MANUAL
SFW-E

SULZER®

CONTENTS

1. Introduction

The WSM-E is a unit that controls the filling thread during the last part of the insertion.

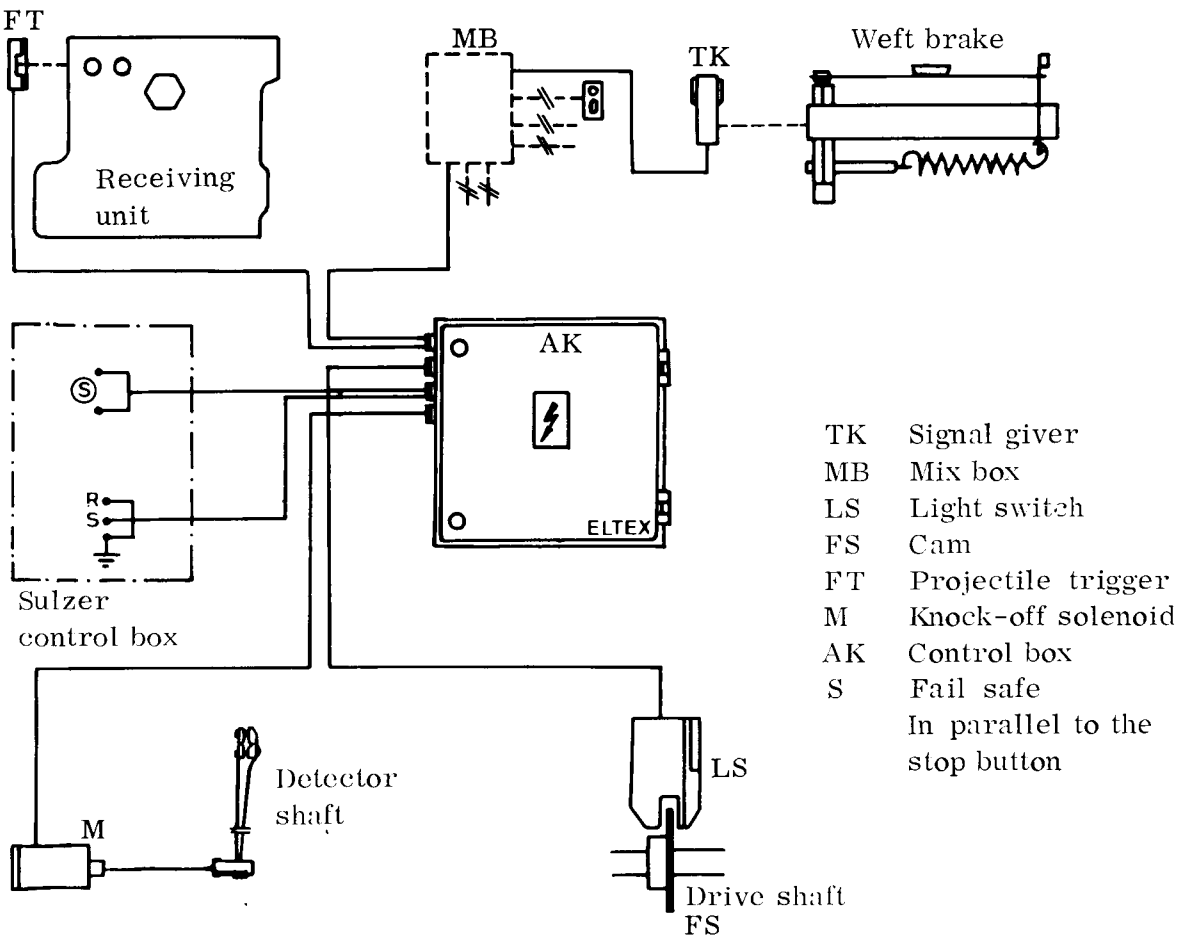
The WSM-E works on the piezo-electric principle, i.e. the mecanical vibrations generated when the thread moves across the surface of the ceramic eyelet are in the piezo-electric crystal in the signal giver transformed into electrical signals.

2. Methods of notation

WSM-E 1 : Eltex Weft Stop Motion with 1 channel
Used for : Control of single weft insertion
Used on : SWM-ES

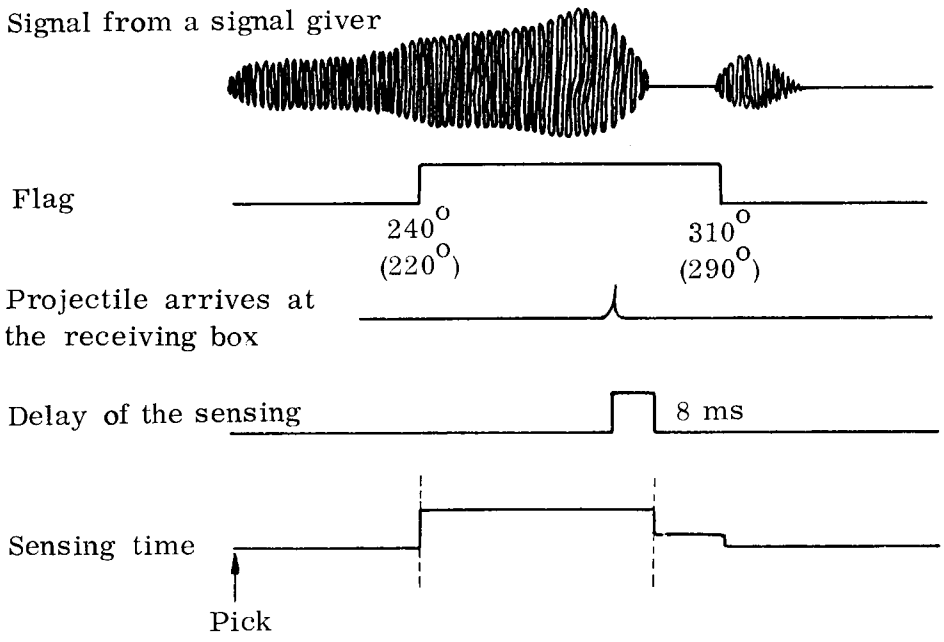
WSM-E 2 : Eltex Weft Stop Motion with 2 channels
Used for : Control of single, double or mixed single-double weft insertion
Used on : SWM-MS and SWM-ES converted for double pick insertion

3. Construction



4. Working principle

- The sensing of the moving thread takes place in the signal givers mounted directly on the yarn brakes.
- When the flag on the main shaft enters the electronic switch at 240^{o} (70^{o} flag) and breaks the light beam the sensing phase begins. The flag leaves the switch at 310^{o}.
- The sensing phase is ended by the projectile trigger mounted at the receiving box. When the shuttle passes over the projectile trigger it generates an electric pulse and after a delay of 8 ms the sensing phase ends.
- This delay time ensures that the sensing continues until the shuttle has reached the bottom of the receiving lock.
- During the sensing time, i.e. from 240^{o} until the projectile has stopped in the receiving lock there must be a continuos signal from the moving yarn.
- Is there however no signal the knock-off solenoid receives an impulse and turns the detector shaft and thus stops the machine.

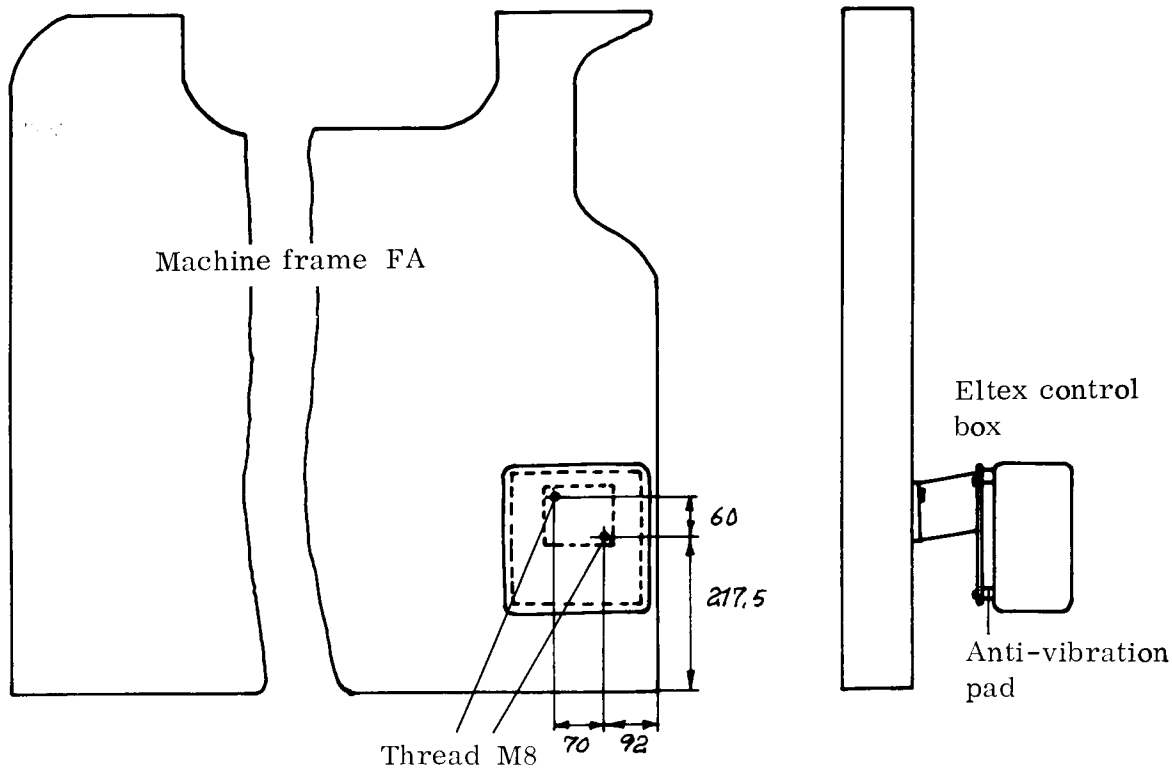


5. Special remarks

- The sensitivity of the unit is easily adjustable with the potentiometer(s) in the box.
- When changing the width of the cloth woven no adjustments are necessary since the projectile trigger determines the duration of the sensing.
- When stopped due to a broken yarn the machine will stop in such a position that it will be easy to rethread it.
- It is possible to control single, double and mixed single and double weft insertion. (WSM-E 2)
- Picks breaking at the moment the projectile reaches the box or after this time can not be detected.

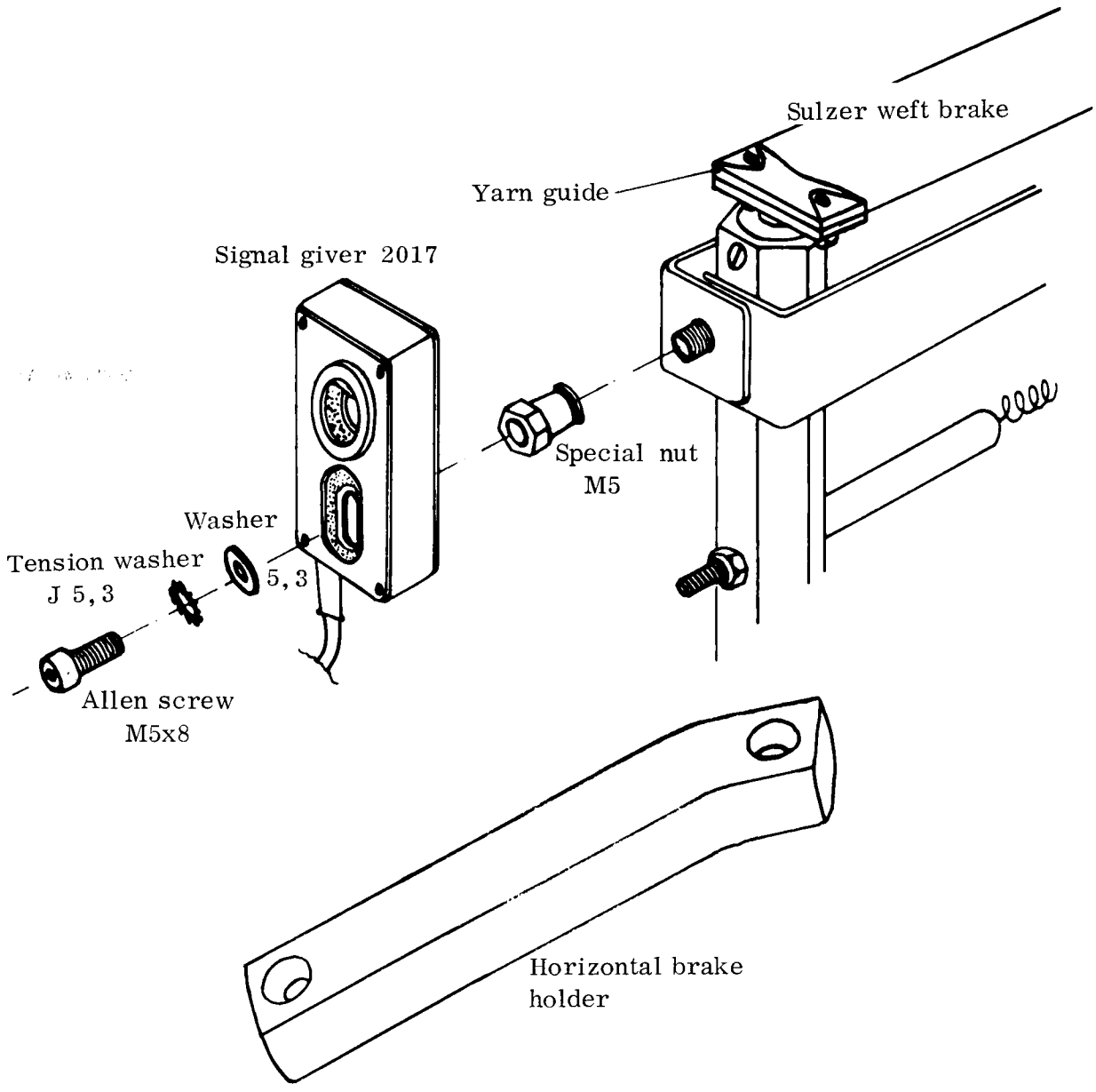
6. Fitting

a) Control box



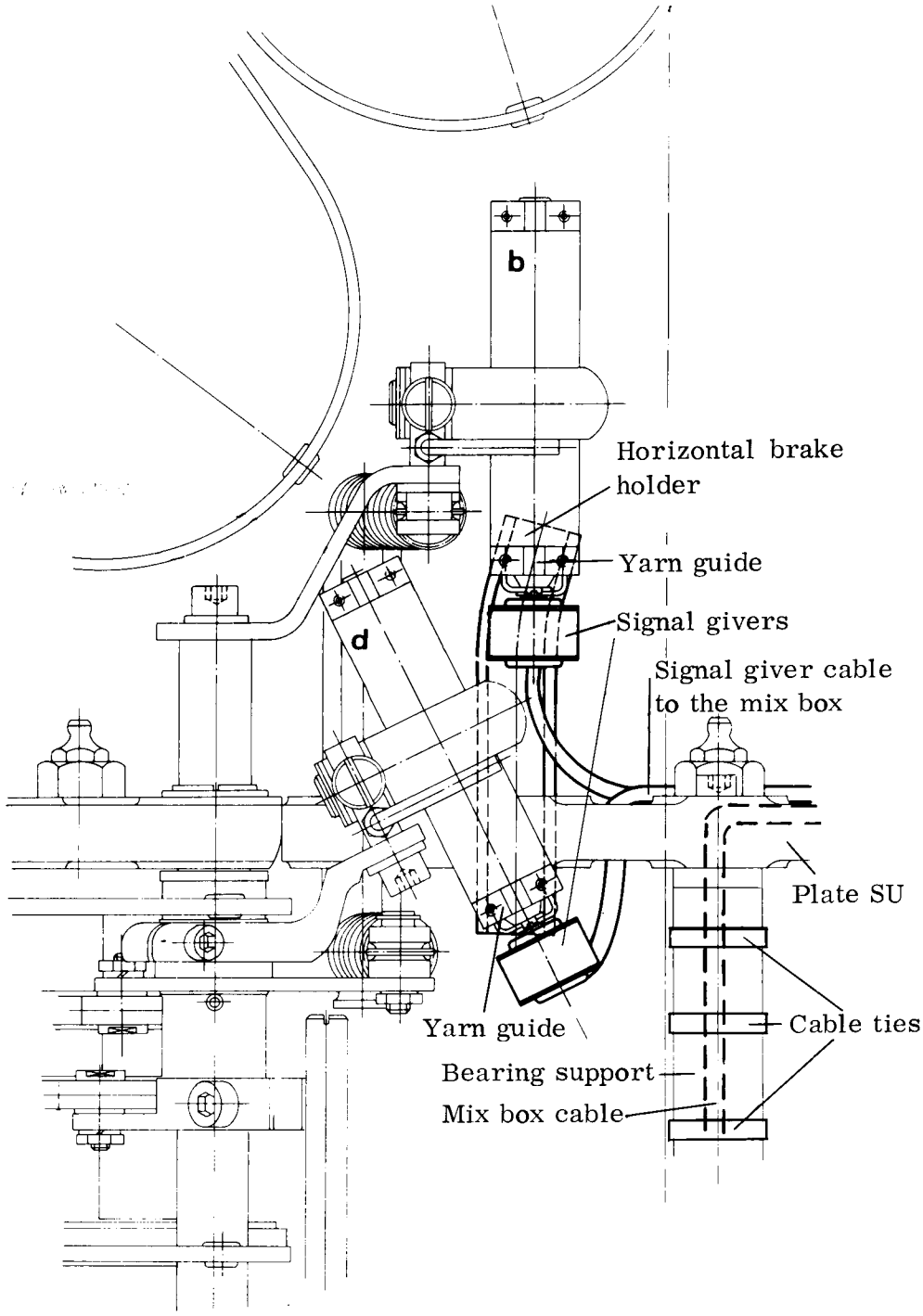
- Drill two 6,8 mm holes according to drawing and tap M8.
- Fit the box to the support with the four anti-vibration pads.
- Mount the box with the support to the Sulzer machine frame on the receiving side with two M8x20 screws, washers and tension washers.

c) Signal giver for SWM-ZS and VS



- Is to be fitted with a special nut, washer, tension washer and Allen screw.
- The signal giver cable is fastened to the brake holder with cable ties.
- On SWM-ZS and VS with spool shield 35° the horizontal brake holders have to be exchanged to an other type of brake holders due to lack of space for the signal givers.
- The yarn guides are to be fitted.
- The signal giver cables are drawn along the plate to the mixbox.
- The mixbox cable is drawn over the front bearing support to the machine frame on the picking side, down to and through the central girder.

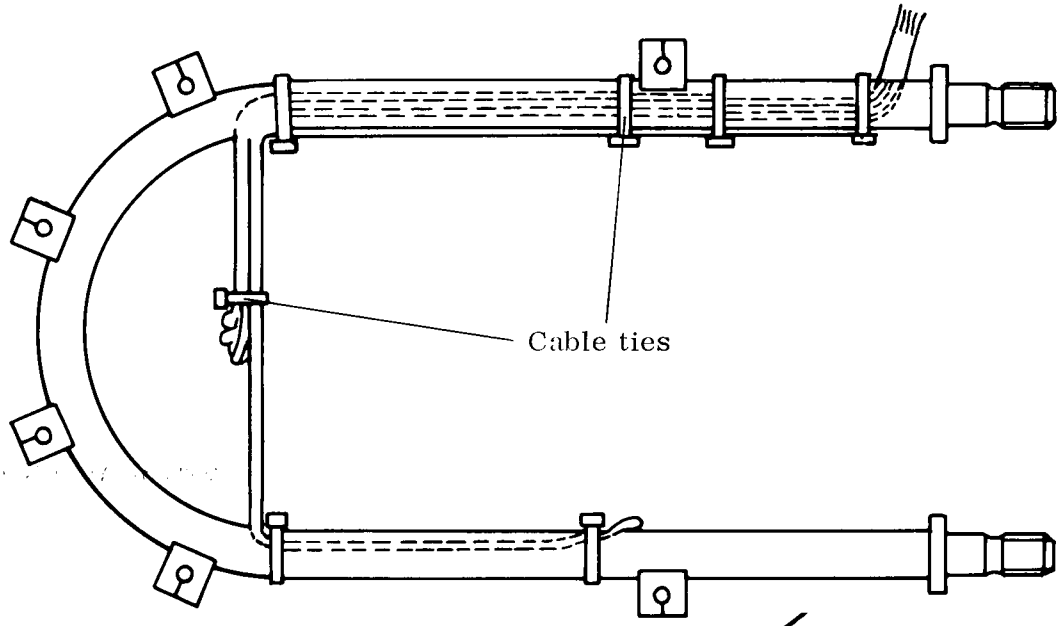
  The cable is fastened to the bearing support with 3 cable ties and with 2 cable ties to the kopex tube on the machine frame.



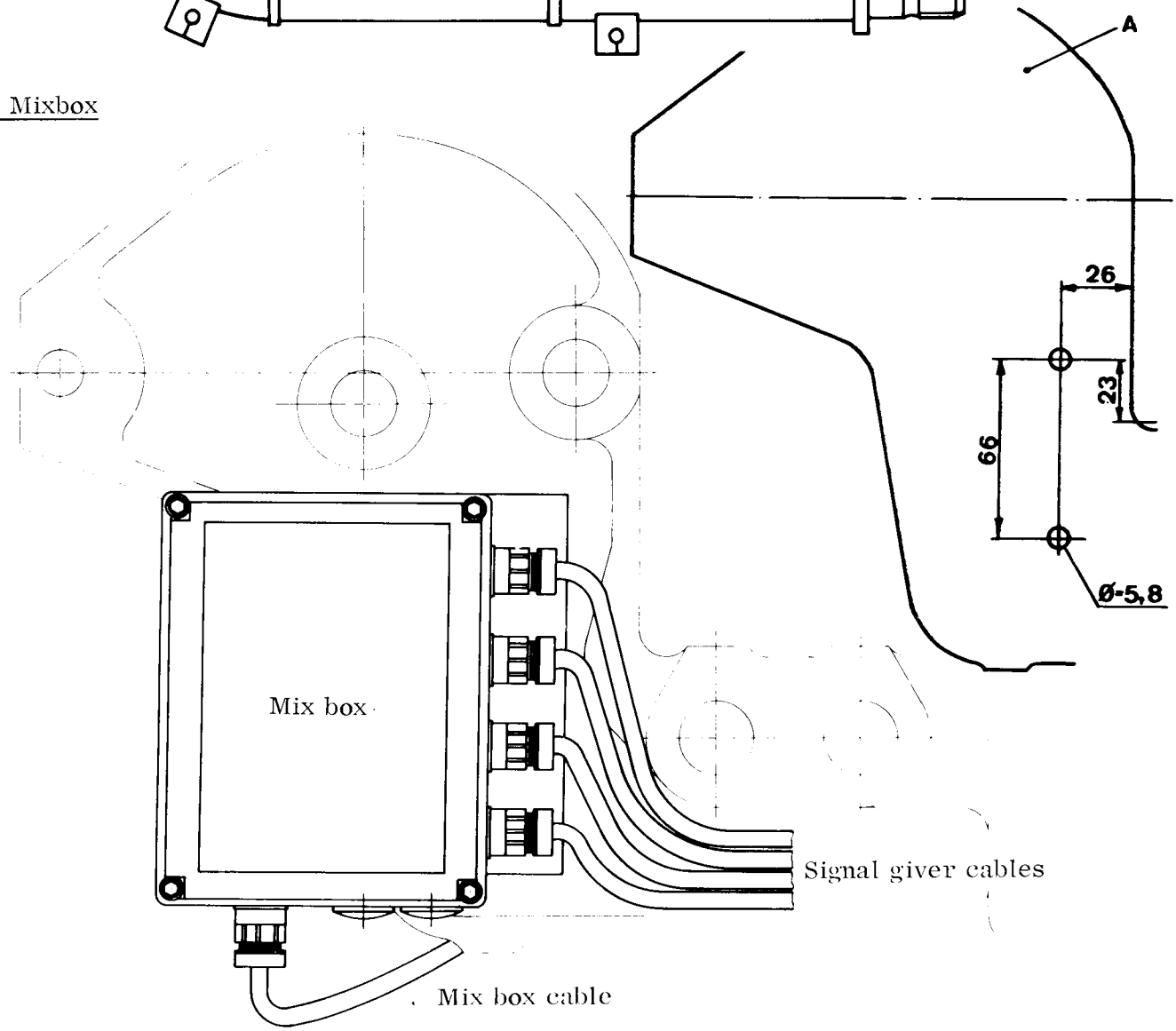
- Fitting the cables on the machine frame receiving side

- Dismantle the protection for the pulley.
- Fasten all the cables to the kopex tubes with cable ties.
- Make sure that the cables do not hang down on the motor.

- How to fasten the signal giver cables on a SWM-SSW 45°



e) Mixbox

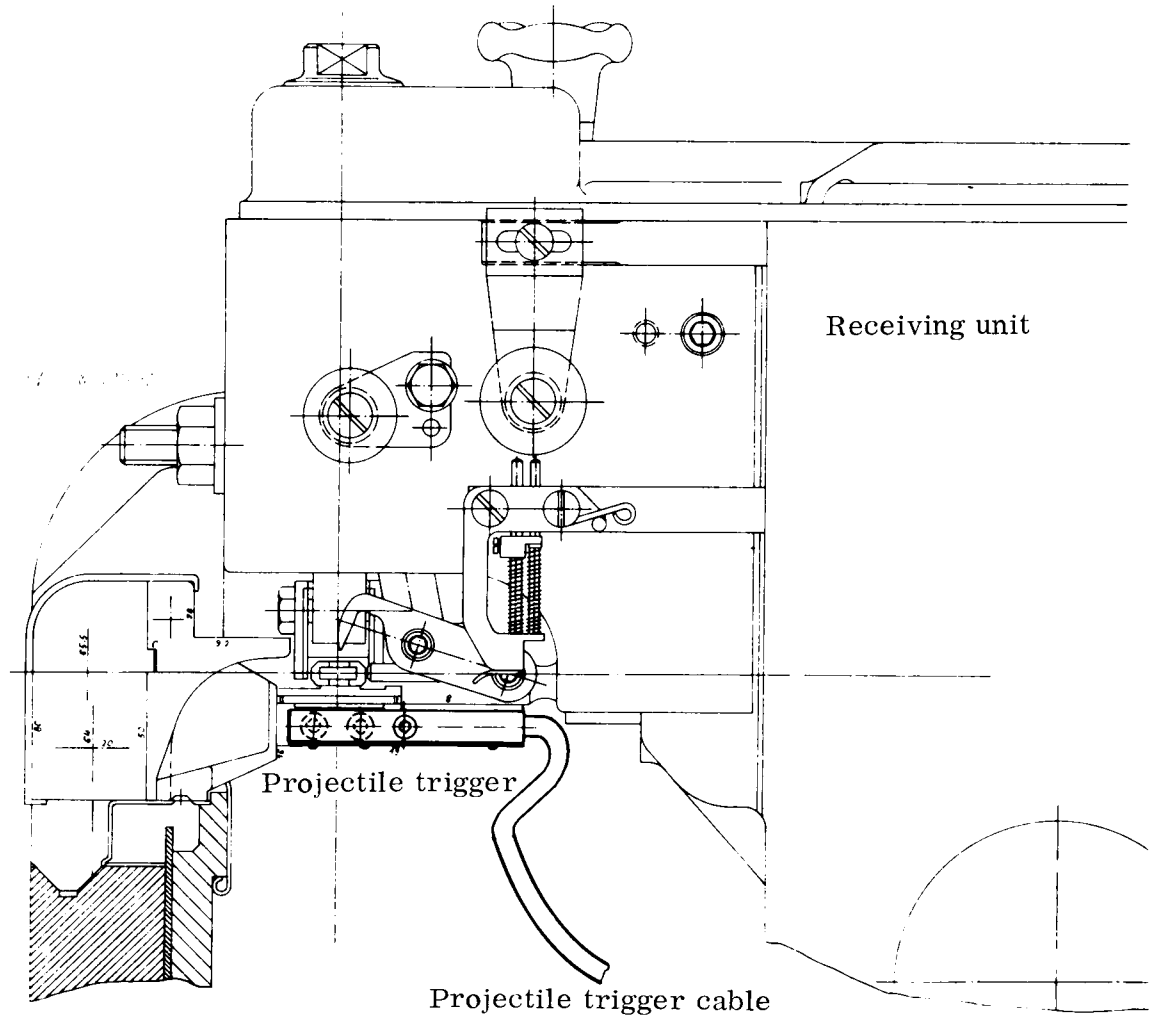


Drill 2 holes 5,8 mm in the plate SU according to drawing A.

- Fit the mixbox to the plate with Allen screws M 5x16 and lockwashers.

f) Projectile trigger

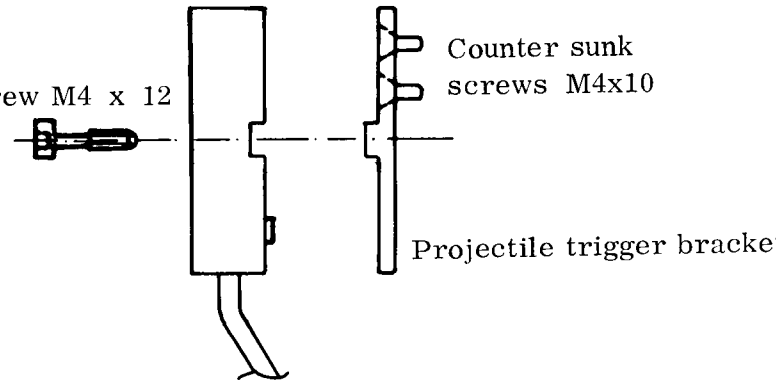
Figure A



- The projectile trigger is to be mounted at the same place as where the spring stirrup clamp used to be.
- Fit the projectile trigger bracket to the receiving unit with the two screws M 4x10. Figure B page 10.
- Mount the projectil trigger on the bracket and draw the cable under the receiving unit. Figure C page 10.
- Drill a hole Ø 3,6 mm in the receiving unit according to figure D page 10. Fasten the cable with a cable clip and a self-tapping screw.
- Make sure that the cable, when fitted, is not too stretched. It must not be in contact with the slay when the machine is in 50^{o}.
- Make sure that the guide tooth holder does not protrude outside the reed and that the guide tooth centering band does not touch the projectile trigger.
- The projectile trigger cable has to be drawn between the central girder and the machine frame on the receiving side down to the control box.

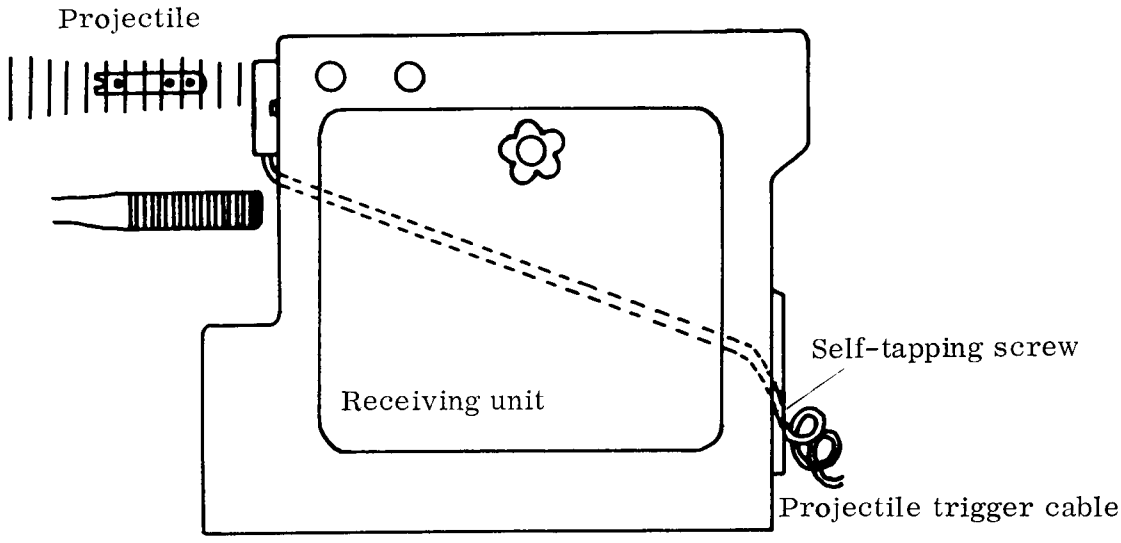
Projectile trigger

Figure B



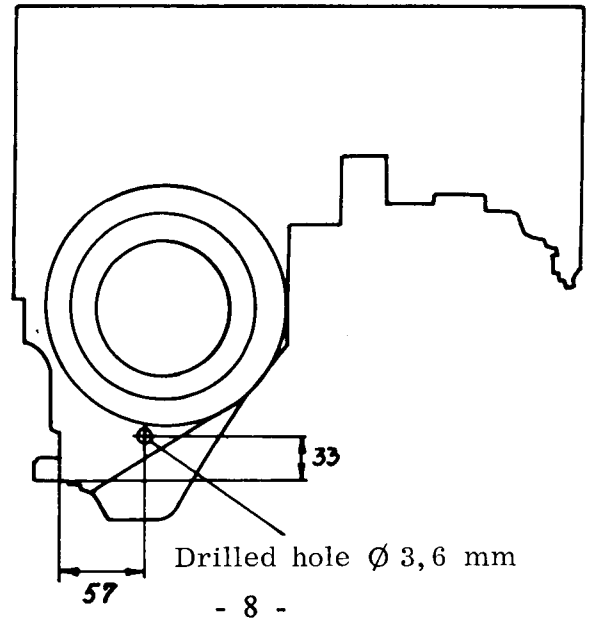
Projectile trigger

Figure C

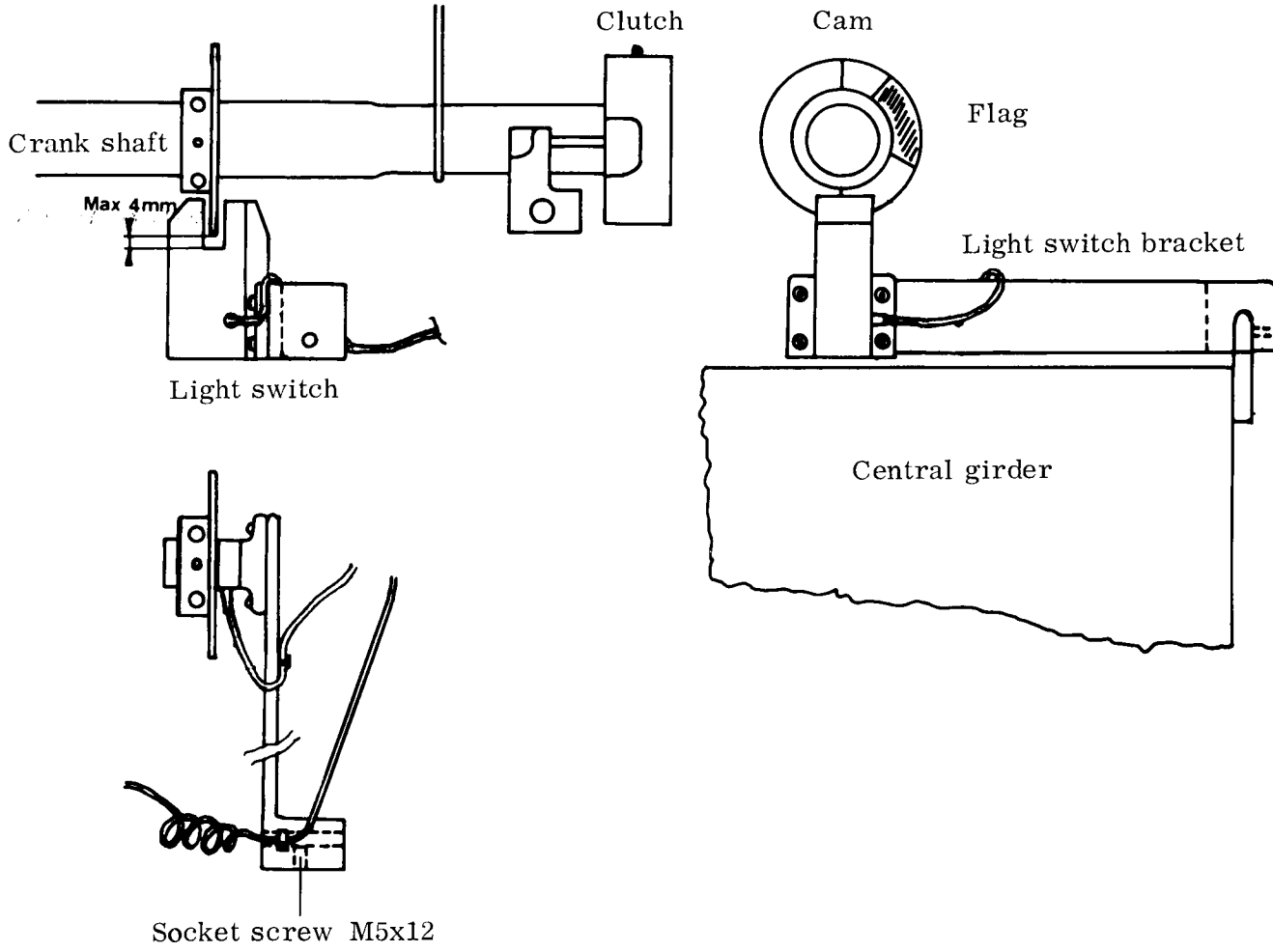


The cable is fastened with a cable clip and a self-tapping screw.

Figure D

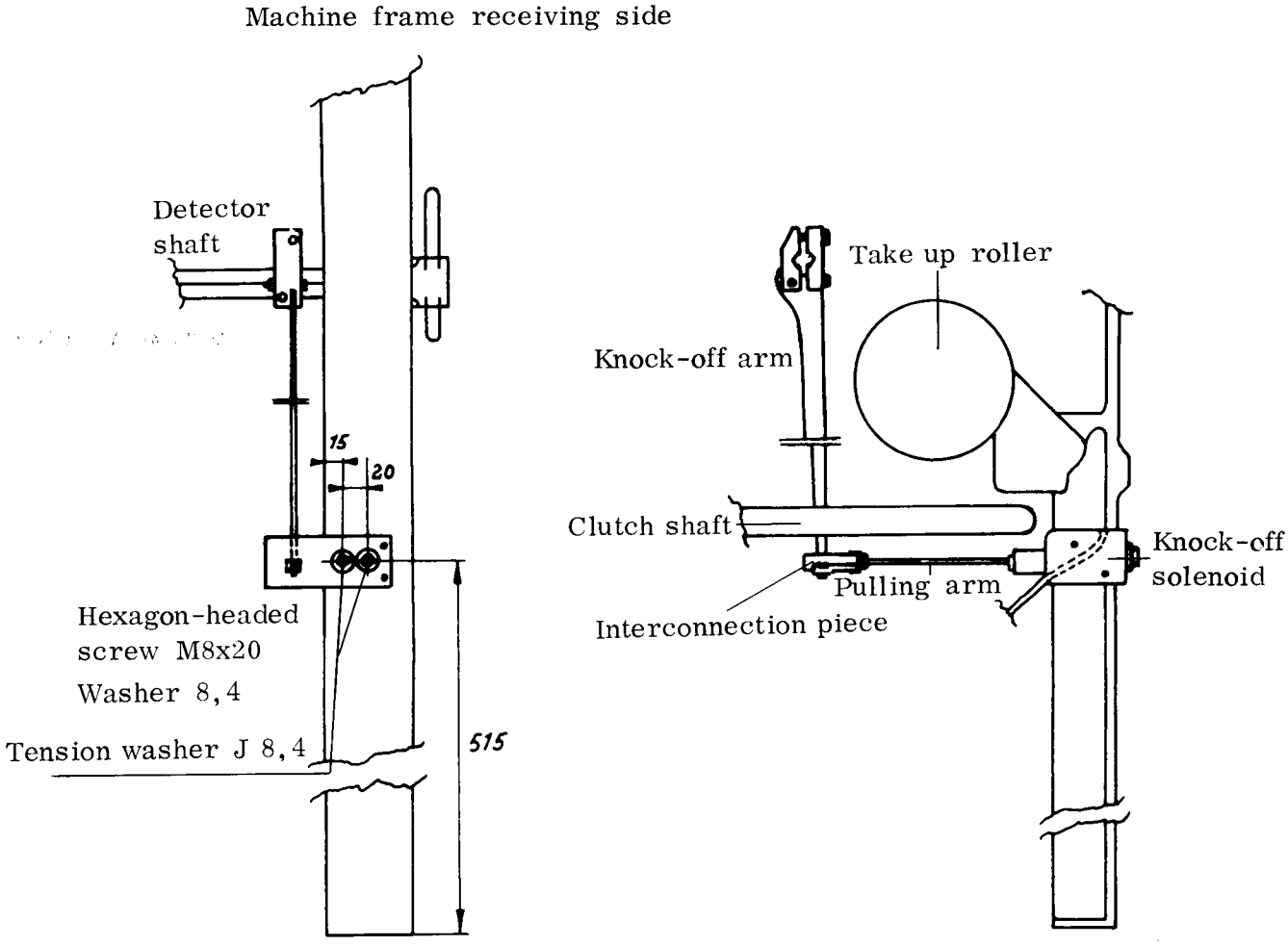


g) Light switch and cam



- The cam is fitted on the drive shaft on the receiving side of the machine and where the shaft has a diameter of 50 mm.
- Mount the light switch on the bracket.
- Fix the light switch bracket to the central girder with the socket screw M 8x12.
- The light switch cable is drawn between the central girder and the machine frame on the receiving side down to the control box.
- The distance between the cam and the light switch must be between 4 mm and 2 mm.
- The projectile trigger cable is fixed to the light switch bracket with a cable clip.

h) Knock-off solenoid and knock-off arm

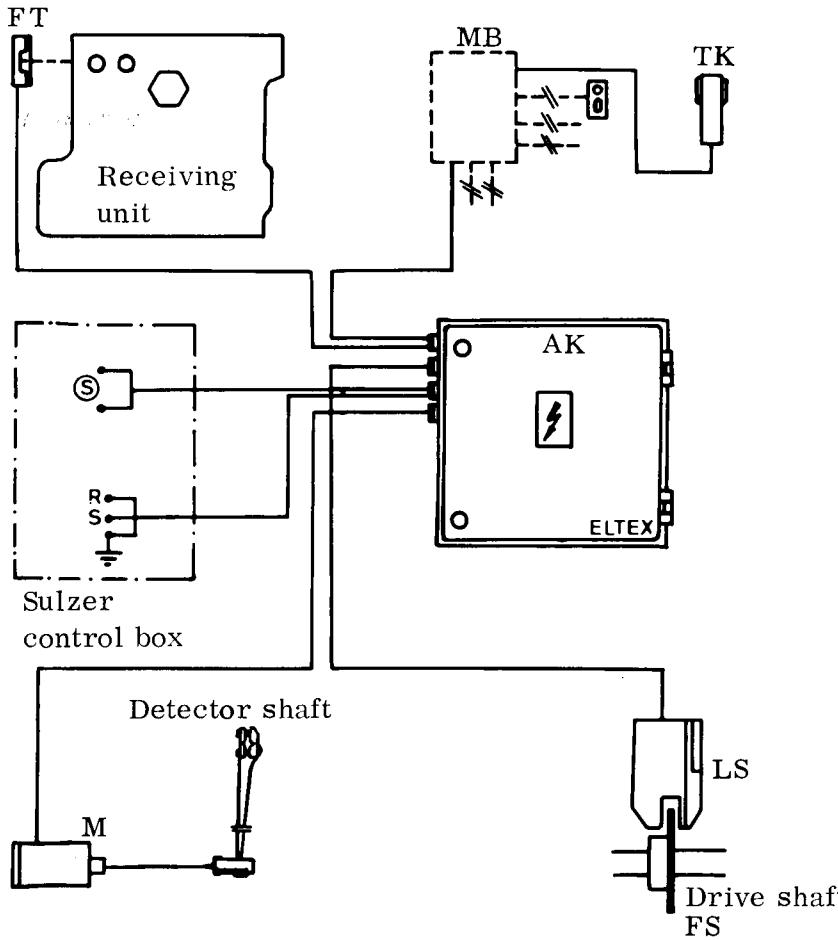


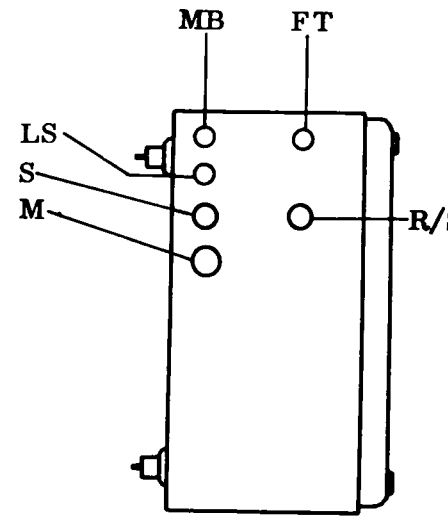
- According to figure drill 2 holes Ø 6,8 mm in the machine frame FA and tap M 8.
- Fix the knock-off solenoid with 2 screws M 8x20, washer and tension washer.
- Mount the knock-off arm on the detector shaft.
- Put the nut and tension washer on the pulling arm.
- Screw the pulling arm into the interconnection piece.

7. Electric connections

a) Cable inlets into the WSM-E control box

Control box

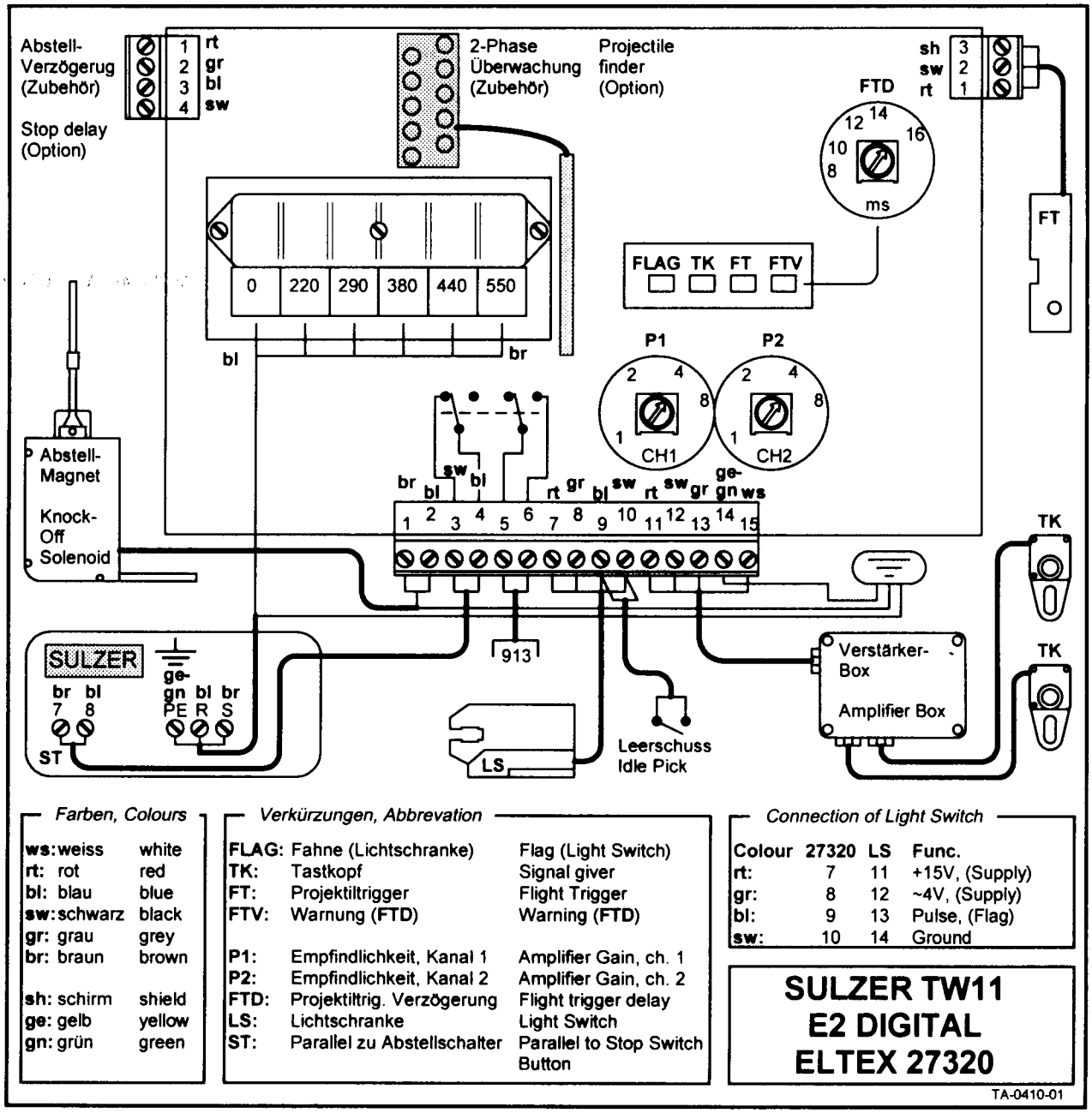




TK	=	Signal giver	MB	=	Mixbox
LS	=	Light switch	FT	=	Projectile trigger
M	=	Knock-off solenoid	AK	=	Control box
S	=	Fail safe	R/S	=	Mains connection
FS	=	Cam			

How to connect WSM-E to system 913 see page 24.

b) Connection plans for WSM-E 1 and WSM-E 2



Farben, Colours

ws:	weiss	white
rt:	rot	red
bl:	blau	blue
sw:	schwarz	black
gr:	grau	grey
br:	braun	brown
sh:	schirm	shield
ge:	gelb	yellow
gn:	grün	green

Verkürzungen, Abbrevation

FLAG:	Fahne (Lichtschranke)	Flag (Light Switch)
TK:	Tastkopf	Signal giver
FT:	Projektiltrigger	Flight Trigger
FTV:	Warnung (FTD)	Warning (FTD)
P1:	Empfindlichkeit, Kanal 1	Amplifier Gain, ch. 1
P2:	Empfindlichkeit, Kanal 2	Amplifier Gain, ch. 2
FTD:	Projektiltrig. Verzögerung	Flight trigger delay
LS:	Lichtschranke	Light Switch
ST:	Parallel zu Abstellschalter	Parallel to Stop Switch Button

Connection of Light Switch

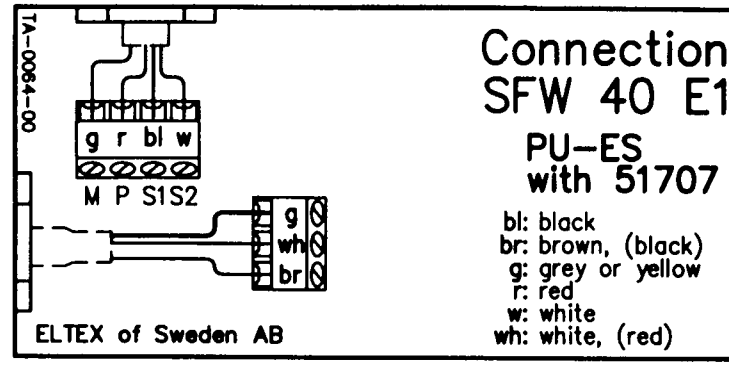
Colour	27320	LS	Func.
rt:	7	11	+15V, (Supply)
gr:	8	12	~4V, (Supply)
bl:	9	13	Pulse, (Flag)
sw:	10	14	Ground

SULZER TW11
E2 DIGITAL
ELTEX 27320

TA-0410-01

c) Amplifier box connection diagrams

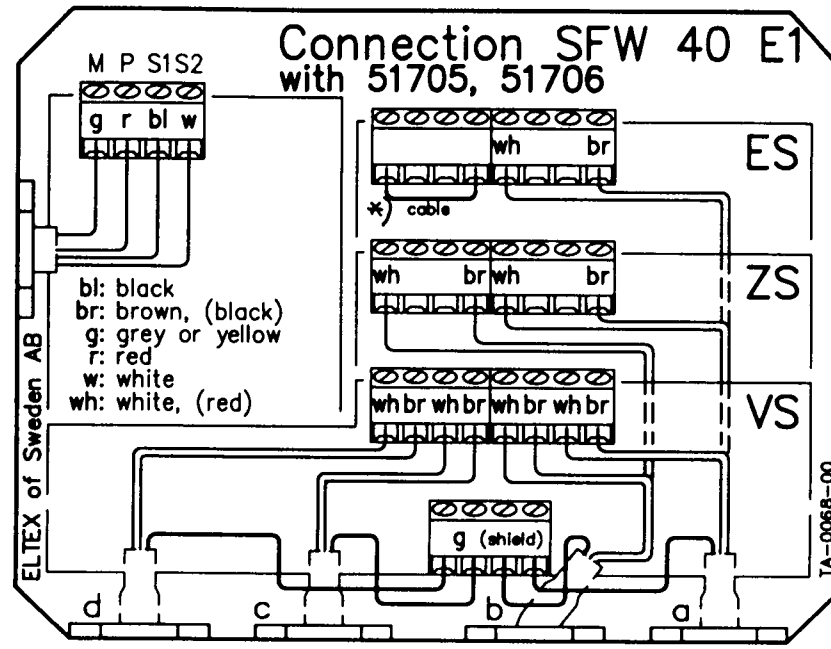
Amplifier box 53908, ES E1
with
Amplifier box plate 53906



Amplifier box 53918, ZS E1
Amplifier box 53919, ZS E1
with
Amplifier box plate 53916

This amplifier box can also be fitted on ES machines. On ES a jumper *) must be fitted.

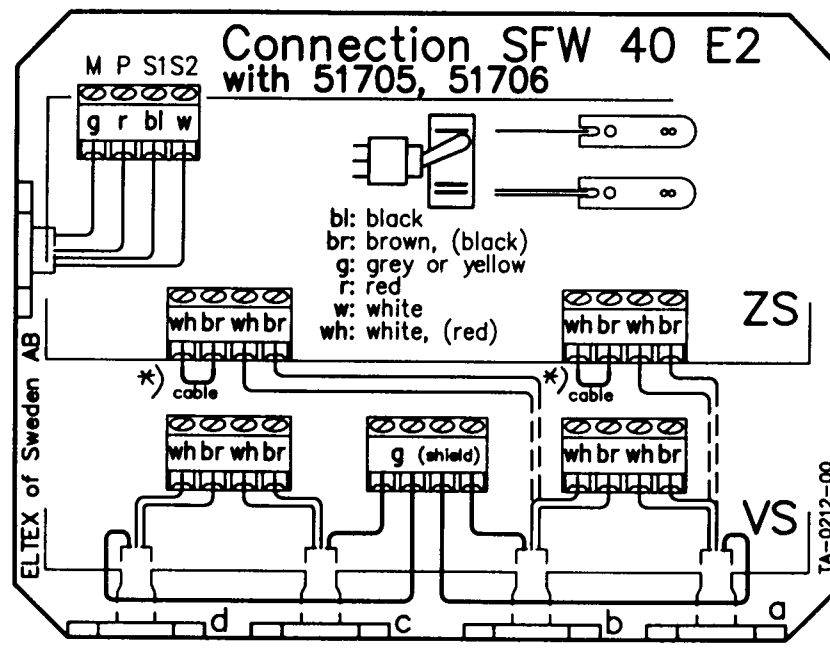
The jumper will prohibit harmful influence of interferences to the WSM-E.



Amplifier box 53948, ZS E2
Amplifier box 53949, VS E2
with
Amplifier box plate 53946

On ZS a jumper *) must be fitted.

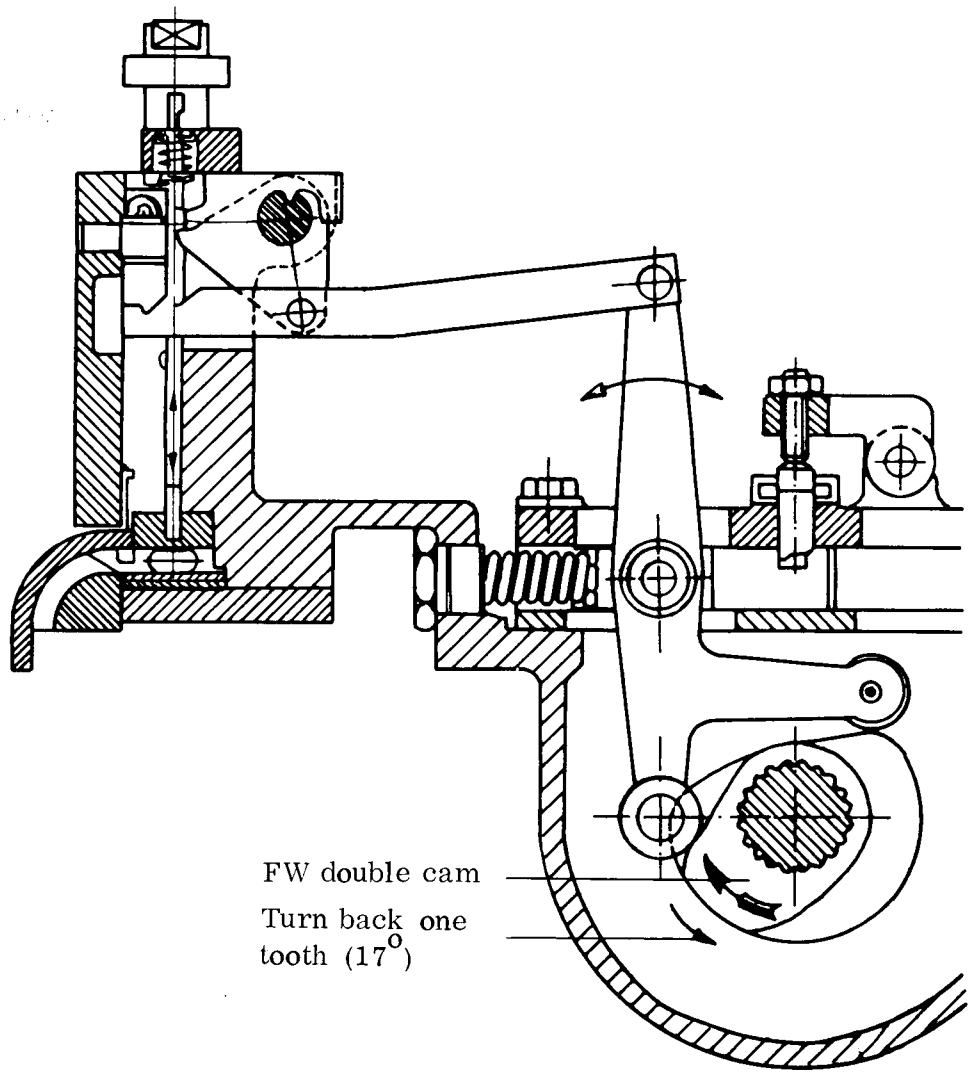
The jumper will prohibit harmful influence of interferences to the WSM-E.



8. Alternations on the SWM

a) Receiving unit

- To be able to reduce the tension of the tension rod and to increase the control phase and the flying time of the projectile, the FW double cam has to be turned one tooth back (17^{o}).
  On machines without mecanical weft stop motions on the receiving side this has already been done.



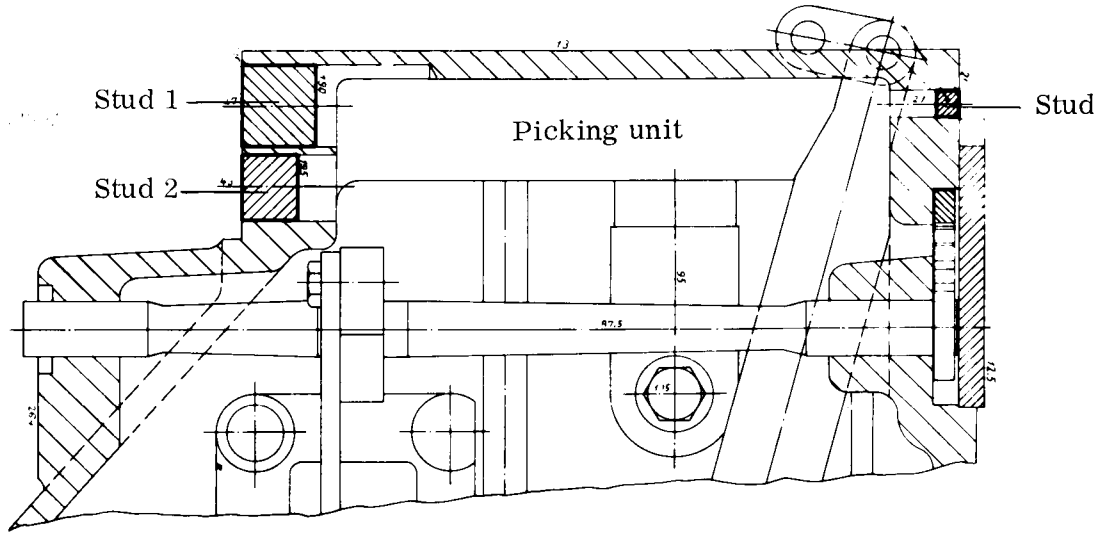
b) Horizontal brake support

- Due to lack of space on the SWM-ZS and VS with 35^{o} packaging shield other horizontal brake supports have to be fitted. Compare page 5.

c) Dismounting of the mechanical WSM-SU and WSM-FA

- The mechanical WSM at the picking and receiving sides have to be removed.
- The remaining holes have to be filled with:

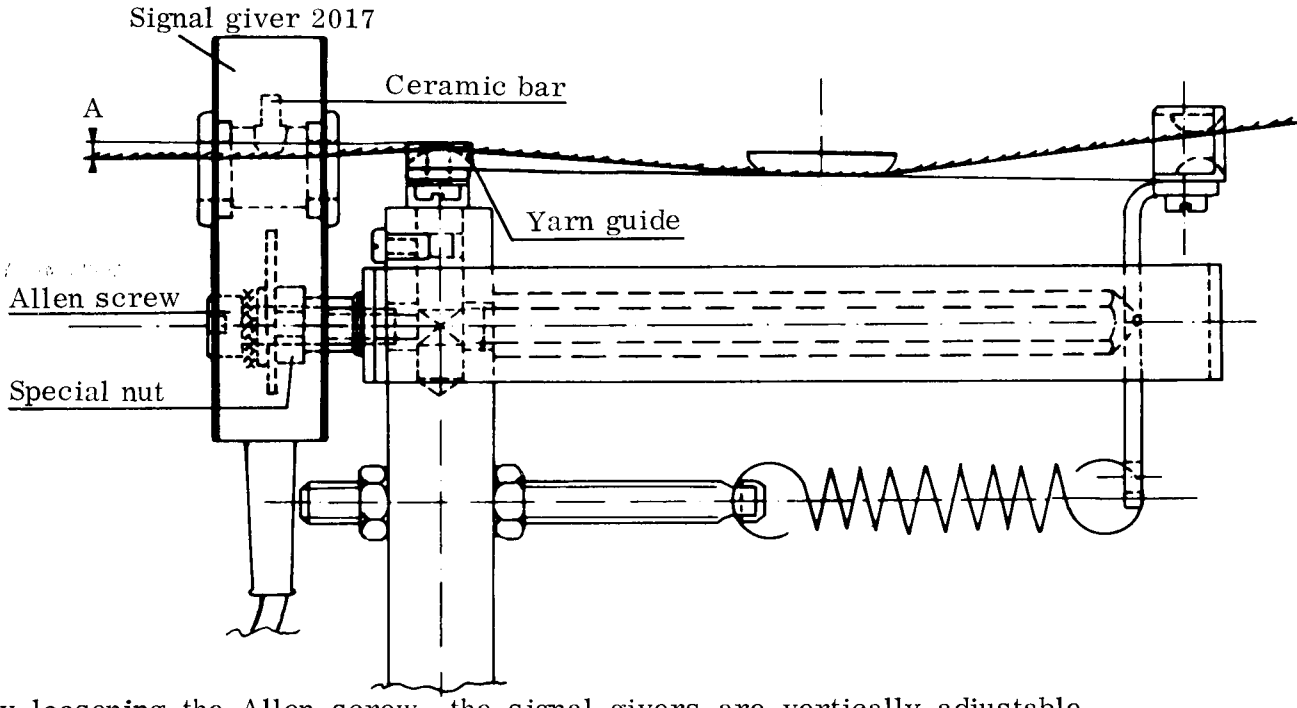
- Stud 1
- Stud 2
- Stud 3



9. Adjustments on the WSM-E

a) Signal givers

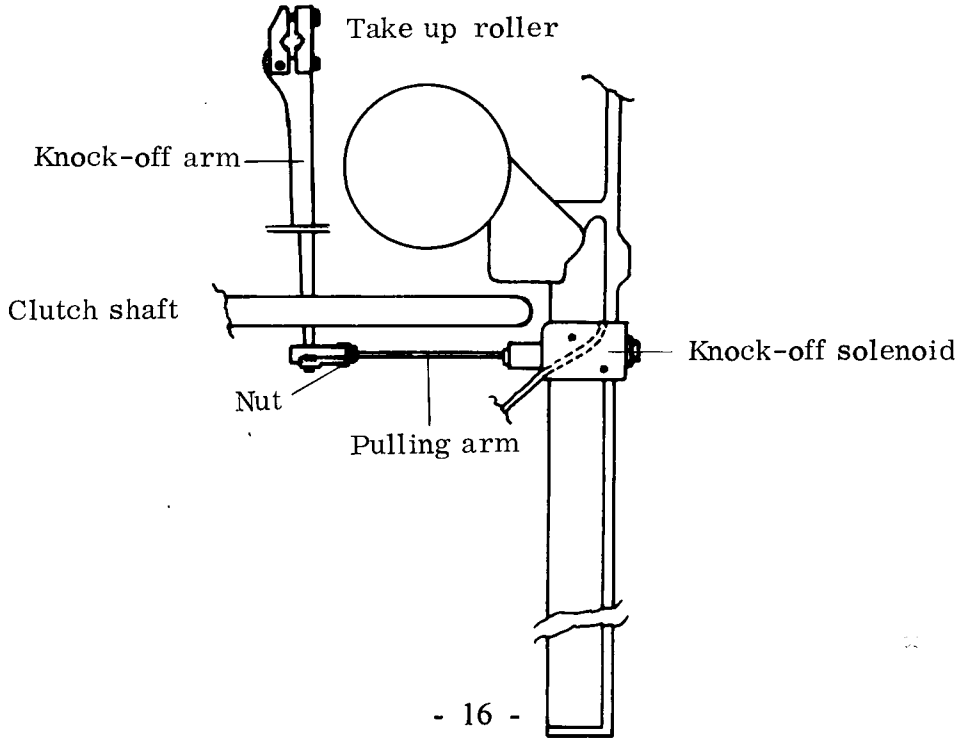
- Make sure that the yarn passes the ceramic bar with as small an angle as possible.
- Measure A roughly 2 mm.
- Coarse yarns – smaller angle.
- Fine yarns – larger angle.
- However, if the machine is subject to a false stop, the angle must be increased. On signal giver 2011 this is accomplished by lowering the yarn guide.



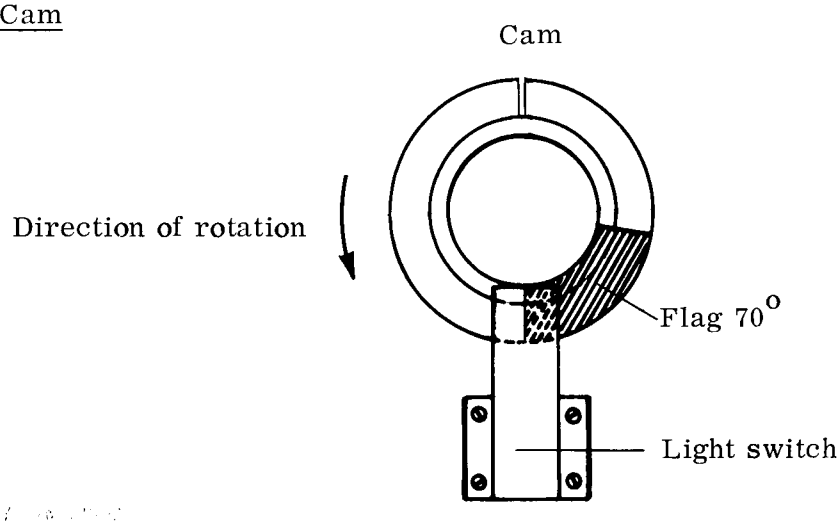
By loosening the Allen screw, the signal givers are vertically adjustable to get the correct angle of the yarn when it passes the ceramic bar.

b) Knock-off arm and solenoid

- Block the starting switch with the pin.
- Pull the handle.
- Screw the pulling arm into the interconnection piece and adjust the knock-off arm free of play. Then secure the setting with the nut on the pulling arm.



c) Cam



- Turn the machine to 310°.
- Secure the SWM with the pin at the switch and pull the handle.
- Turn the cam in the light switch in the opposite direction to that the main shaft is moving until the knock-off mechanism pulls.
- Fix the cam to the shaft in this position. Make sure that the cam is in the middle of the slot of the light switch.
- When weaving an extremely narrow cloth the above mentioned adjustment has to be done at 290° instead. Otherwise the projectile will pass the projectile trigger before the cam enters the light switch.

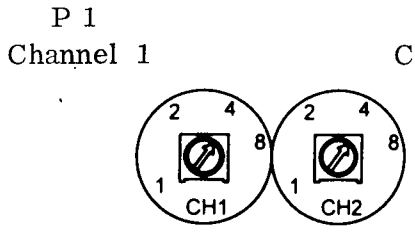
d) Potentiometer

The settings of the potentiometers should be changed when the weft yarn is changed or the width of the cloth is altered. Be aware that the setting is not too high. If this is the case it is not to be guaranteed that the machine is brought to a stop if the yarn is broken.

WSM-E 2 (2 channels)

- Turn both potentiometers to 10.
- Make the machine run.
- Adjust channel 1 and then channel 2 as follows:
- Slowly turn the potentiometer counter clockwise until the machine stops.
- Then turn it back one notch.

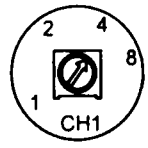
If then the machine stops without a reason turn the potentiometer clockwise so the machine runs without false stops.



WSM-E 1 (1 channel)

- Setting as for WSM-E 2.

P 1
Channel 1



Notice:

- When a plate E 2 is used in a SWM-ES only the 1st channel is used. (Connection drawing WSM-E 1 page 14)
  Now the potentiometer for the 2nd channel should be turned down to 5 and the switch in position I.

e) Mains supply

- Make sure that the connections on the transformer corresponds to the voltage used.

  Possible voltages 220 V, 290 V, 380 V, 440 V, 550 V, -10 +20 %.

f) Double weft insertion (WSM-E 2)

- When weaving double insertion the switch on the E 2 plate has to be in position II.
  Do not forget to turn the switch back into position I when weaving single weft insertion again.

10. Adjustments on the SWM

a) Torsion rod

- Lower the tension of the torsion rod until the projectile arrives too late at the receiving side.
- Increase the torsion so the projectile arrives just on time and then increase the torsion another degree.

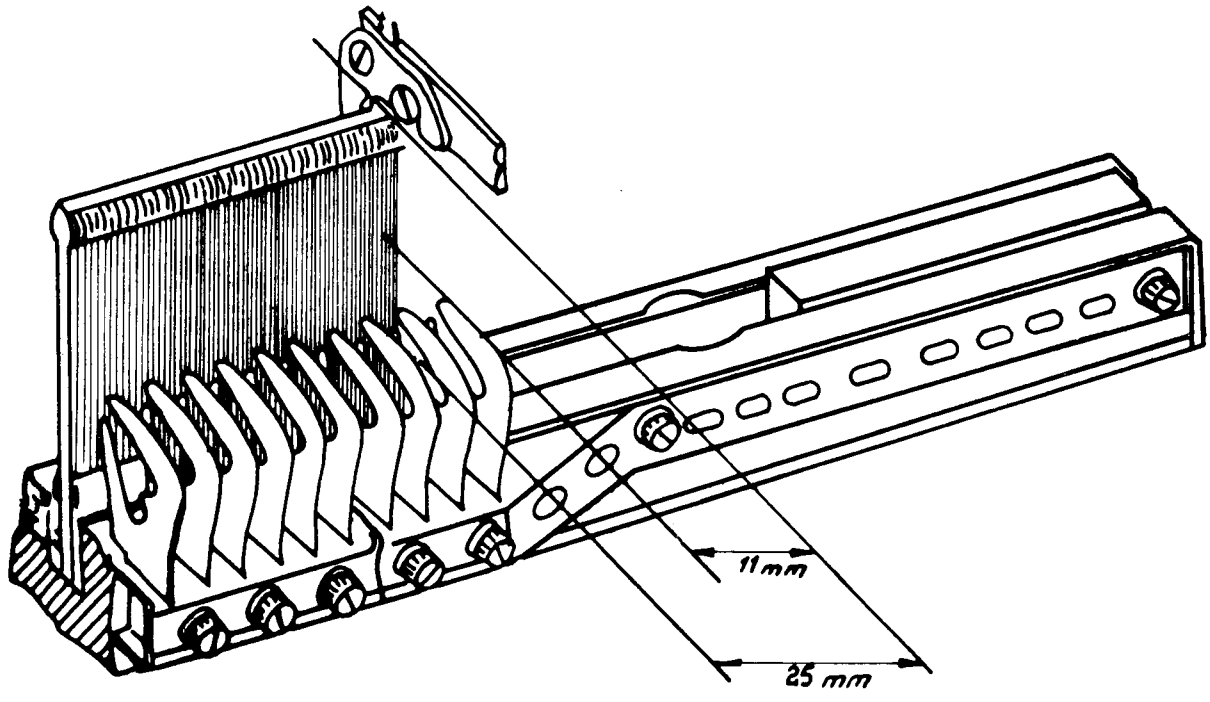
- It is possible that the rod torsion is at its minimum but the projectile is still arriving at the receiving side in time, due to the reduced weft tension.
- In this case speed should be increased to the maximum recommended by Sulzer. You also have the opportunity to install the tension rod with play after speaking to Sulzer.

b) Weft brakes

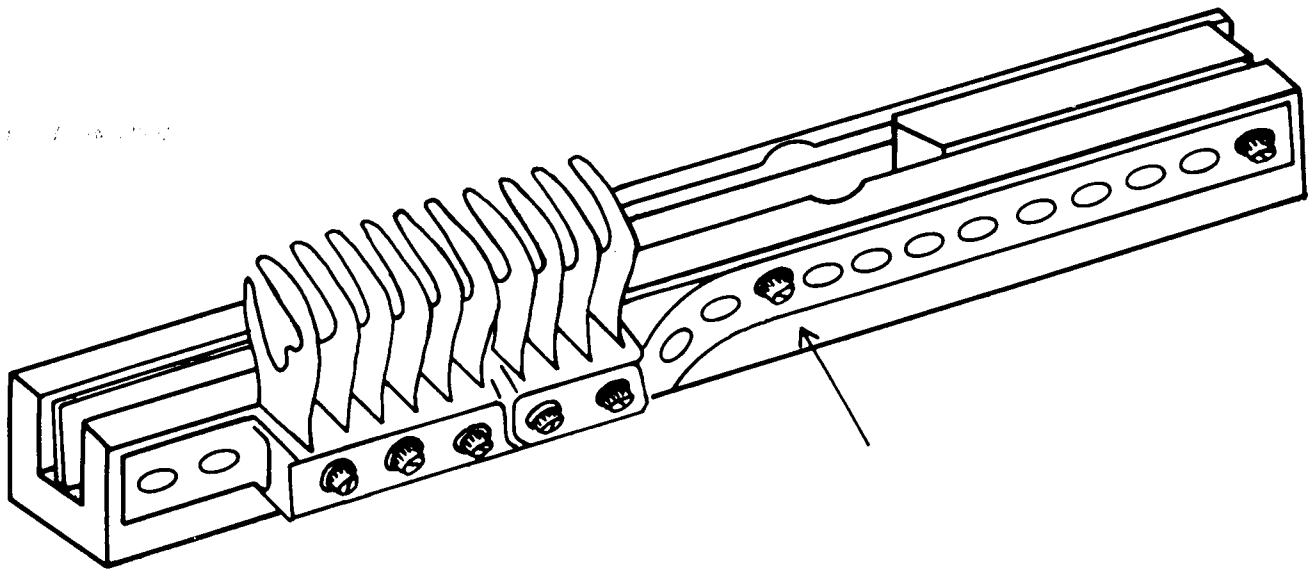
- Reduce the braking of the weft yarn until the ends at the receiving side of the weft are not longer properly tucked in.
- Slowly increase the braking till you get a good selvage. Also make sure that no transfer faults will occur.
- The strong braking that occurs between 305^{o} and 320^{o} should be avoided as much as possible. During this period the weft yarn is no longer controlled and the tension must be as low as possible to avoid undetected weft yarn breaks.
- The strong braking can be avoided by turning the filling brake stop bolt towards the roller lever.
- Loop brakes, filling brakes with 2 brake shoes and with 2 fingers can not be used but only filling brakes with one brake shoe.

c) Adjustment of the width of fabric

- The distance between the last guide tooth and the selvedge gripper on the receiving side must not be less than 11 mm. The maximum distance must not exceed 25 mm.



- At the receiving end the guide tooth holder must not protrude over the end of the reed. This will damage the projectile trigger and very problably destroy it.
- Only guide tooth holders with even numbers, 4 and 6, may be used.
- When fitting the guide tooth centering band, the first screw has to be put in the third hole and then one screw every 10th cm.
- Before the receiving unit is pushed over the guide tooth the projectile trigger has to be removed from the receiving lock.



d) Warp detector stopping point

- If there will be transfer faults when the machine is stopped at 270^{o} by the warp stop motion due to too little braking of the weft yarn, the cam disc. has to be turned so the machine stops later. The loom must not, however, be brought to a stop later than 300^{o}.

11. Control of stopping distance and test-run

- To prevent the WSM-E to stop the machine during stopping distance control and test-run when weaving without a yarn act as follows:
- Dismantle the light switch support with the light switch from the central girder and fix it beside the cam.
- After removing the light switch from the flag the WSM-E will not be activated and the machine can be run without filling and will not stop due to the WSM-E.

Control of the braking distance

- Dismount the light switch support as described above.
- Turn the machine to 50^{o}.
- Take away 2 conveyor cover plates on the receiving side and remove 2 projectiles.
- Run the machine and it will be stopped by the weft carrier detector when there is no projectiles coming.

- Notice at which degree the machine stopped.
- Turn the SWM by hand and it will stop again when the 2nd projectile is missing.
- Notice at which degree the machine stopped.
- The difference between these two values is the stopping distance.
- Braking tolerance of 25^{o} to 30^{o} are acceptable.
- Adjustments are to be made as in WEV, page 04 - 4/5/6.
- Put back the two projectiles and the cover plates.

12. Fail safe

- The fail safe circuit will stop the SWM over the warp stop solenoid if any defects should occur in the WSM-E.
- This is accomplished by connecting the WSM-E in parallel to the stop button. (See drawing page 14)

13. How to check the WSM-E without a checking device

- When checking the WSM-E the machine is not to be running.
- During the checking procedure the single double switch on the E 2 plate is to be in position I and the potentiometer or potentiometers should be in position 10.

a) Light switch

- Interrupt the light beam with the flag or an opaque object.
- Then the relay on the plate E 1 / E 2 must fall and the knock-off arm pull.
- When the relay falls, but the knock-off arm does not pull, the fault is to be found in the knock-off mechanism.

b) Signal givers

- Pull a yarn through the signal giver with continous speed and make sure that the yarn is in contact to the ceramic bar all the time.
- When the yarn is pulled break the light beam in the signal giver as above. Now the knock-off mechanism must not pull.
- As soon as the yarn stops moving the knock-off mechanism must pull.

c) Knock-off magnet

-According to the light switch check.

d) Projectile trigger

- Turn the SWM until the flag goes into the light switch.
- Now the relay on the plate E 1 / E 2 has to fall and the knock-off mechanism has to pull.
- Then rapidly pass a metallic object over the projectile trigger to imitate the projectile flying over, Now the relay has to draw.
- The same procedure as in 14 c can be used too.

14. Voltage check

Connection No.		
	1	+ 120 to + 170 V DC
	2	
	3	Relay contact for the fail safe
	4	
	5	Relay contact for system 913
	6	
	7	+ 15 V DC
	8	4 V AC
	9	Pulse from the light switch
	10	Ground
	11	+ 15 V DC
	12	Different DC voltage channel 1
	13	Ground
	14	Ground
	15	Different DC voltage channel 2

All measurements made to ground.
Ground connections = 10, 13, 14 or ground terminal.

15. The WSM-E works improperly

a) The machine is stopped by the KFW-solenoid (fail safe)

- The knock-off solenoid is not adjusted, defect or its connections are loose.
- Make sure that the mains supply is correctly connected.
- The electronic plate is defect.

b) False stops between 0° - 360°

- The setting of the flag is incorrect.
- Light switch or cam is very dirty.
- The pulling arm is too far screwed into the interconnection piece.
- Light switch is defect, cable broken or its connections are loose.
- The electronic plate is defect.

c) False stops between 250° - 330°

- Potentiometer setting too low.
- The signal giver is defect.
- The yarn deviation in the signal giver is too small.
- When weaving with single weft insertion the switch on the electronic plate E 2 is in position II instead of I.
- Broken or short-circuited cable in the mixbox, signal giver or projectile trigger.
- The electronic plate, projectile trigger plate or mixbox plate is defect.
- The setting of the torsion rod is too high or the flag leaves the light switch slot too late.
- The weft brake setting too weak.
- Wrong setting of the flag.

d) False stops between 310° - 350°

- Weft carrier brake setting is too early.
- Projectile trigger defect.
- Check the projectile trigger connections.
- Projectile trigger plate is defect.

e) Undetected weft breaks in the cloth

- Potentiometer setting too high.
- When using double weft insertion the switch on the electronic plate E 2 is in position I instead of in position II.
- Make sure that the flag is correctly adjusted as to degree and play in the light switch slot.
- The torsion rod setting is too high.
- Mechanical vibrations are fed to the signal giver.
- The knock-off arm is not adequately adjusted.
- Light switch, signal giver or mixbox is defect.
- Electronic plate is defect.

f) The machine is stopped in case of weft break one pick too late by the WSM-E

- Check the adjustment of the knock-off arm and the connections of the knock-off solenoid.
- The electronic plate is defect.

16. Maintenance

- Once a week make sure that the light switch and the cam are clean.
- Blow the signal givers clean when they are dirty. (The machine should not be running as undetected broken picks may occur)
- Once a month check the adjustments of the knock-off arm and cam.

17. Different possibilities

a) Connection to System 913

When connecting the WSM-E to System 913 the following changes have to be done:

1. Instead of the two-wire fail safe cable a four-wire cable has to be drawn to the WMK-7 and to be connected as follows:
   WMK-7 connection No. 60 blue and 61 green.
   WSM-E connection No. 9 blue and 10 green.
2. The connection between terminal No. 17 in WAK and connection No. 60 in WMK-7 is to be changed to connection No. 61 in the WMK-7.
3. A connection has to be made in the WMK-7 between connections Nos. 39 and 60 with the furnished green cable.
4. In the central unit the input circuits on the corresponding input boards have to be made by personnel from the Abt. Industrielle Elektronik.

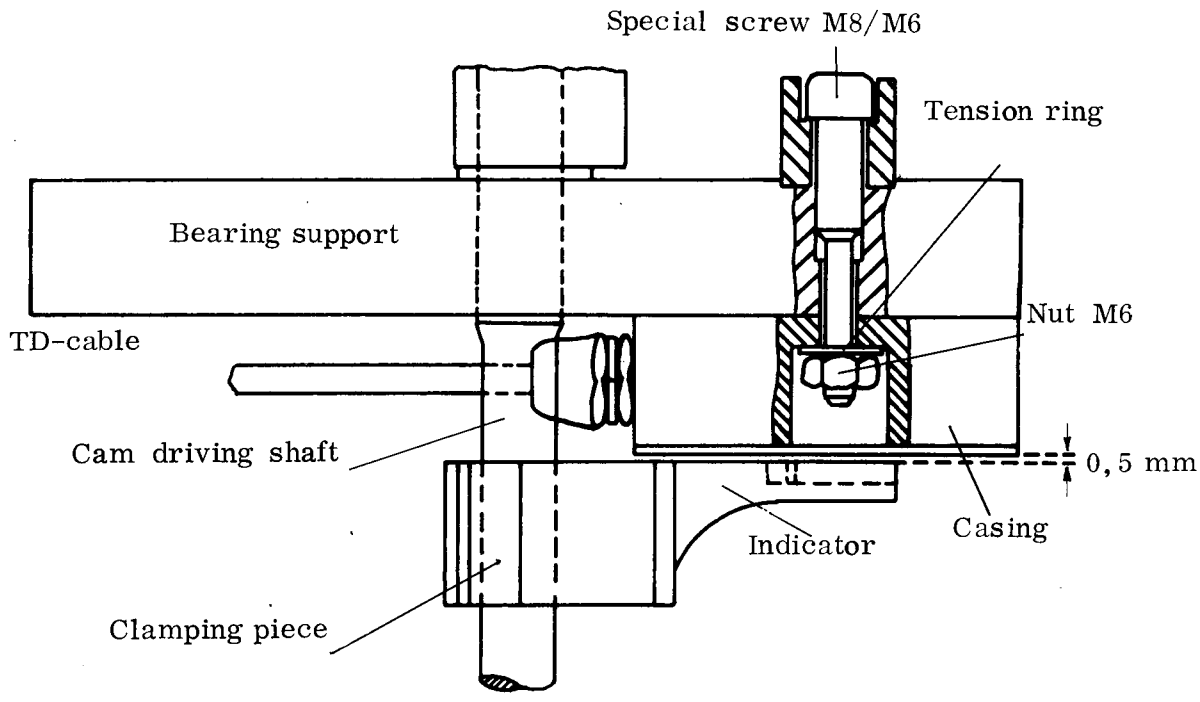
b) Empty weft device

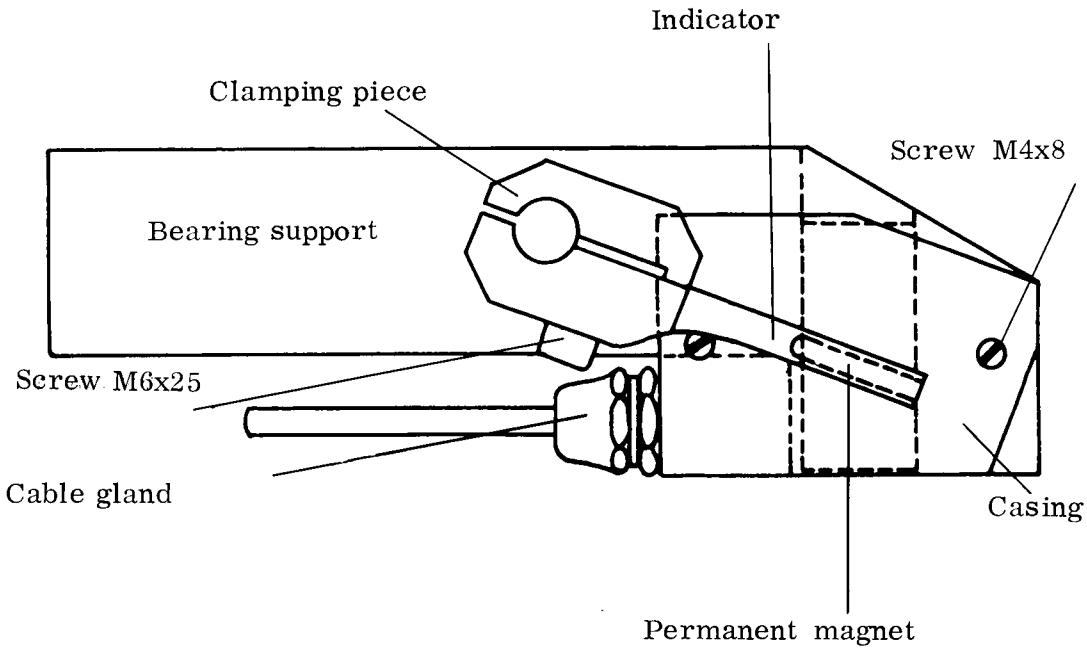
Colour a SWM-VS. Fitting and adjustments.

- Mount the mantle on the front bearing support with the special screw M8/M6.
- Fix the fitting clamp with the complete pointer to the cam driving shaft.
- Draw the TD cable to the SFW-E control box in the same way as the mix-box cable is drawn.

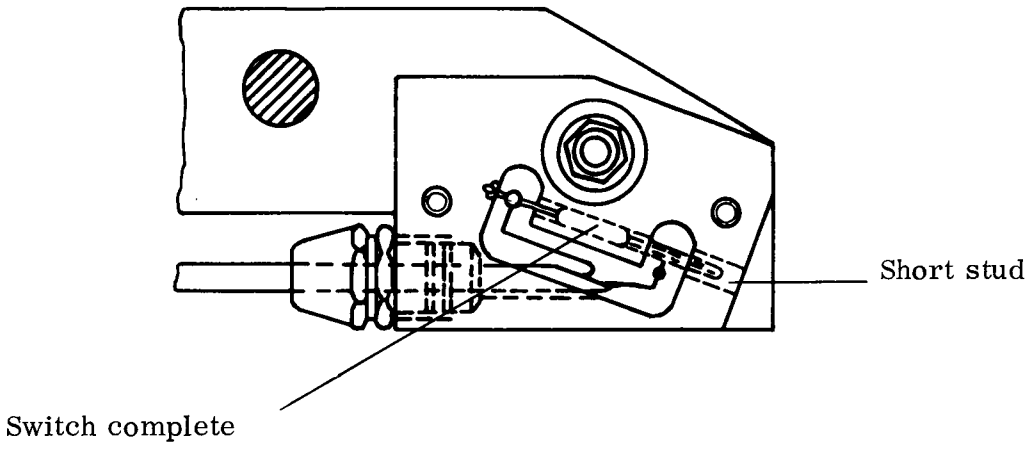
Connections according to diagram on page 14.

- Adjust the play between the mantle and the pointer to 0,5 mm.





- The 23 mm distance between the upper edge of the mantle and the pointer has to be adjusted with the machine in picking position a.



- Cover of the mantle

Weft colour a SWM-SSW. Fitting and adjustments.
To a SWM-SSW the following parts are to be used:

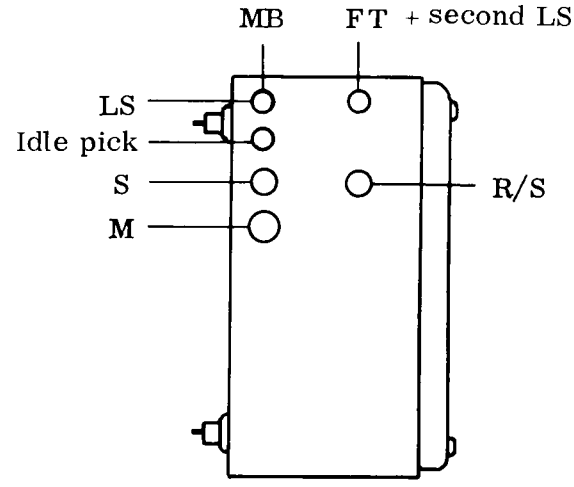
1 LP-Speisung with idle pick.
Connect the cable to connectors 13 and 14.

The connections in the WSM-E control box according to diagram on page 14.

Cable inlets to the WSM-E control box see drawing below.

1 TD cable
1 cable gland for the mantle

LS	Light switch
M	Knock-off solenoid
S	Fail safe
MB	Mixbox
FT	Projectile trigger
R/S	Mains connection



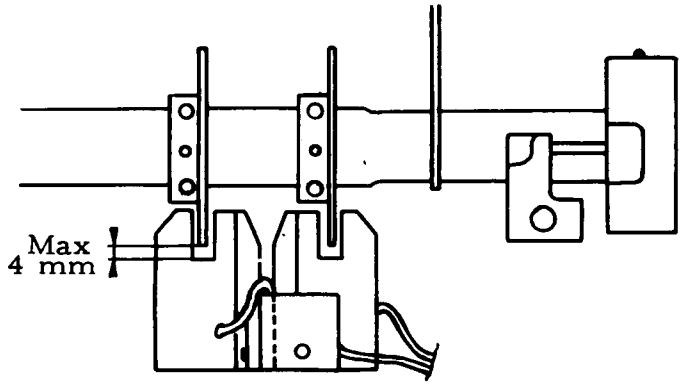
c) How to connect a second light switch

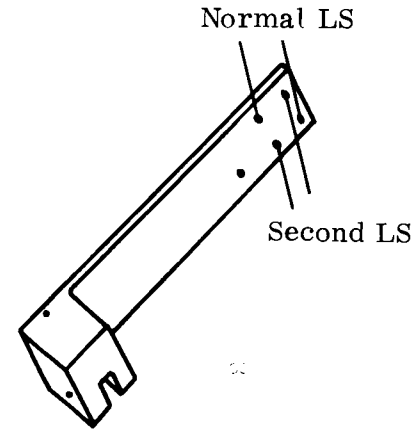
A second light switch is used when the machine is to be stopped at a certain degree.

The following parts are to be used:
1 Light switch
1 Cam
1 Edge connector 6-pol

Fitting and adjustments

- Mount the cam on the main shaft without tightening the screws.
- Fix the second light switch to the existing bracket with two of the washers and screws M3x10 used for the regular light switch.

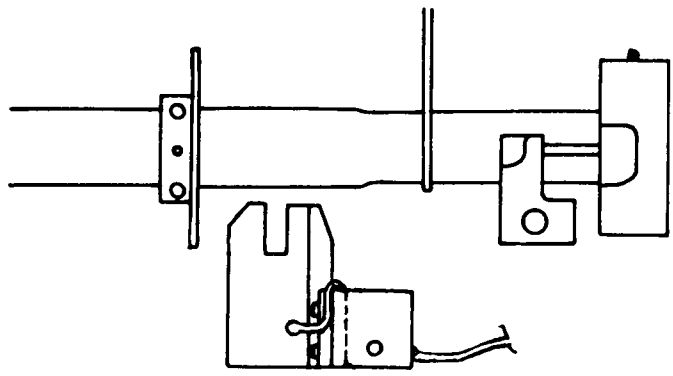




- The cable has to be drawn between the central girder and the machine frame FA, down to the control box and through the cable gland used for the light switch into the box.
- Connect the cable to the 6-pol edge connector according to the drawing in the box.
- Stick the edge connector to the plate.
- Turn the machine to the desired stopping point minus roughly 25^{o} - the braking distance.
- Turn the cam in the second light switch in the same direction as the shaft is rotating till the flag breaks the light beam.
- Now fix the cam in this position.
- Run the machine and make sure that it stops at the desired degree when the weft thread is broken.
- Perhaps minor adjustments of the setting of the flag have to be done.

18. How to disengage the sensing

Remove the light switch bracket and mount it beside the cam on the central girder. (Page 22)



Light switch with bracket

Eltex of Sweden AB
is an innovative company manufacturing and marketing high-technology electronic equipment.
The company was founded in 1964 and has affiliated companies in many countries.

Eltex of Sweden is the market leader in the world of electronic
yarn movement detectors and yarn tension monitors for textile machines.
We have a large range of control equipment and load limiters for electrical heating systems.
Eltex also manufacture data acquisition systems for online operation and small data loggers
for temperature, air humidity, voltage and current.

ELTEX OF SWEDEN AB • BOX 608 • SE-343 24 ELMHULT • TEL +46 476 48800 • FAX +46 476 13400
E-MAIL: info@eltex.se • WEB: www.eltex.se

ELTEX U.S. INC.
P.O. Box 868
Greer, S C 29652-0868
USA
Tel: 864-879-2131
In U.S. toll free
1-800-421-1156
Fax: 864-879-3734
Email: sales@eltexus.com

ELTEX MFG LTD
Railway Road
Templemore, Co. Tipperary
Ireland
Tel: 504-314 33
Fax: 504-310 02
Email: info@eltex.ie

ELTEX OF SWEDEN GMBH
c/o Frank Widmann e.K.
Murgstrasse 13
DE-76337 WALDBRONN
Germany
Tel: 07243-767268
Fax: 07243-61216
Email: a.f.widmann@t-online.de

POLSA-ELTEX S.L.
Zamora, 103 - entlo 3
ES-08018 Barcelona
Spain
Tel: 093-309 00 17
Fax: 093-309 59 45
Email: polsa@infonegocio.com

1999-09-13/27320m-e.doc/TH-0247-00