

SERVO-TOP

QE5542

CE

Type

Q360SE

Instruction Manual

Part 2

QUICK-ROTAN Elektromotoren GmbH
Königstraße 154
67655 Kaiserslautern
Tel: 0631 / 200 38 80
Fax: 0631 / 200 38 62
E-Mail: tech.supp@quick-rotan.com
www.quick-rotan.com

Contents Part 2

Chap.	contents	page
7.	Construction and description of the SERVO-TOP drive system	7.1 - 7.6
7.1	Motor QE 5542	
7.2	Control system - control box	
7.3	Speed control unit (command unit)	
7.4	Synchronizer (position control unit)	
7.5	ON/OFF switch (power connection unit)	
7.6	External operator panel OC-TOP	
8.	Error messages (malfunction diagnostics)	8.1
9.	Programming by the user	9.1 - 9.7
9.1	User programming with operator panel OC-TOP/DQ	
9.1.1	Direct programming	
9.1.2	Parameter programming	
9.1.2.1	Programming level A (operator level)	
9.1.2.2	Programming level B (technician level)	
9.1.2.3	Programming level C (special level)	
9.1.3	Reset	
10.	Start of operation	10.1 - 10.6
10.1	Start of the operation with the external operator's control panel OC-TOP	
10.1.1	Procedure for checking the direction of rotation and for the correct adjustment of the needle bar	
10.1.2	Control of the needle positions (NP1 / NP2)	
10.1.3	Procedure for checking maximum speed	
10.2	Hardware test	

Technical updatings reserved!

7. Construction and Description of the SERVO-TOP Drive System

The SERVO-TOP Drive System is an electronically commutated DC motor.

The system is composed of the following subassemblies (see Fig. 7.1)

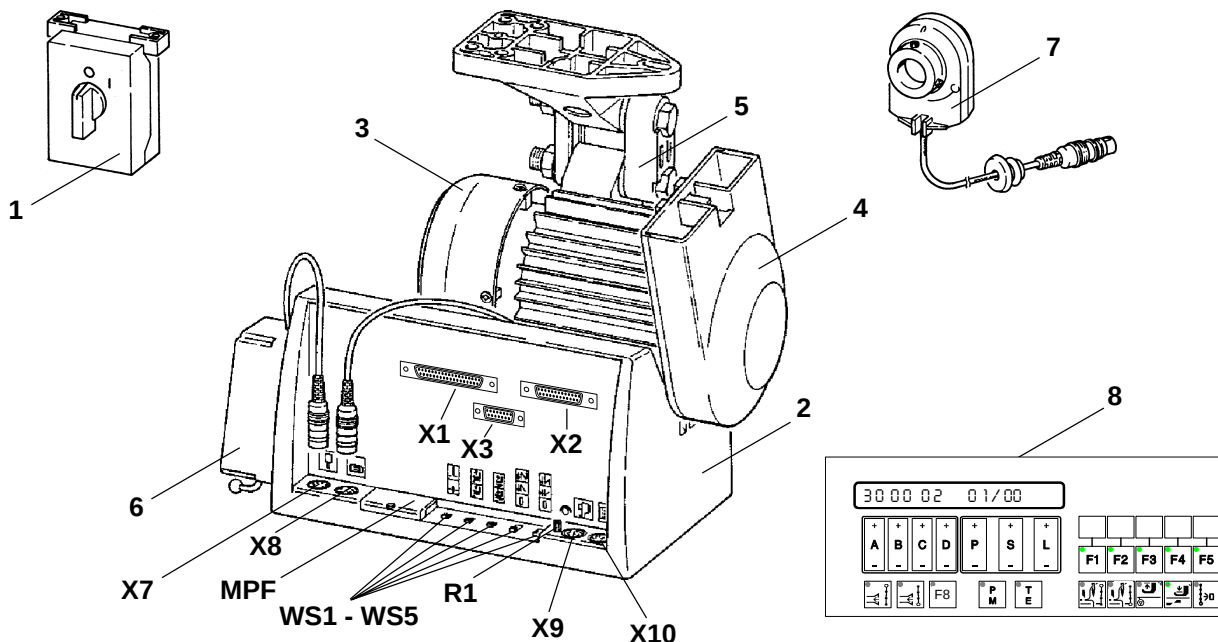


Fig. 7.1

- Basic motor (3) with mounting base and link (5) and with belt guard (4)
- Control box (2) with power electronics (DC intermediate circuit converter) and with control electronics specifically adapted for sewing machines
- Speed control unit (command unit) (6)
- Synchronizer (position control unit) (7)
- ON/OFF switch (mains power switch) (1)
- Operator panel (optional) (8)

7.1 Motor QE 5542

This is a synchronous motor with permanent magnet rotor and commutation transmitter

The rated power of the motor (shaft output power) is 550 W in operating mode S5. Rated speed is 4200 rpm, maximum speed is 5000 rpm.

Two connection cables are provided:

1. 4-conductor with AMP special plug for connecting the stator windings with the power board.
2. 6-conductor, shielded, with 6-contact Hirschmann plug for connecting the commutation transmitter with the control system.

7.2 Control System - Control Box

The control box is suspended from the basic motor and forms an integral part of the latter. Use two socket head hex screws M6 x 60 to attach the unit to the basic motor. Make electrical connections between control system and basic motor by means of the two cables provided on the latter.

Insert the 6-contact plug of the commutation transmitter into the correspondingly marked female connector (X8) on the lefthand front face.

To be able to insert the 4-contact AMP plug into the control system, open the cover on the rear side of the control box. Then slip the grommet with strain relief provided on the cable into the slot provided on the motor and secure with the nut provided.

Insert the 4-contact AMP plug into the female connector provided on the base board of the control system.

Description of the control System Q360SE

The system is equipped with:

female connectors	X1 to X3 for connection of process elements (keys, switches, solenoids, solenoid valves) X7 for the speed control unit (command unit) X8 for the commutation transmitter of the motor X9 for the synchronizer (position control unit) X10 for an operator panel X2.1 for an stepper motor 1 X2.2 for an stepper motor 2 X2.3 for an tape tension sensor
selector switches	WS1 for needle position at sewing stop (down, up) WS3 for presser foot position at sewing stop (down, up) WS2, WS4, WS5 without function
potentiometer	R1 for continuous reduction of the maximum machine speed as specified by parameter <607>.

miniature operator's control panel (MPF) for user programming of various control parameters.

The control system is connected with the sewing machine/ sewing equipment via:

inputs (Ex), such as for keys, switches, proximity switches, monitors, and

outputs (Ax), such as for solenoids, solenoid valves, signal indicators.

Inputs (Ex)

E12: Chopper
E10: light barrier: table
E13: light barrier: start/stop

Outputs (Ax)

A1: Chopper (<486> = I) / fast scissors forwards (<486> = II)
A2: Transport down
A3: Fast scissors backwards
A4: Presser foot lift
A5: Chain vacuuming
A6: Plate
A7: Folder
A8: Start transport motor
A10: Chain blowing
A11: Vacuum waste
A13: Table down
A14: Presser foot 2 lift
A15: Table up
A16: Count signal
A17: 480 pulses per revolution (FA)
A18: 480 pulses per revolution (FB)

7.3 Speed Control Unit (SWG-Command Unit)

As a general rule, this unit is attached to the lefthand side of the control box by means of two screws and is mechanically connected by means of a pitman rod with the treadle located on the sewing machine stand.

Electrical connection is made by inserting the cable with 7-contact plug into the correspondingly marked female connector (X7) located on the lefthand front face of the control box.

The speed control unit is a mecano-electric converter, dividing the treadle stroke into 16 different digital values comprising 4 bits each.

To achieve this, the speed control unit is equipped with 4 signal tracks (A, B, C, D).

The 16 digital values are listed below together with the treadle stroke (treadle position) and with the uppertaining command.

Coding Chart of the Speed Control Unit:

Position:		Signals				Meaning
		A	B	C	D	
-2		0	1	1	0	Treadle heeled fully (seam end, SN)
-1		0	1	1	1	Treadle heeled slightly (PF lift)
0		1	1	1	1	Treadle zero position
+1	1	1	1	1	0	Treadle toed slightly (PF down)
+2	1D	1	1	0	0	Speed step 1
+3	2D	1	1	0	1	Speed step 2
+4	3D	1	0	0	1	Speed step 3
+5	4D	1	0	0	0	Speed step 4
+6	5D	1	0	1	0	Speed step 5
+7	6D	1	0	1	1	Speed step 6
+8	7D	0	0	1	1	Speed step 7
+9	8D	0	0	1	0	Speed step 8
+10	9D	0	0	0	0	Speed step 9
+11	10D	0	0	0	1	Speed step 10
+12	11D	0	1	0	1	Speed step 11
+13	12D	0	1	0	0	Speed step 12 (n-max treadle toed fully)

Pin connection of speed control plug

1	A
2	B
3	C
4	D
5	+5V
6	0V
7	

7.4 Synchronizer (Position Control Unit)

This unit is mechanically attached to the machine handwheel and is connected with the righthand front face of the control box by inserting a cable with a 6-contact plug into the female connector (X9) marked with the synchronizer symbol.

The synchronizer is a mechano-electric transducer (angular position transmitter) comprising a transmitter disk equipped with a signal track and a synchronization track. Signal generation is performed by photoelectric means via light barriers.

The signal track furnishes 480 pulses per revolution on two channels (FA, FB). The two pulse sequences are electrically phase-shifted by 90 degrees and thus permit recognition of the direction of rotation. The synchronization track furnishes one pulse per revolution having a width of 240 pulses furnished by the signal track.



The synchronizer is a precision instrument. To prevent malfunction, please do not open the unit!

Synchronization of the drive system and the machine is made with the synchronizer by a teach-in process within user programming (zero adjustment of the machine).

7.5 ON/OFF Switch (Power Connection Unit)

The switch unit should be attached to an appropriate place beneath the sewing machine table top.

The unit is supplied with two cables.

The first 3-conductor cable is provided for connection to the power mains by means of a locally used plug with earthing contact.

Introduce the other, shorter 3-conductor cable into the control box through the cable grommet with strain relief located above the rear cover. Connect the leads of this cable to the terminals on the base board and on the housing (PE).

The switch unit is designed for installation of up to three additional cable grommets with strain relief, permitting to connect further devices, such as a sewlight and a mains power outlet, to the ON/OFF switch.

To make additional connections, open the switch housing.

Proceed as follows:

- Loosen the retaining screw of the switch toggle
- Remove the toggle
- Insert a screwdriver into the bottom slot of the cover and release the retainer
- Remove the cover
- In order to make the terminals of the switch readily accessible, remove the switch from its fixed position.
This is easy to do. Just press the four retaining levers slightly outward by pairs.
Now the switch can easily be pulled out to the front.

7.6 External Operator Panel OC-TOP / DQ

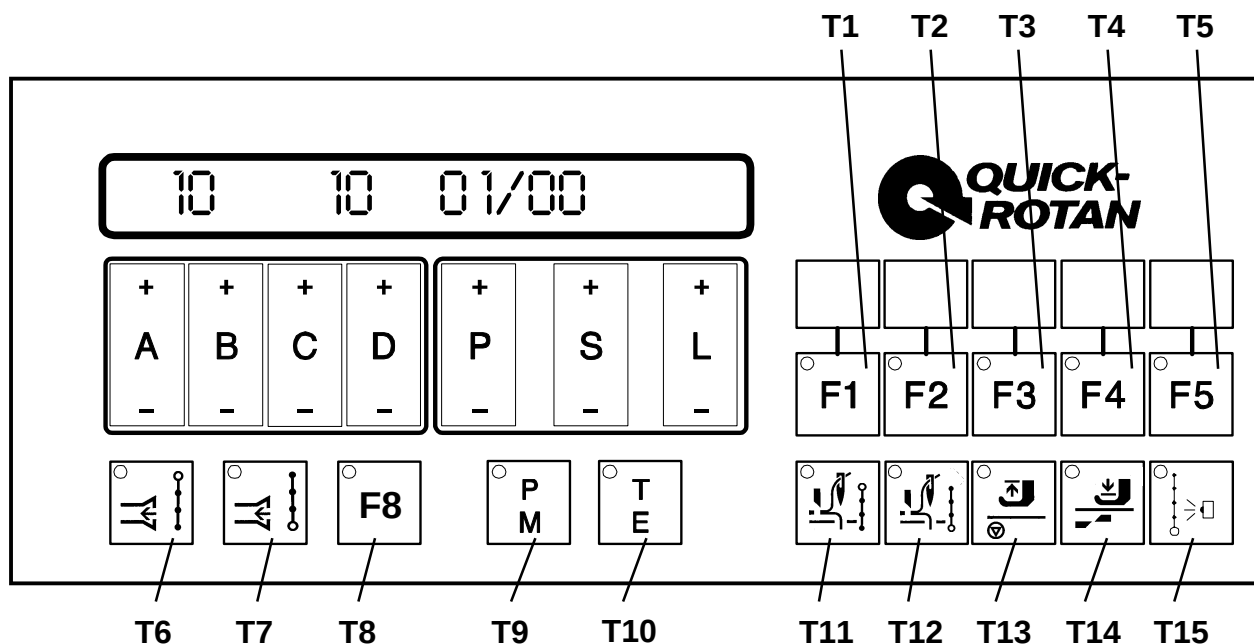


Fig. 7.2

The operator panel **OC-TOP / DQ** (Fig. 7.2) has the following components:

- **a display:** 16-digit LCD matrix
- **14 programming keys:**
A+ / A-, B+ / B-, C+ / C-, D+ / D-, P+ / P-, S+ / S-, L+ / L-
- **2 keys (T9, T10)** for selection of the operating mode
- **13 keys (T1...T8, T11...T15)** for machine functions
- **one connector for a light sensor** at rear for connection of one or two (with adapter) light sensors

Function of the programming keys in operating mode "manual sewing"

(key T9 is dark key T10 is dark)

- **A+/A-/B+/B-** adjustment of stitchcount S1 (vacuum at seam start)
- **C+/C-/D+/D-** adjustment of stitchcount S2 (vacuum at seam end)

Function of the programming keys in operating mode "programmed sewing"

(key T9 is bright, key T10 is dark)

- **A+/A-** adjustment of speed nx in program x
- **A+/A-/B+/B-** adjustment of stitchcount S1 (chopper at seam start)
- **C+/C-/D+/D-** adjustment of stitchcount S2 (chopper at seam end)
- **D+/D-** preselection of the program following program x
- **P+/P-** adjustment of program x (program number x)
- **S+/S-** adjustment of seam section 01 in program x
- **L+/L-** adjustment of the cycle counter for stacker activation

Function of the programming keys in operating mode "parameter programming" (key T9 is dark, key T10 is bright)

Function of the keys T9 and T10 for selection of the operating mode

- T9 dark, T10 dark: manual sewing
- T9 bright, T10 dark: programmed sewing
- T9 dark, T10 bright: parameter programming

Function of the programming keys for machine functions

- T5 function change-over for keys T1 ... T4 (shift key)
- T1 linking of seam sections
- T5+T1 change of the tape feed (stepper motor 2)
- T2 speed during programmed sewing:
variable (treadle-controlled) if T2 is dark
constant (automatic) if T2 is bright
- T5+T2 change of the differential feed (stepper motor 1)
- T3 change over between automatic start or semi-automatic start
- T5+T3 teach in for control
- T4 switch on manual tape feed
- T5+T4 at present no function
- T6 vacuum at start of seam
- T7 vacuum at end of seam
- T8 program reset
- T11 change over between seam section with stitch count or
seam section without stitch count (trigger off the next seam section over the light barrier)
- T12 switch on manual chopper
- T13 presser foot 1 - position before seam start and if pedal position "-2"
- T14 presser foot 2 - position at seam end
- T15 light barrier

Caution: After programming push key T5 till LED goes out

The keys T1...T15 are provided with one signal lamp each (LED). Each LED provides optical feedback on the control position of the function assigned to each key. If the function is ON, the LED is bright; if the function is OFF, the LED is dark.

8. Error Messages (Malfunction Diagnostics)

The control system of the drive cyclically tests its own functional condition and the functional condition of the complete drive system.

Malfunctions are signalled via the display of the external operator panel, for instance:



List of possible error codes:

- 1 Treadle not in zero position when mains power is turned ON
- 9 Start lock
- 10 Machine class, <799> was changed; remedy: turn mains power switch OFF and ON again
- 62 Short circuit on 24 V (32 V) DC
- 63 Overload on 24 V (32 V) DC, load current > 4 amps
- 64 Power supply monitor: voltage too low (90 V - 150 V)
- 65 Power electronics not operational after mains power ON, mains power < 130 V
- 66 Earth short (motor or motor supply line has earth short in one or more phases)
- 67 Internal malfunction
- 68 Power electronics shut-off
 - a) Overcurrent, short circuit in motor or supply line
 - b) Overvoltage, mains voltage too high (>300 V), motor overloaded while decelerating
 - c) Undervoltage
- 69 Synchronizer not furnishing increments
 - a) Synchronizer plug not inserted
 - b) Belt not in place or belt tension insufficient
- 70 Machine blocked, no increment from synchronizer at max. motor torque
- 71 Commutation transmitter plug not inserted
- 72 Synchronizer plugged into commutation transmitter connector
- 73 Motor overloaded
- 75 Internal malfunction
- 90 EEPROM does not exist
- 91 EEPROM not programmable
- 92 Start lock while motor running
- 93 Wrong EEPROM
- 100- } Internal malfunction
- 117 }

In case of error messages ≥ 62 , the motor will stop in undefined positions.

Control system reset possible only by mains power OFF/ON.

9. Programming by the User

Enables machine functions and parameters to be switched on or set up.

User programming of the **SERVO-TOP** can be carried out via

- external operator's control panel **OC-TOP** or
- the miniature integrated control panel (MPF)

The user programming of the **SERVO-TOP** is possible by means of the OC-TOP via:

- **direct programming** (only with drives from function level 40) and/or
- **programming parameters.**

The programming of parameters is possible via three levels of program:

- **Programming on level A** (operator level)
- **Programming on level B** (technician's level)
- **Programming on level C** (special level)

9.1 User Programming with Operator Panel OC-TOP / DQ

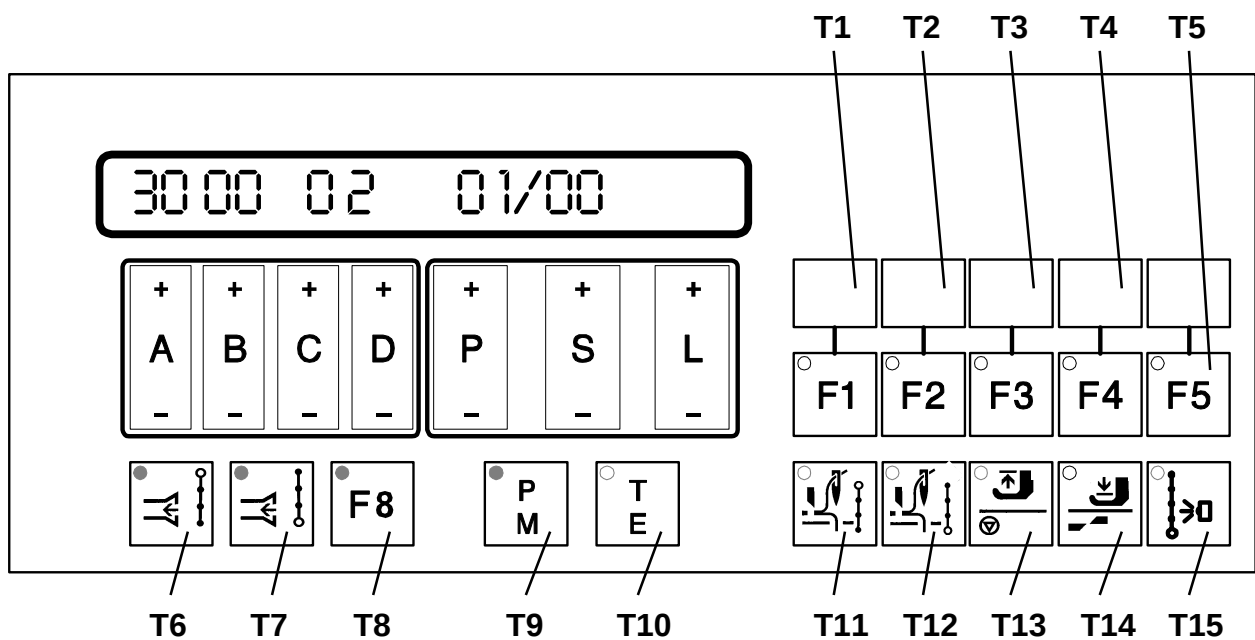


Fig. 9.1

9.1.1 Direct Programming

Regardless of the programming levels, certain values can be programmed without calling up parameter numbers - i.e. directly.

Attention!

All values modified within direct programming are stored only when

a) the drive system is started or

b) key T9 (P/M) are pressed.

If the drive system is switched off via the mains power switch immediately after any values were modified, the values set before modification will be retained!

The following values can be modified by direct programming:

Stitch rating S1

Stitch rating S2

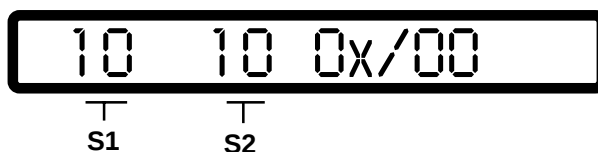
Stitch rating S3

Speeds for seam sections NS

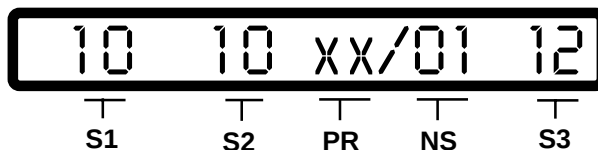
Functions for seam sections NS

a) Modification of Stitch Rating S1, S2, S3

Display shown when "manual sewing" is ON (T9 (P/M) and T10 (T/E) not luminous)



Display showing: when "programmed sewing" (T9 (P/M) being bright, T10 (T/E) not being bright) and the seam section are activated



The keys located below the display permit to modify the values shown:

rated stitchcount S1	via keys A+/A-/B+/B-
rated stitchcount S2	via keys C+/C-/D+/D-
rated stitchcount S3	via keys L+/L-
sewing program PR	via keys P+/P-
seam section NS	via keys S+/S-

b) Programming of Stitch Rating S3 by „Teach-in“ (Performing Work, with <799> = 3 only)

Condition: Key T9 (P/M) is bright
Key T10 (T/E) is bright
The machine must have performed at least one stitch before.

Activate the desired program x in the display via keys P+ or P- and the seam section to be programmed via keys S+ or S-.

Cycle:

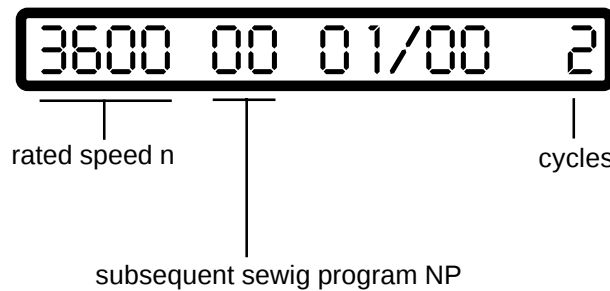
- Treadle forward
Reaction: the stitchcount which has been registered up to now will be eliminated
- Treadle returns to zero position
- Treadle forward
Reaction: machine sews, the sewed stitches will be added in, shown in the display and registered

Correction of the value shown in the display is possible via key L+ or L-.

c) Programming of Cycles (Number of Sequences of Program) to Stacker ON, of Program x Speed and of the Subsequent Program

Condition: Operation mode „programmed sewing“ is on, i.e. key T9 (P/M) is bright and key T10 (T/E) is dark, machine not sewing

Display showing



Cycle programming is made via the keys L+ (number increased) or L- (number decreased)

Programming of the **speed n** for the program is made via key A+ (value increased) or A- (value decreased)

Programming of the **subsequent sewing program NP** is made via keys D+ or D-.

d) Programming of Functions

Functions for the program x are controlled via the functional keys

- **T5** function change-over for keys **T1 ... T4** (shift key)
- **T1** linking of seam sections
- **T5+T1** change of the tape feed (stepper motor 2)
- **T2** speed during programmed sewing:
variable (treadle-controlled) if **T2** is dark
constant (automatic) if **T2** is bright
- **T5+T2** change of the differential feed (stepper motor 1)
- **T3** change over between automatic start or semi-automatic start
- **T5+T3** teach in for control
- **T4** switch on manual tape feed
- **T5+T4** at present no function
- **T6** vacuum at start of seam
- **T7** vacuum at end of seam
- **T8** program reset
- **T11** change over between seam section with stitch count or
seam section without stitch count (trigger off the next seam section over the light barrier)
- **T12** switch on manual chopper
- **T13** presser foot 1 - position before seam start and if pedal position "-2"
- **T14** presser foot 2 - position at seam end
- **T15** light barrier

Caution: After programming push key T5 till LED goes out.

9.1.2 Parameter Programming

9.1.2.1 Programming Level A (Operator Level)

This level is used for programming control parameters which immediately affect the operation sequence.

a) Activation of Programming Level A

Conditions Mains power switch ON
 Drive system not running
 Operating mode: manual sewing must be ON (key T9 (P/M) dark)

A rectangular LCD display with a black border. It shows the text '10 10 xx/00' in a digital font. The first '10' is on the left, followed by a space, then another '10', followed by a space, then 'xx/00'.

Press key T10 (T/E)

Response:

Key T10 (T/E) becomes bright, the display shows in its righthand half the first parameter (parameter no. and parameter value) associated with programming level A.
Sewing is not possible

A rectangular LCD display with a black border. It shows the text '10 10 479 80' in a digital font. The first '10' is on the left, followed by a space, then another '10', followed by a space, then '479', followed by a space, then '80'.

- Programming
The **parameter number** is set by using keys P+ or P- (hundreds of parameter no.) and keys S+ or S- (tens and units of parameter no.). The **parameter value** is programmed by using key L+ or L-

b) Deactivation of the Programming Level A

Press key T10 (T/E)

Response:

Key T10 (T/E) goes dark, the display returns to initial condition.
Sewing is possible.

A rectangular LCD display with a black border. It shows the text '10 10 xx/00' in a digital font. The first '10' is on the left, followed by a space, then another '10', followed by a space, then 'xx/00'.

9.1.2.2 Programming Level B (Technician Level)

This level is used for programming the control parameters which have to be modified or adapted very rarely or only for starting operation of the system.

a) Preparation for Activation of the Programming Level B

Turn mains power switch OFF
Press and hold keys T9 (P/M) and T10 (T/E) simultaneously
Turn mains power switch ON
Release keys

Response:

The display shows a „*“ between program number and seam section.
Sewing is possible.

A rectangular digital display with a black border. It shows the text '10 10 XX*00' in a monospaced font. The first '10' is followed by a space, then another '10', followed by a space, then 'XX*', and finally '00'.

b) Activation of Programming Level B

Deactivate key T9 (P/M) (going dark) and activate key T10 (T/E) (going bright).

Response:

In the righthand half of the display are shown: a parameter number (at first 105, then the number selected last) and the associated value.
Sewing is not possible.

A rectangular digital display with a black border. It shows the text '10 10 112 0' in a monospaced font. The first '10' is followed by a space, then another '10', followed by a space, then '112', followed by a space, and finally '0'.

Modification of **parameter number**:

for hundreds of parameter numbers use key P+ or P-
for tens and units of parameter numbers use key S+ or S-

Modification of **parameter value**: via key L+ or L-

c) Deactivation of Programming Level B

Deactivate key T10 (T/E) (going dark)

Response:

Parameters shown disappear from the display, the display returns to initial condition
Sewing is possible.

A rectangular digital display with a black border. It shows the text '10 10 XX*00' in a monospaced font. The first '10' is followed by a space, then another '10', followed by a space, then 'XX*', and finally '00'.

9.1.2.3 Programming Level C (Special Level)

Caution!

At this level, control parameters are stored the values of which have to be modified in exceptional cases only. Correction of these parameters should therefore be made only after consultation of the manufacturer.

a) Activation of Programming Level C

- Activate programming level B (see 9.1.2.2)
- Call up parameter 798
- Set parameter value <798> to I
- Deactivate programming level B
- Turn mains power switch OFF, wait for >2 secs. to elapse
- Turn mains power switch back ON
- Deactivate key T9 (P/M) (going dark)
- Activate key T10 (T/E) (going bright)

Response:

In the righthand half of the display appears the first parameter of programming level C.

Calling up further parameter numbers and correcting the parameter values can be made in the same way as described for programming levels A and B.

b) Deactivation of Programming Level C

- Deactivate key T10 (T/E) (going dark)
- Turn mains power switch OFF.

9.1.3 Reset

a) Reset of Parameter Values

All parameter values having been modified from the ex-factory condition (standard value) are reset to their standard values by this procedure.

Exceptions: the parameters 700, 799, 800 and further parameters at the parameter list signed with "*". For these parameters, the values programmed by the user are retained even after -Reset- has been performed.

-Reset- procedure:

- turn mains power switch OFF
- press treadle fully forward and hold in that position
- press and hold keys P- or P+, S- or S+ and L- or L+ simultaneously
- turn mains power switch ON
- release the three keys and the treadle

Response: Display showing

The LCD display shows the word 'RESET' followed by a space, then 'Y', two dashes, and 'N'.

Now -Reset- can be performed.

Located below the display Y (yes) there is key P+. Press this key P+ to start the reset. The display briefly shows:

The LCD display shows the words 'MASTER-RESET'.

After that the display shows the power-on display for approx. 2 secs.

The LCD display shows 'Q360SE' followed by a space, then '2Z-944-C'.

and then shows the display corresponding to the operating mode selected

The LCD display shows '10' followed by a space, then '10', a space, then 'XX/00'.

If it is not desired to start the -Reset-, press key L+ located below the display saying N (no).

b) Reset of Parameter Values and Sewing Programs

The reset procedure including the data of the sewing programs is analog to that described under a), until the following appears in the display:

The LCD display shows the word 'RESET' followed by a space, then 'Y', two dashes, and 'N'.

In order to reset the data of the sewing programs to their original values, it is now required before pressing key P+ to press at first key T8 and hold until activation is acknowledged in the display.

10. Start of operation

If the SERVO-TOP has been stored at a temperature of $<+5^{\circ}\text{C}$, then a working temperature of between $+5^{\circ}\text{C}$ and $+40^{\circ}\text{C}$ must first be obtained.
The equipment must be dry.

Before work with the machine can be started, make sure to perform the following:

- a) Control the direction of rotation
- b) Adjust the reference position of the needle bar
- c) Control the needle positions
- d) Control the maximum speed

10.1 Start of the operation with the external operator's control panel OC-TOP

10.1.1 Procedure for checking the direction of rotation and for the correct adjustment of the needle bar (Reference Position NP0)

- a) Activate programming level B (technician level) (see section 9.1.2.2 „programming level B“)
- b) Set parameter 700
- c) Actuate treadle briefly forward:
Reaction: The machine performs a full revolution and then positions in a random position.
- d) Is the direction of rotation correct?
When yes, then proceed to adjust the reference position, proceed with e) below
If no, then activate parameter 800 and change the value $<800>$ ($\text{I} \rightarrow \text{II}$ or $\text{II} \rightarrow \text{I}$) than proceed as b)
- e) Turn the handwheel of the machine in the direction of rotation until the point of the needle coming from up to down touches the level of the throat plate (= reference position).
When doing this it is important that parameter $<701> = \text{I}$.
- f) Actuate the treadle briefly forward:
Reaction: The machine performs one revolution and positions in the same position that had been previously obtained by hand.
- g) As soon as new parameter numbers are activated, or the programming level B is negated, then the parameter value $<700>$ is memorized and the reference position adjustment is completed.

10.1.2 Control of the needle positions (NP1 / NP2)

NP1 - needle down position $<702>$

NP2 - thread take up lever in the up position $<703>$

- a) Activate programming level B (technician level) (see section 9.1.2.2 „programming level B“)
- b) Activate parameter 702
- c) Actuate the treadle briefly forward
Reaction: The machine performs a revolution and then positions at the programmed $<702>$.
- d) Is the needle position correct?
When yes, then proceed as with g) below.
When no, then the position must be changed
by turning the hand wheel (when $<701> = \text{I}$) or
via key L+ or L- (when $<701> = \text{II}$)
- e) Actuate the treadle briefly forward
Reaction: The machine performs a revolution and positions in the same position.

- f) The position can again be corrected.
When no further correction is needed, then proceed as with g) below.
- g) As soon as another parameter number is called up, e.g. example 703, the previously programmed value of <702> is memorized.
- h) With parameter 703 correction is obtained as described above for parameter 702.
- i) Deactivate programming level B (see section 9.1.2.2 „programming level B“).

10.1.3 Procedure for checking maximum speed

- a) Activate programming level B (see section 9.1.2.2 "programming level B")
- b) Set to parameter 607
- c) Check the parameter value <607> and make correction if necessary via keys L+ or L–
- d) Deactivate programming level B (see section 9.1.2.2 "programming level B")

10.2 Hardware Test

Hardware Test is a check routine permitting to use the operator panel OC-TOP for testing various components of the drive system (control system) and of the machine installation.

Hardware testing is made via test blocks. These are called up consecutively via key A+ or A-.

Activation of the „hardware test“ routine

- a) Activate programming level „B“ and call up parameter 797
- b) Set <797> to I
- c) Deactivate programming level „B“
- d) Turn mains power switch OFF
- e) Wait for approx. 2 secs. to elapse, and turn mains power switch back ON

Response: The display shows „HARDWARE TEST“ for approx. 2 secs.

After that, the display shows the first test block: Inputs.
All OC-TOP keys equipped with LEDs become bright

Survey of test blocks:

Test Block	Check	Display
1	Inputs	E 01 0 X 1 : 5
2	Outputs	A 02 0 X 2 : 4
3	Speed control unit	S U G 0
4	Synchronizer	I U G 0 0 0 0
5	Potentiometer	R 1 x x x %
6	Selector switches	U 5 1 - 5 0 0 0 0 0
7	Light barrier	L 5 1 0 L 5 2 0

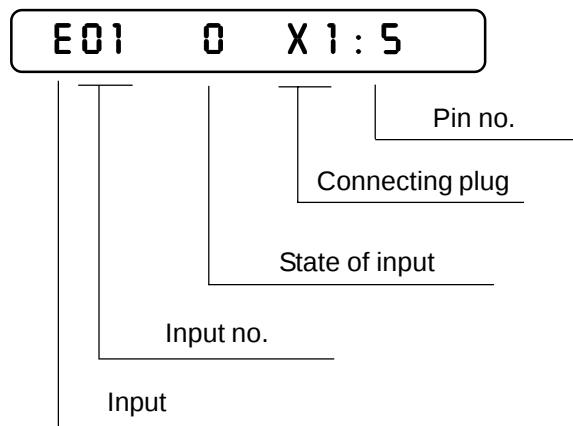
To call up the test blocks (advancing from test block to test block), use keys A+ and A-.

To call up various functional elements within a test block (advancing from functional element to functional element), use keys B+ and B-.

To activate functional elements selected, use key D+

Test block 1: Inputs

Display:



The function assigned to the input displayed can be seen from chapter 12 „Connections Diagram for Connectors“.

The designations E (for input) are located on the lefthand side of the connectors shown. The keys or selectors assigned to the inputs are designated S in the connections diagram and have the same numbers as the associated inputs, i.e.

key S1 is connected to input E1

key S2 is connected to input E2

key Sx is connected to input Ex.

The operating state of the input is signalled in the 7th digit of the display.

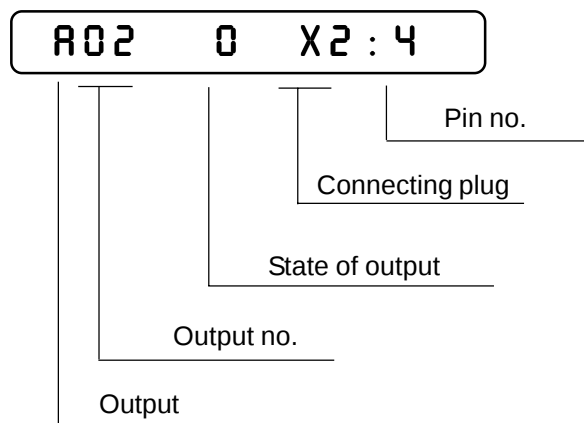
Key/switch open → display: 0

Key/switch closed → display: 1

In the righthand part of the display, the connecting plug and the pin number to which the displayed input is connected are shown for the purpose of reference.

Test block 2: Outputs

Display:



The function assigned to the output displayed can be seen from chapter 12 „Connections Diagram for Connectors“.

The designations A (for output) are located on the lefthand side of the connectors shown.
The solenoids/solenoid valves assigned to the outputs are designated Y in the connections diagram and have the same numbers as the associated outputs, i.e.
solenoid Y2 is connected to output A2
solenoid Y3 is connected to output A3
solenoid Yx is connected to output Ax

The operating state of the output displayed is signalled in the 7th digit of the display.
Output not activated → display: 0
Output activated → display: 1

To activate an output, use key D+. Deactivation is made automatically after approx. 2.5 secs have elapsed or can be caused by using key D-.

In the righthand part of the display, the connecting plug and the pin number to which the displayed output is connected are shown for the purpose of reference.

Test block 3: Speed control unit (SWG)

Display:

SWG 0

The treadle can be actuated to operate consecutively all 16 steps of the speed control unit.

The following is displayed in digits 6, 7 and 8

-2 / -1 / 0 / +1 / 10 / 20 / ... / 120, when the speed control unit is in proper condition.

Test block 4: Synchronizer (IWG)

Display:

IWG 000 0

This test block permits to check the synchronizer (position control unit). For this purpose, the shaft accommodating the synchronizer is rotated manually.

The synchronization track is signalled in digit 11 of the display. At the first change of the display in digit 11, from 0 to 1, the increments (pulses) of the synchronizer are counted and shown in display digits 7, 8 and 9.

This display runs from 0 through 239 when the synchronizer is in proper condition.

Test block 5: Potentiometer R1

Display

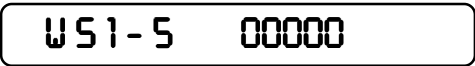
R1 x x x%

This test block permits to check potentiometer R1 on the control box.

The display is in a proportion (%) of total resistance.

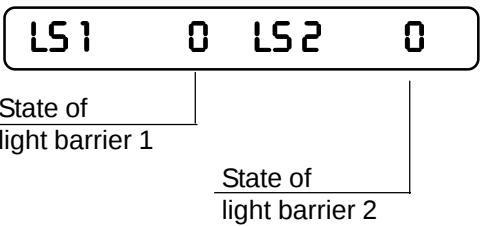
Turning the potentiometer axle causes the display to vary from 0 through 100.

Test block 6: Selectors
Display



This test block permits to check the 5 selectors (WS1 ... WS5) on the control box.
The operating state is shown in digits 8 to 12 of the display. Each switch has a display digit assigned to it.
The operating state is signalled by 0 and 1 for WS1, WS2 and WS3 and by 0, 1 and 2 for WS4 and WS5.

Test block 7: Light barrier
Display:



State of display 0: light barrier is clear
 1: light barrier is dark

To deactivate the test routine, turn the mains power switch OFF.