

TELEPERM M

Interface and Calculation Modules

Manual

Order No. C79000-G8076-C032-07

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We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

Technical data subject to change

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Order No. of the manual: C79000-G8076-C032

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Printed in the Federal Republic of Germany

Notes on the CE Symbol for TELEPERM M AS

EC Directive EMC

The following applies to the TELEPERM M products described in this manual:

89/336/EEC

Products which carry the CE symbol fulfil the requirements for the EC Directive 89/336/EEC.

The EC declaration of conformity and the documentation relating to this are available to the authorities concerned, according to the above-mentioned EC Directive, Article 10(2), from:



**Siemens AG
Automation Group
A&D SE PLBG
Rheinbrückenstraße 50
76 187 Karlsruhe**

Products which do not have the CE symbol meet the requirements and standards given in the System Manuals under "General Technical Data".

Fields of Application

For the TELEPERM ME System, the following field of application apply according to this CE symbol:

Field of Application	Requirement for	
	Emitted interference	Noise immunity
Industry	EN 50081-2:1993	EN 50082-2:1995

Observing the Setup Guidelines

The setup guidelines and notes on safety given in the System Manuals must be observed during startup and when operating the TELEPERM ME System.

Working on Cabinets

To protect the modules from the static electricity, the user must discharge his body's electrostatic charge before opening cabinets.
Observe the general ESD Guidelines.

Notes on the CE Symbol for TELEPERM M AS

Notes on Manual–Auto Stations

A filter must be inserted in the power supply lines (SIFI C, B84113–C–B30 or similar).

Updated Technical Data

In addition to the specifications in the "General Technical Data" of the System Manuals, the specifications on noise immunity and electromagnetic compatibility given below apply to modules carrying the CE symbol.

The specifications are valid for systems which are assembled according to the above-mentioned setup guidelines.

Electromagnetic Compatibility (EMC)

Radio interference suppression to EN 55011	
Limit value class	A ¹⁾
Interference by conduction on AC and DC supply lines to EN 61000–4–4/ IEC 1000–4–4 (Burst)	2 kV
Interference by conduction on signal lines to EN 61000–4–4/ IEC 1000–4–4 (Burst)	2 kV
Interference by conduction on process lines to EN 61000–4–4/ IEC 1000–4–4 (Burst)	2 kV
Noise immunity to discharges of static electricity to EN 61000–4–2/ IEC 1000–4–2 (ESD)	4 kV ²⁾
Noise immunity to electromagnetic HF field ¹⁾ amplitude modulated to ENV 50140 / IEC 1000–4–3	80 to 1000 MHz 10V/m 80% AM (1kHz)
Noise immunity to electromagnetic HF field ¹⁾ pulse modulated to ENV 50204	900 MHz 10V/m 50 % c.d.f.
Noise immunity to high frequency (sinusoidal) to ENV 50141	0.15 to 80 MHz 10 V 80 % AM

1) With closed doors for AS 235 and AS 235 H, open for AS 235 K and ES 100 K

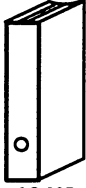
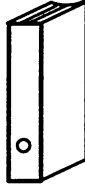
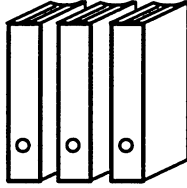

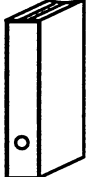
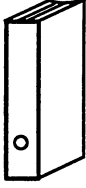
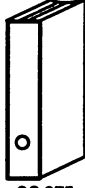
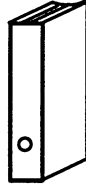

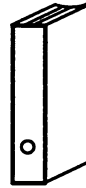
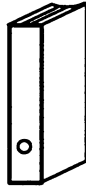
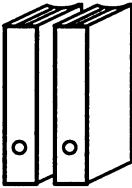
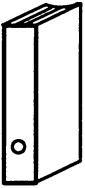


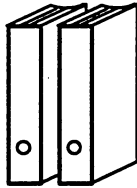




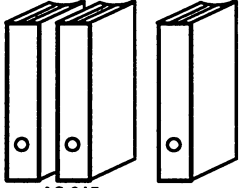
2) With AS 235 K and ES 100 K 6 kV

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TELEPERM M

Process Control Systems

Survey of Manuals (also available as TELEPERM M Library, Order No. C79000-G8076-C139)

 AS 235 (HW) *)-G8076- -C295	 AS 235 K *)-G8076- -C305	 AS 235 (SW) Var. G *)-G8076- -C416	 AS 235 H (HW) *)-G8076- -C293	 Suppl. System Documentation AS388/TM and AS488/TM *)-G8076- -C700	
 CS 275 *)-G8076- -C006	 CS 275 N-V.24 *)-G8076- -C087	 KSN-S55 *)-G8076- -C319	 PROGRAF AS+ *)-G8076- -C450		
 OS 525 HW *)-G8076- -C522	 OS 525 PROFU *)-G8076- -C524	 OS 525 BIPRO *)-G8076- -C523	 BATCH X-TM V3 *)-G8076- -C525	 BATCH X-TM V5 *)-G8076- -C527	 FUZZY TM *)-G8076- -C312
 Function Modules *)-G87076- -C030	 Signal Modules *)-G8076- -C031	 Interface and Calculation Modules *)-G8076- -C032	 Field multiplexer FM 100 *)-G8076- -C012	 Instructions and Guidelines for Planning *)-G8076- -C417	
				 AS 215 Var. C 6DS9025- -1CB23 STRUK-AS 215 6DS5243- -8CB22 Order separately from WKF	

TELEPERM M/ME

Safety-Related Guidelines for the User

1 General

This manual provides the information required for the intended use of the particular product. The documentation is written for technically qualified personnel such as engineers, programmers or maintenance specialists who have been specially trained and who have the specialized knowledge required in the field of instrumentation and control.

A knowledge of the safety instructions and warnings contained in this manual and their appropriate application are prerequisites for safe installation, commissioning and maintenance as well as safe and proper operation of the product described. Only qualified personnel as defined in section 2 have the specialized knowledge that is necessary to correctly interpret the general danger notices and warnings contained in this documentation and implement them in each particular case.

This manual is an inherent part of the scope of supply even if, for logistic reasons, it has to be ordered separately. For the sake of clarity, not all details of all versions of the product are described in the documentation, nor can it cover all conceivable cases regarding installation, operation and maintenance. Should you require further information or face special problems that have not been dealt with in sufficient detail in this documentation, please contact your local Siemens office.

We would also point out that the contents of this product documentation shall not become a part of or modify any prior or existing agreement, commitment or legal relationship. The Purchase Agreement contains the complete and exclusive obligations of Siemens. Any statements contained in this documentation do not create new warranties or restrict the existing warranty.

2 Qualified Personnel

Persons who are **not qualified** should not be allowed to handle the equipment/system. Non-compliance with the warnings contained in this manual or appearing on the equipment itself can result in severe personal injury or damage to property. Only **qualified personnel** should be allowed to work on this equipment/system.

Qualified persons as referred to in the safety guidelines in this manual as well as on the product itself are defined as follows:

- System planning and design engineers who are familiar with the safety concepts of automation equipment;
- Operating personnel who have been trained to work with automation equipment and are conversant with the contents of the manual in as far as it is connected with the actual operation of the plant;
- Commissioning and service personnel who are trained to repair such automation equipment and who are authorized to energize, deenergize, clear, ground and tag circuits, equipment and systems in accordance with established safety practices.

3 Danger Notices

The notices and guidelines that follow are intended to ensure personal safety, as well as protecting the product and connected equipment against damage.

The safety notices and warnings for protection against loss of life (the users or service personnel) or for protection against damage to property are highlighted in this manual by the terms and pictograms defined here. The terms used in this manual and marked on the equipment itself have the following significance:

Danger

indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

Warning

indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken.

Note

is an important information about the product, its operation or a part of the manual to which special attention is drawn.

Important

If in this manual "Important" should appear in bold type, drawing attention to any particularly information, the definition corresponds to that of "Warning", "Caution" or "Note".

4 Proper Usage

- The equipment/system or the system components may only be used for the applications described in the catalog or the manual, and only in combination with the equipment, components and devices of other manufacturers as far as this is recommended or permitted by Siemens.
- The product described has been developed, manufactured, tested and the documentation compiled in keeping with the relevant safety standards. Consequently, if the described handling instructions and safety guidelines described for planning, installation, proper operation and maintenance are adhered to, the product, under normal conditions, will not be a source of danger to property or life.



Warning

- After opening the housing or the protective cover or after opening the system cabinet, certain parts of this equipment/system will be accessible, which could have a dangerously high voltage level.
- Only suitably qualified personnel should be allowed access to this equipment/system.
- These persons must be fully conversant with any potential sources of danger and maintenance measures as set out in the instructions contained in this manual.
- It is assumed that this product be transported, stored and installed as intended, and maintained and operated with care to ensure that the product functions correctly and safely.

5 Guidelines for the Planning and Installation of the Product

The product generally forms a part of larger systems or plants. These guidelines are intended to help integrate the product into its environment without it constituting a source of danger.

The following facts require particular attention:



Note

Even when a high degree of safety-related reliability has been designed into an item of automation equipment by means of multichannel configuration, it is still imperative that the instructions contained in this manual be exactly adhered to. Incorrect handling can render ineffective the preventive measures incorporated into the system to protect it against dangerous process states, and even create new sources of danger.

The following advice regarding installation and commissioning of the product should - in specific cases - also be noted.



Warning

- Follow strictly the safety and accident prevention rules that apply in each particular case.
- Units which are designed as built-in units may only be operated as such, and table-mounted or portable equipment only with its casing closed.
- In the case of equipment with a permanent power connection which is not provided with an isolating switch and/or fuses which disconnect all poles, a suitable isolating switch or fuses must be provided in the building wiring system (distribution board). Furthermore, the equipment must be connected to a protective ground (PE) conductor.
- For equipment or systems with a fixed connecting cable but no isolating switch which disconnects all poles, the power socket with the grounding pin must be installed close to the unit and must be easily accessible.
- Before switching on the equipment, make sure that the voltage range setting on the equipment corresponds to the local power system voltage.
- In the case of equipment operating on 24 V DC, make sure that proper electrical isolation is provided between the mains supply and the 24 V supply. Only use power supply units to IEC 364-4-41 or HD 384.04.41 (VDE 0100 Part 410).
- The I/O modules are designed for operation with safety extra-low voltage acc. to IEC 950 / EN 60950/VDE 0805. Therefore only components whose connection points are separated in a safe manner (by means of the protective measure "Protective separation") from voltages (e.g. mains) may be connected to the inputs/outputs of these modules.
- Fluctuations or deviations of the power supply voltage from the rated value should not exceed the tolerances specified in the technical specifications. Otherwise, functional failures or dangerous conditions can occur in the electronic modules/equipment.
- Suitable measures must be taken to make sure that programs that are interrupted by a voltage dip or power supply failure resume proper operation when the power supply is restored. Care must be taken to ensure that dangerous operating conditions do not occur even momentarily. If necessary, the equipment must be forced into the "emergency off" state.
- Emergency tripping devices in accordance with EN 60204/IEC 204 (VDE 0113) must be effective in all operating modes of the automation equipment. Resetting the emergency off device must not result in any uncontrolled or undefined restart of the equipment.



Caution

- Install the power supply and signal cables in such a manner as to prevent inductive and capacitive interference voltages from affecting the automation functions.
- Automation equipment and its operating elements must be installed in such a manner as to prevent unintentional operation.
- Automation equipment can assume an undefined state in the case of a wire break in the signal lines. To prevent this, suitable hardware and software measures must be taken when interfacing the inputs and outputs of the automation equipment.

6 Active and Passive Faults in Automation Equipment

- Depending on the particular task for which the electronic automation equipment is used, both **active** as well as **passive** faults can result in a **dangerous** situation. For example, in actuator control (e.g. press control), an active fault is generally dangerous because it can result in an unauthorized startup of the actuator. On the other hand, a passive fault in a signalling function (alarm signalling system) can result in a dangerous, command-blocking operating state not being reported to the operator.
- This differentiation of the possible faults and their classification into dangerous and non-dangerous faults, depending on the particular task, is important for all safety considerations in respect of the product supplied and the its interaction with the process to be controlled.



Warning

In all cases where a fault in an automation equipment can result in severe personal injury or substantial damage to property, ie. where a dangerous fault can occur, safety-related and fail-safe systems (in general prototype-tested by the German Technical Inspectorate (TÜV)) must be used or additional external measures be taken or equipment provided to ensure or force safe operating conditions even in the event of a fault (e.g. by means of independent limit monitors, mechanical interlocks etc.).

7 Procedures for Maintenance and Repair

If measurement or testing work is to be carried out on an active unit, the rules and regulations contained in the "VBG 4.0 Accident prevention regulations" of the German employers liability assurance association (Berufsgenossenschaften) must be observed. Particular attention is drawn to paragraph 8 "Permissible exceptions when working on live parts". Use only suitable electrical tools.



Warning

- Repairs to an item of automation equipment may only be carried out by **Siemens service personnel** or an **authorized Siemens repair center**. For replacement purposes, use only parts or components that are contained in the spare parts list or listed in the "Spare parts" section of this manual. Unauthorized opening of equipment and improper repairs can result in loss of life or severe personal injury as well as substantial property damage
- Before opening the equipment, always remove the power plug or open the disconnecting switch.
- Only use the fuse types specified in the technical specifications or the maintenance instructions of this manual.
- Do not throw batteries into an open fire and do not carry out any soldering work on batteries (danger of explosion). Maximum ambient temperature 100°C. Lithium batteries or batteries containing mercury should not be opened or recharged. Make sure that the same type is used when replacing batteries.
- Batteries and accumulators must be disposed of as classified waste.
- The following points require attention when using monitors:
Improper handling, especially the readjustment of the high voltage or fitting of another tube type can result in excessive X-ray radiation from the unit. The license to operate such a modified unit automatically lapses and the unit must not be operated at all.

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Guidelines for Handling Electrostatically Sensitive Devices (ESD)

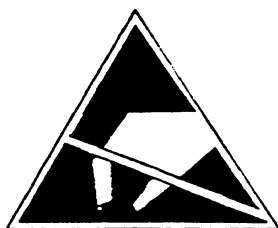
1 What is ESD?

VLSI chips (MOS technology) are used in practically all SIMATIC S5 and TELEPERM M modules. These VLSI components are, by their nature, very sensitive to overvoltages and thus to electrostatic discharge:

They are therefore defined as
"Electrostatically Sensitive Devices"

"ESD" is the abbreviation used internationally.

The following warning label on the cabinets, subracks and packing indicates that electrostatically sensitive components have been used and that the modules concerned are susceptible to touch:



ESDs can be destroyed by voltage and energy levels which are far below the level perceptible to human beings. Such voltages already occur when a component or a module is touched by a person who has not been electrostatically discharged. Components which have been subjected to such overvoltages cannot, in most cases, be immediately detected as faulty; the fault occurs only after a long period in operation.

An electrostatic discharge

- of 3500 V can be felt
- of 4500 V can be heard
- must take place at a minimum of 5000 V to be seen.

But just a fraction of this voltage can already damage or destroy an electronic component.

The typical data of a component can suffer due to damage, overstressing or weakening caused by electrostatic discharge; this can result in temporary fault behavior, e.g. in the case of

- temperature variations,
- mechanical shocks,
- vibrations,
- change of load.

Only the consequent use of protective equipment and careful observance of the precautions for handling such components can effectively prevent functional disturbances and failures of ESD modules.

2 When is a Static Charge Formed?

One can never be sure whether the human body or the material and tools which one is using are not electrostatically charged.

Small charges of 100 V are very common; these can, however, very quickly rise up to 35 000 V.

Examples of static charge:

- Walking on a carpet	up to 35 000 V
- Walking on a PVC flooring	up to 12 000 V
- Sitting on a cushioned chair	up to 18 000 V
- Plastic desoldering unit	up to 8 000 V
- Plastic coffee cup	up to 5 000 V
- Plastic bags	up to 5 000 V
- Books, etc. with a plastic binding	up to 8 000 V

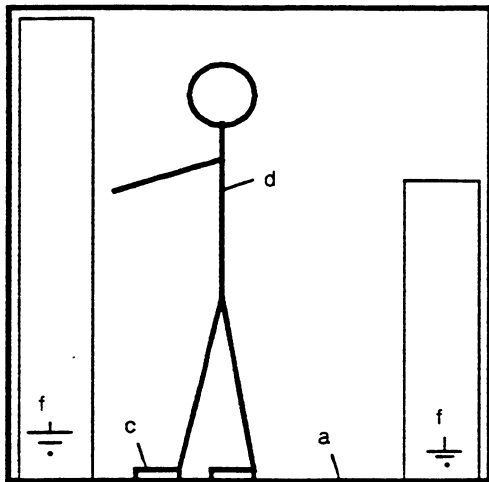
3 Important Protective Measures against Static Charge

- Most plastic materials are highly susceptible to static charge and must therefore be kept as far away as possible from ESDs.
- Personnel who handle ESDs, the work table and the packing must all be carefully grounded.

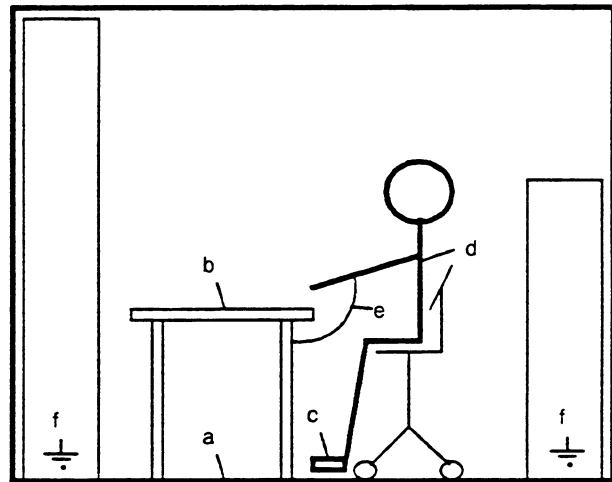
4 Handling of ESD Modules

- One basic rule to be observed is that electronic modules should be touched by hand only if this is necessary for any work required to be done on them. Do not touch the component pins or the conductors.
- Touch components only if
 - the person is grounded at all times by means of a wrist strap
 - or
 - the person is wearing special anti-static shoes or shoes with a grounding strip.
- Before touching an electronic module, the person concerned must ensure that (s)he is not carrying any static charge. The simplest way is to touch a conductive, grounded item of equipment (e.g. a blank metallic cabinet part, water pipe, etc.) before touching the module.
- Modules should not be brought into contact with insulating materials or materials which take up a static charge, e.g. plastic foil, insulating table tops, synthetic clothing, etc.
- Modules should only be placed on conductive surfaces (table with anti-static table top, conductive foam material, anti-static plastic bag, anti-static transport container).
- Modules should not be placed in the vicinity of monitors, TV sets (minimum distance from screen > 10 cm).

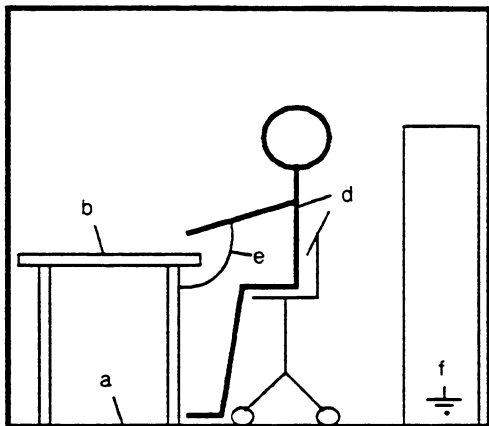
The diagram below shows the required protective measures against electrostatic discharge.



Standing position



Standing/sitting position



Sitting position

- a Conductive flooring
- b Anti-static table
- c Anti-static shoes
- d Anti-static coat
- e Grounding wrist strap
- f Grounding connection of the cabinets

5 Measurements and Modification to ESD Modules

- Measurements on modules may only be carried out under the following conditions:
 - The measuring equipment is grounded (e.g. via the PE conductor of the power supply system) or
 - when electrically isolated measuring equipment is used, the probe must be discharged (e.g. by touching the metallic casing of the equipment) before beginning measurements.
- Only grounded soldering irons may be used.

6 Shipping of ESD Modules

Anti-static packing material must always be used for modules and components, e.g. metalized plastic boxes, metal boxes, etc. for storing and dispatch of modules and components.

If the container itself is not conductive, the modules must be wrapped in a conductive material such as conductive foam, anti-static plastic bag, aluminium foil or paper. Normal plastic bags or foils should not be used under any circumstances.

For modules with built-in batteries ensure that the conductive packing does not touch or short-circuit the battery connections; if necessary cover the connections with insulating tape or material.

**SIEMENS AG
A&D SE PL BG**

D-76181 Karlsruhe

**Vorschläge Korrekturen
Suggestions Corrections
Propositions Corrections
Propuestas Correcciones**

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Pour l'imprimé ou le manuel
Para folleto o manual**

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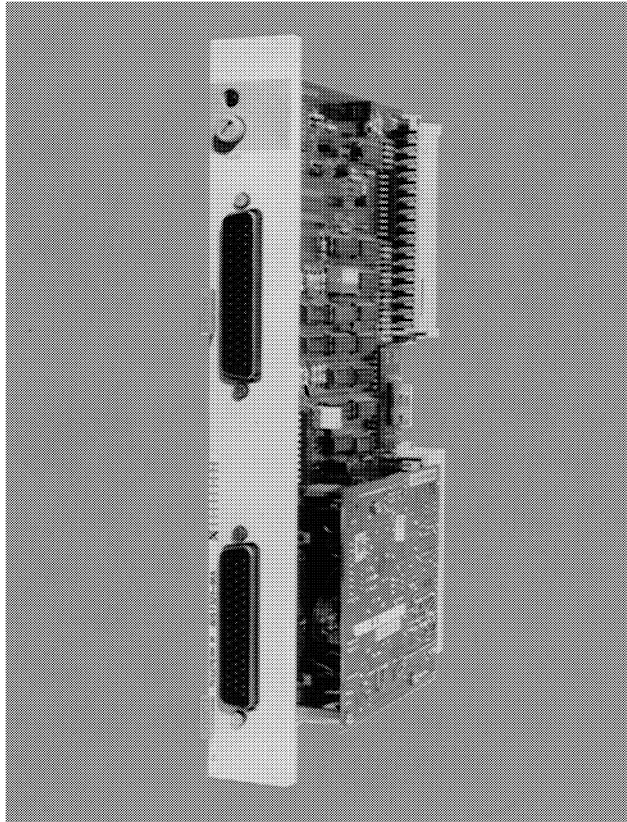
**Vorschläge und/oder Korrekturen
Suggestions or/and corrections**

**Propositions et/ou corrections
Propuestas y/o correcciones**

TELEPERM M

Interface Module for S5 Expansion Units

6DS1321-8AA



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1 Description

1.1 Application

The interface module 6DS1321-8AA provides the TELEPERM M system with an interface to the following SIMATIC S5 expansion units.

Compact I/O units

6ES5183-3UA12	(230 V, isolated, with fan)
6ES5183-3UA21	(24 V, isolated, with fan)
6ES5186-5UA11	(230 V, isolated, without fan)
6ES5186-5UA21	(24 V, isolated, without fan)

Block-type I/O unit:

Subrack 6ES5701-2LA11 with power supply modules 6ES5951-...

Important: A DC/DC converter must be provided for potential isolation if non-isolated 24-V power supply modules are used.

The permissible potential difference between TELEPERM M (6DS1321-8AA) and S5 systems must not exceed 7 V (see also Section 2.5 System Layout).

The interface modules enable the connection of binary and analog I/O modules of the SIMATIC S5 system (the permissible S5 modules are indicated in the current TELEPERM M Catalog PLT 111); the interface module can be plugged into any I/O bus slot in the AS 220, AS 230 and AS 220 H TELEPERM M systems.

The interface module has two RS422 interfaces for connection of S5 units at distances of up to 500 m.

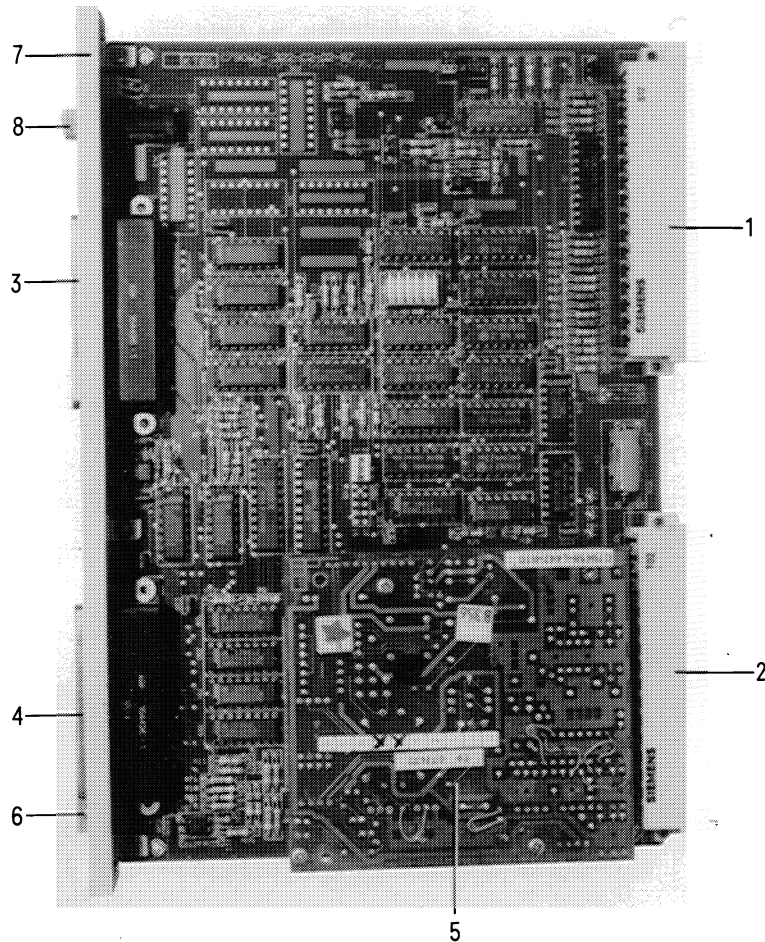
The S5 end of the communication link is formed by an AS 310 central controller interface module (Order No. 6ES5310-3AB11). Depending on the S5 expansion units used, either a centralized or distributed I/O configuration in accordance with SIMATIC S5 standards is possible.

o Limitations

- When non-linear sensors (e.g. Pt100, thermocouples) are used for measured value acquisition, the S5 analog input modules do not carry out any linearization of the characteristic. When thermocouples are used there is no internal compensation for the terminal temperature.

1.2 Design

1.2.1 Mechanical Design



- 1 Backplane connector 1
- 2 Backplane connector 2
- 3 Front connector 1
- 4 Front connector 2
- 5 Voltage regulator module
- 6 Extraction grip
- 7 Front panel
- 8 Module fuse

Fig. 1 Mechanical design

- Printed-circuit board in double-height Eurocard format consisting of a mother board and a voltage regulator module
- Module width = two standard slots
- Module fuse and alarm LED on the front panel
- Backplane connector 1: 48-pin ES902 male connector for I/O bus connections
- Backplane connector 2: 64-pin ES902 male connector for power supply connections
- Front connector 1: 50-pin connector for RS422 interface 1 (channel 1)
- Front connector 2: 50-pin connector for RS422 interface 2 (channel 2).

1.2.2 Functions

The interface module provides the communication link between the TELEPERM M I/O bus and the SIMATIC S5 I/O modules via the SIMATIC AS 310 interface module.

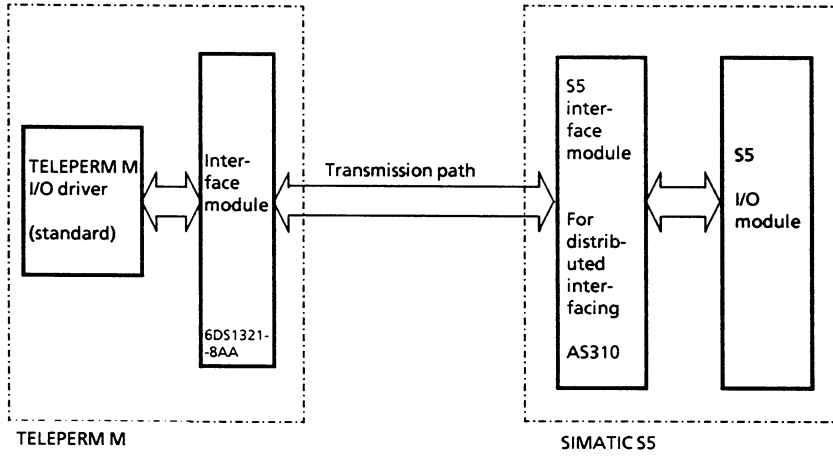


Fig. 2 Principle of interfacing

The two S5 communication channels can be used for directly connecting S5 expansion units.

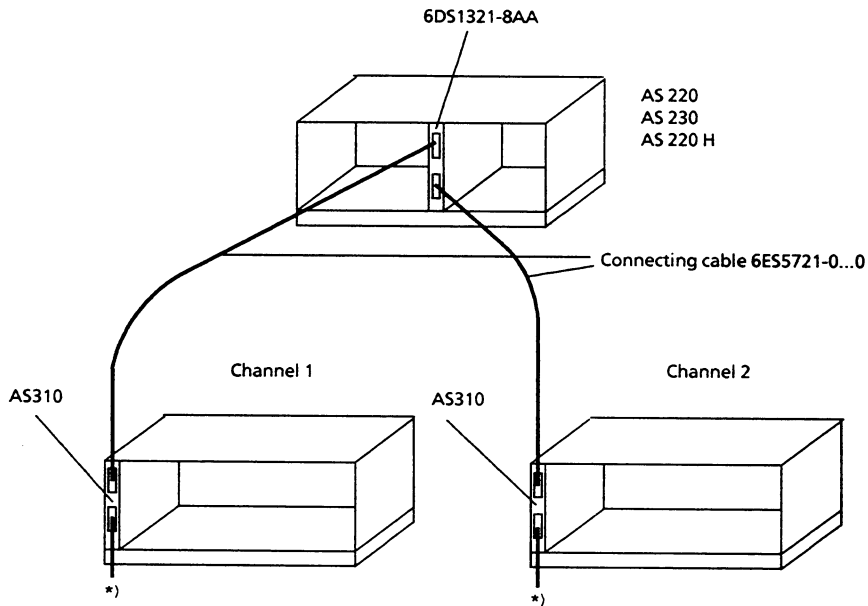


Fig. 3 Connection of S5 expansion units

*) From these expansion units the I/O configuration can be further expanded in accordance with S5 standard practice. A terminator resistor connector (6DS5760-0AA11) must be plugged on the lowest interface of the AS 310!

1.3 Method of Operation

The interface module 6DS1321-8AA converts the TTL signal level of the TELEPERM M I/O bus into the RS422 signal levels required by the S5 communication interface. It also matches the timings and addresses between the TELEPERM M I/O bus and the communication interface of the AS 310 central controller interface module in the S5 expansion units.

1.3.1 Address Matching

The addresses in the TELEPERM M I/O area are converted to the address areas of the S5 expansion units.

The following table shows the assignments between TELEPERM M addresses and the S5 addresses.

- Address assignment using the interface module in an AS 230 system

Interface module no.	Interface channel no.	TM address (hex.)	S5 address (decimal)
0	1	F000...F0FF	0...255
	2	F100...F1FF	0...255
1	1	F200...F2FF	0...255
	2	F300...F3FF	0...255
2	1	F400...F4FF	0...255
	2	F500...F5FF	0...255
3	1	F600...F6FF	0...255
	2	F700...F7FF	0...255
4	1	F800...F8FF	0...255
	2	F900...F9FF	0...255
5	1	FA00...FAFF	0...255
	2	FB00...FBFF	0...255
6	1	FC00...FCFF	0...255
	2	FD00...FDFF	0...255
7	1	FE00...FEFF	0...255
	2	FF00...FFFF	0...255

- Address assignment of the interface module in an AS 220 S, K or AS 220 H system

Interface module no.	Interface channel no.	TM address (hex.)	S5 address (decimal)
0	1	F000...F0FF	0...255
	2	F100...F1FF	0...255
1	1	F200...F2FF	0...255
	2	F300...F3FF	0...255
2	1	F400...F4FF	0...255
	2	F500...F5FF	0...255
3	1	F600...F6FF	0...255
	2	F700...F7FF	0...255
4	1	F800...F8FF	0...255
	2	F900...F9FF	0...255
5	1	FA00...FAFF	0...255
	2	FB00...FBFF	0...255

The table shows the address conversion for the TELEPERM M address area of the analog input and output modules.

When S5 binary I/O modules are used, the corresponding operating mode must be selected on the interface module (see adjustments in Section 2.1).

The address area of the binary I/O modules is then converted as follows:

Module type	TM address (hex)	S5 address (decimal)
Binary input module	FC40...FCBF	0...127
Binary output module	FD40...FDBF	0...127

When converting an address in the TELEPERM M address area FC40 to FDBF, the module no. set on the interface module has no significance.

This means that all interface modules plugged into an AS 220 or AS 220 H system and which are set to the "binary input/binary output module" operating mode, **simultaneously** output the converted address to the S5 I/O units via both their S5 interface channels.

1.3.2 System Response on Failure of System Components

- Failure of S5 expansion unit or load power supply of S5 I/O modules

The TELEPERM automation system (TM-AS) responds with a "ready delay" system message.

- Failure of the TM-AS, interruption of the communication link or failure of the 6DS1321-8AA (e.g. fuse blow.)

The BASP and CPKL signals are generated in the expansion unit. The S5 modules of the expansion unit that process these signals switch off the outputs. From the S5 signal modules only the binary output modules (with BASP) are usually concerned, and not the analog output modules (6ES5470-4Ux12); in case of link failure these maintain the current analog values

When the TM-AS is functioning properly, an interruption in the communication link (e.g. pulling out the plug, wire break) is reported by a "ready delay" system message.

1.4 Technical Data

Can be used in	AS 220 S/H/K AS 230 AS 235 S/H/K
Perm. ambient temperature in operation in storage	0 °C to +55 °C -40 °C to +70 °C
Weight	approx. 0.5 kg
Dimensions	double-height Eurocard format 2 standard slots ¹⁾ wide
Voltage supply	L+, PM = +24 V (rated voltage) (+20.8 V to + 33 V including super- imposed ripple)
Permis. superimposed ripple	≤ 15 % of average value of the DC voltage within the permissible range ($U_E = 22.5$ V; U_V min. for max. ripple)
Current consumption L+ ($U_N = 24$ V) PM ($U_N = 24$ V)	one S5 interface operation: 470 mA two S5 interface operation: 580 mA 35 mA
Interfaces to TELEPERM M to SIMATIC S5 Number of S5 interfaces	I/O bus interface (TTL level) RS422 interface 2
Address volume	2 x 256 bytes
Max. interface cable length	500 m
Permissible potential difference between TELEPERM M and S5 systems	≤ 7 V

1) 1 standard slot $\hat{=}$ 15.24 mm

2 Installation and Commissioning

The interface module contains electrostatically sensitive components. The necessary precautions must therefore be taken when handling such modules during installation and commissioning.

2.1 Adjustments on the Interface Module

Before plugging in the module, set the coding plugs and switches as shown below.

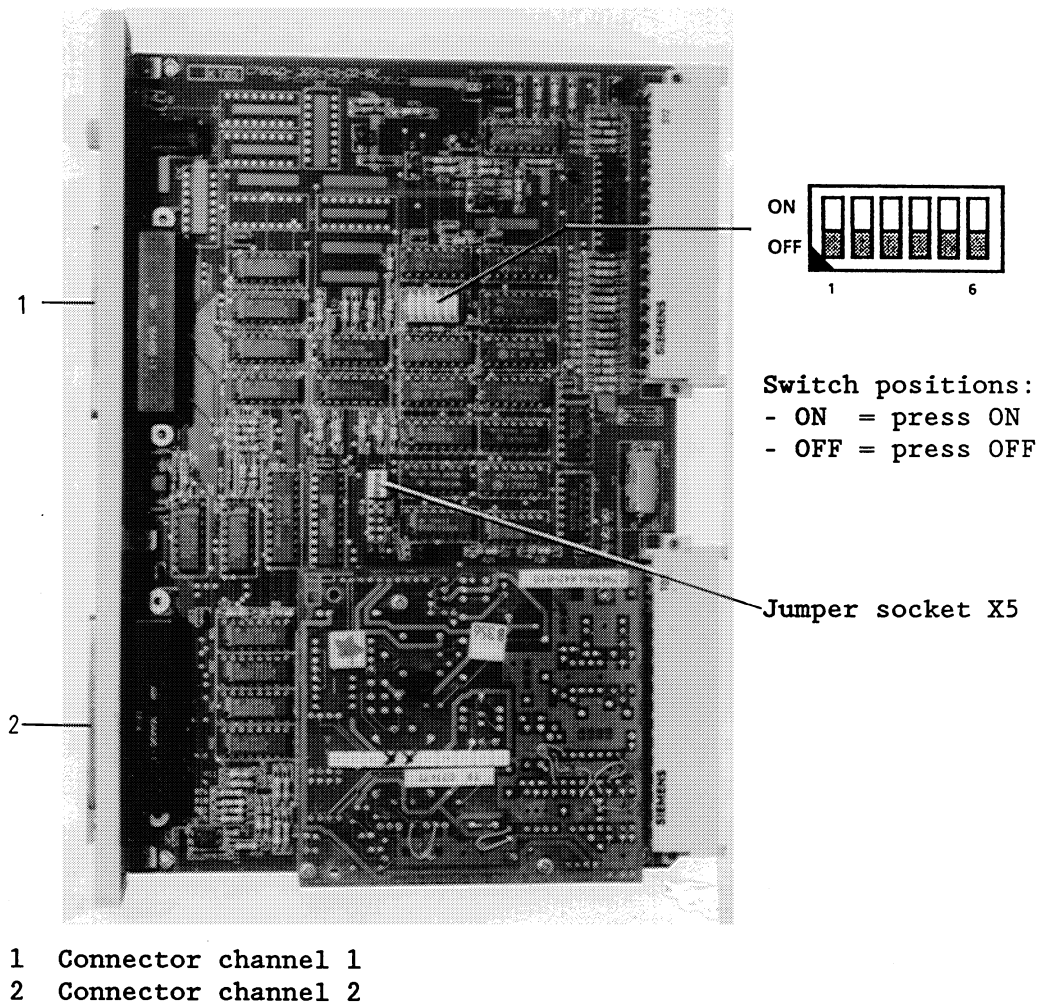


Fig. 4 Position of coding switches

The jumpers 1-2, 3-4 and 5-6 must be inserted on the jumper socket X5 (factory-set).

- Set the one-out-of-n check (EANK)

Set coding switch 6 to the desired position.

Position	Significance	Function
OFF	EANK active	AS detects double addressing Addresses within the 512-byte address area of the interface module which are not used by S5 I/O modules cannot be utilized for TELEPERM M I/O modules
ON	EANK not active	No address check Addresses within the 512-byte address area of the interface module which are not used for S5 I/O modules can be utilized for TELEPERM M I/O modules

- Set the module no. of the interface module

Select the address area to be converted out of the TELEPERM M I/O address area.

Interface module no.	Coding switch			TM address area
	3	2	1	
0	-	-	-	F000.....F1FF
1	-	-	ON	F200.....F3FF
2	-	ON	-	F400.....F5FF
3	-	ON	ON	F600.....F7FF
4	ON	-	-	F800.....F9FF
5	ON	-	ON	FA00.....FBFF
6	ON	ON	-	FC00.....FDFF
7	On	ON	ON	FE00.....FFFF

Important: When the interface module is used in the AS 220 or AS 220 H systems module nos. 6 and 7 cannot be used.

● Setting the operating mode

Set coding switch 5 into the ON position if the following condition is fulfilled:

- The interface module is used in an AS 220 or AS 220 H system and binary input and/or output modules are used in the S5 expansion unit.

If more than one interface module 6DS1321-8AA which fulfil the above condition are used in an AS 220 or AS 220 H system, the coding switch 6 in the interface modules must also be set to the ON position (EANK not active).

2.2 Address Setting on the S5 I/O Modules

The address setting on the S5 I/O modules is shown in the following tables and examples.

The following points require careful attention when assigning module addresses.

- Data is always exchanged between the TELEPERM system and the S5 I/O units as a multiple of 16 bits.
Thus, when the S5 unit is equipped with 8-bit I/O modules, 16 bits or a multiple thereof must always be assigned in which the first 8-bit address must be an even-numbered S5 address. If this scheme is not adhered to, the system message "ready delay" appears.
- When an S5 expansion unit is connected to an AS 220 or AS 220 H system, the AE/AA (analog input/analog output) drivers and the process image (PAA/PAE) also partly access the same S5 address area within an expansion unit or the same address area in different expansion units.

Take care to avoid double addressing.

Example:

PAE/PAA - bits 0...15 access the same addresses as the AE/AA driver with parameter settings

BGNR = 0 , KNR = 0
BGNR = 4 , KNR = 0
BGNR = 8 , KNR = 0
etc.

The PAE and PAA are formed from the first 128 bytes of all channels of the 6DS1321-... modules used.

- When S5 I/O units are used with an AS 220 or AS 220 H system, one binary output and one binary input module can be set to the same address.
- The S5 analog input and output modules must be set for representation of the two's complement. The settings are explained in the instructions for the S5 I/O modules.

2.2.1 Operating the S5 I/O Units with an AS 220/AS 220 H System

● Analog input/output modules

The following table shows the relationship between the S5 interface channel, the module no. to be assigned in the driver block of the AS software and the related S5 address area.

Interface module no. 0		Interface module no. 1		Interface module no. 2		Interface module no. 3		Interface module no. 4		Interface module no. 5		Corresponding S5 address area
Channel		Channel		Channel		Channel		Channel		Channel		
1	2	1	2	1	2	1	2	1	2	1	2	
PARAMETER SETTING OF AA/AE DRIVERS												
Specified module no.												
0	4	8	12	16	20	24	28	32	36	40	44	0 to 63
1	5	9	13	17	21	25	29	33	37	41	45	64 to 127
2	6	10	14	18	22	26	30	34	38	42	46	128 to 191
3	7	11	15	19	23	27	31	35	39	43		192 to 255

The S5 I/O modules are addressed bitwise.

An analog value of the S5 analog I/O modules occupies two bytes; thus, a maximum of 32 analog values can be processed using the 64 bytes of the S5 address area assigned to a driver module no.

The channel no. 0 in the software driver is invariably assigned to the start address in the corresponding S5 address area. The S5 addresses of the subsequent channels are obtained from this start address of the relevant S5 address area plus 2 x channel no.

Example of address setting
(see arrows in the table)

32 analog values are to be acquired via channel 2 of the interface module 6DS1321-8AA assigned module no. 1.

The corresponding module no. in the I/O driver must be assigned nos. 12, 13, 14 or 15 (see table).

In the example, the module no. selected is 13; the S5 address area is thus 64 to 127.

Within this address area, the relationship between the channel no. in the software driver and the S5 hardware address is as follows:

Channel no. *)	S5 address
0	64
1	66
2	68
.	.
.	.
.	.
31	126

S5 address = area start address + 2 x channel no.

The address to be set on the S5 analog input module depends on the type of S5 module used as is shown in the following table.

Channel no. *)	Address to be set	
	8-channel analog input module (AE)	16-channel analog input module (AE)
0...7	1st AE module = 64	1st AE module = 64
8...15	2nd AE module = 80	
16...23	3rd AE module = 96	2nd AE module = 96
25...31	4th AE module = 112	

*) **Important:**

When parameterizing the software driver, an offset value must be added to the channel no. given above. For offset values see description of software driver.

● Binary input/output modules

PAA/PAE Output/input no.	Corresponding S5 address
0-7	0
8-15	1
16-23	2
24-31	3
32-39	4
40-47	5
48-55	6
56-63	7
.	.
.	.
.	.
.	.
952-959	119
960-967	120
968-975	121
976-983	122
984-991	123
992-999	124
1000-1007	125
1008-1015	126
1016-1023	127

Example:

The information from an S5 binary input module from PAE input no. 16 onwards must be read in.

In this case, the binary input module must be set to address 2 (see table).

Important: Binary input/output modules with $n \times 8$ binary values occupy the $n-1$ addresses which follow the address set on the S5 module. This means, for example, that a 32-bit S5 module ($n = 4$) with address setting 2 also occupies the S5 addresses 3, 4 and 5.

2.2.2 Operating the S5 I/O Units with an AS 230 System

The following table shows the relationship between the S5 interface channel, the module no. to be assigned in the driver block and the corresponding S5 address area.

Interface module no. 0		Interface module no. 1		Interface module no. 2		Interface module no. 3		Interface module no. 4		Interface module no. 5		Interface module no. 6		Interface module no. 7		
Channel		Channel		Channel		Channel		Channel		Channel		Channel		Channel		
1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
PARAMETER SETTING OF DRIVERS														AA/AE AE/AA (for analog signals) E110/A110 (for binary signals)		Corresponding S5 address area
Specified module no.																
0	4	8	12	16	20	24	28	32	36	40	44	48	52	56		0 to 63
1	5	9	13	17	21	25	29	33	37	41	45	49	53	57		64 to 127
2	6	10	14	18	22	26	30	34	38	42	46	50	54	58		128 to 191
3	7	11	15	19	23	27	31	35	39	43	47	51	55	59		192 to 255

For interpretation of the tables and the example of address setting on the S5 analog I/O modules please refer to section 2.2.1.

When setting the address of the AS binary I/O modules, it should be noted that the 2 driver blocks E110 and A110 always input/output binary values in blocks of 16 from the parameterized channel no. onwards.

The driver channel no. 0 is basically the start address of the corresponding S5 address area.

The S5 address of the driver channels is

start address + channel no.

(Channel no. = 0, 2, 4)

Example of address setting:

64 binary values are to be read in via channel 1 of an interface module 6DS1321-8AA assigned module no. 5.

In this case, 40, 41, 42 or 43 must be parameterized as the corresponding module no. in the AS driver E110. If, for example, module no. 42 is selected, the S5 address area is 128 to 191.

Within this address area, the relationship between the channel no. in the software driver and the S5 hardware is as follows:

Channel no.	S5 address
0	128
2	130
4	132
.	.
.	.
.	.
.	.
62	190

S5 address = start address + channel no.

The address to be set on the S5 binary input module depends on the type of module used. This is shown in the following table:

Channel no.	Address to be set Binary I/O module with		
	8 binary inputs	16 binary inputs	32 inputs
0	1st module = 128	1st module = 128	1st module = 128
	2nd module = 129		
2	3rd module = 130	2nd module = 130	
	4th module = 131		
4	5th module = 132	3rd module = 132	2nd module = 132
	6th module = 133		
6	7th module = 134	4th module = 134	
	8th module = 135		
8			
.			
.			
.			
.			
62			

2.3 Plugging in the Module


The interface module 6DS1321-8AA can be plugged into any slot of the TELEPERM M I/O bus. The module can be plugged in and removed when the plant is energized.

Important

The fuse on the module must be removed before the module can be plugged in or pulled out with the plant energized.

2.4 Connection

The interface module 6DS1321-8AA is connected to the AS 310 S5 interface module by means of the cable connector 6ES5721-0...0. The maximum permissible cable length is 500 m. The following table shows the standard cable lengths and relevant order numbers.

Length of cable	6ES5721-0  0
1.00 m	BB0
1.60 m	BB6
2.00 m	BC0
2.50 m	BC5
3.20 m	BD2
5.00 m	BF0
8.00 m	BJ0
10.00 m	CB0
12.00 m	CB2
16.00 m	CB6
20.00 m	CC0
25.00 m	CC5
32.00 m	CD2
40.00 m	CE0
50.00 m	CF0
63.00 m	CG3
80.00 m	CJ0
100.00 m	DB0
120.00 m	DB2
160.00 m	DB6
200.00 m	DC0
250.00 m	DC5
320.00 m	DD2
400.00 m	DE0
500.00 m	DF0

2.5 System Layout and Connections

The system layout and connections are to be made as shown in Figures 5 to 7.

The following points must be adhered to:

- a) Each cabinet must be connected with as low a resistance as possible directly to the grounding system of the system. (Connection to the local ground or protective ground). Cabinets mounted adjacent to each other must be bolted together to provide good metallic connection and then connected to the grounding system. The connection to the grounding system should have as low an ohmic resistance and impedance as possible, i.e. shortest possible connections with a cross-section of at least 16 mm^2 .
- b) The screen of the interconnecting cable must be connected to the cabinet grounding terminal immediately after it enters the cabinet at both ends, i.e. TELEPERM M and S5 cabinets.
- c) The potential difference between the SIMATIC 0 V (S5 cabinet) and the M bar of the TELEPERM M cabinet should not exceed 7 V. If this condition cannot be fulfilled due to different ground potentials at the S5 cabinet and the central grounding point the potentials must be equalized by laying an equipotential bonding connection as shown in Figures 5-7.
- d) A maximum potential grading current of 1 A may flow through the screen of the interconnecting cable. If higher currents are to be expected between the S5 and the TELEPERM M local ground due to a difference in ground potentials, a potential grading conductor must be laid in parallel to the interconnecting cable.
- e) For a system layout as shown in Figure 5 the following points must be additionally considered:
 - if the sensor and the actuator are supplied with power from the central 24-V supply, only S5 I/O modules with an isolated process interface may be used.
 - If an S5 expansion unit is supplied with power from a non-isolated 24-V power supply, an isolating DC/DC converter must be provided to achieve isolation.

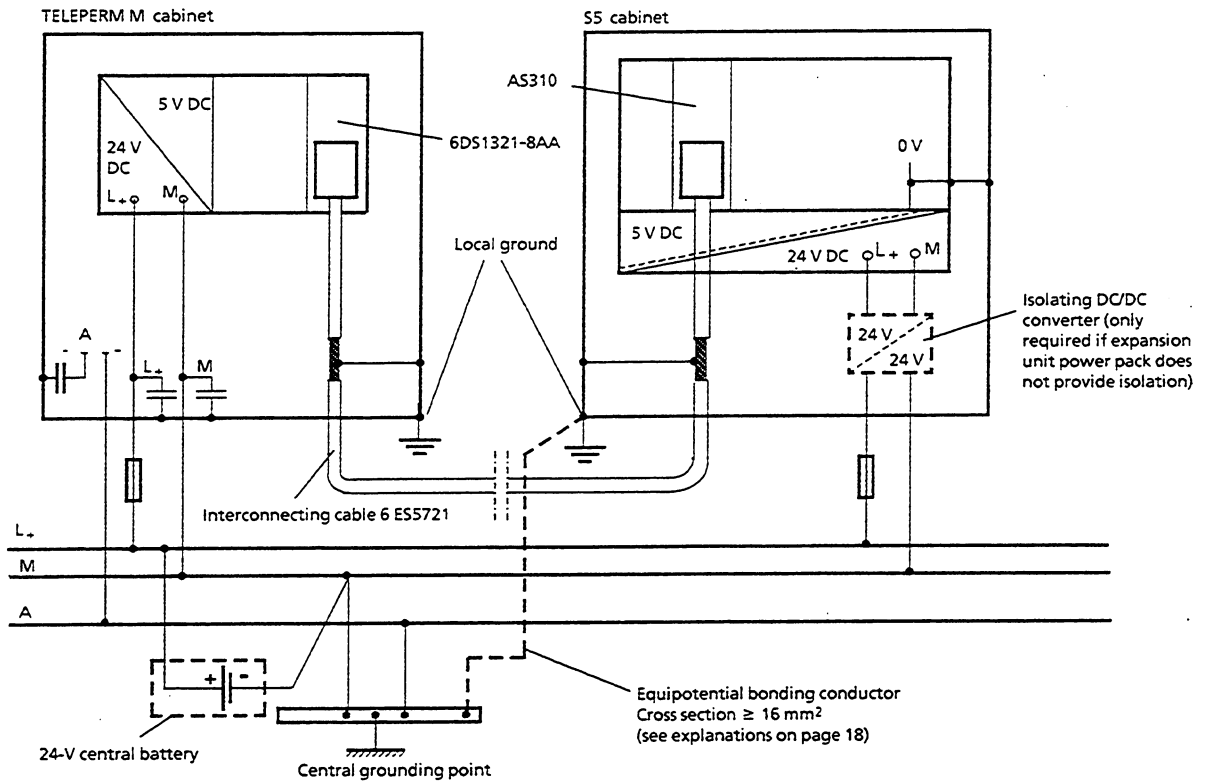


Fig. 5 Grounding concept for power supply from a central battery

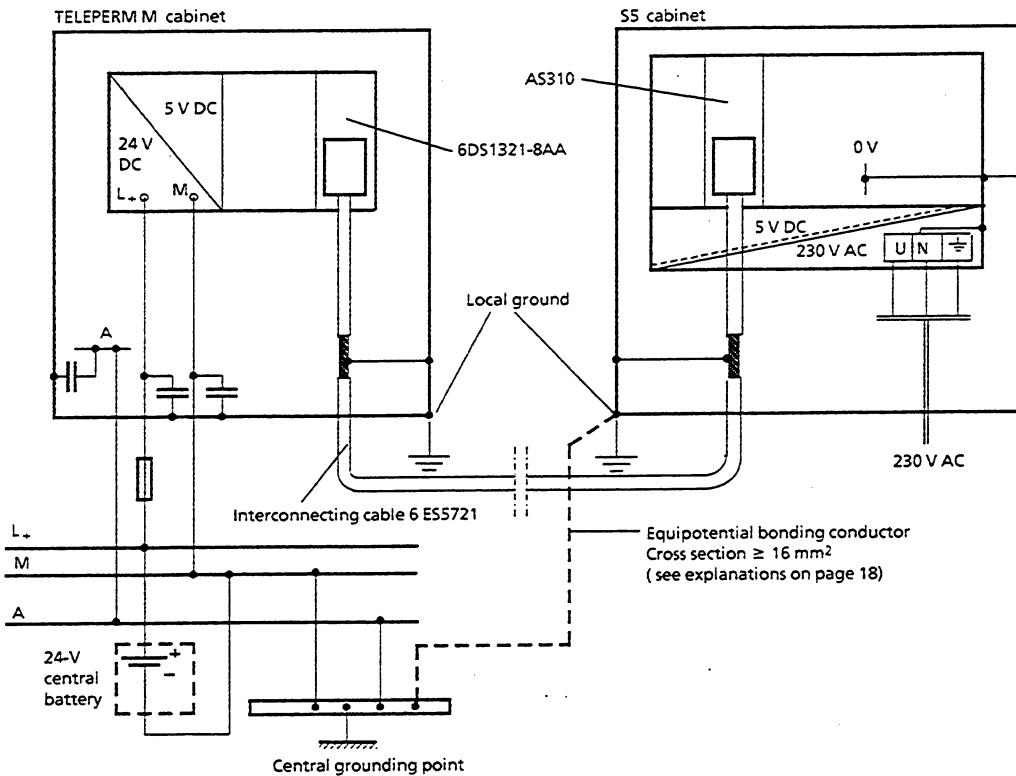


Fig. 6 Grounding concept for supply to the TELEPERM M system from a central battery and the S5 I/O unit from the 220-V mains

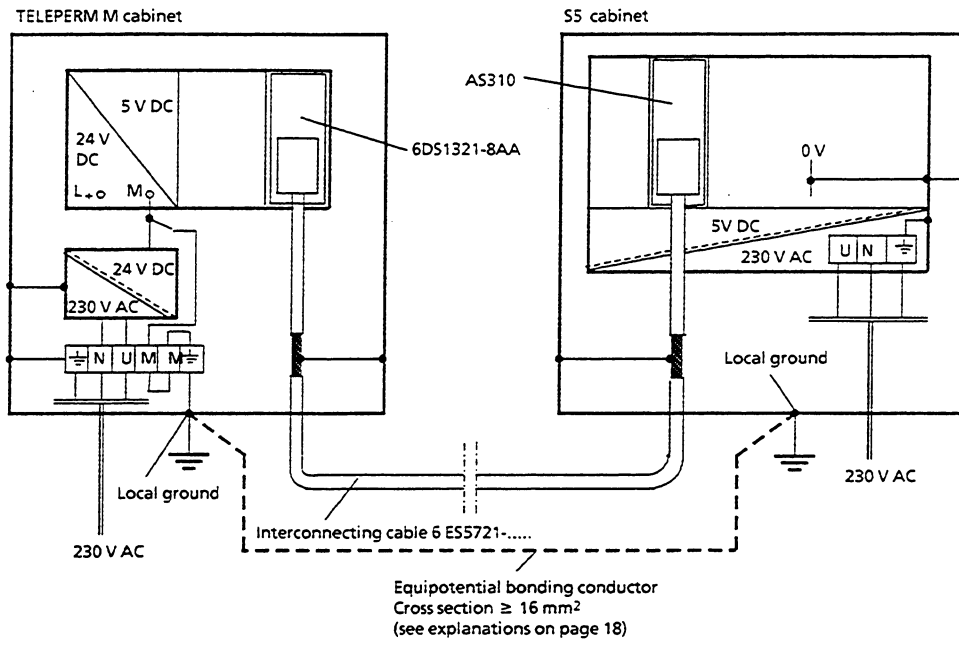


Fig. 7 Grounding concept for 230-V power supply

3 Maintenance

3.1 Functional Design

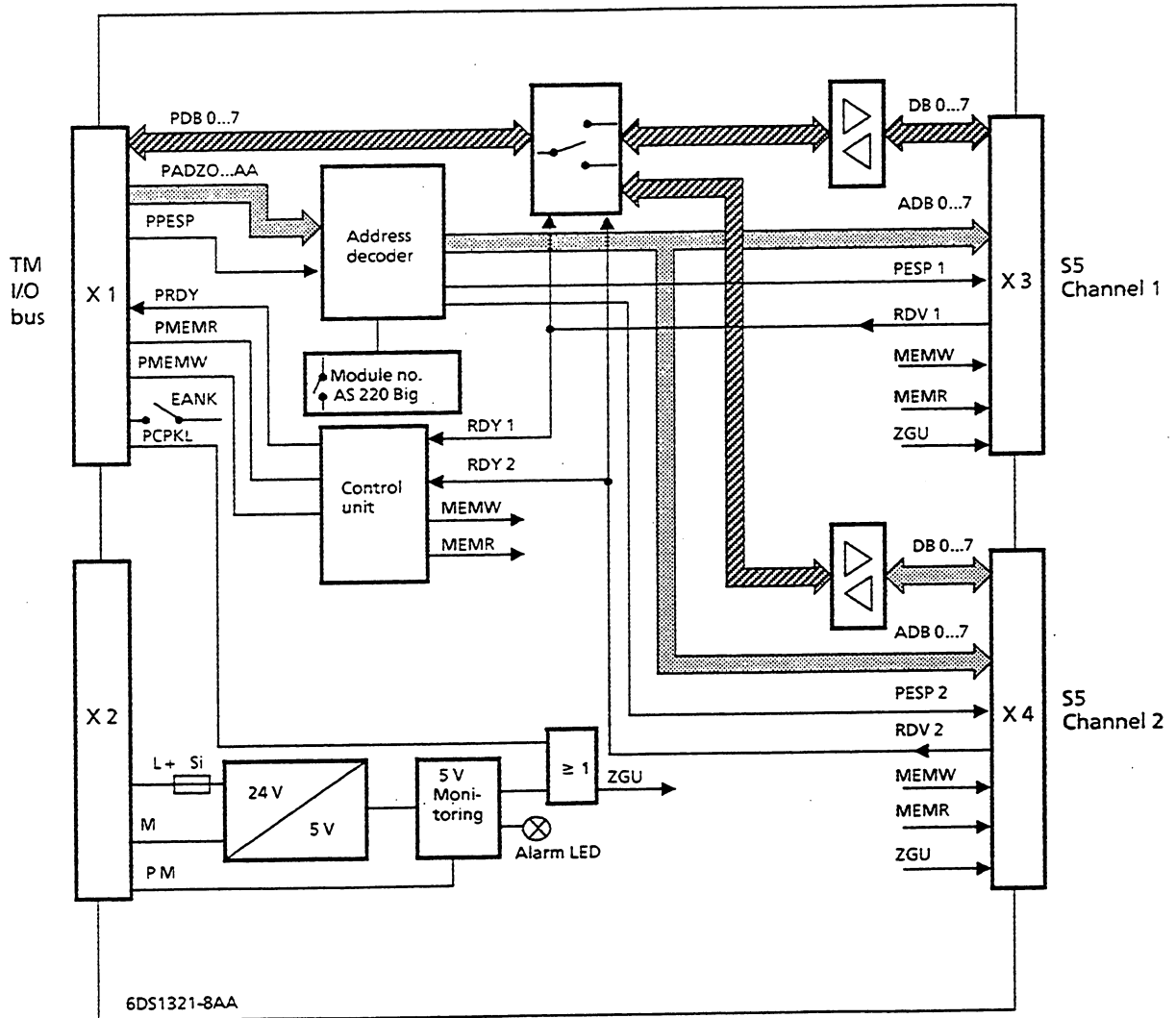


Fig. 8 Block diagram

3.2 Principle of Operation

The interface module converts the TELEPERM M I/O bus interface into two RS422 interfaces and carries out the necessary timing and address conversion between the two system interfaces.

Figures 11 and 12 show how the timing is matched between the two systems.

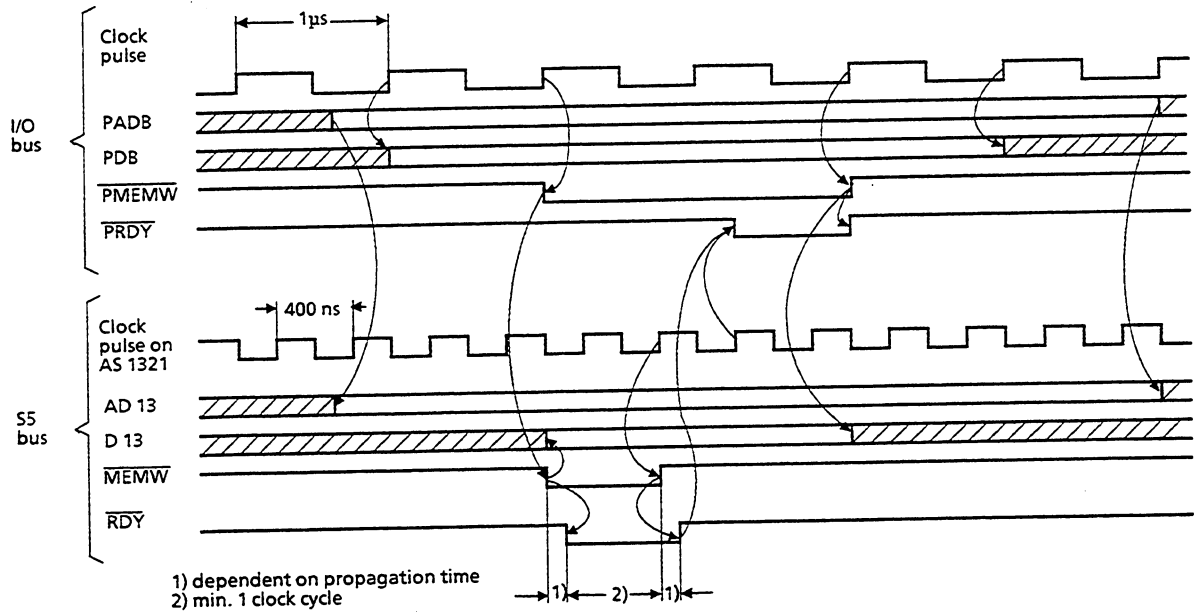


Fig. 9 Timing cycle for write operation

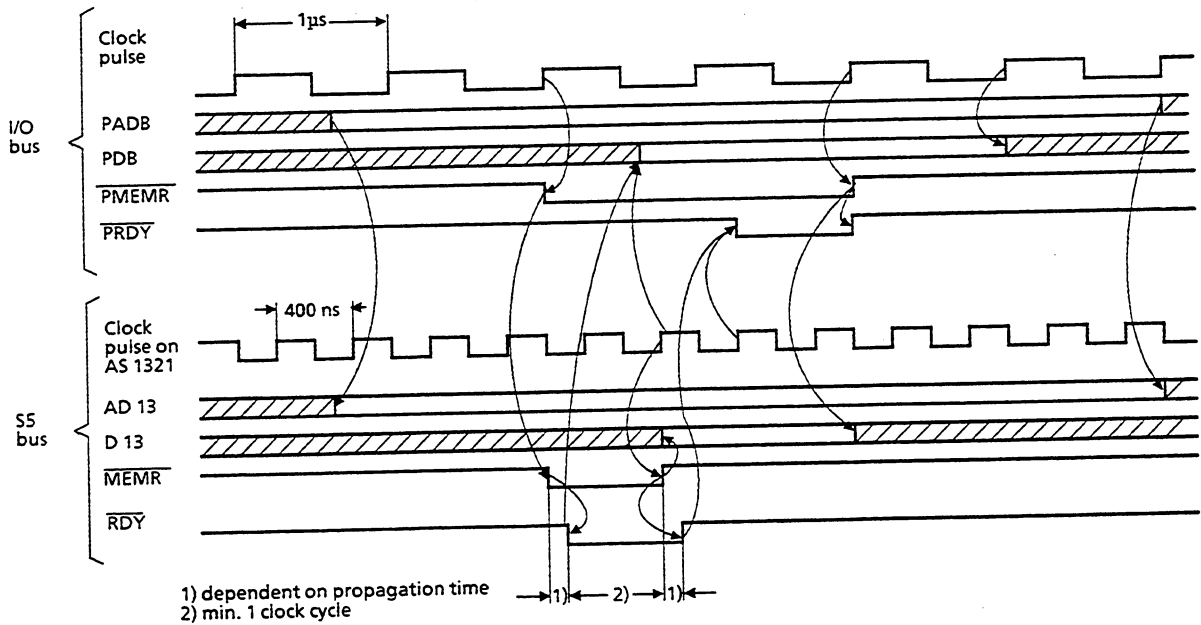


Fig. 10 Timing cycle for read operation

3.3 Connector Pin Assignments

Front connector 1 and 2 (RS422 interface)

1			34 +	MEMR
2 +	} ADB4	18 +	35 -	MEMW
3 -		19 -	36 +	
4 +	} ADB5	20 +	37 -	PESP 1/2
5 -		21 -	38 +	
6 +	} ADB6	22 +	39 -	BASP 1/2
7 -		23 -	40 +	
8 +	} ADB7	24 +	41 -	DB0
9 -		25 -	42 +	
10 +	} DB6	26 +	43 -	DB1
11 -		27 -	44 +	
12 +	} DB7	28 +	45 -	DB2
13 -		29 -	46 +	
14 +	} PEU 1/2	30 +	47 -	RDY
15 -		31 -	48 +	
16	—	32 +	49 -	—
17 Screen		33 -	50	—

Significance of S5-specific control signals

- PEU = I/O not ready
- ZGU = Central controller not ready
- BASP = Disable command output
- PESP = Disable I/O

Pin no.	d	b	z
2		0 V	+ 5 V
4	PMEMW	PMEMR	+ 5 V
6	0 V	PRDY	
8	CPKL	Reset	PPESP
10	0 V		
12	EANK		
14	0 V	PDB1	PDB0
16	PDB4	PDB3	PDB2
18	PDB7	PDB6	PDB5
20	0 V	PADB1	PADB0
22	PADB4	PADB3	PADB2
24	PADB7	PADB6	PADB5
26	PADB10	PADB9	PADB8
28		0 V	PADB11
30			
32		0 V	

Backplane connector 1 (TM I/O interface)

Pin no.	f	d	b	z
2				
4				
6				
8				
10				
12				
14				
16				
18				
20				
22				
24				
26				
28				
30			PM	
32	L +	L +	M	M

Backplane connector 2 (power supply)

3.4 Troubleshooting

Fault image	Possible cause of fault
Alarm LED lights up	<ul style="list-style-type: none"> - $\overline{\text{PCPKL}}$ signal missing (TM bus not ready) - Internal 5-V supply voltage from L+ supply less than 4.75 V - L+ supply voltage failure - Module fuse failure
System message	<ul style="list-style-type: none"> - S5 power supply failure - Interconnecting cable not plugged in
Ready delay	<ul style="list-style-type: none"> - Addressed S5 module non-existent or load power supply of the addressed module has failed - Addressed interface module not existent
System message	<ul style="list-style-type: none"> - A number of interface modules are set to the same module no.
Multiple addressing	<ul style="list-style-type: none"> - When using binary S5 I/O modules on an AS 220 system, the EANK signal was not switched to not active mode (see section on settings) - TM modules and S5 modules occupy the same address area

Important: Multiple addressing in the S5 I/O area is not detected and reported.

3.5 Fault Elimination

Repair of modules at site is limited to replacing a defective module fuse. Further repairs are not meaningful.

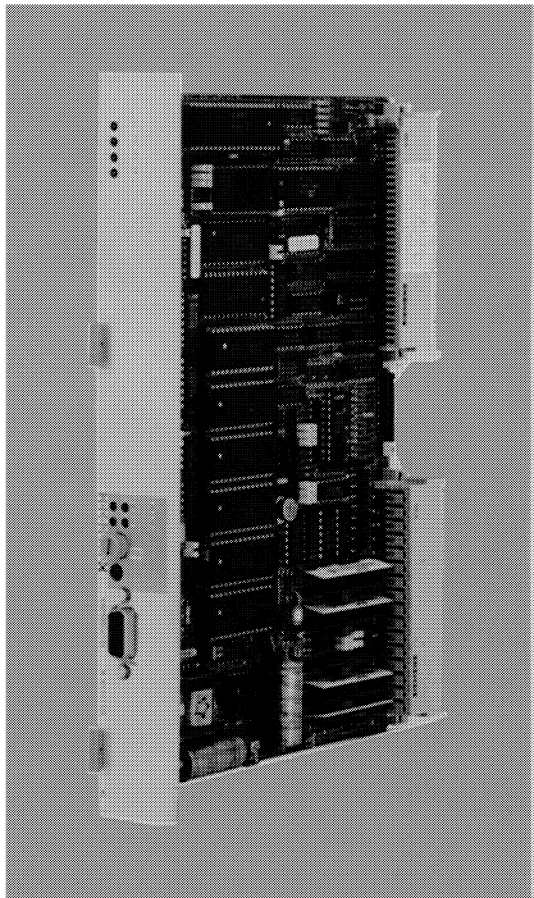
Defective modules must be sent with a description of the fault for repairs to the factory (please use returned goods form).

TELEPERM M

Interface Module

for SIMATIC S5 Programmable Controllers

6DS1333-8AA



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1 Technical Description

1.1 Applications

The TELEPERM M 6DS1333-8AA interface module is used to connect SIMATIC S5 programmable controllers, types AG 135 U, AG 150 U, AG 115 U, AG 155 U and AG 150 S, to the AS 220 S and H automation systems. It is the update for the 6DS1318-8AA interface module.

The corresponding interface modules on the SIMATIC S5 side of the link are listed below:

For the AG 150 S and AG 150 U: AS 512 C interface module
basic module 6ES5512-5BC12 with/without
6ES5512-5BC21 extension module

For the AG 135 U with R processor, CP 524/CP 525/CP 525-2 interface module
AG 115 U, AG 150 U Order No. 6ES5524-3UA11
and AG 155 U 6ES5525-3UA11/-3UA12

Important! The SIMATIC S5 programmable controllers may operate only in the single-processor mode.

Data are exchanged between the TELEPERM M automation systems and the SIMATIC S5 controllers in a point-to-point connection via a 20 mA interface.

The TELEPERM M 6DS1333-8AA module is equipped with two interfaces, allowing a total of two SIMATIC S5 programmable controllers (S5 PLC) to be directly connected.

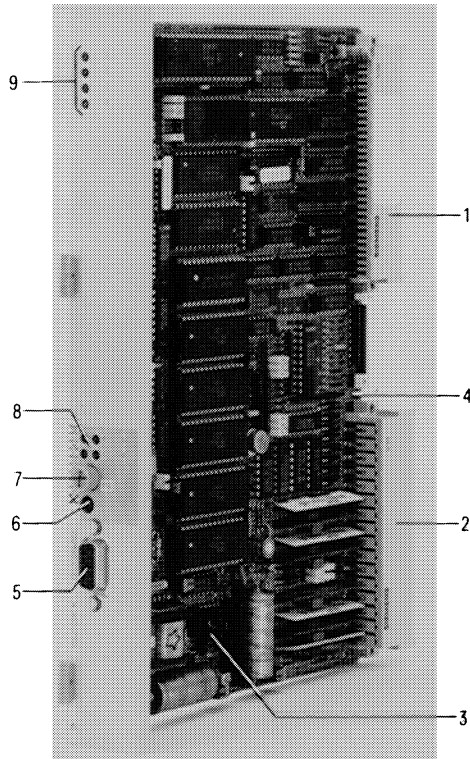
With a maximum of 12 field multiplexer (FM) header blocks in each TELEPERM M AS 220 system, a total of three interface modules can be installed in each AS 220 if all four channels (virtual interfaces) are accessed by one or both hardware interfaces for data transmission. On the other hand, if only one channel (virtual interface) is used for data transmission, then a maximum of 12 interface modules can be installed in each AS 220.

It is therefore possible to connect a total of 24 SIMATIC S5 programmable controllers to an AS 220 system. With this structure, however, the two hardware interfaces of the 6DS1333-8AA module may access only one channel (virtual interface).

1.2 Design

- PCB in ES 902 system
- Front panel width: Two standard plug-in stations (SPS) *
- Front panel with channel-specific LEDs, diagnostic LEDs, common alarm LED and front interface socket connector
- Module fuse on front panel
- Backplane connector 1: 48-pin ES 902 male multipoint connector for I/O bus
- Backplane connector 2: 64-pin ES 902 male multipoint connector for supply voltages and two interfaces

*1 SPS = 15.24 mm



- 1 Backplane connector 1 for TELEPERM I/O bus
 - 2 Backplane connector 2 for two 20 mA interfaces
 - 3 Power supply with watchdog module
 - 4 PCB
 - 5 Programmer/PC interface (20 mA interface, cannot be used for this application)
 - 6 Common alarm LED (controlled by power supply module)
 - 7 Module fuse
 - 8 Fault LEDs
 - 9 Signalling LEDs
- } controlled by firmware

Fig. 1 Mechanical design

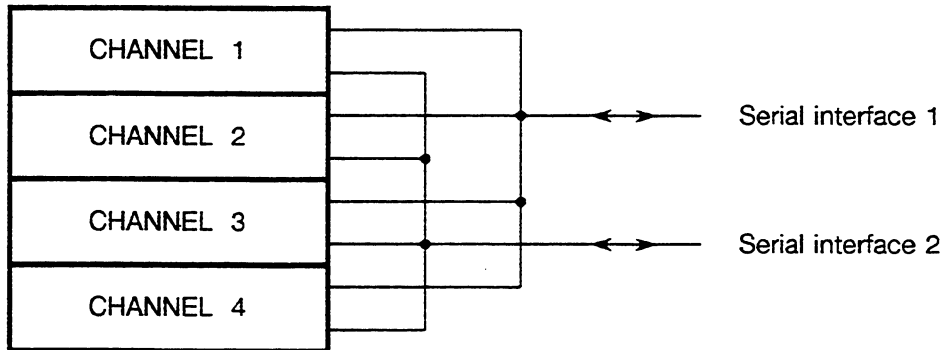
1.3 Method of Operation

The 6DS1333-8AA interface module organizes, controls and monitors the data communication between the TELEPERM M AS 220 system and the connected SIMATIC programmable controllers.

Data are transferred serially via a 20 mA interface using the 3964 or 3964R procedure.

The module is fitted with two serial hardware interfaces to link the programmable controllers. All channels (virtual interfaces) of the 4-channel transfer RAM in the module can be accessed via both interfaces.

TRANSFER RAM



The storage area in the transfer RAM is divided into the following subareas for each channel (virtual interface):

43 * 8 bits for binary output values	=	344 binary output values
43 * 8 bits for binary input values	=	344 binary input values
29 * 64 bits for analog output values	=	58 analog output values
26 * 128 bits for analog input values	=	104 analog input values

The FM blocks (AAF, AEF, BAF and BEF) in the AS software address the individual values in the transfer RAM via the module number (BGNR) parameter.

The analog input and analog output areas are subdivided again within the BGNR into 32-bit values, i.e.

a 64-bit analog output area corresponds to two 32-bit analog values

and

a 128-bit analog input area corresponds to four 32-bit analog values.

BGNR 44 is a special parameter for binary input values. Data transmission error information is stored under this BGNR (error byte).

Special feature:

If a channel limit is exceeded during data transmission, then the data are stored within the next channel, starting at BGNR 0, in the transfer RAM or transmitted from this location. Should the channel limit of channel 4 be exceeded, then the interface module transmits the error number 18H in its response message to the S5 link partner (i.e. limit error). Data which can still be stored in or transmitted from channel 4 are, however, processed in this case.

1.3.1 Generating Transmission Messages

Transmission messages cannot be initiated by the interface module. It can only react to fetch messages transmitted by the S5 programmable controllers and send back the data from the TELEPERM M automation system, which have been stored by the FM drivers in the transfer RAM of the interface module, within a response message.

The interface module extends the data stored in the transfer RAM to make complete response messages and sends these to the link partners via its serial interface.

1.3.2 Processing of Receive Messages

The interface module checks receive messages for acceptability and stores the data they contain in the transfer RAM.

The data stored in the transfer RAM can be read out for further processing by the AS 220 which employs the field multiplexer (FM) driver blocks for this purpose.

1.3.3 Addressing the Module with the FM Driver Blocks

1.3.3.1 FM Header Block

An FM header block with the corresponding channel number (KANR) (1 - 4) must be installed in the AS 220 for every virtual transmission channel (nos. 1 - 4) used to transmit data from the S5, i.e. at least one and maximum four FM header blocks per interface module.

Parameter **BGNR** (Module No.)

The BGNR specified in the FM header block corresponds in this case to the interface BGNR (jumper position or slot address) set on the 6DS1333-8AA module.

Parameter **KANR** (Channel No.)

The specified KANR refers in this case to the number of the virtual channel on which the connected S5 programmable controller is transmitting. The S5 transfers this number as byte 5 in the message header sent to the TELEPERM M (TM) system (cf. Chapter 1.6.3 or 1.6.4).

When an AS 512 interface is used, this value must be entered in the S5 as a high byte of parameter PAR1 in the function block FB128.

When a CP 524 or CP 525/525-2 communication processor is used, the value must be entered as a DB number within a job using the COM 525 RK 512 (job-programming user interface for computer link in CP 525). The value entered in this way is transmitted directly in the S5 message header as byte 5 to the TM and then addresses the associated FM header block in each case (1st address information item), to fetch data from the TM or transmit data to the TM in the case of FETCH and SEND jobs respectively. Since values 1 and 2 are inhibited for the DB number parameter with the CP 525-2 or CP 524 processor, the range of channel number (KANR) values has been extended by the digits 5 - 8. The channel number parameters are as follows:

KANR 5 corresponds to 1
 KANR 6 corresponds to 2
 KANR 7 corresponds to 3
 KANR 8 corresponds to 4

With the exception of the "Module fault" output, the FM-specific error outputs of the FM header block cannot be used in this application. The "Module fault" output signals a fuse failure on the interface module or a duplicate address assignment. The FM header block can be operated only with FAN set to 1 in this application. Processing of the FM header block and its subordinate FM drivers is activated via input 1 (AK).

1.3.3.2 Analog Input/Output Data (AEF/AAF Drivers)

AEF driver

The AEF driver can read four floating-point analog values to the TELEPERM M system from each message sent by the S5 programmable controller.

A total of 27 AEF drivers can be inserted under an FM header block, i.e. a total of 108 floating-point analog values can be transferred under one KANR. The assignment between the AEF driver and the FM header block must be parameterized on input 14.

Since, however, the message length with this transmission method is limited to 128 bytes of data, only 32 floating-point analog values can be transferred in a message from the S5.

Accordingly, three complete messages with 32 different analog values and a further message with 12 analog values can be transmitted on one channel.

The binary outputs 5 - 8 of the AEF driver (analog values faulty) remain on "1" (active) until the first correctly assigned value has been transferred by an S5 programmable controller.

In order to obtain a 1:1 image of the analog values in the TM, the "end of measuring range" inputs in the AEF drivers must be set to 1.

The BGNR to be specified in the AEF driver refers to the entry in byte 6 of the S5 message header (2nd address information item) with this interface and can be a value between 0 and 26. In the S5 controller, the value is entered as a low byte in parameter PAR1 in the FB128 block when an AS 512 interface is used or, with the CP 525 or CP 525-2, entered using the COM 525 as the SOURCE/TARGET address in the job. This information is transferred to the TM in byte 6 of the S5 message header and thus addresses the corresponding AEF driver(s). The firmware of the 6DS1333-8AA module converts the 32-bit analog numbers of the S5 into the 20-bit format of the AEF driver.

This application does not permit linearization, i.e. only zeros may be used as classification digits.

Furthermore, input 13 of the AEF driver must be set to 0 for this application.

AAF driver

The AAF driver can transmit two analog values to the S5 when requested by an S5 FETCH message. A total of 30 AAF blocks can be inserted under an FM header block, i.e. under one KANR.

The blocks can be assigned as required to the higher-level FM header block by setting input 8. Theoretically, therefore, a maximum of 60 analog values could be transferred with one KANR.

Since the maximum message length is, however, limited to 128 bytes, only 32 analog values can be transferred from the TM to the S5 in one message, i.e. a complete message with 32 analog values and a further message with 28 analog values can be sent on one channel.

In order to obtain a 1:1 image of the TM values in the S5, the inputs "end of measuring range" in the AAF driver must be set to 8192.

The parameterizable BGNR in the AAF driver also corresponds in this case to the 2nd address information item (cf. AAF driver, Chapter 1.3.3.2) and can be a value between 1 and 30.

The firmware of the 6DS1333-8AA converts the 14-bit fixed-point format of the AAF driver to the 32-bit floating-point analog format of the SIMATIC S5 system; only **positive** values are permissible.

Input 7 of the AAF driver must be set to 0 for this application.

1.3.3.3 Binary Input/Output Data (BEF/BAF Driver)

BEF driver

A BEF driver must be installed under every FM header block.

The number of this higher-level FM driver must be set on input 1 of the BEF driver.

A BEF driver can read in all the binary values transferred from the S5 under a KANR and store them in the PAE (process input image) of the TM, starting at the group number (GRNR) which has also been specified in the BEF driver at input 2. (GRNR means in this case the binary value group in the PAE, i.e. number of binary value to be addressed: 16.)

The number of bytes to be stored by the BEF driver in the PAE of the AS 220 can be parameterized on input 4 of the driver.

A total of $44 \times 8 = 352$ binary values can be transmitted with one KANR, i.e. under one FM header block. Since, however, a maximum of 128 bytes, i.e. 1024 binary values, can be transferred in an S5 message, the BEF drivers under the FM header blocks with the following KANRs are also specified addressed by the same message and store the binary values in the PAE, starting at the specified GRNR.

Important!

Severe errors, e.g. caused by overwriting of binary values, can result if the above-mentioned rules are not adhered to.

The BGNR specification (input 3 of the BEF driver) refers again in this case to the 2nd item of address information in the S5 message (cf. AEF driver, Chapter 1.3.3.1) and can be a value between 0 and 43.

Moreover, the BGNR also defines the first binary value within the PAE group.

When the BGNR is an even number, values are entered in the PAE starting at binary input 0 relative to the GRNR and, when the BGNR is an odd number, starting at binary input 8 relative to the GRNR.

For this application, the binary values to be read in must be enabled word-serially (every 16 bits) with the EP instruction for FM binary input.

Special feature

An additional BEF driver permits all fault signals supplied by the 6DS1333-8AA module to be read to the PAE from both serial interfaces of the module (error bytes) and transferred from here to the AS 220 for further processing. This additional driver is parameterized with BGNR 44 and is installed under every FM header block which operates with the interface module, i.e. which can run with every KANR of the module.

Fault signals are automatically reset as soon as the faults concerned have been eliminated.

BAF driver

A BAF driver can read all binary values requested by the S5 under a KANR from the PAA (process output image) of the AS 220, starting at the GRNR which has also been parameterized at input 2 on the BAF driver, and send them to the S5. (GRNR means in this case the binary value group in the PAE (process input image), i.e. number of binary value to be addressed: 16.)

A maximum of $44 \times 8 = 352$ binary values can be transmitted with a KANR, i.e. under an FM header block. Since, however, an S5 can request a maximum of 128 bytes, i.e. 1024 binary values, the BAF drivers under the FM header blocks with the following KANRs are also addressed by this message and transmit the binary values stored under the parameterized GRNR from the PAA to the S5.

Important!

Severe errors, e.g. caused by the transfer of the wrong binary values, can result if the above-mentioned rules are not adhered to.

The BGNR specification refers again in this case to the 2nd item of address information in the S5 message and must be set at input 3.

It can be a value between 0 and 43. The BGNR also defines the first binary value within the PAE group.

When the BGNR is an even number, values are transferred from the PAA to the S5 starting at binary input 0 relative to the GRNR and, when the BGNR is an odd number, starting at binary input 8 relative to the GRNR.

The binary values in the PAA need not in this case be enabled by the AP instruction.

1.3.3.4 Example of Parameterization

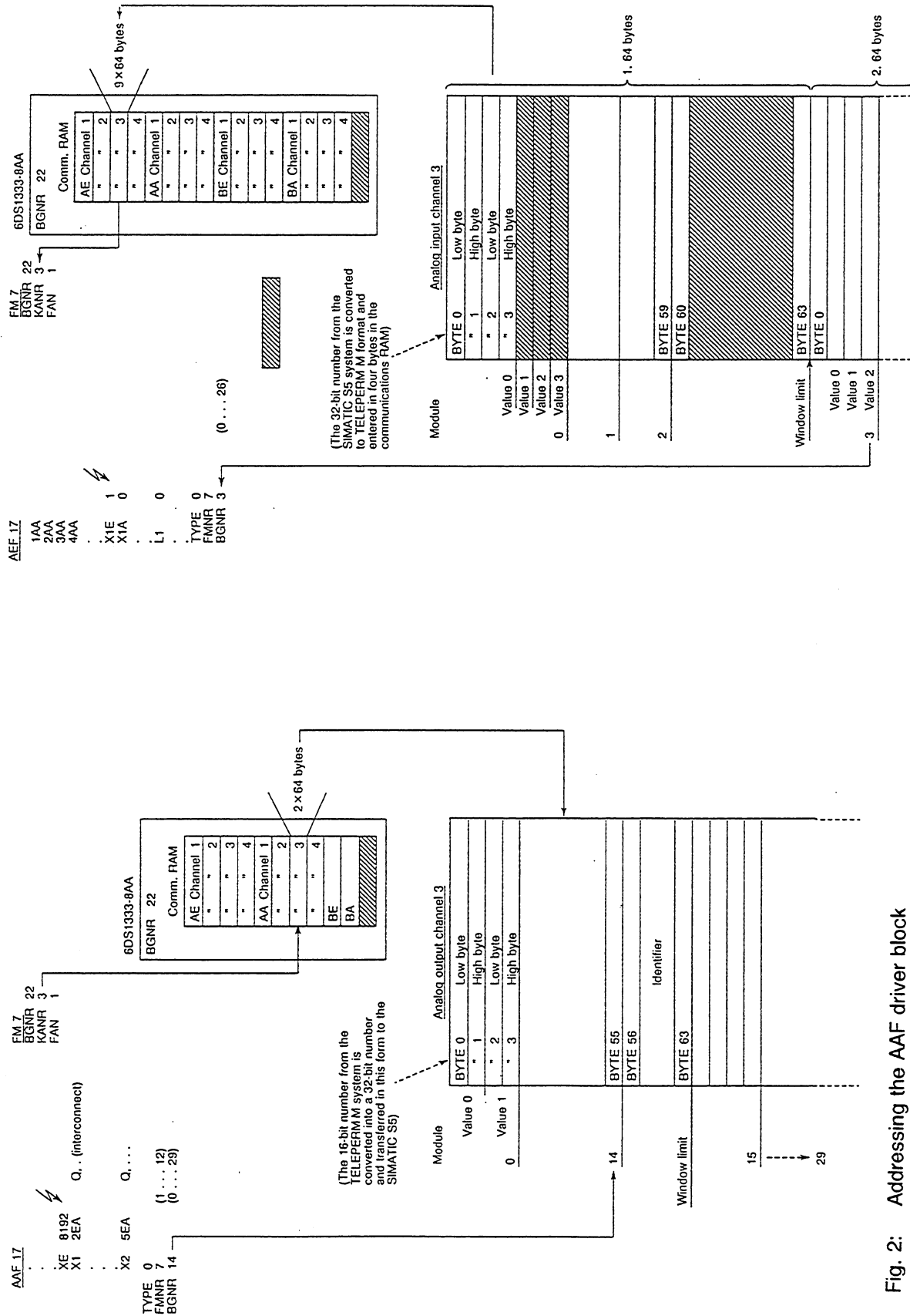


Fig. 3: Addressing the AEF driver block

Fig. 2: Addressing the AAF driver block

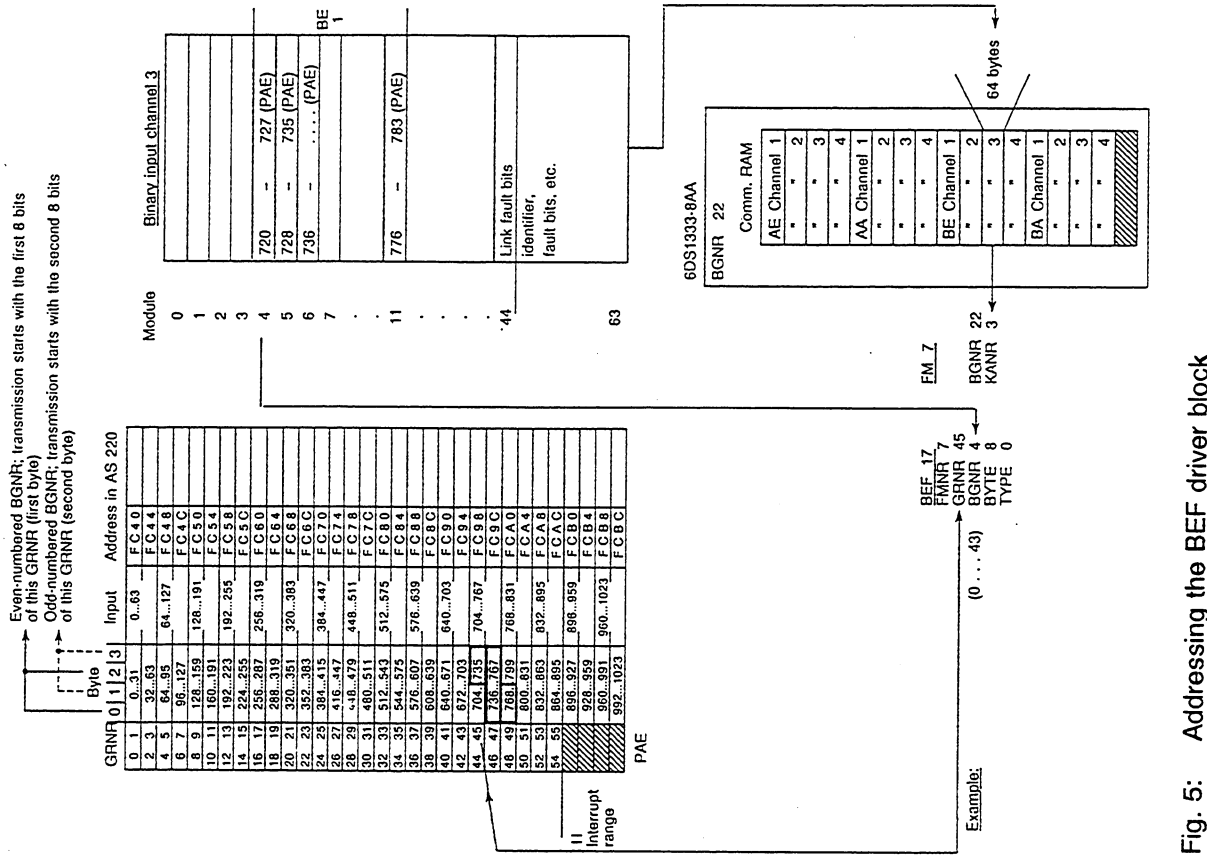


Fig. 5: Addressing the BEF driver block

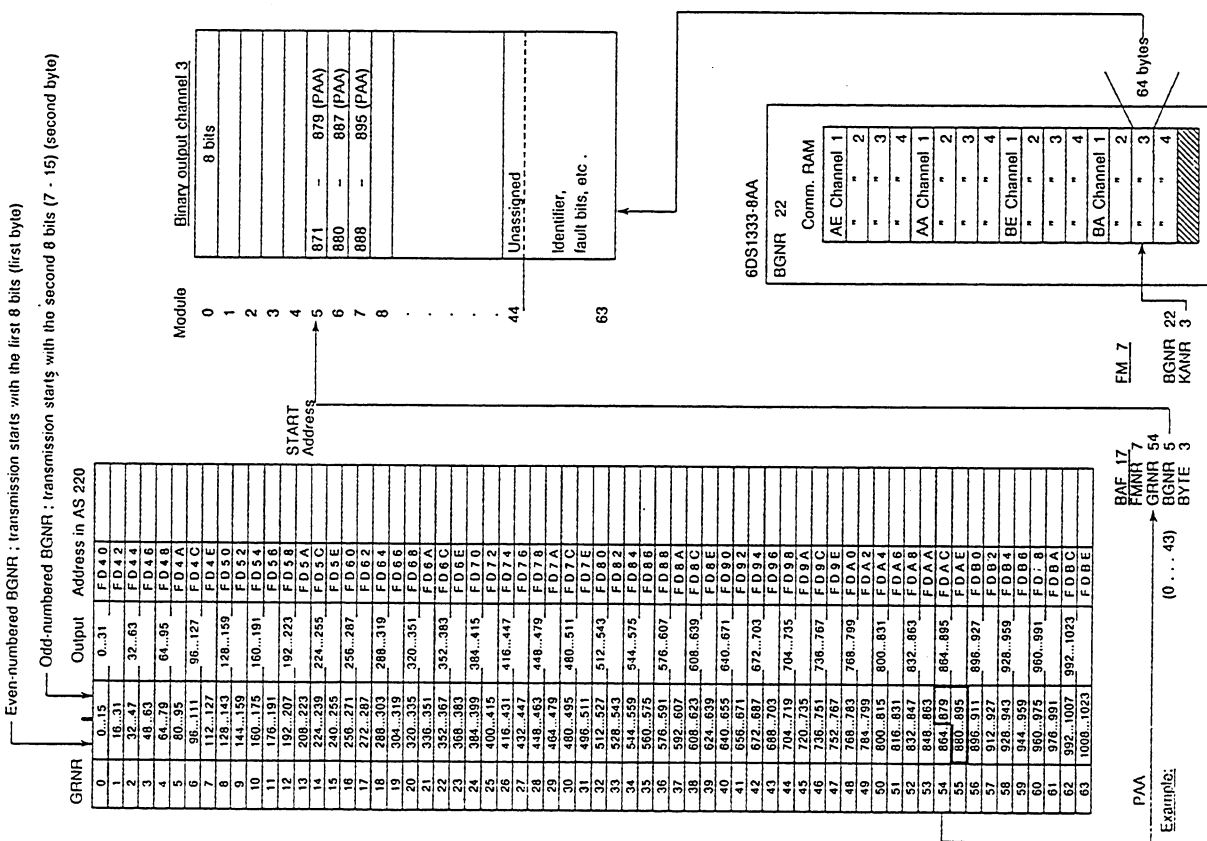


Fig. 4: Addressing the BAF driver block