4. DNC-Interface
RS 232-Interface

DNC-Interface:

RS 232 Interface:

DNC-Interface

(Compact 5 CNC)

The DNC-interface is an accessory which can be
built in at later stage on request. The DNC-
interface allows to send instructions with the
help of a CNC-program.

Attention:

If you use the DNC-interface together with external
voltage sources you have to obey the maximum power
and voltage values. Also differences in the potential
between the devices have to be taken into account. An
excessive voltage at an DNC-input or output can
destroy the complete electronics of the Compact 5 CNC.

DNC-Interface
PIN - Coverage

X62/PIN			
	1	A	Status hand
	2	E	Turret - hand operation
	3	E	Instruction G66 + INP
	4	-	-
	5	-	-
	6	E	Instruction G66 + FWD
	7	A	Status program running
	8	A	Status intermediate stop
	9	E	Instruction switch hand /CNC
	10	-	-
	11	-	-
	12	-	-
	13	-	-
	14	-	-
	15	A	Output set with M8, M9
	16	-	-
	17	E	Instruction start
	18	A	Output set with M22, M23
	19	A	Status main motor ON/OFF
	20	A	Output impulse set with M26
	21	E	Instruction blockage-turret
	22	V	+10V not controlled
	23	V	} GND
	24	V	
	25	V	
	26	V	+5V controlled

E = Input
A = Output
V = Power

Function of the DNC-board:

1.

- The main spindle can be switched on with
  MO3 and switched off with MO5 (set main
  spindle switch to CNC).

- A main spindle switched on with MO3, can
  be switched off manually during the inter-
  mediate stop, by actuating the M-switch (e.g.
  for measuring processes). Where the inter-
  mediate stop is interrupted by a start, the
  main spindle is automatically switched on
  again, and after a 2 second start delay,
  the program continues to operate.

- The program end command M30, automatically
  produces a switching off of the main spindle
  (additional programming of MO5 is not necess-
  ary).

2.

   In and output possibilities of the DNC-inter-
   face via the 26-pole plug X62:

A) Outputs:

PIN 1: Status Hand
The machine reports wether it is in Hand or
CNC-operation:
PIN 1 with CNC-operation ....LO
PIN 1 with Hand-operation ...HI

PIN 7: Status program running.
The machine reports, wether a program is
worked off at the moment.
Program running ......HI
Program not running .....LO

PIN 8: Status intermediate stop
The machine reports whether it is in intermediate
stop or not.
Intermediate stop ....HI
No intermediate stop ....LO

PIN 15 - Output set MO8, MO9
PIN 18 - Output set MO8, MO9

Input of	produces at switch output / Pin	the condition	initial condition
M08	X 62 / 15	HI	LO
M09	X 62 / 15	LO	
M22	X 62 / 18	HI	LO
M23	X 62 / 18	LO	

These 3 switch outputs can also
be manually actuated.

Lighting the WEG–LED	and actuating the pushbutton	produces at switch output / Pin	the condition
X	FWD	X 62 / 15	HI
X	REV	X 62 / 15	LO
Z	FWD	X 62 / 18	HI
Z	REV	X 62 / 18	LO

<u>With Pin 19</u>, the main motor is switched on and
off.
M03 – HI
M05 – LO
Initial condition – LO

<u>Pin 20:</u> Pulse output

> Format M 26
> N3/M26/H3

At Pin 20, with a frequency of 100 Hz, the number of
pulses given with H is issued (HI–LO).
Initial condition: LO
Maximum H–input: 0-221
The program is interrupted during the output time, and is
then subsequently continued.

<u>B) Inputs:</u>

Where a voltage of 3 – 30 V is applied to the
following pins, the following functions are
executed by the machine:

  <u>Pin 2:</u> Turret - HAND operation

  <u>Pin 3:</u> Set the machine to RS–232 operation
        (received as with G66 + INP)

  <u>Pin 6:</u> Set the machine to RS–232 operation
        (transmit as G66 + FWD)

  <u>Pin 9:</u> Change machine from manual operation
        to CNC operation, or vice versa.

PIN 17:   Through voltage at PIN 17 a start
            instruction is effected.
            PIN 17 is not cabled to the CPU board.
            Compare also notes with cabling.

PIN 21:   Instruction turret blockage.

C) Power:

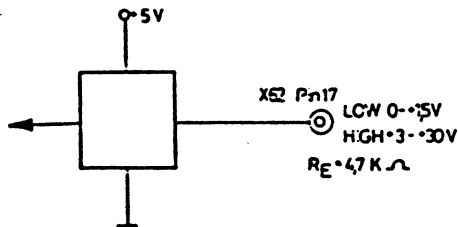PIN 22: + 10V not controlled

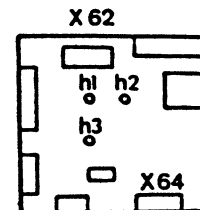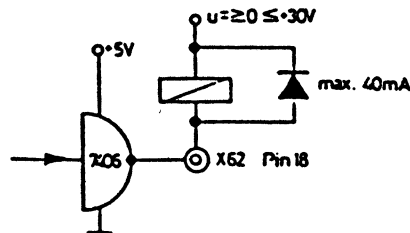PIN 23:

PIN 24: GND

PIN 25:

PIN 26: + 5 V controlled

Example entrance: Example exit:

3. To plug X64/PIN 5,6 an opener contact can
   be connected, with same function as X62/PIN 10
   (e.g. function end guard of door).
   h3 lights up when door is open (J4).

Mounting of the DNC-Interface:

Scope of supply

1. PC-board
2. Cable 16 – 12-pole
3. Cable 5-pole
4. Cable 2-pole
5. Spacer bolt with washers
6. Cable clips
7. Relay

Work to be carried out:

– Assemble DNC-board

– Connect all cables

Attention:

– Disconnect the mains plug prior to carrying out
  all assembly work. Otherwise there is not only
  the danger of accident, but also the danger of elec-
  tronic components on the boards being destroyed.

– Never connect and switch on the machine, when all
  the plug connections are not fitted and the printed
  circuit boards are not fastened.
  Loose cables and printed circuit boards cause short-
  circuits, when they come into contact with the
  housing or other pc-boards.
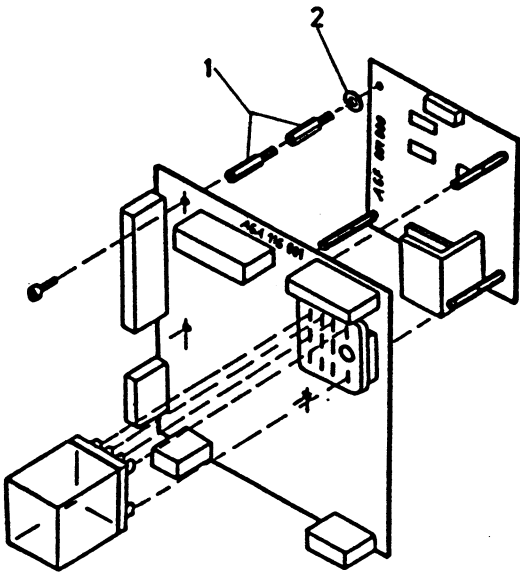

Assembly of the DNC-board

– Replace the cylinder bolts on
  the cassette board with spacer
  bolts (1). Ensure that the plas-
  tic washers (2) are fitted.

– Fasten the DNC-board with cylin-
  der bolts.

– Plug-in the relay.

Assembly simplification:

First plug-in all cables, then
screw the pc-board tight.

Cable:

1. Attach 16 - 12-pole cable (1) to CPU and
   DNC-board.

2. Attach 5-pole cable (2) to CPU and DNC-board.

3. Attach 2-pole cable (3) from mains board
   to DNC-board.

4. Remove the 2-pole cable (4) from the cable
   clip and attach to the DNC-board.
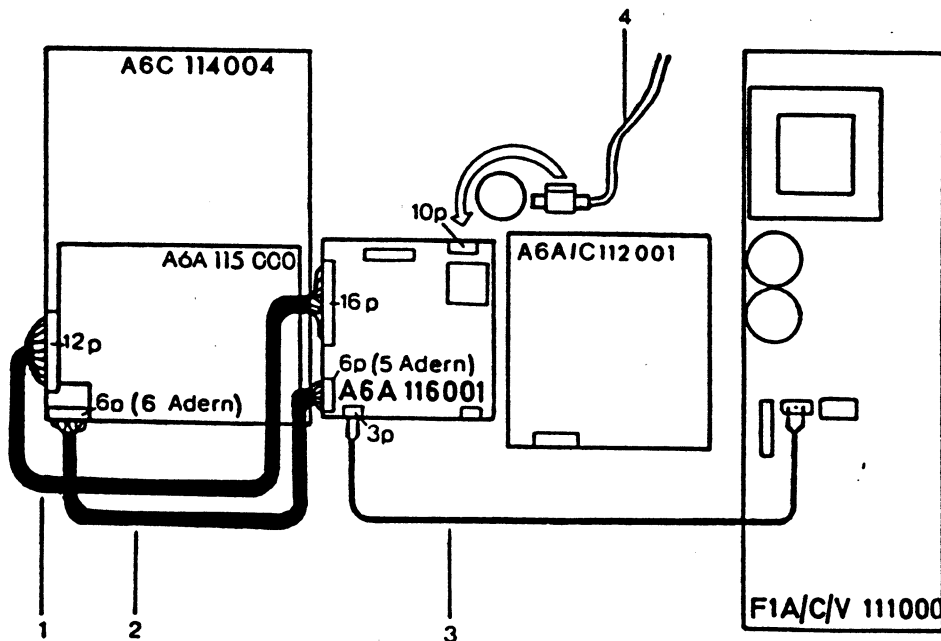
Note:

On 5-pole cable, the side with the 6 cores
on the plug must be attached to the CPU, and
the side with the 5 cores on the plug must
be attached to the DNC-board.
Pin 3 of this cable may not be wired (Pin 3
is connected with Pin 1, as standard, for this
reason, the CPU side has 6 cores). Via Pin 3,
the "Start" pulse for the main spindle is trans-
mitted, that comes with the programming of
M06/T/0 after the issuance of the intermediate
stop (danger of injury during manual tool
change).

G66 RS 232 Operation
(V24/20mA — Operation)

G66 function is like G64, G65 a pure switch
function for the operation of the interface
RS 232. RS 232 is an internationally
standardised interface.

It is an output/input for information.
Via this interface information (data) can be
transferred into an unit which has the same
interface RS 232 C.

The data are sent via a connecting cable.
This connecting cable has to be produced by
a specialist for the respective unit.
The information for the manufacture are to be
found in the wiring diagrams of the manufacturer
of these units.

Examples Using RS 232:

- Connection of a computer system
- Connection of a printer
- Connection of the EMCO-TRAINER
- Connection of a perforated tape reader
  and a perforated tape puncer.
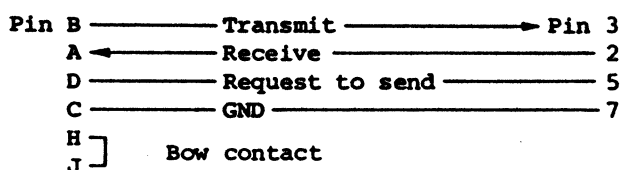
Survey RS 232-Operation

Examples for transmission of data:

Transmission from perforated tape into computer:	Transmission from perforated tape to machine:
- Switch to CNC-operation - Put in perforated tape - Start tape reader	- Put in perforated tape - Switch to CNC-operation

Left column:

G66

INP   The read-out indicates.

     [A]

     ASCII = American Standard Code of Information Interchange

INP   The read-out indicates:

     [A   LO]

     (LO=LOAD)
The program is being transferred. At the end of the transfer operation the read-out indicates N00.

Right column:

G66

INP   The read-out indicates:

     [A]

INP   The read-out indicates:

     [A   LO]

RUN   Start tape reader, the program is transmitted.

RS 232C Connection Cable for COMPACT 5CNC and F1-CNC

The V24 Interface is used with this cable. The machine
(COMPACT 5 CNC/F1-CNC) is thus set at 300 baud.

Pin occupancy of the cable (standard) for V24 Interface

```
Pin B ───────── Transmit ──────────► Pin 3
    A ◄──────── Receive ──────────────── 2
    D ───────── Request to send ──────── 5
    C ───────── GND ──────────────────── 7
    H ─┐
    J ─┘   Bow contact
```

| COMPACT 5 CNC F1-CNC | 25-pin RS 232 plug for peripheral device |

The only "handshake line" of the COMPACT 5 CNC and F1-CNC
is intended for the "request to send" (RTS) signal. The
RTS core is connected to pin 5 of the 25-pin plug.
The Interface of the COMPACT 5 CNC/F1-CNC does, however,
function without the request to send signal.
(A handshake line is a control line for the data flow. It
releases or stops a transmission)

Notes in the event of problems with Interface RS 232C

Since the COMPACT 5 CNC and the F1-CNC do not depend on a
handshake line, you can presume that the transmission and
reception mode will be carried out (simple design of the
Interface on COMPACT 5 CNC and F1-CNC).

Trouble-shooting in the event of problems

1. Check whether the peripheral device actually has a
   RS 232 Interface. That is a BIT serial Interface and
   not a BYTE serial, such as Centronics or IEEE 488.

2. Check whether the V24 or 20 mA Interface on the peripheral device is active.

Pin occupancy COMPACT 5 CNC/F1-CNC

Pin occupancy RS 232 Interface:

V24 Interface			20 mA Interface		
Plug Pin B	Transmit		Plug Pin F		– 20 mA
A	Receive		G		+ Transmit
C	GND		H		– Receive
D	Request to send		J		+ 20 mA

Plug Pin E	Baud rate	open	300 bd.
		to GND	110 bd.

If you use the 20 mA connection, open bow contact H/J and
note the baud setting.

3. 110 or 300 baud rate: Check setting on peripheral device
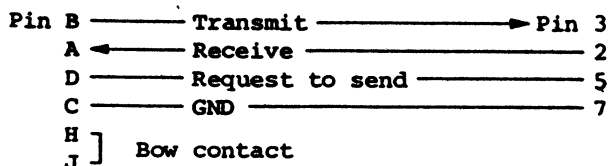   and COMPACT 5 CNC or F1-CNC.

   With the EMCO cable, the COMPACT 5 CNC/F1-CNC is set at
   300 baud (Pin E not with Pin C – GND – with bow contact).

4. The Interface of data receiver (e.g. printer, PC ...) must
   be equipped with a buffer memory (due to the lack of hand-
   shake signals of the COMPACT 5 CNC/F1-CNC).

5. Check the pin occupancy TRANSMIT and RECEIVE.

   Transmit: From COMPACT 5 CNC/F1-CNC to peripheral device
             (the peripheral device is the receiver).

   Receive: From the peripheral device to COMPACT 5 CNC/
             F1-CNC (the peripheral device is the transmitter).

Pin occupancy of the cable:

```
Pin B ——————— Transmit ———————————→ Pin 3
    A ◄——————— Receive ————————————— 2
    D ——————— Request to send ——————— 5
    C ——————— GND ———————————————— 7
    H ]
    J ]  Bow contact
```

COMPACT 5 CNC F1-CNC		Peripheral device

6. Check whether your peripheral device is operating without
   the cabling of the handshake line or if the handshake
   lines must be functionally disconnected (bow contact,
   DIL-switch, etc.)

7. Transmission from COMPACT 5 CNC/F1-CNC to the peripheral
   device: the COMPACT 5 CNC/F1-CNC transmits 7 bit ASCII
   code. The eighth bit is intended as parity bit, which is
   not, however, transmitted.
   In the event of reception, a parity bit can be trans-
   mitted, although it is not required and is disregarded
   by the COMPACT 5 CNC/F1-CNC.

   At 110 baud, one start bit and two stop bits are trans-
   mitted.
   At 300 baud, one start bit and one stop bit are trans-
   mitted.

Peripheral device remarks, control lines

The control line connections differ according to the de-
vice. Please note the instructions.

- Where the peripheral device requires control lines for
  operation, the clear to send (Pin 4) can be connected
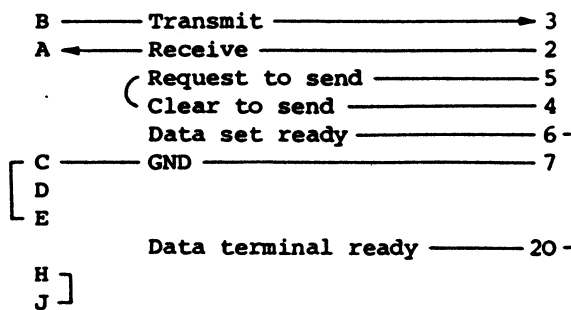 with the request to send (Pin D) of the COMPACT 5 CNC/
  F1-CNC.
  The second possibility would be, to bow connect Pin 4 and
  Pin 5.

```
        B ─────────► 3
        A ◄───────── 2
        D ─────────── 5 ──────── 4 ┐
        C ─────────── 7
        H ┐
        J ┘
```
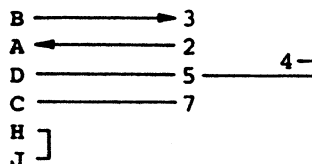
- There are also devices which require the additional sig-
  nal "Data Terminal Ready". This signal can be generated
  by bow connection of Pin 6 and 20.

Example of a connection:

4/5 bow connected
6/20 bow connected
C/E bow connected (setting at 110 baud).

```
    B ──── Transmit ─────────────────► 3
    A ◄──── Receive ──────────────────── 2
         ⎧ Request to send ──────────── 5
         ⎨ Clear to send ────────────── 4
         ⎩ Data set ready ───────────── 6 ┐
    ⎡ C ──── GND ──────────────────── 7  │
    ⎢ D                                  │
    ⎣ E                                  │
           Data terminal ready ──────── 20 ┘
    H ┐
    J ┘
```

Video Connection, TV-Connection
Interface RF232

1. Mounting possibilities of Videoprint

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

| No connection possibility! |

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

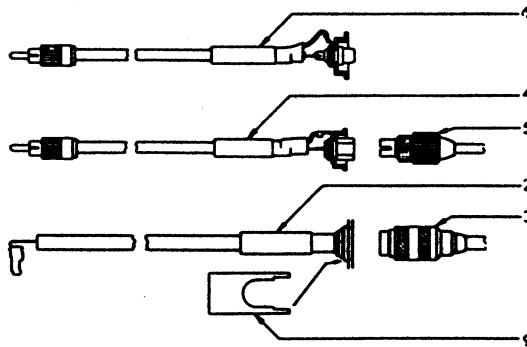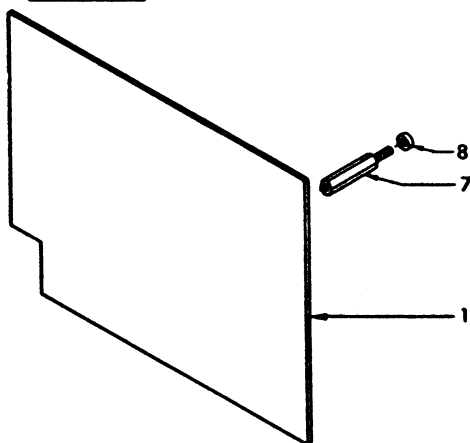**Means:** | Computer board A6C 114·oo2 |

+

| Videoprint (Ref.No. 26o 2oo) |

1.3. COMPACT 5 CNC with electrical se-
rial 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)

4/8.1

3. Necessary means for the connection of
   TV/monitor etc.

   3.1. TV-connection:
   - Standard antenna cable (co-axial
     approx. 6o - 75 Ω)
   - Plug for TV-apparatus

   3.2. Video connection:
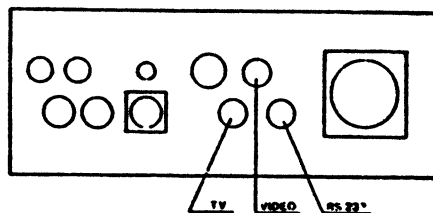   - Video cable with cinch plugs

   3.3. RS 232:
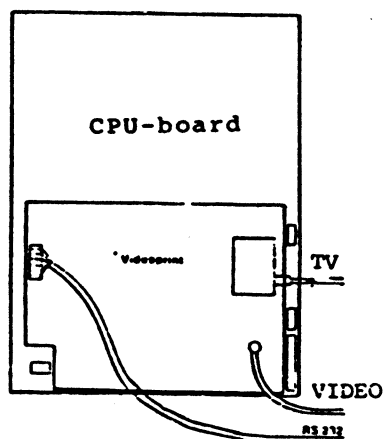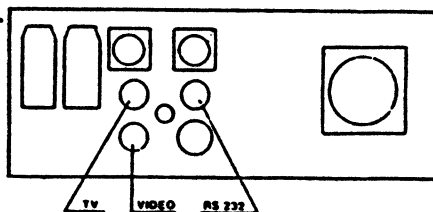   - 4 or 5-pole protected cable (4
     resp. 5 x o,14 mm^2)

4. Mounting the cables

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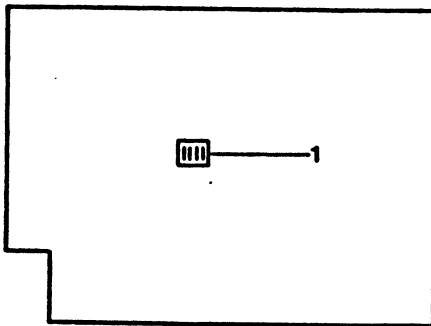and plug them to the video print.

Electrical control unit A6A/B/C

CPU-board

TV

VIDEO

RS 232

TV   VIDEO   RS 232

Electrical control unit A6F/G/H/N

TV   VIDEO   RS 232

5. Setting language and frequency on the video board

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

5.1. Frequency setting:
50 Hz: switch 2 "ON"
60 Hz: switch 2 "OFF"
Illustration shows position for 50 Hz

5.2. Languages are set with switch 3 and 4.

Combinations

Language	Switch 3	Switch 4
German	OFF	OFF
English	OFF	ON
French	ON	OFF
Spanish	ON	ON
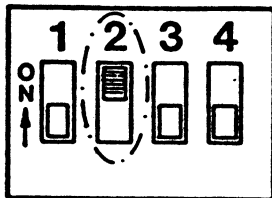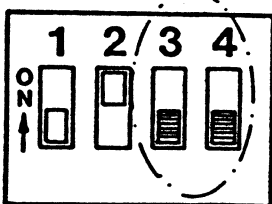
Illustration shows switch positions for German.

Note:

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

TV-Characteristic

UHF receiving unit : frequency between 500 and 700 Megahertz
Transmitter frequency must be adjusted.

Monitor-Characteristic

Equipped for receiving BAS resp. COMPOSIT signals.

6. Interface RS 232

For connection of paper tape punchers, paper tape readers, printers, computer systems, etc.

For the connection of the several devices you must know the PINNING!

4/8.3

Pinning of COMPACT 5 CNC

Pin occupancy RS 232 Interface:

20mA Interface		
Plug Pin	F	-20mA
	G	+ Transmit
	H	- Receive
	J	+20mA

V24 Interface		
Plug Pin	B	Transmit
	A	Receive
	C	GND
	D	Request to send

Plug Pin	E	Baud-Rate	left open	300bd.
			conn.to GND	110bd.

Examples RS 232

a) 2o mA Interface:

Connection to Teletype ASR 33
(Duplex operation, 11obd.)

COMPACT 5 CNC			TTY
Pin J		Receive +	TB 7
H		Receive -	TB 6
G		Transmit +	TB 4
F		Transmit -	TB 3
E ⎤			
} jumpered			
C ⎦		GND	GND Shield connected to ground

b) V24 Interface:

Connection to printer, paper tape recorder/paper tape puncher etc.

COMPACT 5 CNC   Accessory

	(recommended)		
Pin D	- - - - - - - - -	Request to send	Generally
Pin B		Send	
Pin A		Receive	
Pin C		GND	

Pin D	- - - - - - - - -	Request to send	f. ex. paper
Pin B			tape puncher
		Receive	
Pin C		GND	

Pin D	- - - - - - - - -	Request to send	f. ex. paper
		Send	tape reader
Pin A			
Pin C		GND	
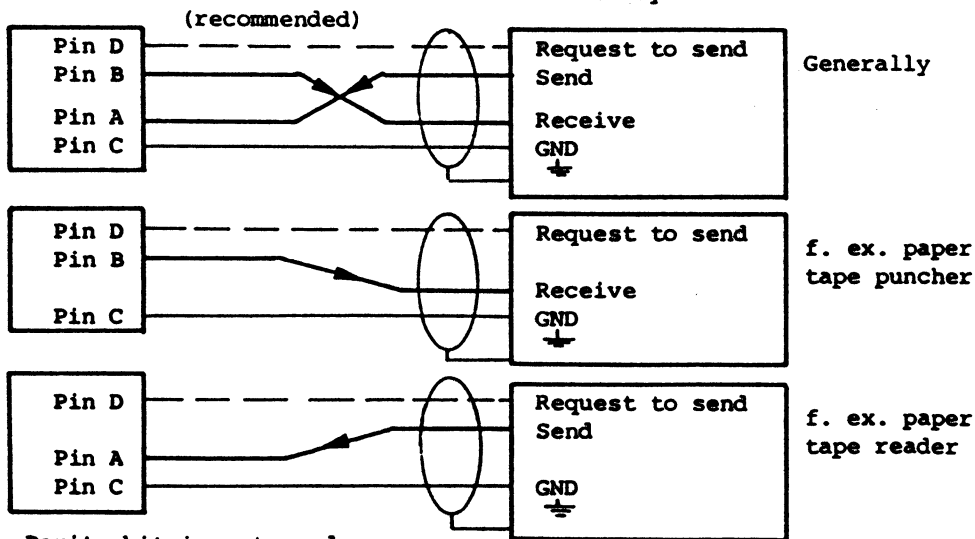
Note: Parity bit is not used.

Note: If pins H and J are not used they must be jumpered.

RS 232 Connection / Some Tips

Connection with tape readers, punchers, computers, etc.

Pinning and cable type of COMPACT 5 CNC see page 4/5.

The plug for the RS 232 Interface of the COMPACT 5 CNC is delivered with the Videoprint.

Connection: Either the producer of the tape reader, pun-
                         cher, computer, etc. makes the connection or
                         he tells you the pinning of the device so
                         that you yourself can make the connection.

Examples:

Possibility 1:   You send to the producer X the RS 232 plug
                         of the EMCO COMPACT 5 CNC and the pinning
                         description (page 4/5). The producer X makes
                         the cable to plug the COMPACT 5 CNC with the
                         tape reader, puncher, computer, etc.

Possibility 2:   You ask the producer of the paper tape rea-
                         der, puncher, computer, etc. for the pinning
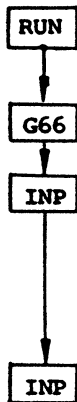   of his device and mount the plugs yourself.

Activating RS 232:   RS 232 is activated via G66. G66 does not en-
ter the memory, it is a switching function.

Examples:

● **Transmission from paper tape to memory of**
COMPACT 5 CNC
(With "Request to send" signal)

- Switch to CNC-mode (memory must be empty)
- Insert paper tape
- Start paper tape reader

RUN

↓

G66   1. Program G66

INP   2. Press INP   o o o o o o
                On the display appears | A |
                (A is the abbreviation for ASCII = Ameri-
                can Standard Code for Information Inter-
                change)

INP   3. Press INP   o o o o o o
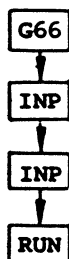   The display shows | A   L O |
                (LO = LOAD)
                The program is transferred. At the end of
                the transfer the display shows | N   OO |

● **Transmission from paper tape to COMPACT 5 CNC**
(without "Request to send" signal)

- Insert paper tape
- Switch to CNC-mode

G66   1. Program G66

                              o o o o o o
INP   2. Press INP. The display shows | A |

                              o o o o o o
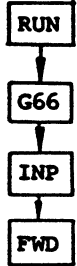INP   3. Press INP. The display shows | A   L O |

RUN   4. Start paper tape reader (transmission begins)

Transmission from COMPACT 5 CNC to paper tape
(with or without "Request to send" signal)

- Switch to CNC-mode
- Insert paper tape
- Start paper tape puncher

```
┌─────┐
│ RUN │
└──┬──┘
   │
┌──▼──┐
│ G66 │
└──┬──┘
   │
┌──▼──┐
│ INP │
└──┬──┘
   │
┌──▼──┐
│ FWD │
└─────┘
```

1. Program G66

2. Press INP. Display shows

        o o o o o o
        | A |

3. Press FWD. Display shows

        o o o o o o
        | A   S A |

   (SA = SAVE)
   The paper tape is punched.

Data formats COMPACT 5 CNC
Software A6C 114 004

```
1234567890123456789012345678890 31 32
% CR LF
....N'.G'...X:'....Z.'..F'..H. CR LF
....00.24...................... CR LF
....01.00.-5999..32760......... CR LF
....02.01....01,.....12.499.... CR LF
....03.02.-1000.-.1000..09.... CR LF
....04.03...200....200.199.... CR LF
....05M99.I..00.K..200......... CR LF
....06.04....10............... CR LF
....07.21..................... CR LF
....08M06..1222.-10000T.01.... CR LF
....09.78...100.-.2000K120..20 CR LF
....10.73.......-..100.100.... CR LF
....11.81..........02.400.... CR LF
....12.82.......-10200.100.... CR LF
....13.83.........30..09.... CR LF
....14.85........2000.120.... CR LF
....15.89........2300.200.... CR LF
....16.86.-.100...3000..50.100 CR LF
....17.88...200....300.200..05 CR LF
....18.84.-1000.-.2000.499..26 CR LF
....19.90..................... CR LF
....20.91..................... CR LF
....21.92...100....200........ CR LF
....22.94..................... CR LF
....23.95..................... CR LF
....24.33........-.5000K100.... CR LF
....25M00..................... CR LF
....26.27..............L.02.... CR LF
....27.25..............L.98.... CR LF
....28M03..................... CR LF
....29M05..................... CR LF
....30M08..................... CR LF
....31M09..................... CR LF
....32M17..................... CR LF
....33M22..................... CR LF
....34M23..................... CR LF
....35M98....02.....03........ CR LF
....36M30..................... CR LF
...M
```

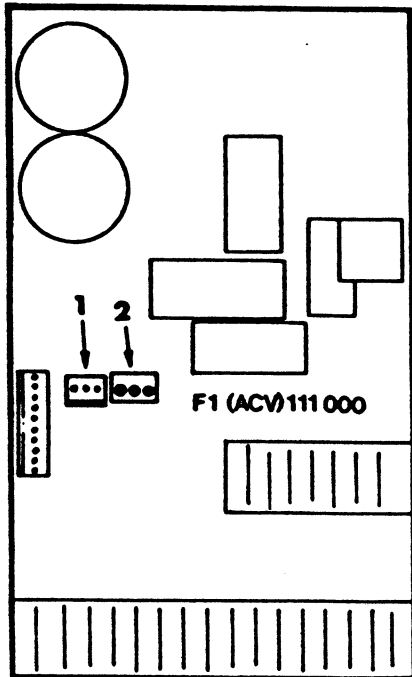|	Space	ASCII 32
		ASCII 96
CR	Carriage return	ASCII 13
LF	Line feed	ASCII 10

When programs are received, the data format must be fully retained, otherwise the programs will not be correctly stored.

You can also obtain the data format by printout of a punched tape.

Service Information Turret Toolpost

1. For better mounting the turret board connection, the power supply board has been redesigned: F1A(V,C) 111 000

2. The two-pole cable for power supply board has been modified.
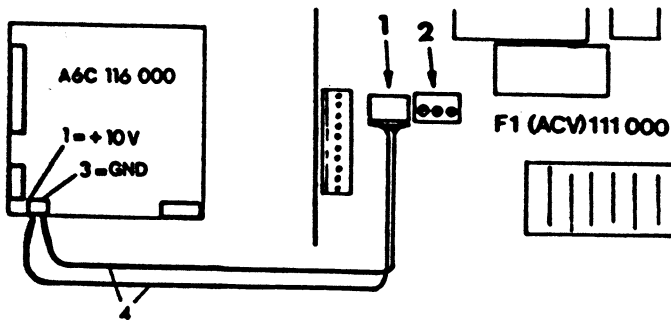
F1 (ACV) 111 000

Point 1

Power supply board F1A(V,C) 111 000

On the power supply board you find a plug contact (1) and a clamping strip.

Point 2

Turret toolpost

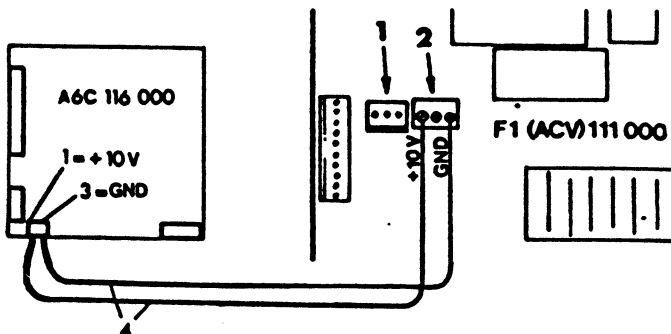The two-pole cable supplied with the turret toolpost has a plug.

A6C 116 000

1 = +10V
3 = GND

F1 (ACV) 111 000

Connection

1. Power supply board F1A(V,C) 111 000

It is mounted in the machine.
Cable with plugs

Plug the two-pole cable to plug (1).

A6C 116 000

1 = +10V
3 = GND

F1 (ACV) 111 000

2. Power supply board F1A(V,C) 111 000

Your cable has no plug.

Clamp the cable to connecting strip (2).

3. Power supply board old version, but new cable

Remove plug and make connections as described in the instructions provided with the turret toolpost.