Module Description

ABB
ASEA BROWN BOVERI

GKWE 705 179 E, edition 03/89

PROCONTROL 44
Transfer

Control Module
for Transfer Procedure

88 VA01-E/R1010
88 VA02-E/R1010

Application

The control module for transfer procedure is used within a PROCONTROL master station.

Together with the modules 88 VP01/VP02 (master station processor module) and 88 VT01/VT02 (telegram handling module) it forms the central processor within the master station. This processor controls and monitors the entire data communication on the connected PROCONTROL remote bus system.

The module is available in two versions. These differ only by the fact that their number of telegrams per block is differently.

88 VA01-E/R1010: Reception of 8 telegrams per block

88 VA02-E/R1010: Reception of 8 or 16 telegrams per block

Features

The module can be plugged into each of the two master stations of the PROCONTROL bus system, but is only available once for each station. It is provided with two standard interfaces: one of these is used to link the module with the master station bus to which all modules of the master station (including master station coupling modules 88 VK01) are connected. The second one is for the general bus (G-bus) which only connects the modules 88 VA01/VA02, 88 VP01/VP02 and 88 VT01/VT02 with each other.

A light-emitting diode, a pushbutton and three decimal switches are provided at the front of the module.

These components are used to determine whether faultless cyclic data exchange was carried out with a multi-purpose processing station, and to store on control module 88 VA01/VA02 the currently valid total number of the cyclic response telegrams of each multi-purpose processing station (see also "Operating and annunciation functions").

Description

The control module for transfer procedure is part of the entire master station processor (comprising the modules 88 VA01/VA02, 88 VP01/VP02, 88 VT01/VT02). As an "auxiliary module" of the processor, it performs certain subfunctions of the entire master station program. However, each of these subfunctions is only executed after a specific command from processor module 88 VP01/VP02. The commands result from the command fields of the 48-bit data word in the program memory (see module description "Master station processor module 88 VP01/VP02", GKWE 705 180). The commands are transferred in coded form via the general-bus and are decoded on the module (the decoders are not shown in the functional diagram).

In the following, the most important functional blocks are specified and their functions within the entire program of the master station processor module are described (see also "Functional diagram").

TELEGRAM MONITORING

Every multi-purpose processing station transfers a defined number of response telegrams in the cyclic mode. This number is dependent on the number of modules installed in the station, but is always the same under normal conditions, after appropriate planning and commissioning.

All incoming telegrams are counted by the telegram counter, using the counting pulses of the processor, until the "End" telegram is received from the multi-purpose processing station. The total number of telegrams of this station is then stored in the telegram number memory. The same counting and storing procedure is performed once for each of the stations connected to the bus system after "Power ON" in the master station.

The total numbers of telegrams determined in this way for each station are then used as reference values for later cyclic data communication with a station. The incoming telegrams are always counted and compared by the telegram number comparator (comparing element) with the number of telegrams stored for this station. The three possible results (SP > Z, SP = Z, SP < Z; SP = stored value, Z = counter value) are transferred, when requested, to the processor via the comparator register for further evaluation. The current counter value can also be scanned by the processor.

The result of this comparison "stored value is not equal counter value" does not necessarily indicate a defect in the multi-purpose processing station. Any discrepancy may also be due to the fact that one or more modules have been added or removed later for technical reasons. The number of telegrams transferred by this station increases or decreases automatically when modules are added or removed. In such a case, the control module can be synchronized to this new telegram number with the aid of the three decimal switches and pushbutton ZT. The new total number is then transferred to the telegram number memory as a reference value.

DATA HANDLING

The processor can write any 8-bit word into the three registers A1 to A3.

With the two multiplexers A and B, the multiplexer comparator and the adder, the processor can carry out different program-dependent functions. For instance, the processor can compare the contents of any registers with each other or with the counter value of the station address counter, by scanning the comparator results A > B, A = B or A < B via the comparator register. In addition, the processor can (due to the program) add the contents of two registers and write the result via the general-bus again into one of the 3 registers. The adding result can also be switched directly to the general-bus.

STATION ADDRESS PROCESSING

The station addresses of all (projected) multi-purpose processing stations connected to the (max. 8) remote bus lines are programmed in the station address PROM (see "Programming note").

In the cyclic mode, the station address counter counts the station addresses in sequence with the counting pulses of the processor. At every counting step, the processor checks in the station address PROM whether the corresponding station has been projected. If this is the case, the station receives permission for cyclic data communication. If the station address has not been programmed, the processor continues to count the next station address. The processor scans, via the comparator register, whether the highest possible address (255) is reached. If this is the case, the system cycle is completed.

A maximum of 250 multi-purpose processing stations can be connected to the (max. 8) remote bus lines. The remaining addresses are intended for the master stations themselves. Station address 255 is a common address with which the master station can jointly address all available multi-purpose processing stations. The station address zero is used for addressing the PDDS when this is connected to the local bus.

ERROR COUNTER

The processor transfers call telegrams to a particular multi-purpose processing station (in cyclic or event mode) to obtain data response telegrams from this station. In the response telegram of the station, the following three types of error are possible:

- no telegrams or less than 8 telegrams (88 VA01 or 88 VA02), without the "End" telegram being transferred,

- formally invalid telegrams (plausibility check),

- a CRC error was detected in one or more response telegrams.

If the processor detects any of the mentioned errors by evaluating the response telegrams that arrived, it generates a counting pulse for the corresponding error counter on module 88 VA01/VA02. In addition, the call to the station is repeated. The repeated response telegrams are evaluated in the same way.

Each type of error allows two call repetitions. The processor terminates the calling procedure after the third unsuccessful attempt and proceeds to the next station.

STATION ADDRESS PRESELECTION

To synchronize the module to the currently valid telegram number of a station, its address is set with three decimal switches (see "Operating functions").

The preset station address is internally converted into 8-bit information and thus available to the processor via the general-bus.

INTERFACE FOR MASTER STATION BUS

The exchange of information (commands and check-back signals) between the master station processor and modules 88 VK01 and 88 VU01 takes place on the master station bus. To this end, module 88 VA01/VA02 incorporates the transmission and reception logic and an address register with a capacity of 4 x 4 bits. Into this register, the processor writes the address of the coupling module 88 VK01 that is to be addressed. Common address 15 is used to address all coupling modules simultaneously.

The module also receives a central clock pulse from the processor module 88 VP01/VP02 via this interface.

INTERFACE FOR GENERAL-BUS

The exchange of information between the modules of the master station (88 VA01/VA02, 88 VP01/VP02, 88 VT01/VT02) takes place via the general-bus. This bus contains eight data lines (for an 8-bit data word) and control lines. On these, the processor commands are transferred in coded form. These processor commands serve for initiating the execution of the respective functions in the different functional sections of the module

The module also receives two other system time frequencies via the general-bus.

Operating functions

Module 88 VA02 is designed for reception of 8 or 16 telegrams per block. Conversion is carried out with plug-in jumpers:

Plug-in jumper No.	8 tel./block	16 tel./block
1-2-3 4-5	1-2 closed closed	2-3 closed open

On delivery the module is set for 8 telegrams per block.

The total number of telegrams of each station is stored on the module. If a station suddenly transfers a larger or smaller number of telegrams (because modules have been added or removed), diagnostic information is output by the processor. To eliminate this discrepancy, the module can be synchronized to the new number.

For this, the address of the relevant station is set in decimal form at the front of the module, using the three decimal switches for the decimal places "ones", "tens" and "hundreds" (see "Mechanical design").

In addition, pushbutton switch ZT ("Count telegrams") must be pressed. By this, the telegram counting flip-flop and the light-emitting diode KT are set (see also "Annunciation functions"). This has the same effect as "Power On". The set flip-flop prompts the processor to transfer the actual number of telegrams into the memory with the next cyclic call of this station address.

After proper storage, the flip-flop and the light-emitting diode are set back by the processor. If light-emitting diode "KT" remains set after a complete system cycle, the set station address does not correspond to any existing station. Light-emitting diode "KT" also remains set in the case of an incorrect data exchange between the multi-purpose processing station and the master station.

Annunciation functions

The red light-emitting diode KT ("No telegrams")
is provided at the front of the module.

It is set when pushbutton switch ZT was pressed
to synchronize the module to a new number of tele-
grams. It is set back when, during the next cyclic
call, the station selected by means of the switch
has properly transferred all its telegrams, and
when the total number was transferred to the
memory. It remains set if the selected station
either transfers no "End" telegram after a call
or if this station transfers no telegrams at all
(station either defective or not existent).

Programming note

The station address PROM (A205, see "Mechanical
design") must be programmed according to the pro-
ject involved. The contents of the module PROMs
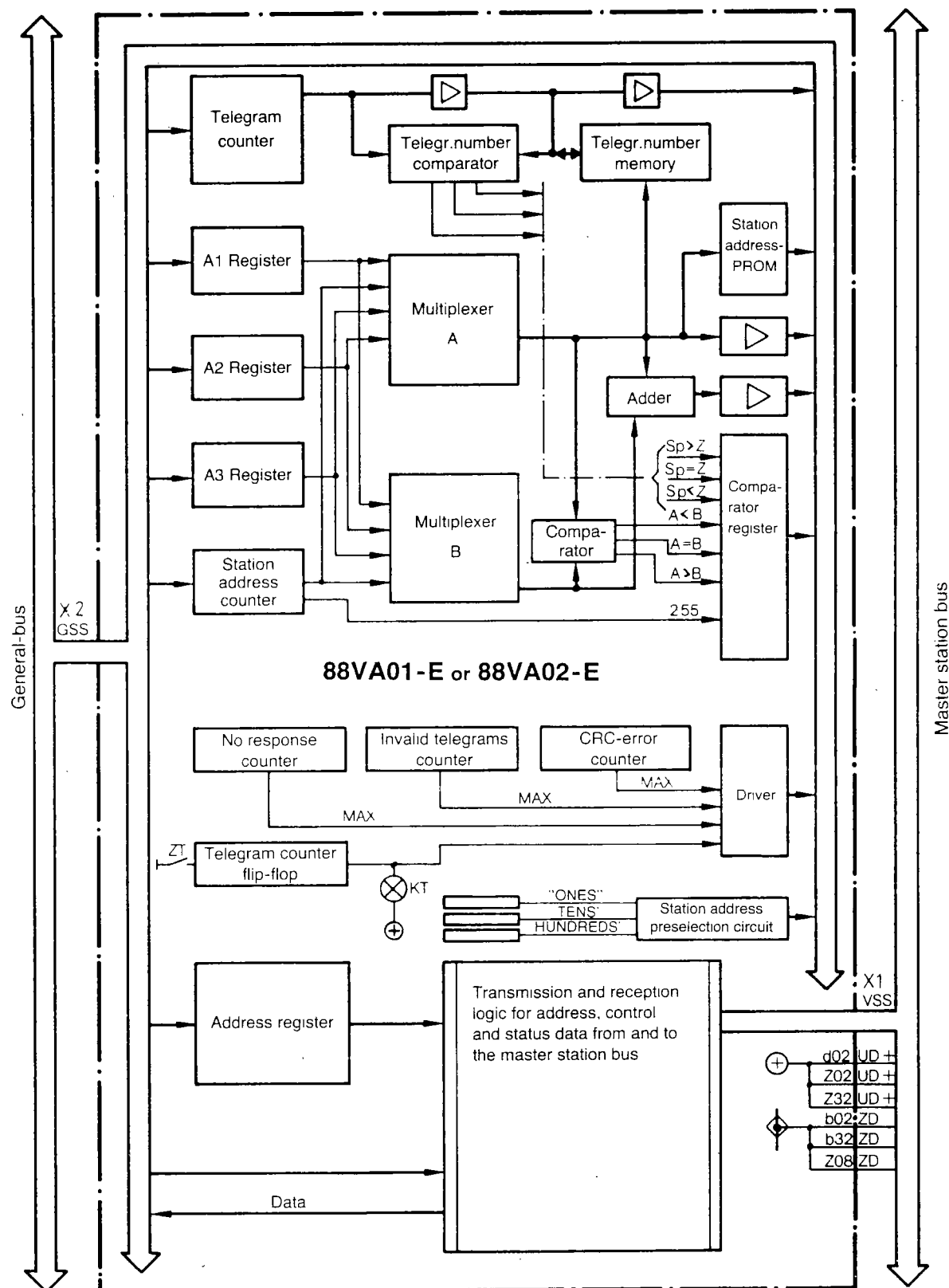in master station A and B is identical.

The following list shows memory allocations and
the contents of the PROM:

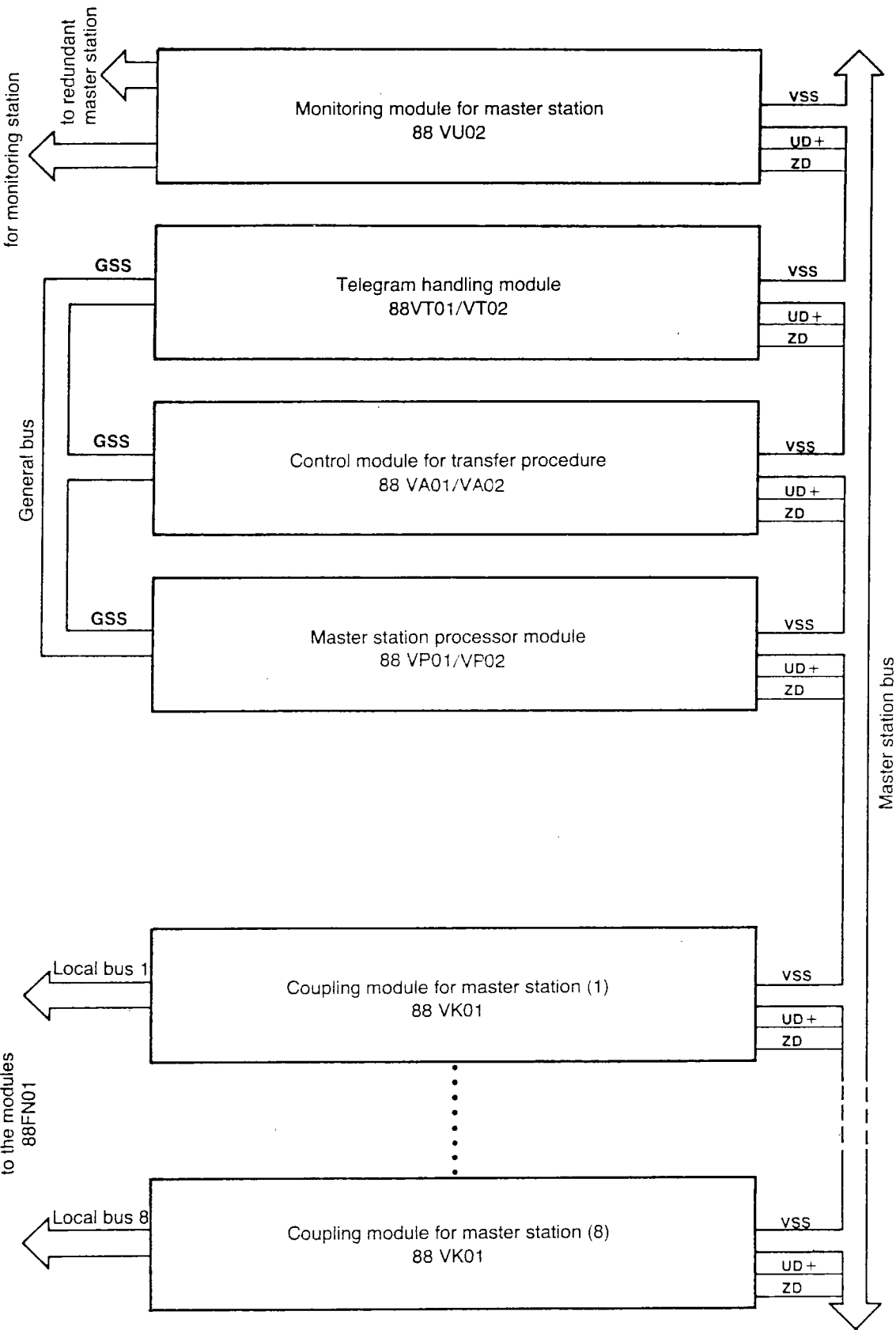| Address	Contents	Explanation	
000	0111 1111	Constant fixed value	
001-0FC:	MSB D7	Max. number of response telegrams = 2048 (INVERTER VALUE) default value = 256	) 11 = 256 telegrams) 10 = 512 telegrams
	D6	Max. number of response telegrams = 512 (INVERTER VALUE) default value = 256	) 01 = 2048 telegrams) 00 = 2048 telegrams
	D5	Privileged station (number of cyclic responses alternating)	) Privileged station = 1) Non-privileged station = 0
	D4	Station address valid (INVERTER VALUE)	) Station address valid = 0
	D3		
	D2	Number of remote bus line (value 1 - 8)	) 0001 = 1; 0100 = 4
	D1		) 0010 = 2; to
	LSB D0		) 0011 = 3; 1000 = 8
0FD	1111 1111	Constant fixed value	
0FE	1111 1111	Constant fixed value	
0FF	1111 1111	Constant fixed value	
100	1111 1110	Constant fixed value	
101-1FC	1111 1110	If station is a dummy station	
	1111 1111	If station is not a dummy station	
1FD	1111 1111	Constant fixed value	
1FE	1111 1111	Constant fixed value	
1FF	1010 1010	Constant fixed value	

Functional diagram

The module is equipped with connectors X1 and X2 (see "Mechanical design"). Connector X1 incorporates the interface to the master station-bus and the voltage supply.

Connector X2 incorporates the interface to the general bus.

88VA01-E or 88VA02-E

Connection diagram in the master station

Monitoring module for master station
88 VU02

Telegram handling module
88VT01/VT02

Control module for transfer procedure
88 VA01/VA02

Master station processor module
88 VP01/VP02

Coupling module for master station (1)
88 VK01

Coupling module for master station (8)
88 VK01
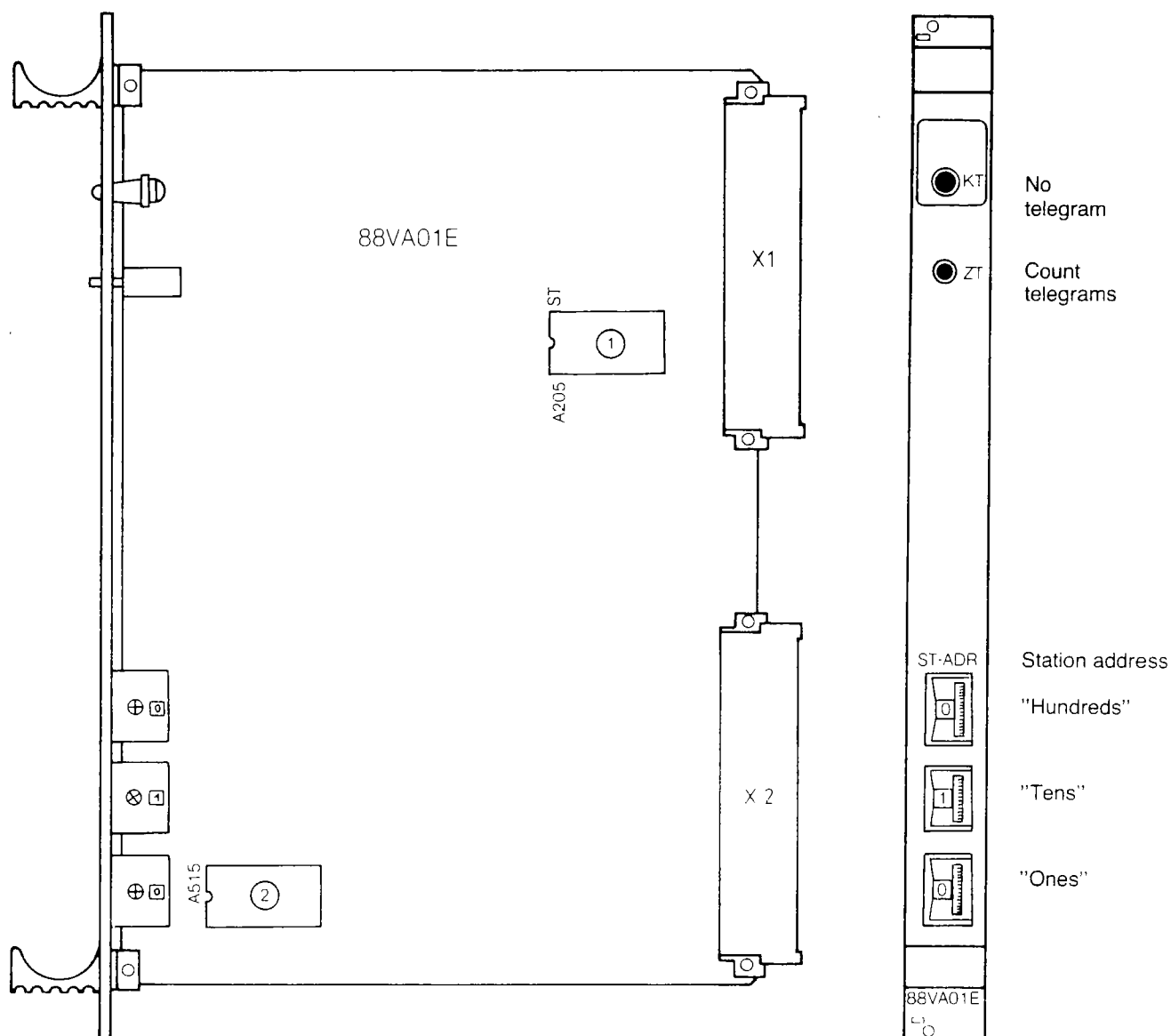
Mechanical design

Board size: 6 units, 1 division, 220 mm deep

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

Weight: approx. 0.45 kg

POSITION OF THE MEMORY MODULES ON THE PRINTED CIRCUIT BOARD AND FRONT VIEW OF 88 VA01 OR 88 VA02

Memory modules:	Order number: (component)	Order number: (PROM programmed)
① = A205(ST)	GJTN160053P1 (Station address PROM)	
② = A515	GJTN160183P1	GJR2351801Pxxxx for 88 VA01 GJR2351801Pxxxx for 88 VA02

Note:
The mounting position of the components is marked by an imprint on the printed circuit board.
xxxx = Position number corresponding to the appropriate revision.

Warning:
The module may only be plugged into the master station (double subrack AA, AB) within the slot range 09-45 (general-bus range, lower connector).

Technical data

In addition to the system data, the following values apply:

POWER SUPPLY

Operating voltage	$UD+$ =	+5 V
Current consumption	I_D =	1.6 A
Power dissipation typ.	P_v =	8 W
Reference potential bus section	ZD =	0 V

STANDARD CONNECTIONS

VSS - Standard interface to the master station bus

GSS - Standard interface to the general bus

ORDERING DATA

Type designation: 88 VA01-E/R1010   Order number: GJR2312300R1010
                  88 VA02-E/R1010   GJR2365700R1010

Technical data are subject to change without notice!

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