

Application and Module Description

Publication No.
GKWE 705 155 E, edition 09/90
Replacing GKWE 705 155 E, edition 06/88

Application

The output module is used to output analog signals in the signal range 0 ... 20 mA. It is used to activate indicating instruments or line recorders.

The module contains 8 function units. It is thus possible to output 8 different analog signals simultaneously.

Features

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

The module receives the analog signals to be output from the PROCONTROL bus system via the station bus in the form of telegrams. The telegrams are checked for faultless transfer by means of the parity bits before being output.

The analog signal outputs are short-circuit-proof and open-circuit-proof. They have a common reference conductor.

The output circuits are supplied with their own operating voltage to eliminate any interaction between the bus side and the process side.

The output signals can be simulated individually via the control system operator station. A simulated output is indicated by a light-emitting diode (SIM) at the front of the module and is recorded by the control system operator station on a logger and displayed on a screen.

A binary signal is output per function unit if analog signals are marked as disturbed.

Any disturbance in the processing section is indicated by a disturbance annunciation (ST) at the front of the module.

PROCONTROL P

Input, Output, Signal Conditioning

Output Module for Analog Signals

8fold, 0....20 mA, 9 Bit Resolution

81AA01 – E/R1010

Signal input

The module receives, via its standard interface, all telegrams that are transferred by the local bus/station-bus coupling module. Transfer takes place serially; the processing section therefore performs a serial/parallel conversion of the data.

Signal recognition

The following information is implemented in the address section of the data telegram:

- System address (possible 0 ... 3)
- Station address (possible 1 ... 249)
- Module address (possible 1 ... 58)
- Register address (max. 0 ... 63
for signals
Register address 246
for diagnosis data)

They help to clearly identify the signal by the transferring module. By its program, the processing section knows which telegrams are to be evaluated and in which output register the data word is to be written (see "Data communication ...").

Signal output

The module only passes on a received signal to an output if it has established

- by means of the parity bits in the telegram, that the data are transferred and received error-free
- by means of an address comparison, that the signal is allocated to one of its outputs.

The first function unit is described below. The others operate similarly.

Data output

The processing section of the module receives the serial data telegram via the station–bus. After the serial/parallel conversion, an address comparison is performed to find out whether the signal is meant for one of the function units. One register in the shared memory is permanently allocated to each function unit (see “Data communication ..”). The data word is written to the appropriate register.

Two output ranges can be selected for the output signal:

- 50 % ...+50 % (= 0 ... 20 mA)
- 0 % ... 100 % (= 0 ... 20 mA)

If the output signal exceeds the specified output range, a correspondingly higher current signal (up to max. 30 mA) is output.

In case of plug in or plug off the module during the running state respectively in case of switch on or switch off the power supply ashoret current peak of I_{max} (< 50 ms) may appear.

The range required is set via a switch on the module. The correctly evaluated data word is transferred from the shared memory register to a further output register in the output section of the module. The register stores this value until the next output cycle is performed by the PROCONTROL bus system. The subsequent digital/analog converter activates the output amplifier. This outputs an analog signal of 0 ... 20 (max. 30) mA.

The signal output is through outputs AA11(+) und AA12 or Z1.

Disturbance signal output

If a particular analog value telegram for a module with set disturbance bit is received, the module responds as follows:

- The faulty analog value is output
- A binary “1” signal is output at the associated output ST1.

This output can be used for activating an external disturbance light–emitting diode.

A resistor–mounting place is provided on the module for setting the output current of ST1. It is thereby possible to adapt the output to various types of light–emitting diodes.

Sink time monitoring

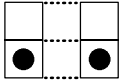
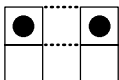
The module is provided with a time monitoring feature for supervising the incoming telegrams for cyclical renewal. If any of these telegrams is missing (e.g. failure of the source module), the module responds as follows:

- The corresponding analog output is switched to 0 mA
- A bit is set in the diagnosis register, the light–emitting diode for disturbance annunciation ST is set and the signal “Common disturbance Station” is output.

Operating modes

Interpretation of the analog signal

The converted analog value received is converted to 0 ... 20 (max. 30) mA. It can be output optionally in 2 output ranges. The switch S1 with 8 contacts is provided on the module for this. With contacts 1 to 8, the required output range for each function unit is set. The contact number corresponds to the number of the function unit.

Output Range	Switch Position	Output Current Range
–50 %...0...+50 %	S1 : 1 ... 8 ON 	0...10... 20 mA
0 % ... 100 %	*ON 	0 ... 20 mA

* = Setting on delivery

The received output signal can be expanded with the parameters $X1=0\%$ and $X2=100\%$ for each function unit. It is therefore possible, for example, to indicate only the range 10 mA(= $X1$) – 15 mA(= $X2$) as 0–20 mA output signal out of a 0–100 % signal received from the bus.

Both expansion parameters $X1$ and $X2$ are located in the address PROM and must fulfill the following conditions:

$$| X2 - X1 | \geq 6.25 \%$$

If this condition is not fulfilled, the module internal diagnosis message “Parameter error” is shown (see “Diagnosis”).

Important: If the range expansion is programmed via the expansion parameters, the corresponding contacts of switch S1 must each be set to position 0 %...100 %!

Simulation of the output signals

The output signals can be simulated individually. This is performed via the control system operator station.

During simulation, data telegrams are sent to the module address of the output required (see "Data communication ...").

The processing section blocks the real signal value and transfers the value to be simulated to the output register instead. Further signal output proceeds as described above.

The red light-emitting diode SIM at the front of the module is set for as long as one or more output signals are being simulated.

Diagnosis

The processing section of the module continuously monitors the reception of the data telegrams and their processing (self-diagnosis).

In the event of a disturbance, the type of disturbance is filed in the diagnosis register (see "Data communication...") and a disturbance annunciation is sent to the PROCONTROL bus system. The diagnosis register is then read out from the control system operator station for evaluation.

It is also possible to scan the current status of the module at any time from the control system operator station (remote diagnosis).

Data communication with the module

Signal allocation

The addresses of all the telegrams whose data are to be output are programmed in the module via the control system operator station. In this way the module knows (address comparison) which of the data telegrams received have to be processed. The module outputs at which the individual converted signals shall be made available are also programmed.

Formation of address

The telegram must contain the address of the output module to enable this module to respond selectively (e.g. for simulating an output signal).

The system and station addresses are the same for all modules in a multi-purpose processing station. They are set on the modules jointly and automatically via the station-bus control module.

The module addresses are set automatically by plugging the module into the slot provided within the multi-purpose processing station.

Writing in/reading out of data

Appropriate address information is necessary in the telegram in order to read out the register contents (output and diagnosis data). Table 1 (following page) shows this address information and the contents of the relevant register for writing in and reading out. The addresses identified with a are freely selectable and depend on the place of installation of the modules.

The module is notified in the operation code of the telegram as to whether it should write in or read out.

Annunciation functions

Annunciations on the module

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

The light-emitting diode SIM emits a steady light as long as one of the output signals is being simulated.

The light-emitting diode ST emits a steady light if a disturbance is recognized in the module or if the sink time monitor responds.

A voltage signal appears at outputs ST1 to ST8 if the corresponding analog value is marked as disturbed. External light-emitting diodes can be connected to these outputs. The light-emitting diode ST is not set in this case.

Annunciation functions to the station bus

Disturbances during reception, processing or transfer of telegrams are recognized and stored. The signal "Common disturbance Station" is output at the same time. The diagnosis register is then read out from the control system operator station for evaluation.

Table 1 With bit significance (applicable to any analog value telegram)

Write In Type of Information	Register Output Module	Source Address Signals				Data Word (Bit Address)																DA	
		Sy- stem	Sta- tion	Mod- ule	Regi- ster	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Analog Value FE1	64	a	a	a	a	VZ	100 %	50 %	25 %	12.5 %	6.25 %	3.125 %	1.56 %	0.78 %	0.39 %	0.195 %	0.097 %	0,048 %	0	0	SM 1	5.6	
AA1																							
Analog Value FE8	71	a	a	a	a	VZ	AA 8													0	0	SM 8	5.6

Read Out Type of Information	Source Address Signals				Data Word (Bit Address)																DA	
	Sy- stem	Sta- tion	Mod- ule	Regi- ster	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
Analog Value FE1	a	a	a	64	VZ	AA1													0	0	SM 1	5.6
Analog Value FE8	a	a	a	71	VZ	AA 8													0	0	SM 8	5.6
Diagnosis Register	a	a	a	246	Processing and Process Disturbed				Busadaptation Disturbed				Reception Disturbed				Transmission Disturbed				0	

Explanation:

FEX = Function unit X
 AAX = Output value X
 DA = Type of data
 VZ = Sign

SMX = Common disturbance Single telegram
 a = Address freely selectable (depending on place of installation)

Note:

The module receives 12-bit analog value telegrams from the station-bus, but only converts bits 6-14 into analog output signals.

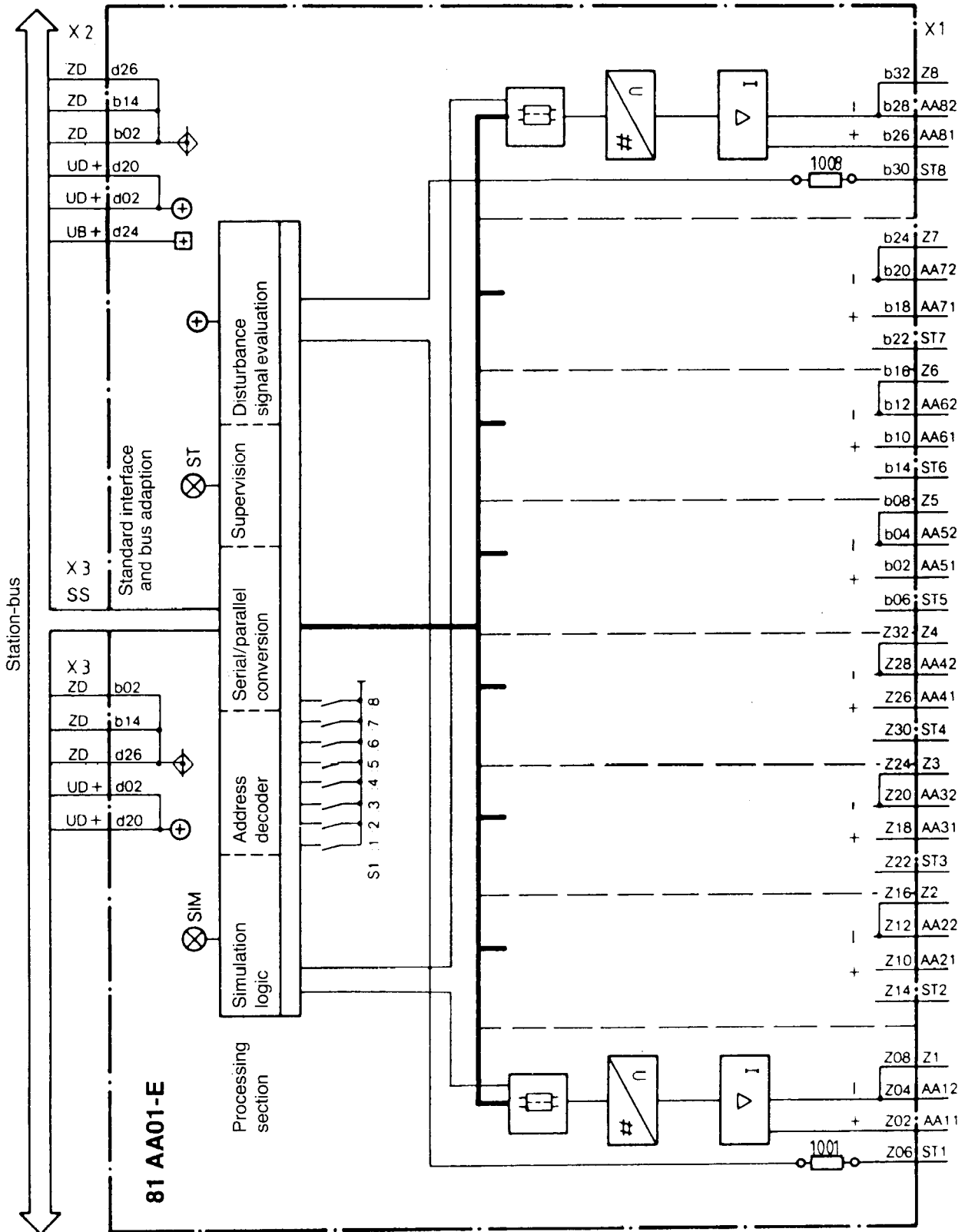
Important:

It is not allowable to enter the same source location address in the source address PROM for several module outputs (i.e. no signal distribution via an output module).

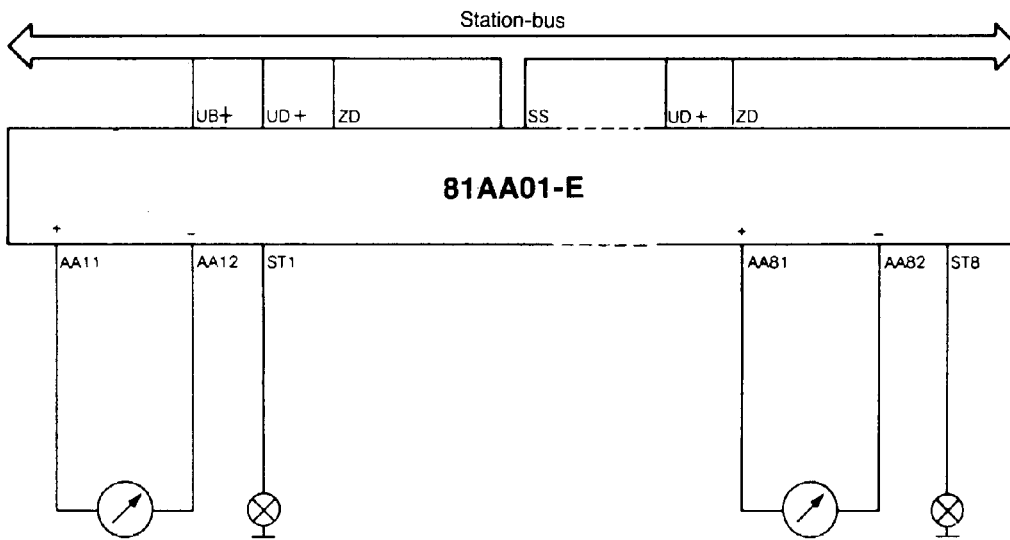
Function diagram

Terminal designations: The module consists of two printed circuit boards (see "Mechanical design"). The output PCB is equipped with connectors X1 and X2. Connector X1 contains all process outputs.

Connector X2 contains all voltages for this printed circuit board. The processing board is equipped with connector X3. It contains the standard interface to the station-bus and the operating voltages for this PCB.



Connection diagram



Mechanical design

Board size: 6 units, 2 divisions, 160 mm deep

View of connector side:

Connector: to DIN 41 612

2 x for station-bus connection,
48-pole, edge-connector type F
(connector X2, X3)

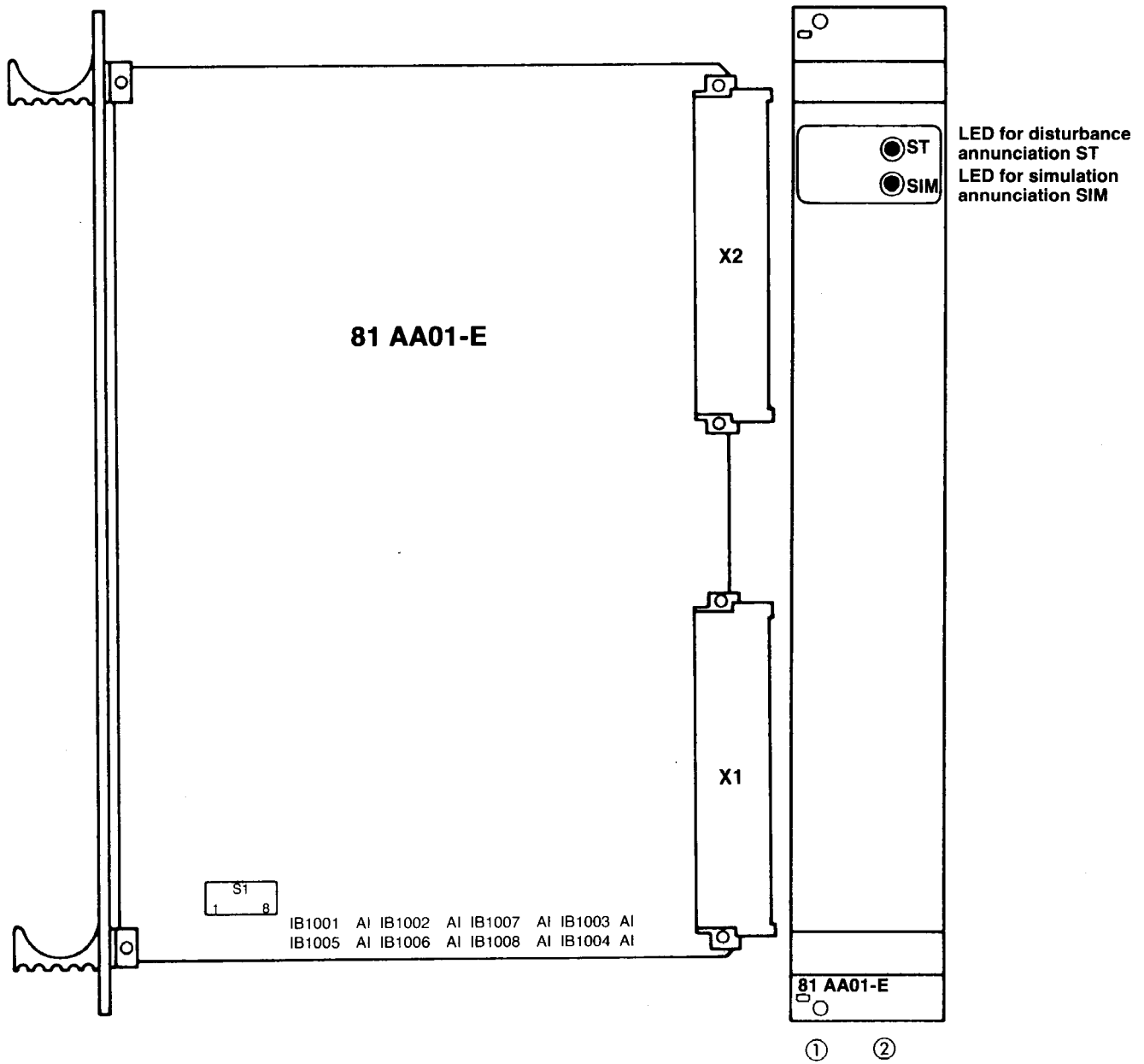
1 x for process connection
32-pole, edge-connector type F
(connector X1)

Weight: approx. 0.78 kg

Both printed circuit boards are connected with each other electrically and mechanically.



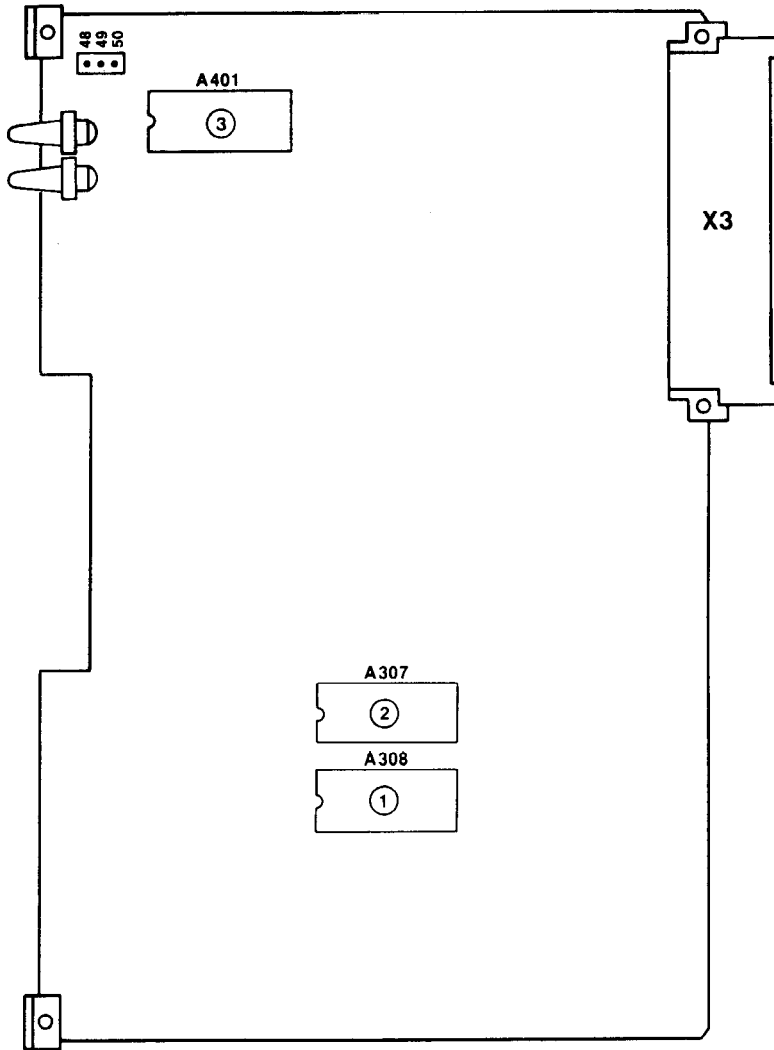
Position of the switch and the resistors on printed circuit board 1 and front panel



Explanation:

- ① = Output PCB
- ② = Processing PCB

Position of plug-in memory modules on the processing printed circuit board



Memory modules:

- ① = Bus and module program, A308 (EPROM)
- ② = Bus and module program, A307 (EPROM)
- ③ = Address PROM (unprogr.), A401

Order number:
(Component)

- GJT110034P1 (2732A)
- GJT110034P1 (2732A)
- GJT110034P1 (2732A)

Order number:
(PROM programmed)

- GJR2350101Pxxxx
- GJR2350102Pxxxx

Note:

The mounting position of the components is marked by an imprint on the printed circuit board.

xxxx = Position numbers corresponding to the appropriate revision.

Technical Data

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

Power supply

Operating voltage (bus-side)	UD+ = + 5 V UB+ = +24 V
Current consumption	I _D = 1.25 A I _B = 0.21 A+ (max) 8 x 25 mA
Power dissipation, typ.	P _v = 16.09 W max.
Reference potential BUS side	ZD = 0 V

Input values

SS– Standard interface Station–bus

Output values

AA11/AA12 – Current outputs (load independent current)	0 ... 20 (max. 30) mA $\hat{=}$ 0 ... 100 (150) %
to Voltage range	0 ... 10 V
AA81/AA82 Max. load	500 (330) Ohm
Short–circuit–proof and open–circuit–proof	
ST1–ST8 – Binary disturbance signal outputs	I _a ≤ 12 mA , when permanently equipped U _a = 2 V with R = 270 Ohm

Error specification

Linearity error	≤ +/- 0.32 %
Effect of temperature	< 50 ppm/K
Temperature error 0 ... 70 °C	< +/- 0.18 %
Effect of supply voltage variations	none
Total error 0 ... 70 °C	≤ 0.5 %

ORDERING DATA

1. Complete module:

Type designation: 81AA01–E/R1010

Order no: GJR2370100R1010

This description is also valid for order no.
GJR2342400R1010

2. Memory modules: see “Mechanical design”

Technical data are subject to change without notice!



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