Module Description

Application

The control module for station-bus is used within a PROCONTROL multi-purpose processing station.

It is the central control module handling the entire exchange of information within the station and between the station and the PROCONTROL bus system.

To increase availability for redundancy purposes, the control module for station-bus can be provided twice in the multi-purpose processing station. However, in this case, the monitoring module for station-bus control module 88 TV01 is also required.

The module is available in three versions:

88 TV01-E/R1040: Control module for non-redundant operation
88 TV01-E/R1041: Control module A for redundant operation
88 TV01-E/R1042: Control module B for redundant operation.

Tasks

Because of its central position in the PROCONTROL multi-purpose processing station the control module for station-bus has the following tasks:

- To control all operational sequences required for the exchange of information in the station
- To transmit the system and station addresses
- To initiate and control special operating procedures automatically or by external instructions
- To perform diagnostic functions
- To generate the central clock ZET.

These tasks are carried out by means of a programmable control unit.

Features

The module can be plugged into every multi-purpose processing station of the PROCONTROL bus system. It has a standard interface to the PROCONTROL station-bus.

The module is the central bus control module in the station. All other modules within the station (input/output modules, processing modules, bus coupling module) have to execute its instructions. The bus control function is not transferred to any other module of the station, except the redundant control module.

Disturbances on the module and disturbances within the station are each indicated by a light-emitting diode (ST, STS) at the front.

The current operating mode (station communication, remote bus communication) is indicated by a light-emitting diode (STVE, F8VE) at the front.
Functional sequences

STATION-BUS COMMUNICATION

No module of the station - with the exception of the control module for station-bus itself - may transfer data telegrams to the station-bus via its standard interface without permission from the control module. There are two modes of data communication:

- Cyclic mode
- Event mode.

In the cyclic mode bus grant is permitted in sequence by the control module to the individual station-bus modules. Only after bus grant the individual modules are entitled to transfer their data telegrams to the station-bus. The telegrams are then transferred to the PROCONTROL bus system via the bus coupling module from the station-bus to the local bus.

In the event mode, the modules notify the station-by an event annunciation that they would like to transfer data telegrams (see section "Event generation" of the module descriptions of the PROCONTROL input modules). The control module for station-bus then identifies the requesting module and grants it permission to transmit its telegrams to the station-bus. As soon as the control module for station-bus initiates an event mode, the cyclic mode is interrupted until no more event annunciations are available.

If the bus coupling module between local bus and station-bus receives, via the PROCONTROL bus system, a data telegram intended for the station, it also generates an event annunciation, and the control module for station-bus grants it permission to transfer the telegram. If there is a bus request from the coupling module, the control module interrupts both the cyclic mode and the event mode of input or processing modules.

The central allocation function of the control module for station-bus ensures that only one module transfers telegrams to the serial station-bus at a time and that no data get lost as a result of the concurrent transmission of telegrams.

ADDRESS TRANSFER

The module address of the control module is set by programming in the module itself (address 62).

The system and station addresses are the same for all the modules of a station. They are set on the control module for station-bus. This transfers a data telegram which is received simultaneously by all modules of the station. Here, the addresses which are included in the data field of the telegram are stored.

The addresses are set by means of the 10 contacts of switch S1 (see "Mechanical design"). The addresses are set in the binary code. Contact numbers 1, 2 ... 9, 0 and the contact position "ON" are marked on the cover of the switch casing. Position "ON" of the individual contacts corresponds to "logical 0".

The following table shows the allocation of the contacts to the system and station addresses and, by way of example, the setting of the system address 2 and of station address 178.

<table>
<thead>
<tr>
<th>Address</th>
<th>Station</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacts</td>
<td>S1:1,2:3:4:5:6:7:8:9:0</td>
<td></td>
</tr>
<tr>
<td>Binary Significance</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Set Example</td>
<td>ON</td>
<td></td>
</tr>
</tbody>
</table>

TELEGRAM MONITORING

Every PROCONTROL telegram contains a number of security characters to protect the telegram contents (operation code, addresses, data). The control module for station-bus monitors all telegrams transferred on the station-bus and checks them for possible errors on the basis of these security characters. If an error has occurred, the telegram is blocked. If there is no error, a release signal is output. Only after this telegram-specific release signal has been output by the bus control module a telegram is permitted for further processing, e.g. the bus coupling module is allowed to transfer this telegram from the station to the PROCONTROL bus system, or the station-bus modules are allowed to process the telegram.
SPECIAL FUNCTION STAND-ALONE MODE

The firmware of the module incorporates additional functions which permit the use of small PROCNTRL systems without remote bus connection.

CONDITIONING OF THE STATION

After connection of the voltage or after pressing the Reset pushbutton (see "Operating functions"), the control module for station-bus generates a reset signal which causes the following:

- in the control module the control section is set to a defined state
- all registers are erased
- self-diagnosis is started (see "Diagnosis")

- in the processing section of the input/output and processing modules all microprocessor components are set to a defined state
- all bus driver stages (i.e. the circuit parts of the modules, which transfer the signals to the station-bus) are switched off.

After the self-diagnosis procedure, the control module for station-bus activates in sequence the bus driver stages of the other modules (module by module) and starts the external diagnosis procedure (see "Diagnosis").

Following this, the entire station is ready to start data communication.

DIAGNOSTIC

The control module for station-bus carries out self-diagnosis and external diagnosis procedures.

During self-diagnosis, both the control section and the bus driver stages are checked. If a disturbance occurs, this is indicated (see "Annunciation functions") at the front of the module.

During external diagnosis, the control module checks the bus driver stages of all other modules. If it detects a disturbance in a module, it switches this module off for the duration of the disturbance. Such a disturbance is also indicated at the front of the control module for station-bus (see "Annunciation functions").

In both cases, the type of malfunction is entered in the diagnosis register, and a disturbance announcement is simultaneously output to the PROCNTRL bus system.

Operating functions

Two pushbuttons are provided at the front of the module (see "Mechanical design").

The pushbutton QT for diagnosis acknowledgement is used to acknowledge disturbance annunciations. If a disturbance occurs on the control module for station-bus, the light-emitting diode ST is set. If it is set back again after actuation of the acknowledgement pushbutton, the disturbance was only of a transient nature. If the diode is continuously set after actuation of the acknowledge-ment pushbutton, the disturbance is still present.

In "Stand-alone mode", the acknowledgement key has an additional function: when it is operated, all station modules are caused to transmit the contents of their diagnosis registers.

In the redundant mode, a disturbance within the module initiates immediate changeover to the undisturbed redundant control module.

By pressing reset pushbutton RST, the reset signal is generated, with which the station is conditioned for data communication (see "Conditioning of the station"). This pushbutton is needed for commissioning and in case of disturbances.

Warning:
During normal station operation, the RST pushbutton must not be actuated.
Operating modes

Two plug-in jumpers X1 and X2 (see "Mechanical design") are provided on the module.

REDUNDANT/NON-REDUNDANT MODE

With jumper X1, the module can be set for redundant or non-redundant control mode.

The following allocation applies here:

Operating mode: Plug-in jumper X1:

Redundant mode

Non-redundant mode

When replacing modules in redundant mode, the precise sequence described for 88 TU01 must be observed.

MEMORY DIMENSIONING

4K-PROMs are used for the memory modules A310 - A314. Plug-in jumper X2 is used for setting purpose.

Version Type of memory Plug-in jumper X2:
104x 4K-PROM 6 5 4 3 2 1

Annunciation functions

ANNUNCIATIONS ON THE MODULE

Two red and two green light-emitting diodes are provided at the front of the module.

The red light-emitting diode ST is set when a disturbance occurs on the module itself.

The red light-emitting diode STS is set when the control module for station-bus has switched off another faulty module.

The green light-emitting diode FBVE (remote bus communication) is always set when data communication takes place in the station (reception from the remote or local bus) or from the station (transmission to the local or remote bus).

The green light-emitting diode STVE (station communication) is always set when data communication takes place on the station-bus.

Therefore, both green light-emitting diodes are set when data telegrams are transferred from the station.

ANNUNCIATIONS TO THE STATION-BUS

Internal disturbances and disturbances detected in other modules of the station are transferred as "General disturbance" to the station-bus.
**Functional diagram**

Terminal designations: the module consists of a printed circuit board and is equipped with connector X1. It incorporates the voltage supply and the standard interface to the station-bus.

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**Diagram details:**
- **Display and operation**
- **Auxiliary memory**
- **Control section**
- **Program memory**
- **88 TVO1-E**
- **Output register**
- **Time control station-bus**
- **Bus driver**
- **Input register**
- **Station address**
- **Standard interface**
- **Module bus**
- **Station bus**
- **Connector X1**
  - b02 ZO
  - b14 ZO
  - d29 ZO
  - d20 UD+
  - d20 UD+
  - SS
Mechanical design

Board size: 6 units, 1 division, 160 mm deep

Connector: according to DIN 41 612
48-pole, edge-connector type F

Weight: approx. 0.42 kg

POSITION OF SWITCH, MEMORY MODULES AND PLUG-IN JUMPERS ON THE PRINTED CIRCUIT BOARD AND FRONT VIEW

Memory modules: Order number: Order number: redundant A redundant B
(component) (PROM-programmed) not redundant

1 = A310 GJTN160259P1 GJR2351615Pxxxx GJR2351616Pxxxx
2 = A311 GJTN160259P1 GJR2351611Pxxxx
3 = A312 GJTN160259P1 GJR2351612Pxxxx as for
4 = A313 GJTN160259P1 GJR2351613Pxxxx "not" as for
5 = A314 GJTN160259P1 GJR2351614Pxxxx "redundant" "not redundant"

Note: The mounting position of the components is marked by an imprint on the printed circuit board, next to components.

xxxx = Position number corresponding to the appropriate revision level.
Technical data

In addition to the system data the following values apply:

POWER SUPPLY
Order number: GJR2346500R....
Order number: GJR2385100R....

Operating voltage bus section
UD+ = +5 V
ID = 1.5 A
PV = 7.25 W

Current consumption
Ig = 2.2 A

Power dissipation typ.
PV = 11 W

Reference potential of bus section
ZD = 0 V

SS - Standard interface to the Station-bus

ORDERING DATA

1. Complete modules:

Type designation:

88 TV01-E/R1040 *
88 TV01-E/R1041 *
88 TV01-E/R1042 *

Order number:
GJR2346500R1040 respective GJR2385100R1040 **
GJR2346500R1041 respective GJR2385100R1041 **
GJR2346500R1042 respective GJR2385100R1042 **

* 88 TV01-E/R104x supersedes the versions 88 TV01-E/R101x and 88 TV01-E/R102x.

** The module 88 TV01-E with the order number GJR2385100R104x supersedes the version with the order number GJR2346500R104x.

2. Memory modules: see "Mechanical design"

Technical data are subject to change without notice.