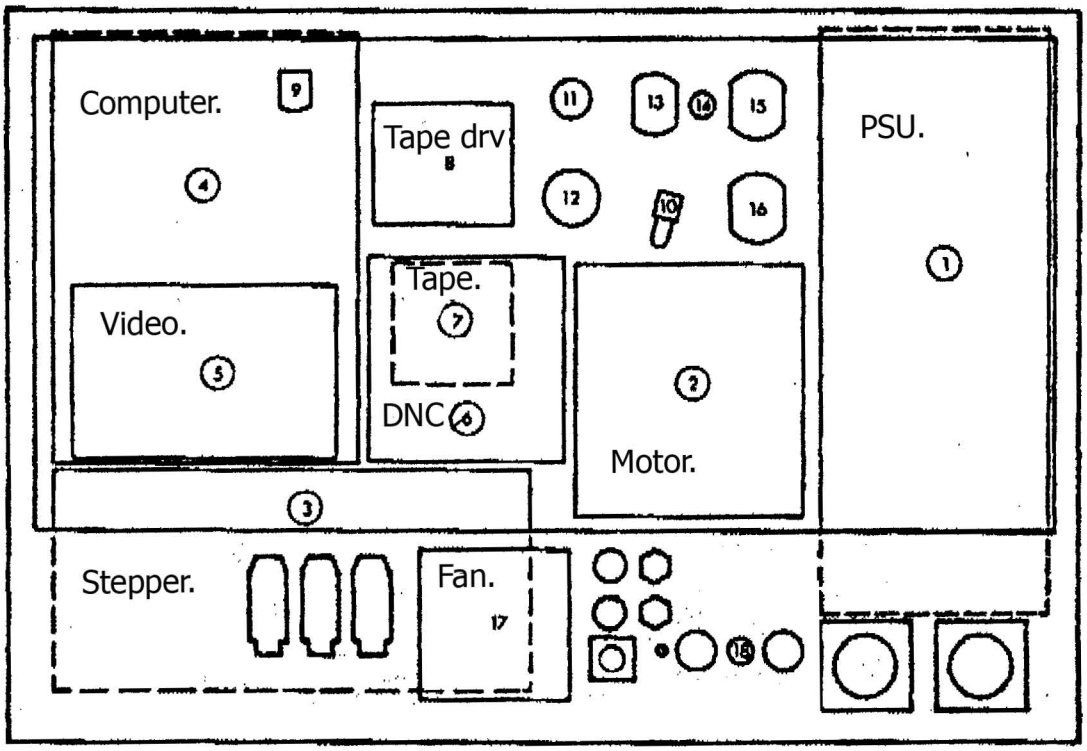

Hauptmotor **Main motor**	220-240 V: ZMO 78 1445 100-115 V: ZMO 78 1446
Vorschubspindel **Spindles feed**	X : F1A 031 001 Y : F1A 032 001 Z : F1A 021 001 X,Y,Z beziehen sich auf vertikales Achssystem X,Y,Z in vertical axis system
Schrittmotor **Step motor**	X : F1A 103 000 Y : F1A 103 000 Z : F1A 103 000

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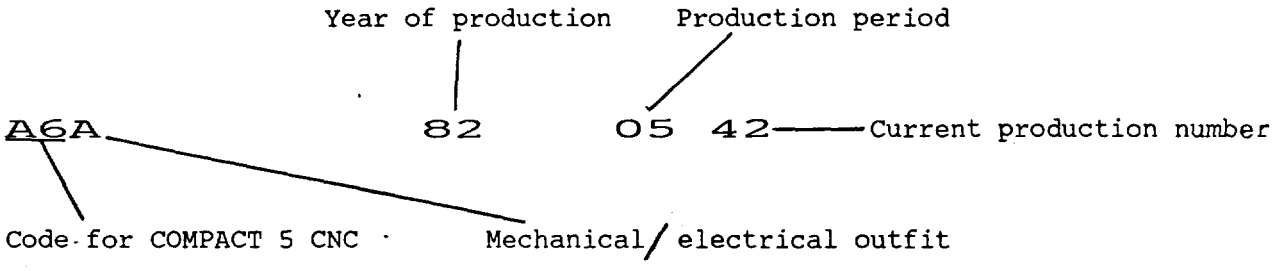
Chapter 2

The Reference Number System

1. Ref. No. of basic machine

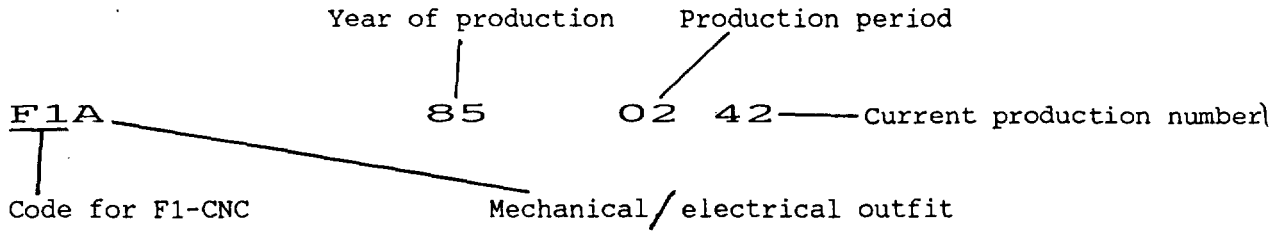
Compact 5:

The reference number is engraved on the bed (on mounting socket for vertical drilling and milling attachement).



F1 CNC:

The reference number is engraved on the base below the milling tabel.



2. The Ref. No. for the electrical equipment and the electrical control unit

On the inside of the electrical housing you find these numbers.

A6S 100 000	....Ref.No. for electrical equipment
A6S 105 000	....Ref.No. for electrical control
003 240	....Serial number (by earlier controls on own plate)

A6A 86 09 053

2.1. The E-equipment number

The E-equipment number indicates the voltage variant and the design variant.

2.1.1. COMPACT 5 CNC

A6A 100 000	A = 220 V / metric
A6B 100 000	B = 240 V / metric-inch
A6C 100 000	C = 115 V / metric-inch

Variants A, B and C were built up to Serial No 299.

A6F 100 000	F = 220 V / metric
A6G 100 000	G = 240 V / metric-inch
A6H 100 000	H = 115 V / metric-inch
A6N 100 000	N = 220 V / France version

Variants F, G, H and N were built up to Serial No. 1499.

A6R 100 000	R = 220 V / metric
A6S 100 000	S = 220-240 V / metric-inch
A6T 100 000	T = 110-120 V / metric-inch
A6U 100 000	U = 220-240 V / France version
A6V 100 000	V = 100 V / metric-inch
A6W 100 000	W = 110-120 V / metric-inch CSA

These variants were built from Serial No. 1500.
At present, only variants S, U, V and W are offered.

Serial CC5533

A6S

2.1.2. F1-CNC

F1S 100 000	S = 220-240 V / metric-inch
F1N 100 000	N = 220-240 V / France version
F1V 100 000	V = 100 V / metric-inch
F1W 100 000	W = 110-120 V / metric-inch CSA

Should the last digit not be 0, this indicates a modification in the internal construction (e.g. A6S 100 001).

2.2. The E-serial number indicates the pc-board structure

Comp. 5 CNC ——{ A6A 105 000 to A6W 105 000 : as before

or

F1 CNC ——{ F1S 105 000 to F1W 105 000 : as before

Where the last digit is not 0 (Zero), this indicates a modification in the internal construction.

2.3. The serial number

This number is important, since it indicates the development stage. Please note this number, especially for retrofitment and extensions.
e.g. A6W 105 000 / 3245

3. The pc-board number

The numbers are indicated either by an adhesive label or by embossing.
As a matter of principle, the latest generation pc-boards are supplied as replacement pc-boards. Exchangeability is compatible upwards.

Example:

Fitment of pc-board F1A 111 000 is possible in machines with pc-boards A6A 111 001.
This is not possible vice-versa.

3.1. The mains pc-board

Comp. 5 CNC:
- A6A 111 000 220-240 V, A6C 111 000 115 V — up to Serial No. 299
- A6A 111 001 220-240 V, A6C 111 001 110-120 V — up to Serial No. 3540

F1 CNC:
- F1A 111 000 220-240 V, F1C 111 000 110-120 V, F1V 111 000 100 V — Latest version for use in COMPACT 5 CNC and F1-CNC.

3.2. The main spindle pc-board

Comp. 5 CNC	A6A 112 000	220-240 V	up to Serial No. 49
	A6C 112 000	115 V	
	A6A 112 001	220-240 V	from 50 (TUV tested version from 3540)
	A6C 112 001	110-120 V	
F1 CNC	F1A 112 000	220-240 V	for F1-CNC
	F1C 112 000	110-120 V	

3.3. The step motor pc-board

Comp 5 CNC	A6A 113 000		up to 299
	A6A 113 001		from 300
F1 CNC	F1A 113 000		for F1-CNC

3.4. The computer pc-board

Comp. 5 CNC	A6A 114 000	metric	up to 49
	A6C 114 000	metric-inch	

These pc-boards are not suitable for the video and tool reverser extensions.

Comp. 5 CNC	A6A 114 001	metric	from 50 - 618
	A6A 114 001	metric-inch	

These pc-boards are not suitable for the video and tool reverser extensions. However, they can be retrofitted by Emco.

Comp. 5 CNC	A6A 114 002	metric	from 619-2499
	A6A 114 002	metric-inch	

These pc-boards are suitable for the video extension. They are not suitable for the tool reverser extension (can be retrofitted by Emco).

Where an A-variant is replaced by a C-variant, the metric/inch selector switch must be fitted.

Comp. 5 CNC —— A6C 114 003 from 2500 up to 3539

This pc-board has the following software extensions: Video and RS 232 interface, tool reverser and DNC interface, absolute value programming

Comp. 5 CNC —— A6C 114 003 from 3540, type according to TÜV, otherwise as above

F1 CNC —— F1C 114 000 for F1-CNC

3.5. The video pc-board

Comp. 5 CNC —— A6A 115 000 (lettering on EPROM CG1) Only COMPACT 5 CNC

Comp. 5 CNC/ F1 CNC —— A6A 115 000 (lettering on EPROM CG2 This pc-board is suitable for COMPACT 5 CNC and F1-CNC

3.6. The tool reversal pc-board, also DNC pc-board

Comp. 5 CNC	A6A 116 000	Tool reversal pc-board for COMPACT 5 CNC
Comp. 5 CNC/ F1 CNC	A6A 116 001	Tool reversal pc-board for COMPACT 5 CNC and DNC pc-board for F1-CNC

3.7. Cassette deck assembly

Comp. 5 CNC/ F1 CNC	A6F 090 000	Contains the recorder and interface pc-board A6F 091 000. Suitable for COMPACT 5 CNC and F1-CNC.

Note: The interface pc-board is fitted in the recorder of the COMPACT 5 CNC with serial numbers lower than 50.

The Service Card for Compact 5 CNC and F1 CNC

When sending in below mentioned service-/spare parts to EMCO Hallein, the service card has to be attached:

- Complete electrical control unit
- Step motors
- Main motor
- Power supply circuit board
- Main spindle circuit board
- CPU circuit board
- Cassette Deck with Interface circuit board
- Video circuit board
- DNC-board
- Step motor board

Reason for service card

1. All electronic and electrical parts are thoroughly checked before they are built in. If there are errors occurring, the EMCO service department needs the defective boards to locate the error.

2. Organisational reasons

Therefore the following regulations:

1. If faults occur on above parts during the guaranty period, we shall write out a credit note on the condition that the defective part is sent to the EMCO service department together with the filled out service card within one month's time.

2. Outside the guaranty period we can re-imburse you after the repair service only if the defective part comes with a filled out service card (within one month's time). For parts not sent in or parts sent in without a service card there will be no re-imbursement to you whatsoever. We follow an usance which is quite common in the electronic repair sector. We ask for your understanding.

Chapter 5

Function of the components/ sources of defects

+ External components - sources of defects

1. Light barrier (COMPACT 5 CNC)
2. Step motors
3. Main motor
4. Tool reverser motor (only COMPACT 5 CNC)
5. Chip door limit switch (only F1-CNC)

+ Internal components - sources of defects

1. Computer pc-board
2. Step motor pc-board
3. Interface pc-board and cassette recorder
4. Main spindle pc-board
5. Power pack pc-board
6. Fuses
7. Video pc-board
8. Tool reverser and DNC pc-board
9. Measuring points in the electrical control

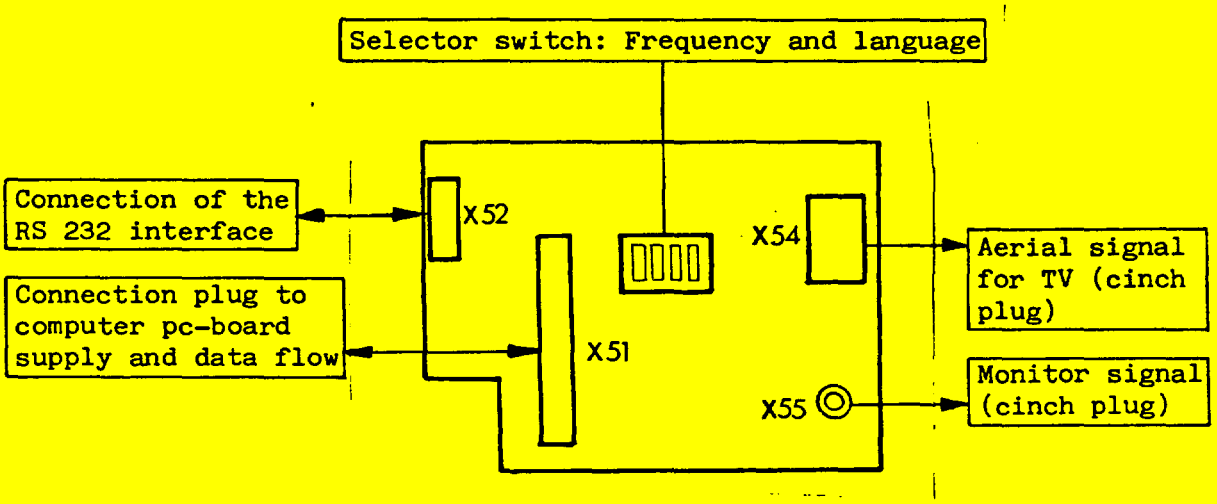
A basic understanding of the design of the electrical control and the function of the individual assemblies, is required for fault repairs.

The wiring diagrams and the flow diagram indicate the relationships and are aids to improved understanding.

5.2.7. Video pc-board

Functions:

- Transformation of the memory content (RAM) into a usable form for the screen (monitor or TV).
- Issuance of the memory content (RAM) at the RS 232 interface.



The exact functions and DIN occupancies are comprehensively dealt with in the chapters Video and RS 232.

5.2.8. Tool reverser and DNC pc-board

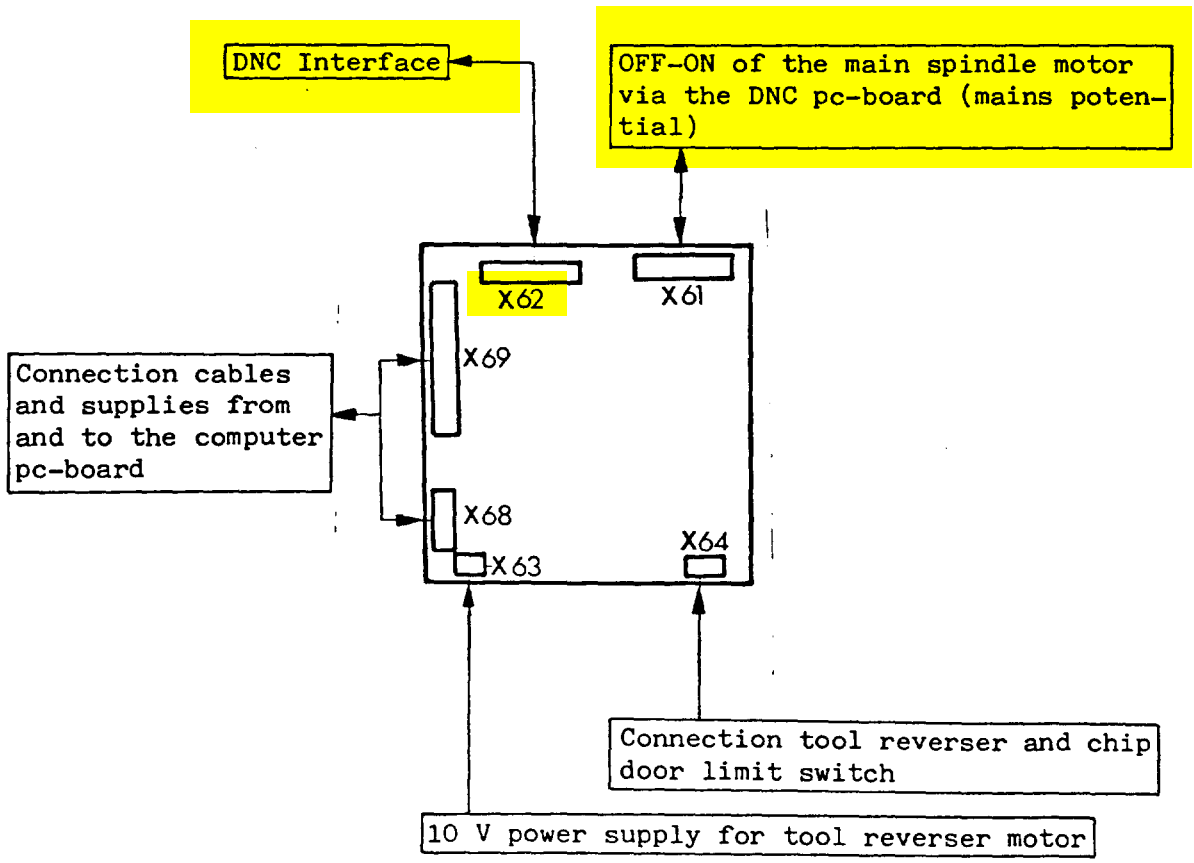
A) Function with COMPACT 5 CNC:

- Triggering the tool reverser
- DNC interface
- Switching the main motor off and on with the so-called X-output is not wired in the works, although it is functional. The same applies for the input chip protection limit switch.

B) Functions with F1-CNC:

- DNC interface
- SWITCHING the main motor OFF and ON
- Tool reverser triggering is not used for the F1-CNC.
- Input chip door limit switch

More comprehensive information in the chapter DNC interface



Measuring points:

X61, Pin 2 and 9 ..... Switch function mains potential MP39

X62, Pin 25 and 26 .... 5 V } MP40

X62, Pin 22 and 26 .... 10 V }

X63, Pin 1 and 3 ..... 10 V MP18

X64, Pin 1 and 2 ..... Voltage tool reverser motor } MP16
See details in chapter 5.1.4.

X64, Pin 5 and X63, Pin 3 (GND) ..... 5 V }

X68, Pin 1 and 2 ..... 5 V MP17

COMPACT 5 CNC, 22o/24o Volt, F,G,S Ausführung

Eine Untersuchung hat ergeben, daß beim Aus- und Einschalten des Hauptmotors induzierte Spitzenströme auftreten können, die zu einem Defekt auf der Hauptmotorplatine führen können.

Maßnahme:

Einlöten des Kondensators o,1 µF, 63o V, parallel zum Primäranschluß des Trafos auf der Netzteilplatine. Der Kondensator nimmt die gefährlichen Spitzenströme auf.

Maschinen mit Steuerungsseriennummer 0 - 299 (Netzteilplatine A6A/B 111 ooo)

Kein Einlöten des Kondensators erforderlich.

Maschinen mit Steuerungsseriennummer 300-1499 (Netzteilplatine A6A 111 oo1)

Kondensator zwischen Pin 1 und Pin 5 oder Pin 1 und Pin 8 einlöten.

Maschinen mit Steuerungsseriennummer 1500-2720:

Kondensator zwischen Pin 1 und Pin 4 einlöten

Compact 5 CNC/22o/24o Volt Versions F, G, S

When switching on and off the main motor inductive peak currents could disturb a diode on the main spindle board.

Measures:

Solder the condenser 0,1 µF 63o V parallel to the primary winding of the transformer. This condenser takes the peak current.

Machines with control unit serial no. oo-299:

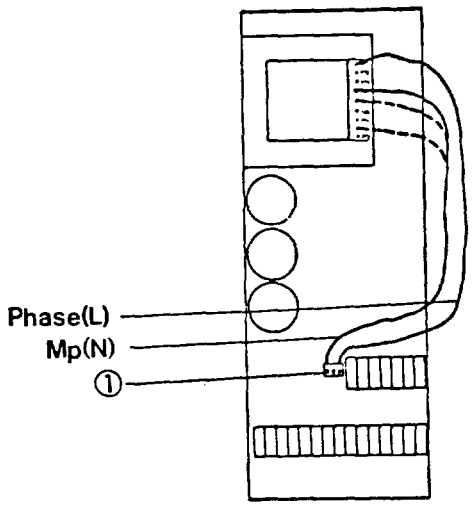
No condenser must be soldered

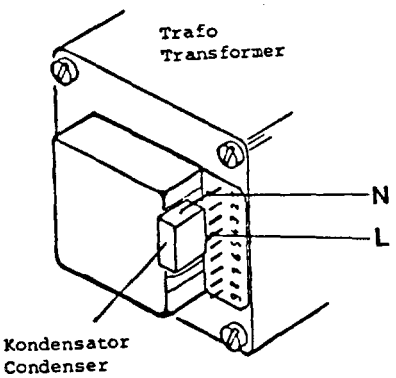
Machines with control unit serial no. 3oo-1499

Solder condenser between pin 1 and 5 or pin 1 and 8.

Machines with control unit serial no.15oo-272o

Solder condenser between pin 1 and 4.





Weiterer Hinweis

Die 2 Kabel (Phase L und Mittelpunktsleiter N) führen von der Klemmbuchse (1) auf die Pins zur Primärseite des Trafos. Zwischen diese Pins muß der Kondensator eingelötet werden.

- Steuerungsseriennummer 3oo-1499 zwischen 1 und 5 oder 1 und 8 (siehe Kabel von Klemmbuchse)
- Steuerungsseriennummer 1500-2720 zwischen 1 und 4.

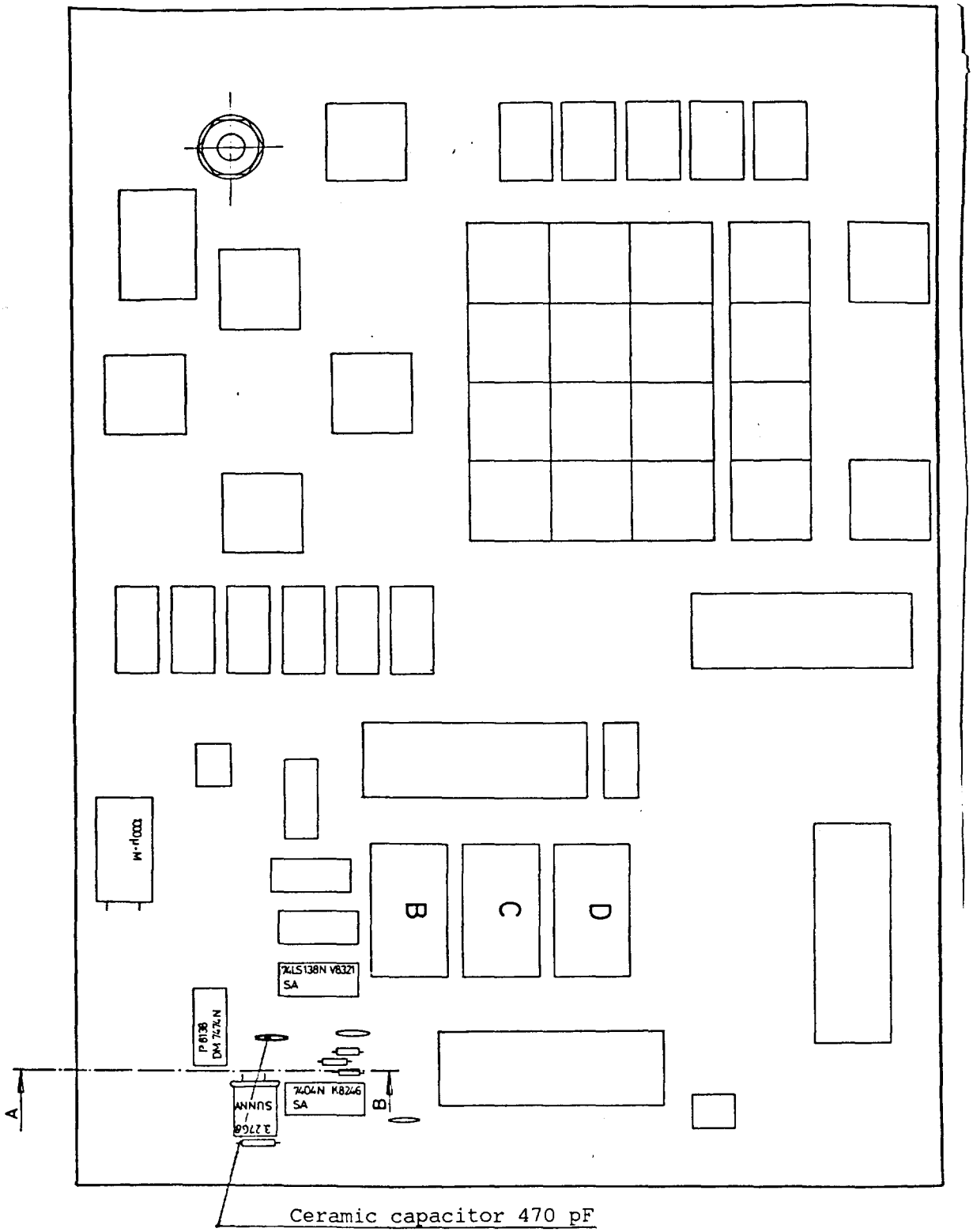
Additional tip

The two wires (Phase L and neutral wire N) go from the clamping socked(1) to the pins of the primary circuit of the transformer.

The condenser has to be soldered between phase L and the neutral wire N.

This is with
- control serial no. 3oo-1444 pin 1 and 5 or 8.
- control serial no. 15oo-272o between pin 1 and pin 4.

Computer board A6. 114 003 and F1. 114 000



Ceramic capacitor 470 pF

Video Connection
TV-Connection
Interface RF 232

1. Mounting possibilities of Videoprint

1.1. COMPACT 5 CNC with electrical serial numbers A6A/B/C 1o5.ooo / ooo - o49:

No connection possibility!

1.2. COMPACT 5 CNC with electrical serial number A6A/B/C/F/G/H/N 1o5.ooo / o5o - 618:

Means: Computer board A6C 114 oo2

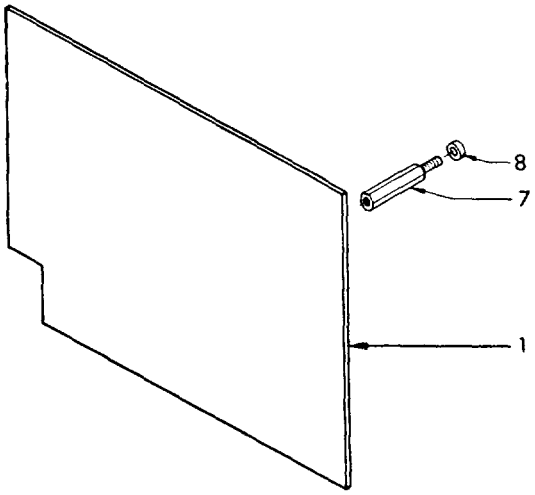
+

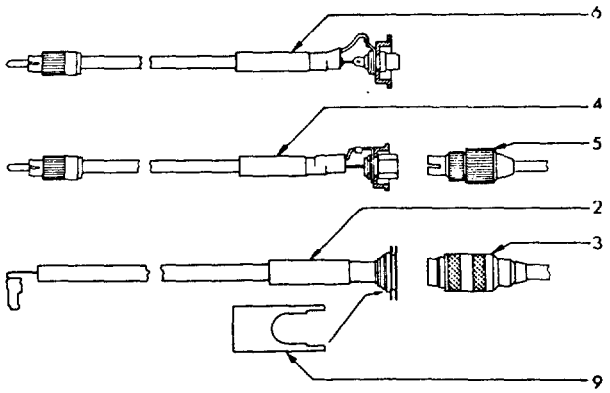
Videoprint (Ref.No. 26o 2oo)

1.3. COMPACT 5 CNC with electrical serial number A6A/F/G/H/N 1o5.ooo / 619 upwards:

Means: Videoprint Ref.Nr. 26o 2oo
(The computer board A6C 114 oo2 is mounted)

2. Equipment of Videoprint (Ref.No. 26o 2oo)





1 Videoboard (A6A 115 ooo)

2 Cable RS 232 (A6Z 2o1 ooo)

3 Coupling plug RS 232 (ZEL o3 oo12)

4 TV-cable (A6Z 2o2 ooo)

5 TV-coupling plug (ZES 15 1oo6)

6 Video cable (A6Z 2o3 ooo)

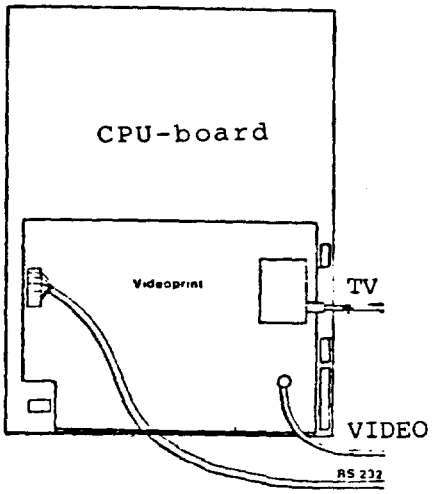
7 Spacing bolt (ZBO oo 6256)

8 Washer (ZSB 51 o315)

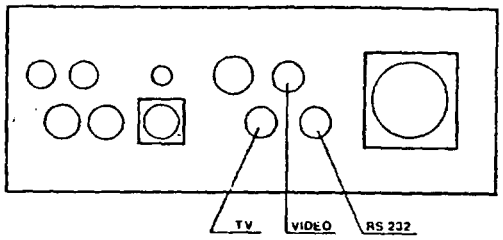
9 Key for tightening cable couplings (A6Z 2oo o1o)

4.3. Mounting the cables:

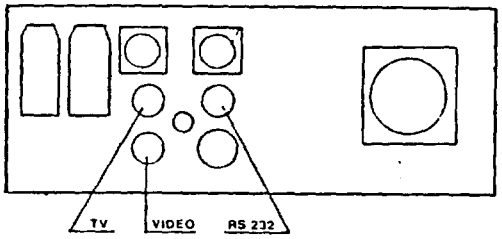
Insert the cables through the bores.
Fix the cables with the counter nuts
and plug them to the video print.



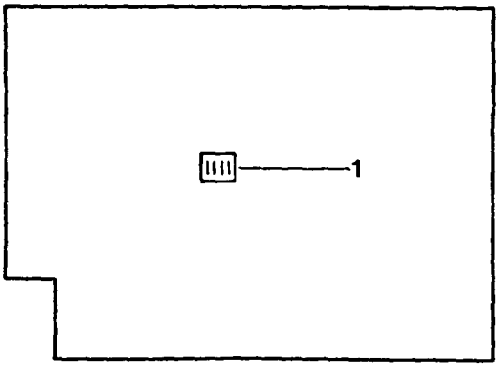
Electrical control unit A6A/B/C



Electrical control unit A6F/G/H/N



5. Setting language and frequency on the video board



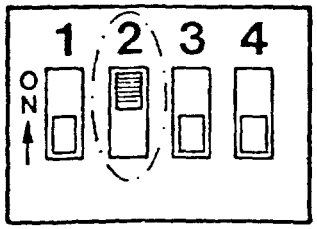
Language and frequency are set with the code switch (1).

5.1. Frequency setting:

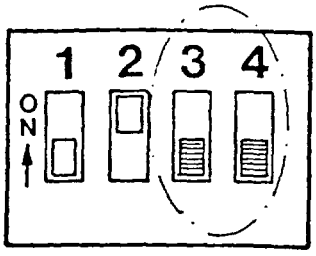
5o Hz: switch 2 "ON"
6o Hz: switch 2 "OFF"
Illustration shows position for 5o Hz

5.2. Languages are set with switch 3 and 4.

5.1



5.2



Combinations

Language	Switch 3	Switch 4
German	OFF	OFF
English	OFF	ON
French	ON	OFF
Spanish	ON	ON

Illustration shows switch positions for German.

Note:

The first switch is without function.
The change of language appears when the machine is switched off and on.

7.3 Removal tool reverser (only COMPACT 5 CNC)

The installation instructions for this accessory are given below.

Please note the following:

- Do not exchange the + and - 10 V connection.

- Do not connect offset the connection plugs (6/12/16 pole).

The DNC interface is also located on the tool reverser pc-board of the COMPACT 5 CNC. See also chapter 7.4.

Automatic Turret Toolholder
COMPACT 5 CNC

Necessary Equipment

1. CPU board A6C 114 003 (for machines with with electrical control serial no. below 2500)
2. Automatic turret tollholder ref. no. 260 040
3. Chip guard A6A 140 001 (for electr. contr. unit no. below 2500)

Mounting work

- Mount CPU board
- Make slot for cable in chip pan
- Mount turret circuit board
- Connect 10 Volt power supply
- Mount plug connection
- Mount automatic turret toolholder

Attention:

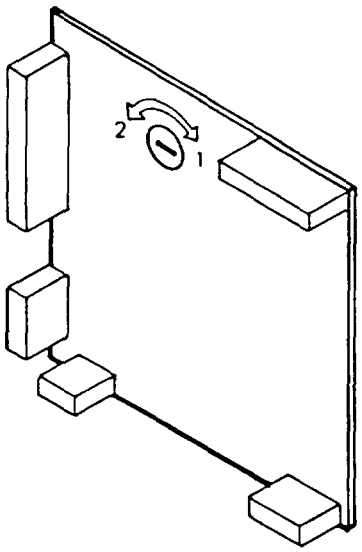
+ Before mounting displug main plug! Not only danger of accidents but also possibility of disturbing electronical parts on the boards.
+ Never plug or switch on machine before all plugs on the board are fitted and the boards are mounted firmly.

Loose cables and boards could cause short circuits if they get a contact with other boards or the electrical housing.

Basic equipment of automatic turret toolholder comprises

1. Automatic turret toolpost
2. Turret circuit board
3. Cable 16 poles for CPU board
4. Cable 6 pole
5. Cable for power supply 10V
6. Plug cable
7. Distance pins
8. Washers for adjustment of tools
9. Cable clips and cable binders
10. Special key and hexagon keys.

Potentiometer on turret circuit board



Potentiometer on turret circuit board

Check that the actual number of swivels is identical with the programm number (in hand-operation).
Caused by the different frictions of the toolholder it might be possible that too much or too less swivels are executed.

Measures:

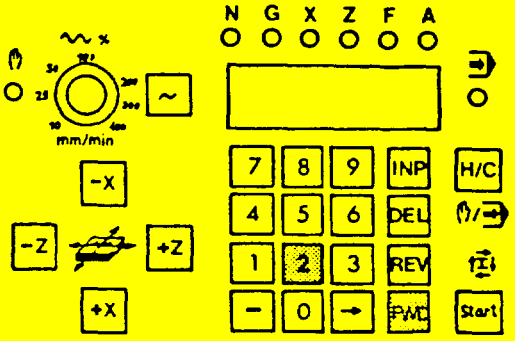
1. Too much swivels:

Turn the potentiometer clockwise.

2. Too less swivels:

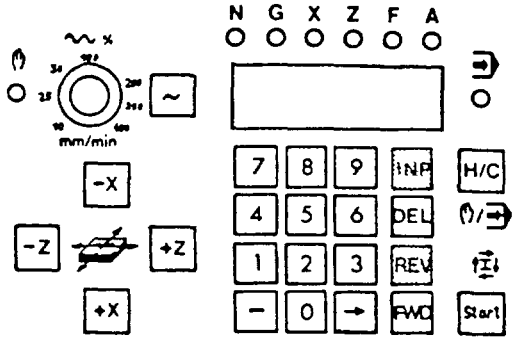
Turn the potentiometer counterclockwise.
Check number of swivels 1 to 6.

Operating the Turret Toolholder



1. By hand:

Press key [FWD] and a number key, the turret will swivel by the number on the number key pressed.
For example: you press [FWD] and [2]: the turret swivels twice.



2. Swivelling in CNC-operation:

G26/X=0/Z=0/F..
Put in the number of positions to be swivelled under address F.
For example: G26/X=0/Z=0/F=2: the turret swivels by 2 positions.

Interrupting the swivel operation

Press key [INP] + [REV]

Cables:

- 16 poles cable (1) on CPU and turret circuit board.
- 6 poles cable (2) on CPU and turret circuit board.
- Mount socket for the connection of the turret into hole for "TV" or "VIDEO". Put cable plug (3) onto turret circuit board.

Note:

Three bores for plugs are privided. If the videoboard is mounted, remove either TV or monitor plug and mount plug for automatic turret toolholder instead of it.

4. 2-pole cable (4) for 1o V supply

+ 1oV and ground (GND) are taken from the condensor cables.

4.1 + 1o V supply

The +10V cable is marked with a red point on the condensor. The red point (+1oV) can be either at the right or left side of the condensor.

The +1oV connection cable is marked with a cable binder (7) and goes to pin 1 of the plug.

4.2 Ground wire:

The not marked cable comming from the condensor is the grounding wire.

It leads to pin 3 of the connection cable.

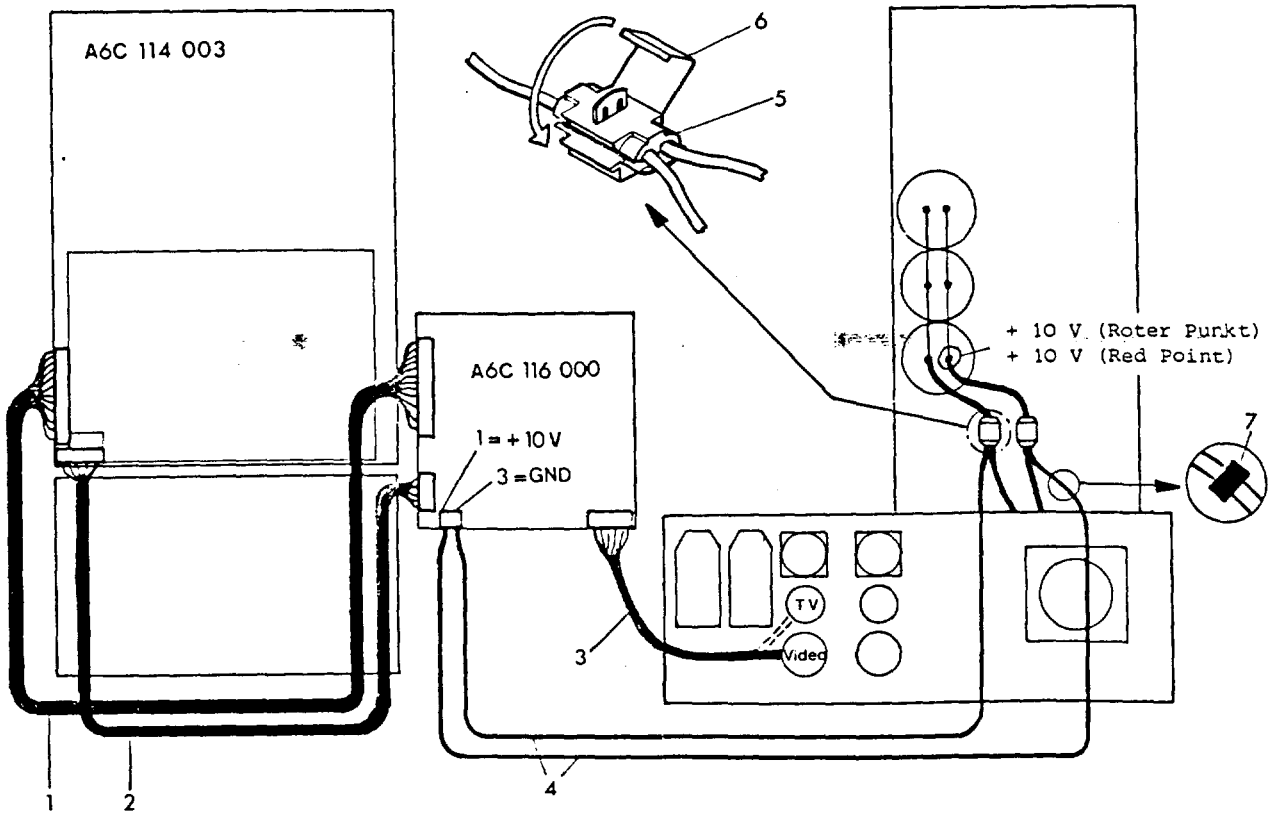
Connection:

Insert the cables in the cable connector (5) close the clip (6) and press it together with a plier.

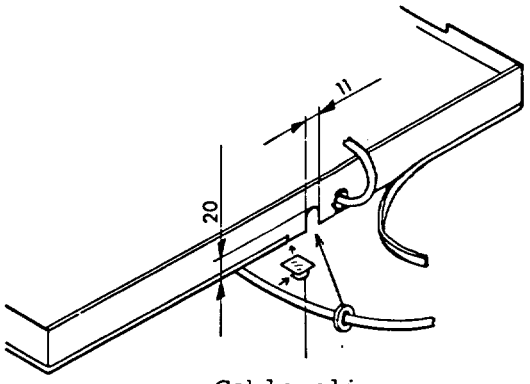
5. Use the cable binders to bind the cables

Place cable clips on the bottom of the E-housing and insert cables.

Attention:
Check that the cables don't lock the fan.



Mounting instructions



Cable clip

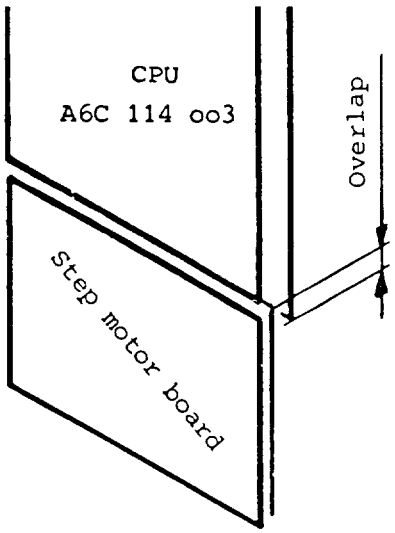
Preperations

- If there is no slot in chip pan, use file to get slot in order to guide through cable.
- To tighten cable underneath chip pan use cable clip.

Mounting the automatic turret tool post

Dismount intermediate plate from cross slide and mount turret tool post with the 4 socked head screws M5x6o.

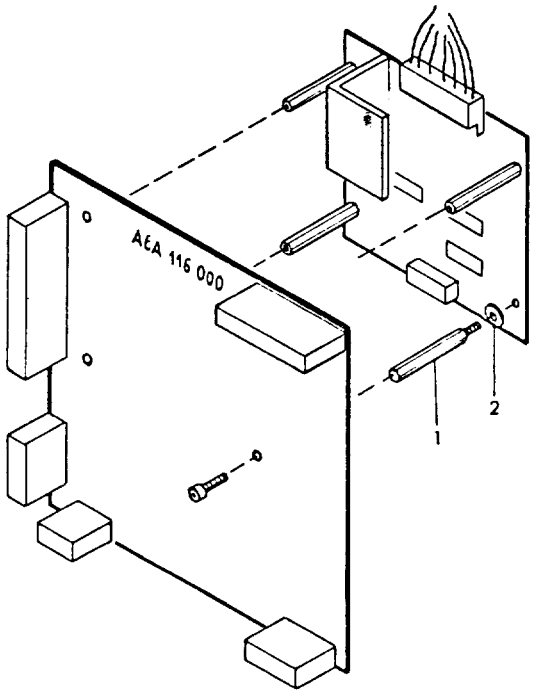
Pay attention that no chips will enter into the threaded holes of the cross slide.



Mounting the circuit boards:

Exchange old CPU against new one. (ref.no. A6C 114 oo3)if necessary.

Attention:
The cover foil of the CPU boards has to overlap with the foil of the step motor board in order to protect against chip creeping in.



- Instead of screws on cassette board use distance pins (1). Pay attention that plastic washers (2) are put on.
- Tighten turret circuit board with the hexagon head screws.

Making mounting easier: Plug in connections before mounting the turret circuit board itself.

7.4 Removal DNC - Interface of the Compact 5 CNC

The DNC interface permits the external input of commands to the machine, enquiry of machine conditions or the transmission of switch functions with the CNC program. For this reason, the DNC interface is divided into outputs, inputs and supply voltages.

ATTENTION:

When using the DNC interface with external voltage sources, the maximum admissible currents and voltages must be noted. In addition, possible potential differences between the devices must be observed. An excessive voltage at a DNC input or output can destroy the complete electronics of the COMPACT 5 CNC (spread of the voltage throughout the 5 V network).

All functions are carried via plug X62 to the tool reverser pc-board.

Input and output possibilities

7.4.1. Outputs

Pin 1: Manual operation status (the machine reports whether it is in manual or CNC operation).

In CNC operation, Pin 1 is LO
In manual operation, Pin 1 is HI

Pin 7: Status program operates (the machine reports whether a program is being processed).

Program runs	HI
Program does not run	LO

Pin 8: Intermediate stop status (the machine reports whether or not it is in an intermediate stop).

No intermediate stop	LO
Intermediate stop	HI

Pin 15: Alarm status (the machine reports whether or not it is in an alarm).

No alarm	LO
Alarm	HI

Output switch functions:

The following functions can be switched through the input of

G23/$X^{=0}_{\neq 0}$/$Z^{=0}_{\neq 0}$/$F^{=0}_{\neq 0}$

Input of	Causes on switch output/pin	The condition	Initial condition
G23 X=0	X62/19	LO	LO
G23 X≠0	X62/19	HI	
G23 Z=0	X62/18	LO	LO
G23 Z≠0	X62/18	HI	

These 2 switch outputs can also be manually actuated (by manual operation).

The path LED lights up	and pressing the pushbutton	produces at switch output/pin	the condition
X	REV	X62/19	LO
Z	FWD	X62/18	HI
Z	REV	X62/18	LO

Note:

The function X-FWD (X62/19 HI) is suppressed (i.e. is not possible).
Where X62/19 is set at HI by the program (G23/X=0), this output can be set at LO with REV during the intermediate stop. Where the program continues with Start, X62/19 becomes HI. 2 seconds later, the program then starts with the set following the intermediate stop.

Compare the function of the X output X62/19 with the F1-CNC output M03/M05. It would be used for the OFF-ON switching of the main spindle. However, this function is not included in the hardware.

Considerable wiring requirement: The motor switch of the F1-CNC would have to be fitted (ZEL 22 0010; ZEL 22 0020). See the circuit diagrams A13.168-22 and A13.168-71.
In addition, the power relay (ZER 82 6033) must be inserted on the tool reverser pc-board.

Pin 20: Pulse output
With a frequency of 100 Hz, the number of pulses specified with G23/F (HI-LO) are input at Pin 10.

Initial condition: LO
Maximum F-input: 0-499

The program is interrupted during the output time of the pulses, and is then continued.
(For this reason, one can also use G23/F as dwell time = between 0.01 and 4.99 seconds)

Input format for G23:

N.../G23/X..../Z...../F...

i.e. simultaneous input of all 3 functions is possible.

7.4.2. Inputs

Where a voltage of 3-30 V is applied to the following inputs, the following function is executed by the machine:

X62/Pin 3: Bring machine into RS-232 operation (receive as G66 + INP).

X62/Pin 4: Break off program (function as INP/REV).

X62/Pin 5: Intermediate stop (function as INP/FWD).

X62/Pin 6: Bring machine into RS-232 operation (receive as G66 + FWD).

X62/Pin 9: Bring machine from manual to CNC operation, or vice versa.

X62/Pin 10: When voltage is applied to Pin 10, the machine changes to intermediate stop. In addition, there is a start interlock (e.g. function protective cover).

Note: This function is also on plug X64/Pin 6. This is where one can obtain the + 5 V from plug X64/Pin 5, and thus connect a limit switch (as an opener).

ATTENTION:

Pin 10 only functions, where the wire bridge J4 is removed from the tool reverser pc-board.

X62/Pin 11: Manual traverse X/Z

X62/Pin 12: Manual traverse +/-

X62/Pin 13: Manual traverse command

With voltage on Pin 13, the COMPACT 5 CNC traverses with the set feed (potentiometer), with the axis (Pin 11) and direction (Pin 12) which were preselected.

X62/Pin 17: A start command is actuated by voltage at Pin 17.

X62/Pin 2: The tool reverser indexes, as long as there is voltage at Pin 2 (J2 must be removed).

X62/Pin 21: When the wire bridge J1 is open, the tool reverser is blocked. When a voltage is applied to Pin 21, one can again index. This function is also on X64/3.
Function, e.g. tool reverser cover.

7.4.3. Supply:

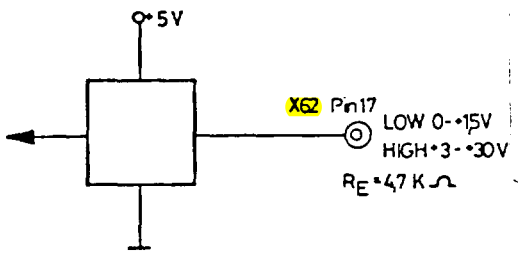
X62/Pin 22: + 10 V uncontrolled

X62/Pin 23
24 } GND
25

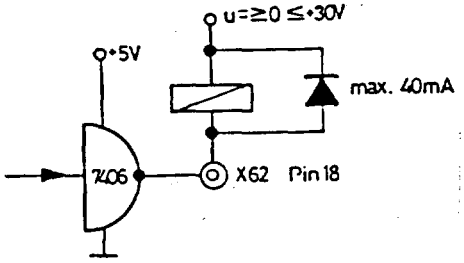
X62/Pin 26: + 5 V controlled

7.4.4. Examples for the wiring

Example Input



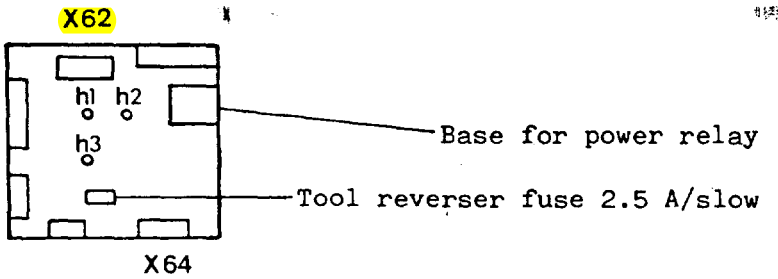
Example Output



7.4.5. Notes on the tool reverser pc-board

- Where wire bridge J3 is removed, indexing can proceed during intermediate stop and manual operation.

- There are 3 LED's on the tool reverser pc-board.
  h1 is alight when the tool reverser lock is open (J1)
  h2 is alight when the tool reverser swivel is blocked (J2)
  h3 is alight when the chip protection cover is open (J4)



Chapter 8

Generations, retrofitment of old machines

8.1 Generations of the Compact 5 CNC

Serial No.:

1-49	1st Generation: Yellow main motor with old main spindle pc-board, interface pc-board fitted in cassette deck, computer pc-board not suitable for extensions, weak power pack, old step motor pc-board, old step motor wiring.
50-299	2nd Generation: Not suitable for extension video and RS-232. Weak power pack, old step motor pc-board, old step motor wiring.
300-618	3rd Generation: Not suitable for extension video and RS-232. Similar in design to the new machines.
619-1499	4th Generation: Suitable for extension video and RS-232. Similar in design to the new machines.
1500-2499	5th Generation: Suitable for extension video.
2500-3539	6th Generation: Suitable for video and tool reverser extension. Absolute value programming, RS-232 and DNC interface software fitted.
3540-	7th Generation: Software as in 5th Generation, TUV tested, design change internally.

Chapter 11

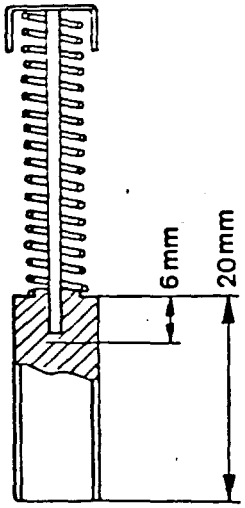
Control, Service and Adjustment

+ Adjustment of carbon brushes on main motor

+ Service and adjustment

1. Exchanging the main spindle bearings
2. Exchanging the countershaft belt
3. Exchanging the countershaft pulley
4. Nut on carrier plate
5. Exchanging the main motor
6. Exchanging the toothed belt, exchange of step motors
7. Exchanging the lead screw
8. Exchanging the cross slide spindle
9. Gibs on longitudinal slide
10. Tailstock
11. Adjustment of cross slide guidance

Control of the Carbon Brushes on Main Motor



Before checking the carbon brushes, draw out plug to cut of power supply.

Worn off carbon brushes damage the anchor lamellas and may destroy the main spindle circuit board by brush firing.

Control of carbon brushes:

After 100 hours of operation.

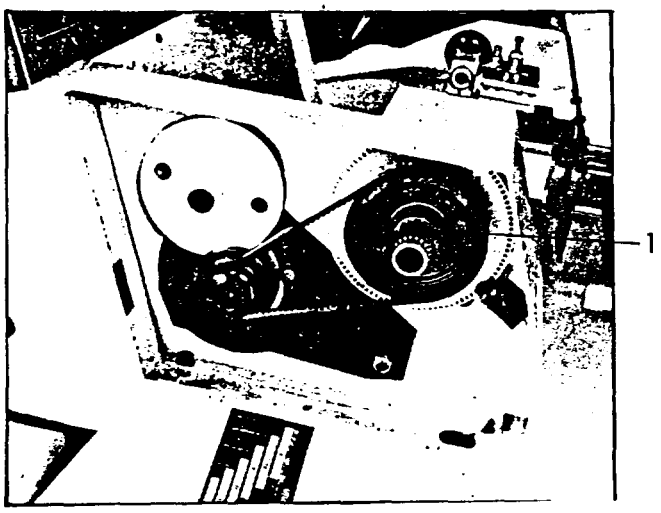
A new brush is approx 20 mm long.
When a length of only 6 mm is left, then it must be replaced.

An unregular wear of the 2 carbon brushes is a typical characteristic of a direct current permanent motor.

Swap unregular weared brushes if they are long enough.

Service and Adjustment

1 Exchanging the main spindle bearings



1. Mark the position of the light barrier for easier re-mounting. Dismount light barrier.
2. Take off retaining ring on main spindle.
3. Use plastic hammer to get main spindle forward, apply only gentle strokes until spindle can be drawn by hand. Pay attention that perforated disc will not be damaged.
4. Exchange bearings
5. Assemble again.

Attention: Note bearings!

Front bearing: Inside and outside medium - force fit, i.e. the bearing has to be pressed onto spindle (inside ring) and into the bore of the headstock (outside ring). If you do not have available a press-on device then you mount the bearings using hammer and bushing (when mounting bearing onto spindle, press only onto inside ring, when mounting bearing in headstock, press only onto outside ring.

Back bearing: Slide fit

6. Checking the light barrier mounting

6.1. Digital read out of rpm: switch on machine and check whether rpm. are shown on read out.

6.2. Threading: Check of impulse

- Put in program

N	G	X	Z	F
00	78	-200	-2000	150
01	22			

- Slow down rpm.
- Press start - Threading cycle must run

A wrong adjusted light barrier gives wrong synchronisation impulses so that the start of threading operation is wrong.

Operation not running

Cause: Nc impulse from light barrier. Only the first X-movement is executed, then operation is interrupted because computer waits for start impulse.

Measure: Adjust light barrier

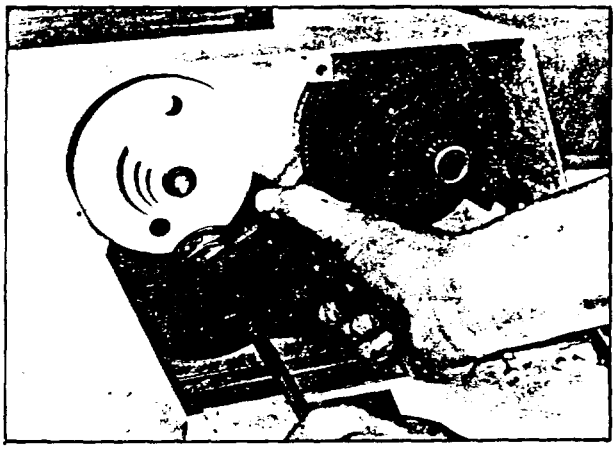
2 Exchange of the countershaft belt

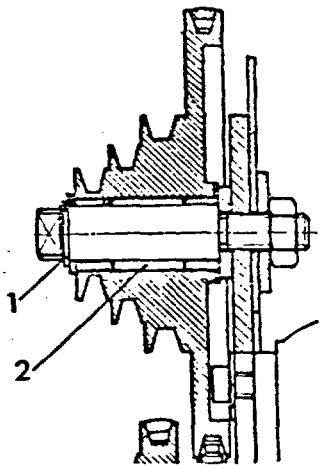
- Loosen motor tightening screws, exchange belt
- Press motor firmly down and tighten screws

3 Exchange of countershaft belt

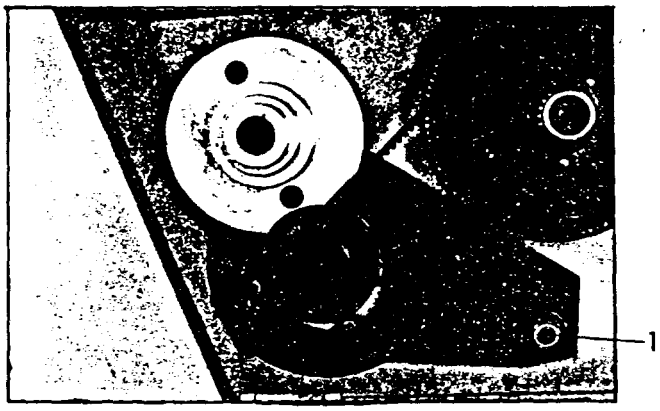
For this purpose you have also to take off the motor pulley.

1. Unscrew flat head screw from motor pulley. This screw is secured by "Loctite". For better getting hold of the pulley, press drive belt together.
2. Loosen motor tightening screws, and take off countershaft belt.
3. Take off motor pulley.
4. Take off retaining ring (1) and then countershaft pulley.
5. Fill out space (2) with ball bearing grease.
6. When remounting do not forget to secure flat head screw again with "Loctite".



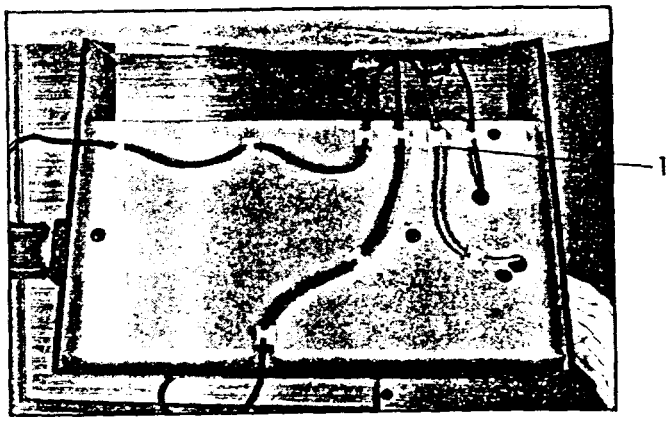


4 Nut on carrier plate



The nut on the carrier plate has to be tightened such that the carrier plate can be swivelled without play. The stud bolt is secured with "Loctite" against torsion. Without this securing, the screw could get loose - thus the carrier plate would not be clamped play-free. This could lead to vibrations and finally to an unsatisfactory surface quality on the workpiece.

5 Exchange of main motor (version without perforated disc)



Draw out plug to cut off power supply.

1. Take off motor pulley (compare before chapter "Exchanging the countershaft pulley").
2. Unscrew motor
3. Loosen motor coupling on the backside of the electrical housing. Press out motor cable from cable clip (1) and draw through cable with coupling.

Motor-version with perforated disc mounted

Same as above, but dismount perforated disc first. The belt pulley is divided into 2 parts, i.e. take off both pulleys.

6 Exchanging the toothed belt, exchange of step motors

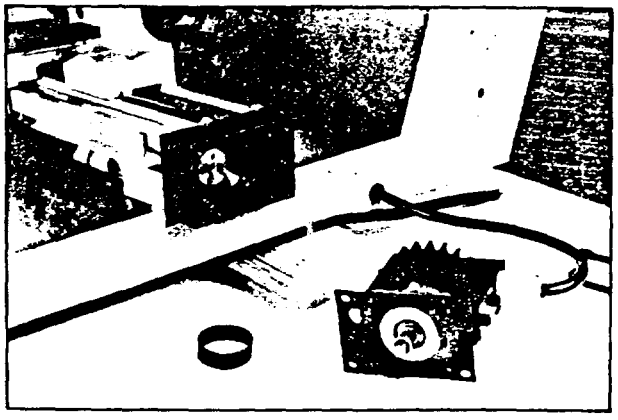
Pay attention!

Step motors X and Z are identical. The COMPACT 5 CNC comes, however, with two different coupling versions. Machines with el. housing ref.no. A6A/B/C 1o5 ooo come with the coupling of the cable directly on the step motor. Machines with el. housing ref.no. A6F/G/H/N 1o5 ooo came with the coupling on the backside of the el. housing.

Exchange

A T T E N T I O N !

Plug out to cut off power, otherwise the power supply circuit board with machines carrying ref.no. A6A/B/C 1o5 ooo may be destroyed.



1. Uncouple motor cable on backside of electrical housing.
2. Press cable through cable clip. Open edge coverage only locally to get cable through.
3. Unscrew step motor together with carrier plate. Mount carrier plate on new step motor.
4. Put pulley into toothed belt and mount motor.
   Tightening of belt:
   Pressing power onto motor for tightening of belt approx. 3o N (3 kp). If the belt is tightened too firm, the wear off will be too high.

The carrier plate for the X-motor

Take care that carrier plate is mounted onto X-motor the right way. If the carrier plate is mounted upside down then the slide would be blocked in direction Minus X.

7 Exchanging the leadscrew

The reason for a necessary exchange of the lead screw can only be a mechanical shortcoming.

e.g. - Spindle bent, because machine was lifted on spindle
- heavy stroke on right hand or left hand side of spindle bearings.

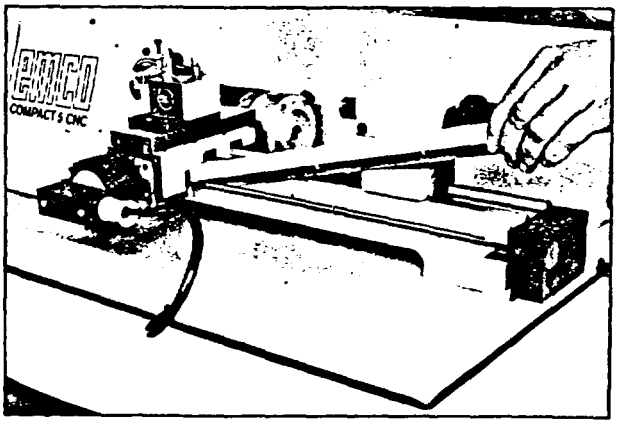
"Leadscrew complete"

The leadscrew as spare part will come to you as "leadscrew complete", ref.no. ZME 2oo o7o (compare spare parts list): leadscrew, left hand bearings, nut carrier with nuts, right hand bearings.

Dismounting of leadscrew

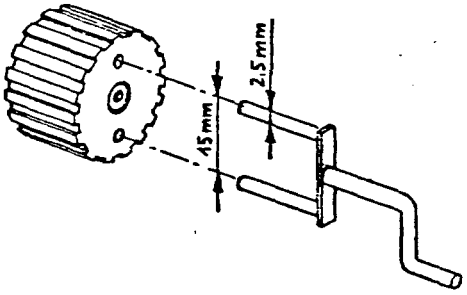
1. Plug out to cut off power. Take off motor together with carrier plate.

2. Unscrew flat head screws of spindle cover. Move longitudinal slide to the left, draw through spindle cover.



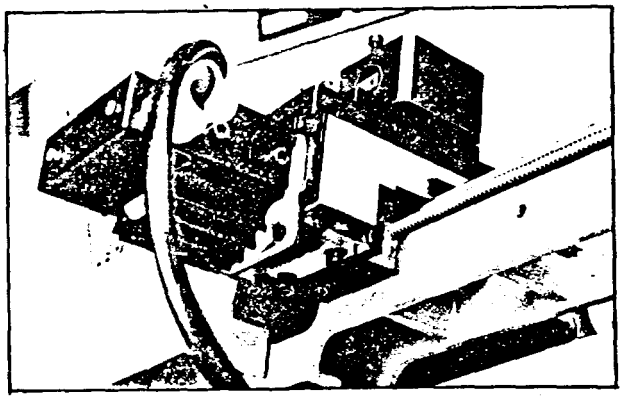
Tool to use:

Place pin into bore of belt pulley so you can turn the slide into the desired position. You manage better with a selft-constructed key.



Stud distance = 15 mm

Stud diameter = 2,5 mm

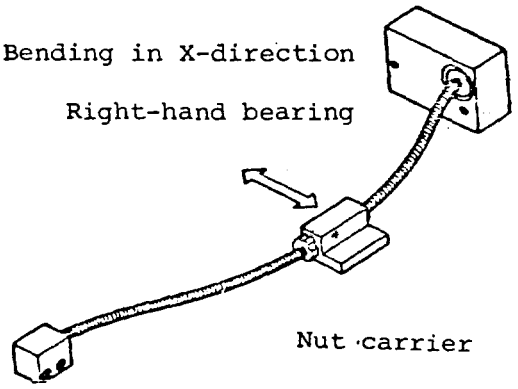


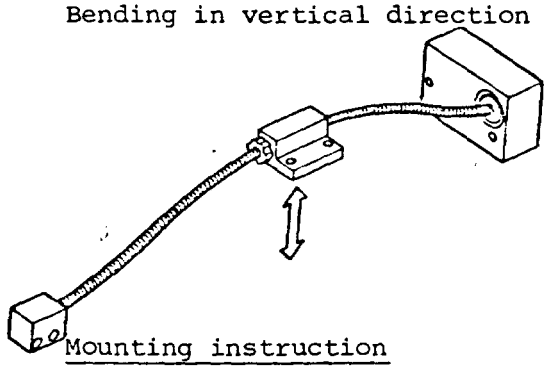
3. Unscrew tightening screws for nut carrier (flat head screw M5 x 16, DIN 91).

4. Unscrew tightening screws for right hand bearing. Draw through leadscrew in Z-direction. The left hand bearing is a sliding bearing.

Assembly:

The spindle can be overtightened in ± direction as well as vertically, if you are not adjusting it correctly.





Mounting instruction

1. Loosen socket head screw on left hand bearing. The bearing must be easy to move.

2. Draw in leadscrew. Tighten right hand bearing such that you can still move it by hand.

3. - Move slide to the left.
   - Position nut carrier (turn leadscrew)
   - Tighten nut carrier, but not too firmly.

4. Positioning of left hand bearing and of nut carrier:

4.1. Wind slide into left hand position. Press bearing body by hand against bed. Tighten nut body. Position nut carrier and spindle in X-direction.

4.2. Tighten left hand bearing body. Its position in vertical direction is determined by the nut carrier.

5. Positioning of the right hand bearing:

Wind slide to the right. The position of the right hand bearing in X-direction and vertical direction is determined by the position of the spindle carrier. Tighten the screws of the right hand bearing.

6. Mount spindle cover and step motor.

SUMMARY

- Position of nut carrier
  X-direction = determined by left hand bearing. Vertical direction = given

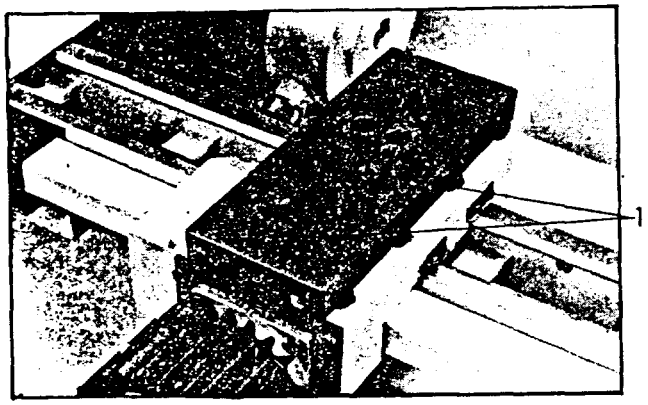
- Position of left hand bearing
  X-direction = given
  Vertical direction = determined by nut carrier.

- Position of right hand bearing
  X-direction + vertical direction = determined by nut carrier.

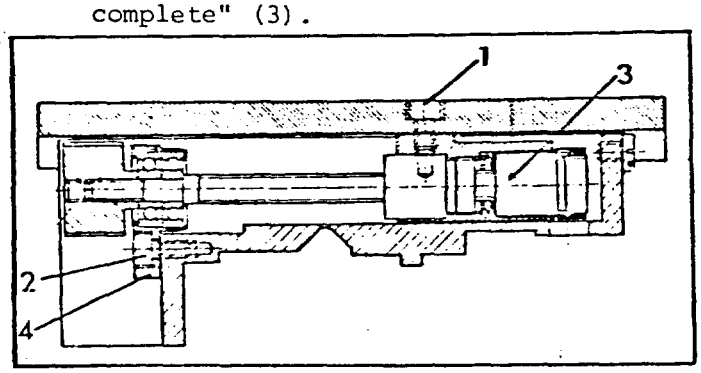
8 Exchanging the cross spindle

Dismounting:

- Unscrew toolpost plate on cross slide.
- Take off X-motor together with carrier plate.
- Unscrew socket head screws for nut carrier (1).



- Unscrew socket head screws on bearing (2), draw out "cross slide spindle complete" (3).



Mounting:

When mounting the spindle must not be bent, i.e. nut carrier and bearing must be aligned.

1. Wind nut carrier in back position, draw in "cross slide spindle complete".
2. Tighten bearing body (4), but do not tighten screws yet. The bearing body must be moveable by hand.
3. Move cross slide such that nut carrier can be tightened. Tighten nut carrier firmly.
4. Move cross slide forward. Tighten screws on bearing.
5. Mount X-motor.

9 Gibs on longitudinal slide

These gibs made of plastic (1) are under tension to keep the longitudinal slide playfree.

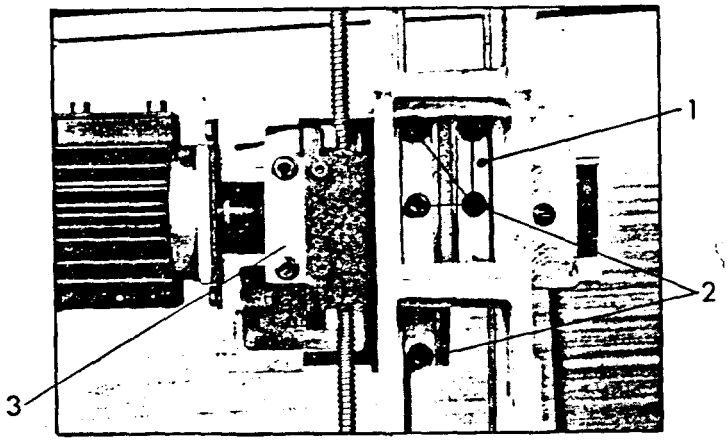
A bad surface quality of the workpiece could well be caused by worn out gibs and/or gibs where the tension is too low.

Measure 1:

Tighten socket head screws (2)
- Loosen nut carrier Z-slide
- Tighten socket head screws symetrically until longitudinal slide runs playfree, but still can be moved efficiently.

Measure 2:

Exchange of gibs
If the gibs cannot be adjusted anymore, they have to be exchanged. Since these gibs as well as the socket head screws are not easy to reach, dismount machine bed.



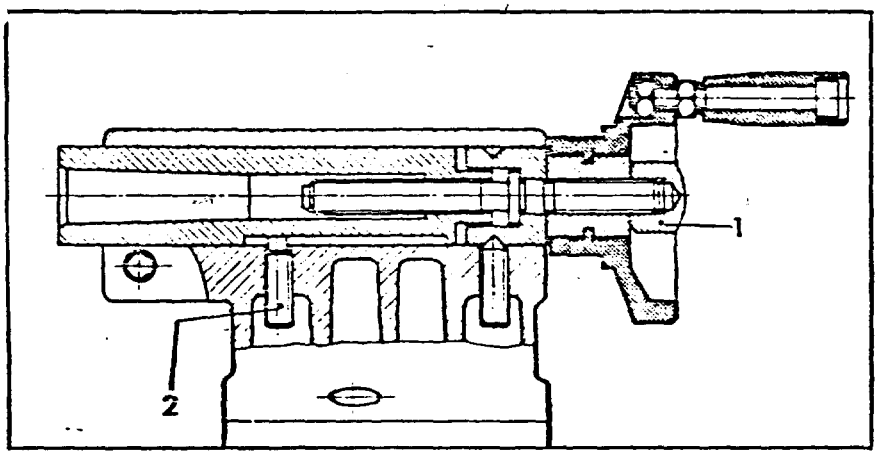
Dismounting of machine bed

- Uncouple couplings for main motor, X/Z motor and light barrier. Press out cables from cable clips so that cables will not be damaged when bed is lifted.
- The 2 hexagon head screws at the bed and the 2 socket head screws at the gear box have to be taken off.
- The machine bed with headstock, gear box and motor can be lifted.

Mounting of gibs

- Loosen nut carrier Z-slide (3)
- Exchange gibs, slides have to run playfree, but it should still be possible to move it by hand efficiently.
- Mounting of nut carrier, bed and cable.

10 Tailstock



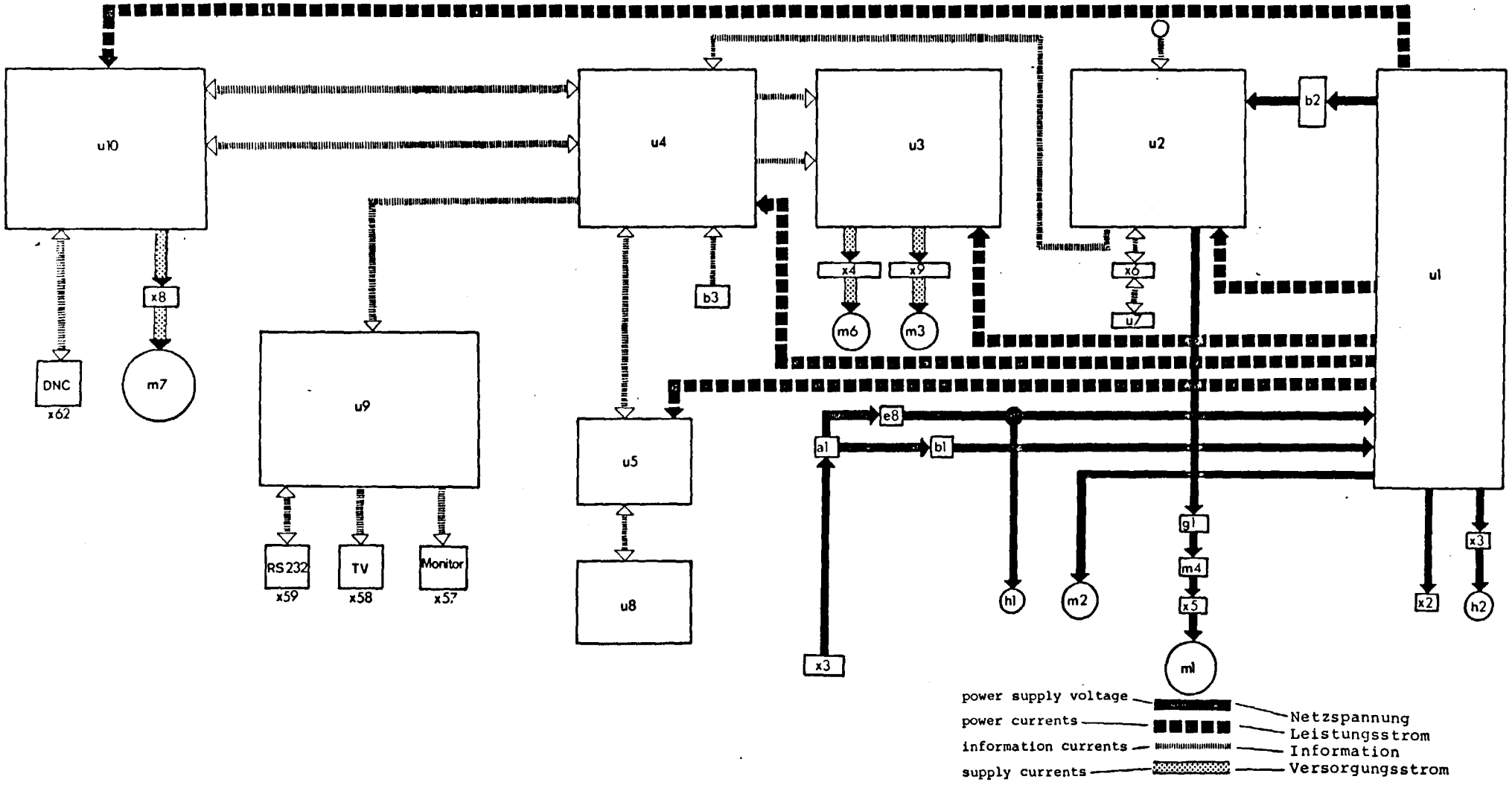
1. Adjustment, if play is too big at handwheel

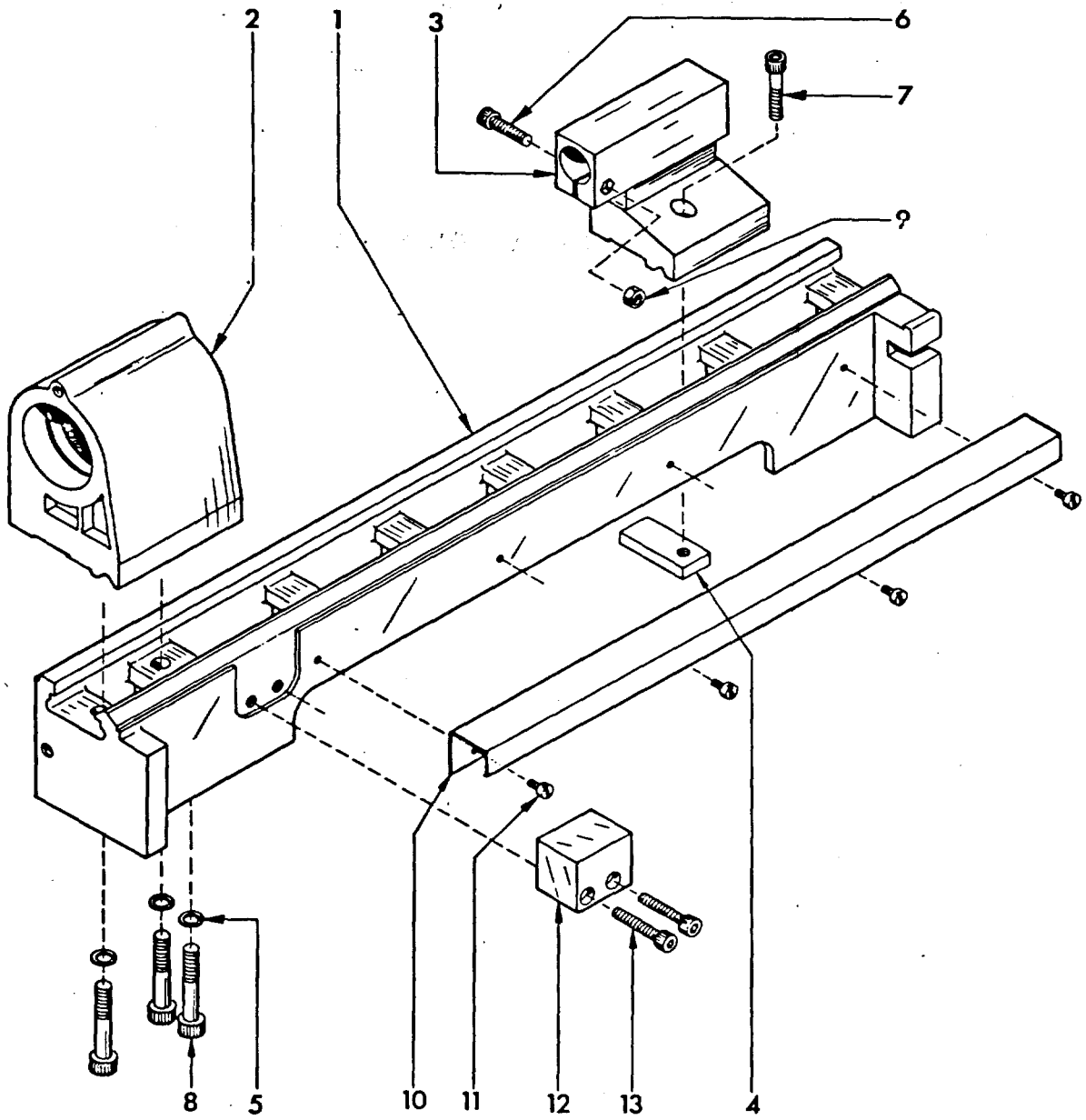
Clamp tailstock barrel, loosen nut (1), adjust handwheel, tighten nut again.

2. Exchange of tailstock barrel

Protection against torsion (2) of the barrel by a glued stud bolt has to be loosened. After exchange of the barrel secure stud bolt again with "Loctite 242" or with similar material.

Flußdiagramm
Flow chart COMPACT 5 CNC

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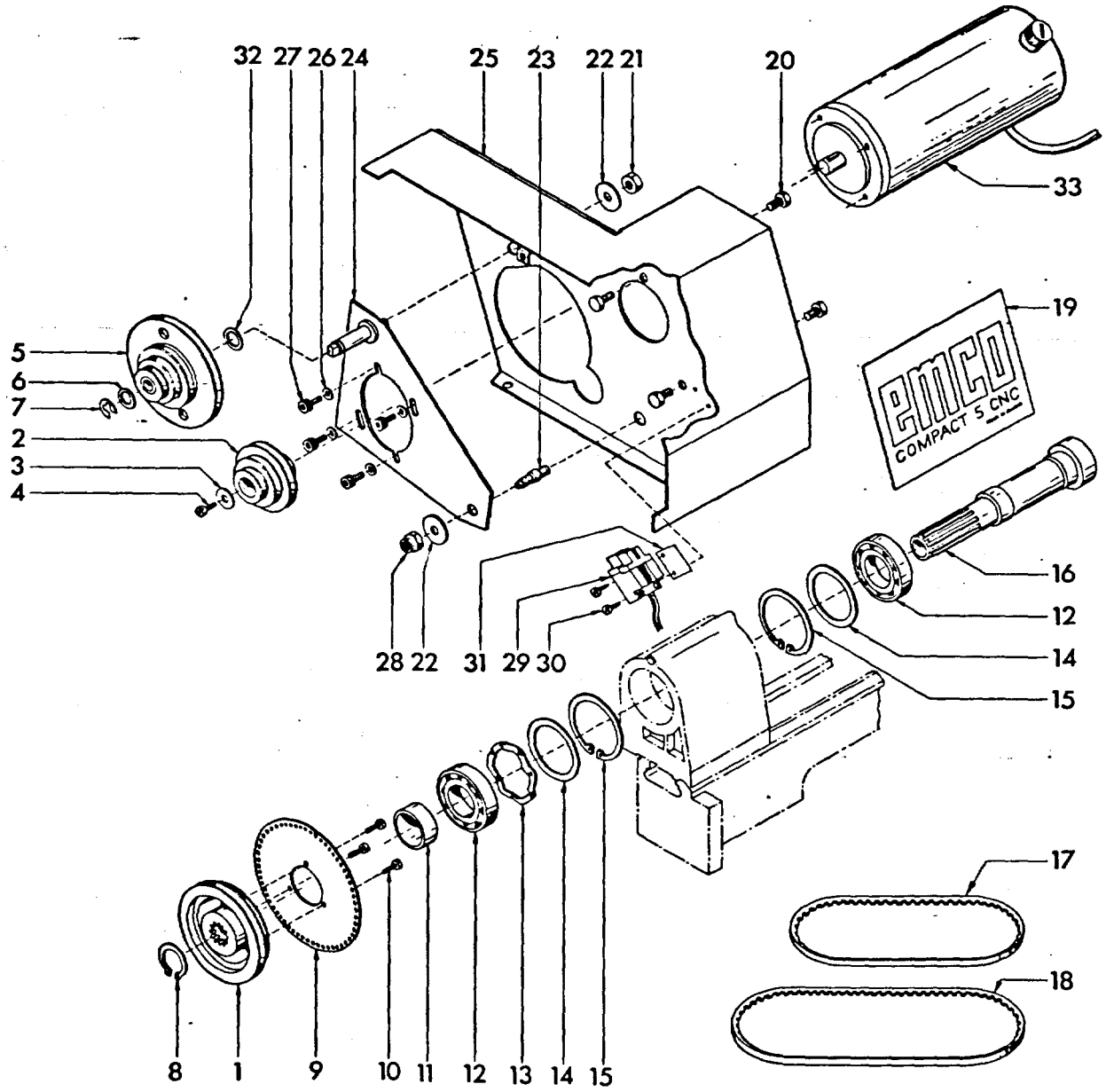
Pos.	Ref. No.	DIN		Benennung	Description	Designation
1	A6A o1o o1o			Bett	Bed	Banc
2	A5A o1o o2o			Spindelstock	Headstock	Poupée fixe
3	A5A o1o o3o			Reitstockgehäuse	Tailstock housing	Corps de la poupée
4	A3A ooo o4o			Klemmplatte	Clamping plate	Plaque de blocage
5	ZRG 28 oo8o	B8 DIN127		Federring	Spring washer	Rondelle ressort
6	ZSR 12 o625	M6x25 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZSR 12 o63o	M6x3o DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	ZSR 12 o845	M8x45 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
9	ZMU 34 o6oo	M6 DIN934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
1o	A6A ooo o6o			Abdeckung	Cover	Couvercle
11	ZSR 63 o4o8	M4x8 DIN963-4.8		Senkschraube	Countersunk screw	Vis tête fraise
12	A6A ooo o4o			Lagerbock 2	Bearing block	Palier de la roulement
13	ZSR 12 o53o	M5x3o DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux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COMPACT 5 CNC
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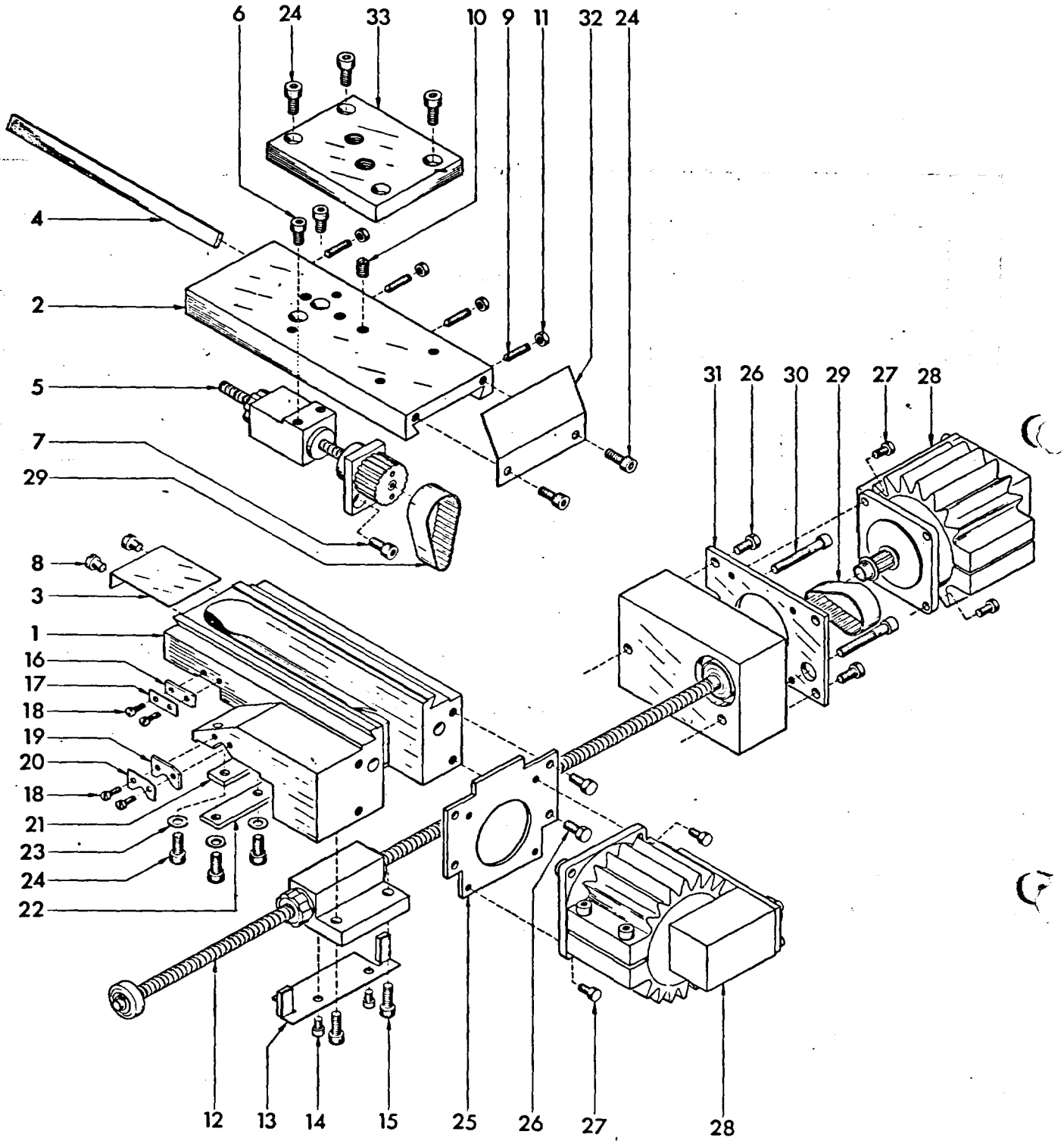
Pos.	Ref. No.	DIN		Benennung	Description	Designation
1	A6A ooo o2o			Riemenscheibe	Pulley	Poulie
2	A5A ooo o3o			Motorriemenscheibe	Motor pulley	Poulie de moteur
3	ZSB 22 o53o	B5,3 DIN9o21		Scheibe	Washer	Rondelle
4	ZSR 84 o512	M5x12 DIN84-4.8		Zylinderschraube	Flat head screw	Vis à tête cylindrique
5	A5A o6o ooo			Vorgelegeriemenscheibe	Countershaft pulley	Poulie
6	ZSB 1o 2181	PS12x18x1,2		Stützscheibe	Supporting ring	Rondelle
7	ZSB 99 o9oo	9 DIN6799		Sicherungsscheibe	Retaining washer	Poulie de retenue
8	ZRG 71 2412	24x1.2 DIN471		Sicherungsring	Retaining ring	Anneau de retenue
9	A6A ooo 11o			Teilscheibe 1oo	Dividing washer 1oo	Disque diviseur 1oo
1o	ZSR 84 o516	M5x16 DIN84-4.8		Zylinderschraube	Flat head screw	Vis à tête cylindrique
11	A6A ooo 24o			Hülse	Spacer	Douille d'écartement
12	ZLG 6o o6o2	6oo6-2Z		Rillenkugellager	Ball bearing	Roulement à billes
13	ZSB o2 6oo6	6oo6/2K		Ausgleichscheibe	Compensating washer	Rondelle de compensation
14	ZSB 1o 5553	SS45x55x3		Stützscheibe	Supporting ring	Rondelle
15	ZRG 72 552o	B55x2 DIN472		Sicherungsring	Retaining ring	Anneau de retenue
16	A5A ooo o1o			Hauptspindel	Main spindle	Broche principale
17	ZRM 4o 6335	6x335		Keilriemen	V-belt	Courroie trapézoidale
18	ZRM 4o 645o	6x45o		Keilriemen	V-belt	Courroie trapézoidale
19	A6A ooo 17o			Frontschild	Front plate	Plaque frontale
2o	ZSR 33 o612	M6x12 DIN933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
21	ZMU 34 o8oo	M8 DIN934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
22	ZSB 21 o84o	A8,4 DIN9o21		Scheibe	Washer	Rondelle
23	A5A ooo 1oo			Lagerbolzen	Bearing shaft	Axe palier
24	A6A 13o ooo			Trägerplatte	Carrier plate	Plaque support seule
25	A6A o3o ooo			Spindelstockabdeckung	Headstock cover	Couvercle de la poupée fi
26	ZSB 22 o53o	B5,3 DIN9o21		Scheibe	Washer	Rondelle
27	ZSR 11 o512	M5x12 DIN6912-6.9		Zylinderschraube	Socket head screw	Vis à 6 pans creux
28	ZMU 8o o8oo	NM8 DIN98o-8		Sicherungsmutter	Securing nut	Ecrou de sûreté
29	A6A 1o8 oo1			Lichtschranke	Light barrier	Barrière lumineux
3o	ZSR 75 3513	B3.5x13 DIN7981		Blechschraube	Sheet metal screw	Vis en tôle
31	A6A ooo 28o			Abstimmblech	Compensating sheet	Tôle de compensation
32	ZSB 12 12o3	PS 12x18xo,3		Paßscheibe	Shim ring	Rondelle
33	A6A 1o4 ooo			Motor 22o-24o V (A,B,F,G,N)	Motor 22o-24o V (A,B,F,G,N)	Moteur 22o-24o V (A,B,F,G,N)
	A6C 1o4 ooo			Motor 115 V (C,H)	Motor 115 V (C.H)	Moteur 115 V (C,H)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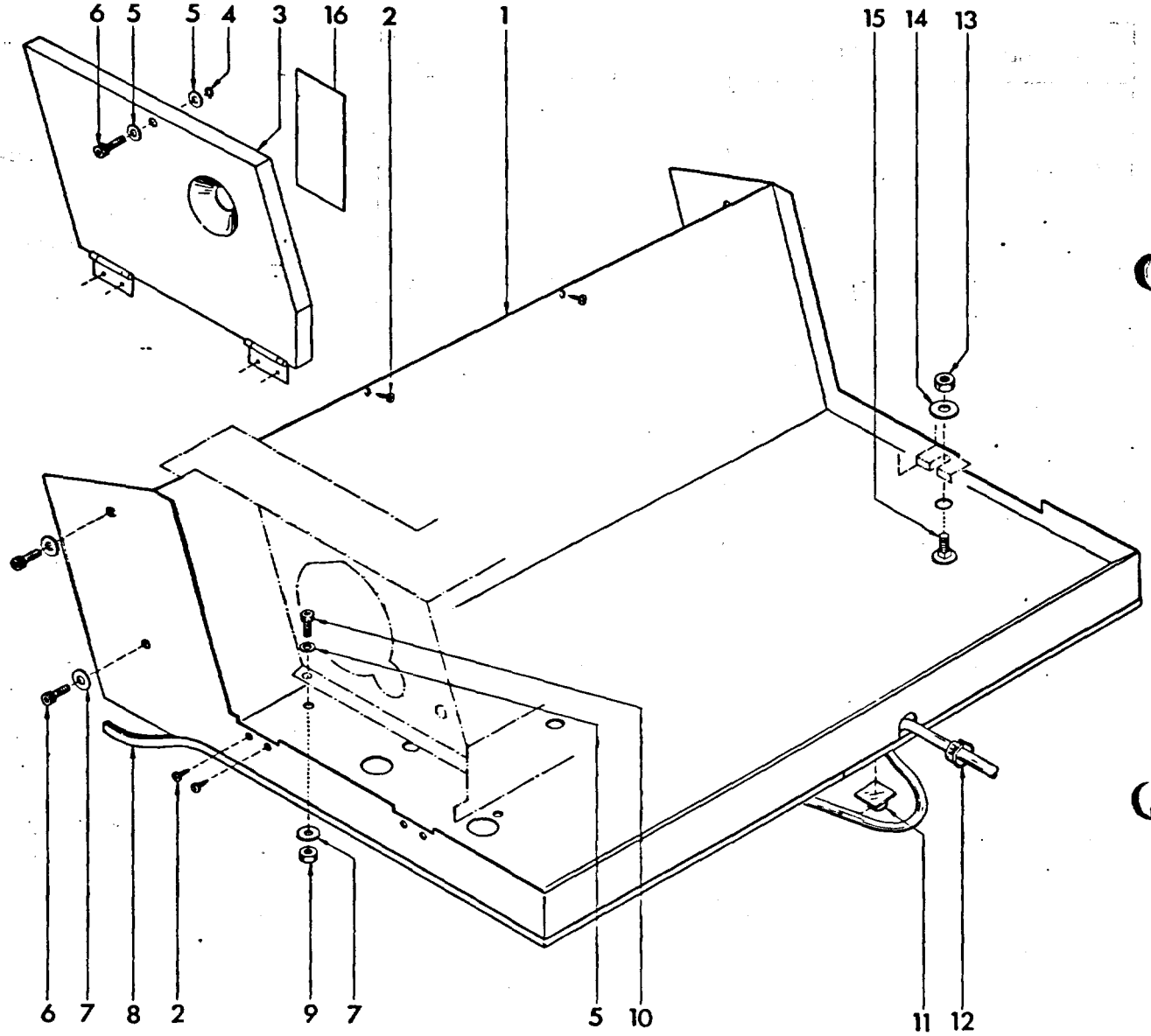
Pos.	Ref. No.	DIN		Benennung	Description	Designation
1	A6A o2o o1o			Schlitten	Slide	Chariot
2	A6A o2o o2o			Querschlitten	Cross slide	Chariot transversal
3	A6A o2o o6o			Abdeckblech	Cover sheet	Couvercle
4	A6A o2o o7o			Einstelleiste	Gib	Lardon
5	ZME 2oo 26o			Gruppe Querspindel	Cross slide spindle c.	Ens. broche transversale
6	ZSR 12 o5o8	M5x8 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZSR 12 o51o	M5x1o DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	ZSR 84 o5o6	M5x6 DIN 84-4.8		Zylinderschraube	Socket head screw	Vis 6 pans creux
9	A6A o2o o8o			Gewindestift	Set screw	Vis pointeau
1o	ZST 13 o6o6	M6x6 DIN913-45H		Gewindestift	Set screw	Vis pointeau
11	ZMU 34 o4oo	M4 DIN934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
12	ZME 2oo 27o			Gruppe Längsspindel	Lead screw complete	Ens. vis-mère
13	A6A o4o ooo			Abstreifblech	Wiper sheet	Tôle de racleur postérieur
14	ZSR 12 o4o8	M4x8 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
15	ZSR 12 o516	M5x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
16	A6A ooo 22o			Abstreiffilz 1	Felt wiper 1	Racleur en feutre post. 1
17	A6A ooo 2oo			Abstreifblech 1	Wiper plate 1	Plaquette de racleur post.1
18	ZSR 84 o3o8	M3x8 DIN84-4.8		Zylinderschraube	Flat head screw	Vis à tête cylindrique
19	A6A ooo 23o			Abstreiffilz 2	Felt wiper 2	Racleur en feutre post. 1
2o	A6A ooo 21o			Abstreifblech 2	Wiper plate 2	Plaquette de racleur post.2
21	A5A ooo 13o			Bettleiste kurz	Keep plate short	Lardon de chariot court
22	A6A ooo o5o			Bettleiste lang	Keep plate long	Lardon de chariot long
23	ZSB 25 o53o	B5,3 DIN125		Scheibe	Washer	Rondelle
24	ZSR 12 o512	M5x12 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
25	A6A ooo o7o			Motorplatte 1	Motor plate 1	Plaque de moteur 1
26	ZSR 33 o51o	M5x1o DIN933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
27	ZSR 33 o4o8	M4x8 DIN933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
28				Schrittmotor	Step motor	Moteur pas à pas
29	ZRM 73 48o5			Zahnflachriemen	Timing belt	Courroie crantée
3o	ZSR 12 o535	M5x35 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
31	A6A ooo o8o			Motorplatte 2	Motor plate 2	Plaque de moteur 2
32	A6A ooo 26o			Anschlag	Stop	Butée
33	A6A ooo 14o			Stahlhalterauflage	Toolpost support	Support de tourelle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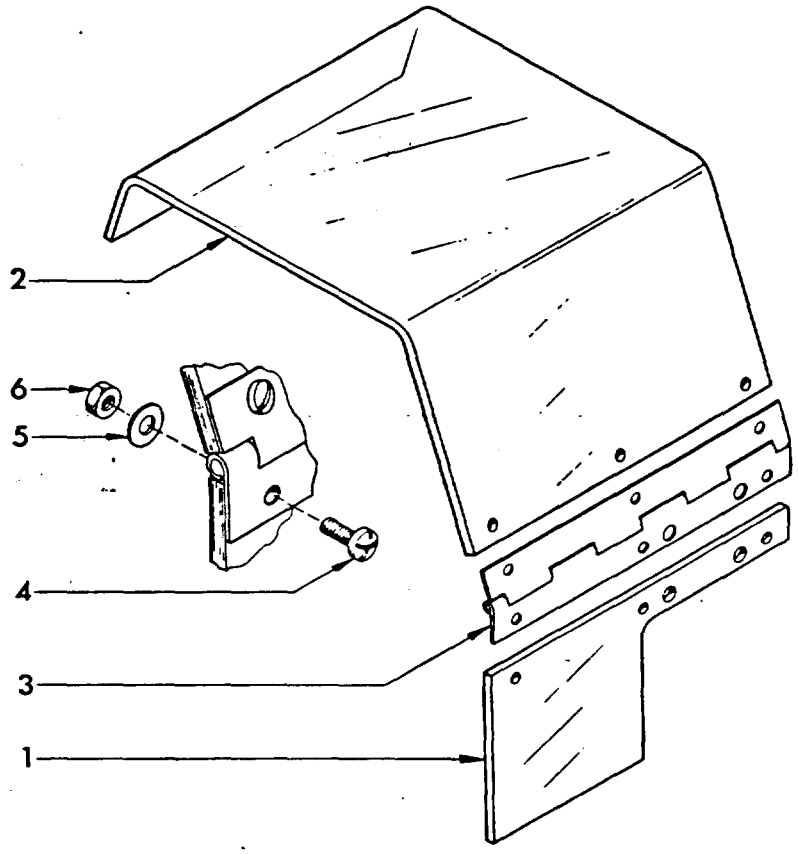
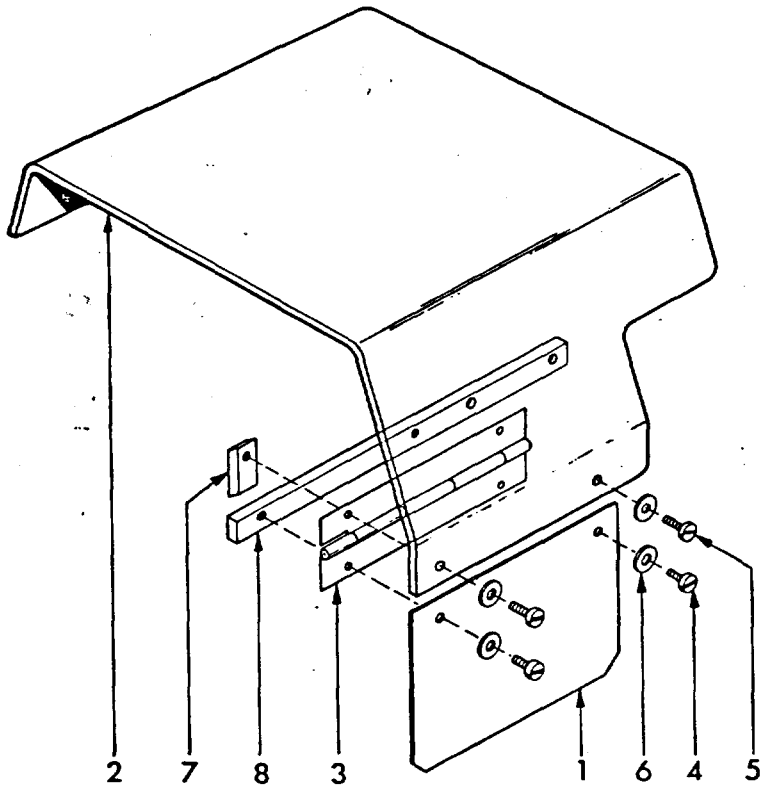
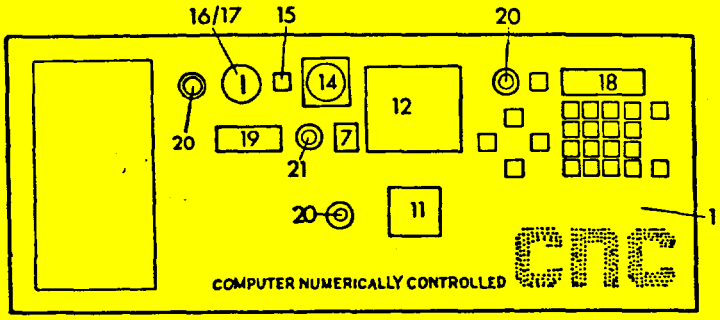
Pos.	Ref. No.	DIN		Benennung	Description	Designation
1	A6A o6o oo1			Spänetasse	Chip tray	Bac à copeaux
2	ZSR 75 3595	B3,5x9,5 DIN7981		Blechschraube	Sheet metal screw	Vis en tôle
3	A6A o5o ooo			Deckel	Cover	Couvercle
4	ZRG 71 o6o7	6xo,7 DIN471		Sicherungsring	Retaining ring	Anneau de retenue
5	ZSB 25 o64o	B6,4 DIN125		Scheibe	Washer	Rondelle
6	ZSR 12 o62o	M6x2o DIN912		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZSB 21 o64o	A6,4 DIN9o21		Scheibe	Washer	Rondelle
8	ZGU 77 o621	853 mm		Kantenschutzprofil	Protective profile	Perfil protective
9	ZMU 34 o6oo	M6 DIN934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
1o	ZSR 12 o616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
11	ZEE 25 1o1o			Kabelklipp	Clip for cable	Pince pour câble
12	ZEL 15 o75o			Tülle	Ring	Bague
13	ZMU 34 o8oo	M8 DIN934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
14	ZSB 21 o84o	A8,4 DIN9o21		Scheibe	Washer	Rondelle
15	ZSR o3 o82o	M8x2o DIN6o3-4.6		Flachrundschraube	Square neck bolt	Collet carré
16	A6A ooo 19o			Drehzahlschild	Speed plate	Plaquette de vitesses



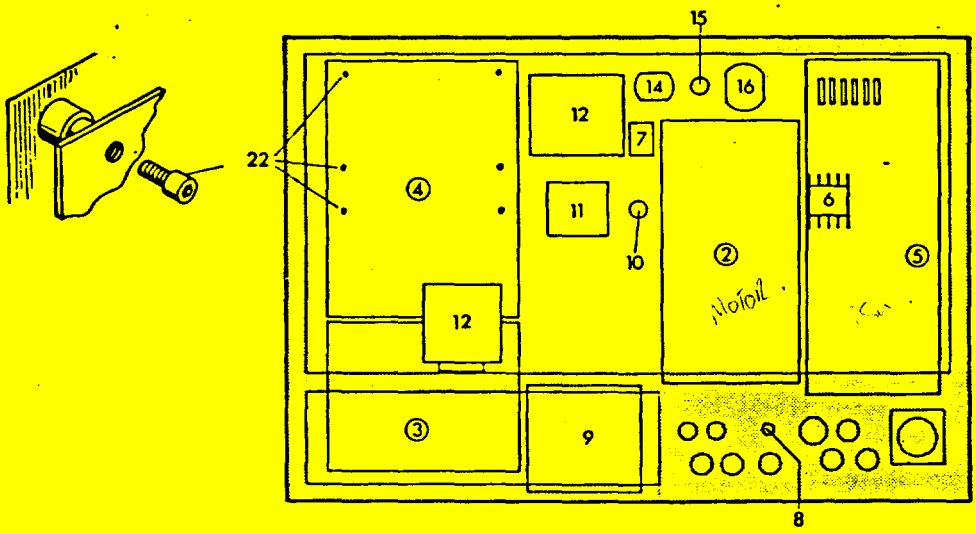
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	A6A 140 000			Gruppe Späneschutz	Chip guard complete	Ens. pare-copeaux
1	A6A 140 010			Frontschutz	Front guard	Pare-copeaux
2	A6A 140 020			Deckel	Cover	Couvercle
3	A6A 140 030			Scharnier	Frame joint	Charnière
4	ZSR 89 0410	M4x10 DIN7985-4.8		Linsenschraube	Filister head screw	Vis à tête lentiforme
5	ZSB 21 0430	A4,3 DIN9021		Scheibe	Washer	Rondelle
6	ZMU 34 0400	M4 DIN934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans



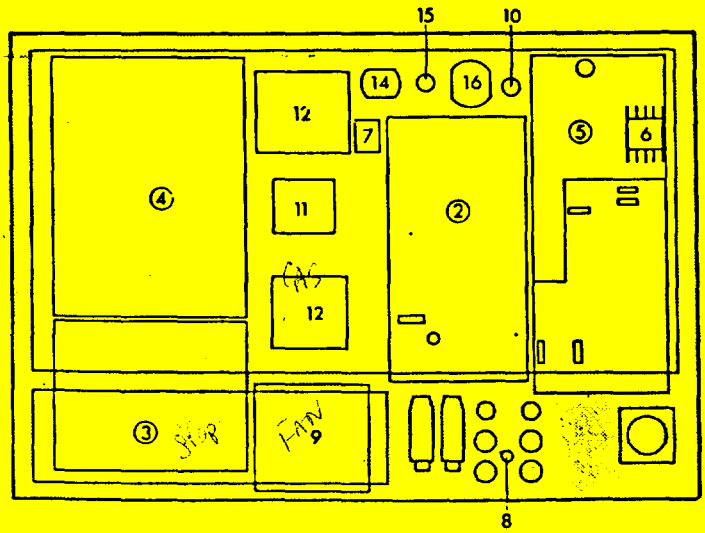
Pos.	Ref. Nc	DIN		Benennung	Description	Designation
	A6A 14o oo1			Gr. Späneschutz	Chip guard compl.	Ens. pare-copeaux
1	A6A 14o oo1			Frontschutz	Front guard	Pare-copeaux
2	A6A 14o o21			Deckel	Cover	Couvercle
3	A6A 14o o31			Scharnier	Frame joint	Charnière
4	ZSR 89 o41o	M4x1o DIN 7985-4.8		Linsenschraube	Filister head screw	Vis à tête lentiforme
5	ZSR 89 o412	M4x12 DIN 7985-4.8		Linsenschraube	Filister head screw	Vis à tête lentiforme
6	ZSB 21 o43o	A4,3 DIN 9o21		Scheibe	Washer	Rondelle
7	A6A 14o o4o			Anschlag	Stop	Butée
8	A6A 14o o5o			Leiste	Gib	Barre



Version ABC



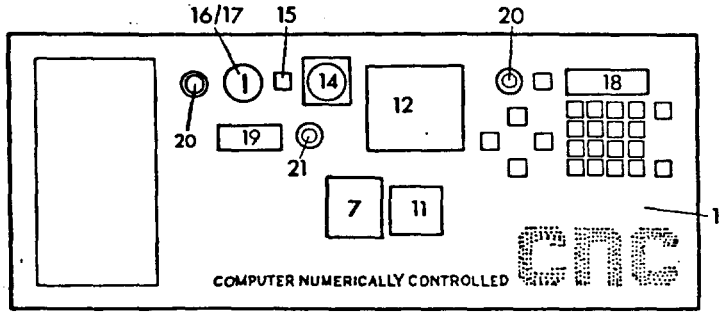
Version FGH

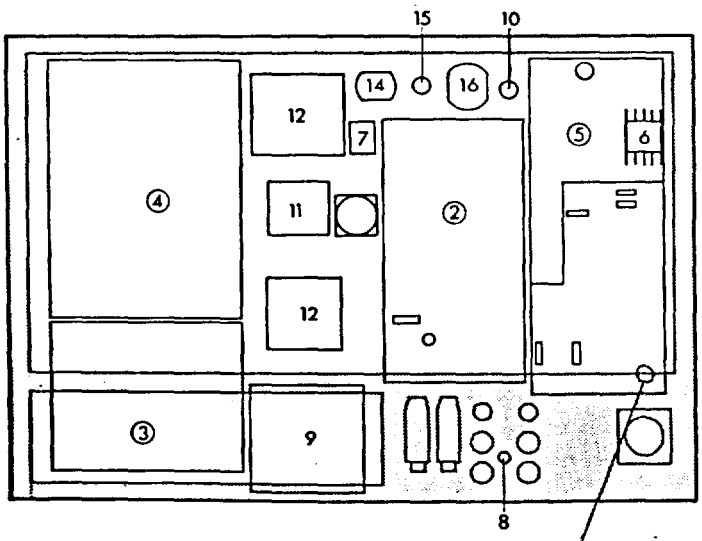


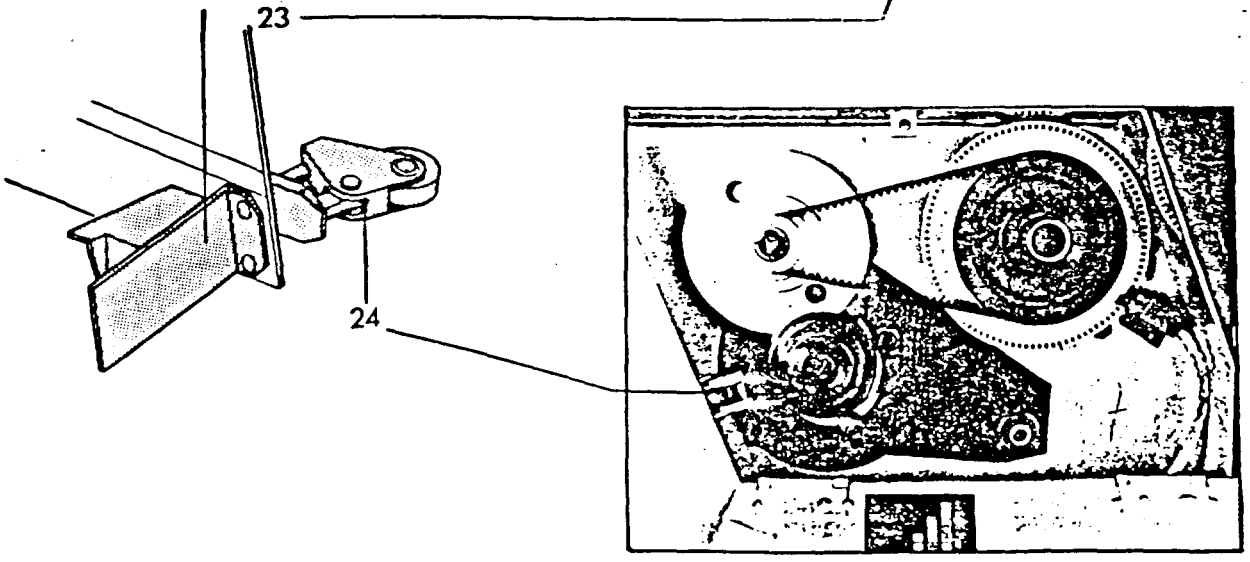
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	A6G 1o5 ooo			E-Kasten komplett	Ass. E-Housing	Ens. Couvercle Elêctrique
	A6H 1o5 ooo			E-Kasten komplett	Ass. E-Housing	Ens. Couvercle Elêctrique
1	A6A 1oo o11			Frontschild	Front plate	Plaque frontale
2	A6A 112 oo1			Hauptspindelplatine (A,B,F,G)	Main spindle circuit board (A,B,F,G)	Platine alimentation broche (A,B,F,G)
	A6C 112 oo1			Hauptspindelplatine (C,H)	Main spindle circuit board (C,H)	Platine alimentation broche (C,H)
3	A6A 113 oo1			Schrittmotorplatine	Step motor circuit board	Platine alimentation moteur pas à pas
4	A6C 114 oo3			Rechnerplatine	CPU board	Platine entrée informations
5+6	A6A 111 oo1			Netzteilplatine (A,B,F,G)	Power supply circuit board (A,B,F,G)	Platine bloc d'alimentation (A,B,F,G)
	A6C 111 oo1			Netzteilplatine (C,H)	Power supply circuit board (C,H)	Platine bloc d'alimentation (C,H)
6	ZEL 53 1o1o			Schütz (A,B,F,G)	Relay (A,B,F,G)	Relais (A,B,F,G)
	ZEL 53 1o14			Schütz (C,H)	Relay (C,H)	Relais (C,H)
7	ZEL 21 31oo			Motorschalter	Motor switch	Commutateur moteur
8	ZEE 75 1o8o			Hauptsicherung 8 A tr. (A,B,F,G)	Main fuse 8 A slow (A,B,F,G)	Fusible principale 8 A lent (A,B,F,G)
	ZEE 75 11oo			Hauptsicherung 1o A tr. (C,H)	Main fuse 1o A slow (C,H)	Fusible principale 1o A lent (C,H)
9	ZMO 78 922o			Ventilator (A,B,F,G)	Fan (A,B,F,G)	Ventilateur (A,B,F,G)
	ZMO 78 911S			Ventilator (C,H)	Fan (C,H)	Ventilateur (C,H)
1o	ZEL 21 9oo3			Umschalter metrisch/ zöllig (B,C,G,H)	Throw-over switch metric/inch (B,C,G,H)	Commutateur métrique/en pouces (B,C,G,H)
11	ZEM oo 1oo5			Amperemeter 5 A (A,B,F,G)	Amperemeter 5 A (A,B,F,G)	Ampèremètre 5 A (A,B,F,G)
	ZEM oo 1o1o			Amperemeter 1o A (C,H)	Amperemeter 1o A (C,H)	Ampèremètre 1o A (C,H)
12	A6F o9o ooo			Cassetten Deck mit Interface Platine	Cassette Deck with Interface circuit board	Elément Cassette Deck avec platine Interface
14	ZEL 4o ooo2			Pilztastenschalter	Mushroom emerg. switch	Arrêt coup de poing
15	ZEE 53 o22o			Leuchte EIN (A,B,F,G)	Power control (A,B,F,G)	Lampe temoin (A,B,F,G)
	ZEE 53 o11o			Leuchte EIN (C,H)	Power control (C,H)	Lampe temoin (C,H)
16	ZEL 21 oo14			Hauptschalter mit 2 Schlüssel	Main switch with 2 keys	Commutateur principal avec 2 clês
17	ZME o62 oo5			Schlüssel zu Hauptschalter	Key for main switch	Clê pour commutateur principal
18	A6A 1o5 o2o			Sichtfenster/Display	Display glass	Ecran visualisation
19	A6A 1o5 o3o			Sichtfenster für Spindeldrehzahl	Display glass for number of spindle speed	Ecran visualisation pour vitesse de broche
2o	ZED 25 1oo6			Potentiometergriff 6 mm	Knob 6 mm	Poignée de potentiomètre 6 mm
21	ZED 25 1oo4			Potentiometergriff 4 mm	Knob 4 mm	Poignée de potentiomètre 4 mm
22	ZSR 12 o3o6	M3x6 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis de fixation

E-Ausrüstung für Version
El. Equipment for Version
Equipement el. pour version

A,F	22o V, 5o/6o Hz, metr.
B,G ...	22o-24o V, 5o/6o Hz, metr.-inch
C,H ...	1oo-115 V, 5o/6o Hz, metr.-inch





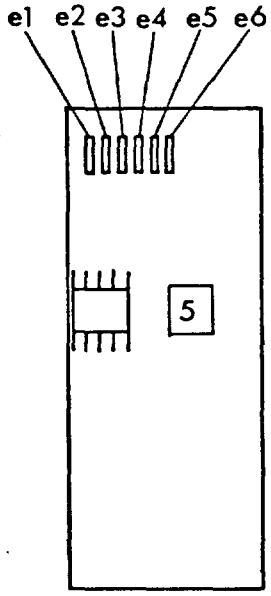


E-Ausrüstung für Sonderversion (Frankreich)
El. Equipment for special version (France)
Equipement el. pour version spéciale (France)

A6N ... 220-240 V, 50/60 Hz, metr.-inch

Pos.	Ref. No.	DIN		Benennung	Description	Designation
	A6N 105 000			E-Kasten komplett	Ass. E-housing	Ens. couvercle elèctrique
1	A6N 100 010			Frontschild	Front plate	Plaque frontale
2	A6A 112 001			Hauptspindelplatine	Main spindle circuit board	Platine alimentation broche
3	A6A 113 001			Schrittmotorplatine	Step motor circuit board	Platine alimentation moteur pas à pas
4	A6C 114 003			Rechnerplatine	CPU board	Platine entrée informations
5+6	A6A 111 001			Netzteilplatine	Power supply circuit board	Platine bloc d'alimentation
6	ZEL 53 101 0			Schütz	Relay	Relais
7	ZEL 22 000 2			Motorschalter	Motor switch	Commutateur moteur
8	ZEE 75 108 0			Hauptsicherung 8 A tr.	Main fuse 8 A slow	Fusible principale 8 A
9	ZMD 78 922 0			Ventilator	Fan	Ventilateur
10	ZEL 21 900 3			Umschalter metrisch/ zöllig	Throw-over switch metric/inch	Commutateur métrique/en pouces
11	ZEM 00 100 5			Amperemeter 5 A	Amperemeter 5 A	Ampèremètre 5 A
12	A6F 090 000			Cassette Deck mit Interface Platine	Cassette Deck with Interface circuit board	Element Cassette Deck avec Platine Interface
14	ZEL 40 000 2			Pilztastenschalter	Mushroom emerg. switch	Arrêt coup de poing
15	ZEE 53 022 0			Leuchte "EIN"	Power control	Lampe temoin
16	ZEL 21 001 4			Hauptschalter mit 2 Schlüssel	Main switch with two keys	Commutateur principal avec 2 clès
17	ZME 062 005			Schlüssel zu Hauptschalter	Key for main switch	Clé pour commutateur principal
18	A6A 105 020			Sichtfenster/Display	Display glass	Ecran visualisation
19	A6A 105 030			Sichtfenster für Spindeldrehzahl	Display glass	Ecran visualisation vitesse brocne
20	ZED 25 100 6			Potentiometergriff 6 mm	Knob 6 mm	Poignée de potentiomètre 6 mm
21	ZED 25 100 4			Potentiometergriff 4 mm	Knob 4 mm	Poignée de potentiomètre 4 mm
22	ZSR 12 030 6	M3x6 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis de fixation
23	ZEL 45 001 0			Grenztaster	Switch de sécurité sur le couvercle du boîtier	
24	ZEE 47 310 4			Winkelrollenhebel	du harnais d'engrenages	

Sicherungen für Netzteilplatine **A6A 111 000**
Fuses for power supply circuit board **A6C 111 000**
Fusible pour platine bloc d'alimentation



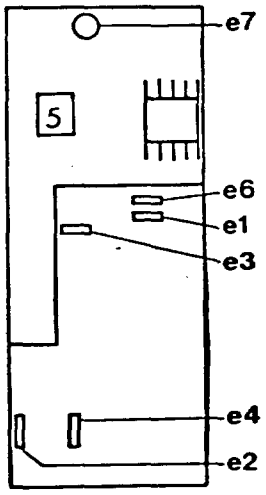
e1 ..... 8 A ..... ZEE 75 1o8o
e2 ..... 8 A ..... ZEE 75 1o8o
e3 ..... 4 A ..... ZEE 75 1o4o

e4 — 22o V - 24o V ..... 4 A ..... ZEE 75 1o4o
e4 — 11o V ..... 8 A ..... ZEE 75 1o8o

e5 .....2,5 - 4 A ..... ZEE 75 1o4o

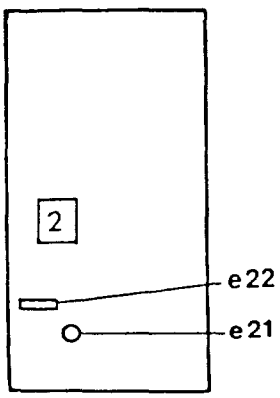
e6 .....1 A ..... ZEE 75 1o1o

Sicherungen für Netzteilplatine **A6A 111 001**
Fuses for power supply circuit board **A6C 111 001**
Fusible pour platine bloc d'alimentation



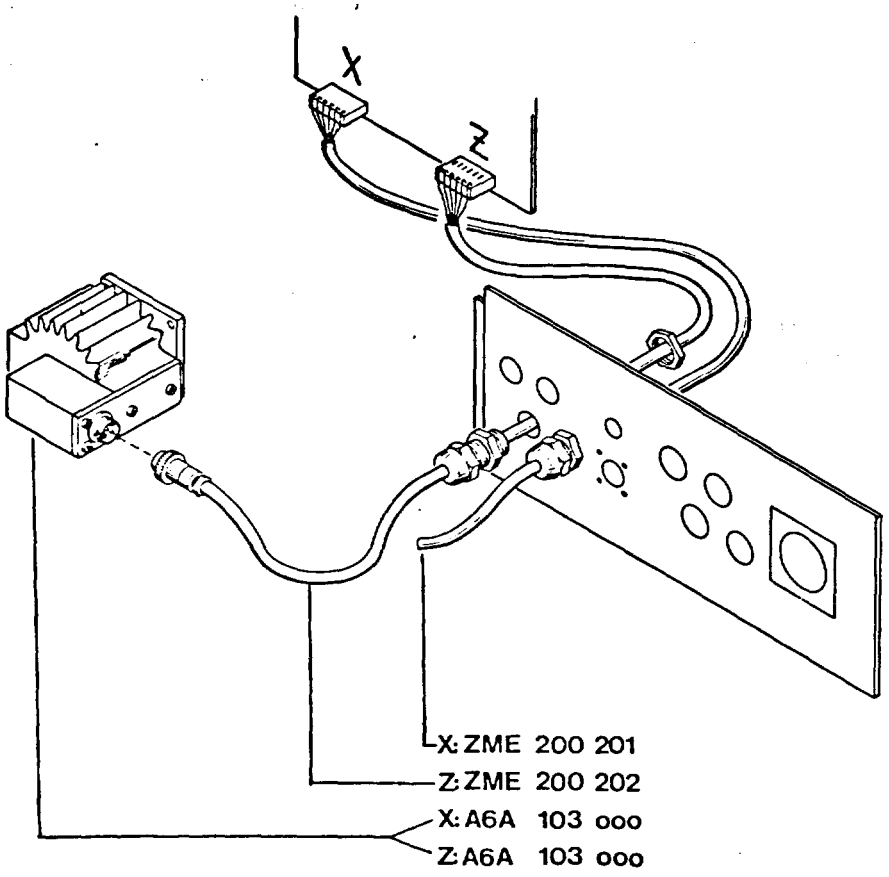
e1 ..... 4 A ..... ZEE 75 1o4o
e2 ..... 4 A ..... ZEE 75 1o4o
e3 ..... 6,3 A ... EEE 75 1o63
e4 ..... 4 A ..... ZEE 75 1o4o
e6 ..... 1 A ..... ZEE 75 1o1o
e7 ..... 16 A .... ZEE 7o 2o16

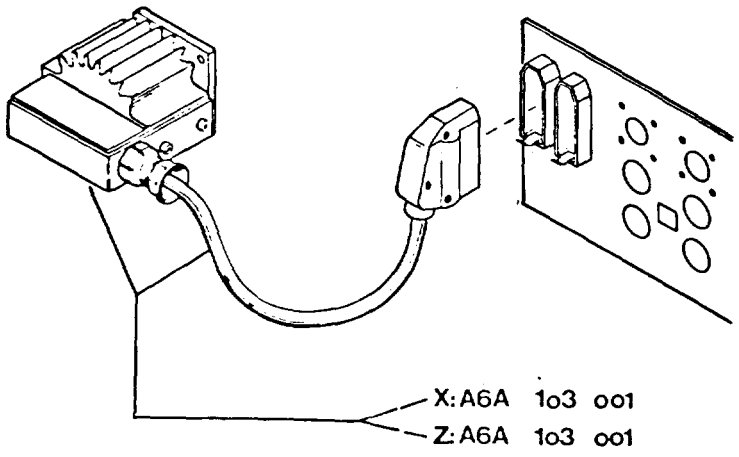
Sicherungen für Hauptspindelplatine **A6A 112 001**
Fuses for main spindle circuit board **A6C 112 001**
Fusibles pour platine d'alimentation broche



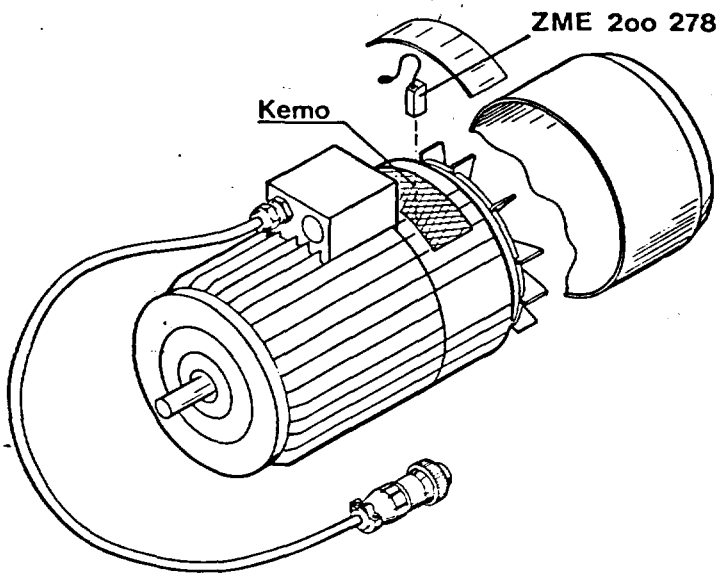
e21 ..... 1o A (ff, super fast, rapide) ..... ZEE 75 11o1
e22 ..... 1oo mA ..... ZEE 75 1oo1

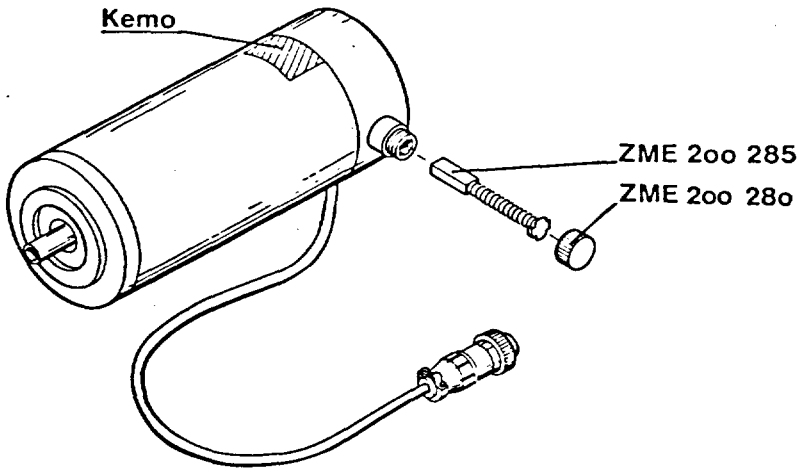
Ref. Nr. für Schrittmotor und Kabel
Ref. No. for step motor and cable
Réf. pour moteur pas à pas et câble

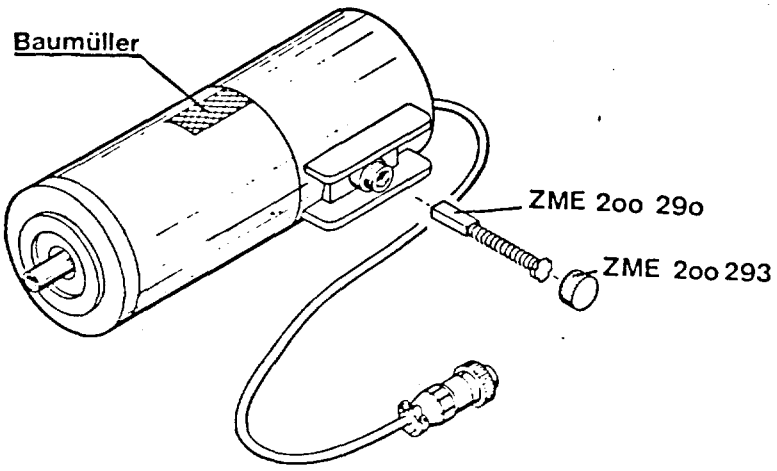


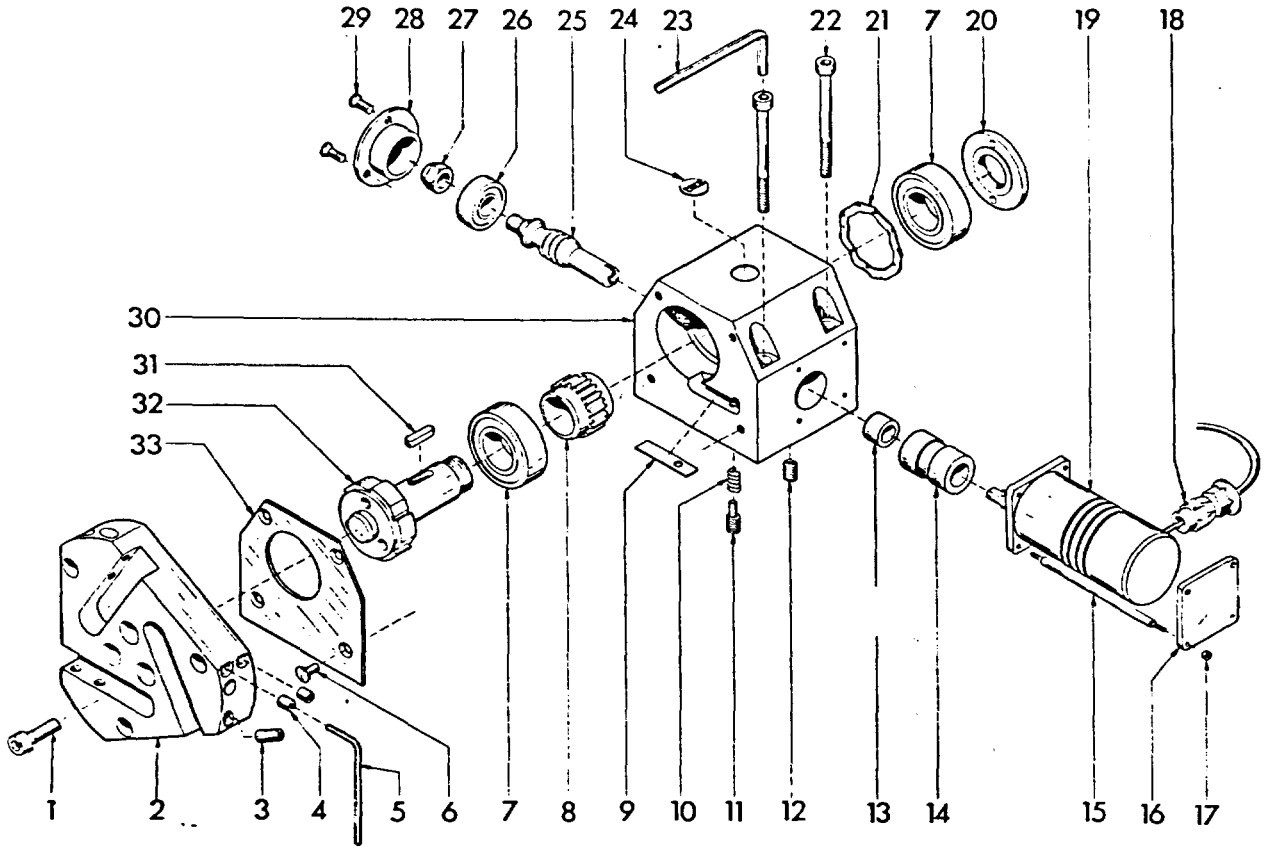


Ref. Nr. für Kohlebürsten
Ref. No. for carbon brushes
Réf. pour balai de charbon

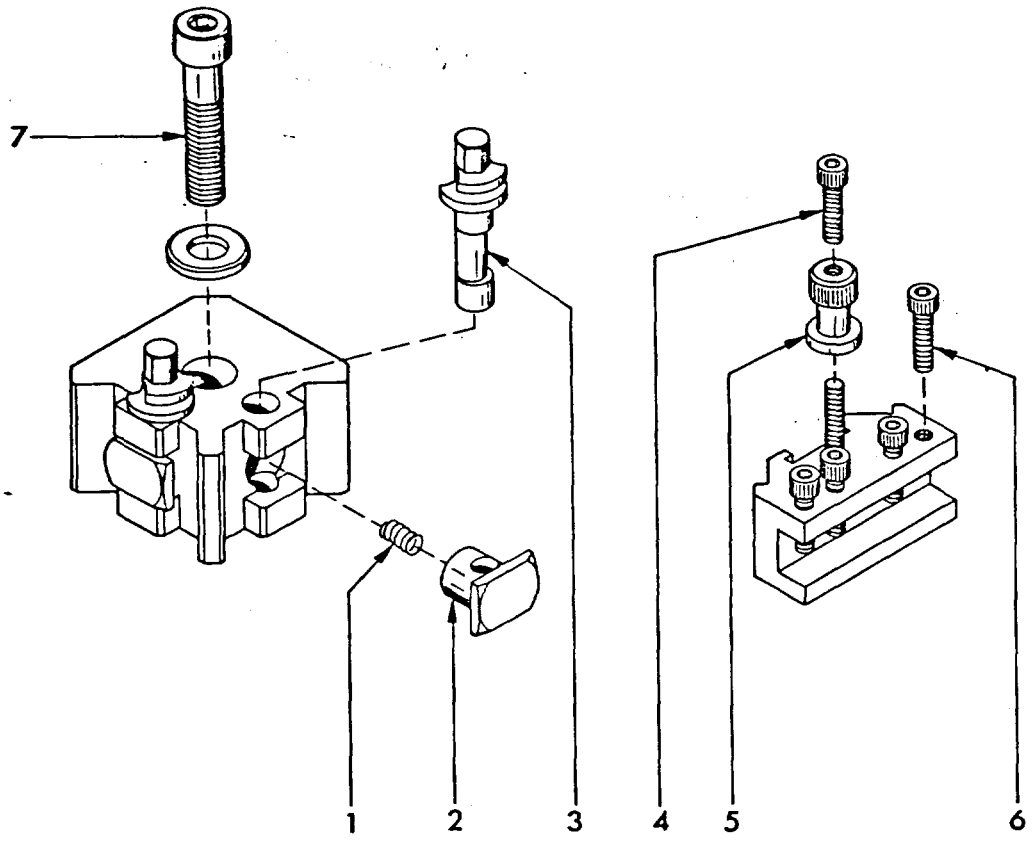




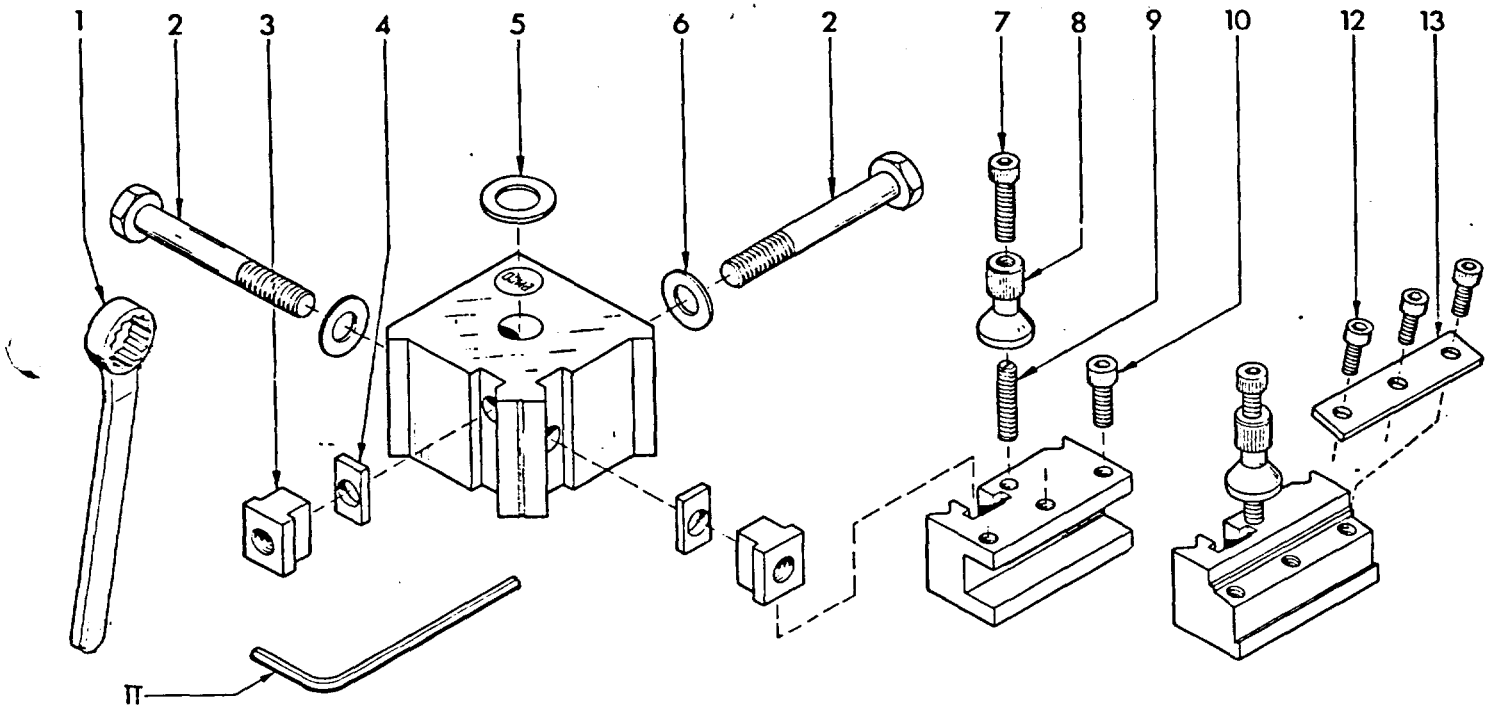




Pos.	Ref. No.	DIN		Benennung	Description	Designation
	26o o4o			Werkzeugrevolver	Turret toolpost	Tourelle-revolver autom.
1	ZSR 12 o62o	M6x2o DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
2	A6Z o4o o2o			Revolverscheibe	Toolpost disc	Disque de la tourelle
3	ZST 13 o616	M6x16 DIN 913-45H		Gewindestift	Set screw	Vis pointeau
4	ZST 13 o6o6	M6x6 DIN 913-45H		Gewindestift	Set screw	Vis pointeau
5	ZWZ 11 o3oo	SW3 DIN 911		Schraubendreher	Hex.socket screw key	Clé mâle coudée
6	ZSR 63 o4o6	M4x6 DIN 963-4.8		Senkschraube	Countersunk screw	Vis tête fraisée
7	ZLG 6o o4o2	6oo4-2Z		Rillenkugellager	Ball bearing	Roulement à billes
8	A6Z o4o o6o			Schraubenrad	Worm wheel	Roue à vis sans fin
9	A6Z o4o 12o			Federplatte	Leaf spring	Ressort en feuillard plat
10	ZFD 21 3o74			Druckfeder	Compression spring	Ressort de compression
11	A6Z o4o 19o			Gewindestift	Set screw	Vis pointeau
12	ZST 16 o6o8	M6x8 DIN 916-45H		Gewindestift	Set screw	Vis pointeau
13	ZBU 5o oo15	J1ox14x1o DIN185o		Sinterlager	Bearing bush	Bague
14	A6Z o4o 11o			Büchse	Bush	Bague
15	A6Z o4o 16o			Spannbolzen	Bolt	Boulon
16	A6Z o4o 17o			Deckel	Cover	Couvercle
17	ZMU 34 o25o	M2,5 DIN 934-5		Mutter	Nut	Ecrou
18	ZPG 1o oo12	MZB7		Kabelverschraubung	Screw-type cond.fittg.	Raccordement à vis
19	A6Z o46 ooo			Motor komplett	Motor compl.	Ens. moteur
20	A6Z o4o 1oo			Mutter	Nut	Ecrou
21	ZSB o2 6oo4	6oo4/K2		Ausgleichscheibe	Compensating washer	Rondelle de compensation
22	ZSR 12 o56o	M5x6o DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
23	ZWZ 11 o4oo	SW4 DIN 911		Schraubendreher	Hex.socket screw key	Clé mâle coudée
24	PoB ooo 16o			Firmenschild	Name plate	Plaque
25	A6Z o4o o5o			Schneckenwelle	Worm	Vis sans fin
26	ZLG 6o ooo2	6ooo-2Z		Rillenkugellager	Ball bearing	Roulement à billes
27	ZMU 8o o8oo	NM8 DIN 98o-8		Sicherungsmutter	Securing nut	Ecrou de sûreté
28	A6Z o4o o7o			Deckel	Cover	Couvercle
29	ZSR 63 o4o8	M4x8 DIN 963-4.8		Senkschraube	Countersunk screw	Vis tête fraisée
30	A6Z o4o o4o			Gehäuse	Housing	Corps
31	ZFD 85 4416	A4x4x16 DIN 6885		Paßfeder	Square key	Clavette parallèle
32	A6Z o4o o3o			Schaltwelle	Shaft	Arbre
33	A6Z o4o o8o			Dichtplatte	Seal plate	Joint d'étanchéité

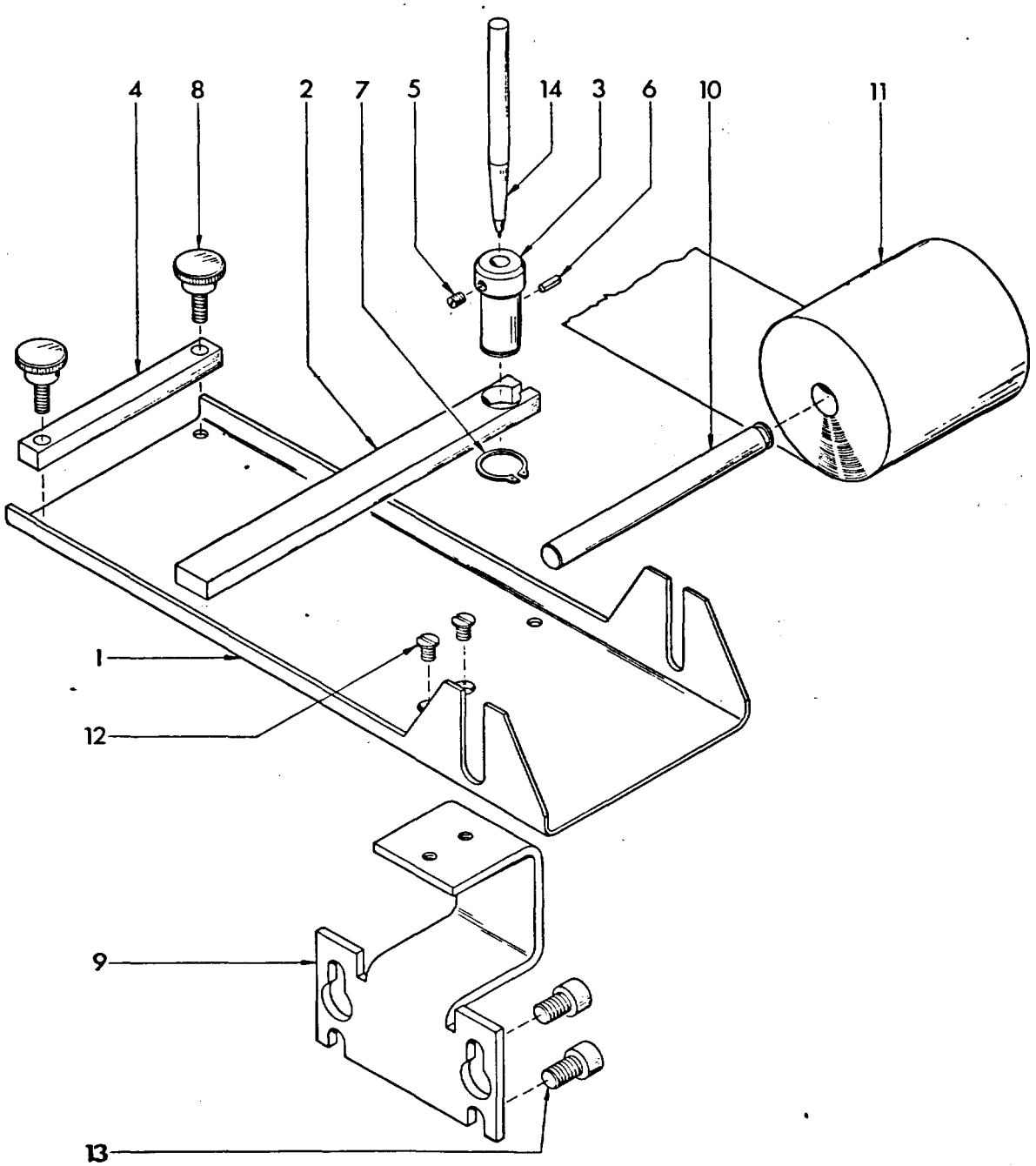


Pos.	Ref. No.	DIN		Benennung	Description	Designation
1-6	544 ooo			Schnellwechselstahl-halter	Quick-change toolpost	Tourelle porte-outil à changement rapide
1	ZME 11 ooo2			Feder	Clamp pad spring	Ressort
2	ZME 11 ooo1			Klemmplatte	Clamp pad	Plaque de serrage
3	ZME 11 oooo			Exzenterbolzen	Clamp bolt	Boulon excentré
4	ZSR 12 o52o	M4x2o DIN912		Zylinderschraube	Socket head screw	Vis 6 pans creux
5	ZME 11 ooo5			Mutter	Nut	Ecrou
6	ZSR 12 o516	M4x16 DIN912		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZSR 12 1o5o	M1ox5o DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux

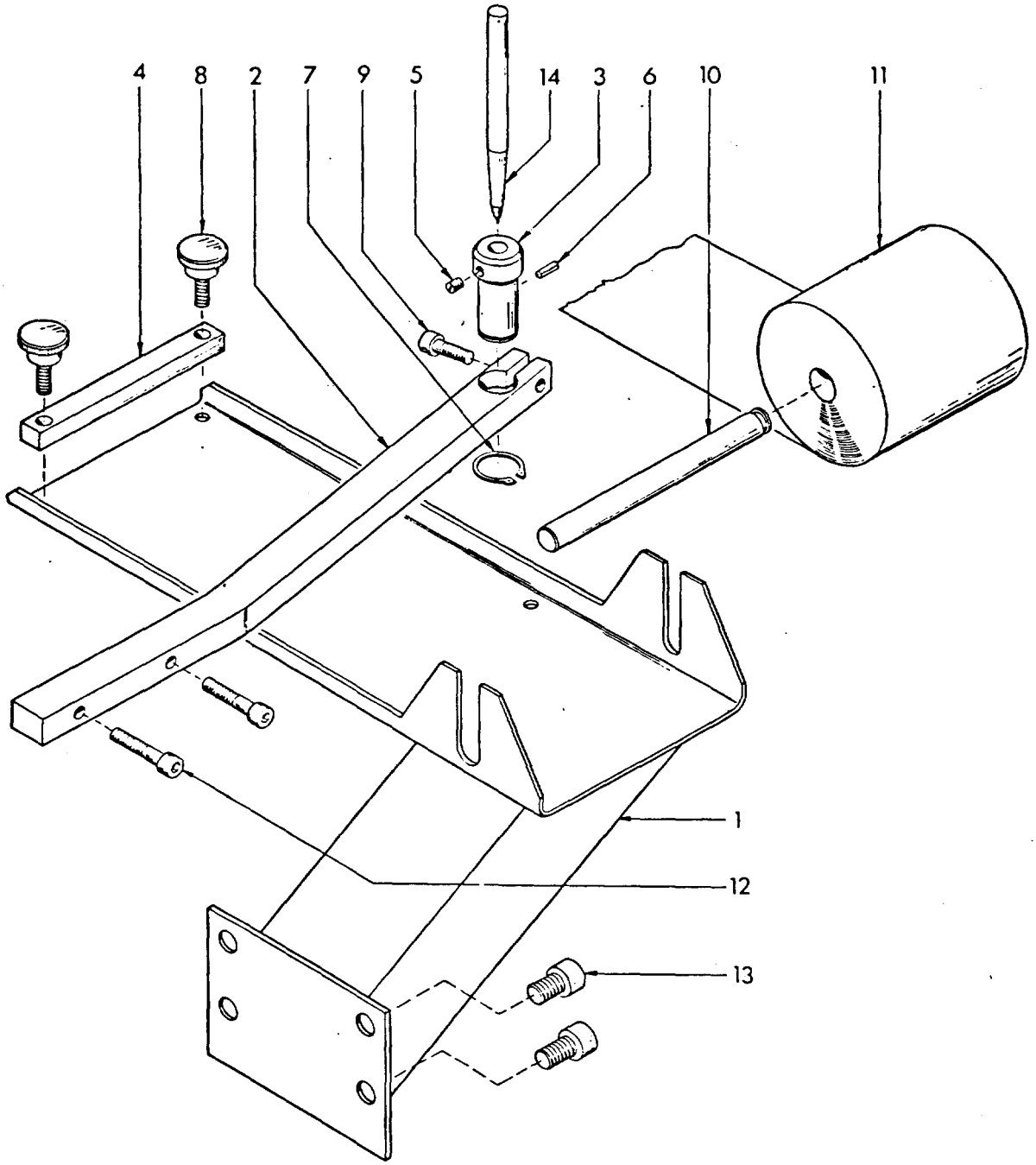


Pos.	Ref. No.	DIN		Benennung	Description	Designation
	584 180			Schnellwechselstahl-halter	Quick-change tool-post	Tourelle porte-outil à changement rapide
1	C6Z 180 040			Ringschlüssel 13	Ring spanner 13	Clé à oeil 13
2	ZSR 31 0860	M8x60 DIN931-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
3	C6Z 180 020			T-Nutenstein	T-nut	Boulon en T
4	C6Z 180 030			Zwischenstück	Intermediate piece	Pièce d'écartement
5	ZSB 25 1050	B10,5 DIN125		Scheibe	Washer	Rondelle
6	ZSB 25 0840	B8,4 DIN125		Scheibe	Washer	Rondelle
7	ZSR 12 0520	M5x20 DIN912-6.9		Zylinderschraube	Socket head screw	Vis six pans creux
8	C6Z 181 020			Stellknopf	Adjusting nut	Ecrou de reglage
9	ZST 13 0525	M5x25 DIN913-45H		Gewindestift	Set screw	Vis pointeau
10	ZSR 13 0516	M5x16 DIN912-10.9		Zylinderschraube	Socket head screw	Vis six pans creux
11	ZWZ 11 0400	SW4 DIN911		Schraubendreher	Hexagonal key	Clé à six pans
12	ZSR 12 0512	M5x12 DIN 912		Zylinderschraube	Socket head screw	Vis six pans creux
13	C6Z 280 020			Spannplatte	Clamping plate	Plaquette de serrage

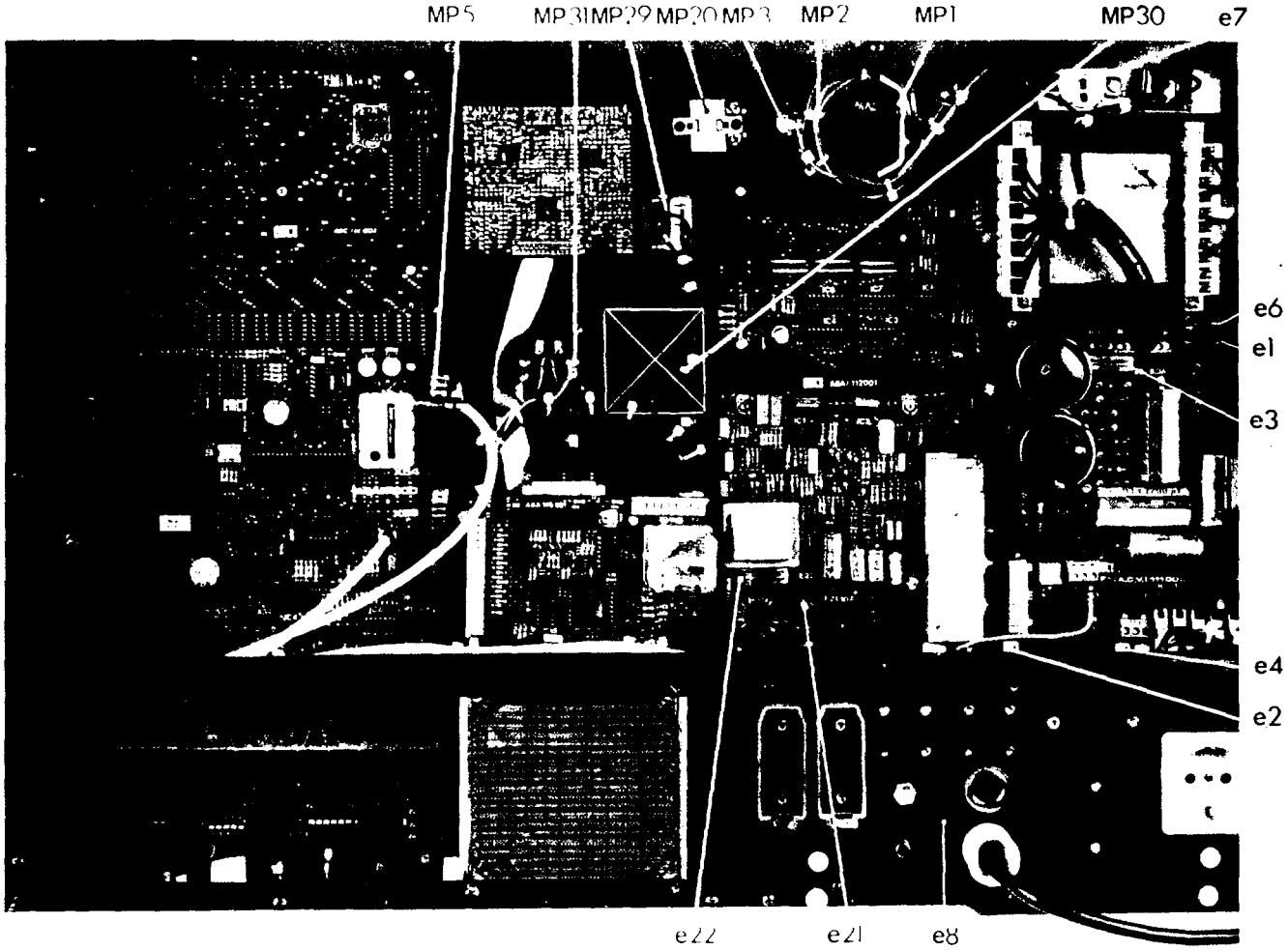
EMCO Compact 5 CNC



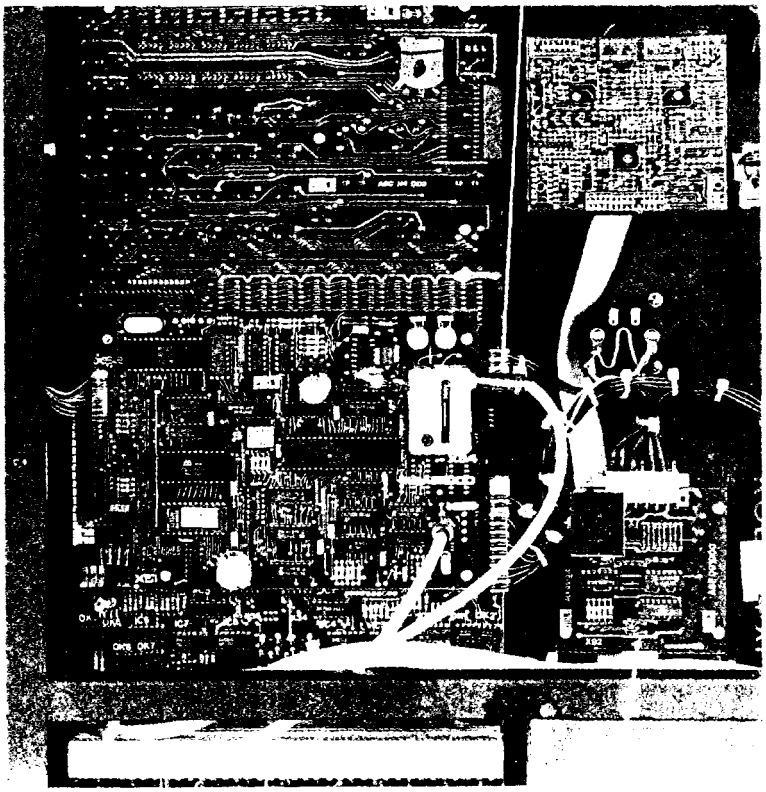
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	26o olo			Gruppe Plotter	Plotter complete	Ens. Plotter
1	A6Z olo olo			Auflage	Table	Tableau
2	A6Z olo o3o			Halter	Bar	Support
3	A6Z olo o5o			Führung	Holder	Guidage
4	A6Z olo o6o			Leiste	Gib	Lardon
5	ZST 51 o4o4	M4x4 DIN551-5.8		Gewindestift	Set screw	Vis pointeau
6	ZHL 81 o3o8	3x8 DIN1481		Spannhülse	Lock pin	Goupille de serrage
7	ZRG 71 141o	W14x1 DIN471		Sicherungsring	Retaining ring	Anneau de retenue
8	ZSR 64 o515	M5x15		Rändelschraube	Knurled screw	Vis moletée
9	A6Z olo o2o			Bettwinkel	Basis element	Equerre
10	A6Z olo o4o			Achse	Axis	Axe
11	ZRO o6 7o7o	7o x 7o		Papierrolle	Paper roll	Rouleau à papier
12	ZSR 63 o5o8	M5x8 DIN963-4.8		Senkschraube	Countersunk screw	Vis tête fraise
13	ZSR 12 o812	M8x12 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
14	ZST 99 1ooo			Plotterstift	Plotter pen	Crayon Plotter



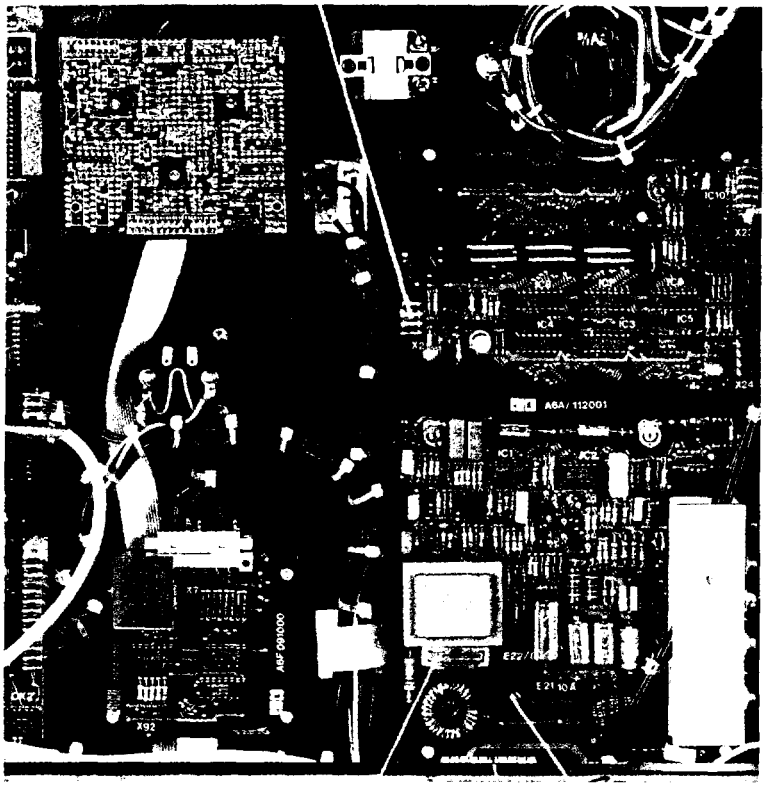
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	26o 31o			Gruppe Plotter	Plotter complete	Ens. Plotter
1	A6Z o11 ooo			Auflage	Table	Tableau
2	A6Z o1o o31			Halter	Bar	Support
3	A6Z o1o o5o			Führung	Holder	Guidage
4	A6Z o1o o6o			Leiste	Gib	Lardon
5	ZST 51 o4o4	M4x4 DIN 551-5.8		Gewindestift	Set screw	Vis pointeau
6	ZHL 81 o3o8	3x8 DIN 1481		Spannhülse	Lock pin	Goupille de serrage
7	ZRG 71 141o	W14x1 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
8	ZSR 64 o515	M5x15		Rändelschraube	Knurled screw	Vis moletée
9	ZSR 12 o516			Zylinderschraube	Socket head screw	Vis 6 pans creux
10	A6Z o1o o4o			Achse	Axis	Axe
11	ZRO o6 7o7o	7o x 7o		Papierrolle	Paper roll	Rouleau à papier
12	ZSR 12 o525			Zylinderschraube	Socket head screw	Vis 6 pans creux
13	ZSR 12 o812	M8x12 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
14	ZST 99 1ooo			Plotterstift	Plotter pen	Crayon Plotter



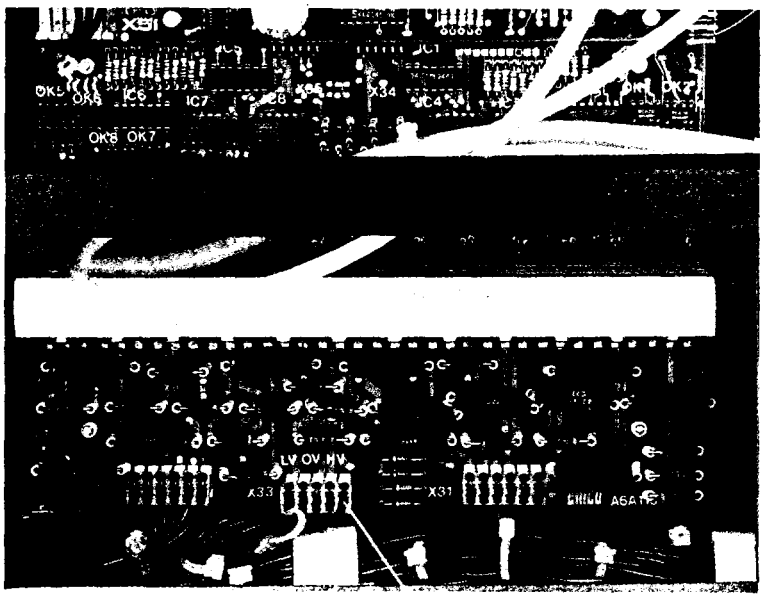
MP5



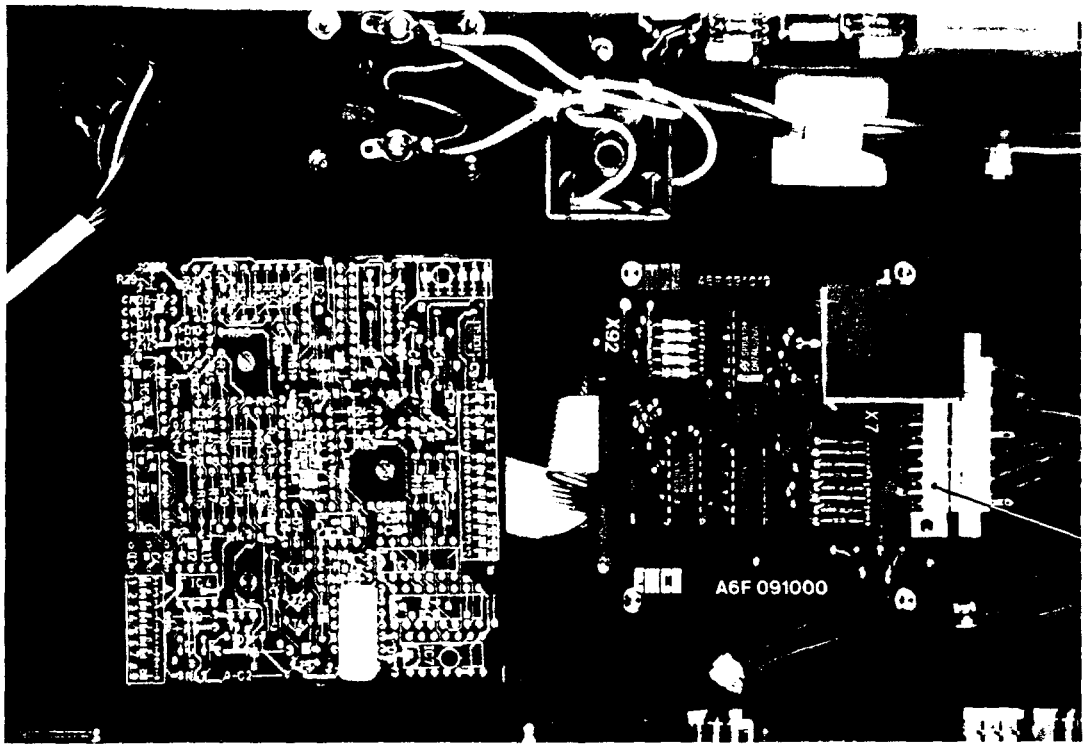
MP 8

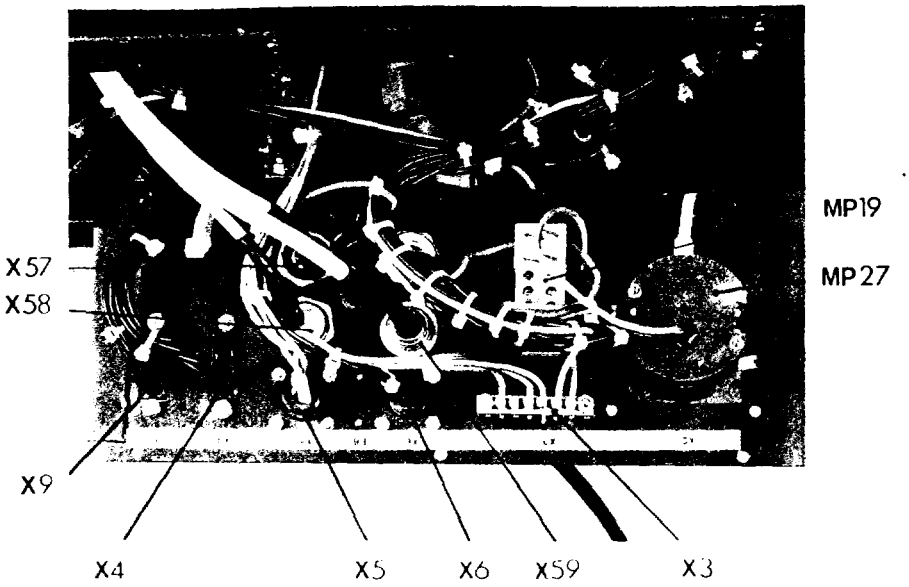


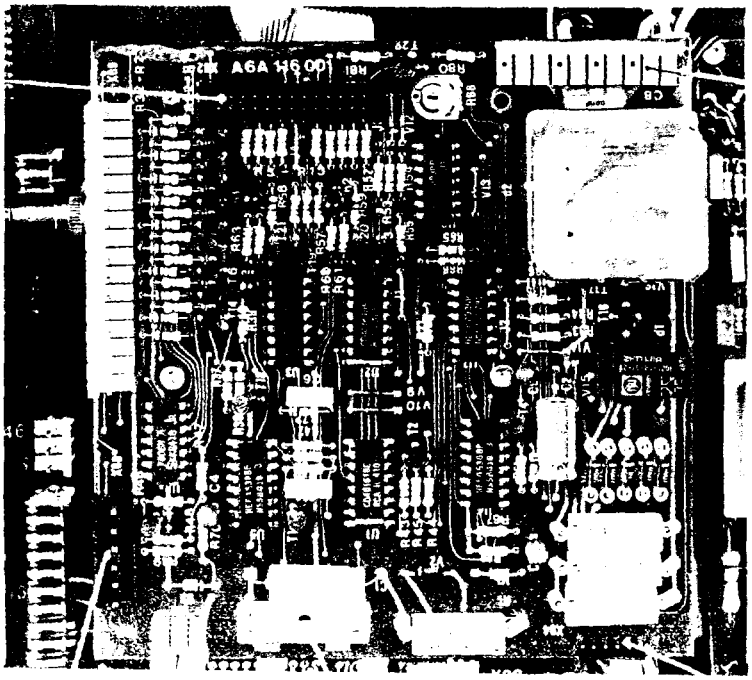
e22 MP6 e21



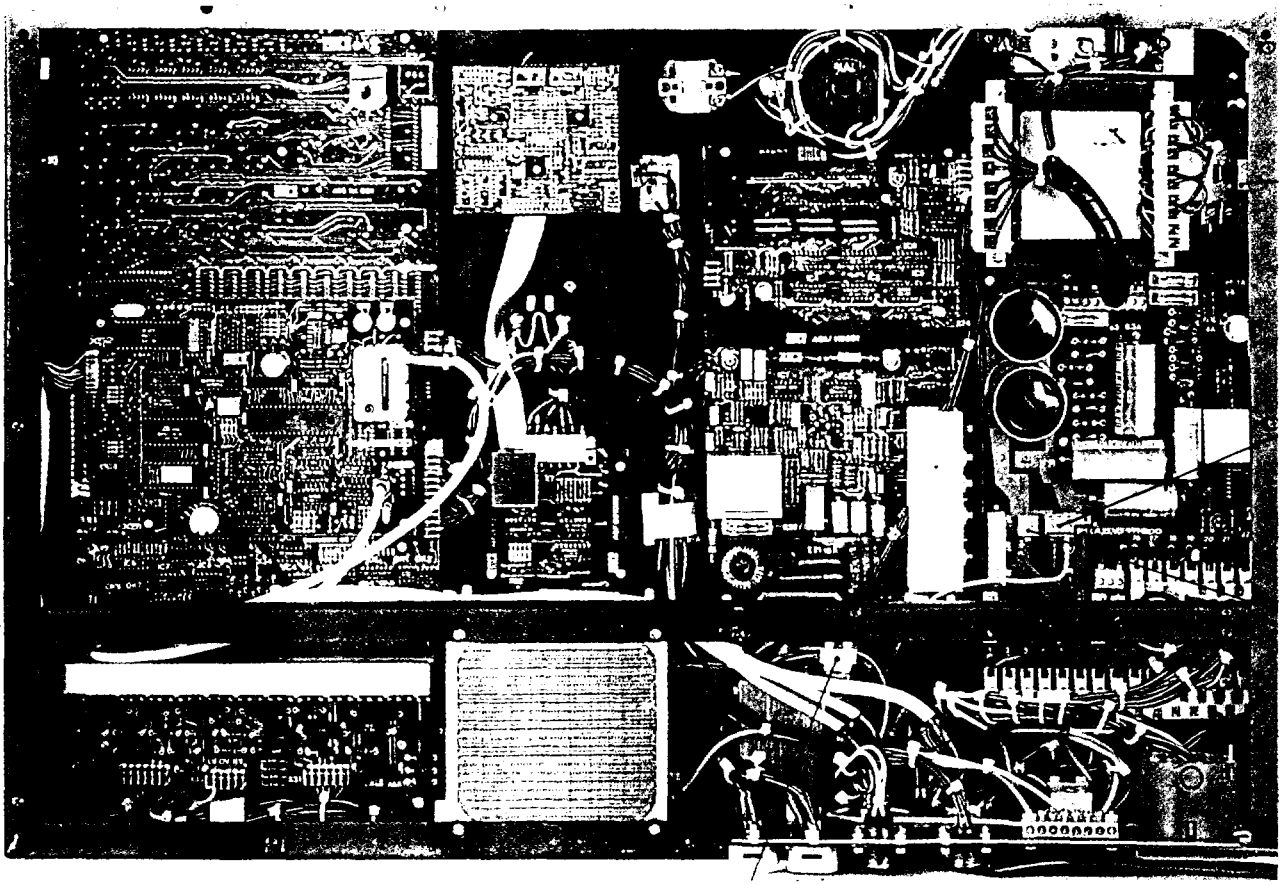
MP9


A6F 091000
MP14
MP15


X57
X58
X9
X4
X5
X6
X59
X3
MP19
MP27


MP40
MP 39
MP 16

MP 34



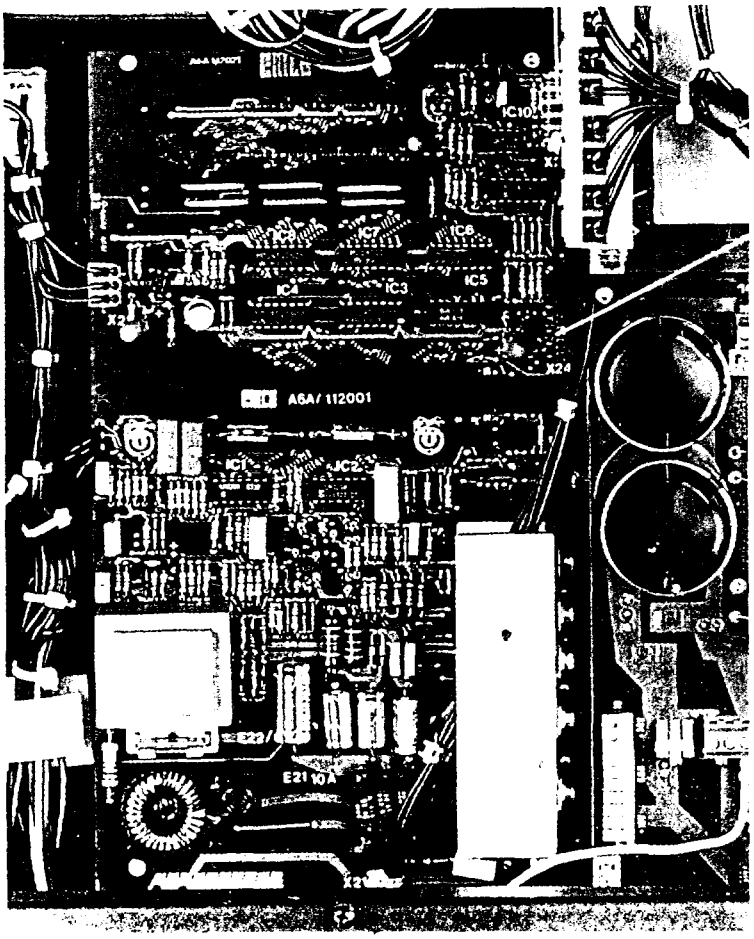
MP 33

MP 38

MP 37

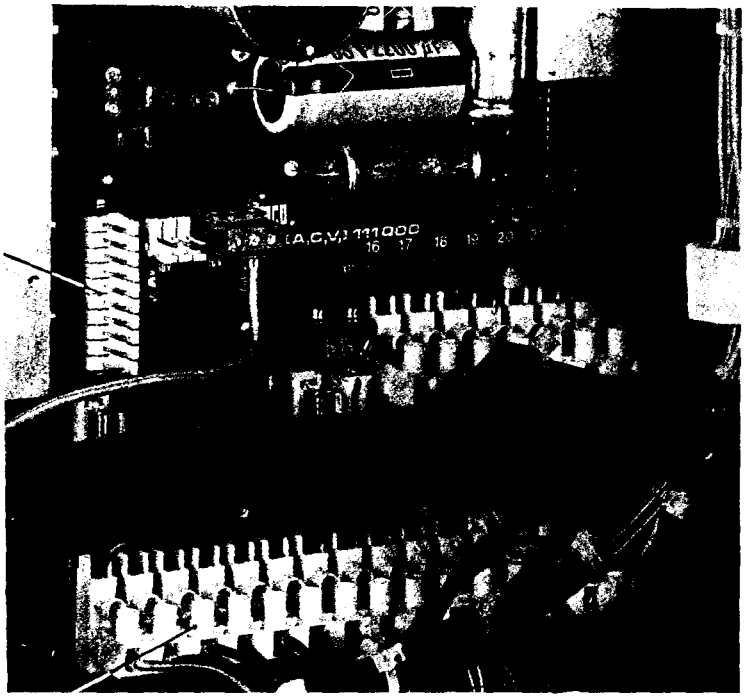
MP 32

MP 22 – MP 26



MP 21

MP11



MP 4 PIN 9/10
MP 7 PIN7/8
MP10 PIN3/6
MP12 PIN5/6
MP13 PIN4/6
MP41 PIN2/6
MP42 PIN19/18
MP43 PIN16/17
MP44 PIN16/1
MP45 PIN13/15