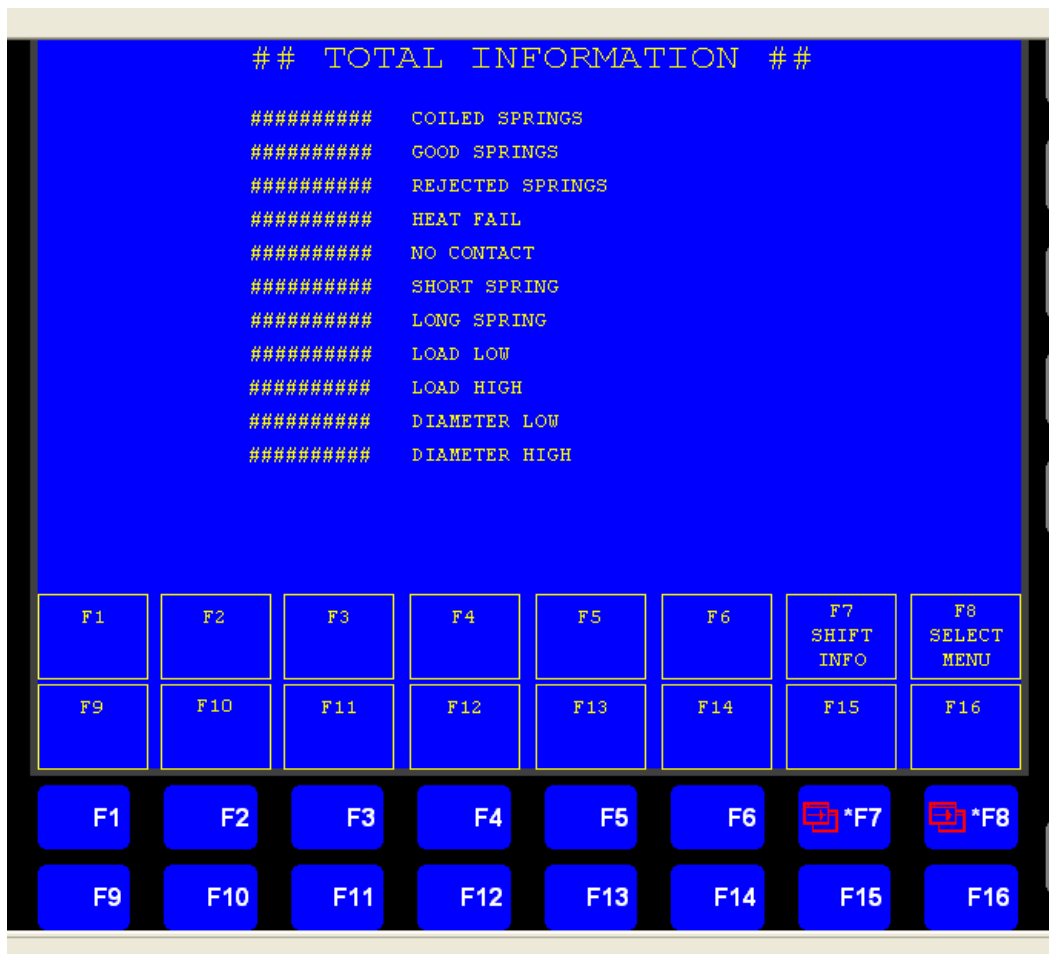
F4: Press without any weight on load cell.

F5: Value of weight used for calibration of load cell.

F6: Press with calibration weight on load cell.

F8: Select menu.

3.9 System total info



Information in this menu can only be reset with external computer and appropriate software.

3.9.1 Total counter

TOTAL COILED SPRINGS: Total coiled springs since latest reset.

TOTAL GOOD SPRINGS: Good springs produced since latest reset.

TOTAL REJECTED SPRINGS: Springs rejected since latest reset.

TOTAL LOAD LOW: Springs with load below tolerance since latest reset, set in **LOAD SETUP** menu.

TOTAL LOAD HIGH: Springs with load above tolerance since latest reset, set in **LOAD SETUP** menu.

HEAT FAIL: Not heated springs since latest reset.

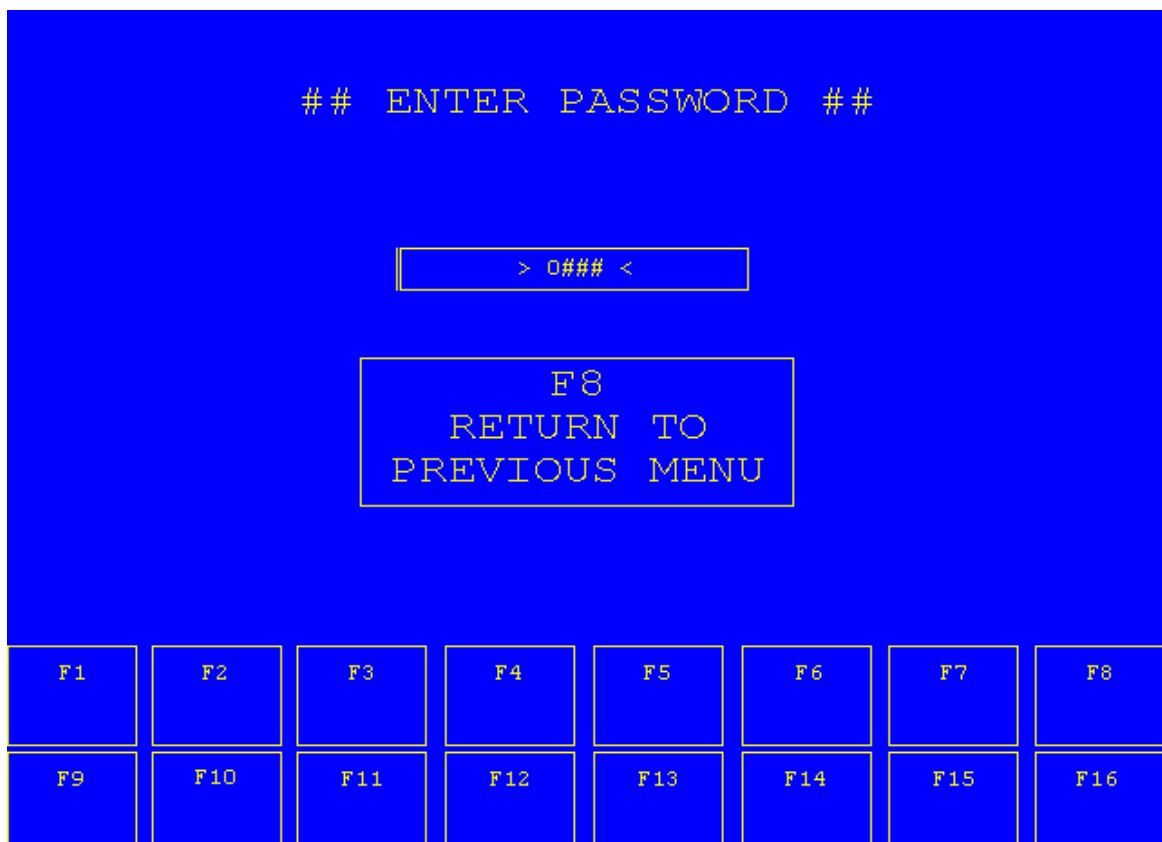
NO CONTACT: Springs to short to reach heater electrode since latest reset

3.9.2 Function buttons in System total information menu

F8: Select menu.

F16: Reset alarms if present.

3.10 Password



3.10.1 Enter password

When you choose a menu that requires a password, the menu **ENTER PASSWORD** is shown. Enter the default password or your own, then press ??

3.10.2 Menus that require password

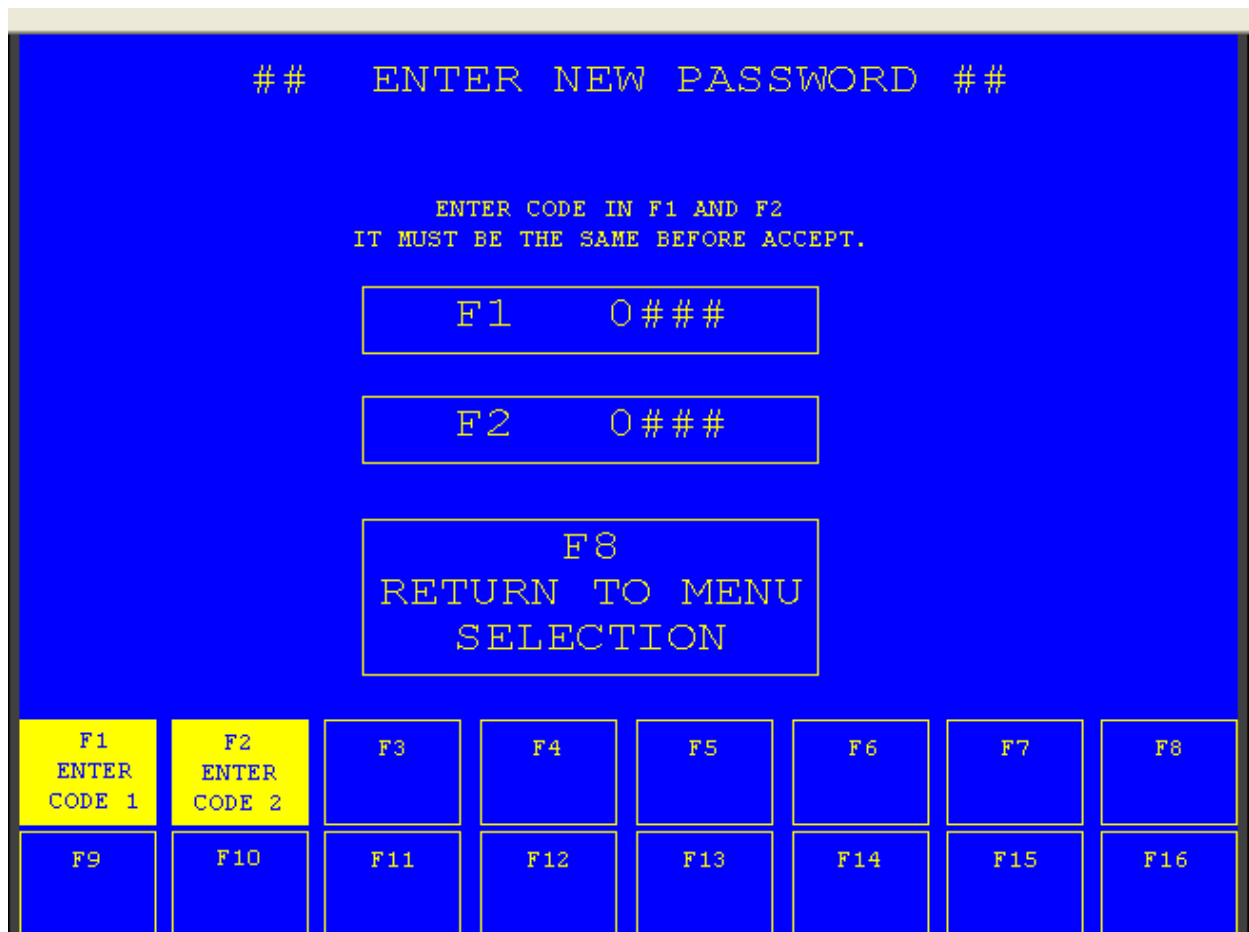
SPRING CONFIGURATION
ORBIT TEST
LOAD SETUP
LOAD CALIBRATION
SHIFT INFORMATION
NEW PASSWORD

3.10.3 Function buttons in Password menu

F8: Return to previous menu.

F16: Reset alarms if present.

3.11 New password



3.11.1 Set new password

Press **F1**, enter new password, one to four digits, press ?

Press **F2**, repeat new password, press ?

3.11.2 Function buttons in New password menu

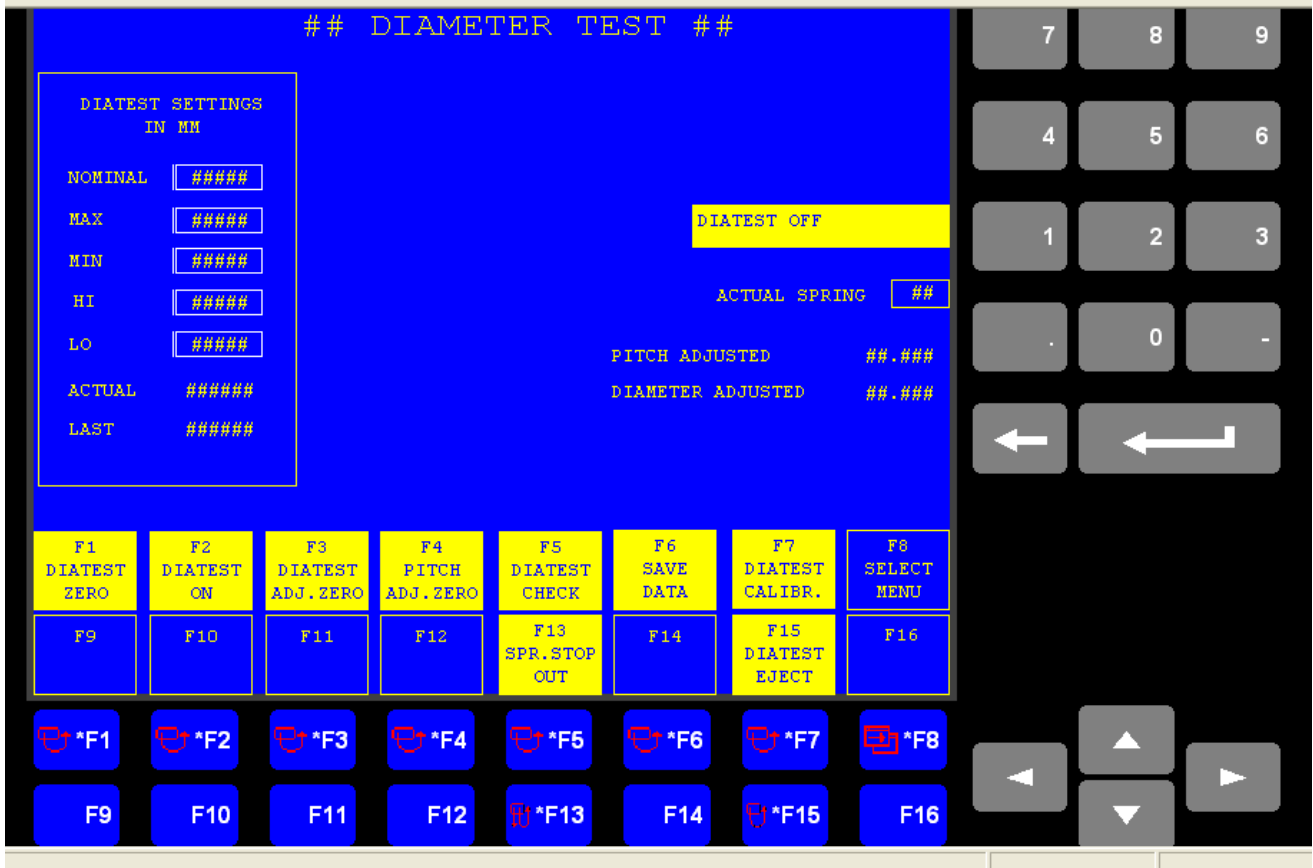
F1: First input of new password.

F2: Second input of new password.

F8: Return to previous menu.

F16: Reset alarms if present

3.12 Diatest menu



3.12.1 Diatest settings in mm

NOMINAL: Preferred diameter from diameter test. This value can differ slightly from the final diameter of the spring.

MAX: Maximum deviation from nominal value for actual spring.

MIN: Minimum deviation from nominal value for actual spring.

HI: Accepted max deviation from nominal value before automatic adjustment is done.

LO: Accepted max deviation from nominal value before automatic adjustment is done. To change settings for values above, move cursor with \leftarrow or \rightarrow arrows, press \rightarrow to enter new value, and press \rightarrow again.

ACTUAL: Actual reading from diameter test.

LAST: Latest value sent to the control system for automatic diameter adjustment.

3.12.2 Diatest status indicator

DIATEST OFF: Diameter test disabled with **F2**.

DIATEST ON: Diameter test enabled with **F2**.

3.12.3 Automatic offset information

ACTUAL SPRING: Spring configuration selected in **SPRING CONFIG** menu.

PITCH ADJUSTED: Offset position of pitch tool when coiling spring, adjusted by feedback from length control. Reset with **F4 PITCH 1 ADJ. ZERO**.

DIAMETER ADJUSTED: Offset position of coiler pins adjusted by feedback from diameter test. Reset with **F3 DIATEST ADJ. ZERO**.

3.12.4 Function buttons in Diatest menu

F1: Diatest zero. Sets actual position of diameter test to zero.

F2: Diatest on/off (choice)

F3: Diatest adjust zero

F4: Pitch adjust zero

F5: Diatest check /up. Moves diameter test down/up.

F6: Save data (save diatest settings).

F7: Diatest calibration. Remove spring from diameter test and then press button for calibration.

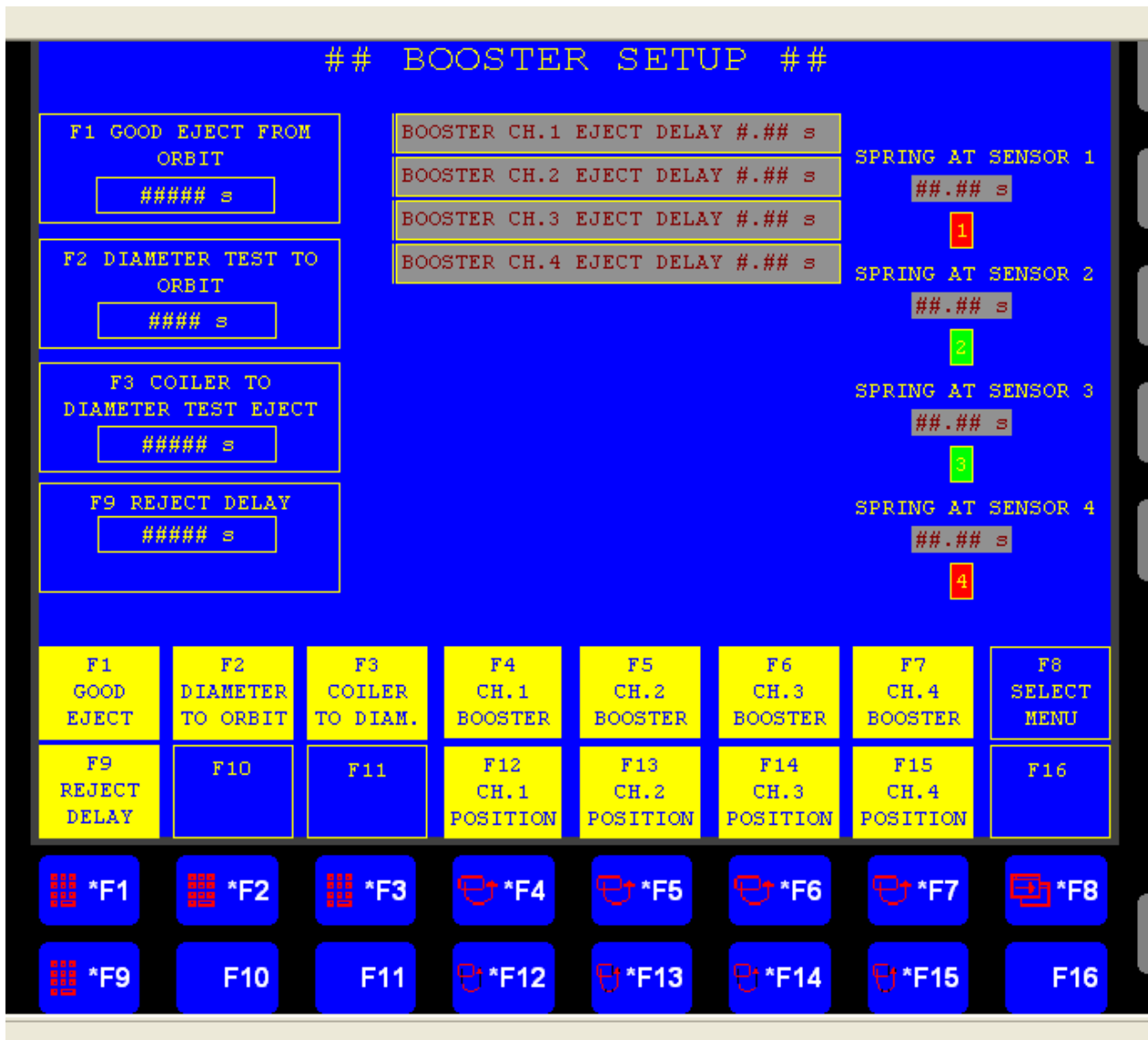
F8: Select menu

F13: Opens diatest for eject

F15: Ejects spring from diatest.

F16: Reset alarms if present.

3.13 Booster setup menu



The basic principal of the timers, F1 and F12, are that the time set is the time that will run from a tube sensor signal until the sequence is ready.

All delivery boosters and pulse timers can be modified in this menu.
See Delivery setup documents for factory settings.

3.13.1 Function buttons in Setup menu

- F1: Good Eject time from Orbit.
- F2: Eject time from Diatest to Orbit.
- F3: Eject time from Coiler to Diatest.
- F4: Eject time from Ch I to Line.
- F5: Eject time from Ch 2 to Line.
- F6: Eject time from Ch 3 to Line.
- F7: Eject time from Ch 4 to Line.
- F8: Select menu.

F9: Eject time bad spring out.

F12 Positions IPP4 to ch 1.

F13 Positions IPP4 to ch 2.

F14 Positions IPP4 to ch 3.

F15 Positions IPP4 to ch 4.