1. COMMUNICATION ADAPTER TRANS

A UNIVERSAL INTERFACE BETWEEN NC AND CNC MACHINES AND MODERN COMPUTER TECHNOLOGY

1.1 What Trans is

Most of the developing NC and CNC machines, beyond the technical limits of domestic main systems, work satisfactorily at present and meet the specifications. So from an economic standpoint, it isn't realistic to think of replacing them with new modern machines at this time. Therefore the attempt to make them economically useful will certainly také several years. One of the weakest articles of the manufacturing process for these machines is the media for the machine program storage, which first and foremost is a punched tape and to a tape reader extent a magnetic cassette tape.

The Communication adapter TRANS is a universal simulator of the most varying different readers of punched tape, the most widely used puncher DT105S and a cassette magnetophone for systems NS260/261. This adapter is, in addition, equipped with two standard serial ports for dual-direction data transfer when connecting to a PC, disk drive or modern CNC systems and an entry point for reading from different kinds of readers. Its hardware solution continues to ensure reliability for the minimum price. TRANS's main priority is its universiality. With a change in configuration and an adjustment of simulation parameters, a use of Trans is possible .for work with any periferial equipment used at NC and CNC systems. We list as the most used readers CONSUL, FS100, FS331, FS1503, FS1501, FS751, FS314, Ghielmetti, Facit, Agie, Fanuc, Griesheim and Tally, punchers DT105S and Facit magnetophone for TESLA system NS260 etc.

1.2 A Description of Trans

The basis is embedded CMOS RAM memory, which acts as a recorder of data, particularly partprograms. The installed battery ensures protection of data for several weeks after TRANS has been diconnected from the feed. TRANS's memory allows for up to 128 thousand characters to be read at a time, or for gradual reading mode, reading a larger amount of data (segmentation). TRANS has three connectors - threee lindividual channels - they are a parallel outlet for simulation of different types of readers, parallel input for simulating functions of the puncher and for data input from parallel punched tape readers. In addition, it is the communication channel COM1 (serial input/output) for connection with a PC, disk drive or modern CNC systems (It's possible to choose the voltage level RS232C or the wire loop 20 mA for remote transfer of data) and the second communication channel COM2 (serial input/output) for connection with modern CNC systems for connecting TRANS to the DNC network. For selection of individual input and other help functions, TRANS is equipped with a user-friendly keyboard for displaying information about work being done, with an LCD display and LED indicators.

1.2.1 TRANS connections

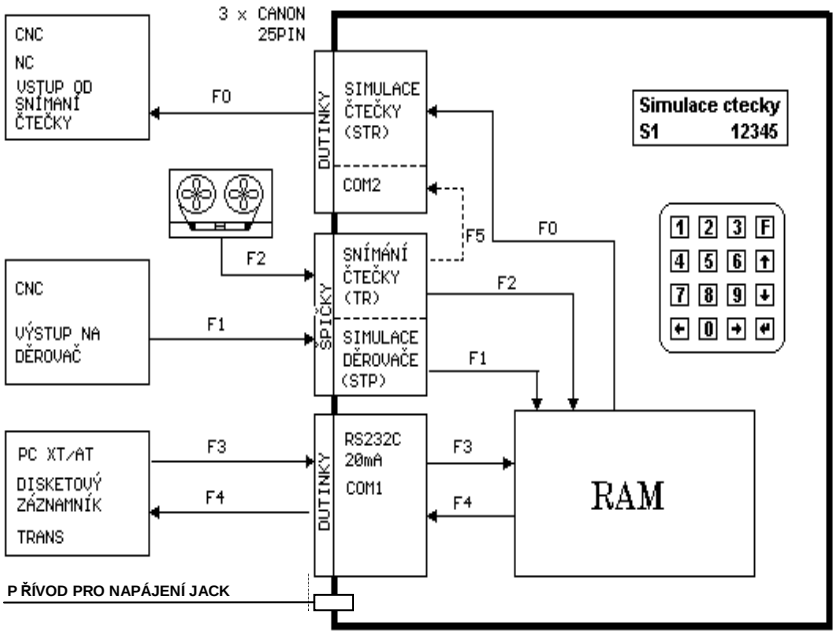
Connector "STR" reader simulation CANON 25pin, holes signals TTL (0-5V) signals RS232C	1,6,7 14,15,16,17,19,21,22,23 11 24 25 13 2 3	GND F1,F2,....F8,F9 STR2 RDY CRDY SMER TxD RxD	ground track start ready prepared direction transmitter data receiver data
Connector "TR" reader scanning puncher simulation CANON 25 nose pin signals TTL (0-5V)	14,3,17,6,20,12 1,2,4,5,7,8,10,11 25 13 19 18 15	GND E1,E2,...E8 E9 Ucc EOF DRDY DPL	ground track conduction level +5V end of tape punch. Prepared valid data
Connector "COM1" communication s PC CANON 25 pin holes signals for RS232C and 22mA	1,7 2 3 24 12 25 13	GND TxD RxD -Rx +Rx -Tx +Tx	Ground transmitter data receiver data 20mA
Connector "JACK" TRANS voltage supply	1	9Vss	Supply voltage

1.2.2 Adapter supply voltage

Communication adapter TRANS is powered by a a small **safe voltage** 9-12Vss. For voltage feed, it is equipped JACK plug of about 2,1mm. The voltage adapter is external.

Polarity:
The outer according to of the JACK connector is connected to the conductive parts of the TRANS, and must be connected to the negative pole of the voltage supply.

Recommendataions for external supply:
The output parameters of the voltage supply should be 9V/1,2A. TW. The supply voltage need not be stabilised and should be protected by fuse 1,6A. The output cable must have a JACK plug. .



TRANS diagram

1.3 Control panel

The TRANS keyboard has numbers 0 - 9 and also the asterisk symbol (*) and a confirmation symbol shaped like a hockey stick. The asterisk is shown as "F" (Functions) in the text manual, and the confirmation symbol is shown there with the abbreviation CR (carriage return) or ENTER.

The display provides information about tasks in progress. "F" is shown when the F key is pressed. After entry of the number of the function and pressing CR, the symbol "C" can appear. This asks the user for the necessary code, for example the identification number of the partprogram. When errors are made, the symbol "E" appears along with a number code of errors. A list of errors is given at the end of chapter 3. During deletion of memory contens or programs, the symbol "A" (accept) is shown. This asks user to confirm the deletion by pressing CR.

On the top panel there are the signals BUSY and POWER. The green signal POWER is always on when TRANS is connected to power and switched on. The red signal BUSY can have three states.

a) off: no transfer function is worked out

b) permanently lit: The transfer function has been started, but no data has yet been received - TRANS is in idle mode. This mode can be turned off by pressing CR. In this case, the display will show an error message to let the user know that the device has stopped working.

c) blinking: the device is in use, and data is being transfered.

It's general that every activity starts with a selection of a function or by pressing F and the number of the function. In the manual, every action is described with step by step notations of all the keys pressed, divided

with a line or a comma.

2. SERVICE MANUAL FOR THE ADAPTER TRANS

2.1 Installation

To function TRANS needs to be connected to the power supply adapter and adapter connected to the mains. The switch is set to ON. After several seconds, the green POWER indicator lights. This not only indicates voltage connection, but also the operation of the adapter processor. After diagnostics tests are done on all of the main sectors of the TRANS, including checking that all previously saved data is protected, TRANS provides separate checks for preserved memory data in the area of the partprograms and also in configuration areas. During these tests, the symbol CA soon appears on the screen together with a hyphen and the software version no. (e.g. CA-1.1). After the successful completion of the test, all displays are shut off and the TRANS is ready for individual function selection..

During **the first** TRANS installation (or after errors E0 - see further), it is necessary **to delete contens of all sections of memory**. Deletion is done using **F,8,CR, 0,1,CR, CR**.

Before choosing transfer Function F0 to F5 TRANS must be properly configured and connected to equipment with the right cable. The configuration remains unchanged even after power off. The new configuration must be done only if TRANS is used for different types of systems or different types of input/output equipment.

If error E99 occurs, basic configuration is set. This doesn't have to be the same as your requested configuration.

Important:

If TRANS is not working right, always first check the configuration settings. This configuration check is recommended especially if the TRANS has not been switched on for a long time or if the TRANS is used by more than one person for different types of equipment which have different configurations. For these situations, the use of more memory sections is recommended .

2.2 TRANS Services

2.2.1 F0 – punched tape reader (or tape recorder) simulation

If TRANS configuration for the actual control device was not done earlier, we will do the configuration

Notes.:
During simulation of the tape reader with serial output, reading must be started first at the system site. During

tape recorder simulation the reading mode for reception equipment must be started within four seconds after activating simulation of the reader in TRANS.

2.2.4 F1 – tape puncher simulation

If TRANS configuration for the actual control device was not done earlier, we will do the configuration

notes:
With some CNC systems (NS510A) it is first necessary to start hole punching in the driving system.

2.2.6 F2 – tape reading from the reader (from the magnetophone, NS260)

If TRANS configuration for the actual control device was not done earlier, we will do the configuration.

Notes:
During entry into TRANS from the magnetophone or from NS260, we start reading in the TRANS once the transmission of introductory system frequency has started. Finally, transmission from the system begins.

2.2.9 F3 - transfer to Trans through the serial port

If TRANS configuration for the actual control device was not done earlier, we will do the configuration.

Note for DNC:
When selecting F, 3, ENTER the file with "*.STX" extension is received. When selecting F, 3, 1 file with "*.WTX" extension is received. Details can be found in the DNC manual.

2.2.10 F4 - transfer from Trans through the serial port

If TRANS configuration for the actual control device was not done earlier, we will do the configuration.

2.2.11 F5 - tape reader reading and simulation

2.2.14 F6 - selection of the file

2.2.15 F7 - deletion of the file

2.2.16 F8 C0x - work with files

In this chapter functions are described which manage Trans memory. This includes deletion of memory contens, determination of amount of free memory ,searching through memory and files of TRANS, and for TRANS connected to DNC net, searching through folders on the main computer disk.

2.3 TRANS Communication adapter with an alphanumeric display

2.3.1 Basic characteristics

The communication adapter TRANS with an alphanumeric display was the result of inovation from the previous version o Trans. All functions and configuration possibilities of the new Trans are protected according to the original version. The most important changes with the new TRANS are these:

- the original five space seven-segment display was replaced with a two row alphanumeric display with sixteen characters.
- twelve character keyboard was replaced with a 16 character keyboard.
- TRANS always contains 128kB of memory
- the original TRANS service (basic function selection and a five space display) was kept exactly the same.
- every task when selecting functions and setting configuration is commented with a text display in Czech or in English
- alphanumeric display enables in addition browsing through files in text form
- One of its new functions is file edit in text form
- TRANS has in addition, a cursor key, which allows selection of specific functions with the help of a MENU.
- the possibility to choose the name of the file in Trans as 7 free (ASCII) characters.

2.3.2 display space

Since with the new TRANS the original means of control is still the same, a five character space was reserved on the screen for communication with the user. This is known as the **command input window**. The space of the command input window is located in the lower right corner and is shown with the symbols "> <". All reactions to pressing of keys when selecting functions or new TRANS configuration are shown in the command input window the same as with the previous version of TRANS. Therefore, the instructions so far are same, except that we understand "display" to mean only the command imput window space.

The upper row of the text alphanumeric display known as **the text window** is a description in Czech or in English which appears every time a function is selected or TRANS is configured. Errors mesages also appear in the text. In modes for searching through and editing files, blocks of the partprogram are shown in tex form.

The first two positions in the second row of display specify the actual memory in the section. The symbols S1, S2, S3 and S4 refer to memory sections from the first to the fourth. The symbol S5 refers to the linked sections.

Other parts of the display serve as other information displays, depending on the mode being used. For example, in the file search mode, a reading block appears.

2.3.3 Manipulation Of Trans with the cursor keys.

The newTRANS includes in addition, cursor keys, which make it possible to perform TRANS tasks with the help of the menu. The vertical cursor keys are used for selection of Function F0 and F1 to F9, and the horizontal cursor keys serve with some functions as a way switch to already selected functions. The selected function can

be started by pressing ENTER.

When we use the vertical cursor key to cotinue on to function F6 (selection of the file), we use the horizontal keys to search the TRANS memory so that we can directly choose of the the existing files by pressing ENTER.

When we use the vertical cursor keys to continue on to function F8, (TRANS configuration and work with memory), we can use the horizontal keys to select one of the functions for working with TRANS memory.

2.3.4 Searching through and editing of text files

Searching through of the file is done with the command: F, 8, Enter, 7 (F8C7)
Editing of the file is done with the command: F, 8, Enter, 8. (F8C8)

Before searching through or editing, a file must be chosen using function F6. After selecting to search through or edit, the vertical cursor pointers are used to move the block horizontally on the display. Pressing "F" finishes the searching or editing.

When selecting function F8C8, we get into the EDITING mode by pressing ENTER. A cursor appears on the display that we can move using the horizontal cursor keys. We can press the TRANS keys to owerwrite characters in display buffer. During rapid and repeated striking of the same key, alternative characters appear according to the description on the TRANS keys. Tables showing all the possible characters for editing follows. Finishing editing and writing to the TRANS file is done by pressing ENTER again.

For correct file editing, configuration parameter 143 needs to be set with the corresponding values:
- 0 ... for editing text files
- 1 ... for editing files in ISO code
- 2 ... for editing files in EIA code

We also show all characters which can be used in editing:

EIA codes of individual characters:

2.4 Description of configuration functions

Work with memory:
C01 .... Memory contens deletion
C02 .... Memory free capacity
C03 .... TRANS memory searches
C04 .... Number of recorded files
C05 .... File searches in binary form
C06 .... Searching through disk memory in the machine folders (for DNC)
C07 .... Searching through files in text form
C08 .... Editing of the file in text form

Parity checks:
C11 .... No Parity checks
C12 .... Odd parity
C13 .... Even parity

Parameters for tape reader reading:
C10 .... reader with short signal STROBE (CONSUL /A)
C14 .... Default values of signals for reading
C15 .... Ignoring "blanks" at the beginning of reading
C16 .... Delay of reading data after the signal "data valid"
C17 .... Set inversion of the signal "start" for reading
C18 .... Set inversion data for reading
C19 .... Set inversion signal " data valid" for reading

Reading of the tape reader:
C20 .... Driver reading of the reader FANUC
C21 .... Driver reading of the reader FS100
C22 .... Driver reading of the reader FS330, FS1503
C23 .... Driver reading of the reader CONSUL
C24 .... Driver reading of the reader GRIESHEIM
C25 .... Driver reading of the tape recorder or NS260
C26 .... Driver serial reader reading

Number of blanks for the end of reading:
C27 .... Number of blanks for the end of reading

Reading direction of the reader:
C28 .... straight reading direction
C29 .... opposit reading direction

Simulation of the reader:
C30 .... Driver simulation of the reader with the short signal "start"
C31 .... Driver simulation of the reader FS100
C32 .... Driver simulation of the reader FS331 (opposite direction)
C33 .... Driver simulation of the reader FS331
C34 .... Driver serial reader simulation
C36 .... Driver simulation of the reader CONSUL (opposite direction)
C37 .... Driver simulation of the reader CONSUL
C38 .... Driver simulation of the tape recorder
C39 .... Puncher driver

Communication protocol for serial port COM1:
C40 .... without protocol, with the terminating symbol EOF (1Ah)
C41 .... Communication protocol "TRANS"
C42 .... Communication protocol "HEIDENHAIN"
C43 .... Communication protocol "DNC"
C44 .... Without protocol
C45 .... Entry tables from external keyboard

Time-out for the end of simulation for the DNC site:
C46 .... Time out for the end of simulation (with C43)

Name prefixes for partprograms on the computer disk, for the DNC network:
C47 .... The first letter of the prefix for the name fo the partprogram (DNC)
C48 .... The second letter of the prefix for the name of the partprogram (DNC)
C49 .... Third letter of the prefix for the name fo the partprogram (DNC)

Transfer speed serial port COM1:
C51 .... Transfer speed 110 Bd for COM1
C52 .... Transfer speed 300 Bd for COM1
C53 .... Transfer speed 1200 Bd for COM1
C54 .... Transfer speed 2400 Bd for COM1

C55 .... Transfer speed 4800 Bd for COM1
C56 .... Transfer speed 9600 Bd for COM1

Transfer norm for serial port COM1:
C57 .... RS232C
C58 .... current loop 20mA
C59 .... current loop 20mA with data inversion

Parameters for simulation of the reader:
C60 .... Default values of signals for simulation of the reader
C61 .... Setting signal length for"data-valid"
C62 .... Setting driver length for simulation of the reader
C63 .... Setting signal delay for "data-valid" from "start"
C64 .... Setting inversion signal "start" for simulation of the reader
C65 .... Setting inversion data for simulation of the reader
C66 .... Communication protocol TRANS for serial reader simulation
C67 .... Back cycling of the program
C68 .... Blocking of the signal "start" for simulation of the reader
C69 .... Simulation of reader type GRIESHEIM

Transfer speed pro serial port COM2:
C70 .... Transfer speed 600 BD for COM2
C71 .... Transfer speed 110 BD for COM2
C72 .... Transfer speed 300 BD for COM2
C73 .... Transfer speed 1200 BD for COM2
C74 .... Transfer speed 2400 BD for COM2
C75 .... Transfer speed 4800 BD for COM2

Comments:
C77 .... Symbol for the beginning of comments
C78 .... Symbol for the end of comments 1
C79 .... Symbol for the end of comments 2

Memory section:
C81 .... Memory section RAM 1
C82 .... Memory section RAM 2
C83 .... Memory section RAM 3
C84 .... Memory section RAM 4
C85 .... Linked memory 128K

Monitoring of machine conditions:
C88 .... The number of ports for monitoring of machine conditions

Address of Trans in the DNC network:
C89 .... Address of Trans in the DNC network

Display of configuration:
C90 .... Display of condition
C91 .... Sorting of errors

Parameters for simulation of the puncher:
C92 .... Entry of data setup (MC630)
C93 .... Simulation DT105 puncher without confirmation
C94 .... Default values of signals for simulation of the puncher
C95 .... Ignoring "blanks" at the beginning of puncher simulation
C96 .... Delay in data reading from "command for hole punching"

C97 .... Set inversion signal "puncher prepared" for simulation of the puncher
C98 .... Set inversion data for simulation of the puncher
C99 .... Set inversion signal"command for hole punching"

Segmentation of transfer in the DNC network:
C100 ... Segmentation cancelation
C101 ... Set segmentation
C102 ... Set the length of the segment
C103 ... Set transfer messages for the PC (F4)
C104 ... File receipt through buffers (COM1)
C105 ...File receipt through buffers and ISO conversion
C106 ...Continuous data input from the DNC network data while COM2 is idle
C107 ... Set TIME-OUT for parallel simulation during segmentation (F9)
C108 ... Joining of Function F6,F3 and F0 for segmentation (F9)
C109 ... Buffer refilling after 1K during segmentation

Transfer through serial port COM2:
C110 ... Cancelation of handshake protocol for COM2
C111 ... Activation of XON-XOFF handshake protocol for COM2
C112 ... Value code X-ON for COM2
C113 ... Value code X-OFF for COM2
C114 ... Activation of hardware (DTR) handshake protocol for COM2
C115 ... Symbol for start of transfer from serial port (C41, C66) for COM2
C116 ... Symbol for the end of transfer to the serial port (C40, C41, C66) for COM2
C117 ... Transfer stopped before the first character for COM2

Parameters for simulation of the reader:
C121 ... Continuous signal "data - valid ", except during data exchange
C122 ... Setting data exchange time(only for C121)
C123 ... Direction of simulation for driver C30
C124 ... Return to the previous character during change in direction
C125 ... Parameter for TALLY reader for the driver C30
C126 ... Parameter for data clear after the signal "data - valid"
C127 ... Length of zero data for parameter C126
C128 ... Data clear at the end of the driver
C129 ... Scan of the short signal "start" for drivers C32, C33, C36, C37
C130 ... Conversion ISO for simulation of the reader
C131 ... Reversed sequence of signals for drivers C32, C33, C36, C37
C132 ... Reversed phase for signal "data valid" with drivers C32, C33, C36, C37
C133 ... The end of "data - valid" derived from the end of start signal for drivers C32, C33, C36, C37
C134 ... Driver AGIE FER202 with allowance for changes in direction
C135 …Driver for tape recorder SARY (NS569)
C136 … Nullification of the signal CRDY outside simulation
C137 … File offset used in simulation of the reader
C138 … Driver FS302P
C139 … Mode START-STOP

Other:
C140 ... Setting of time for automatic cancelation of errors, for use in DNC
C141 ... Setting of time for control displaying of the file before writing or deletion
C142 ... Language version (0 = Czech, 1 = English, 2 = German)
C143 ... Conversion type for editing (0 = text, 1 = ISO, 2 = EIA)
C144 ... Cursor type for editing (1,2,3)
C145 ... Eight-character filename (0 = 5 characters, 1 = 8 characters)
C146 ... Setting of the period for key change from digit to letters .(File name input)

Transfer using serial port COM1:
C150 ... Cancelation of handshake protocol for COM1
C151 ... Activation of software XON-XOFF handshake protocol for COM1
C152 ... Value code X-ON for COM1
C153 ... Value code X-OFF for COM1
C154 ... Symbol for start of the serial port transfer for COM1 (C41)
C155 ... Symbol for the end of serial port (C40, C41) transfer
C156 ... ISO conversion with protocol HEIDENHAIN for COM1
C157 ... Hard name format for DNC protocol (C43) COM1

C170 … Driver for the simulation of tape recorder JAPAX
C171 … Parameter for for simulation of reader FER203
C172 … Start and stop signals mode for 131

TESTs:

C190 … Configuration locking
C191 … Configuration unlocking
C193 … Display test
C194 ... Test of memory RAM - 128kB
C195 ... Internal testing 1
C196 ... Internal testing 2
C197 ... Test of selected section for memory RAM
C198 ... Test of EPROM memory for checksum
C199 ... Default configuration of TRANS

Notes:

In the groups marked with the rotary switch symbol, it is possible to chose only one parameter. Those sparameters are displayed during searches through configuration display function F8C90.
Parameters marked with switch symbol can be set individually. During searches through configuration display function F8 C90, only the set parameter is displayed. Cancelation of parameter settings in a given group is done using the function marked CLEAR.

In parameters marked with this symbol, numbered values are conditioned. They don't appear during searches through configuration display function. With their selection, the corresponding value appears. Keys 1 and 2 can be used for decrement and increment by1, keys 3 and 4 by 10 and similarly keys 5 and 6 can be for100 value increments.

2.5 Error Messages

While in use, the following error messages may appear, which are shown on the display with the symbol E (ERROR) in the top row with an error code:

E99 - Error in checksum of configuration

This can occur during testing of TRANS after switching on. It means there is a change in the recorded configuration . The most likely cause of this is that the unit has been off for too long. After this error, basic configuration is set. User must first check and then set the required configuration.

E0 - Error in checksum

This error can occur during testing of TRANS after switching on. It means a change in recorded data. The most likely cause of this is that the unit has been off for too long. After this error, it is necessary to completely erase the entire memory. This error can also occur if TRANS is turned off during input transfer (It is unable to calculate the checksums.) In this case, the memory is OK and it doesn't need to be erased. The last file doesn't have to be complete.

E1 - Wrong manipulation

This appears sometimes during wrong manipulation. This is one of the least serious user errors.

- when choosing some functions, numbers are pressed instead of CR
- when selecting function F8, instead of code entry, F or enter is pressed for functions or a non-existing code is given.

E2 - File not found

This can appear when selecting the number of the file (IC) function F6, if no file with the same IC can be found in TRANS memory. Before a file has been received by TRANS, this error is used to confirm that so file with that name (IC) not exists and will not be overwritten.

E3 - File not selected

This can appear during simulation of the reader (Function F0) or while transmitting date through serial output (function F4) if no IC was selected before this function.

E4 - Internal code (IC) not specified (IK)

This can occur during simulation of the puncher (function F1) or during scanning of the reader (Function F2) or during receipt of data from serial input (Function F3), if no IC was selected.

E5 - Memory Full

This can occur when memory is full while writing data during reading from the reader (Function F2) or during simulation of the puncher (Function F1) or during receipt of data from serial input (Function F3).

E6 - Error in simulation of the reader

This can occur during simulation of the reader (Function F0), for example if the length of the start impulse from the external equipment is not correct. Causes for error can vary. Detailed sorting can be determined after entry of Function F8 and the code C91.

E7 - Error in reading from the reader

This can occur during reading of the reader (Function F2 or F5) if the reader does not respond, for example if not connected.

E8 - Error in simulation of the puncher

This can occur during simulation of the puncher (Function F1) if there is no response from the connected equipment.

E9 - Error with serial input driver

This can occur during serial input of data (Function F3) if correct communication is not established, for example if the wrong transfer speed is selected.

E10 - Error in parity

This can occur during data transfers (Function F0, F1,F2).

Errors 11 to 18 have to do with the DNC communication protocol and can occur only if the TRANS is

used in the DNC network.

E11 - Error in communication with DNC - the number of communication bloks does not correspond. *)

Ex12 - Error in end confirmation.
- 112 - Error opening the file on the PC (e.g. the file doesn't exist or isn't in the TRANS directory)
- 212 - Error reading or writing to the file on the PC (e.g. full disk)
- 312 - Error during file transfer - four unsuccessful attempts to transfer a block.
- 412 - Error during transfer of the command input block - four unsuccessful attempts to transfer command input block.
- 512 - Size of the file is not the same as that given. *)
- 612 - Transfer of the file was canceled by the PC user.

E13 - TRANS did not establish communication with the PC even after the fourth attempt. The main cause for this can be an off computer or a disconnected cable.
E14 - Ambiguous request. *)
E15 - Interruption of the communication by pressing key on TRANS .
E16 - Collision of received and transmitted data.*)
E17 - Cancelation of the action following format errors after four receipt attempts*)
E18 - Attempt reestablish communication before the end of previous one. *)

Notes:
Errors marked with asterisks mustn't occur during use. If they do, it is necessary to consult the manufacturer.

E22 - Incomplete or defective second memory section
E23 - Incomplete or defective third memory section
E24 - Incomplete or defective fourth memory section

Errors 22 to 24 have to do with the second, third and fourth memory section. The error is indicated after switch onto the corresponding section, as long as the memory section isn't complete or if it is defective.

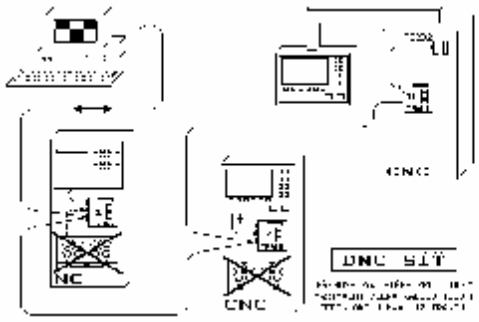
Notes:
When using DNC, it isn't necessary to confirm possible occurences of errors. After a few seconds have passed, the error is automatically canceled.

3. SERVICE MANUAL FOR THE DNC NETWORK

This Service manual for the DNC network ***is intended for NC and CNC machine service workers.*** *Detailed information about the structure, installation and network issues for the network operator (a qualified person with all necessary documentation) are included in the network manual for installation and operation of the network.*

3.1 Basic characteristics of the DNC network

With incorporation of TRANS in the DNC network, another qualitative step is realized with the replacement of the punched tape, which mostly happens at workstations where there are more working centers equipped with both NC and CNC systems or at workstations with demands on the frequent partprogram modification.



The DNC network is connected to the computer using one cable (link) with a maximum length of 1000 meters with a maximum of 10 connections for TRANS communication adapters. A maximum of 10 TRANS units can be connected to one link. If it is necessary to connect more TRANS units, another link must be used. For every link, connected computers must have available one slot for network card and one free serial port RS232C. Use of the DNC network requires a PC XT/AT personal computer equipped with free serial ports according to the number of connected links and the corresponding number of free slots for connecting network cards. Hard drive use is predicted even and especially without a database of the superstructure and without greater demands on speed it is possible to operate the DNC network even on computers without a hard drive.

DNC network resources enable control of the network from both the computer and every TRANS adapter. Both the computer service operator and every user of the TRANS adapter can cause the partprogram transfer. Transfer of partprograms are two-directional, meaning from PC to TRANs and from TRANS to PC.

For example, TRANS service at machine side can receive or send partprogram at any time, from his directory on computer disk. Additionally, computer service can send or request a random partprogram from a random TRANS adapter connected to the DNC network. The DNC network driver program is resident, meaning that the computer service can run other applications during transfer, as long is not necessary to conrol network. If a request to for network service is made, it is possible to enter a command directly from the keyboard or use the superstructure database, which the user controls from the MENU.

A significant problem when dealing with the DNC network is the organization of data, meaning partprograms on the disk of the personal computer. Partprograms must be protected from unwanted overwriting of data, nevertheless in some cases it is necessary to modify the source forms of the partprograms and to do fixing, for example, during fine tuning of the partprograms on the machine. User access for operation of the DNC network and organization of data is enabled with applications of the database system dBASE IV. The Database of the superstructure isn't essentially necessary for the operation of the DNC network, but simple manipulation with the help of the MENU provides access to the whole network. The application database keeps actual information about files and tables for every machine speparate, and a well-trained user alone can specify which file and table information need to be kept in tables and displayed during manipulation (except for the filename and information such as who created the partprogram and when, the number of ommisions, corrections and footnotes).

3.2 Structure of the directories

In the description below of the program equipment for the DNC network, there is a system of two copies of one partprogram, which are distinguished according to DOS filename extension. For instance, a source form of the partprogram, possibly created by a technologist, which mustn't be rewritten under any circumstances has extension STX (source text). So called work text (which is modified source text), has extension WTX (Work Text). In order that a preview can be preserved and mixing of partprograms for individual network connected machines does not occur, every machine can have its own directory on the disk. All communication thereafter is done with the TRANS and the corresponding directory. Every TRANS is given an identification number or an

address during configuration. This address matches the disk directory. Folder names are given during installation, and are recorded in the configuration file.

Partprograms which are in the machine's directories must have the data format necessary for a specific machine (for example ISO, EIA etc.) Partprogram input and output between the text form and the machine form is done with the necessary conversion during transfer between Input/output folders (INOUT) which have only text forms of partprograms (with TXT extensions) and MACHINE folders.

For work with the manual, we will use the names DNC, MACHINEn, and INOUT. The user has the chance to change the names of directories during installation.
Individual folders of the MACHINEn contain machine forms of the partprograms (ISO, EIA code etc.). The directory INOUT holds files with partprograms in text form. It is from this directory that copies are made onto the individual directories of machines. When copying, necessary data conversion is processed. During use of the superstructure database, the program is moved to the database for the specified machine. If the main programming system (Kovoprog, CNC-APS) is used for the partprograms, the necessary partprogram first must be copied from that system to the directory INOUT. During copying, attention must be paid to the syntax of the the partprogram name, if there is a difference between the two systems.

Example of directory structures for the DNC network

Example of partprogram transferu from the main "CAD" sytem to machines.

3.3 Names of the partprograms in the DNC network environment

In the DNC network environment names of files with partoprograms must be used according to the rules shown below.

The filename must have the following form:

XXXccccc.YYY

- **XXX** is the maximum three character prefix, composed of the characters allowed for MS DOS file names (There don't have to be any.)

- **ccccc** is a maximum 5 digit number. Under the same number, the partprogram is also shown in the TRANS. The number of figures in the name is limited - numbers between 1 and 99999 can be used. Meaningless

leading zeros at the begining of a number (e.g. 0012) cannot be used!

- **YYY** can be a maximum of 3 characters as a extension for the name of a part program. In the DNC Network environment, three extension types are normally used.

- Both prefix **XXX** and extensions **YYY** are intended for use during DNC installation.

Note: New models of TRANS adapter with alphanumeric display support full 8 character name, which can contain letters.

Every partprogram can be saved in the directory of a machine in two versions, according to extension. In the manual, we will use STX (Source Text) and WTX (Work TEXt). As long as the partprogram can be found in the input/output directory, it will have the extension TXT (TEXT)

- **STX** This extension is used for the source partprogram, which was created by a technologist, moved from the directory INOUT and converted from text form to the machine code.

- **WTX** This extension is used for the work partprogram. It can be modified or even created by the machine service user and can be saved on a disk.

- **TXT** This extension is used for text partprograms in text form for the input/output directory INOUT.

This strategy is based on predictions that the source form of the partprogram (created by a technologist), which has the extension STX in machines, must not be written to. Therefore, during transfer of the partprogram from TRANS to the PC, the file is always given the extension WTX, or in the PC to TRANS direction the extension STX or WTX can be used (if it has already been created). In transfers from TRANS to the PC, the partprogram only receives the extension WTX.

Table of TRANS transfers

Partprogram Name in the machine directory	Movement from the computer to Trans	Movement from Trans to the computer
***.STX** ***.WTX**	**F,3,CR (F,3,0)** **F,3,1**	**F,4,CR (F,4,1)**
*.MC1	F,3,2	
*.MC2	F,3,3	F,4,3 (F,4,2)
*.DG1	F,3,4	
*.DG2	F,3,5	F,4,5 (F,4,4)

In addition to partprogram groups with extensions STX and WTX, other file groups are also included. They can be used, for example, as an independent group of macros or sub-programs, tests or system programs.

3.4 Linked-level Programs

The link level of the DNC network involves two-directional transfers for individual TRANS adapters. The link level is managed by program TRANSNET.

3.4.1 TRANSNET .COM

TRANSNET is a resident program, which runs the DNC network operations. It can comunicate with 10 TRANS communication adapters. It transmits cycles of queries to individual TRANS units, and transfers of files in both directions are made according to this. Every TRANS adapter has an address in the DNC network (F8, C89) and its messages are guided by a special communications protocol.

Installation of the program after configuration (see further) is done with commands:

SHARE (MS DOS command)
TRANSNET

Installation of the program is canceled only by resetting the computer or shutting it down.

3.4.2 TRANSCNF.COM

TRANSCNF is a configuration program for the whole DNC network. It configures all programs for the DNC network. The configuration program TRANSCNF is controlled with the text file TARNSCNF.TXT, which is created during DNC installation with the help of the program INSTALL. Configuration is done automatically at the end of the DNC installation

SYNTAX: TRANSCNF

The configuration text file is created automatically during installation.

Changing the data in the file TRANSCNF.TXT is not reccomended. If it is necessary to change the other pamereters in the configuration file, reinstallation in recommended.

3.5 Some programs for guiding the DNC network

This group includes programs for moving the partprograms. Commands are given from the computer. Only some of the important programs will be described further. Their complete description can be found in the manual for the DNC network. These programs can be grouped together according to their properties, and executed in the MS-DOS environment or another such environment without using the superstructure database from the company MEFI.

3.5.1 TRANSCPY.COM

The program TRANSCPY is a computer command for providing transfer between the TRANS communication adapter and the PC.

Entry of the parameters:

- ***file*** entry of the partprogram name. It's enough to give only the partprogram number.

- ***trans*** entry of Trans addresses. The prefix "TRANS", "TR" or "T" is entered, and it can be followed by a number with a maximum of two digits with the TRANS address.

Examples:

TRANSCPY t2 1
transfer of the file '1' from TRANS no. 2 to the file DNC\MACHINE2\PPG1.WTX

TRANSCPY T9 ABC123
transfer of the file '123' from TRANS no. 9 to the file NC\MACHINE9\ABC123.WTX

TRANSCPY 987.STX tr8
transfer of the file DNC\MACHINE8\NCP987.STX to the file '987' in TRANS no. 8

3.5.2 TRANSLST.COM

The program TRANSLST displays a partprogram list showing the partprograms from the selected TRANS, their size and number of bytes, on the screen.

Parameter Entry:

- ***trans*** entry of TRANS addresses

Example:

TRANSLST T2
A contens of TRANS no. 2 (partprogram list) is displayed on computer screen.

3.5.3 TRANSDEL.COM

The program TRANSDEL is a computer command for deleting the partprograms from the TRANS communication adapter.
Parameter Entry:

- ***file*** entry of the partprogram name. Only the number of the partprogram to be deleted should be given.

- ***trans*** entry of TRANS addresses

Examples:

TRANSDEL TRANS09 1234
deletion of the file '1234' from Trans č.9

TRANSDEL 98765 TR8
deletion of the file '98765' from Trans č.8

3.5.4 TRANSISO.COM

The program TRANSISO is a conversion program for conversion between text file form and ISO code.

Parameter Entry:

- ***file*** entry of the partprogram name.
- ***trans*** entry addresses of Trans. The machine subdirectory is determined by the corresponding TRANS address.
- ***param*** parameters for carrying out conversion. Entry is not required. If there is no entry, the parameters marked (*) are set.

Entry of the parameter conversion:

- for conversion from text form to ISO code

- for conversion from ISO code to text form

Examples:

TRANSISO t2 12.wtx 01
conversion of the file from ISO code located in the directory DNC\MACHINE2\PPG12.WTX to a text file, which will be placed in the folder DNC\INOUT\PPG12.TXT. During conversion, spaces will be placed between the entries.

TRANSISO 123 T9 10
conversion of the text file DNC\INOUT\ABC123.TXT
to a file in ISO code placed in DNC\MACHINE9 under the filename ABC123.STX.
After conversion, delimiters between blocks will be CR and spacess will not be removed.

(Notes: prefix ABC set during installation)

3.5.5 TRANSEIA.COM

The program TRANSEIA is a program for conversion between text file form and EIA code. It contains the same syntax as the program TRANSISO.

Parameter Entry:

- ***param*** parameters for carrying out conversion. Entry is not required. If there is no entry, the parameters marked (*) are set.
-

Entry of the parameters for conversion:

- for conversion from text form to EIA-code

- for conversion from EIA-code to text form

Example:

TRANSEIA 123 TR9 10
text conversion of the file located in DNC\INOUT\ABC123.TXT to the file in EIA code located in DNC\MACHINE9\ABC123.STX. During conversion, the table TR_EIA_1.TAB will be used .No spaces will be leaved out.