SERVO-TOP

QE5542

CE

Type

P340SE

Instruction Manual

Part 2

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Contents Part 2

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)

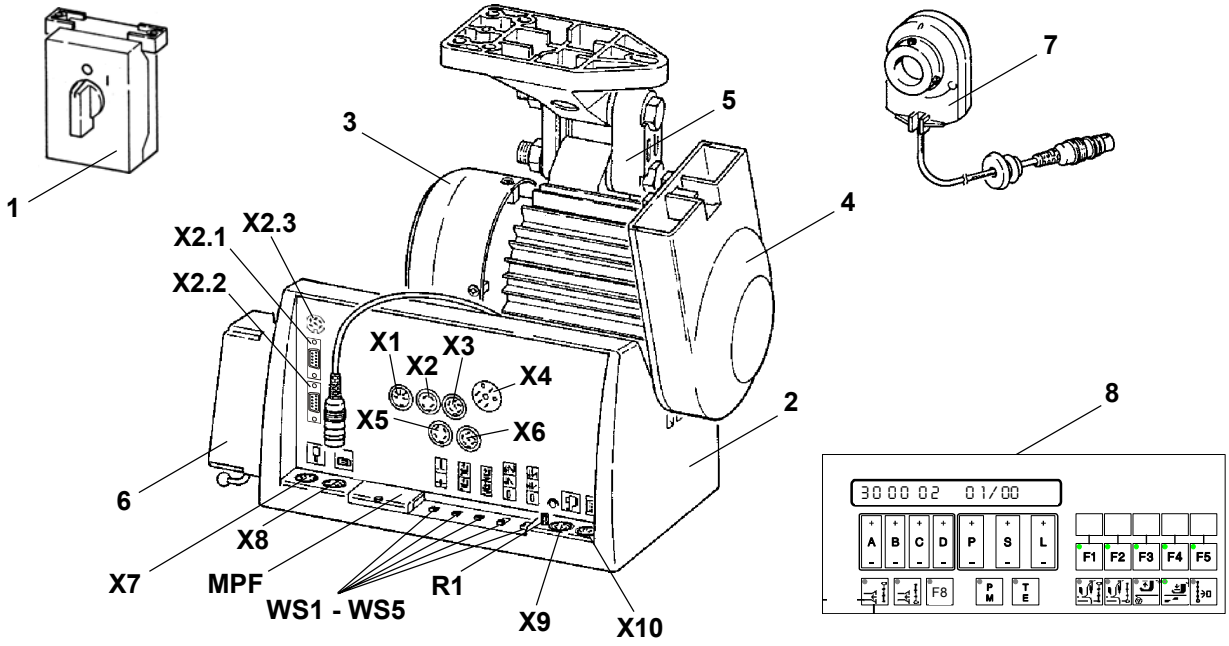


Fig. 7.1

- 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 P340SE

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 - SWG)
	X8	for the commutation transmitter of the motor
	X9	for the synchronizer (position control unit - PD1)
	X10	for an operator panel
	X2.1	for the stepping motor 1
	X2.2	for the stepping motor 2
	X2.3	for the 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) without function.

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)

E3: Forth switching of the gathering value stepp at manuel sewing
Forth switching of the seam sections NS at programmed sewing

Outputs (Ax)

A1: Chopper
A2: Magn. thread trimmer
A3: Thread wiper
A4: Presser foot lift
A5: Feed reverse
A8: Motor running

7.3 Speed Control Unit (Command Unit - SWG)

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.

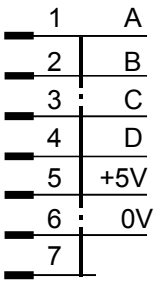
To achieve this, the speed control unit is equipped with 4 signal tracks (A, B, C, D).

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	0	Treadle toed slightly (PF down)
+2	1	1	0	0	Speed step 1
+3	1	1	0	1	Speed step 2
+4	1	0	0	1	Speed step 3
+5	1	0	0	0	Speed step 4
+6	1	0	1	0	Speed step 5
+7	1	0	1	1	Speed step 6
+8	0	0	1	1	Speed step 7
+9	0	0	1	0	Speed step 8
+10	0	0	0	0	Speed step 9
+11	0	0	0	1	Speed step 10
+12	0	1	0	1	Speed step 11
+13	0	1	0	0	Speed step 12 (n-max treadle toed fully)

Pin connection of speed control plug



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 / AP

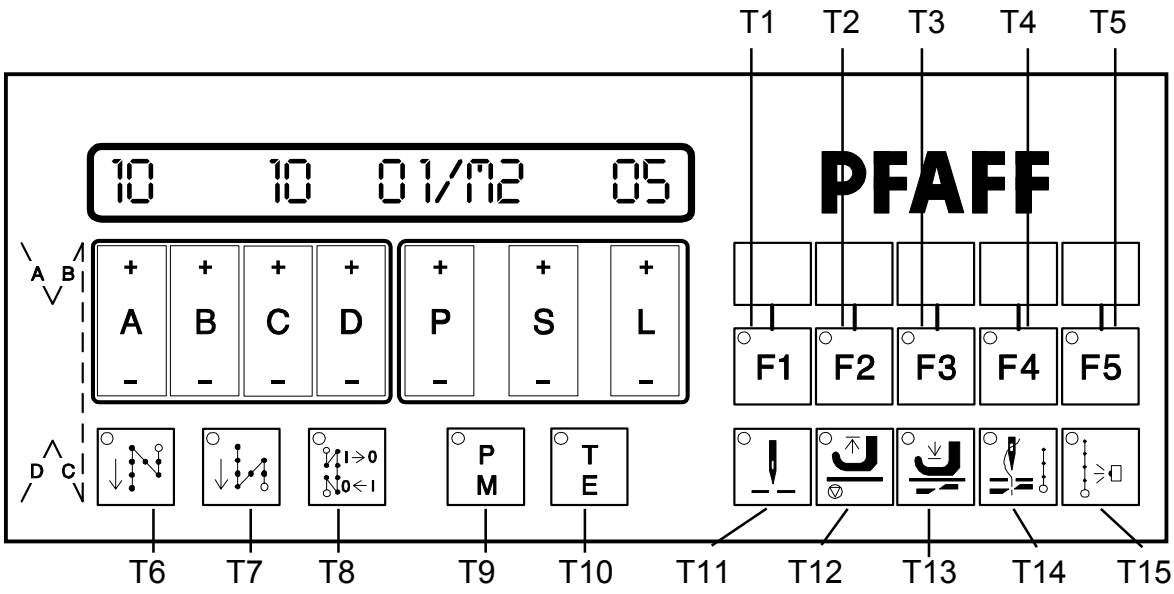


Fig. 7.2

The operator panel **OC-TOP** / **AP** (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 at seam start
- **C+/C-/D+/D-** adjustment of stitchcount S2 at seam end
- **S+/S-** switch over the level of gathering value

Function of the programming keys in operating mode ”programmed sewing”
(key **T9** is bright, key **T10** is dark)

- **A+/A-** adjustment of speed n in program PR
- **A+/A-/B+/B-** adjustment of stitchcount S1 at seam start
- **C+/C-/D+/D-** adjustment of stitchcount S2 at seam end
- **D+/D-** preselection of the program PR following program NP
- **P+/P-** adjustment of program PR (program number PR 01...25)
- **S+/S-** adjustment of seam section NS (NS = 01...15) in program PR
- **L+/L-** adjustment of the cycle counter if NS = 00
  adjustment of stitchcount S3 of the switched on seam section NS (NS = 01...15)

Function of the programming keys in operating mode ”parameter programming”
(kex **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: paramter programming

Function of the programming keys for machine functions

- **T5** function change-over for keys **T1** … **T4** (shift key)
- **T1** linking of seam sections (with / without)
- **T5+T1** indicate of the gathering value (the tape feed with stepper motor 2)
- **T2** speed during programmed sewing:
  variable (treadle-controlled) if **T2** is dark
  constant (automatic) if **T2** is bright
- **T5+T2** indicate of the bottom differential feed (stepper motor 1)
- **T3** program mirroring
- **T5+T3** seam start with light barrier (with / without)
- **T4** manual tape feed
- **T5+T4** unit count in display
- **T6** start stitch condensation (on/off)
- **T7** end stitch condensation (on/off)
- **T8** inversion of the stitch condensation
- **T11** needle position at sewing stop (up / down)
- **T12** presser foot position at sewing stop (up / down)
- **T13** presser foot position after seam end (up / down)
- **T14** thread trimming (on / off)
- **T15** seam end with light barrier (with / without)

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. Application

The drive SERVO-TOP type P340SE is based on the P40SE. Additionally this drives provides the possibility to connect two stepper motors and one sensor. This sensor is measuring the tension of the tape to be sewn into the fabric to be manufactured.
The tape is fed with a preset constant tension to the machine by a metering device
This metering device is driven by stepper motor number 2.

It makes sense to use this drive P340SE only together with the external operator's panel OC-TOP.

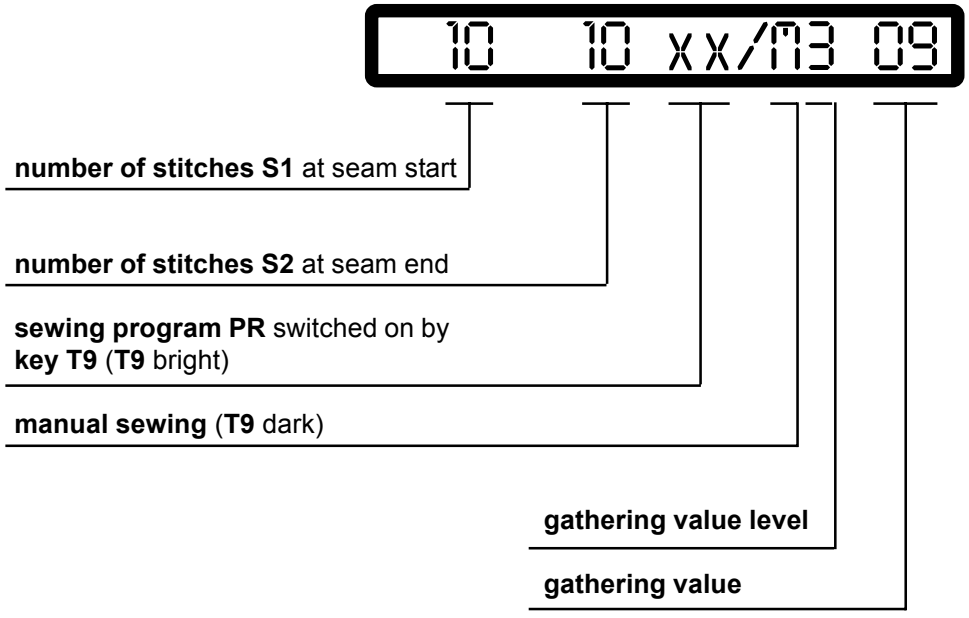
Manual and programmed sewing mode is available.

8.1 Sewing without sewing program (manual sewing)

Requirements:
Key T9 (P/M) dark
Key T10 (T/E) dark

- Five different gathering values can be operated.
- The gathering value levels can be selected either by key S+/- at OC-TOP or via knee switch (input E3)
- One particular gathering value is belonging to each gathering value level. Gathering values are set by key L+/- at OC-TOP.
- If the sewing operation requests less than five gathering value levels you have to set to „Zero" in the gathering value level which follows the last needed gathering value level.

Display showing
before start or after start, if <605> = II



Following adjustments are possible only when the machine is stopped

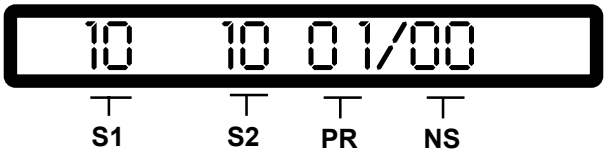
Number of stitches S1 at seam start by **keys A+/-, B+/-**
Number of stitches S2 at seam end by **keys C+/-, D+/-**
Gathering value level by **keys S+/-** or over **input E3 (knee switch)**
Gathering value by **keys L+/L-**

Display showing
before start or after start, if <605> = I

8.2 Sewing with sewing program (programed sewing)

Requirements:
Key T9 (P/M) brigth
Key T10 (T/E) dark

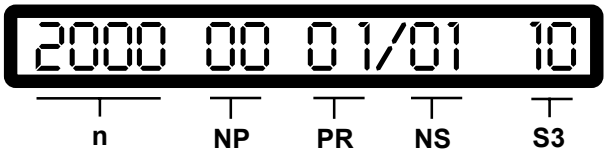
Showing on display before start (start display)



Following adjustments are possible only when the machine is stopped:

Sewing gram PR by **keys P+/-**
Seam section NS by **keys S+/-**
Number of stitches S1 at seam start by **keys A+/- B+/-**
Number of stitches S2 at seam end by **keys C+/- D+/-**

Showing on display before start or after start, if <605> = II



Following adjustments are possible only when the machine is stopped:

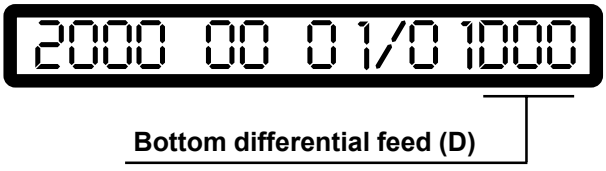
Speed n ($n_{max} \leq$ <607>)
for the adjusted program by **keys A+/-**

Following sewing program NP by **keys D+/-**
Sewing program PR by **keys P+/-**
Seam section NS by **keys S+/-**
Number of stitches S3 of the **seam section** by **keys L+/-**

When only x (x < 15) seams are required out of the at most 15 possible seams within a sewing programme, then you have to set number of stitches in seam number (x + 1) to „00“.

Showing on display
before start or after start, if <605> = II
if the keys **T5+T1** are brigth

if the keys **T5+T2** are brigth



Available adjustments are possible only when the machine is stopped:
Gathering value (R) by **keys** L+/-
Bottom differential feed (D) by **keys** L+/-

8.3 Sewing programs

a) Number of sewing programs: 25

b) Number of seam sections per sewing program: 15

c) Number of stitches per seam section: max. 99

d) Adjustment of seam functions at the seam section:

start stitch condensation (on/off)	via key T6
end stitch condensation (on/off)	via key T7
needle position at sewing stop (up / down)	via key T11
presser foot position at sewing stop (up / down)	via key T12
presser foot position after seam end (up / down)	via key T13
thread trimming (on / off)	via key T14
seam start with light barrier	via key T3 if T5 is off
indicate of the gathering value (the tape feed with stepper motor 2)	via key T1 if T5 is off
indicate of the bottom differential feed (stepper motor 1)	via key T2 if T5 is off
at present no function	via key T4 if T5 is off
seam end with light barrier (with / without)	via key T15

e) Breaking of stichcount

Stitchcount of a seam section can be broken via treadle position "-2."-letter "m" appears on the display. Manual sewing (without stitchcount) is now possible. Set treadle again at "-2" to complete seam section and advance the next one.

f) Seam section without stichcount

Seam sections can be also be sewn without stitchcount (manual):
switch on T4 when T5 is off (LED dark). "m" on display signals manual seam section. For seam sections without stitchcount, display must show stitchcount ≥ 1.
Set treadle at "-2" to complete seam section and advance the next one.

g) Seam section with light barrier control

The rated stitchcounts stored for this seam section are light barrier compensation stitches.

h) Sewing speed

The sewing speed can be individually set for each program via display before starting the sewing operation. The maximum sewing speed to be programmed is defined by parameter <607>.

i) Interlinking of sewing programs

It is possible to run several consecutive sewing programs. When programming, the subsequent program is displayed by digits 6 and 7 and can be entered via key D+ and D-.
00 means that the current program will be performed exclusively; at its end return is made to its start.

8.4 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
100-117	Internal malfunction

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 / AP

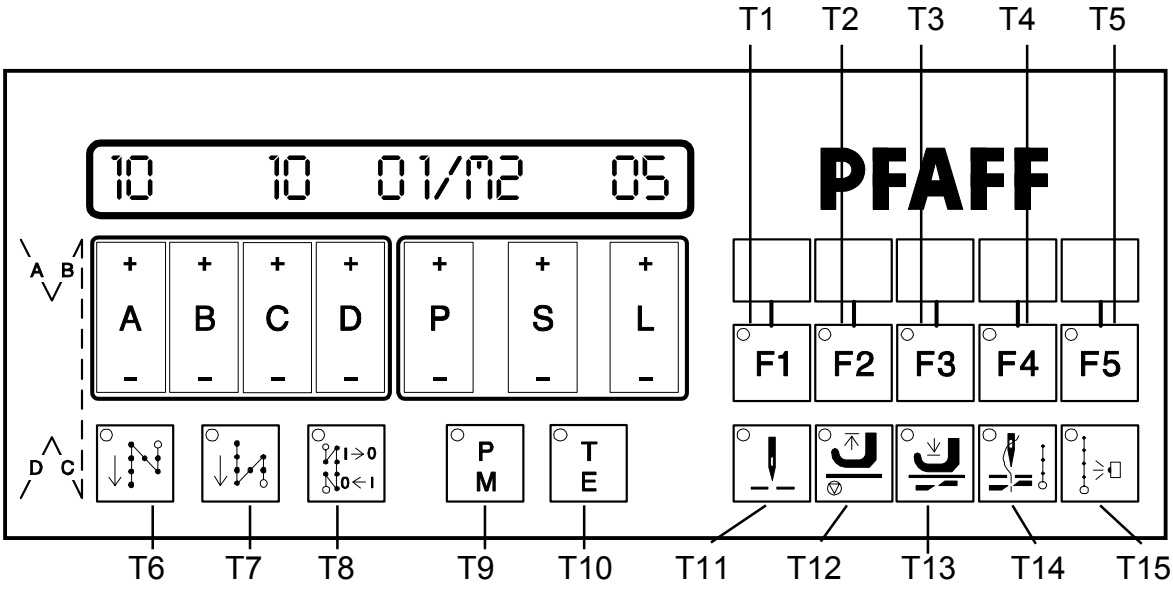


Fig. 9.1

9.1.1 Direct Programming

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

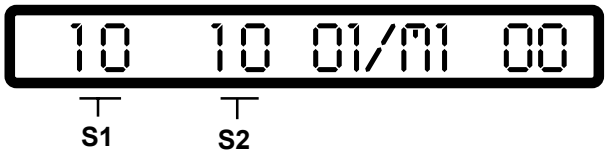
Attention! All values modified within direct programming are stored only when
a) the drive system is started or
b) key T9 (P/M) are pressed.
If the drive system is switched off via the mains power switch immediately after any values were modified, the values set before modification will be retained!

The following values can be modified by direct programming:

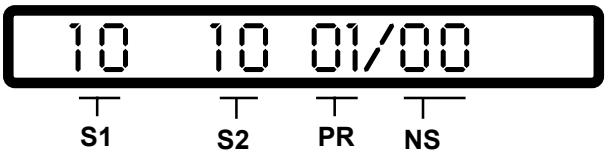
Stitch rating S1
Stitch rating S2
Stitch rating S3
Speeds for seam sections NS
Functions for seam sections NS

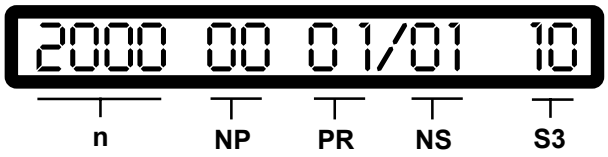
a) Modification of Stitch Rating S1, S2, S3

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:

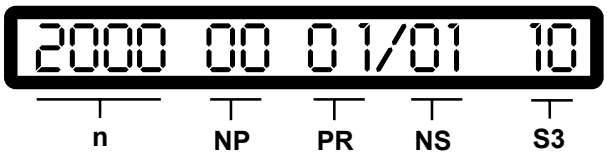
a) Treadle forward
Reaction: the stitchcount which has been registered up to now will be eliminated
b) Treadle returns to zero position
c) Treadle forward
Reaction: machine sews, the sewed stitches will be added in, shown in the display and registered

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

c) Programming of the speed of the program (PR) and of the number 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:



Programming of the **speed n** for the program (PR) 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 (with / without)
- **T5+T1** indicate of the gathering value (the tape feed with stepper motor 2)
- **T2** speed during programmed sewing:
  variable (treadle-controlled) if **T2** is dark
  constant (automatic) if **T2** is bright
- **T5+T2** indicate of the bottom differential feed (stepper motor 1)
- **T3** program mirroring
- **T5+T3** seam start with light barrier
- **T4** manual tape feed
- **T5+T4** unit count in display
- **T6** start stitch condensation (on/off)
- **T7** end stitch condensation (on/off)
- **T8** inversion of the stitch condensation
- **T11** needle position at sewing stop (up / down)
- **T12** presser foot position at sewing stop (up / down)
- **T13** presser foot position after seam end (up / down)
- **T14** thread trimming (on / off)
- **T15** seam end with light barrier (with / without)

Caution: After programming push key T5 till LED goes out

9.1.2 Parameter Programming

9.1.2.1 Programming Level A (Operator Level)

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)

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

- 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.

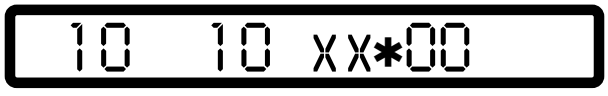
9.1.2.2 Programming Level B (Technician Level)

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.



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.

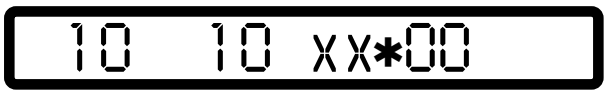
Modification of **parameter number**:
for hundreds of parameter numbers use key P+ or P-
for tens and units of parameter numbers use key S+ or S-

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.



9.1.2.3 Programming Level C (Special Level)

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

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:

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

and then shows the display corresponding to the operating mode selected

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:

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°C, then a working temperature of between +5°C and +40°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 of the direction of rotation
b) Adjust of the reference position of the needle bar
c) Control of the needle positions
d) Control of 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> (I → II or II → 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> = 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/NP3)

NP1 - needle down position <702>
NP2 - thread take up lever in the up position <703>
NP3 - needle up <710>

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> = I) or
via key L+ or L- (when <701> = 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 and 710 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 Control of the positioning (angle) for thread trimming (Parameter 705, 706)

a) Activate programming level B (technician level) (see section 9.1.2.2 „programming level B“)

b) Set parameter 705

c) Actuate the treadle briefly forward
Reaction: The machine performs a revolution and positions at the indicated <705>.

d) Is the position correct?
When yes, then proceed as g) below.
When no, then the position must be corrected
by turning the hand wheel (when <701> = I) or
via keys L+ or L- (when <701> = II).

e) Activate the treadle forward.
Reaction: The machine performs a revolution and positions at the corrected program value <705>.

f) The position can again be corrected.
If no further correction is needed, then proceed as g) below.

g) Back heel the treadle.
Reaction: The machine rotates to NP2, <705> is memorized, programming (correction of position) is no longer possible.

h) If the treadle is back heeled then the thread trim procedure will be activated and the machine performs one revolution.

i) Should parameter <705> be changed again, then the sequence from c) above must be repeated. In any other event, call up parameter 706 and repeat the sequence from c) above.

j) Deactivate program level B (see section 9.1.2.2 „programming level B“).

10.1.4 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

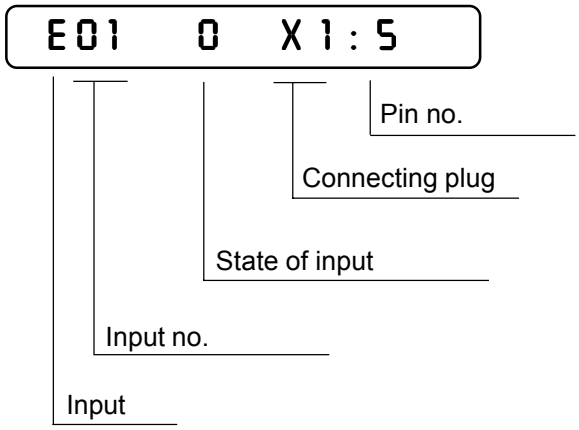
Survey of test blocks:

Test Block	Check	Display
1	Inputs	E01 0 X1:5
2	Outputs	A02 0 X2:4
3	Speed control unit	SWG 0
4	Synchronizer	IWG 000 0
5	Potentiometer	R1 xxx%
6	Selector switches	WS1-5 00000
7	Light barrier	LS1 0 LS2 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:



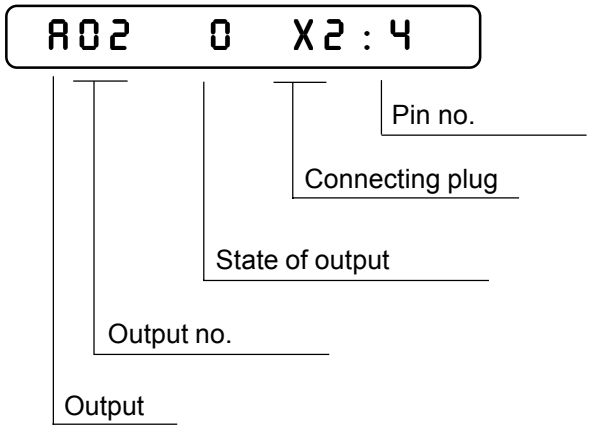
The function assigned to the input displayed can be seen from chapter 12 „Connections Diagram for Connectors“.

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.

Th 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 ouput displayed can be seen from chapter 12 „Connections Diagram for Connectors“.

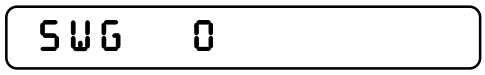
The designations A (for output) are located on the lefthand side of the connectors shown.
The solenoids/solenoid valves assigned to the outputs are designated Y in the connections diagram and have the same numbers as the associated outputs, i.e.
solenoid Y2 is connected to output A2
solenoid Y3 is connected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



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

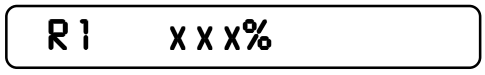
-2 / -1 / 0 / +1 / 10 / 20 / ... / 120, when the speed control unit is in proper condition.

Test block 4: Synchronizer (IWG)
Display:

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

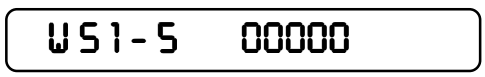
The synchronization track is signalled in digit 11 of the display. At the first change of the display in digit 11, from 0 to 1, the increments (pulses) of the synchronizer are counted and shown in display digits 7, 8 and 9. This display runs from 0 through 239 when the synchronizer is in proper condition.

Test block 5: Potentiometer R1
Display



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.

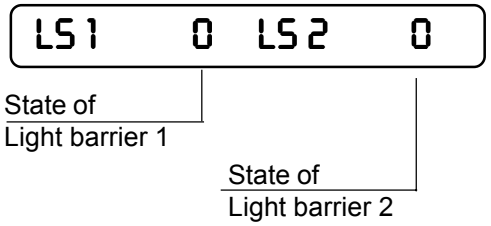
Test block 6: Selector switches
Display



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: **Test block 8**: 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.