Warning Notices

Contractual Conditions
Regarding the use of Software

Important Notice
Disks

Instruction Manual CP 516

Standard Function Block
EXT-115U for AG S5-115U, -115H
(CPU 941, 942, 942H, 943, 944)
EXT-945U for AG S5-115U
(CPU 945)

Standard Function Block
EXT-135R for AG S5-135U
(CPU 922, 928, 928B)

Standard Function Block
EXT-155U for AG S5-155U, -155H
(CPU 946/947, 946R/947R)

Standard Function Block
EXT-150U for AG S5-150U

SIMATIC S5

Memory Module CP 516 with Standard Function Blocks

Product Manuel

Edition January 1998
Order No.: 6ES5998–1EB21

SIEMENS

Warnhinweis

Gefahren beim Einsatz sogenannter SIMATIC-kompatibler Baugruppen fremder Hersteller

"Den Hersteller eines Produktes (hier SIMATIC) trifft die Produktbeobachtungspflicht, d.h. er muß generell vor Gefahren des Produktes warnen. Diese Produktbeobachtungspflicht wurde von der neueren Rechtssprechung auch auf fremde Zubehörteile erstreckt. Der Hersteller hat danach die Verpflichtung, auch solche Gefahren zu beobachten und zu erkennen, die aus der Verbindung des Produktes mit Produkten anderer Hersteller entstehen.

Aus diesem Anlaß sehen wir uns verpflichtet, unsere Kunden, die SIMATIC-Produkte einsetzen, zu warnen, sogenannte SIMATIC-kompatible Baugruppen fremder Hersteller als Ersatz- oder Zusatzbaugruppen in das Automatisierungssystem SIMATIC einzusetzen.

Unsere Produkte werden einer anspruchsvollen Qualitätssicherung unterworfen. Uns ist nicht bekannt, ob die fremden Hersteller sogenannter SIMATIC-kompatibler Baugruppen überhaupt oder eine annähernd gleichwertige Qualitätssicherung durchführen. Diese sogenannten SIMATIC-kompatiblen Baugruppen kommen nicht im Einvernehmen mit uns auf den Markt; es gibt **keine** Empfehlung der Siemens AG, sogenannte SIMATIC-kompatible Baugruppen fremder Hersteller einzusetzen. Die Werbung der fremden Hersteller sogenannter SIMATIC-kompatibler Baugruppen erweckt irrtümlich den Eindruck, als sei der Inhalt der Werbung in Fachzeitschriften, Katalogen oder Ausstellungen mit uns abgesprochen. Werden sogenannte SIMATIC-kompatible Baugruppen fremder Hersteller mit unserem SIMATIC-Automatisierungssystem verbunden, handelt es sich um einen empfehlungswidrigen Gebrauch unseres Produkts. Wegen der universellen Vielfalt der Einsatzmöglichkeiten unserer SIMATIC-Automatisierungssysteme und der hohen Zahl der weltweit vermarkteten Produkte, können wir die konkrete Gefahrenanalyse durch diese sogenannten SIMATIC-kompatiblen Baugruppen nicht konkret beschreiben. Es geht über die tatsächlichen Möglichkeiten des Herstellers hinaus, alle diese sogenannten SIMATIC-kompatiblen Baugruppen in ihrer Wirkung auf unser SIMATIC-Produkt überprüfen zu lassen. Treten Mängel bei der Verwendung von sogenannten SIMATIC-kompatiblen Baugruppen in einem SIMATIC-Automatisierungssystem auf, werden wir für solche Systeme jede Gewährleistung ablehnen.

Im Fall von Produkthaftpflichtschäden verursacht durch den Einsatz von sogenannten SIMATIC-kompatiblen Baugruppen sind wir nicht haftbar, da wir die Anwender rechtzeitig vor den potentiellen Gefahren der Benutzung sogenannter SIMATIC-kompatibler Baugruppen gewarnt haben."

PRAKTIZIERTER
UMWELTSCHUTZ

Informationen zu den Verpackungsmaterialien/Entsorgungshinweise

Sehr geehrte Kundin, sehr geehrter Kunde !

Unsere hochwertigen Produkte benötigen für den Transportweg bis zu Ihnen eine wirksame Schutzverpackung. Bei der Dimensionierung beschränken wir uns auf das unbedingt Notwendige.

Alle verwendeten Verpackungsmaterialien sind umweltverträglich und können gefahrlos entsorgt werden.

Holzteile sind nicht chemisch behandelt.

Die Kartonagen bestehen überwiegend aus Altpapier und können zerkleinert der Altpapiersammlung beigefügt werden.

Die Folien sind aus Polyethylen (PE), die Umbänderung aus Polypropylen (PP) und die FCKW-freien Polsterteile aus geschäumtem Polystyrol (PS).

Diese Materialien sind reine Kohlenwasserstoff-Verbindungen und recyclebar. Bitte geben Sie diese wertvollen Sekundär-Rohstoffe bei einem Wertstoffcenter ab.

Durch die Aufbereitung und Wiederverwendung können Rohstoffe eingespart und das Müllvolumen verringert werden.

Die Anschrift des nächstgelegenen Wertstoffcenters für die Entsorgung der Verpackung und von Altgeräten erfragen Sie bitte bei Ihrer Gemeindeverwaltung.

Vielen Dank für Ihre Mithilfe!

Neue Generation von Flash Memory Cards bei SIMATIC S5

Dieser Beitrag ist in folgenden Sprachen vorhanden:
→ deutsch → english

Beitrags-ID: 4202137 **Datum:** 09.12.1996

Bestellnummer:

6ES5374-1FG11	MEM 374, Flash, 128 kB
6ES5308-3UC11	Masteranschaltung IM 308-C
6ES5374-1FH11	MEM 374, Flash, 256 kB
6ES5374-1FH21	MEM 374, Flash, 256 kB
6ES5374-1FJ21	Memory-Card, FLASH, 512K Byte
6ES5374-1KG11	MC 374, 128KB, 5V Flash, kurz
6ES5374-1KH21	MC 374, 256KB, 5V Flash, kurz
6ES5374-1KJ11	MC 374, 512KB, 5V Flash, kurz
6ES5374-2FH21	MEM 374, Flash, 256 kB
6ES5374-2FJ21	MEM 374, Flash, 512 kB
6ES5374-2FK21	MEM 374, Flash, 1 MB
ES5374-2FL21	MEM 374, Flash, 2 MB
6ES5374-2FL22	MEM 374, Flash, 2 MB
6ES5374-2FM21	MEM 374, Flash, 4 MB
6ES5374-2FP22	MEM 374, Flash, 8 MB
6ES5374-2KH21	MC 374, 256KB, 5V Flash, lang
6ES5374-2KK21	MC 374, 1 MB, 5V Flash, lang
6ES5374-2KL21	MC 374, 2 MB, 5V Flash, lang
6ES5374-2KM21	MC 374, 4 MB, 5V Flash, lang
6ES5516-3UA11	Speicherbgr. 516, CP 516
6ES5581-0ED13	CP581 Grundbaugruppe (486/100)
6ES55810	

Internet Dokument

Betroffen sind Produkte mit den Bestellnummern:

6ES5 374-1KG11	MC 374, 5V Flash, kurz 128 KB, neu
6ES5 374-1KH21	MC 374, 5V Flash, kurz 256 KB, neu
6ES5 374-1KJ11	MC 374, 5V Flash, kurz 512 KB, neu
6ES5 374-2KH21	MC 374, 5V Flash, lang 256 KB, neu
6ES5 374-2KK21	MC 374, 5V Flash, lang 1 MB, neu
ES5 374-2KL21	MC 374, 5V Flash, lang 2 MB, neu
S5 374-2KM21	MC 374, 5V Flash, lang 4 MB, neu
6ES5 374-1FG11	MEM 374, Flash, 128 KB
6ES5 374-1FH11	MEM 374, Flash, 256 KB
6ES5 374-1FH21	MEM 374, Flash, 256 KB
6ES5 374-2FH21	MEM 374, Flash, 256 KB
6ES5 374-2FJ21	MEM 374, Flash, 512 KB
6ES5 374-1FJ21	MEM 374, Flash, 512 KB
6ES5 374-2FK21	MEM 374, Flash, 1 MB
6ES5 374-2FL21	MEM 374, Flash, 2 MB
6ES5 374-2FL22	MEM 374, Flash, 2 MB
6ES5 374-2FM21	MEM 374, Flash, 4 MB
6ES5 374-2FP22	MEM 374, Flash, 8 MB
6ES5 581-0ED13	CP581 Grundbaugruppe (486/100)
6ES5 516-3UA11	CP 516, Speicherbaugruppe
6ES5 308-3UC11	IM 308-C, Masteranschaltung

Ab sofort steht fuer die SIMATIC S5 eine neue Generation von Memory Cards in "5 V only" Technologie zur Verfuegung. Schreib- und Lesespannung betragen dabei einheitlich 5 V. Die Lieferung der bisherigen Memory Cards mit 12 V fuer Schreiben und 5 V fuer Lesen wird eingestellt.

ır Programmierung der neuen Speicherkarten wird STEP 5 Version 6.6 bzw. COM ET 200, V 2.0, benoetigt.

Kompatibilitaet

er alle Produkte, die nur lesend auf die Flash Memory Cards zugreifen (z.B. CPU 945, CPU 948, CP 544), ist die neue Generation der Flash Memory Cards voll kompatibel zur alten Generation.

Nachfolgend eine Uebersicht der Ablosung:

bisherige Memory Cards	neue Memory Cards
6ES5 374-1FG11	6ES5 374-1KG11
6ES5 374-1FH11	6ES5 374-1KH21
6ES5 374-1FH21	6ES5 374-1KH21
6ES5 374-1FJ21	6ES5 374-1KJ11
6ES5 374-2FH21	6ES5 374-2KH21
6ES5 374-2FJ21	-
6ES5 374-2FK21	6ES5 374-2KK21
6ES5 374-2FL21	6ES5 374-2KL21
6ES5 374-2FM21	6ES5 374-2KM21

Bei Produkten, die schreibend und lesend zugreifen (z.B. CP 581 CP 516), ist der Einsatz der neuen Generation der Flash Memory Cards an bestimmte Ausgabestaende dieser Produkte gebunden:

Produkt	Bestellnummer	Ausgabestand Memory-Card
CP 581	6ES5 581-0ED13	alle Ausgabestaende
CP 516		ab Ausgabestand 2
IM 308 C		ab Ausgabestand 3

Hochruestung der Hardware:

Eine Hochruestung aelterer CP 581 Baugruppen ist nicht moeglich.

Der CP 516 laesst sich von Ausgabestand 1 nach 2 kostenpflichtig hochruesten.

Die IM 308 C ist kostenlos von Ausgabestand 1 bzw. 2 nach 3 hochruestbar.

Wenden Sie sich wegen der Hochruestungen an Ihren Partner in Ihrer Siemens-Niederlassung.

Zur Versorgung der obengenannten Geraete mit Ersatz-Memory-Cards wurden zwei Ersatzteiltypen festgelegt, die nur im Service-Fall bestellbar sind:

Speicherkap.	Bestellnummer
2 MByte	6ES5 374-2FL22
8 MByte	6ES5 374-2FP22

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Software-Produkt-Schein (SPS) / Software Product Sheet (SPS) / Certificat de Logiciel (CL)

Nutzungstyp: Einzelnutzung/Type of use: single/Type d'utilisation: monoposte

Das beiliegende Doppel dieses Software-Produkt-Scheines geben Sie bitte unverzüglich vollständig ausgefüllt und unterschrieben an SIEMENS zurück.

Please fill out and sign the attached copy of this SPS and have it thereafter returned to the address of Siemens given below.

Prière de remplir intégralement le présent Certificat de Logiciel et d'en envoyer immédiatement le double ci-joint à SIEMENS, revêtu de votre signature.

Lizenznehmer/Licensee/Licencié:

Name bzw. Firma/Name/Nom ou societé _____

Abteilung/Department/Service _____

Anschrift/
Adress/
Adresse _____

PLZ/ Postal code/ Code postal/	Ort/ City/ Ville/	Straße/Platz/Nr. Street/square/no. Rue/place/n°

Siemens-Hardware-Produkt/Siemens hardware product/Matériel Siemens

Gerät (CPU)/CPU/Ordinateur, calculateur (CPU)	Fabrik-Nr./Serial Number/N° d'usine

Software-Produkt/Software Product/Logiciel

Produktname/Name/Nom du logiciel	Version/Ausgabestand, Version/Release, Version/édition	Serien-Nr./Serial number/ N° de série

Ort, Datum/Place, Date/Etabli à, le

Unterschrift des Lizenznehmers/
Signature of Licensee/
Signature du licencié

Siemens AG

ANL A441-WE
Hr. Schnieber
Günther-Scharowsky-Str. 2
D-8520 Erlangen

← Anschrift für die Rücksendung
Siemens address for returning
A retourner à l'adresse ci-coutre

Agreement concerning the use of software products acquired against one payment

(Energy and Automation sectors)

Please, carefully read all the following terms and conditions which shall govern your use of the enclosed software product(s) and attached documentation. Opening the diskette cover indicates your full acceptance of these terms and conditions. If you do not accept them in full, please return the unopened diskette together with the complete documentation immediately. In this case, your money, if paid, will be refunded.

Your rights relating to the software product(s) contained in the attached diskette and written material are exclusively governed by the following provisions and you acknowledge to have read and understood them in full and to agree to be bound and strictly adhere by them.

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1 **Definitions**

1.1 "SIEMENS": Siemens Aktiengesellschaft, Berlin and Munich, Federal Republic of Germany and/or its affiliated companies and/or its authorized distributors;

1.2 "LICENSEE": the lawfull recipient of the attached SOFTWARE and the attached SOFTWARE-DOCUMENTATION;

1.3 "SOFTWARE": the software product(s) on the attached medium;

"SOFTWARE-DOCUMENTATION": the attached set of written software documentation and parts thereof;

"SPS": the software product sheet attached hereto which is part of this agreement;

2 **Rights**

Upon receipt of the payment for use and subject to Section 8 Siemens grants to LICENSEE for an unlimited period of time the non-exclusive and non-transferable right to use the SOFTWARE and the SOFTWARE-DOCUMENTATION in accordance with the provisions below on the Siemens' hardware identified in the SPS and within the scope of the SOFTWARE-DOCUMENTATION.

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3.2 LICENSEE has no rigth to copy the SOFTWARE-DOCUMENTATION, in whole or in part. Copies of the SOFTWARE-DOCUMENTATION are available against payment.

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4.1 The SOFTWARE and SOFTWARE-DOCUMENTATION are trade secrets of the Siemens AG and/or its licensors and/or subject of copyrights and/or other rights: such rights shall not be affected by these provisions; the names of the SOFTWARE are also protected. LICENSEE shall observe such rights and shall, in particular, not delete any copyright notices.

4.2 Neither the SOFTWARE including the archival copies thereof nor the SOFTWARE-DOCUMENTATION shall at any time be transferred, lent, leased or otherwise made available to any third party by LICENSEE.

5 **Revision, Up-dates**

The SOFTWARE and the SOFTWARE-DOCUMENTATION may, at Siemens' discretion, be revised and/or up-dated by Siemens. Revisions and/or up-dates will be furnished by Siemens to LICENSEE, upon request of LICENSEE, against usual payments but only if Siemens has on its files a copy of the SPS filled out by LICENSEE.

6 **Warranties**

6.1 The SOFTWARE and the SOFTWARE-DOCUMENTATION are made available in the version identified in the SPS.

6.2 The period of waranty extends to six (6) months, beginning on the day the LICENSEE has provably received the SOFTWARE from Siemens. During such period Siemens assumes – on presentation of the original of the respective delivery note or the respective invoice – warranties as follows:

- the SOFTWARE was properly copied;
- the SOFTWARE runs on the hardware identified in the SPS;
- the data media of the SOFTWARE is free from material and manufacturing faults.

The warranty obligations will be fulfilled by delivery of a substitute.

6.3 THE SOLE OBLIGATION OF Siemens UNDER WARRANTY SHALL BE THE FULFILLMENT OF THE OBLIGATIONS SET FORTH IN SECTION 6.2. Siemens EXPRESSLY DISCLAIMS ALL WARRANTIES EXPRESSED OR IMPLIED WITH RESPECT TO ANY CLAIM BY LICENSEE OR ANY THIRD PARTY ARISING FROM THE INCORRECTNESS OF THE SOFTWARE, ITS DATA STRUCTURES AND/OR THE SOFTWARE DOCUMENTATION AND/OR THE USE OF THE SOFTWARE AND/OR THE SOFTWARE DOCUMENTATION, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR LICENSEE'S PARTICULAR PURPOSE.

7 **Liability**

Siemens AG shall be liable for injury to persons for which Siemens AG may be held responsible and, in the event of damage to property for which Siemens AG may be held responsible, Siemens AG shall reimburse the cost of restoring such property up to an amount of DM 1,000,000 (Deutsche Mark one million) for any one event. In the case of loss or damage to data carrying material the liability for damage does not include the cost of reconstructing lost data. Any further claims for damages other than the expressly specified compensation as in these provisions, in particular in respect to damage resulting from consultation, assistance in the installation of the SOFTWARE or errors in the SOFTWARE shall be excluded unless liability is mandatory in cases of intent, gross negligence or absence of assured characteristics.

8 **Termination**

This agreement and the rights granted herein shall terminate if LICENSEE fails to comply with any provision contained herein.

9 **Amendments**

Supplemental agreements and amendments to this agreement are not binding unless agreed upon in writing.

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Wichtiger Hinweis

Besondere Vertragsbedingungen

Bevor Sie die Hülle des beiliegenden Datenträgers öffnen,

lesen Sie bitte alle nachstehenden Bedingungen genau durch.
Sie regeln die Benutzung des beiliegenden Software-Produktes
und der beiliegenden Dokumentation. Das Öffnen der Hülle bedeutet,
daß Sie diese Bedingungen in vollem Umfang anerkennen.
Wenn Sie diese nicht anerkennen, schicken Sie bitte den Datenträger
und diese Dokumentation ungeöffnet und unverzüglich zurück.
Sie erhalten dann eine Gutschrift.

Siemens Aktiengesellschaft

Important Notice

Special conditions

Before opening this cover

Please, carefully read all the following terms and conditions which shall govern your use of the enclosed software product(s) and attached documentation. Opening the diskette cover indicates your full acceptance of these terms and conditions. If you do not accept them in full, please return the unopened diskette together with the complete documentation immediately. In this case, your money, if paid, will be refunded.

Siemens Aktiengesellschaft

SIEMENS

SIMATIC S5

Memory Module CP 516

Instruction Manual

Attention!
Electrostatic sensitive module!

Edition January 1998

Version 4

Table of Contents

Note:

These instructions do not purport to cover all details in equipment, nor to provide for every possible contingency to be met in connection with operation.

Should further information be desired or should particular problems arise which are not covered sufficiently for the Purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

The contents of this instruction manual shall not become part or modify any prior or existing agreement, commitment or relationship. The Sales Contract contains the entire obligations of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

Range of validity:

This Instruction Manual describes the Memory Module CP516, MLFB 6ES5 516–3UA11, from revision level 2.
In CP516 from revision level 2 you can also use Memory Cards with 5V–only FLASH technology.

☞ It is our objective to provide optimum documentation. Should you have difficulties understanding any part of this manual, please do not hesitate to contact us. We would greatly appreciate any suggestions for improvement. You will find a preprinted form at the end of the manual.
In an emergency, you can reach us over our "hotline" telephone number ..9131–7–22888.

0 Safety–Related Guidelines and ESD Guidelines

0.1 Safety–Related Guidelines for the User

0.1.1 General

This manual provides the information required for the intended use of the particular product. The documentation ist written for technically qualified personal 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 and commissioning as well as safety in operation and maintenance of the product described. Only qualified personal as defined in section 0.1.2 have the specialized knowledge that is necessary to correctly interpret the general guidelines relating to the safety instructions and warnings 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, please contact your local Siemens office.

We would also point out that the contents of this product docmentation shall not become a part 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.

0.1.2 Qualified Personnel

Persons who are **not qualified** should not be allowed to handle the equipment/system. Noncompliance 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 personal** should be allowed to work on this equepment/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 planing and design engineers who are familar 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.

0.1.3 Danger Notices

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

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 eqipment itself have the following significance:

Danger

indicates that death, servere 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 propety 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 particualry information, the definition corresponds to that of "Warning", "Caution" or "Note".

0.1.4 Proper Usage

- The equipment/system or the system components may only be used for the applications described in the catalog or the technical description, and only in combination with the equipment, components and devices of other manufactures 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 planing, 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 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.

0.1.5 Guidelines for the Planing and Installation of the Product

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

The following facts require particular attention:

Note

Even when a high degree of safety 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 faults, 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 wich is not provided with an isolating switch and/or fuses which disconnect all poles, a suitable isolating switch or fuses must bei provided in the building wring system (distribution board). Furthermore, the equipment must bei 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 case of equipment operating on 24 V DC, make sure that the 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).
- Fluctuations or deviations of the power supply voltage from the rated value should not exceed the tolerances specified in the technical specefications. 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/IEC204 (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 instaled 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.

0.1.6 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 drive control, an active fault is generally dangerous because it can result in an unauthorized startup of the drive. On the other hand, a passive fault in a signalling function can result in a dangerous 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.

Warning

In all cases where a fault in an automation equipment can result in severe personal injury or substntial damage to property, ie. where a dangerous fault can occur, additional external measures must 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.)

0.1.7 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 eqipment 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 opering of equipment and improper repairs can result in loss of life or severe personal injury as well as substantial property damage
- Before opering 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 classfied 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 incense to operate such a modified unit automatically lapses and the unit must not be operated at all.

0.2 Guidelines for Handling Electrostatically Sensitive Divices (ESD)

0.2.1 What is ESD?

VSLI chips (MOS technology) are used in practically all our modules. These VLSI components are, by their nature, very sensitive to overvoltage and thus to electrostatic discharge:

They are therefore defined as
"Electrostatically Sensitive Device".

"ESD" is the abbrevation used internationally.

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

ESDs can be destroyed by voltage and enercy 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.

0.2.2 When is a Static Charge Formed?

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

Small charges up to 100 V are very common; these can, however, very quickly rise up to 35000 V!

Examples fo static charge:

– Walking on a carpet	up to	35000 V
– Walking on a PVC flooring	up to	12000 V
– Sitting on a cushioned chair	up to	18000 V
– Plastic desoldering unit	up to	8000 V
– Books etc. with a plastic binding	up to	8000 V
– plastic bags	up to	5000 V
– Plastic coffee cup	up to	5000 V

0.2.3 Important Protective Measures against Static Charge

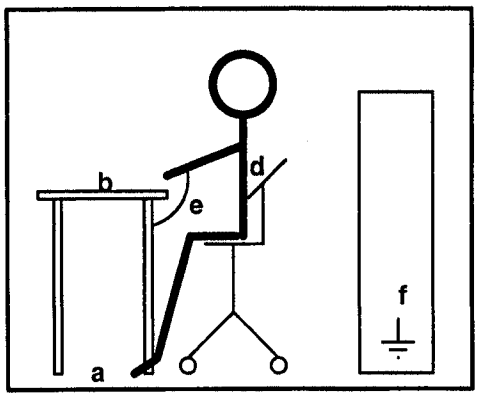
- Most plastic materials are highly susceptible to static charge and must therefore be kept as far away as possible from ESDs!
- Personnel who handle ESDs, the work table and the packing must all be carefully grounded!

0.2.4 Handling of ESD Modules

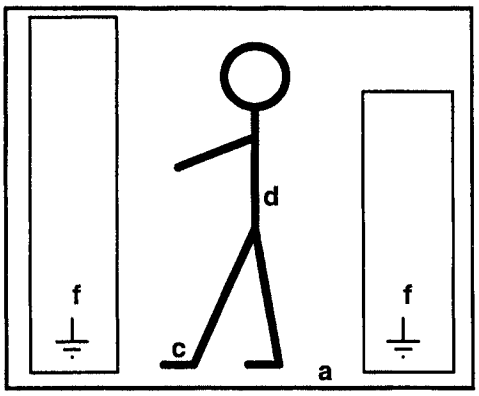
- One basic rule to be observed is that electronic modules should be touched by hand only if this is necessary for any work to be done on them. Do not touch the component pins or the conductors.
- Touch components only if
  - the person is grounded at all times by means of a wrist strap

  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 chage. 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 shoud 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 visual display units, monitors or TV sets (minimum distance from screen > 10 cm).

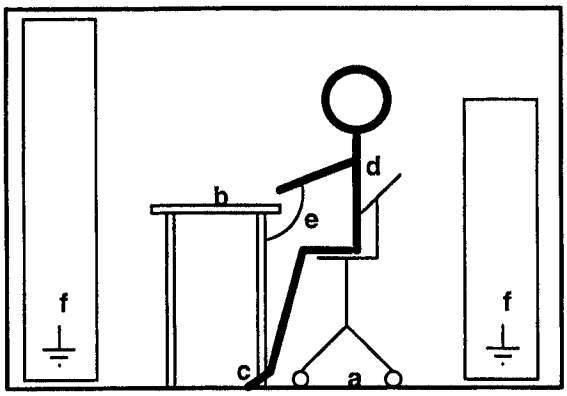
The diagram below shows the required protective measures against electrostatic discharge.



Sitting position



Standing position



Standing/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

0.2.5 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.

0.2.6 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 moduls 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 unsulating tape or material.

1 Description

1.1 Range of Application

In many applications, process control facilities handle bulk data. However, not all of these data have to be held in the RAM of the programmable controller (AG), e.g. formulas, operating or machine data or application programs etc. At some times the quantity of data will exceed the RAM capacity of the AG.

The memory module CP 516 was designed to accommodate these data.

The CP 516 can be installed in the AGs listed below

- SIMATIC S5–115U (CPU 941, 942, 943, 944, 945)
  (Adaptation module required; no fan required);
- SIMATIC S5–115H (CPU 942H)
  (Adaptation module required; no fan required);
- SIMATIC S5–135U (CPU 922, 928, 928B);
- SIMATIC S5–150U;
- SIMATIC S5–155U (CPU 946/947, CPU 948);
- SIMATIC S5–155H (CPU 946R/947R, CPU 948R).

Memory Cards

The memory on the CP 516 is accommodated on two plug–in Memory Cards of the SIMATIC S5 equipped with RAMs or FLASH EPROMs.

☞ **Attention:**
Memory Cards sold by third party manufacturers cannot be used!

Standard Function Blocks

The operation of the memory module CP 516 requires the standard function blocks (FB 199; chapter 4, "Accessories and Replacement Parts"):

- for S5–115U, –115H: FB EXT–115U, FB EXT–945U with CPU 945;
- for S5–135U: FB EXT–135R;
- for S5–150U: FB EXT–150U;
- for S5–155U, –155H: FB EXT–155U.

Data Handling Blocks

The operation of the CP 516 also requires the data handling blocks (chapter 4, "Accessories and Replacement Parts"; described in the catalogue ST 57).

Data Block DB 255

For the communication between the CPU and the CP 516, the data block DB 255 must be reserved.

1.2 Features

- For the CP 516, Memory Cards with RAM and FLASH EPROM are available in the following memory sizes:
  - RAM: 256kbyte, 512kbyte, 1Mbyte, 2Mbyte;
  - FLASH-EPROM: 256kbyte, 512kbyte, 1Mbyte, 2Mbyte, 4Mbyte.
- Mixed use of RAM and FLASH EPROM is possible.
- The largest possible memory capacity is 8Mbyte.
- The use of standard function blocks allows easy communication between the CPU and the CP 516.
- Memory Cards with RAM are not subject to any limitations as far as the number of reads and writes to/from them is concerned.
  They are buffered while on the module. When off the module the data they contain is volatile.
- Memory Cards with FLASH EPROM allow approximately 10000 writes and can be read from an unlimited number of times.
  They can only be erased completely and their main application is therefore as read only memory. The do not require battery buffering and retain their data without voltage applied and even when removed from the module.
- Page frame addressing:
  On the module, settings for 1 or 4 page frames (interfaces; this number is limited by the standard FBs EXT-...) can be made. Thus, 8 or 2 modules can be inserted in the AG.
- Direct data transmission between the programmer interface module (PG) and the CP 516 is possible if the PG is connected to the front panel plug of the CP 516.

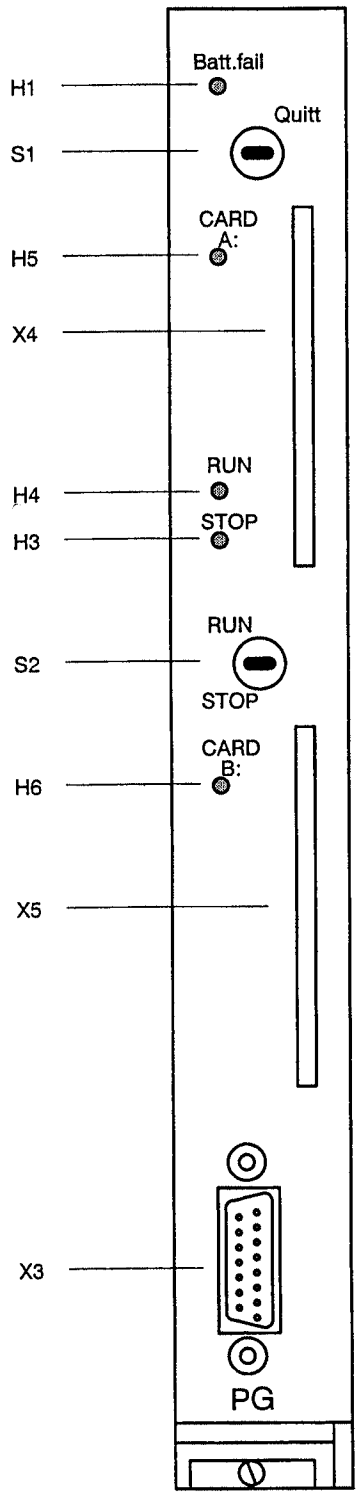
1.3 Design

1.3.1 Mechanical Design

The memory module CP 516 has been designed as a single width compact module. It occupies one slot within the AG. For the installation in the AG S5-115U, an adaptation module is required.

Figure 1.1 shows the front panel of the CP 516.
The Memory Card inserted at the top is addressed by the software or by the PG as "A:", the card inserted at the bottom is addressed as "B:"
The programmer interface is connected to the 15 pin Sub-D socket at the bottom.

Figure 1.2 shows the PCB of the CP 516.
The module is equipped with two battery holders. However, only one battery is required for the buffering of the data. This allows replacing the battery without losing data.



H1	yellow LED:	internal battery empty
H3	red LED	STOP
H4	green LED	RUN
H5	green LED	Memory Card A: selected
H6	green LED	Memory Card B: selected
S1	key	acknowledgement for "internal battery empty"
S2	switch	RUN/STOP
X3	socket	conn. for programmers interface
X4	slot	for Memory Card A:
X5	slot	for Memory Card B:

Figure 1.1 Front panel of the CP 516

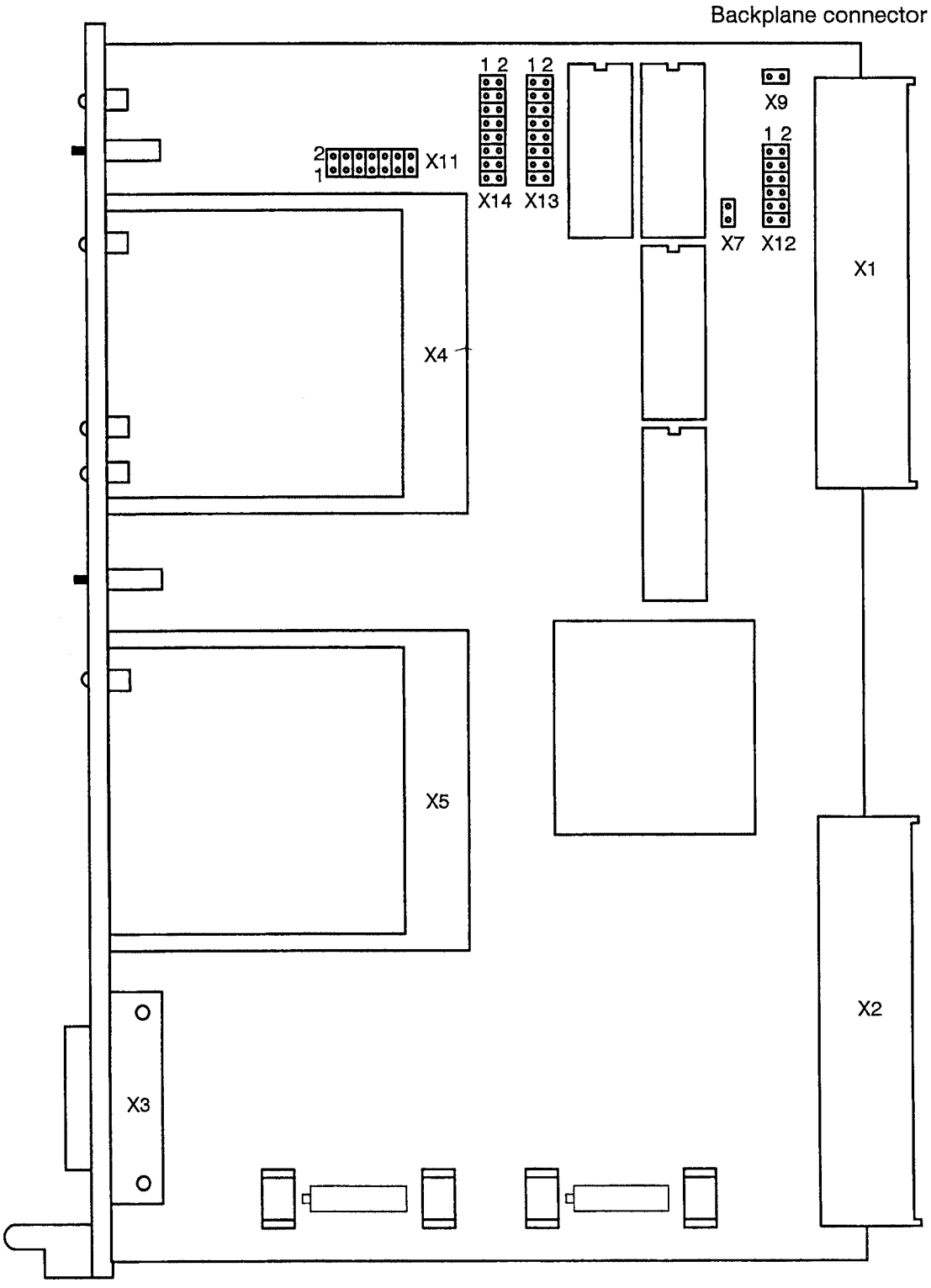


Figure 1.2 PCB of the CP 516; positions of the jumper modules

Siemens AG Order No.: T89120–E3031–U10–*–7619
Instruction Manual: SIMATIC S5, Memory Module CP516

1.3.2 Scope of Delivery

The CP 516 package includes:	*Order No.*
Memory module CP 516 with 2 slots for one Memory Card each; with 10 jumper modules	**6ES5516–3UA11**

Not included are (chapter 4, "Accessories and Replacement Parts"):

- Memory Cards
- Standard function blocks with instruction manual CP 516 (german, english or french)
- Data handling blocks
- Buffer battery for RAM

1.4 Method of Operation

1.4.1 Function Diagram

Figure 1.3 shows the main components of the CP 516. The central processor which handles the data traffic is the microprocessor 80C188 equipped with firmware stored in an EPROM and with RAM.

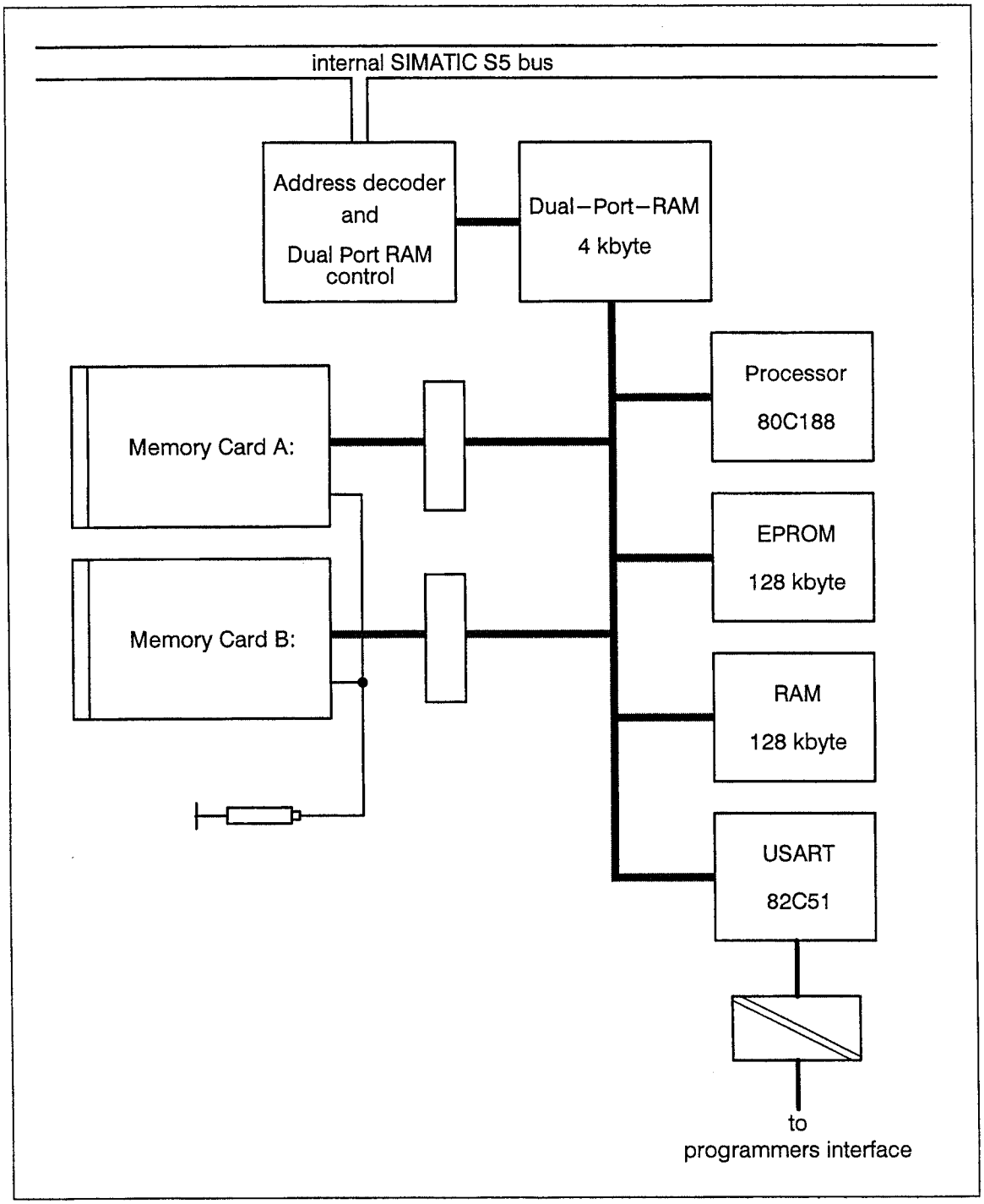


Figure 1.3 Function diagram of the memory module CP 516

1.4.2 Interface with the CPU

Addressing

The memory module CP 516 is addressed in page frame mode.

The number of page frames (interfaces with the AG) the module allocates is set to 1 or 4 by a jumper.
The standard function block EXT–... handles up to 8 interfaces. This allows the following configurations of CPs with one AG:
– with number of page frames = 1: 8 CP 516
– with number of page frames = 4: 2 CP 516

The base address of the page frames for the CP 516 is set to F400H in the standard function blocks EXT–... (the factory jumper settings must not be changed.)
The first page frame number (interface number 0 to 255) the CP 516 is to be addressed under must be set by a jumper.

Dual Port RAM

A 4 kbyte dual port RAM (i.e. 4 page frames with continuous numbers = offsets) acts as an interface for the exchange of data with the CPU.

Each CP module has an offset register with an identical address (FEFFH). A CPU uses the data handling blocks to write a data byte (an offset = page frame number) to this address on all CPs. Only the CP which has been set to this page frame number enables this page frame. All other page frames are disabled towards the S5 bus. On the CP 516, even if four page frames (interfaces) have been set, only one page frame is active towards the S5 bus. Switching between page frames is done if the CPU writes a new page frame number to the offset register.

1.4.3 Functions (Operating modes)

Transmission of Data Blocks

The user exchanges data among CPU and CP 516 as data blocks. For this purpose he/she uses standard function blocks EXT–... in his/her program. These standard function blocks and their parameterizing are described in detail in the instruction manuals "Memory Module CP 516, Standard Function Blocks EXT–...".

In addition, the data exchange requires the following data handling blocks to be available on the CPU:

- SEND,
- FETCH,
- RECEIVE,
- SYNCHRON.

For each page frame (interface) the program has to execute a SYNCHRON request upon voltage return. An interface which has not been synchronised will accept no requests.

If more than one CPU request access to the same block (in the same sector of the same Memory Card), the conflict is handled as follows:

- If the requests in question are read requests, the CP 516 handles these requests as desired.
- If a write request is active for this block, the CP 516 rejects any incoming requests for this block. The FB EXT–... recognises this and processes the request after having completely processed the current request.
- If a read request for this block is active, the CP 516 rejects incoming write requests for this block. This is recognised by the FB EXT–... who processes this request after the current request has been completely processed. The CP 516 permits additional read requests.

Management Functions

In addition to the transmission of data blocks the CP 516 provides the user with the following management functions for Memory Card, sectors and data blocks:

- renaming a sector,
- erasing a sector,
- erasing individual data blocks within a sector,
- transferring the directory of a sector,
- Memory Card info,
- copying the contents from Memory Card A: to B: or vice versa,
- formatting a Memory Card.

The functions are described in detail for each AG in the instruction manuals "Memory Module CP 516, Standard Function Blocks EXT–...".

1.4.4 Memory Cards of the SIMATIC S5

Usable Memory Card Types

On the CP 516,

- RAM based and,
- FLASH EPROM based

Memory Cards can be used (chapter 4, "Accessories and Replacement Parts"). Different types of Memory Cards may be used at the same time in different slots.
At least one Memory Card must always be in use.

☞ **Attention:**
Memory Cards produced by third party manufacturers cannot be used!

Facts on FLASH EPROM Types

FLASH EPROM based Memory Cards can be exchanged without removing the voltage. However, this makes sense only while the memory module is in STOP state and if neither PG nor AG are accessing the Memory Card.

On the CP 516, FLASH EPROM based Memory Cards can only be erased completely by formatting them. Deleting (i.e. invalidating) blocks does not free storage capacity on a FLASH EPROM based Memory Card.
Writing to a Memory Card is actually writing a data block with a specified number to a specified sector of the Memory Card. If one block – i.e. the same sector name and the same DB number on a FLASH EPROM based Memory Card is written to repeatedly, the CP 516 invalidates the older block and writes the new one. The storage space occupied by the invalidated block remains allocated, however. If the entire storage capacity is exhausted, the user has to reformat the Memory Card.

Facts on RAM based Types

If RAM Memory Cards are replaced, the data they are storing are lost, since they are not battery buffered.

RAM based Memory Cards do not have to be compressed or reformatted, since the CP 516 writes into any gaps available.

Sectors

The memory on Memory Cards is organised in sectors (like directories on disks): with every write request to a Memory Card, a sector name and a data block number must be specified. If there is no sector with the specified nyme, the CP 516 creates that sector.
Blocks of identical type and block number can be stored under different sector names. This is i.e. useful for the handling of formulas.

The sector name is made up of 8+3 alphanumeric characters. The specification of the sector name must be preceded by the slot ID (like a drive ID) "A:" or "B:" of the Memory Card the sector is located on. For more examples, please refer to the instruction manuals "Memory Module CP 516, Standard Function Blocks EXT–...".

The number and size of sectors are variable. Their number is not limited.

Block Size

The CP 516 stores and manages blocks of a minimum size of 1kbyte.
This means that each block allocates at least 1kbyte of storage space, even if its actual length is only 10 bytes.
The block length is not limited, but the programmers interface limits its length to 2048 words.

The entire number of blocks which can be stored depends on the size and number of the Memory Cards inserted.

Monitoring

The CP 516 constantly monitors the two slots and detects whether a Memory Card has been inserted or removed. If a new Memory Card is inserted, the CP 516 updates the Memory Card type and the Memory Card capacity in order to allow the user to request information on the Memory Cards.

If a block is set up or modified, the CP 516 first writes the new block entry to the directory together with the preliminary ID "Block is written". After completion of the write process, the CP 516 marks the older block entry as invalid in the directory and sets the new entry to valid.

If the process of renaming a block from "block is written" to "valid" is interrupted, the CP 516 issues an error message. In this case, if the user tries to access the block, he gets the error message 3, "Data block does not exist on CP 516" in the condition code word.

Incoming requests for this Memory Card are rejected by the CP 516 with the error message 8, "Memory Card replaced or full" in the condition code word until the new Memory Card information has been read by a "Memory Card Info" request (request number 19).

If a PG tries to access a replaced Memory Card, the function "INPUT DB255" must be called to select the new Memory Card.

Checksum Generation

In the process of page frame addressing, the CP 516 generates a 16 bit wide checksum from the data of a block and stores this checksum following the data on the Memory Card.

When the block is read, the CP 516 checks its checksum and – if an error is detected (e.g. RAM based Memory Card pulled out – issues an error message in the condition code word of the FB EXT-...: error number 6, "Hardware error".

Memory Management

The structure of the directory and the memory management resemble that of a disk drive.

When a Memory Card is formatted, the CP 516 installs a boot sector which starts at the physical address 0 of the Memory Card. In that boot sector the CP 516 stores a parameter block which contains the physical organisation of the Memory Card.

Since the number of sectors in the root table directory is limited by the format of the Memory Card, the CP 516 creates a subdirectory when the maximum number of sectors is reached. This subdirectory has the name "NAMEN.DIR" and contains all the new sectors. Therefore, the sector name "NAMEN.DIR" must not be used by the user.

The sector "NAMEN.DIR" is internally handled by the CP 516. It does not show up in the list of sector names output during output of DB255.

There is no limit to the number of blocks within sectors.

Example:

Root directoy:	Subdirectory NAMEN.DIR:
ANTON_11.DAT	REZEPTE2.NEW
REZEPTE .DAT	DAT_123 .DAT
REZEPTE .SAV	DAT_123 .SAV
etc.	ANTON_11.SAV
etc.	etc.
NAMEN.DIR	etc.

Sector ANTON_11.DAT:	Sector REZEPTE2.NEW:
DB 1	DB 55
DB 122	DB 121
DB 55	DB 43
DB 110	PB 7
FB 240	PB 8
FB 120	etc.
PB 45	etc.

1.4.5 Module Status RUN, STOP

When the CP 516 is set to RUN, it will assume RUN status only after it has been synchronised. Data traffic with the CPU is
- enabled in RUN status,
- disabled in STOP status.

If the mode switch is set to STOP, the CP 516 sets bit 0 in the interface condition code byte of the handshake area (byte address = page frame address + 996 / 3E4H). This is actually a "not ready" indication, since the standard function block EXT–... does not receive data traffic in this status but sets bit 0 in the parameterising error byte "PAFE" and the error number 8, "interface not ready".

If the "STOP" status occurs while a request is processed, the FB EXT–... indicates this in the condition code word by setting both the bits 1, "FB EXT–... active" and 2, "FB EXT–... completed without error" or the bits 1 and 3, "FB EXT–... completed with error".

A detailed description of the parameterising error byte PAFE and the condition code word ANZW is provided in the instruction manuals "Memory Module CP 516, Standard Function Blocks EXT–...".

1.4.6 Operating Functions with the Programmers Interface

A programmers interface can be connected to the front panel connector of the CP 516 (20mA current loop interface).

For a subset of PG functions, the CP 516 acts like an AG. Some of the operating functions of the CP 516 are executed using the data block DB 255.

The CP 516 provides the operating functions listed below:

– Input block	with PG directly
– Output block	with PG directly
– Compare Blocks	with PG directly
– Transmit blocks	with PG directly
– Erase blocks	with PG directly
– Output directory (directory of a sector)	with PG directly
– Switch CP516 to operating modes RUN, STOP	with PG directly
– Select Memory Card A: or B:	with DB255
– Select sector on Memory Card A: or B:	with DB255
– Format Memory Card A: or B:	with DB255
– Copy a Memory Card	with DB255
– Copy individual sectors	with DB255
– Memory size Memory Card A: or B:	with DB255
– Check Memory Card type A: or B:	with DB255

"with PG directly"	indicates that the CP 516 is operated like a CPU from the PG.
"with DB 255"	indicates that the specified functions are triggered by "Input DB 255 into the AG" or "Output DB 255 from the AG".

In section 2.3.2 the individual functions are described.

1.4.7 Buffer Concept for RAM

Responsible for retaining the data on a RAM based Memory Card are

- the battery in the AG SIMATIC S5 and
- a lithium battery on the CP 516.

A yellow LED at the front panel of the CP 516 indicates low battery voltage of the CP 516 while the AG is on. The battery failure message can also be obtained via the S5 bus. (For more details, refer to the instruction manuals "Memory Modules CP 516, Standard Function Blocks EXT–...".)

The CP516 is equipped with two battery holders which are connected in parallel via 100W each. Only one battery is required, however.
To replace the battery, first insert the new battery into the empty battery holder, then remove the old battery.

The RAM in the Memory Cards is supplied with voltage:

- By the 5V supply of the AG while the AG is on.
- By the battery of the AG while the AG is off and if the AG battery is operable.
- By the battery of the CP 516 if the AG is off and the battery voltage of the AG has dropped below 2.8V.
- By the battery of the CP 516 while the CP 516 is removed from the AG.

The Memory Cards have no built–in battery. If a RAM based Memory Card is pulled, it will lose its data.

1.5 Technical Data

Memory size	max. 8Mbyte (2 Memory Cards with 4Mbyte each)
Usable Memory Cards	
– FLASH–EPROM	256kbyte, 512kbyte, 1Mbyte, 2Mbyte, 4Mbyte
– RAM	256kbyte, 512kbyte, 1Mbyte, 2Mbyte
Insertion cycles of Memory Cards	min. 10000 in clean environment
Processor	80C188
– RAM	128kbyte (Data)
– EPROM	128kbyte (Firmware)
Interface with SIMATIC S5	Dual Port RAM, 4 times 1kbyte
Buffering	internal, via plug–in buffer battery, external, via subrack; both voltage monitored
Environment temperature	
– Operation	0 ... +60 °C
– Transport and storage	–40 ... +70 °C
Relative humidity	code letter F as defined by DIN 40050, no moisture condensation
Operating altitude	up to 1500m above MSL
Supply voltages	+5V, ±5% +24V, +25%, –15%
Buffer battery	lithium battery, 3.6V, 1.9Ah, type AA
Power consumption	
– at +5V	max. 0.8A
– at +24V	max. 25mA
– from the SIMATIC buffer battery	typ. 100µA for a Memory Card with 2Mbyte RAM
Protection type	IP00 as defined in DIN 40040, IEC 144
Space requirements	1 slot
Weight	approximately 600 g

2 Commissioning and Operation

2.1 General Information

The activities required for commissioning must be carried out by authorised personal only! If ESD safety measures are not taken (support, equipotential bonding, ESD protective garments etc.) lasting damages may be inflicted on the module, which may also lead to complete failure. In addition, damages may be inflicted which do not become apparent immediately.

☞ **Attention:**
Please refer to the safety and ESD information in chapter 0.

☞ **Attention:**
Not permitted when live:
- pulling and inserting the module,
- moving jumpers.

Any manipulations to the module beyond normal operation completely void the warranty!

2.2 Commissioning

2.2.1 Jumper Settings

In order to set jumpers, put the module with the component side down on a conductive support as defined by the EGB guidelines.
The positions of the jumper modules are shown in figure 1.2.
Figure 2.1 shows the representation of set jumpers in the following figures.

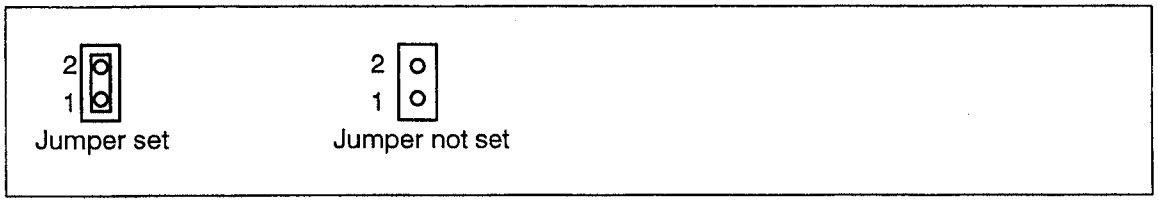


Figure 2.1 Representation of jumpers in the following figures

Addressing mode, jumper module X7

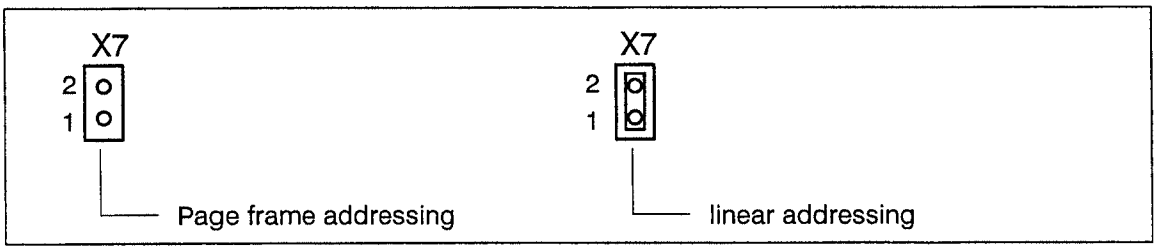


Figure 2.2 Setting the addressing mode; the left hand diagram shows the factory setting (page frame addressing)

The default setting is page frame addressing. Please do not change this setting.

Number of page frames, jumper module X9

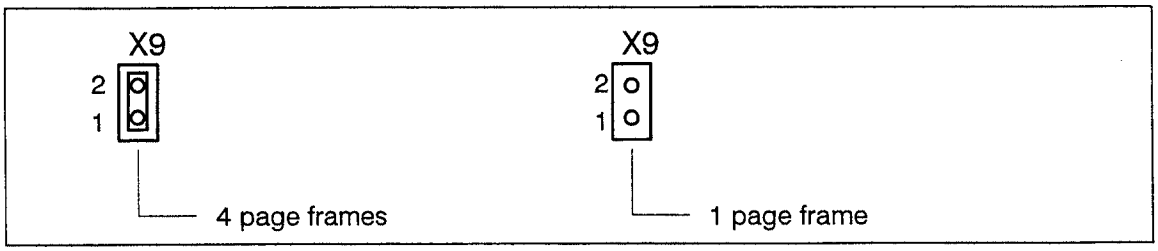


Figure 2.3 Setting the number of page frames; the left hand diagram shows the factory setting (4 page frames)

The default setting is "4 page frames". Please modify this setting to match your application.

Operating modes, jumper module X11

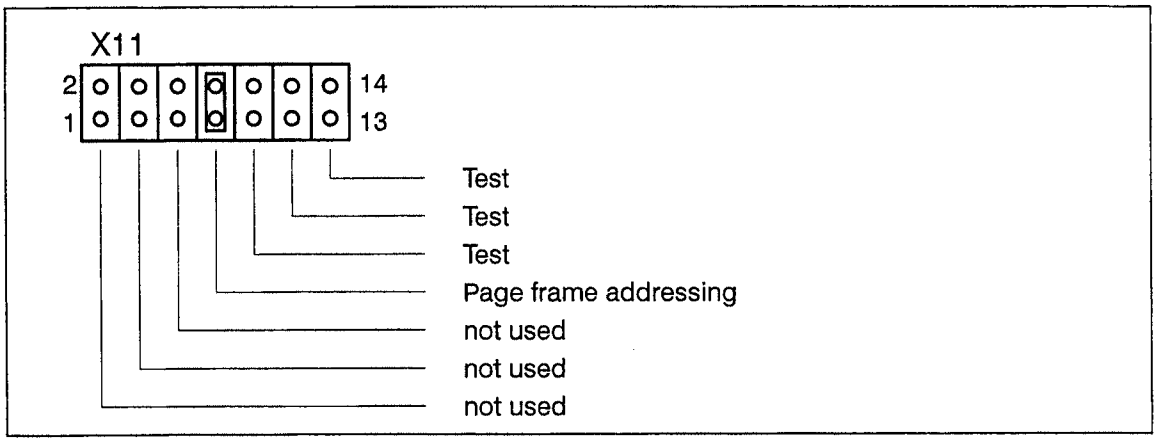


Figure 2.4 Setting the operating mode; this diagram shows the factory setting (page frame addressing)

The default setting is page frame addressing. Please do not modify this setting.

Page frame base address jumper module X12

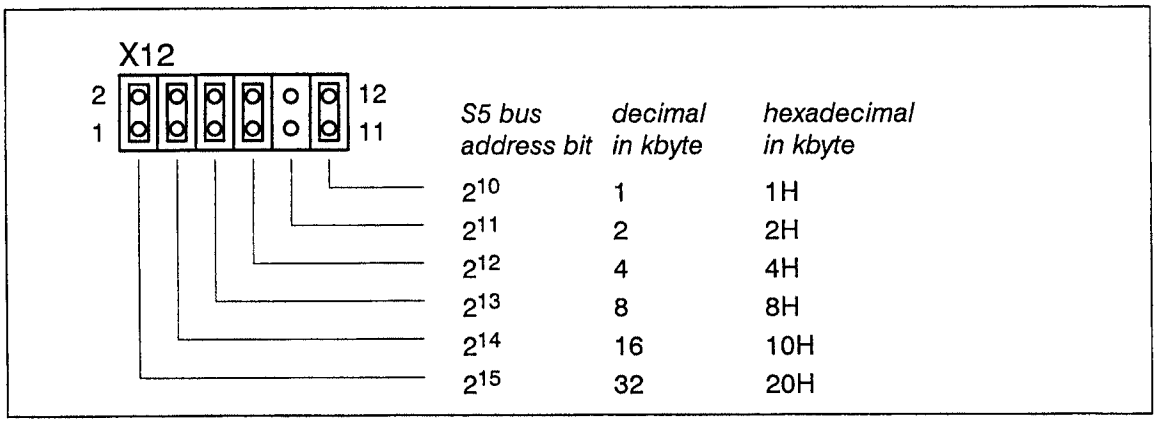


Figure 2.5 Setting the page frame base address; this diagram shows the factory setting (61kbyte = F400H)

The default setting for the page frame base address is decimal 61kbyte or hexadecimal F400H. Please do not modify this setting. The standard function blocks EXT–... require this setting.

Reserved, X10

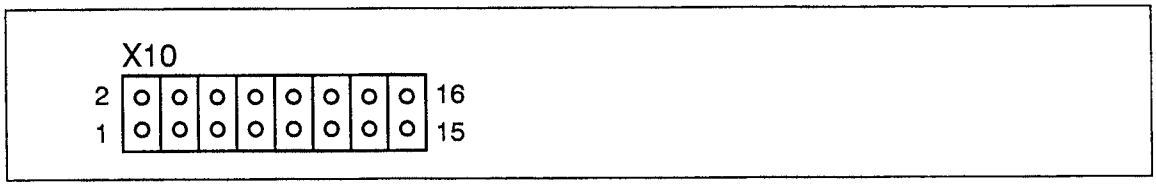


Figure 2.6 Jumper module X10; this diagram shows the factory setting

The default is that no jumper is set. Please do not modify this setting.

Reserved, X14

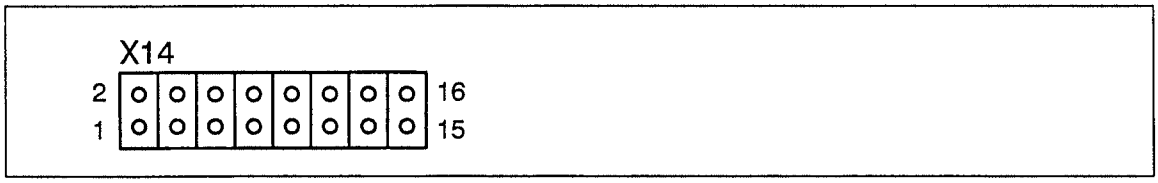


Figure 2.7 Jumper module X14; this diagram shows the factory setting

The default is that no jumper is set. Please do not modify this setting.

Reserved, X15

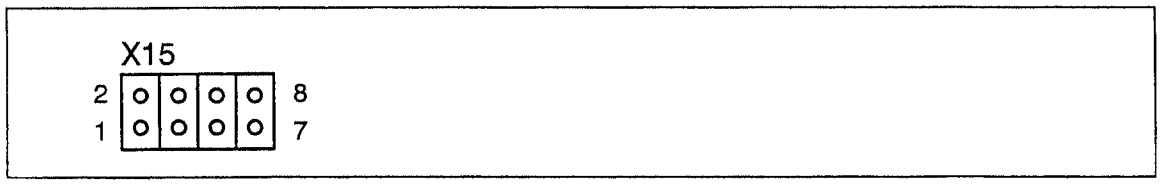


Figure 2.8 Jumper module X15; this diagram shows the factory setting

The default is that no jumper is set. Please do not modify this setting.

Page frame number, X13

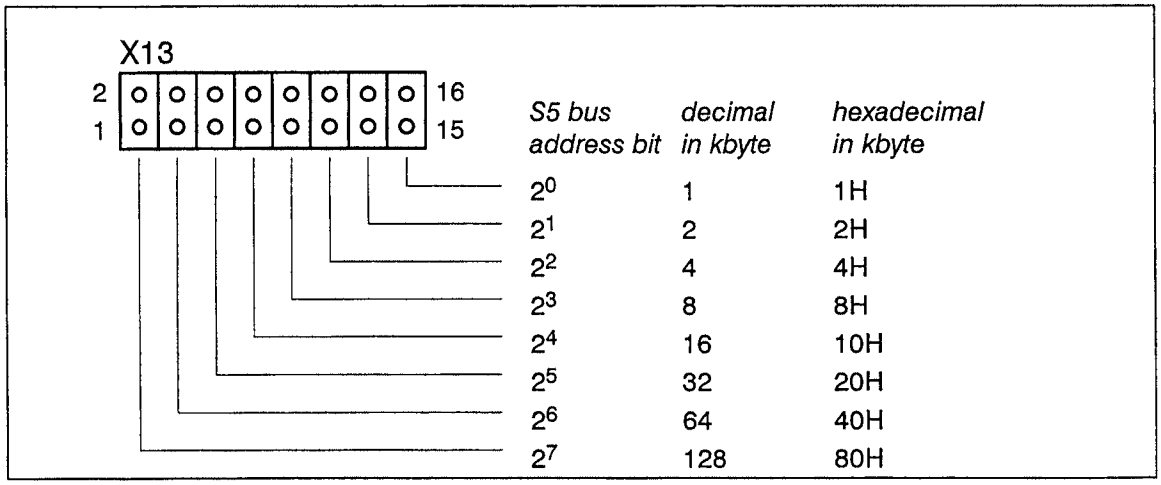


Figure 2.9 Setting the page frame number; this diagram shows the factory setting (number 0)

The default setting is page frame number 0 (no jumper set) for the first page frame to be used for accessing the CP 516.

Please modify this setting to match your application.

2.2.2 Inserting Memory Cards

Please insert the Memory Cards (plug-in types are listed in chapter 4, "Accessories and Replacement Parts") into the slots in the front panel of the module:
the Memory Card which will be addressed as A: should be inserted into the upper slot,
the Memory Card which will be addressed as B: should be inserted into the lower slot.

The Memory Card smoothly slides into the slot. If it does'nt, please insert the Memory Card the other way around.

Number of insertion cycles: 10000 in clean environment.

Non–formatted Memory Cards must be formatted after activation of the CP 516 (section 2.3.2).

2.2.3 Inserting the Buffer Battery

If you are using a RAM based Memory Card, you should insert a buffer battery (section 1.4.7) into one of the holders provided for this purpose. Use batteries which meet the specifications: lithium battery, 3.6V, 1.9Ah, type AA

Insert the battery in the orientation printed on the PCB at the battery holders.

2.2.4 Inserting the CP 516

Make sure the AG is voltage free.

Prior to insertion into an AG SIMATIC S5–115U or S5–155H, insert the CP 516 into an adaptation module 491.

Insert the CP 516 into the CP slot within the AG. The table below shows the possible slots.

Subrack	*possible slots*	
CR 700–0	0 to 2	
CR 700–2, –2F	0 to 5	
CR 700–3	0 to 5	
ER 701–3	0 to 6	
ZG 135U	19 to 67	(for devices with order no. 6ES5135–3**K**A..)
ZG 135U	19 to 131	(for devices with order no. 6ES5135–3**U**A..)
ZG 150U	107 to 131 (3 to 19 only together with routing module 756) (139 and 147 only after modification of jumpers on the bus board)	
ZG 155U	19, 35 to 59, 75 to 131 (139 and 147 only after modification of jumpers on the bus board)	
EG 185U	19 to 131	

2.2.5 Activating the AG

Set the CPU to STOP.

Switch the AG on again.

If the Memory Card has not been formatted:
Switch the CP 516 to STOP.
Connect the programmers interface (PG) to the CP 516.
Send the DB 255 with ASCII contents (=KC) "FORMAT A:" or "FORMAT B:" to the CP 516.

Set the CP 516 to RUN.

Connect the PG to the CPU.

If you are using the MS–DOS operating system on your PG and your standard function blocks FB EXT–...(FB 199) are on an S5–DOS(PCP/M) disk, you have to copy the file containing the standard function block FB EXT–... for your AG from the S5–DOS(PCP/M) disk to your MS–DOS harddisk using "PCOPY".

Transmit the data handling blocks, e.g. SYNCHRON, SEND, RECEIVE etc. to the CPU (not necessary with AG S5 115U).

Transmit the standard function block FB EXT–... required for your AG and the DB 255 to the CPU.

Transmit the data blocks (DB) used by the FB EXT–... to the CPU.

Create the startup OB (e.g. OB 21) with parameterisation and call ing of SYNCHRON.

Create e.g. OB 1 with parameterisation and call ing of the FB EXT–...

Switch the CPU to RUN.

If SYNCHRON in the startup OB has executed successfully, the STOP LED on the CP 516 is extinguished and the RUN LED is lit (S5 bus access open for data transfer).

The data transfer can now be initiated by activating the trigger bit parameterised in the FB EXT–...

The condition code word (see instruction manuals "Memory Module CP 516, Standard Function Blocks EXT–...") shows the status of the FB EXT–...: 0004H indicates "FB EXT–... completed without error".

2.3 Operation

2.3.1 Operating Controls on the Front Panel
(Figure 1.1)

Displays "CARD A:" and "CARD B:"

These green LEDs are lit if the corresponding Memory Card has been selected.

Display "Batt.fail"

This yellow LED is lit if the internal battery is empty.

Switches and displays "RUN, STOP"

Depending on the position of the RUN/STOP switch, the green LED (RUN) and the red LED (STOP) at the front panel of the CP 516 indicate the following:

LED RUN green	*LED STOP red*	*Switch RUN/STOP*	*Significance*
On	On	any	reset status; after power on or reset until SYNCHRON has been executed successfully.
			following SYNCHRON this is not a defined state; CP 516 is probably defective.
On	Off	RUN	operating condition following SYNCHRON.
Off	On	STOP	data traffic with CPU is disabled.
Off	On	RUN	during startup of the system, an error occurred or STOP from the programmers interface.

2.3.2 Operating Functions with the Programmers Interface

A programmers interface can be connected to the front panel connector of the CP 516 (20mA current loop interface).

For a subset of the operating functions, the CP 516 acts like an AG. Some of the operating functions related to blocks require previous selection of the corresponding sector by the DB 255.

The CP 516 supports the following operating functions:

- Input block with PG directly
- Output block with PG directly
- Compare blocks with PG directly
- Transmit blocks with PG directly
- Delete blocks with PG directly

– Output directory of a sector	with PG directly
– Switch the CP516 to the operating modes RUN, STOP	with PG directly
– Select Card A: or B:	with DB255
– Select sector on Memory Card A: or B:	with DB255
– Format Memory Card A: or B:	with DB255
– Copy a Memroy Card	with DB255
– Copy individual sectors	with DB255
– Memory size Memory Card A: or B:	with DB255
– Check type of Memory Card A: or B:	with DB255

"with PG directly" indicates that the CP 516 is handled from the PG like a CPU. (see device manual "Programmers Interface")

"with DB255" indicates that the specified functions are triggered by "Input DB 255 into the AG" or "Output DB 255 from the AG".

Formatting or copying a Memory Card from the PG is possible only if the CP 516 is in the condition STOP.
All other functions are possible both in STOP or RUN condition.

Selecting Memory Card A: or B:

Input DB 255:

```
0:   KC = A:          ; select Card A:
1:
```

or

```
0:   KC = B:          ; select Memory Card B:
1:
```

All other operating functions refer to the selected Memory Card.
(e.g. memory size, directory, ...)

Each Memory Card is assigned an LED at the front panel of the CP 516. After selection of a Memory Card the corresponding LED is lit if the Memory Card has been inserted. The selection remains valid until another Memory Card is selected by the PG or until this Memory Card is pulled out. If a Memory Card which is not inserted is selected, the selection has to be repeated after insertion of the Memory Card.

If the selected Memory Card has not been formatted, the PG reports the error "Memory Error in AG".

Selecting a sector on Memory Card A: or B:

Input DB 255 (Examples):

```
0:   KC = A:NAMEXYZ0.DAT
7:
```

or

```
0:   KC = NAMEXYZ0.SAV
6:
```

or

```
0:   KC = B:NAME1.NEU
6:
```

or

```
0:   KC = NAME.D
3:
```

or

```
0:   KC = A:SEKTOR
4:
```

A sector can be selected with or without specification of the name of the corresponding Memory Card (A: or B:):

If the name is specified, the CP 516 switches to that Memory Card. That Memory Card is now the selected Memory Card.

If no Memory Card name is specified, the selected Memory Card remains selected. If no Memory Card had been selected before (both selection LEDs at the front panel are off), the PG rejects functions such as "Output directory" and issues an error message.

A sector name consists of up to 8+3 ASCII characters, separated by a full stop; up to 8 characters to the left of the full stop, up to 3 characters to the right of the full stop. If less characters are specified, the PG adds blanks until the name consists of 8+3 characters. If there are no characters specified to the right of the full stop, the full stop may be omitted.

Sector names may contain any printable character except blanks. The only exceptions to this are the keywords:
A:, B:, COPY, FORMAT, BLOCK, NAMEN.DIR.
These strings must not be used as sector names.

Formatting a Memory Card A: or B:

Formatting a Memory Card is possible only while the CP 516 is STOPped.

Input DB 255:

```
0:   KC = FORMAT A:    ; Formatting Memory Card A:
5:
```

or

```
0:   KC = FORMAT B:    ; Formatting Memory Card B:
5:
```

The formatting function requires the name of the Memory Card (A: or B) to be specified. Prior to formatting, the PG issues the message "DB 255 already in AG, overwrite?". If you press the transfer key, the formatting is carried out. If you press the abort key, the Memory Card is not formatted.

After the formatting, all data on the Memory Card are deleted.

Copying a Memory Card

Copying a Memory Card is possible only while the CP 516 is in STOP condition.

Input DB 255:

```
0:   KC = COPY A: B:     ; copy Memory Card A: to B:, conditionally
5:
```

or

```
0:   KC = COPY B: A:     ; copy Memory Card B: to A:, conditionally
5:
```

or

```
0:   KC = COPY A: B: /U ; copy Memory Card A: to B:, unconditionally
7:
```

or

```
0:   KC = COPY B: A: /U ; copy Memory Card B: to A:, unconditionally
7:
```

The data are copied from the source Memory Card to vacant areas in the target Memory Card.

Prior to copying a block, the CP 516 checks the size of the vacant memory in the target Memory Card. If the block is too large to fit into the target Memory Card, the copying process is aborted; thus, there are no incomplete blocks on the target Memory Card. In this case, the PG terminates the "Input DB 255" with the message "Storage space in AG insufficient".

Copying is possible conditionally or inconditionally (parameter /U).

Conditional copying (option /U not specified):

Prior to copying the PG checks whether there is a block like the one to be copied from the source Memory Card already on the target Memory Card under the same sector name. If this is the case, at the PG, the message "DB 255 already in AG, overwrite?" is issued.
At the PG, you are unable to recognize, which block and which sector name are actually the ones in question.

If you press the transfer key, the PG will stop checking for existing blocks and overwrite these blocks on the target Memory Card.

If you press the abort key, the PG aborts the copying process.

Unconditional copying (option /U specified):

All blocks on the source Memory Card are transferred to the target Memory Card. Blocks which already exist on the target Memory Card under the same sector name are overwritten without warning.

Important note for FLASH EPROM based Memory Cards:
If a Memory Card is copied to a new formatted Memory Card, the data are compressed. Only valid data are transmitted to the target Memory Card. On the target Memory Card the data belonging to one block are arranged without gaps in–between.

If a Memory Card is missing, the PG issues the error message "Block list does not exist in AG" as a response to "Input DB 255".

Copying individual sectors

Input DB 255 (Examples):

```
0:  KC = COPY A:REZEPTE.DAT A:REZ          ; first line
12: KC = EPTE.SAV                          ; second line
16:
```

or

```
0:  KC = COPY A:NAMEXY.D B:NAME.N
12: KC = EU /U
15:
```

or

```
 0: KC = COPY SEKTOR1.DAT SEKTOR1
12: KC = .SAV /U
16:
```

Individual sectors can be copied within a Memory Card or from one Memory Card to another. If the target sector name does not exist, it is created automatically. If the source sector name does not exist or if the specified Memory Card has not been inserted, the PG terminates the "Input DB 255" and issues the error message "Block does not exist in AG".

If A: or B: is not specified with the sector name, the copy process is carried out within the currently selected Memory Card.

Similar to the procedure for copying an (entire) Memory Card, individual sectors may also be copied conditionally or unconditionally (parameter /U).

If a conditional copy is aborted because a block under the specified target sector name already exists, it is possible to list the sector names of existing blocks at the PG by calling the utility function "Output directory".

When copying sectors, the existing blocks are not listed in the DB 255.

Memory size Memory Card A: or B:

After having selected a Memory Card you can check the capacity of the memory on that Card by calling the PG function "AG–INFO" and "SPAUS" (memory size).

At the output line "AG–RAM AUSGEBAUT BIS:" the memory capacity of the currently selected Memory Card; the output line "AG–SPEICHER BELEGT BIS:" informs you of the currently used memory area. This value is output in kbyte as a hexadecimal number. E.g., 100H = 256kbyte.

Check type of Memory Card A: or B:

"OUTPUT DB 255" at the PG lists the sector names and the firmware version plus additional information on the currently selected Memory Card (format KC).

Example:

```
MODUL A: Sektor .xyz          ; Memory Card (A: or B:), current sector
6ES5374-2FL21                 ; order no. of the Memory Card
FLASH-EPROM                   ; Memory Card type (RAM or FLASH-EPROM)
2Mbyte                        ; Memory Card capacity
APPLIKATION: CP 516           ; Information on directory structure
FW: V1.0                      ; Firmware version of the CP 516
1-20/20                       ; Displayed sector names
                              ; from .. to .. / total available
Inhaltsverzeichnis:           ;List of sector names
```

If there are more than 298 sectors, the following sector names can be output by a consecutive "Output DB255".

2.3.3 Control Module RUN/STOP

RUN specifies that the CPU has access to the CP 516.
STOP specifies that the CP 516 rejects access requests issued by the CPU (see instruction manuals "Memory Module CP 516, Standard Function Blocks EXT-...").

"AG-FUNKTIONEN" at the PG and "START" or "STOP" control the operating status of the memory module from the PG. The control via PG takes effect only if the switch RUN/STOP at the front panel of the CP 516 is set to RUN.

3 Preventive Maintenance

General Information

The only servicing the CP 516 requires is replacing the battery.

The module has passed computer tests and dynamic tests at the factory. It should not be repaired at the installation site.

The battery should only be inserted if RAM based Memory Cards are used.
It should be replaced after one year.

☞ **Attention:**
Any manipulations to the module beyond normal operation void the warranty!

4 Accessories and Replacement Parts

Material		*Order No.*
Memory Module CP 516 with 2 slots for one Memory Card each		**6ES5516–3UA11**
Memory Card		
with RAM, 256kbyte		**6ES5374–2AH21**
with RAM, 512kbyte		**6ES5374–2AJ21**
with RAM, 1Mbyte		**6ES5374–2AK21**
with RAM, 2Mbyte		**6ES5 374–2AL21**
Memory Card		
with FLASH–EPROM (12V type), 256kbyte	(phased–out product)	**6ES5374–2FH21**
with FLASH–EPROM (12V type), 512kbyte	(not ex catalog)	**6ES5374–2FJ21**
with FLASH–EPROM (12V type), 1Mbyte	(not ex catalog)	**6ES5374–2FK21**
with FLASH–EPROM (12V type), 2Mbyte		**6ES5374–2FL21**
with FLASH–EPROM (12V type), 4Mbyte	(not ex catalog)	**6ES5374–2FM21**
with FLASH–EPROM (5V type), 256 kByte		**6ES5 374–2KH21**
with FLASH–EPROM (5V type), 1 Mbyte		**6ES5 374–2KK21**
with FLASH–EPROM (5V type), 2 Mbyte		**6ES5 374–2KL21**
with FLASH–EPROM (5V type), 4 Mbyte		**6ES5 374–2KM21**
Standard Function Blocks EXT–... (FB 199) for SIMATIC S5–115U (CPU 941, 942, 943, 944, 945), SIMATIC S5–115H (CPU 942H), SIMATIC S5–135U (CPU 922, 928, 928B), SIMATIC S5–150U, SIMATIC S5–155U (CPU 946/947, CPU 948), SIMATIC S5–155H (CPU 946R/947R, CPU 948R); with device manual;		
shipped in S5–DOS (PCP/M) format on $5^1/_4$ and $3^1/_2$ inch disks:		
– german		**6ES5848–8GC11**
– english		**6ES5848–8GC21**
– french		**6ES5848–8GC31**
shipped in MS–DOS format on $3^1/_2$ inch disks:		
– german		**6ES5848–6GC11**
– english		**6ES5848–6GC21**
– french		**6ES5848–6GC31**
Data handling blocks for – SIMATIC S5–115U,–115H (CPU941,942,942H,943,944,945) in the CPU operating system		
shipped in S5–DOS (PCP/M) format on $5^1/_4$ and $3^1/_2$ inch disks:		
– SIMATIC S5–135U (CPU 922, 928, 928B)		**6ES5842–8CB01**
– SIMATIC S5–150U		**6ES5844–8CA01**
– SIMATIC S5–155U, –155H (CPU 946/947/948, 946R/947R/948R)		**6ES5846–8CA01**
shipped in MS–DOS format on $3^1/_2$ inch disks:		
– SIMATIC S5–135U (CPU 922, 928, 928B)		**6ES5842–7CB01**
– SIMATIC S5–150U		**6ES5844–7CA01**
– SIMATIC S5–155U, –155H (CPU 946/947/948, 946R/947R/948R)		**6ES5846–7CA01**

Device manual CP 516

– german	**6ES5998–1EB11**
– english	**6ES5998–1EB21**
– french	**6ES5998–1EB31**

Buffer battery

for CP 516	**6ES5980–0AE11**

5 Appendix

5.1 Connector Pin Assignment

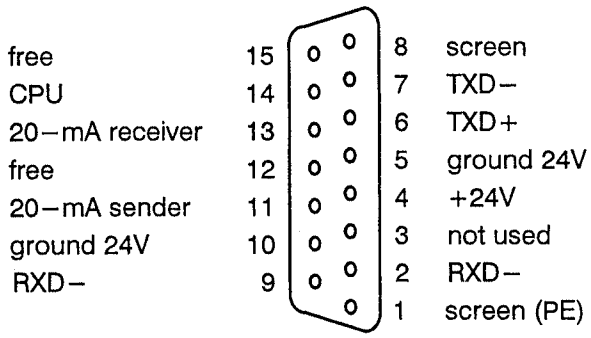
Backpanel connector X1

	d	b	z
2	--	0 V	+5 V
4	UBATT	--	--
6	ADB12	ADB0	RESET
8	ADB13	ADB1	MEMR-N
10	ADB14	ADB2	MEMW-N
12	ADB15	ADB3	RDY-N
14	--	ADB4	DB0
16	--	ADB5	DB1
18	--	ADB6	DB2
20	--	ADB7	DB3
22	--	ADB8	DB4
24	NAU-N	ADB9	DB5
26	--	ADB10	DB6
28	DSI-N	ADB11	DB7
30	--	BASP	M24
32	--	0 V	--

Backpanel connector X2

	d	b	z
2	--	0 V	+5 V
4	--	--	--
6	--	--	--
8	--	--	--
10	--	--	--
12	--	--	--
14	--	--	NAU-N
16	--	--	BAU-N
18	--	--	--
20	--	--	--
22	TXD(MUX)	--	--
24	--	--	--
26	--	RXD(MUX)	--
28	--	--	--
30	--	M24	M24
32	--	0 V	+24V

Socket X3
for programmers interface



To

Siemens AG

ATD TD6 EPG
Günther-Scharowsky-Str.2

D-91058 Erlangen

SIMATIC S5
Memory module CP 516

Instruction Manual

Order No.: T89120-E3031-U10-*-7619
Edition January 1998

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SIEMENS

SIMATIC S5

Memory Module CP 516

Standard Function Block EXT-115U for AG S5-115U (CPU 941, 942, 943, 944) AG S5-115H (CPU 942H)

Standard Function Block EXT-945U for AG S5-115U (CPU 945)

Instruction Manual

Edition August 1994

Version 3

Table of Contents

Note:

These instructions do not purport to cover all details in equipment, nor to provide for every possible contingency to be met in connection with operation.

Should further information be desired or should particular problems arise which are not covered sufficiently for the Purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

The contents of this instruction manual shall not become part or modify any prior or existing agreement, commitment or relationship. The Sales Contract contains the entire obligations of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

☞ It is our objective to provide optimum documentation. Should you have difficulties understanding any part of this manual, please do not hesitate to contact us. We would greatly appreciate any suggestions for improvement. You will find a preprinted form at the end of the manual.
In an emergency, you can reach us over our "hotline" telephone number ..9131–7–22888.

1 Description

1.1 Range of Application

The memory module CP 516 can be used in programmable controllers (AG) of the SIMATIC S5 series. This instruction manual refers to the AG

- SIMATIC S5–115U (CPU 941, 942, 943, 944, 945) and
- SIMATIC S5–115H (CPU 942H).

In the AG S5–155H the CP 516 can be used in unilateral or switched unit configurations.

Data (data blocks DB) can be swapped from the memory of the CPU 941, 942, 942H, 943, 944 to or 945 the memory module CP 516.
The CP 516 can accommodate 2 Memory Cards (addressed as "A:" and "B:"). Memory Cards are available as RAM based and as FLASH EPROM based versions.
Each Memory Card can be organised in sectors (addressed using names composed of 8+3 ASCII characters). Different sectors may contain data blocks of identical numbers.

From within the CPU program, the CP 516 is addressed like a communication processor (CP) by specifying an interface number (SSNR). The CP 516 hardware is configurable to provide either 1 or 4 interfaces.
Depending on the configuration, either a maximum of 2 or a maximum of 8 CP 516 can be operated in a programmable controller.

The standard function blocks

- FB EXT-115U (for CPU 941, 942, 942H, 943, 944) and
- FB EXT-945U (for CPU 945)

are called by the number 199.

Therefore in this instruction manual they are designated as **FB 199** further on.

The standard function block FB 199 (to be parameterized by the user) handles the data transfer between the CPU of the AG and the memory module CP 516.
In addition, the FB 199 handles file management tasks.

The FB 199 handles up to 8 interfaces.

1.1.1 Required Software Modules

The FB 199 uses the following data handling blocks available in the CPU:

- FB 244: SEND,
- FB 245: RECEIVE,
- FB 246: FETCH,
- FB 247: CONTROL,
- FB 249: SYNCHRON.

The following items must be available within the CPU

- OB 20 (startup) and OB 21 and OB 22 (restart),
- DB 255 (data buffer).

1.2 Program Structure

The data handling block SYNCHRON (chapter 4) synchronises the CPU and the CP 516:
The FB 199 cannot be executed unless the SYNCHRON data handling block parameterised by the user has executed successfully in the startup branch (startup with OB 20 or restart with OB 21, OB 22) of the AG. This is a prerequsite for a sensible communication between the data handling blocks SEND, FETCH and RECEIVE and the CP 516.

The data handling block SYNCHRON must be called for each of the interfaces of the AG with the corresponding parameters.

The FB 199 is called in the cyclic section of the program (OB 1); the specified interface number must be identical to that of the corresponding call to SYNCHRON.

Parameters for the FB 199 are optionally specified in direct or in indirect mode (section 2.1):

- in direct mode, the parameters are entered into the FB 199 directly.
- in indirect mode, the two mandatory parameters plus two pointers to parameter fields are entered at the FB 199.
  Indirect parameterisation allows the user to specify the required parameters for the FB 199 only once.

To initialise the FB 199, the user sets a trigger bit. After this, the FB 199 requires several cycles to complete the data transfer.
During this period of time, the user must not modify the trigger bit nor any other parameters of the FB 199; i.e. he must not initiate another request for the FB 199 before the previous request for a specific interface has either been completed successfully or has been terminated with an error.

After completion or termination of a request, the FB 199 automatically resets the trigger bit.

1.3 The Data Structure of the DB 255

The data block DB 255 must be reserved for the communication between the CPU and the CP 156 with the FB 199. It acts as a data buffer with internal status words for the parameterised interfaces and the auxiliary data area. Its length depends on the number of interfaces used for the FB 199:

Its minimum length is 81 data words (DW 0 to DW 80) for one interface.

Its maximum length is 347 data words (DW 0 to DW 346) for eight interfaces.

The DB 255 must be dimensioned, installed and initialised as described in section 3.3, "Startup and Restart", by the user in the CPU RAM (figure 1.1).

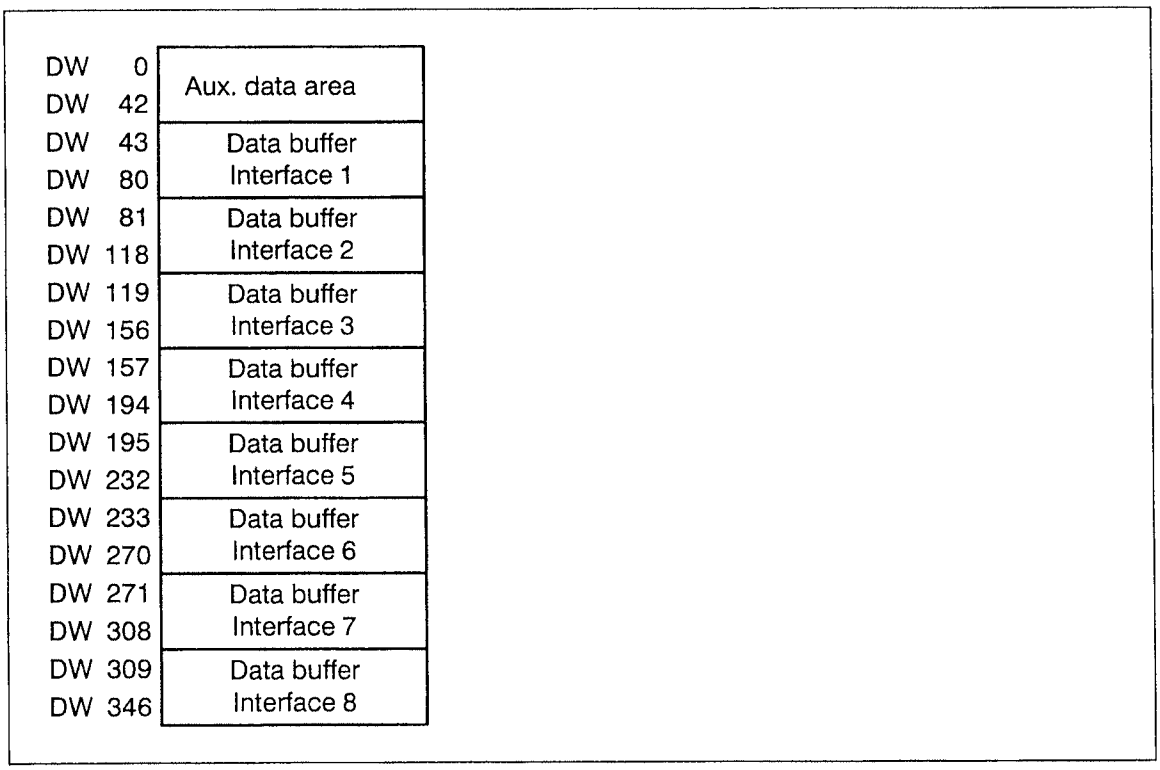

Figure 1.1 Structure of the DB 255

1.4 **Functions** (Modes of Operation)

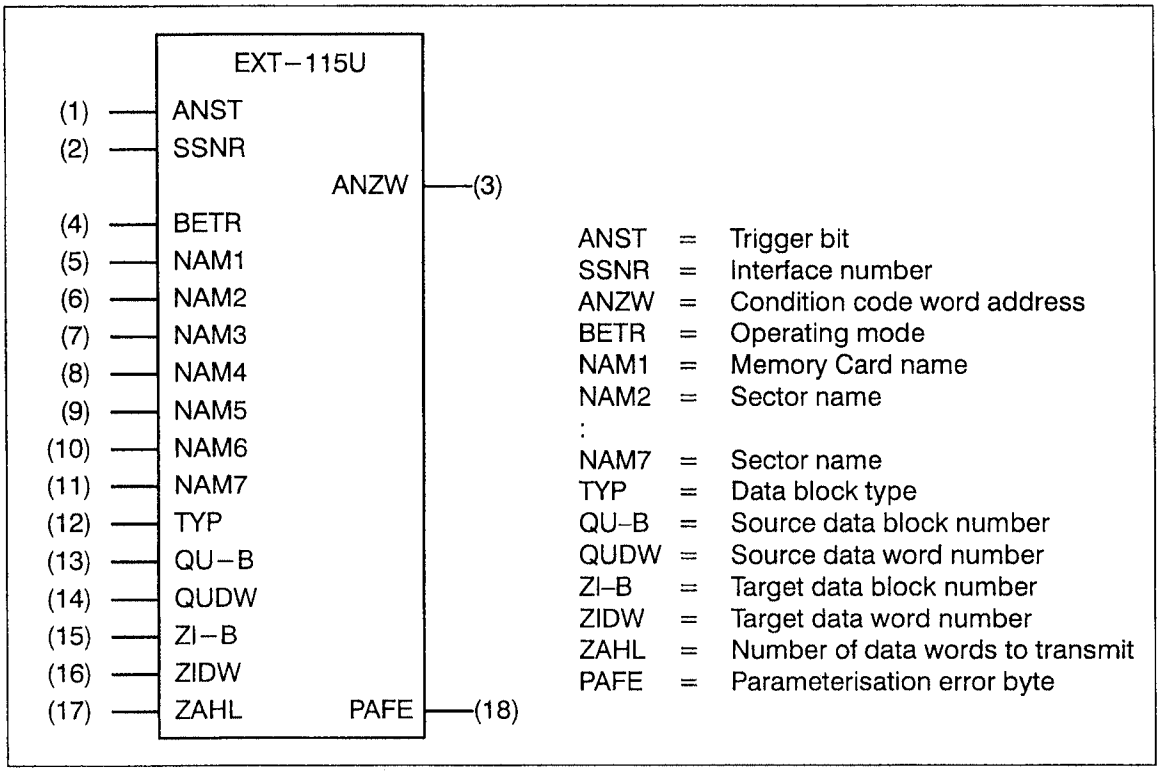

Figure 1.2 Function diagram of the FB 199

The functions of the FB 199 described herein depend on the operating mode specified; i.e., they depend on the value specified for the parameter BETR of the FB 199. Additional parameters must be assigned according to the function. Parameters not required for a function may optionally be specified. The individual parameters are described in chapter 2.

1.4.1 Transmitting Data Blocks

If more than one CP 516 or interface is used, the interface numbers must be within one interface window (section 2.2.2).

The numbers of source and target data block may differ. The transmission is possible only between data blocks of identical types (both DB or both DX).

Data blocks may be transmitted either in parts or as a whole:
Required parameters are the data block number, the number of the first data word to transfer and the number of data words to transfer.

The maximum length of a source or target block is 4096 data words (DW 0 to DW 4095).

Up to 2048 data words can be transmitted in one call.

Data blocks with identical numbers can be created in different sectors.

Data transfer from the CPU to the CP 516 (BETR = HS)

Data blocks can be transferred from the CPU memory to the CP 516 even if there has no target data block been set up. The FB 199 automatically sets up the target data block.

The new length of the target data block is the larger one of the two values:
- length of the existing target data block (length = 0 if there is none);
- target data word number (ZIDW) + number (ZAHL) of the data blocks to be transferred.

The FB 199 carries out any required corrections in the header of the target data block automatically.

During the transfer, no undefined gaps my occur.
Examples:
A transfer with a target data word number greater than zero is not permitted unless there already is a target data block (this would create an undefined leading gap).
A transfer with a target data word number greater than the length of the target data block is not permitted (this would create an undefined gap in the middle).

Data transfer from the CP 516 to the CPU (BETR = MS)

A data block can be transferred from the CP 516 to the CPU RAM only if a target data block has been set up at the destination.

1.4.2 Management Functions

In addition to the transfer of data blocks, the FB 199 provides the following management functions for the Memory Card, sectors and data blocks on the CP 516.

- Copy the contents of Memory Card A: to B: or vice versa,
- Format a Memory Card.

Copy contents from Memory Card A: to B: or from B: to A: (BETR = AB, = BA)

The entire contents of a Memory Card is copied to another Memory Card. Any data on the target Memory Card are overwritten.
In the parameter NAM1 the target Memory Card (A: or B:) is specified.

Formatting a Memory Card (BETR = FO)

The Memory Card is formatted. Any data stored on that card are deleted.

In order to avoid accidental formatting, the function FO must be called twice:
The formatting process starts after the second call if the second call was made immediately following the first call.
If another function is called between the two calls, the FB 199 deletes the first call.

Memory Card info (BETR = MI)

Data on the two Memory Cards are transferred to a target data block (TYP = DB or TYP = DX) in the CPU.

A sufficiently dimensioned target data block for the data (4 words) must be set up in the CPU memory.

For NAM1, optionally "A:" or "B:" may be specified. The data is transferred for each inserted Memory Card.

Figure 1.3 shows the structure of the info list for the two Memory Cards. The significance is

- memory size — hexadecimal specification of memory size (e.g. 800H: 2 Mbyte)
- Memory Card type: 0 H: no Memory Card inserted; 1 H: RAM; 2 H: FLASH-EPROM

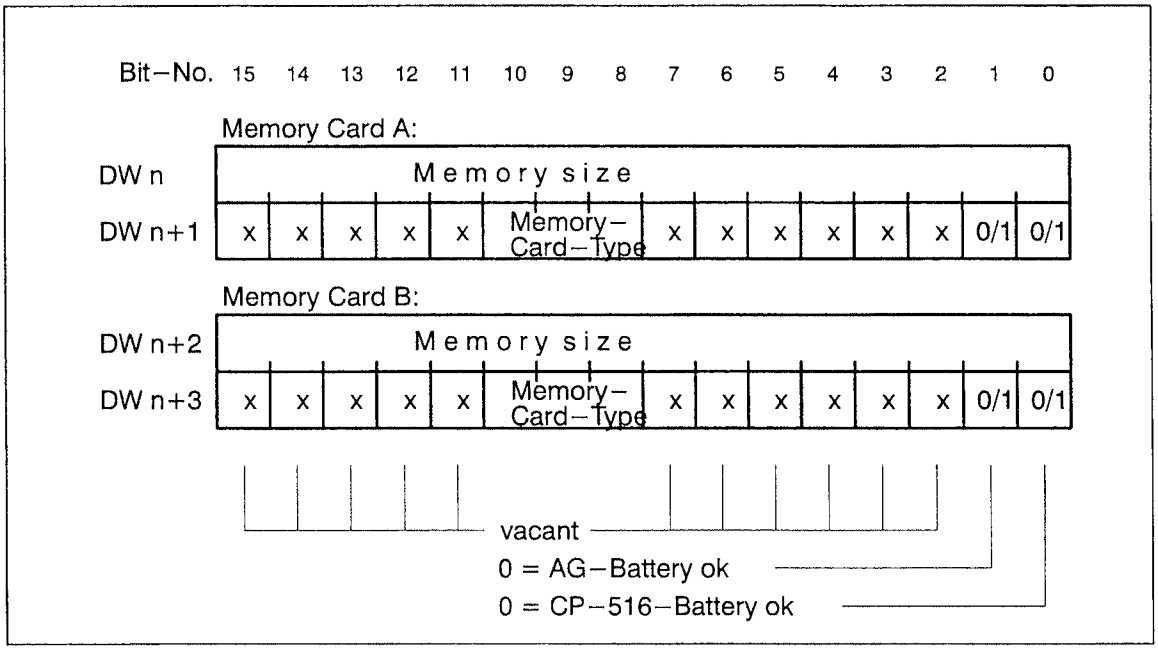

Figure 1.3 Structure of Memory Card data list

Siemens AG Order No.: T89120-E3031-U1-*-7619
Instruction Manual: SIMATIC S5, CP 516, SFB EXT-115U, -945U

1.5 Technical Specifications

Order numbers:

– S5–DOS (PCP/M)	6ES5 848–8GC11 (german) 6ES5 848–8GC21 (english) 6ES5 848–8GC31 (french)
– MS–DOS and S5–DOS/MT	6ES5 848–6GC11 (german) 6ES5 848–6GC21 (english) 6ES5 848–6GC31 (french)
Block number:	FB 199
Block name:	EXT-115U (for CPU 941, 942, 942H, 943, 944) EXT-945U (for CPU 945)
Block length:	961 words with FB EXT-115U 988 words with FB EXT-945U
Call length:	20 words
Processing time:	approximately 1 s to 8 s
Nesting depth:	1
called function blocks:	FB 244 SEND FB 245 RECEIVE FB 246 FETCH FB 247 CONTROL
called data blocks:	DB 255 Data buffer DB xx with indirect parameter specification DB yy with indirect parameter specification DB nn or flag word for condition code word
occupied flag area: (scratch area)	MW 200 to MW 224

Data transfer time

The data transfer time for 1 kbyte (512 data words) is approximately 1 to 8 seconds (at a constant cycle time of 100 ms), depending on the block size (BLGR) set at the data handling block SYNCHRON and the operating mode (BETR) set at the FB EXT-115U:

	BETR = MS	BETR = HS		Number of cycles
BLGR	ZAHL = 512			
1 (16 Byte)	approx. 7.0 s	approx. 6.9 s	DB does not exist on CP 516	70
		approx. 7.1 s	Extend DB on CP 516	72
		approx. 6.8 s	DB exists on CP 516	69
6 (512 Byte)	approx. 0.8 s	approx. 0.8 s	DB does not exist on CP 516	9
		approx. 0.9 s	Extend DB on CP 516	10
		approx. 0.7 s	DB exists on CP 516	8

2 Parameter Specification

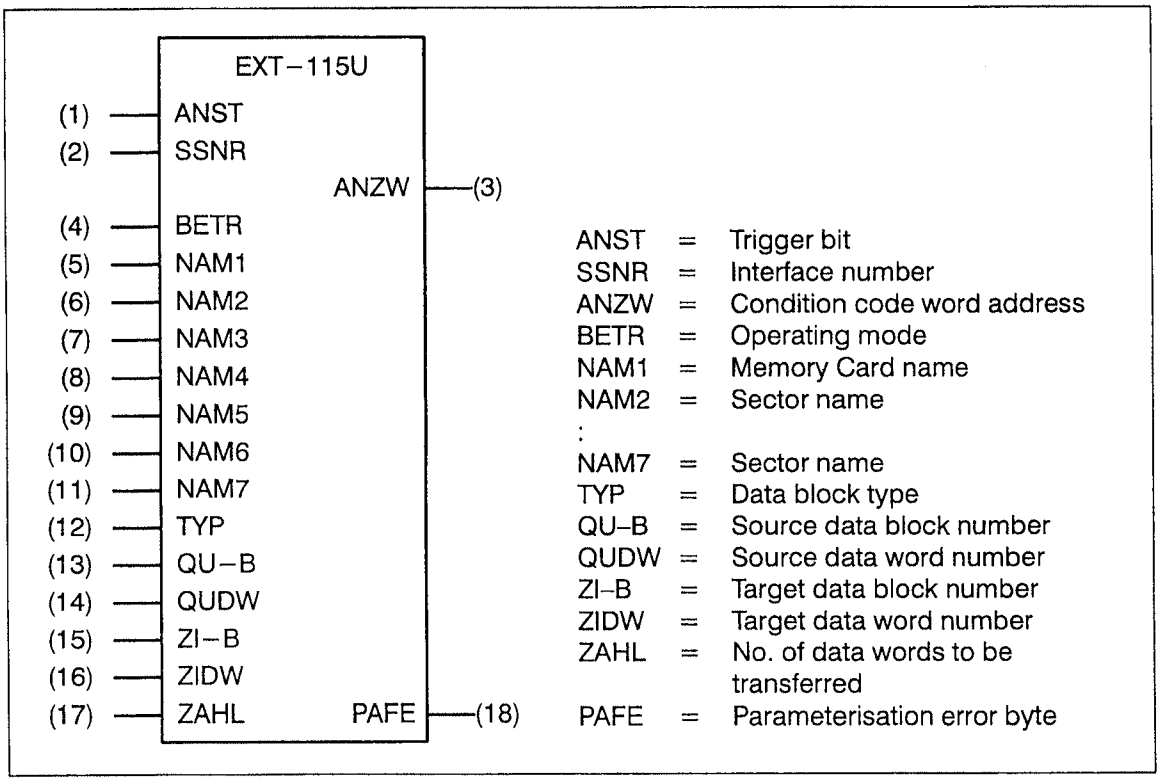

Figure 2.1 Parameters of the FB 199

2.1 Direct and Indirect Specification of Parameters

The parameters for the FB 199 are organised in two subsets:
– SSNR, ANZW, BETR, NAM1 bis NAM7 and
– TYP, QU–B, QUDW, ZI–B, ZIDW, ZAHL.

The FB 199 may be assigned parameters optionally for both subsets either directly or indirectly:

- If the parameters are specified directly (summary see section 2.3), they are entered at the FB 199.

- If the parameters are specified indirectly (summary see section 2.4), for each of the subsets a pointer to a parameter field is passed in two separate data blocks. At the positions pointed to, the two subsets must be specified without gaps in the order used for direct parameter specification.
  Indirect parameter specification allows the user to parameterise the FB 199 once.
  The trigger bit (ANST) and the parameterisation error byte (PAFE) must be specified directly at the FB 199 even if indirect parameter specification is used.

2.1.1 Parameter Set SSNR, ANZW, BETR, NAM1 to NAM7

Direct specification of parameters

In the high byte (left hand byte) of the parameter SSNR, "0" is entered.

In the low byte (right hand byte) of the parameter SSNR the interface number is entered.

Any other parameters are entered directly at the FB 199.

Indirect specification of parameters

In the high byte (left hand byte) of the parameter SSNR at the FB 199 the number of the data block containing the parameters must be entered.

In the low byte (right hand byte) of the parameter SSNR at the FB 199 the number of a data word must be entered.
Starting at this data word, the parameters SSNR, ANZW, BETR, NAM1 to NAM7 must be stored in ascending order in the data block.

The length of the parameter set is always 10 data words, even if in some operating modes the FB 199 does not evaluate all of the parameters.

With indirect specification of parameters, the parameters specified directly (ANZW, BETR, NAM1 to NAM7) at the FB 199 are irrelevant.

2.1.2 Parameter Set TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL

Direct specification of parameters

The parameters are entered directly at the FB 199.

Indirect specification of parameters

Enter "XX" at the parameter TYP at the FB 199 (data format KC).

Enter the number of the data block containing the parameters to be transferred at the parameter QU-B at the FB 199.

Enter the number of a data word at the parameter QUDB at the FB 199. Starting at this data word, the parameters TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL must be entered in ascending order.

The length of the parameter set is always 6 data words, even if in some operating modes the FB 199 does not evaluate all of the parameters.

With indirect parameter specification, the parameters ZI-B, ZIDW and ZAHL, which are entered directly at the FB 199, are irrelevant.

2.2 Description of the Parameters

2.2.1 ANST: Trigger bit

The user sets the trigger bit in order to initiate a request
- for data transfer between the CPU and the CP 516 or
- for the management of data blocks or sectors on the CP 516.

After completion or termination of a request, the FB 199 resets the ANST bit.

Parameter types:	Input / bit	
valid range:	A 0.0 ... A 63.7	with CPU 941
	A 0.0 ... A 127.7	with CPU 942, 943, 944, 945
	M 0.0 ... M 255.7	

2.2.2 SSNR: Interface Number

Specification of the interface number used for addressing the CP 516 or setting of indirect parameter specification (section 2.1.1).

The interface number must match the interface number specified for this CP 516 at the data handling block SYNCHRON.

Any values between 0 and 255 are valid SSNR numbers.
The up to 8 valid interfaces for one FB 199 must be within one interface window. An interface window contains 8 numbers and starts with a multiple of 8 (0, 8, 16 ... 248).

Parameter types:	data / KY
valid range:	0,0 ... 255,255
High byte = 0:	Direct parameter specification; low byte = SSNR
High byte > 0:	Indirect parameter specification; Number of data block with the parameters to be transferred low byte = pointer to parameter field (number of the data word in the specified data block, starting at which the parameters are stored ascendingly.)

2.2.3 ANZW: Condition Code Word Address

In the condition code word, the FB 199 indicates the processing of a job.

It contains the status and/or error messages generated by the CP 516 firmware and by the FB 199. After completion or termination of the job, these messages are available to the user.

The condition code word (16 bit) may optionally be stored in the flag area or in a data block (type DB). Switching criterion is the high byte (left hand byte) of the parameter ANZW:

High byte = 0: condition code word is located in the flag area; the low byte (right hand byte specifies the flag word address of the condition code word).

High byte > 0: condition code word is located in the data block; the high byte (left hand byte) contains the number of the data block which contains the condition code word. The low byte contains the data word address of the condition code word.

Parameter types: data / KY

valid range: 0,0 ... 0,254 (flag area)
3,0 ... 254,255 (data block)

Structure of the condition code word

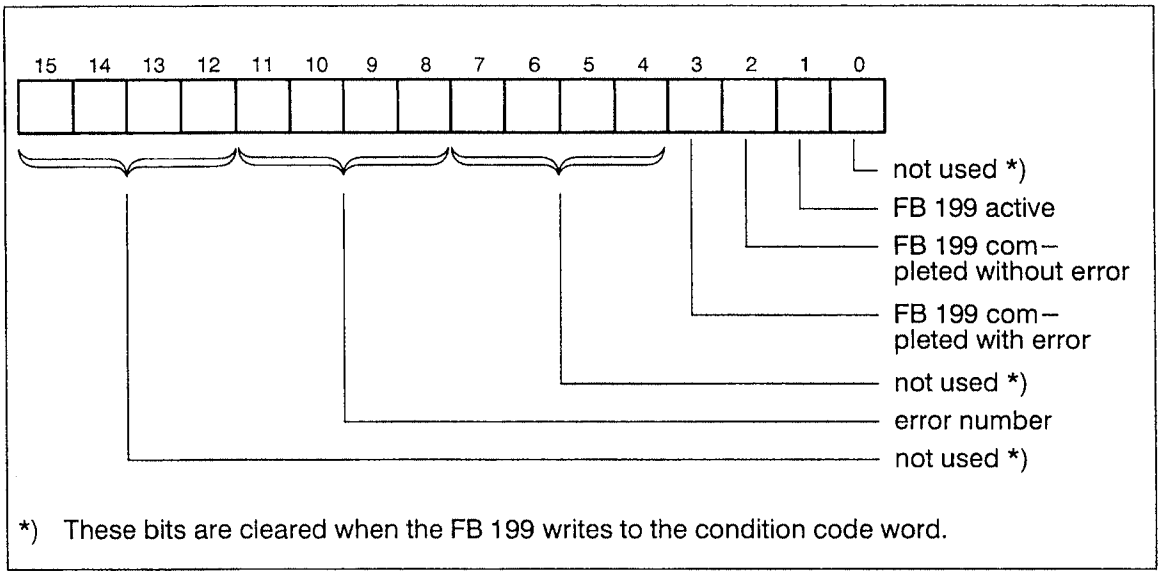

Figure 2.2 Structure of the condition code word

If the FB 199 returns the message "request completed with error" in bit 3 of the condition code word, bits 8 to 11 contain an error number which specifies the reason for the termination.

Error numbers in the condition code word

(1 – 5 : errors recognised by the FB 199)
(6 – F H : errors recognised by the CP 516)

0 = no error
1 = parameterisation error (additional information contained in the PAFE parameter)
2 = operating mode switch of the CP 516 set to STOP
3 = operating mode HS: data block does not exist on CP 516; header gap risk
4 = operating mode MS: data block on CPU too short
operating mode HS: data block on CP 516 too short; middle gap risk
5 = ZAHL = wildcard length: excessive source data block (QU–B) size; data block without block header exceeds 2048 data words.
6 = hardware error (check sum error on memory card)

7 = Memory Card not formatted

8 = Memory Card replaced or full
operating mode AB or BA: not formatted

9 = operating mode MS or LB: data block does not exist on CP 516

AH = not used

BH = incorrect request

CH = handshake error

DH = operating mode MS, NS, LS, LB, DS or DX:
sector name (data set name) does not exist on CP 516

EH = operating mode NS: sector name (data set name) already exists on CP 516

FH = Memory Card not inserted

2.2.4 **BETR:** Operating Mode

Specification of the function (described in section 1.4) the FB 199 is supposed to carry out. The following are valid entries:

HS: transfer a data block from the CPU to the CP 516

MS: transfer a data block from the CP 516 to the CPU

AB: transfer the contents of Memory Card A: to Memory Card B:

BA: transfer the contents of Memory Card B: to Memory Card A:

FO: Formatting a Memory Card

MI: transfer Memory Card related data to a DB data blockin the CPU memory

Parameter types: data / KC

valid range: the ASCII characters listed above

2.2.5 **NAM:** Name of the Memory Card, Sector Name

When addressing a data block in the CP 516, the Memory Card name (NAM1) and the sector name (NAM2 to NAM7) must be specified.
In both Memory Cards identical sector names may be used.
Different sectors may contain data blocks with identical numbers.

In the operating mode "transfer Memory Card related data" (MI) "A:" or "B:" must be specified (only plugged in Memory Cards must be specified).

NAM1: Name of the Memory Card,

The Memory Card must be specified preceding each sector name:
The upper Memory Card has the name "A:";
Lower Memory Card has the name "B:".

Parameter types: data / KC

valid range: A:, B:

NAM2 to NAM7: Sector name

The sector name consists of up to 8 ASCII characters to the left of the full stop and up to 3 ASCII characters to the right. If there are no ASCII characters to the right of the full stop, the full stop may be omitted.

Parameter type: data / KC

valid range: all ASCII characters

Examples

1) A:ANTON1.NEU
2) B:BERTA.1
3) A:SEKTOR_X
4) B:SEKTOR99.DAT
5) A: (selecting a Memory Card)

Example		*1)*	*2)*	*3)*	*4)*	*5)*
NAM1	KC:	A:	B:	A:	B:	A:
NAM2	KC:	AN	BE	SE	SE	
NAM3	KC:	TO	RT	KT	KT	
NAM4	KC:	N1	A.	OR	OR	
NAM5	KC:	.N	1	_X	99	
NAM6	KC:	EU			.D	
NAM7	KC:				AT	

2.2.6 TYP: Data Block Type

Specification of the data block type or the setting of the indirect parameter specification (section 2.1.2). The following settings are possible:

DB: DB data block

XX: indirect parameter specification

Parameter type: data / KC

valid range: the ASCII characters listed above

2.2.7 QU-B: Source Data Block Number

With direct parameter specification:
Specification of the number of the source data block from which the FB 199 is transferred.

With indirect parameter specification:
Specification of the number of the data block which contains the parameter list.

The FB 199 evaluates the source data block number only in the operating modes HS and MS; in all other operating modes it is irrelevant.

Parameter types: data / KF

valid range: + 1 ... + 254

2.2.8 QUDW: Source Data Word Number

With direct parameter specification:
Specification of the number of the first data word in the source data block which the FB 199 should transfer.

With indirect parameter specification:
Specification of the number of the data word which contains the start of the parameter list.

The FB 199 evaluates the source data word number only in the operating modes HS and MS; in all other operating modes it is irrelevant.

Parameter types:	data / KF	
valid range:	+ 0 ... + 2048	(direct parameter specification)
	+ 0 ... + 250	(indirect parameter specification)

2.2.9 ZI-B: Target Data Block Number

Specification of the number of the target data block the FB 199 should make a transfer to.

The target data block number is irrelevant in the operating modes LS, NS, AB, BA and FO.

Parameter types:	data / KF	
valid range:	+ 1 ... + 254	(BETR = HS)
	+ 2 ... + 254	(BETR = MS, MI)

2.2.10 ZIDW: Target Data Word Number

Specification of the number of the first data word the FB 199 should make a transfer to starting at this word.

The target data word number is irrelevant in the operating modes LS, NS, AB, BA and FO.

Parameter types:	data / KF
valid range:	+ 0 ... + 2048

2.2.11 ZAHL: Number of Data Words to transfer

Specification of the number of data words to transfer.

The FB 199 evaluates the number of data words only in the operating modes HS and MS; in all other operating modes it is irrelevant.

If ZAHL = -1 is specified, the FB 199 transfers the source data block in the current length.
The parameter QUDW is irrelevant, i.e., the FB 199 sets it to zero:
The transfer starts at the source data block at DW 0.

Parameter types:	data / KF
valid range:	+ 1 ... + 2048
	- 1 (wildcard length)

2.2.12 PAFE: Parameterisation Error Byte

The FB 199 sets this flag output or input byte if it encounters a parameterisation error.

Parameter type:	Output / BY	
valid range:	AB 0 ... AB 63	with CPU 941
	AB 0 ... AB 127	with CPU 942, 943, 944, 945
	MB 0 ... MB 255	

Structure of the parameterisation error byte

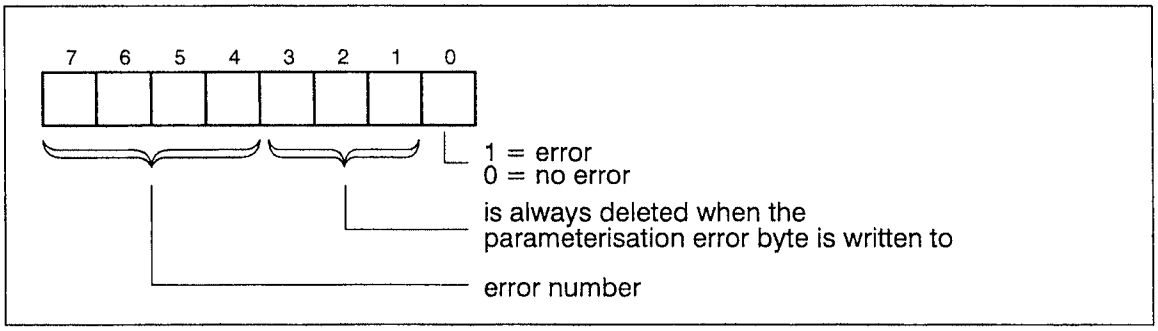

Figure 2.3 Structure of the parameterisation error byte

The error numbers in the parameterisation error byte have the following significance:

0 no error.

1 Data block for indirect parameterisation not available or too short, address for parameter set invalid (greater than DW 246) or data block number invalid (DB–NR < 2, DB–NR = 255). (Without error message in the condition code word.)

2 Invalid parameter specified for SSNR (interface number): specified SSNR does not exist or SSNR is not within interface window. (Without error message in the condition code word.)

3 Invalid parameter specified for ANZW (condition code word): Data block for the parameter not available or too short or data block number invalid (DB–NO < 2 or DB–NO = 255). (Without error message in the condition code word.)

4 Invalid parameter specified for BTR (operating mode): only HS, MS, AB, BA, FO and MI are valid.

5 Invalid parameter specified for TYP (data block type): only DB, XX are valid;

6 Invalid parameter specified for QU–B, ZI–B (data block number):
invalid are:
BETR = HS: TYP = DB : QU–B < 2; QU–B > 254; ZI–B < 1, ZI–B > 254;
BETR = MS: TYP = DB : QU–B < 1; QU–B > 254; ZI–B < 2, ZI–B > 254;
BETR = MI: TYP = DB : ZI–B < 2, ZI–B > 254.

7 Data block does not exist in AG or is too short:
BETR = HS: QU–B; QUDW > DB length; QUDW + ANZ > DB length;
BETR = MS: ZI–B; ZIDW > DB length; ZIDW + ANZ > DB length;
BETR = MI: ZIDW + 4 > DB length.

8 Invalid parameter specified for QUDW, ZIDW (data word number)
invalid are
QUDW, ZIDW < 0;
QUDW, ZIDW > 2048.

9 Invalid parameter specified for ZAHL (number)
invalid are
ZAHL < –1;
ZAHL = 0;
ZAHL > 2048.

AH Data block DB 255 does not exist or is too short.

BH wrong Memory Card selected: NAM1 ≠ „A:" and NAM1 ≠ „B:".

2.3 Summary Direct Parameterisation

The following tables show the parameters required depending on the operating modes (BETR).

Call:

CPU 941, 942, 943, 944:

FB EXT-115U :SPB FB199
NAME
:EXT-945U

CPU 945:

FB EXT-945U :SPB FB199
:EXT-115U NAME

2.3.1 Direct Parameterisation of SSNR, ANZW, BETR, NAM1 to NAM7

Trigger bit	ANST:		++	++	++	++	++	++
Interface number	SSNR:	KY	++	++	++	++	++	++
CC–word address	ANZW:	KY	++	++	++	++	++	++
Operating mode	BETR:	KC	MS	HS	AB	BA	FO	MI
Memory Card name	NAM1:	KC	++	++	++	++	++	++
Sector name	NAM2: to NAM7:	KC	++ ++	++ ++				

++: These params are evaluated by theFB 199. Specifications in vacant field are irrelevant

Table 2.1 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 at the FB 199 with direct parameterisation

2.3.2 Direct Parameterisation of TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL

			Operating mode:	MS	HS	AB	BA	FO	MI
Block type	TYP:	KC		++	++				++
Source data block no.	QU–B:	KF+		++	++				
Source data word no.	QUDW:	KF+		++	++				
Target data block no.	ZI–B:	KF+		++	++				++
Target data word no.	ZIDW:	KF+		++	++				++
Number	ZAHL:	KF+		++	++				
Param. error byte	PAFE:	KF+		++	++	++	++	++	++

++: These params are evaluated by theFB 199. Specifications in vacant field are irrelevant.

Table 2.2 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL at the FB 199 with direct parameterisation

2.4 Summary Indirect Parameterisation

The following tables show the parameters required depending on the operating mode (BETR).

Call:

CPU 941, 942, 943, 944:

FB EXT-115U :SPB FB199
NAME :EXT-115U

CPU 945:

FB EXT-945U :SPB FB199
NAME :EXT-945U

2.4.1 Indirect Parameterisation of SSNR, ANZW, BETR, NAM1 to NAM7

Trigger bit	ANST:		++
Interface number	SSNR:	KY	++
CC word address	ANZW:	KY	
Operating mode	BETR:	KC	++
Memory Card name	NAM1:	KC	
Sector name	NAM2: to NAM7:	KC KC	

++: these params are evaluated by the FB 199. specifications in vacant fields are irrelevant.

Table 2.3 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 at the FB 199 with indirect parameterisation

The parameter set must be entered in the high byte of the data block specified by SSNR.

The low byte (right hand byte) of the parameter SSNR (section 2.2.2) is a pointer to this parameter set. The valid parameters must be entered starting at the data word specified here.

The length of the parameter set is always 10 data words, even if the FB 199 does not evaluate all parameters in some operating modes.

Parameter	*Format*	*DW*	*DB n*						
SSNR	KY	m	++	++	++	++	++	++
ANZW	KY	m+1	++	++	++	++	++	++
BETR	KC	m+2	MS	HS	AB	BA	FO	MI
NAM1	KC	m+3	++	++	++	++	++	++
to	KC	to	++	++				
NAM7	KC	m+9	++	++				

++: these parameters are evaluated by the FB 199. specifications in vacant fields are irrelevant.

Table 2.4 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 in the open data block with indirect parameterisation

2.4.2 Indirect Parameterisation of TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL

Block type	TYP:	KC	XX
Source data block no.	QU–B:	KF+	++
Source data word no.	QUDW:	KF+	++
Target data block no.	ZI–B:	KF+	
Target data word no.	ZIDW:	KF+	
Number	ZAHL:	KF+	
Param. error byte	PAFE:	KF+	++

++: these params are evaluated by the FB 199.
specifications made in vacant fields are irrelevant.

Table 2.5 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL at the FB 199 with indirect parameterisation

The parameter set is entered into the DB data block specified by the parameter QU–B starting at the data word specified in the parameter QUDW.

The length of the parameter set is always 6 data words, although in some operating modes the FB 199 does not evaluate all parameters.

In the operating modes LS, AB, FO and BA this parameter set is not evaluated by the FB 199.

			Operating mode:	MS	HS	MI
Parameter	*Format*	*DW*	*DB a*			
TYP:	KC	b		++	++	++
QU–B:	KF+	b+1		++	++	
QUDW:	KF+	b+2		++	++	
ZI–B:	KF+	b+3		++	++	++
ZIDW:	KF+	b+4		++	++	++
ZAHL:	KF+	b+5		++	++	

++: these params are evaluated by the FB 199.
specifications made in vacant fields are irrelevant.

Table 2.6 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL in the data block specified with QU–B with indirect parameterisation

3 Program Examples

The program examples are based on the following assumptions:

- The CP 516 is configured as interface number 2.
- The FB 199 stores the condition code word in the flag word MW 180.
- The FB 199 stores incorrect parameter specifications in the flag byte MB 50.

3.1 Direct Parameterisation

3.1.1 Operating Mode HS

100 data words of the data block DB 35 starting at DW 0 are to be transferred from the CPU to the CP 516.

By setting the trigger bit M 100.0 the user issues the request to the FB 199.

The trigger bit (M 100.0) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.0          trigger flag
        :UN     M 100.0         trigger bit
        :R      M 90.0          reset activation flag
        :S      M 100.0         set trigger bit
        :SPA    FB199           call FB EXT-115U or EXT-945U
NAME    :EXT-115U (or EXT-945U)
ANST    :       M 100.0         trigger bit: M 100.0
SSNR    :       KY0,2           interface number: 2
ANZW    :       KY0,180         condition code word address: MW 180
BETR    :       KCHS            0peration mode: HS
NAM1    :       KCB:            Memory Card B:
NAM2    :       KCSE            sector name: SEKTOR12.DAT
NAM3    :       KCKT
NAM4    :       KCOR
NAM5    :       KC12
NAM6    :       KC.D
NAM7    :       KCAT
TYP     :       KCDB            data block typee: DB
QU-B    :       KF+35           source data block number: 35
QUDW    :       KF+0            source data word number: DW 0
ZI-B    :       KF+40           target data block number: 40
ZIDW    :       KF+0            target data word number: DW 0
ZAHL    :       KF+100          number: 100 data words
PAFE    :       MB50            parameterisation error byte : MB 50
:
:
```

3.1.2 Operating Mode AB

Copy the contents of Memory Card A: to Memory Card B:.

By setting the trigger bit M 100.5 the user issues the request to the FB 199.

The trigger bit (M 100.5) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.5          trigger flag
        :UN     M 100.5         trigger bit
        :R      M 90.5          reset activation flag
        :S      M 100.5         set trigger bit
        :SPA    FB199           call FB EXT-115U or EXT-945U
NAME    :EXT-115U (or EXT-945U)
ANST    :       M 100.5         trigger bit: M 100.5
SSNR    :       KY0,2           interface number: 2
ANZW    :       KY0,180         condition code word address: MW 180
BETR    :       KCAB            operating mode:  Copy contents of Memory Card A:
                                                 to Memory Card B:
NAM1    :       KCB:            target Memory Card B:
NAM2    :       KC              irrelevant
NAM3    :       KC              irrelevant
NAM4    :       KC              irrelevant
NAM5    :       KC              irrelevant
NAM6    :       KC              irrelevant
NAM7    :       KC              irrelevant
TYP     :       KC              irrelevant
QU-B    :       KF+0            irrelevant
QUDW    :       KF+0            irrelevant
ZI-B    :       KF+0            irrelevant
ZIDW    :       KF+0            irrelevant
ZAHL    :       KF+0            irrelevant
PAFE    :       MB50            parameterisation error byte: MB 50
:
:
```

3.1.3 Operating Mode FO

Format Memory Card A:.

By setting the trigger bit M 100.6 the user issues the request to the FB 199.

The trigger bit (M 100.6) is reset by the FB 199 after the request has been processed.

In order to avoid accidental formatting, the function FO must be called twice:
the formatting process starts if the second function call immediately follows the first call.
If another function is called between these two calls, the FB 199 deletes the first call.

```
OB 1
:
:
        :U      M 90.6          trigger flag
        :UN     M 100.6         trigger bit
        :R      M 90.6          reset activation flag
        :S      M 100.6         set trigger bit
        :SPA    FB199           call FB EXT-115U or EXT-945U
NAME    :EXT-115U (or EXT-945U)
ANST    :       M 100.6         trigger bit: M 100.6
SSNR    :       KY0,2           interface number: 2
ANZW    :       KY0,180         condition code word address: MW 180
BETR    :       KCFO            operating mode: format a Memory Card
NAM1    :       KCA:            Memory Card A:
NAM2    :       KC              irrelevant
NAM3    :       KC              irrelevant
NAM4    :       KC              irrelevant
NAM5    :       KC              irrelevant
NAM6    :       KC              irrelevant
NAM7    :       KC              irrelevant
TYP     :       KC              irrelevant
QU-B    :       KF+0            irrelevant
QUDW    :       KF+0            irrelevant
ZI-B    :       KF+0            irrelevant
ZIDW    :       KF+0            irrelevant
ZAHL    :       KF+0            irrelevant
PAFE    :       MB50            parameterisation error byte: MB 50
:
:
```

3.1.4 Operating Mode MI

Transfer Memory Card information to the extended data block DB 11 of the CPU starting at DW 100.

By setting the trigger bit M 100.4 the user issues the request to the FB 199.

The trigger bit (M 100.4) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U      M 90.4          trigger flag
          :UN     M 100.4         trigger bit
          :R      M 90.4          reset activation flag
          :S      M 100.4         set trigger bit
          :SPA    FB199           call FB EXT-115U or EXT-945U
NAME      ::EXT-115U (or EXT-945U)
ANST      :       M 100.4         trigger bit: M 100.4
SSNR      :       KY0,2           interface number: 2
ANZW      :       KY0,180         condition code word address: MW 180
BETR      :       KCMI            operating mode: Memory Card info
NAM1      :       KCB:            Memory Card B: (or A:)
NAM2      :       KC              irrelevant
NAM3      :       KC              irrelevant
NAM4      :       KC              irrelevant
NAM5      :       KC              irrelevant
NAM6      :       KC              irrelevant
NAM7      :       KC              irrelevant
TYP       :       KCDB            data block type: DB
QU-B      :       KF+0            irrelevant
QUDW      :       KF+0            irrelevant
ZI-B      :       KF+11           target data block number: 11
ZIDW      :       KF+100          target data word number: DW 100
ZAHL      :       KF+0            irrelevant
PAFE      :       MB50            parameterisation error byte: MB 50
:
:
```

3.2 Indirect Parameterisation

The parameters SSNR, ANZW, BETR, NAM1 to NAM7 are specified in the data block DB 101 starting at DW 10.

The parameters TYP, QU–B, QUDW, ZI–B, ZIDW and ANZ are specified in the data block DB 110 starting at DW 1.

By setting the trigger bit M 100.7 the user issues the request to the FB 199.

The trigger bit (M 100.7) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U          M 90.7      trigger flag
          :UN         M 100.7     trigger bit
          :R          M 90.7      reset activation flag
          :S          M 100.7     set trigger bit

          :SPA        FB199
NAME      :EXT-115U (or EXT-945U)
ANST      :           M 100.7     trigger bit: M 100.7
SSNR      :           KY101,10    left hand parameter byte:   parameter in DB 101
                                  right hand parameter byte:  parameters are located in
                                                              DB 101 starting at DW 10
ANZW      :           KY0,0       irrelevant
BETR      :           KC          irrelevant
NAM1      :           KC          irrelevant
NAM2      :           KC          irrelevant
NAM3      :           KC          irrelevant
NAM4      :           KC          irrelevant
NAM5      :           KC          irrelevant
NAM6      :           KC          irrelevant
NAM7      :           KC          irrelevant
TYP       :           KCXX        indirect parameterisation
QU–B      :           KF+110      parameter for TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL
                                  in DB 110
QUDW      :           KF+1        parameter list starts with DW 1
ZI–B      :           KF+0        irrelevant
ZIDW      :           KF+0        irrelevant
ZAHL      :           KF+0        irrelevant
PAFE      :           MB50        parameterisation error byte: MB 50
:
:
```

3.2.1 Operating Mode HS

100 data words of the data block DB 35 starting at DW 0 are transferred from the CPU to the data block DB 40 starting at DW 0 in Memory Card A: in sector DATUM1.A.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= HS	operating mode: BETR = HS
	13 :	KC= A:	Memory Card A:
	14 :	KC= DA	sector name: DATUM1.A
	15 :	KC= TU	
	16 :	KC= M1	
	17 :	KC= .A	
	18 :	KC	
	19 :	KC	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL

DB 110

DW	1 :	KC= DB	data block type: DB
	2 :	KF= +35	source data block: DB 35
	3 :	KF= +0	source data word: DW 0
	4 :	KF= +40	target data block: DB 40
	5 :	KF= +0	target data word: DW 00
	6 :	KF= +100	number: 100 data words

3.2.2 Operating Mode AB

Copy the contents of Memory Card A: to Memory Card B:.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= AB	operating mode: copy contents of one Memory Cards to another
	13 :	KC= B:	target Memory Card
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.2.3 Operating Mode FO

Format Memory Card B:.

In order to avoid accidentally formatting the Card, the function FO must be called twice:
the formatting starts if the second call to this function is made immediately after completion message of the first call has arrived.
If another function is called between these two calls, the FB 199 deletes the first call.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= FO	operating mode: format Memory Card
	13 :	KC= B:	Memory Card B:
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.2.4 Operating Mode MI

Transfer Memory Card info to the extended data block DB 11 of the CPU starting at DW 100.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= MI	operating mode: Memory Card info
	13 :	KC= B:	Memory Card B: (or A:)
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

DB 110

DW	1 :	KC= DB	data block type: DB
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +11	target data block: DB 11
	5 :	KF= +100	target data word: DW 100
	6 :	KF= +0	irrelevant

3.3 Startup and Restart

In the startup and restart branch, for each installed CP 516 the FB SYNCHRON must be called with the appropriate interface number.

Error messages issued by the FB SYNCHRON must be evaluated by the user, because the FB 199 assumes perfect synchronisation of the parameterised interface.

For each CP 516, in the data block DB 255 the internal status word and the auxiliary data are of the FB 199 must be deleted.
For the interfaces 7 and 8, the internal status word can be deleted only using direct addressing, since in this case the length of the DB 255 exceeds 256 DW.

```
OB 21; OB 22 :
:
:
          :SPA      FB249     call to data handling block
NAME      :SYNCHRON           SYNCHRON
SSNR      :KY0,2              interface number: 2
BLGR      :KY0,4              Block size e.g.: 4 (128 byte)
PAFE      :MB255              parameterisation error byte: MB 255
          :
          :
          :A        DB255     data buffer for the FB 199
          :L        KB0
          :T        DW0       delete auxiliary data area
          :T        DW1       delete auxiliary data area
          :T        DW13      delete auxiliary data area
          :T        DW38      delete auxiliary data area
          :T        DW42      delete auxiliary data area
          :T        DW43      delete status word interface 1
          :T        DW81      delete status word interface 2
          :T        DW119     delete status word interface 3
          :T        DW157     delete status word interface 4
          :T        DW195     delete status word interface 5
          :T        DW233     delete status word interface 6
          :SPA      FBnnn     call a function block (nnn = number of the FB)
          :
          :
```

CPU 941, 942, 943, 944:

```
FBnnn  :L KH   E5FE          start address DB 255
       :LIR    0                   load
       :ADD    KF+271
       :L      KB0
       :T AK
       :TIR    1        delete status word interface 7
       :ADD    KF+38
       :TIR    1        delete status word interface 8
```

CPU 945:

```
FBnnn  :MBR    E39FE
       :LRW    0
       :SLD    4
       :MAB
       :LKB    0
       :TRW    +271
       :TRW    +309
```

4 The SYNCHRON Data Handling Block

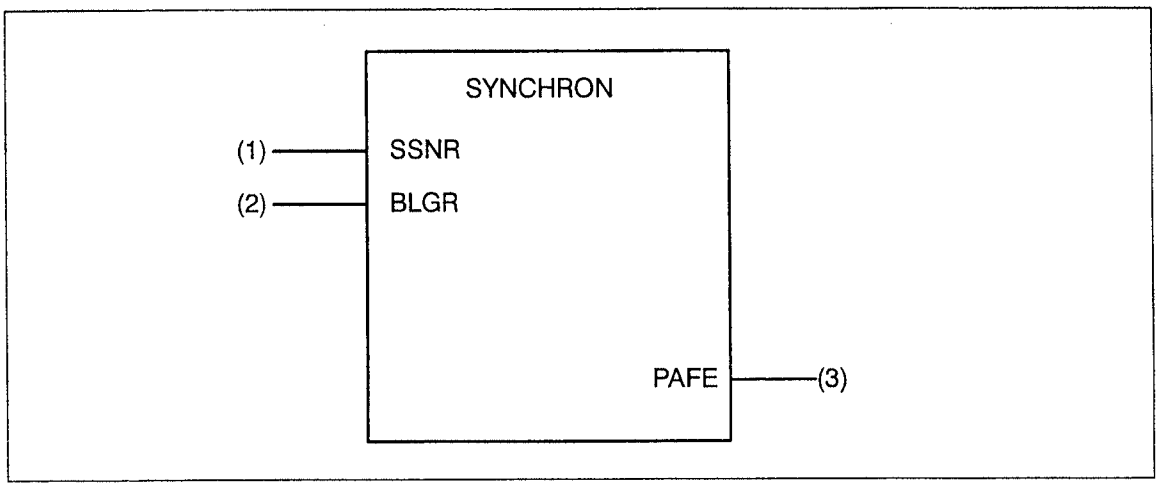

Figure 4.1 The SYNCHRON data handling block

4.1 Function

The SYNCHRON data handling block (FB 249) synchronises the CP 516 and the CPU. It sets the interface number for the related CP 516 and deletes the auxiliary data area and the internal status word for the interface.

The SYNCHRON data handling block is called during "Manual restart" (OB 21) and "Automatic restart" (OB 22).

Because of its execution time, the data handling block SYNCHRON can only be called in these start phases.

At the data handling block SYNCHRON, the following parameters must be entered:
SSNR = interface number,
BLGR = block size,
PAFE = parameterisation error byte.

Section 3.3 contains a parameterisation example for the SYNCHRON.

4.2 Parameter Description

4.2.1 SSNR: Interface Number

Number of the interface the CP 516 is addressed under.

Parameter types:	Datum / KY
valid range:	0,0... 0,255
High byte = 0:	Direct parameterisation; low byte = SSNR
High byte > 0:	Indirect parameterisation; low byte = pointer to parameter field; in the data block opened prior to calling the FB SYCHRON starting at the data word specified here the parameters SSNR and BLGR are stored in the order and format used for direct parameterisation.

4.2.2 BLGR: Blocksize

BLGR allows the user to define the maximum number of data words the FB 199 (or the data handling blocks SEND and RECEIVE) will transfer in one go.
If the value of the parameter ZAHL specified with FB 199 exceeds the value defined in BLGR, the FB 199 automatically transfers any subsequent blocks.

For the sake of high transfer rates, select large blocksize values (which extends the cycle time).

In order to minimise the execution time of the function blocks, select low blocksize values (which reduces the data rate).

For more detailed information refer to the technical specifications (section 1.5).

Parameter types: Datum / KY

valid range: 0,0 ... 0,255

The following blocksize values can be specified with BLGR:

BLGR	*Blocksize*
0	max 256 byte ; default value
1	max. 16 byte
2	max. 32 byte
3	max. 64 byte
4	max. 128 byte
5	max. 256 byte
6	max. 512 byte
7...254	max. 256 byte ; default value
255	Blocksize set to 512 byte

4.2.3 PAFE: Parameterisation Error Byte

This flag–, output or input byte is set by SYNCHRON if it recognises a parameterisation error.

Parameter types:	output / BY	
valid range:	EB 0 ... EB 63	with CPU 941
	EB 0 ... EB 127	with CPU 942, 943, 944, 945
	AB 0 ... EB 63	with CPU 941
	AB 0 ... EB 127	with CPU 942, 943, 944, 945
	MB 0 ... MB 255	

Structure of the parameterisation error byte

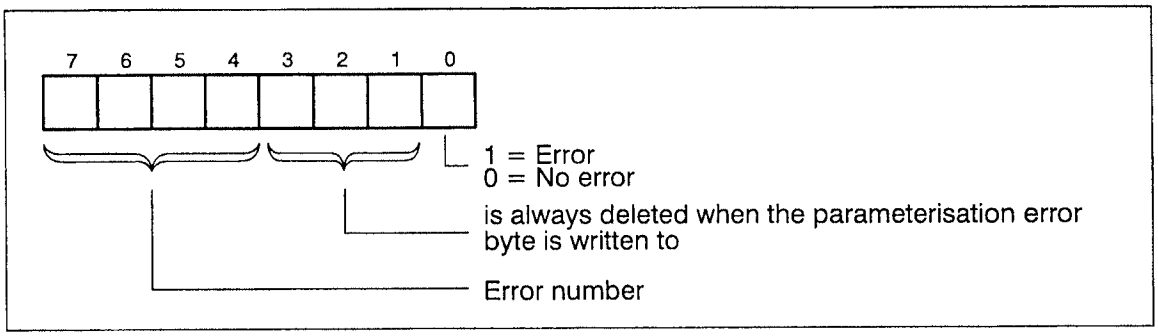

Figure 4.2 Structure or the parameterisation error byte

The error numbers in the parameterisation error byte have the following significance:

0 no error

1–4 source/target parameter incorrect

1 range incorrect

2 DB or DX do not exist

3 range size too small

4 range does not exist

5 condition code word incorrect

6 not used

7 interface does not exist

8 interface not ready

9 interface overload

AH interface used by another CPU

BH invalid request number

CH interface timeout

DH miscellaneous interface errors, e.g.
- invalid handshake acknowledgement
- blocksize of interface not within range 1..255

EH miscellaneous errors at the data handling block, e.g.
- missing call of a data block with indirect parameterisation
- software error in CPU or data handling block

FH FB call invalid, e.g.
- double call with interruptibility at command borders
- invalid modification of standard function blocks.

To

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SIMATIC S5

Memory Module CP 516
Standard function block EXT–115U for AG S5–115U (CPU 941, 942, 943, 944) AG S5–115U (CPU 942H)
Standard function block EXT–945U for AG S5–115U (CPU 945)

Instruction Manual

Order No.: T89120–E3031–U1–*–7619
Edition August 1994

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SIMATIC S5

Memory Module CP 516

Standard Function Block EXT-135R for AG S5-135U (CPU 922, 928, 928B)

Instruction Manual

Edition February 1995

Version 3

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Note:

These instructions do not purport to cover all details in equipment, nor to provide for every possible contingency to be met in connection with operation.

Should further information be desired or should particular problems arise which are not covered sufficiently for the Purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

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In an emergency, you can reach us over our "hotline" telephone number ..9131–7–22888.

1 Description

1.1 Range of Application

The memory module CP 516 can be used in programmable controllers (AG) of the SIMATIC S5 series. This instruction manual refers to the AG

- SIMATIC S5-135U (CPU 922, 928, 928B).

Data (data blocks DB and DX) can be swapped from the memory of the CPU 922, 928 or 928B to the memory module CP 516.
The CP 516 can accommodate 2 Memory Cards (addressed as "A:" and "B:"). Memory Cards are available as RAM based and as FLASH EPROM based versions.
Each Memory Card can be organised in sectors (addressed using names composed of 8+3 ASCII characters). Different sectors may contain data blocks of identical numbers.

From within the CPU program, the CP 516 is addressed like a communication processor (CP) by specifying an interface number (SSNR). The CP 516 hardware is configurable to provide either 1 or 4 (for multiprocessor operation; see chapter 5) interfaces.
Depending on the configuration, either a maximum of 2 or a maximum of 8 CP 516 can be operated in a programmable controller.

The standard function block

- FB EXT-135R

is called by the number 199.

Therefore in this instruction manual it is designated as **FB 199** further on.

The standard function block FB 199 handles the data transfer between the CPU of the AG and the memory module CP 516.
In addition, the FB 199 handles file management tasks.

The FB 199 handles up to 8 interfaces.

1.1.1 Required Software Modules

In addition to the standard function block FB 199 the following data handling blocks are required:

- FB 120: SEND,
- FB 122: FETCH,
- FB 127: REC-A,
- FB 125: SYNCHRON.

The following items must be available within the CPU

- OB 20 (startup) and OB 21 and OB 22 (restart),
- DB 255 (data buffer).

1.2 Program Structure

The data handling block SYNCHRON (chapter 4) synchronises the CPU and the CP 516:
The FB 199 cannot be executed unless the SYNCHRON data handling block parameterised by the user has executed successfully in the startup branch (startup with OB 20 or restart with OB 21, OB 22) of the AG. This is a prerequsite for a sensible communication between the data handling blocks SEND, FETCH and REC–A and the CP 516.

The data handling block SYNCHRON must be called for each of the interfaces of the AG with the corresponding parameters.

The FB 199 is called in the cyclic section of the program (OB 1); the specified interface number must be identical to that of the corresponding call to SYNCHRON.

Parameters for the FB 199 are optionally specified in direct or in indirect mode (section 2.1):

- in direct mode, the parameters are entered into the FB 199 directly.
- in indirect mode, the two mandatory parameters plus two pointers to parameter fields are entered at the FB 199.
  Indirect parameterisation allows the user to specify the required parameters for the FB 199 only once.

To initialise the FB 199, the user sets a trigger bit. After this, the FB 199 requires several cycles to complete the data transfer.
During this period of time, the user must not modify the trigger bit nor any other parameters of the FB 199; i.e. he must not initiate another request for the FB 199 before the previous request for a specific interface has either been completed successfully or has been terminated with an error.

After completion or termination of a request, the FB 199 automatically resets the trigger bit.

1.3 The Data Structure of the DB 255

The data block DB 255 must be reserved for the communication between the CPU and the CP 156 with the FB 199. It acts as a data buffer with internal status words for the parameterised interfaces and the auxiliary data area. Its length depends on the number of interfaces used for the FB 199:

Its minimum length is 81 data words (DW 0 to DW 80) for one interface.

Its maximum length is 347 data words (DW 0 to DW 346) for eight interfaces.

The DB 255 must be dimensioned, installed and initialised as described in section 3.3, "Startup and Restart", by the user in the CPU RAM (figure 1.1).

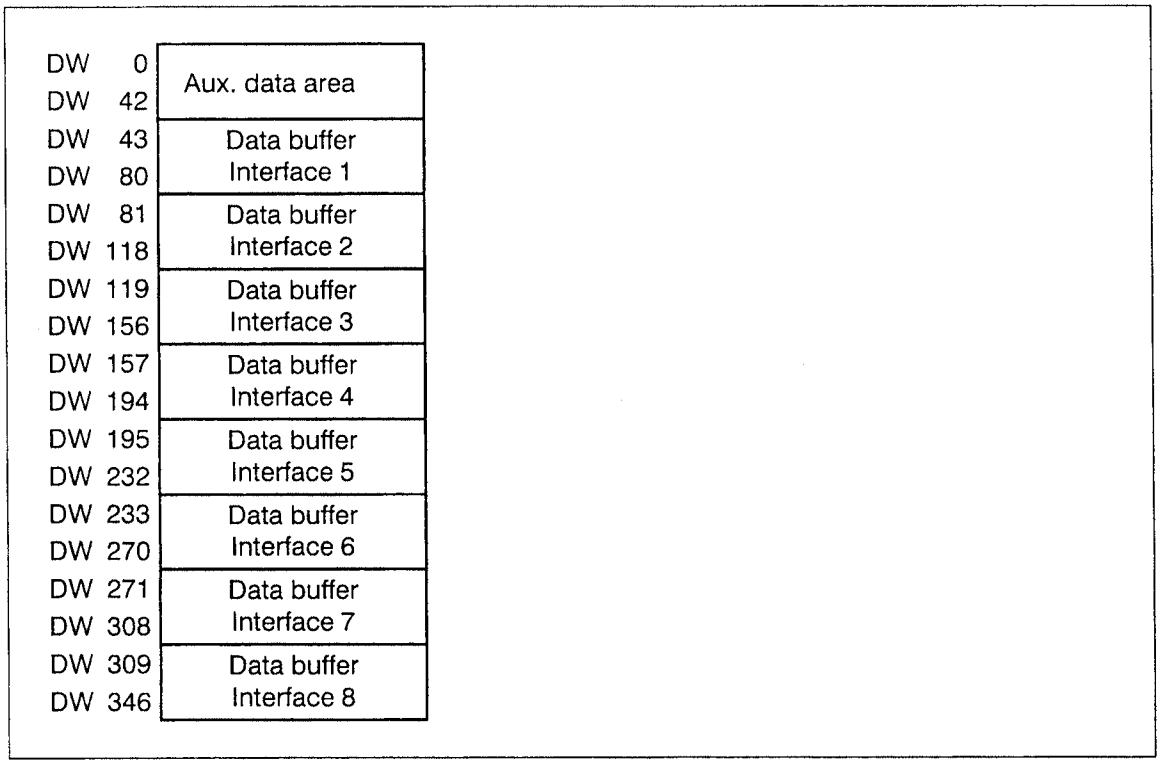

Figure 1.1 Structure of the DB 255

1.4 **Functions** (Modes of Operation)

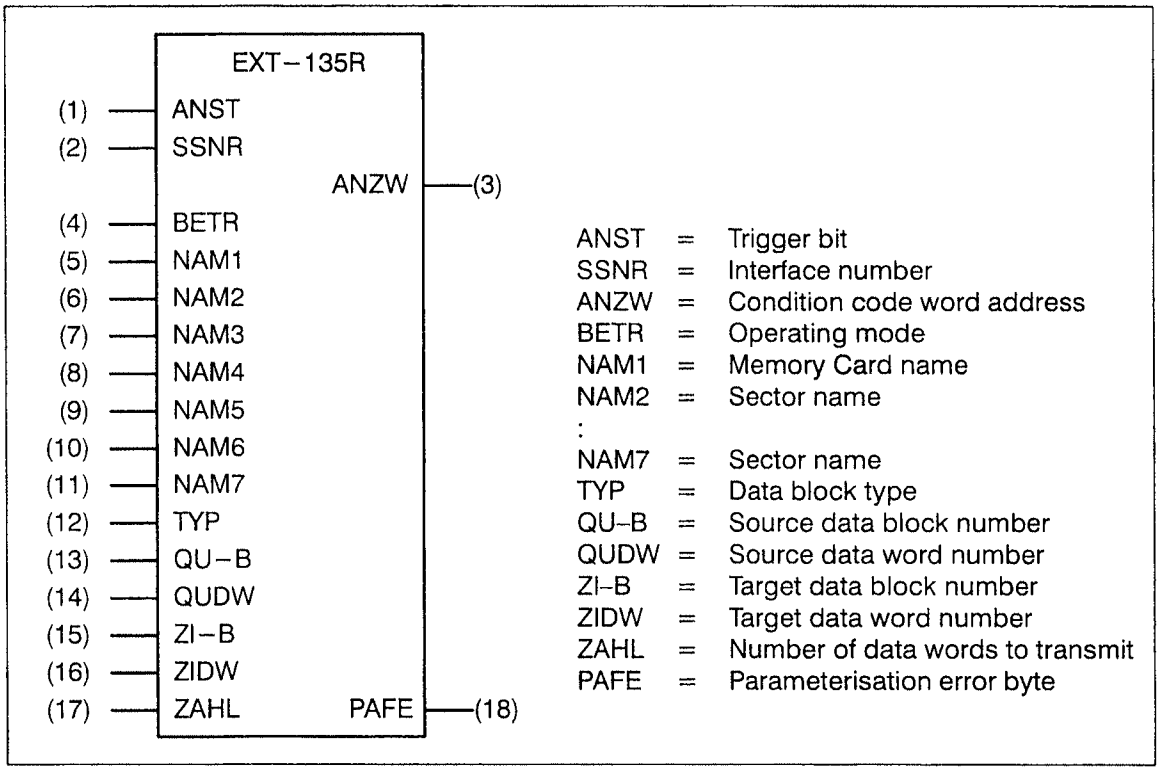

Figure 1.2 Function diagram of the FB 199

The functions of the FB 199 described herein depend on the operating mode specified; i.e., they depend on the value specified for the parameter BETR of the FB 199. Additional parameters must be assigned according to the function. Parameters not required for a function may optionally be specified. The individual parameters are described in chapter 2.

1.4.1 Transmitting Data Blocks

If more than one CP 516 or interface is used, the interface numbers must be within one interface window (section 2.2.2).

The numbers of source and target data block may differ. The transmission is possible only between data blocks of identical types (both DB or both DX).

Data blocks may be transmitted either in parts or as a whole:
Required parameters are the data block number, the number of the first data word to transfer and the number of data words to transfer.

The maximum length of a source or target block is 4096 data words (DW 0 to DW 4095).

Up to 2048 data words can be transmitted in one call.

Data blocks with identical numbers can be created in different sectors.

Data transfer from the CPU to the CP 516 (BETR = HS)

Data blocks can be transferred from the CPU memory to the CP 516 even if there has no target data block been set up. The FB 199 automatically sets up the target data block.

The new length of the target data block is the larger one of the two values:
- length of the existing target data block (length = 0 if there is none);
- target data word number (ZIDW) + number (ZAHL) of the data blocks to be transferred.

The FB 199 carries out any required corrections in the header of the target data block automatically.

During the transfer, no undefined gaps my occur.
Examples:
A transfer with a target data word number greater than zero is not permitted unless there already is a target data block (this would create an undefined leading gap).
A transfer with a target data word number greater than the length of the target data block is not permitted (this would create an undefined gap in the middle).

Data transfer from the CP 516 to the CPU (BETR = MS)

A data block can be transferred from the CP 516 to the CPU RAM only if a target data block has been set up at the destination.

1.4.2 Management Functions

In addition to the transfer of data blocks, the FB 199 provides the following management functions for the Memory Card, sectors and data blocks on the CP 516.

- Rename a sector,
- Delete a sector,
- Delete individual data blocks of a sector,
- Transfer the directory of a sector,
- Memory Card info,
- Copy the contents of Memory Card A: to B: or vice versa,
- Format a Memory Card.

Renaming a sector (BETR = NS)

A sector on a Memory Card is assigned a new name; the old sector name ceases to exist.

The sector and the data blocks of that sector can only be addressed under the new sector name.

Renaming a sector requires indirect parameterisation (section 2.1).
The parameter NAM1 contains the name of the Memory Card. The parameters NAM2 to NAM7 contain the old sector names. The new sector name is specified in the parameters TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL; data format: KC.

Deleting a sector (BETR = LS)

A sector on a Memory Card is deleted.

If a sector is deleted, all data blocks stored in this sector are deleted together with the sector name.
On RAM based Memory Cards, the storage space occupied by this sector is returned to the memory pool.

Deleting individual data blocks of a sector (BETR = LB)

A data block (TYP = DB or = DX) in a Memory Card sector is deleted; the storage space occupied by this data block is returned to the memory pool.

If the last data block of a sector is deleted, the corresponding sector name still exists in the list of sector names.
The sector name can be deleted by calling the function "Delete a sector" (BETR = LS).

Transferring the directory of a sector to the CPU (BETR = DS, DX)

The directory (list of data blocks) of a sector is transferred to a target data block type DB (if BETR = DS) or DX (if BETR = DX) in the CPU.

A sufficiently dimensioned target data block for the data block list must have been set up in the CPU memory.

Depending on the value of the parameter TYP (= DB, = DX or = B) the following data block lists can be transferred:
- Only DB data blocks (—> length of the data block list 16 data words);
- Only DX data blocks (—> length of the data block list 16 data words);
- DB and DX data blocks (—> length of the data block list 32 data words).

In the data block list, one bit is allocated for each of the 256 possible data blocks of a type (DB 0 to DB 255 and DX 0 to DX 255):
If the data block exists in the selected sector, the bit is set (= 1).
If the data block does not exist in the selected sector, the bit is cleared (= 0).

The allocation of the individual bits of the data block list (for one data block type) to data block numbers in the CPU data block is shown in figure 1.3.

Bit–No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DW n	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DW n+1	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
⋮	⋮		⋮					⋮					⋮			
DW n+14	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	224
DW n+15	255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	240

Figure 1.3 Structure of the data block list (for one data block type) for the directory of a sector

Figure 1.4 shows the structure of the data block list if the list is transferred with both DB and DX (setting TYP = B).

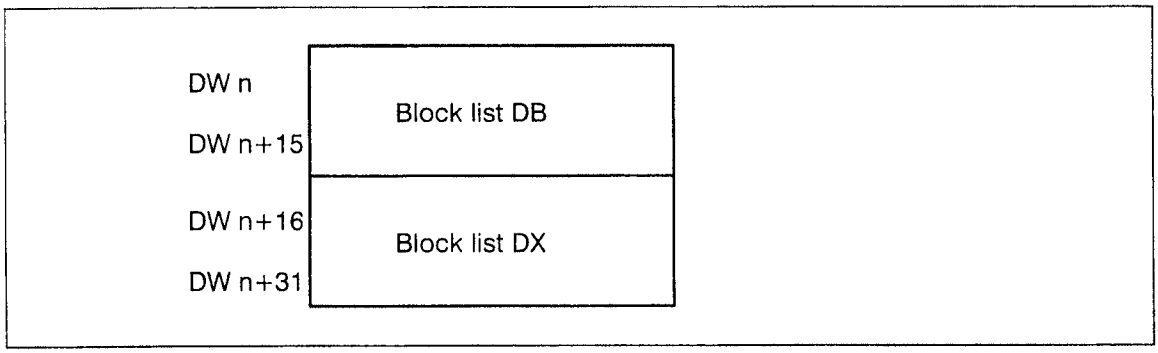

Figure 1.4 Structure of the data block list (for DB and DX data blocks) for the directory of a sector

Memory Card info (BETR = MI)

Data on the two Memory Cards are transferred to a target data block (TYP = DB or TYP = DX) in the CPU.

A sufficiently dimensioned target data block for the data (4 words) must be set up in the CPU memory.

For NAM1, optionally "A:" or "B:" may be specified. The data is transferred for each inserted Memory Card.

Figure 1.5 shows the structure of the info list for the two Memory Cards. The significance is

- memory size — hexadecimal specification of memory size (e.g. 800H: 2 Mbyte)
- Memory Card type: 0 H: no Memory Card inserted; 1 H: RAM; 2 H: FLASH-EPROM

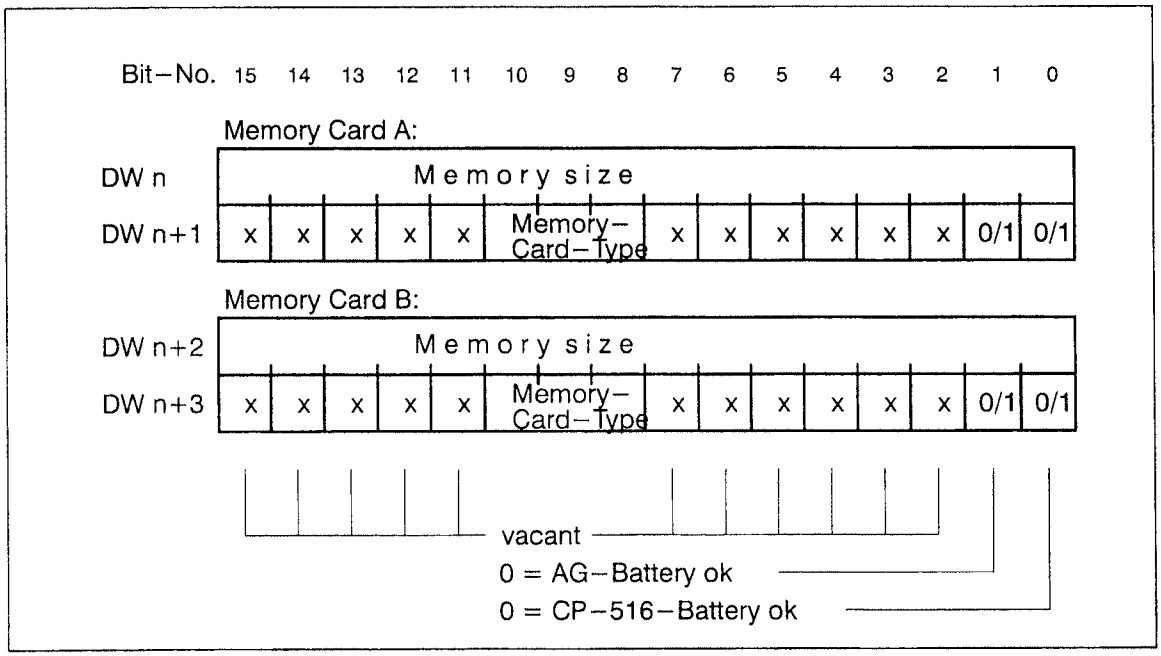

Figure 1.5 Structure of Memory Card data list

Copy contents from Memory Card A: to B: or from B: to A: (BETR = AB, = BA)

The entire contents of a Memory Card is copied to another Memory Card. Any data on the target Memory Card are overwritten.
In the parameter NAM1 the target Memory Card (A: or B:) is specified.

Formatting a Memory Card (BETR = FO)

The Memory Card is formatted. Any data stored on that card are deleted.

In order to avoid accidental formatting, the function FO must be called twice:
The formatting process starts after the second call if the second call was made immediately following the first call.
If another function is called between the two calls, the FB 199 deletes the first call.

1.5 Technical Specifications

Order numbers:

– S5–DOS (PCP/M)	6ES5 848–8GC11 (german) 6ES5 848–8GC21 (english) 6ES5 848–8GC31 (french)
– MS–DOS and S5–DOS/MT	6ES5 848–6GC11 (german) 6ES5 848–6GC21 (english) 6ES5 848–6GC31 (french)
Block number:	FB 199
Block name:	EXT-135R
Block length:	1168 words
Call length:	20 words
Processing time:	approximately 1 s to 8 s
Nesting depth:	1
called function blocks:	FB 120 SEND FB 122 FETCH FB 127 REC–A
called data blocks:	DB 255 Data buffer DB xx with indirect parameter specification DB yy with indirect parameter specification DB nn or flag word for condition code word
occupied flag area: (scratch area)	MW 200 to MW 238
occupied system date: (scratch cell)	BS 62 and BS 63

Data transfer time

The data transfer time for 1 kbyte (512 data words) is approximately 1 to 8 seconds (at a constant cycle time of 100 ms), depending on the block size (BLGR) set at the data handling block SYNCHRON and the operating mode (BETR) set at the FB 199:

	BETR = MS	BETR = HS		Number of cycles
BLGR	ZAHL = 512			
1 (16 Byte)	approx. 7.0 s	approx. 6.9 s	DB does not exist on CP 516	70
		approx. 7.1 s	Extend DB on CP 516	72
		approx. 6.8 s	DB exists on CP 516	69
6 (512 Byte)	approx. 0.8 s	approx. 0.8 s	DB does not exist on CP 516	9
		approx. 0.9 s	Extend DB on CP 516	10
		approx. 0.7 s	DB exists on CP 516	8

2 Parameter Specification

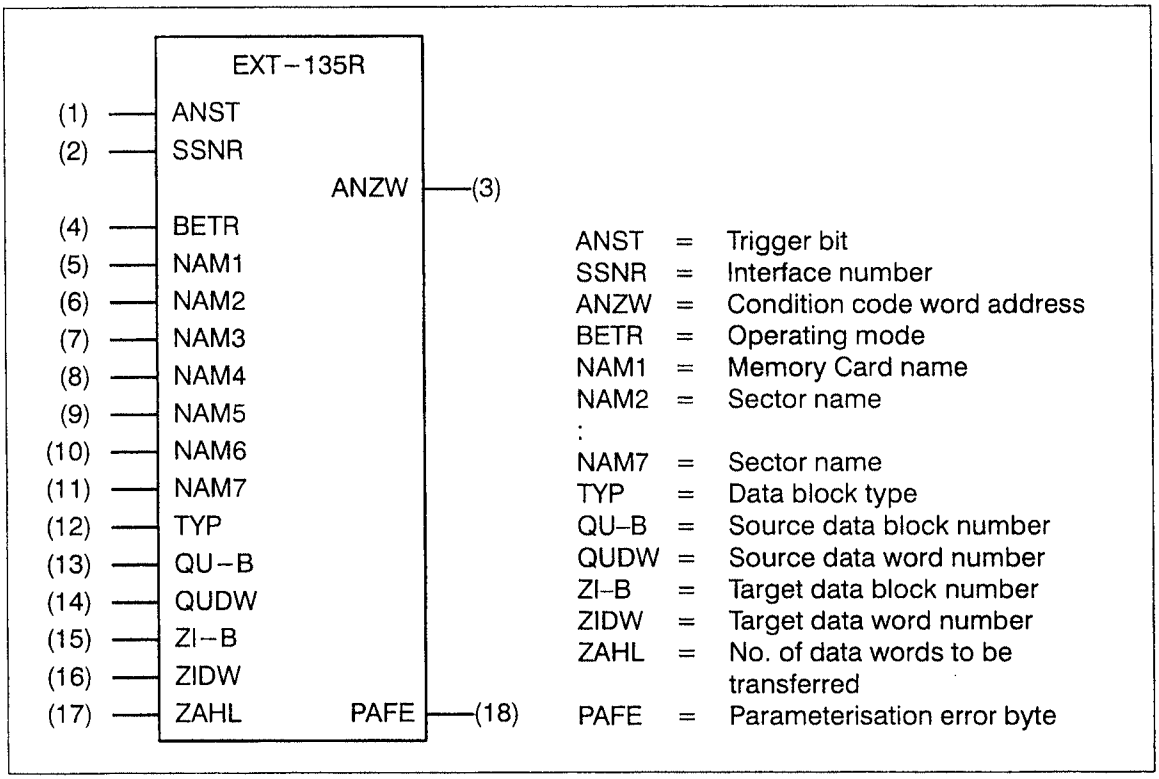

Figure 2.1 Parameters of the FB 199

2.1 Direct and Indirect Specification of Parameters

The parameters for the FB 199 are organised in two subsets:
– SSNR, ANZW, BETR, NAM1 bis NAM7 and
– TYP, QU–B, QUDW, ZI–B, ZIDW, ZAHL.

The FB 199 may be assigned parameters optionally for both subsets either directly or indirectly:

- If the parameters are specified directly (summary see section 2.3), they are entered at the FB 199.
- If the parameters are specified indirectly (summary see section 2.4), for each of the subsets a pointer to a parameter field is passed in two separate data blocks. At the positions pointed to, the two subsets must be specified without gaps in the order used for direct parameter specification.
  Indirect parameter specification allows the user to parameterise the FB 199 once.
  The trigger bit (ANST) and the parameterisation error byte (PAFE) must be specified directly at the FB 199 even if indirect parameter specification is used.

2.1.1 Parameter Set SSNR, ANZW, BETR, NAM1 to NAM7

Direct specification of parameters

In the high byte (left hand byte) of the parameter SSNR, "0" is entered.

In the low byte (right hand byte) of the parameter SSNR the interface number is entered.

Any other parameters are entered directly at the FB 199.

Indirect specification of parameters

In the high byte (left hand byte) of the parameter SSNR at the FB 199 a value greater than "0" must be entered.

In the low byte (right hand byte) of the parameter SSNR at the FB 199 the number of a data word must be entered into a data block.
Starting at this data word, the parameters SSNR, ANZW, BETR, NAM1 to NAM7 must be stored in ascending order starting at this data word. The data block must be open prior to calling the FB 199.

The length of the parameter set is always 10 data words, even if in some operating modes the FB 199 does not evaluate all of the parameters.

With indirect specification of parameters, the parameters specified directly (ANZW, BETR, NAM1 to NAM7) at the FB 199 are irrelevant.

2.1.2 Parameter Set TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL

Direct specification of parameters

The parameters are entered directly at the FB 199.

Indirect specification of parameters

Enter "XX" at the parameter TYP at the FB 199 (data format KC).

Enter the number of the data block containing the parameters to be transferred at the parameter QU-B at the FB 199.

Enter the number of a data word at the parameter QUDB at the FB 199. Starting at this data word, the parameters TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL must be entered in ascending order.

The length of the parameter set is always 6 data words, even if in some operating modes the FB 199 does not evaluate all of the parameters.

With indirect parameter specification, the parameters ZI-B, ZIDW and ZAHL, which are entered directly at the FB 199, are irrelevant.

2.2 Description of the Parameters

2.2.1 ANST: Trigger bit

The user sets the trigger bit in order to initiate a request
- for data transfer between the CPU and the CP 516 or
- for the management of data blocks or sectors on the CP 516.

After completion or termination of a request, the FB 199 resets the ANST bit.

Parameter types:	Input / bit
valid range:	A 0.0 ... A 127.7 M 0.0 ... M 255.7

2.2.2 SSNR: Interface Number

Specification of the interface number used for addressing the CP 516 or setting of indirect parameter specification (section 2.1.1).

The interface number must match the interface number specified for this CP 516 at the data handling block SYNCHRON.

Any values between 0 and 255 are valid SSNR numbers.
The up to 8 valid interfaces for one FB 199 must be within one interface window. An interface window contains 8 numbers and starts with a multiple of 8 (0, 8, 16 ... 248).

Parameter types:	data / KY
valid range:	0,0 ... 255,255
High byte = 0:	Direct parameter specification; low byte = SSNR
High byte > 0:	Indirect parameter specification; low byte = pointer to parameter field (number of the data word in the open data block, at which the specified parameters are stored.)

2.2.3 ANZW: Condition Code Word Address

In the condition code word, the FB 199 indicates the processing of a job.

It contains the status and/or error messages generated by the CP 516 firmware and by the FB 199. After completion or termination of the job, these messages are available to the user.

The condition code word (16 bit) may optionally be stored in the flag area or in a data block (type DB). Switching criterion is the high byte (left hand byte) of the parameter ANZW:

High byte = 0: condition code word is located in the flag area; the low byte (right hand byte specifies the flag word address of the condition code word).

High byte > 0: condition code word is located in the data block; the high byte (left hand byte) contains the number of the data block which contains the condition code word. The low byte contains the data word address of the condition code word.

Parameter types: data / KY

valid range: 0,0 ... 0,254 (flag area)
3,0 ... 254,255 (data block)

Structure of the condition code word

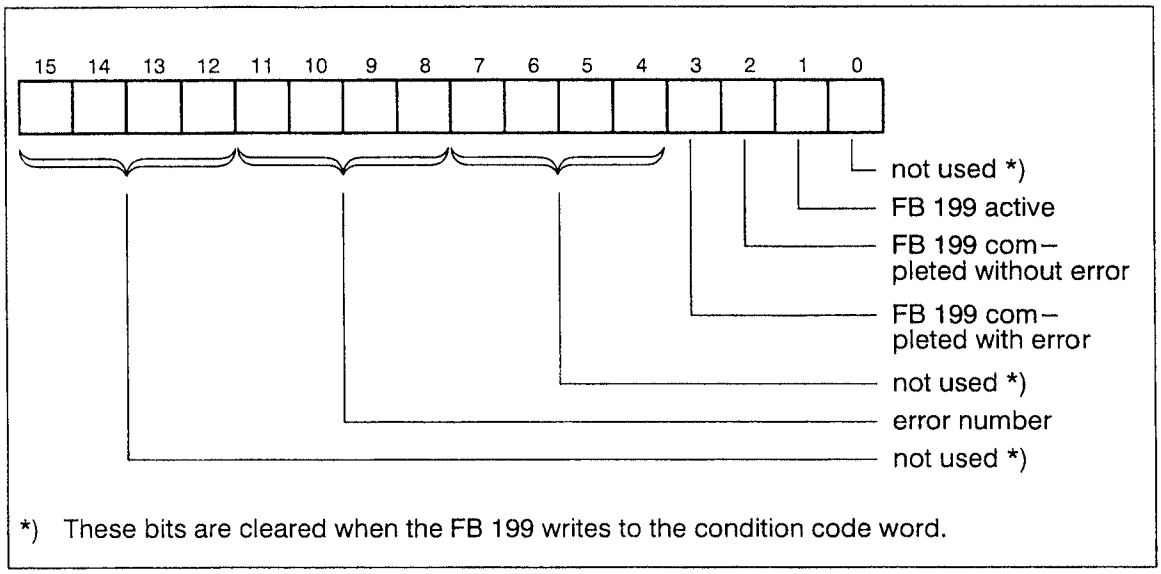

Figure 2.2 Structure of the condition code word

If the FB 199 returns the message "request completed with error" in bit 3 of the condition code word, bits 8 to 11 contain an error number which specifies the reason for the termination.

Error numbers in the condition code word

(1 – 5 : errors recognised by the FB 199)
(6 – F H : errors recognised by the CP 516)

0 = no error
1 = parameterisation error (additional information contained in the PAFE parameter)
2 = operating mode switch of the CP 516 set to STOP
3 = operating mode HS: data block does not exist on CP 516; header gap risk
4 = operating mode MS: data block on CPU too short
operating mode HS: data block on CP 516 too short; middle gap risk
5 = ZAHL = wildcard length: excessive source data block (QU–B) size; data block without block header exceeds 2048 data words.
6 = hardware error (check sum error on memory card)

7 = Memory Card not formatted
8 = Memory Card replaced or full
operating mode AB or BA: not formatted
9 = operating mode MS or LB: data block does not exist on CP 516
AH = not used
BH = incorrect request
CH = handshake error
DH = operating mode MS, NS, LS, LB, DS or DX:
sector name (data set name) does not exist on CP 516
EH = operating mode NS: sector name (data set name) already exists on CP 516
FH = Memory Card not inserted

2.2.4 BETR: Operating Mode

Specification of the function (described in section 1.4) the FB 199 is supposed to carry out. The following are valid entries:

HS: transfer a data block from the CPU to the CP 516

MS: transfer a data block from the CP 516 to the CPU

NS: rename a sector

LS: delete a sector

LB: delete a data block (DB or DX) within a sector

DS: transfer a directory (data block list) of a sector to a DB data block in the CPU memory

DX: transfer a directory (data block list) of a sector to a DX data block in the CPU memory

MI: transfer Memory Card related data to a DB or DX data block in the CPU memory

AB: transfer the contents of Memory Card A: to Memory Card B:

BA: transfer the contents of Memory Card B: to Memory Card A:

FO: Formatting a Memory Card

Parameter types: data / KC

valid range: the ASCII characters listed above

2.2.5 NAM: Name of the Memory Card, Sector Name

When addressing a data block in the CP 516, the Memory Card name (NAM1) and the sector name (NAM2 to NAM7) must be specified.
In both Memory Cards identical sector names may be used.
Different sectors may contain data blocks with identical numbers.

In the operating mode "transfer Memory Card related data" (MI) "A:" or "B:" must be specified (only plugged in Memory Cards must be specified).

NAM1: Name of the Memory Card,

The Memory Card must be specified preceding each sector name:
The upper Memory Card has the name "A:";
Lower Memory Card has the name "B:".

Parameter types: data / KC

valid range: A:, B:

NAM2 to NAM7: Sector name

The sector name consists of up to 8 ASCII characters to the left of the full stop and up to 3 ASCII characters to the right. If there are no ASCII characters to the right of the full stop, the full stop may be omitted.

Parameter type: data / KC

valid range: all ASCII characters

Examples

1) A:ANTON1.NEU
2) B:BERTA.1
3) A:SEKTOR_X
4) B:SEKTOR99.DAT
5) A: (selecting a Memory Card)

Example		*1)*	*2)*	*3)*	*4)*	*5)*
NAM1	KC:	A:	B:	A:	B:	A:
NAM2	KC:	AN	BE	SE	SE	
NAM3	KC:	TO	RT	KT	KT	
NAM4	KC:	N1	A.	OR	OR	
NAM5	KC:	.N	1	_X	99	
NAM6	KC:	EU			.D	
NAM7	KC:				AT	

2.2.6 TYP: Data Block Type

Specification of the data block type or the setting of the indirect parameter specification (section 2.1.2). The following settings are possible:

DB: DB data block

DX: DX data block

B: DB and DX data blocks;
transfer of a sector directory

XX: indirect parameter specification

Parameter type: data / KC

valid range: the ASCII characters listed above

2.2.7 QU-B: Source Data Block Number

With direct parameter specification:
Specification of the number of the source data block from which the FB 199 is transferred.

With indirect parameter specification:
Specification of the number of the data block which contains the parameter list.

The FB 199 evaluates the source data block number only in the operating modes HS and MS; in all other operating modes it is irrelevant.

Parameter types:	data / KF	
valid range:	+ 2 ... + 254	(BETR = HS, TYP = DB)
	+ 1 ... + 254	(BETR = MS, TYP = DB)
	+ 1 ... + 255	(TYP = DX)
	+ 3 ... + 254	(indirect parameter specification)

2.2.8 QUDW: Source Data Word Number

With direct parameter specification:
Specification of the number of the first data word in the source data block which the FB 199 should transfer.

With indirect parameter specification:
Specification of the number of the data word which contains the start of the parameter list.

The FB 199 evaluates the source data word number only in the operating modes HS and MS; in all other operating modes it is irrelevant.

Parameter types:	data / KF	
valid range:	+ 0 ... + 2048	(direct parameter specification)
	+ 0 ... + 250	(indirect parameter specification)

2.2.9 ZI-B: Target Data Block Number

Specification of the number of the target data block the FB 199 should make a transfer to.

The target data block number is irrelevant in the operating modes LS, NS, AB, BA and FO.

Parameter types:	data / KF	
valid range:	+ 1 ... + 254 (	BETR = HS, TYP = DB,
		BETR = LB, TYP = DB)
	+ 2 ... + 254 (	BETR = MS, TYP = DB)
		BETR = MI, TYP = DB)
	+ 1 ... + 255 (	BETR = HS, TYP = DX,
		BETR = MS, TYP = DX,
		BETR = LB, TYP = DX)
		BETR = MI, TYP = DX)

2.2.10 ZIDW: Target Data Word Number

Specification of the number of the first data word the FB 199 should make a transfer to starting at this word.

The target data word number is irrelevant in the operating modes LS, NS, AB, BA and FO.

Parameter types:	data / KF
valid range:	+ 0 ... + 2048

2.2.11 ZAHL: Number of Data Words to transfer

Specification of the number of data words to transfer.

The FB 199 evaluates the number of data words only in the operating modes HS and MS; in all other operating modes it is irrelevant.

If ZAHL = –1 is specified, the FB 199 transfers the source data block in the current length.
The parameter QUDW is irrelevant, i.e., the FB 199 sets it to zero:
The transfer starts at the source data block at DW 0.

Parameter types:	data / KF
valid range:	+ 1 ... + 2048 – 1 (wildcard length)

2.2.12 PAFE: Parameterisation Error Byte

The FB 199 sets this flag output or input byte if it encounters a parameterisation error.

Parameter type:	Output / BY
valid range:	AB 0 ... AB 127 MB 0 ... MB 255

Structure of the parameterisation error byte

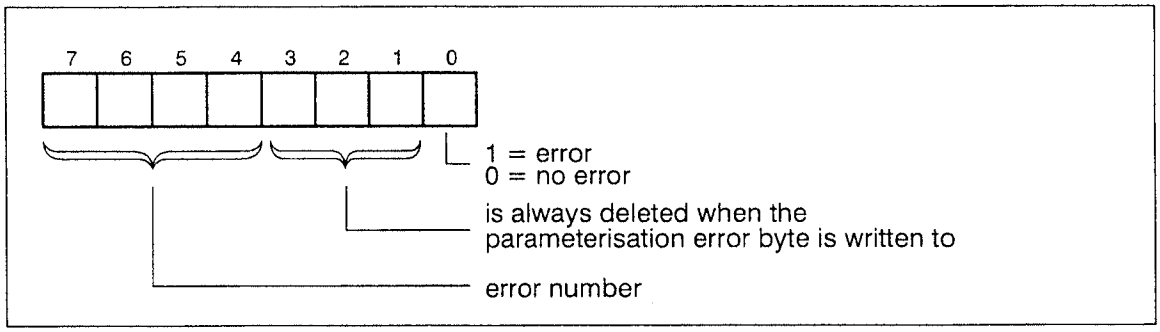

Figure 2.3 Structure of the parameterisation error byte

The error numbers in the parameterisation error byte have the following significance:

0 no error.

1 Data block for indirect parameterisation not available or too short, address for parameter set invalid (greater than DW 246) or data block number invalid (DB–NR < 2, DB–NR = 255). (Without error message in the condition code word.)

2 Invalid parameter specified for SSNR (interface number):
specified SSNR does not exist or SSNR is not within interface window.
(Without error message in the condition code word.)

3 Invalid parameter specified for ANZW (condition code word):
Data block for the parameter not available or too short or data block number invalid (DB–NO < 2 or DB–NO = 255).
(Without error message in the condition code word.)

4 Invalid parameter specified for BTR (operating mode):
only HS, MS, NS, LS, LB, DS, DX, MI, AB, BA and FO are valid.

5 Invalid parameter specified for TYP (data block type):
only DB, DX, B, XX are valid;
with BETR = NS all except XX.

6 Invalid parameter specified for QU–B, ZI–B (data block number):
invalid are:

BETR = HS:	TYP = DB :	QU–B < 2; QU–B > 254;	ZI–B < 1, ZI–B > 254;
BETR = MS:	TYP = DB :	QU–B < 1; QU–B > 254;	ZI–B < 2, ZI–B > 254;
BETR = HS/MS:	TYP = DX :	QU–B > 255;	ZI–B > 255;
BETR = LB:	TYP = DB :		ZI–B < 1; ZI–B > 254;
BETR = LB:	TYP = DX :		ZI–B < 1; ZI–B > 255;
BETR = DS:	:		ZI–B < 2; ZI–B > 254;
BETR = DX:	:		ZI–B < 1; ZI–B > 255;
BETR = MI:	TYP = DB :		ZI–B < 2; ZI–B > 254;
BETR = MI:	TYP = DX :		ZI–B < 1; ZI–B > 255.

7 Data block does not exist in AG or is too short:

BETR = HS:	QU–B;	QUDW > DB length;	QUDW + ANZ > DB length
BETR = MS:	ZI–B;	ZIDW > DB length;	ZIDW + ANZ > DB length
BETR = MI:		ZIDW + U > DB length;	
BETR = DS, DX:	ZI–B;	ZIDW > DB length;	ZIDW + 32 (Type: B) > DB length ZIDW + 16 (Type: DB o. DX) > DB length

8 Invalid parameter specified for QUDW, ZIDW (data word number)
invalid are
QUDW, ZIDW < 0;
QUDW, ZIDW > 2048.

9 Invalid parameter specified for ZAHL (number)
invalid are
ZAHL < –1;
ZAHL = 0;
ZAHL > 2048.

A H Data block DB 255 does not exist or is too short.

B H wrong Memory Card selected: NAM1 ≠ „A:" and NAM1 ≠ „B:".

2.3 Summary Direct Parameterisation

The following tables show the parameters required depending on the operating modes (BETR).

Call:
FB EXT-135R :SPB FB199
NAME :EXT-135R

2.3.1 Direct Parameterisation of SSNR, ANZW, BETR, NAM1 to NAM7

Trigger bit	ANST:		++	++	++	++	++	++	++	++	++	++	++
Interface number	SSNR:	KY	++	++	++	++	++	++	++	++	++	++	++
CC–word address	ANZW:	KY	++	++	++	++	++	++	++	++	++	++	++
Operating mode	BETR:	KC	MS	HS	NS	LS	LB	DS	DX	MI	AB	BA	FO
Memory Card name	NAM1:	KC	++	++	++	++	++	++	++	++	++	++	++
Sector name	NAM2:	KC	++	++	++	++	++	++	++				
	to												
	NAM7:	KC	++	++	++	++	++	++	++				

++: These params are evaluated by theFB 199.
Specifications in vacant field are irrelevant.

Table 2.1 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 at the FB 199 with direct parameterisation

2.3.2 Direct Parameterisation of TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL

	Operating mode:		MS	HS	NS	LS	LB	DS	DX	MI	AB	BA	FO
Block type	TYP:	KC	++	++	**		++	++	++	++			
Source data block no.	QU–B:	KF+	++	++									
Source data word no.	QUDW:	KF+	++	++									
Target data block no.	ZI–B:	KF+	++	++			++	++	++	++			
Target data word no.	ZIDW:	KF+	++	++				++	++	++			
Number	ZAHL:	KF+	++	++									
Param. error byte	PAFE:	KF+	++	++	++	++	++	++	++	++	++	++	++

**: direct parameter specification not available with BETR=NS

++: These params are evaluated by the FB 199
Specifications in vacant field are irrelevant.

Table 2.2 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL at the FB 199 with direct parameterisation

2.4 Summary Indirect Parameterisation

The following tables show the parameters required depending on the operating mode (BETR).

Call:

```
FB EXT-135R      :A DB n     (open data block)
                 :SPB FB199
           NAME  :EXT-135R
```

2.4.1 Indirect Parameterisation of SSNR, ANZW, BETR, NAM1 to NAM7

Trigger bit	ANST:		++
Interface number	SSNR:	KY	++
CC word address	ANZW:	KY	
Operating mode	BETR:	KC	++
Memory Card name	NAM1:	KC	
Sector name	NAM2: to NAM7:	KC KC	

++: these params are evaluated by the FB 199. specifications in vacant fields are irrelevant.

Table 2.3 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 at the FB 199 with indirect parameterisation

The parameter set must be entered into the data block opened prior to calling the FB 199.

The low byte (right hand byte) of the parameter SSNR (section 2.2.2) is a pointer to this parameter set. The valid parameters must be entered starting at the data word specified here.

The length of the parameter set is always 10 data words, even if the FB 199 does not evaluate all parameters in some operating modes.

Parameter	*Format*	*DW*	*DB n*										
SSNR	KY	m	++	++	++	++	++	++	++	++	++	++	++
ANZW	KY	m+1	++	++	++	++	++	++	++	++	++	++	++
BETR	KC	m+2	MS	HS	NS	LS	LB	DS	DX	MI	AB	BA	FO
NAM1	KC	m+3	++	++	++	++	++	++	++	++	++	++	++
to	KC	to	++	++	++	++	++	++	++				
NAM7	KC	m+9	++	++	++	++	++	++	++				

++: these parameters are evaluated by the FB 199. specifications in vacant fields are irrelevant.

Table 2.4 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 in the open data block with indirect parameterisation

2.4.2 Indirect Parameterisation of TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL

Block type	TYP:	KC	XX
Source data block no.	QU–B:	KF+	++
Source data word no.	QUDW:	KF+	++
Target data block no.	ZI–B:	KF+	
Target data word no.	ZIDW:	KF+	
Number	ZAHL:	KF+	
Param. error byte	PAFE:	KF+	++

++: these params are evaluated by the FB 199. specifications made in vacant fields are irrelevant.

Table 2.5 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL at the FB 199 with indirect parameterisation

The parameter set is entered into the DB data block specified by the parameter QU–B starting at the data word specified in the parameter QUDW.

The length of the parameter set is always 6 data words, although in some operating modes the FB 199 does not evaluate all parameters.

In the operating modes LS, AB, FO and BA this parameter set is not evaluated by the FB 199.

			Operating mode:	MS	HS	NS	LB	DS	DX	MI
Parameter	*Format*	*DW*	*DB a*							
TYP:	KC	b		++	++	++	++	++	++	++
QU–B:	KF+	b+1		++	++	++				
QUDW:	KF+	b+2		++	++	++				
ZI–B:	KF+	b+3		++	++	++	++	++	++	++
ZIDW:	KF+	b+4		++	++	++		++	++	++
ZAHL:	KF+	b+5		++	++	++				

++: these params are evaluated by the FB 199. specifications made in vacant fields are irrelevant.

Table 2.6 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL in the data block specified with QU–B with indirect parameterisation

3 Program Examples

The program examples are based on the following assumptions:
- The CP 516 is configured as interface number 2.
- The FB 199 stores the condition code word in the flag word MW 180.
- The FB 199 stores incorrect parameter specifications in the flag byte MB 50.

3.1 Direct Parameterisation

3.1.1 Operating Mode HS

100 data words of the data block DB 35 starting at DW 0 are to be transferred from the CPU to the CP 516.

By setting the trigger bit M 100.0 the user issues the request to the FB 199.

The trigger bit (M 100.0) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.0      trigger flag
        :UN     M 100.0     trigger bit
        :R      M 90.0      reset activation flag
        :S      M 100.0     set trigger bit
        :SPA    FB199       call FB EXT-135R
NAME    :EXT-135R
ANST    :       M 100.0     trigger bit: M 100.0
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCHS        0peration mode: HS
NAM1    :       KCB:        Memory Card B:
NAM2    :       KCSE        sector name: SEKTOR12.DAT
NAM3    :       KCKT
NAM4    :       KCOR
NAM5    :       KC12
NAM6    :       KC.D
NAM7    :       KCAT
TYP     :       KCDB        data block typee: DB
QU-B    :       KF+35       source data block number: 35
QUDW    :       KF+0        source data word number: DW 0
ZI-B    :       KF+40       target data block number: 40
ZIDW    :       KF+0        target data word number: DW 0
ZAHL    :       KF+100      number: 100 data words
PAFE    :       MB50        parameterisation error byte : MB 50
:
:
```

3.1.2 Operating Mode LS

Delete the sector SEKT0R1 in Memory Card A:.

By setting the trigger bit M 100.1 the user issues the request to the FB 199.

The trigger bit (M 100.1) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.1      trigger flag
        :UN     M 100.1     trigger bit
        :R      M 90.1      reset activation flag
        :S      M 100.1     set trigger bit
        :SPA    FB199       call FB EXT-135R
NAME    :EXT-135R
ANST    :       M 100.1     trigger bit: M 100.1
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCLS        operating mode: delete a sector
NAM1    :       KCA:        Memory Card A:
NAM2    :       KCSE        sector name: SEKT0R1
NAM3    :       KCKT
NAM4    :       KCOR
NAM5    :       KC1
NAM6    :       KC
NAM7    :       KC
TYP     :       KC          irrelevant
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+0        irrelevant
ZIDW    :       KF+0        irrelevant
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte : MB 50
:
:
```

3.1.3 Operating Mode LB

Delete the extended data block DX 10 in the sector SEKT0R2 in Memory Card A:.

By setting the trigger bit M 100.2 the user issues the request to the FB 199.

The trigger bit (M 100.2) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U      M 90.2        trigger flag
          :UN     M 100.2       trigger bit
          :R      M 90.2        reset activation flag
          :S      M 100.2       set trigger bit
          :SPA    FB 199        call FB EXT-135R
NAME      :EXT-135R
ANST      :       M 100.2       trigger bit: M 100.2
SSNR      :       KY0,2         interface number: 2
ANZW      :       KY0,180       condition code word address: MW 180
BETR      :       KCLB          operating mode: delete a data block
NAM1      :       KCA:          Memory Card A:
NAM2      :       KCSE          sector name: SEKT0R2
NAM3      :       KCKT
NAM4      :       KCOR
NAM5      :       KC2
NAM6      :       KC
NAM7      :       KC
TYP       :       KCDX          data block typee: DX
QU-B      :       KF+0          irrelevant
QUDW      :       KF+0          irrelevant
ZI-B      :       KF+10         target data block number: 10
ZIDW      :       KF+0          irrelevant
ZAHL      :       KF+0          irrelevant
PAFE      :       MB50          parameterisation error byte: MB 50
:
:
```

3.1.4 Operating Mode DX

Transfer the data block list of all existing data block types of the sector TEST.DDD in Memory Card B: to the extended data block DX 11 of the CPU starting at DW 10.

By setting the trigger bit M 100.3 the user issues the request to the FB 199.

The trigger bit (M 100.3) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.3      trigger flag
        :UN     M 100.3     trigger bit
        :R      M 90.3      reset activation flag
        :S      M 100.3     set trigger bit
        :SPA    FB199       call FB EXT-135R
NAME    :EXT-135R
ANST    :       M 100.3     trigger bit: M 100.3
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCDX        operating mode: transfer data block list of a sector
                            to data block DX
NAM1    :       KCB:        Memory Card B:
NAM2    :       KCTE        sector name: TEST.DDD
NAM3    :       KCST
NAM4    :       KC.D
NAM5    :       KCDD
NAM6    :       KC
NAM7    :       KC
TYP     :       KCB         data block typee: B (list of data block typees DB and DX)
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+11       target data block number: 11
ZIDW    :       KF+10       target data word number: DW 10
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte: MB 50
:
:
```

3.1.5 Operating Mode MI

Transfer Memory Card information to the extended data block DX 11 of the CPU starting at DW 100.

By setting the trigger bit M 100.4 the user issues the request to the FB 199.

The trigger bit (M 100.4) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.4          trigger flag
        :UN     M 100.4         trigger bit
        :R      M 90.4          reset activation flag
        :S      M 100.4         set trigger bit
        :SPA    FB199           call FB EXT-135R
NAME    :EXT-135R
ANST    :       M 100.4         trigger bit: M 100.4
SSNR    :       KY0,2           interface number: 2
ANZW    :       KY0,180         condition code word address: MW 180
BETR    :       KCMI            operating mode: Memory Card info
NAM1    :       KCB:            Memory Card B: (or A:)
NAM2    :       KC              irrelevant
NAM3    :       KC              irrelevant
NAM4    :       KC              irrelevant
NAM5    :       KC              irrelevant
NAM6    :       KC              irrelevant
NAM7    :       KC              irrelevant
TYP     :       KCDX            data block type: DX
QU-B    :       KF+0            irrelevant
QUDW    :       KF+0            irrelevant
ZI-B    :       KF+11           target data block number: 11
ZIDW    :       KF+100          target data word number: DW 100
ZAHL    :       KF+0            irrelevant
PAFE    :       MB50            parameterisation error byte: MB 50
:
:
```

3.1.6 Operating Mode AB

Copy the contents of Memory Card A: to Memory Card B:.

By setting the trigger bit M 100.5 the user issues the request to the FB 199.

The trigger bit (M 100.5) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.5      trigger flag
        :UN     M 100.5     trigger bit
        :R      M 90.5      reset activation flag
        :S      M 100.5     set trigger bit
        :SPA    FB199       call FB EXT-135R
NAME    :EXT-135R
ANST    :       M 100.5     trigger bit: M 100.5
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCAB        operating mode:  Copy contents of Memory Card A:
                                             to Memory Card B:
NAM1    :       KCB:        target Memory Card B:
NAM2    :       KC          irrelevant
NAM3    :       KC          irrelevant
NAM4    :       KC          irrelevant
NAM5    :       KC          irrelevant
NAM6    :       KC          irrelevant
NAM7    :       KC          irrelevant
TYP     :       KC          irrelevant
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+0        irrelevant
ZIDW    :       KF+0        irrelevant
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte: MB 50
:
:
```

3.1.7 Operating Mode FO

Format Memory Card A:.

By setting the trigger bit M 100.6 the user issues the request to the FB 199.

The trigger bit (M 100.6) is reset by the FB 199 after the request has been processed.

In order to avoid accidental formatting, the function FO must be called twice:
the formatting process starts if the second function call immediately follows the first call.
If another function is called between these two calls, the FB 199 deletes the first call.

```
OB 1
:
:
        :U      M 90.6      trigger flag
        :UN     M 100.6     trigger bit
        :R      M 90.6      reset activation flag
        :S      M 100.6     set trigger bit
        :SPA    FB199       call FB EXT-135R
NAME    :EXT-135R
ANST    :       M 100.6     trigger bit: M 100.6
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCFO        operating mode: format a Memory Card
NAM1    :       KCA:        Memory Card A:
NAM2    :       KC          irrelevant
NAM3    :       KC          irrelevant
NAM4    :       KC          irrelevant
NAM5    :       KC          irrelevant
NAM6    :       KC          irrelevant
NAM7    :       KC          irrelevant
TYP     :       KC          irrelevant
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+0        irrelevant
ZIDW    :       KF+0        irrelevant
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte: MB 50
:
:
```

3.2 Indirect Parameterisation

The parameters SSNR, ANZW, BETR, NAM1 to NAM7 are specified in the data block DB 101 starting at DW 10.

The parameters TYP, QU–B, QUDW, ZI–B, ZIDW and ANZ are specified in the data block DB 110 starting at DW 1.

By setting the trigger bit M 100.7 the user issues the request to the FB 199.

The trigger bit (M 100.7) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U        M 90.7      trigger flag
          :UN       M 100.7     trigger bit
          :R        M 90.7      reset activation flag
          :S        M 100.7     set trigger bit
          :A        DB101       call parameter DB for
                                SSNR, ANZW, BETR, NAM1 bis NAM7 <----------+
          :SPA      FB199                                                  |
NAME      :EXT-135R                                                        |
ANST      :         M 100.7     trigger bit: M 100.7                       |
SSNR      :         KY255,10    left hand parameter byte > 0: indirect     |
                                parameterisation                           |
                                right hand parameter byte:  parameters are |
                                                            located in     |
                                                            DB 101 starting|
                                                            at DW 10 <-----+
ANZW      :         KY0,0       irrelevant
BETR      :         KC          irrelevant
NAM1      :         KC          irrelevant
NAM2      :         KC          irrelevant
NAM3      :         KC          irrelevant
NAM4      :         KC          irrelevant
NAM5      :         KC          irrelevant
NAM6      :         KC          irrelevant
NAM7      :         KC          irrelevant
TYP       :         KCXX        indirect parameterisation
QU–B      :         KF+110      parameter for TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL
                                in DB 110
QUDW      :         KF+1        parameter list starts with DW 1
ZI–B      :         KF+0        irrelevant
ZIDW      :         KF+0        irrelevant
ZAHL      :         KF+0        irrelevant
PAFE      :         MB50        parameterisation error byte: MB 50
:
:
```


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3.2.1 Operating Mode HS

100 data words of the data block DB 35 starting at DW 0 are transferred from the CPU to the data block DB 40 starting at DW 0 in Memory Card A: in sector DATUM1.A.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= HS	operating mode: BETR = HS
	13 :	KC= A:	Memory Card A:
	14 :	KC= DA	sector name: DATUM1.A
	15 :	KC= TU	
	16 :	KC= M1	
	17 :	KC= .A	
	18 :	KC	
	19 :	KC	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL

DB 110

DW	1 :	KC= DB	data block type: DB
	2 :	KF= +35	source data block: DB 35
	3 :	KF= +0	source data word: DW 0
	4 :	KF= +40	target data block: DB 40
	5 :	KF= +0	target data word: DW 00
	6 :	KF= +100	number: 100 data words

3.2.2 Operating Mode LS

The sector SEKT0R12 in Memory Card B: is to be deleted.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= LS	operating mode: delete a sector
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	sector name: SEKT0R12
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC	
	19 :	KC	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.2.3 Operating Mode LB

Delete the extended data block DX 10 in Memory Card B: in the sector SEKT0R12.DAT.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= LB	operating mode: delete a data block
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	sector name: SEKT0R12.DAT
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC= .D	
	19 :	KC= AT	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

DB 110

DW	1 :	KC= DX	data block type: DX
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +10	target data block: DX 10
	5 :	KF= +0	irrelevant
	6 :	KF= +0	irrelevant

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3.2.4 Operating Mode DX

Transfer the data block list of all existing data block types of the sector SEKT0R12.DAT in Memory Card A: to the extended data block DX 11 of the CPU starting at DW 10.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= DX	operating mode: transfer data block list in data block DX
	13 :	KC= A:	Memory Card A:
	14 :	KC= SE	sector name: SEKT0R12.DAT
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC= .D	
	19 :	KC= AT	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

DB 110

DW	1 :	KC= B	data block type = B (list data block types DB and DX)
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +11	target data block: DX 11
	5 :	KF= +10	target data word: DW 10
	6 :	KF= +0	irrelevant

3.2.5 Operating Mode MI

Transfer Memory Card info to the extended data block DX 11 of the CPU starting at DW 100.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= MI	operating mode: Memory Card info
	13 :	KC= B:	Memory Card B: (or A:)
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU–B, QUDW, ZI–B, ZIDW, Zahl

DB 110

DW	1 :	KC= DX	data block type: DX
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +11	target data block: DX 11
	5 :	KF= +100	target data word: DW 100
	6 :	KF= +0	irrelevant

3.2.6 Operating Mode AB

Copy the contents of Memory Card A: to Memory Card B:.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= AB	operating mode: copy contents of one Memory Cards to another
	13 :	KC= B:	target Memory Card
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU–B, QUDW, ZI–B, ZIDW, Zahl

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.2.7 Operating Mode NS

The sector SEKT012.DAT in Memory Card B: is renamed to TEST1234.EXT.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7 (with old sector name)

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= NS	operating mode: rename sector
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	old sector name: SEKT0R12.DAT
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC= .D	
	19 :	KC= AT	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL (with new sector name)

DB 110

DW	1 :	KC= TE	new sector name: TEST1234.EXT
	2 :	KC= ST	
	3 :	KC= 12	
	4 :	KC= 34	
	5 :	KC= .E	
	6 :	KC= XT	

3.2.8 Operating Mode FO

Format Memory Card B:.

In order to avoid accidentally formatting the Card, the function FO must be called twice:
the formatting starts if the second call to this function is made immediately after completion message of the first call has arrived.
If another function is called between these two calls, the FB 199 deletes the first call.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= FO	operating mode: format Memory Card
	13 :	KC= B:	Memory Card B:
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.3 Startup and Restart

In the startup and restart branch, for each installed CP 516 the FB SYNCHRON must be called with the appropriate interface number.

Error messages issued by the FB SYNCHRON must be evaluated by the user, because the FB 199 assumes perfect synchronisation of the parameterised interface.

For each CP 516, in the data block DB 255 the internal status word and the auxiliary data are of the FB 199 must be deleted.
For the interfaces 7 and 8, the internal status word can be deleted only using direct addressing, since in this case the length of the DB 255 exceeds 256 DW.

```
OB 20; OB 21; OB 22 :
:
:
          :SPA      FB125     call to data handling block
NAME      :SYNCHRON             SYNCHRON
SSNR      :KY0,2                interface number: 2
BLGR      :KY0,4                Block size e.g.: 4 (128 byte)
PAFE      :MB255                parameterisation error byte: MB 255
          :
          :
          :A        DB255     data buffer for the FB 199
          :L        KB0
          :T        DW0       delete auxiliary data area
          :T        DW1       delete auxiliary data area
          :T        DW13      delete auxiliary data area
          :T        DW38      delete auxiliary data area
          :T        DW42      delete auxiliary data area
          :T        DW43      delete status word interface 1
          :T        DW81      delete status word interface 2
          :T        DW119     delete status word interface 3
          :T        DW157     delete status word interface 4
          :T        DW195     delete status word interface 5
          :T        DW233     delete status word interface 6
          :SPA      FBnnn     call a function block (nnn = number of the FB)
          :
          :
```

```
FBnnn     :MBR      EECFF     start address DB 255
          :LRW      0
          :SLD      4         load
          :MAB                into BR register
          :L        KB0
          :TRW      + 271     delete status word interface 7
          :TRW      + 309     delete status word interface 8
```

4 The SYNCHRON Data Handling Block

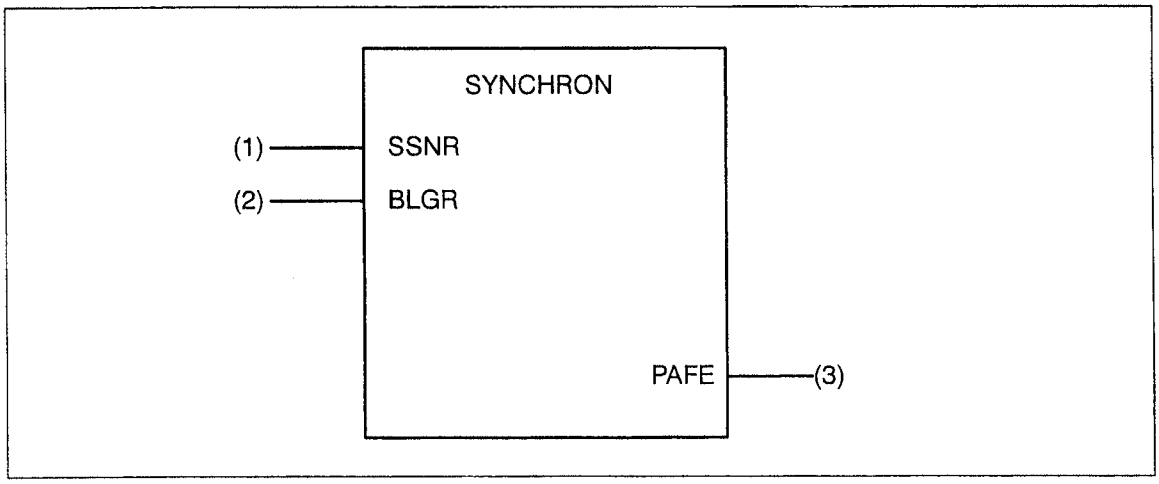

Figure 4.1 The SYNCHRON data handling block

4.1 Function

The SYNCHRON data handling block (FB 125) synchronises the CP 516 and the CPU. It sets the interface number for the related CP 516 and deletes the auxiliary data area and the internal status word for the interface.

The SYNCHRON data handling block is called during "Manual startup" (OB 20), "Manual restart" (OB 21) and "Automatic restart" (OB 22).

Because of its execution time, the data handling block SYNCHRON can only be called in these start phases.

At the data handling block SYNCHRON, the following parameters must be entered:
SSNR = interface number,
BLGR = block size,
PAFE = parameterisation error byte.

Section 3.3 contains a parameterisation example for the SYNCHRON.

4.2 Parameter Description

4.2.1 SSNR: Interface Number

Number of the interface the CP 516 is addressed under.

Parameter types:	Datum / KY
valid range:	0,0... 0,255
High byte = 0:	Direct parameterisation; low byte = SSNR
High byte > 0:	Indirect parameterisation; low byte = pointer to parameter field; in the data block opened prior to calling the FB SYCHRON starting at the data word specified here the parameters SSNR and BLGR are stored in the order and format used for direct parameterisation.

4.2.2 BLGR: Blocksize

BLGR allows the user to define the maximum number of data words the FB 199 (or the data handling blocks SEND and REC–A) will transfer in one go.
If the value of the parameter ZAHL specified with FB 199 exceeds the value defined in BLGR, the FB 199 automatically transfers any subsequent blocks.

For the sake of high transfer rates, select large blocksize values (which extends the cycle time).

In order to minimise the execution time of the function blocks, select low blocksize values (which reduces the data rate).

For more detailed information refer to the technical specifications (section 1.5).

Parameter types:	Datum / KY
valid range:	0,0 ... 0,255

The following blocksize values can be specified with BLGR:

BLGR	*Blocksize*
0	max 256 byte ; default value
1	max. 16 byte
2	max. 32 byte
3	max. 64 byte
4	max. 128 byte
5	max. 256 byte
6	max. 512 byte
7...254	max. 256 byte ; default value
255	Blocksize set to 512 byte

4.2.3 PAFE: Parameterisation Error Byte

This flag–, output or input byte is set by SYNCHRON if it recognises a parameterisation error.

Parameter types: output / BY

valid range: EB 0 ... EB 127
AB 0 ... AB 127
MB 0 ... MB 255

Structure of the parameterisation error byte

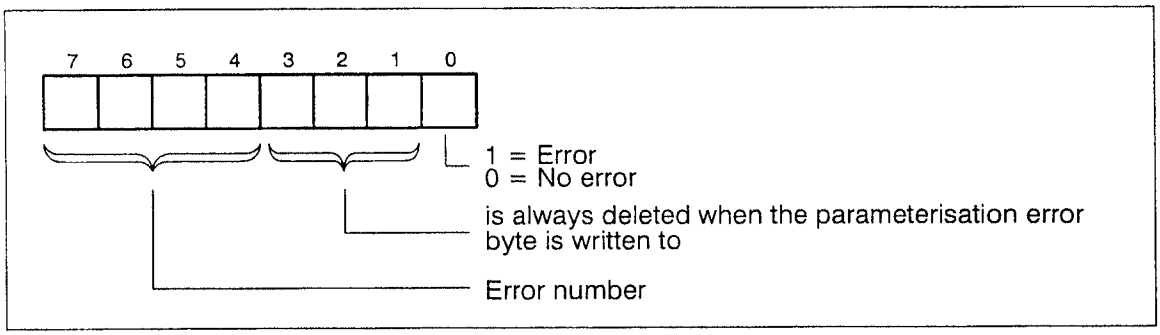

Figure 4.2 Structure or the parameterisation error byte

The error numbers in the parameterisation error byte have the following significance:

0 no error

1–4 source/target parameter incorrect

1 range incorrect

2 DB or DX do not exist

3 range size too small

4 range does not exist

5 condition code word incorrect

6 not used

7 interface does not exist

8 interface not ready

9 interface overload

AH interface used by another CPU

BH invalid request number

CH interface timeout

DH miscellaneous interface errors, e.g.
- invalid handshake acknowledgement
- blocksize of interface not within range 1..255

EH miscellaneous errors at the data handling block, e.g.
- missing call of a data block with indirect parameterisation
- software error in CPU or data handling block

FH FB call invalid, e.g.
- double call with interruptibility at command borders
- invalid modification of standard function blocks.

5 Multi Processor Operation

5.1 Interfaces

The FB 199 supports multi processor operation. The parameters are specified in each of the CPUs as if it was executing in a single processor environment.

On the CP 516, 4 (consecutive) interface numbers can be set. This allows 4 CPUs to access one CP 516. The CP 516 handles the access procedures. There is no need for the user to provide for interlocking in his program. Each CPU must be assigned a different interface number.

For example:
ZBG 1: SSNR = 20
ZBG 2: SSNR = 21
ZBG 3: SSNR = 22
ZBG 4: SSNR = 23

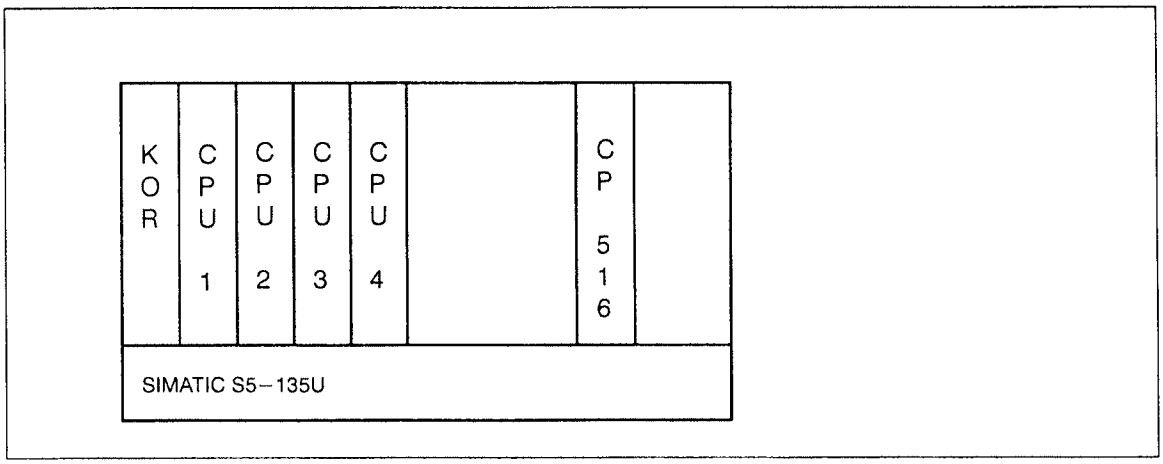

Figure 5.1 Multi processor operation with the CP 516

5.2 Startup and Restart

In single and multi processor operation, the interfaces must be synchronised by the data handling block SYNCHRON (chapter 4).
Each CPU synchronises the interface assigned to it independently of the other CPUs.

To

Siemens AG

ANL A441–WA
Günther–Scharowsky–Str.2

D–91058 Erlangen

SIMATIC S5

Memory Module CP 516
Standard function block EXT–135R for
AG S5–135U(CPU 922, 928, 928B)

Instruction Manual

Order No.: T89120–E3031–U2–*–7619
Edition February 1995

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SIEMENS

SIMATIC S5

Memory Module CP 516

Standard Function Block EXT-155U for
AG S5-155U (CPU 946/947)
AG S5-155H (CPU 946R/947R)

Instruction Manual

Edition February 1995

Version 3

Table of Contents

Note:

These instructions do not purport to cover all details in equipment, nor to provide for every possible contingency to be met in connection with operation.

Should further information be desired or should particular problems arise which are not covered sufficiently for the Purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

The contents of this instruction manual shall not become part or modify any prior or existing agreement, commitment or relationship. The Sales Contract contains the entire obligations of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

☞ It is our objective to provide optimum documentation. Should you have difficulties understanding any part of this manual, please do not hesitate to contact us. We would greatly appreciate any suggestions for improvement. You will find a preprinted form at the end of the manual.
In an emergency, you can reach us over our "hotline" telephone number ..9131–7–22888.

1 Description

1.1 Range of Application

The memory module CP 516 can be used in programmable controllers (AG) of the SIMATIC S5 series. This instruction manual refers to the AG

- SIMATIC S5–155U (CPU 946/947) and
- SIMATIC S5–155H (CPU 946R/947R).

In the AG S5–155H the CP 516 can be used in switced configurations only.

Data (data blocks DB) can be swapped from the memory of the CPU 946/947 to the memory module CP 516.
The CP 516 can accommodate 2 Memory Cards (addressed as "A:" and "B:"). Memory Cards are available as RAM based and as FLASH EPROM based versions.
Each Memory Card can be organised in sectors (addressed using names composed of 8+3 ASCII characters). Different sectors may contain data blocks of identical numbers.

From within the CPU program, the CP 516 is addressed like a communication processor (CP) by specifying an interface number (SSNR). The CP 516 hardware is configurable to provide either 1 or 4 (for multiprocessor operation; see chapter 5) interfaces.
Depending on the configuration, either a maximum of 2 or a maximum of 8 CP 516 can be operated in a programmable controller.

The standard function block

- FB EXT-155U

is called by the number 199.

Therefore in this instruction manual it is designated as **FB 199** further on.

The standard function block FB 199 handles the data transfer between the CPU of the AG and the memory module CP 516.
In addition, the FB 199 handles file management tasks.

The FB 199 handles up to 8 interfaces.

1.1.1 Required Software Modules

In addition to the standard function block FB 199 the following data handling blocks are required:

- FB 120: SEND,
- FB 122: FETCH,
- FB 127: REC–A,
- FB 125: SYNCHRON.

The following items must be available within the CPU

- OB 20 (startup) and OB 21 and OB 22 (restart),
- DB 255 (data buffer).

1.2 Program Structure

The data handling block SYNCHRON (chapter 4) synchronises the CPU and the CP 516:
The FB 199 cannot be executed unless the SYNCHRON data handling block parameterised by the user has executed successfully in the startup branch (startup with OB 20 or restart with OB 21, OB 22) of the AG. This is a prerequsite for a sensible communication between the data handling blocks SEND, FETCH and REC–A and the CP 516.

The data handling block SYNCHRON must be called for each of the interfaces of the AG with the corresponding parameters.

The FB 199 is called in the cyclic section of the program (OB 1); the specified interface number must be identical to that of the corresponding call to SYNCHRON.

Parameters for the FB 199 are optionally specified in direct or in indirect mode (section 2.1):

- in direct mode, the parameters are entered into the FB 199 directly.
- in indirect mode, the two mandatory parameters plus two pointers to parameter fields are entered at the FB 199.
  Indirect parameterisation allows the user to specify the required parameters for the FB 199 only once.

To initialise the FB 199, the user sets a trigger bit. After this, the FB 199 requires several cycles to complete the data transfer.
During this period of time, the user must not modify the trigger bit nor any other parameters of the FB 199; i.e. he must not initiate another request for the FB 199 before the previous request for a specific interface has either been completed successfully or has been terminated with an error.

After completion or termination of a request, the FB 199 automatically resets the trigger bit.

1.3 The Data Structure of the DB 255

The data block DB 255 must be reserved for the communication between the CPU and the CP 156 with the FB 199. It acts as a data buffer with internal status words for the parameterised interfaces and the auxiliary data area. Its length depends on the number of interfaces used for the FB 199:

Its minimum length is 81 data words (DW 0 to DW 80) for one interface.

Its maximum length is 347 data words (DW 0 to DW 346) for eight interfaces.

The DB 255 must be dimensioned, installed and initialised as described in section 3.3, "Startup and Restart", by the user in the CPU RAM (figure 1.1).

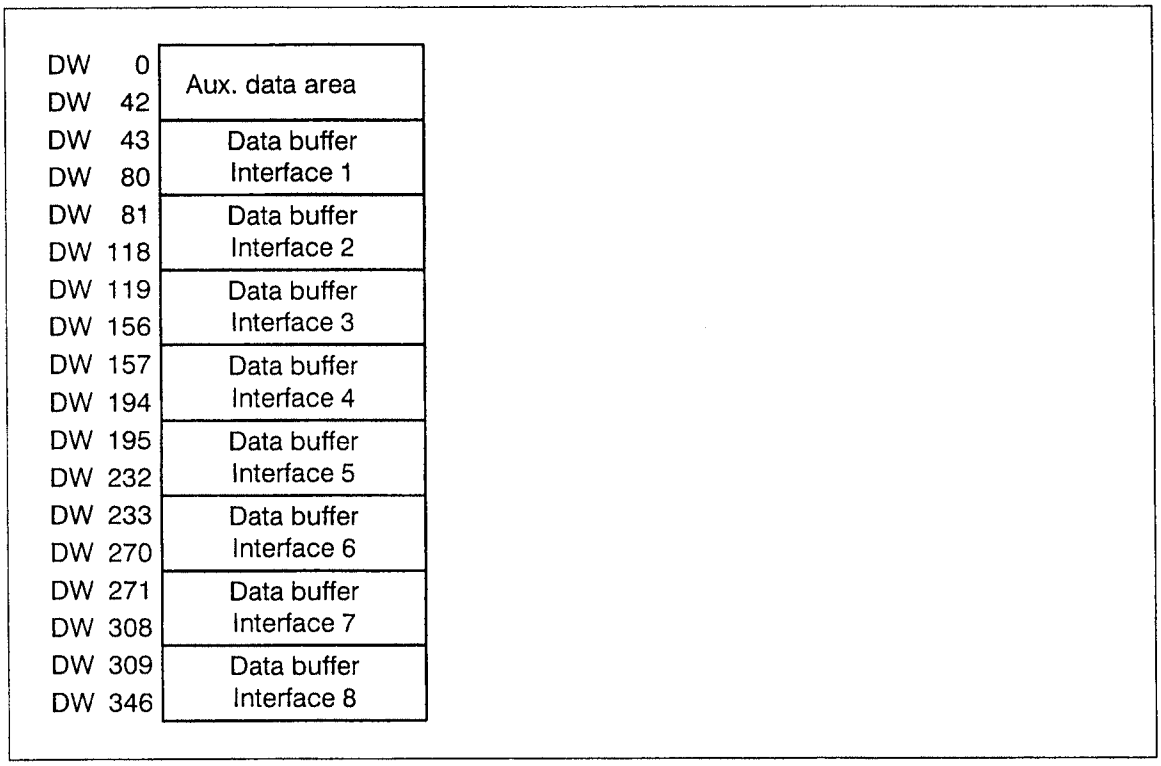


Figure 1.1 Structure of the DB 255

1.4 **Functions** (Modes of Operation)

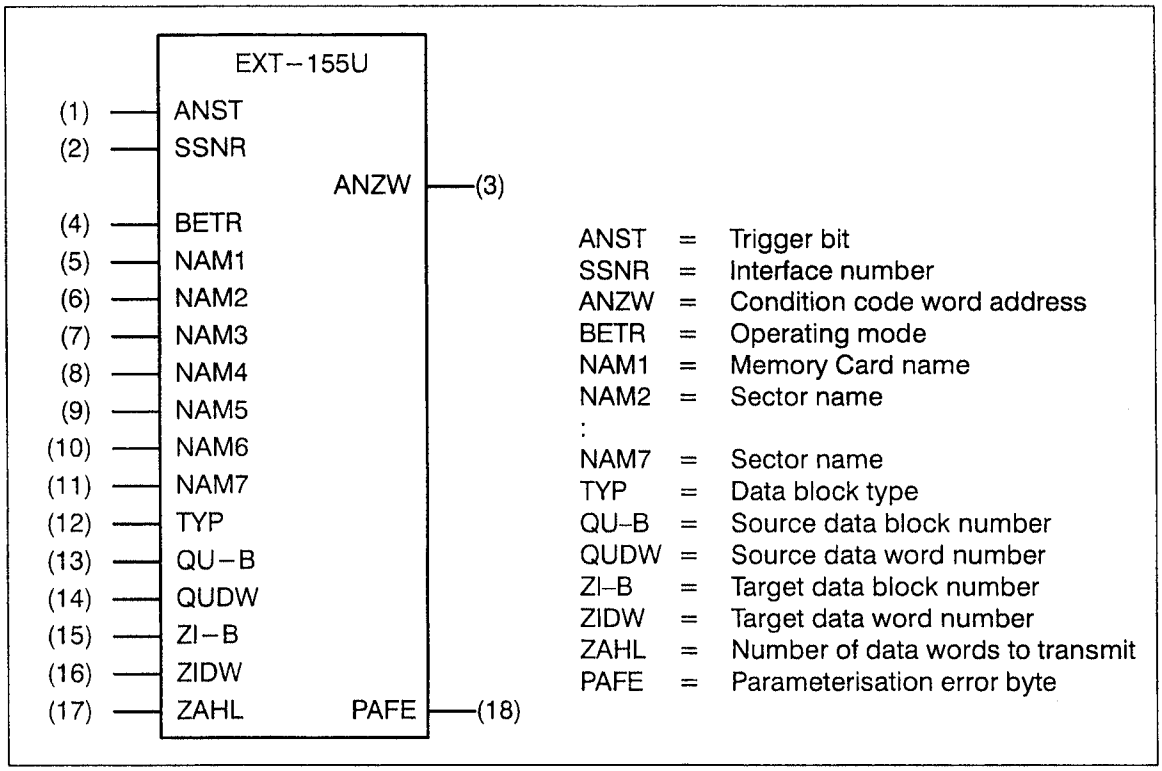


Figure 1.2 Function diagram of the FB 199

The functions of the FB 199 described herein depend on the operating mode specified; i.e., they depend on the value specified for the parameter BETR of the FB 199. Additional parameters must be assigned according to the function. Parameters not required for a function may optionally be specified. The individual parameters are described in chapter 2.

1.4.1 Transmitting Data Blocks

If more than one CP 516 or interface is used, the interface numbers must be within one interface window (section 2.2.2).

The numbers of source and target data block may differ. The transmission is possible only between data blocks of identical types (both DB or both DX).

Data blocks may be transmitted either in parts or as a whole:
Required parameters are the data block number, the number of the first data word to transfer and the number of data words to transfer.

The maximum length of a source or target block is 4096 data words (DW 0 to DW 4095).

Up to 2048 data words can be transmitted in one call.

Data blocks with identical numbers can be created in different sectors.

Data transfer from the CPU to the CP 516 (BETR = HS)

Data blocks can be transferred from the CPU memory to the CP 516 even if there has no target data block been set up. The FB 199 automatically sets up the target data block.

The new length of the target data block is the larger one of the two values:
- length of the existing target data block (length = 0 if there is none);
- target data word number (ZIDW) + number (ZAHL) of the data blocks to be transferred.

The FB 199 carries out any required corrections in the header of the target data block automatically.

During the transfer, no undefined gaps my occur.
Examples:
A transfer with a target data word number greater than zero is not permitted unless there already is a target data block (this would create an undefined leading gap).
A transfer with a target data word number greater than the length of the target data block is not permitted (this would create an undefined gap in the middle).

Data transfer from the CP 516 to the CPU (BETR = MS)

A data block can be transferred from the CP 516 to the CPU RAM only if a target data block has been set up at the destination.

1.4.2 Management Functions

In addition to the transfer of data blocks, the FB 199 provides the following management functions for the Memory Card, sectors and data blocks on the CP 516.

- Rename a sector,
- Delete a sector,
- Delete individual data blocks of a sector,
- Transfer the directory of a sector,
- Memory Card info,
- Copy the contents of Memory Card A: to B: or vice versa,
- Format a Memory Card.

Renaming a sector (BETR = NS)

A sector on a Memory Card is assigned a new name; the old sector name ceases to exist.

The sector and the data blocks of that sector can only be addressed under the new sector name.

Renaming a sector requires indirect parameterisation (section 2.1).
The parameter NAM1 contains the name of the Memory Card. The parameters NAM2 to NAM7 contain the old sector names. The new sector name is specified in the parameters TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL; data format: KC.

Deleting a sector (BETR = LS)

A sector on a Memory Card is deleted.

If a sector is deleted, all data blocks stored in this sector are deleted together with the sector name.
On RAM based Memory Cards, the storage space occupied by this sector is returned to the memory pool.

Deleting individual data blocks of a sector (BETR = LB)

A data block (TYP = DB or = DX) in a Memory Card sector is deleted; the storage space occupied by this data block is returned to the memory pool.

If the last data block of a sector is deleted, the corresponding sector name still exists in the list of sector names.
The sector name can be deleted by calling the function "Delete a sector" (BETR = LS).

Transferring the directory of a sector to the CPU (BETR = DS, DX)

The directory (list of data blocks) of a sector is transferred to a target data block type DB (if BETR = DS) or DX (if BETR = DX) in the CPU.

A sufficiently dimensioned target data block for the data block list must have been set up in the CPU memory.

Depending on the value of the parameter TYP (= DB, = DX or = B) the following data block lists can be transferred:
- Only DB data blocks (—> length of the data block list 16 data words);
- Only DX data blocks (—> length of the data block list 16 data words);
- DB and DX data blocks (—> length of the data block list 32 data words).

In the data block list, one bit is allocated for each of the 256 possible data blocks of a type (DB 0 to DB 255 and DX 0 to DX 255):
If the data block exists in the selected sector, the bit is set (= 1).
If the data block does not exist in the selected sector, the bit is cleared (= 0).

The allocation of the individual bits of the data block list (for one data block type) to data block numbers in the CPU data block is shown in figure 1.3.

Bit-No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DW n	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DW n+1	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
⋮	⋮		⋮					⋮					⋮			
DW n+14	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	224
DW n+15	255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	240

Figure 1.3 Structure of the data block list (for one data block type) for the directory of a sector

Figure 1.4 shows the structure of the data block list if the list is transferred with both DB and DX (setting TYP = B).

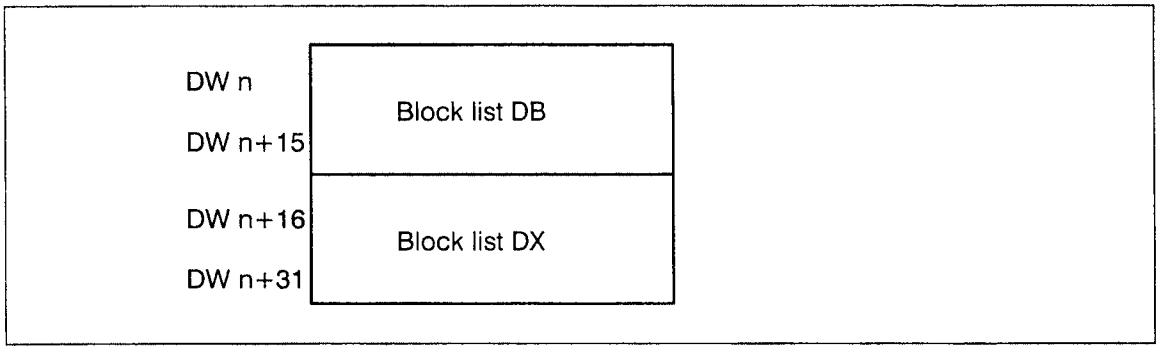


Figure 1.4 Structure of the data block list (for DB and DX data blocks) for the directory of a sector

Memory Card info (BETR = MI)

Data on the two Memory Cards are transferred to a target data block (TYP = DB or TYP = DX) in the CPU.

A sufficiently dimensioned target data block for the data (4 words) must be set up in the CPU memory.

For NAM1, optionally "A:" or "B:" may be specified. The data is transferred for each inserted Memory Card.

Figure 1.5 shows the structure of the info list for the two Memory Cards. The significance is

- memory size — hexadecimal specification of memory size (e.g. 800H: 2 Mbyte)
- Memory Card type: 0 H: no Memory Card inserted; 1 H: RAM; 2 H: FLASH-EPROM

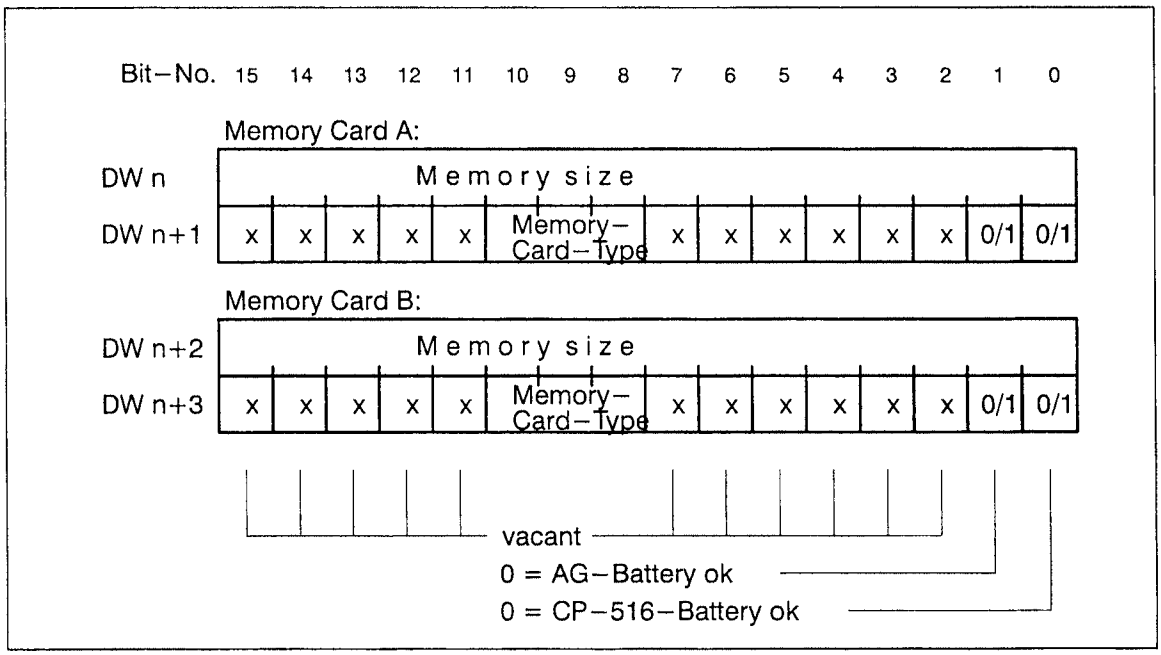


Figure 1.5 Structure of Memory Card data list

Copy contents from Memory Card A: to B: or from B: to A: (BETR = AB, = BA)

The entire contents of a Memory Card is copied to another Memory Card. Any data on the target Memory Card are overwritten.
In the parameter NAM1 the target Memory Card (A: or B:) is specified.

Formatting a Memory Card (BETR = FO)

The Memory Card is formatted. Any data stored on that card are deleted.

In order to avoid accidental formatting, the function FO must be called twice:
The formatting process starts after the second call if the second call was made immediately following the first call.
If another function is called between the two calls, the FB 199 deletes the first call.

1.5 Technical Specifications

Order numbers:

– S5–DOS (PCP/M)	6ES5 848–8GC11 (german) 6ES5 848–8GC21 (english) 6ES5 848–8GC31 (french)
– MS–DOS and S5–DOS/MT	6ES5 848–6GC11 (german) 6ES5 848–6GC21 (english) 6ES5 848–6GC31 (french)
Block number:	FB 199
Block name:	EXT-155U
Block length:	1168 words
Call length:	16 words
Processing time:	approximately 1 s to 8 s
Nesting depth:	1
called function blocks:	FB 120 SEND FB 122 FETCH FB 127 REC–A
called data blocks:	DB 255 Data buffer DB xx with indirect parameter specification DB yy with indirect parameter specification DB nn or flag word for condition code word
occupied flag area: (scratch area)	MW 200 to MW 220
occupied system date: (scratch cell)	BS 62 and BS 63

Data transfer time

The data transfer time for 1 kbyte (512 data words) is approximately 1 to 8 seconds (at a constant cycle time of 100 ms), depending on the block size (BLGR) set at the data handling block SYNCHRON and the operating mode (BETR) set at the FB 199:

	BETR = MS	BETR = HS		Number of cycles
BLGR	ZAHL = 512			
1 (16 Byte)	approx. 7.0 s	approx. 6.9 s	DB does not exist on CP 516	70
		approx. 7.1 s	Extend DB on CP 516	72
		approx. 6.8 s	DB exists on CP 516	69
6 (512 Byte)	approx. 0.8 s	approx. 0.7 s	DB does not exist on CP 516	8
		approx. 0.9 s	Extend DB on CP 516	10
		approx. 0.6 s	DB exists on CP 516	7

2 Parameter Specification

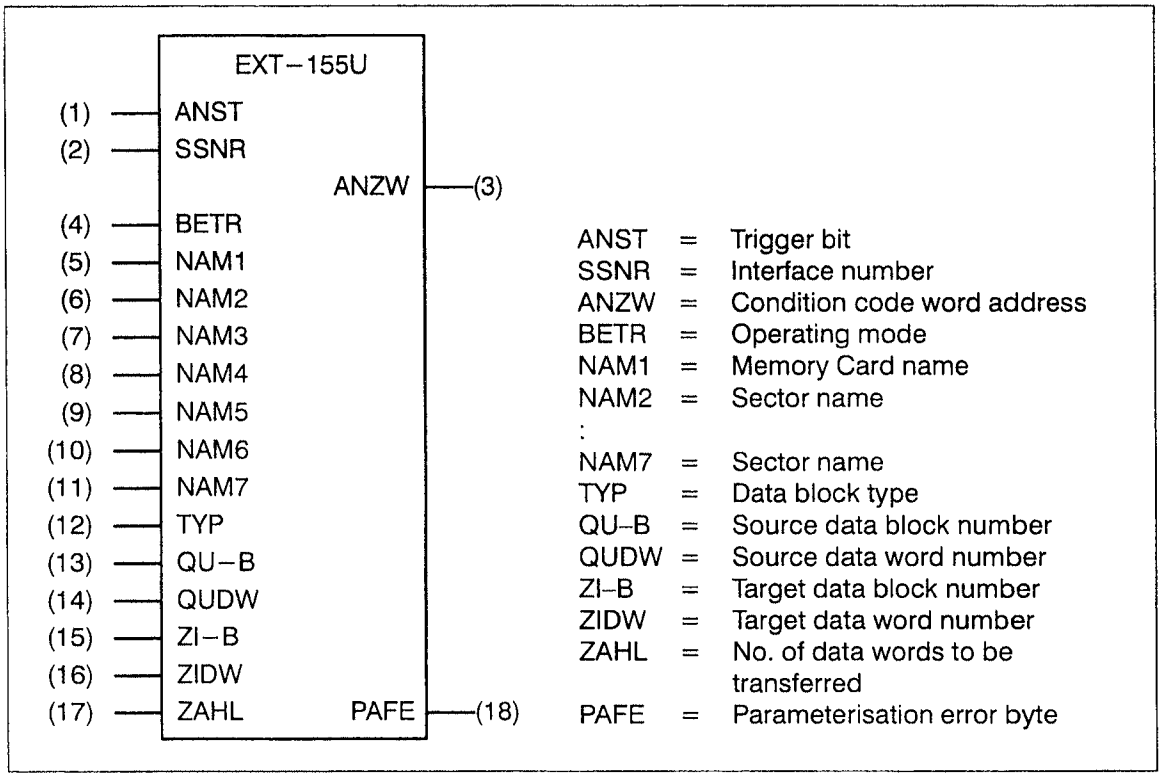


Figure 2.1 Parameters of the FB 199

2.1 Direct and Indirect Specification of Parameters

The parameters for the FB 199 are organised in two subsets:
– SSNR, ANZW, BETR, NAM1 bis NAM7 and
– TYP, QU–B, QUDW, ZI–B, ZIDW, ZAHL.

The FB 199 may be assigned parameters optionally for both subsets either directly or indirectly:

- If the parameters are specified directly (summary see section 2.3), they are entered at the FB 199.
- If the parameters are specified indirectly (summary see section 2.4), for each of the subsets a pointer to a parameter field is passed in two separate data blocks. At the positions pointed to, the two subsets must be specified without gaps in the order used for direct parameter specification.
  Indirect parameter specification allows the user to parameterise the FB 199 once.
  The trigger bit (ANST) and the parameterisation error byte (PAFE) must be specified directly at the FB 199 even if indirect parameter specification is used.

2.1.1 Parameter Set SSNR, ANZW, BETR, NAM1 to NAM7

Direct specification of parameters

In the high byte (left hand byte) of the parameter SSNR, "0" is entered.

In the low byte (right hand byte) of the parameter SSNR the interface number is entered.

Any other parameters are entered directly at the FB 199.

Indirect specification of parameters

In the high byte (left hand byte) of the parameter SSNR at the FB 199 a value greater than "0" must be entered.

In the low byte (right hand byte) of the parameter SSNR at the FB 199 the number of a data word must be entered into a data block.
The parameters SSNR, ANZW, BETR, NAM1 to NAM7 must be stored in ascending order starting at this data word. The data block must be open prior to calling the FB 199.

The length of the parameter set is always 10 data words, even if in some operating modes the FB 199 does not evaluate all of the parameters.

With indirect specification of parameters, the parameters specified directly (ANZW, BETR, NAM1 to NAM7) at the FB 199 are irrelevant.

2.1.2 Parameter Set TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL

Direct specification of parameters

The parameters are entered directly at the FB 199.

Indirect specification of parameters

Enter "XX" at the parameter TYP at the FB 199 (data format KC).

Enter the number of the data block containing the parameters to be transferred at the parameter QU-B at the FB 199.

Enter the number of a data word at the parameter QUDB at the FB 199. Starting at this data word, the parameters TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL must be entered in ascending order.

The length of the parameter set is always 6 data words, even if in some operating modes the FB 199 does not evaluate all of the parameters.

With indirect parameter specification, the parameters ZI-B, ZIDW and ZAHL, which are entered directly at the FB 199, are irrelevant.

2.2 Description of the Parameters

2.2.1 ANST: Trigger bit

The user sets the trigger bit in order to initiate a request
- for data transfer between the CPU and the CP 516 or
- for the management of data blocks or sectors on the CP 516.

After completion or termination of a request, the FB 199 resets the ANST bit.

Parameter types:	Input / bit
valid range:	A 0.0 ... A 127.7 M 0.0 ... M 255.7

2.2.2 SSNR: Interface Number

Specification of the interface number used for addressing the CP 516 or setting of indirect parameter specification (section 2.1.1).

The interface number must match the interface number specified for this CP 516 at the data handling block SYNCHRON.

Any values between 0 and 255 are valid SSNR numbers.
The up to 8 valid interfaces for one FB 199 must be within one interface window. An interface window contains 8 numbers and starts with a multiple of 8 (0, 8, 16 ... 248).

Parameter types:	data / KY
valid range:	0,0 ... 255,255
High byte = 0:	Direct parameter specification; low byte = SSNR
High byte > 0:	Indirect parameter specification; low byte = pointer to parameter field (number of the data word in the open data block, at which the specified parameters are stored.)

2.2.3 ANZW: Condition Code Word Address

In the condition code word, the FB 199 indicates the processing of a job.

It contains the status and/or error messages generated by the CP 516 firmware and by the FB 199. After completion or termination of the job, these messages are available to the user.

The condition code word (16 bit) may optionally be stored in the flag area or in a data block (type DB). Switching criterion is the high byte (left hand byte) of the parameter ANZW:

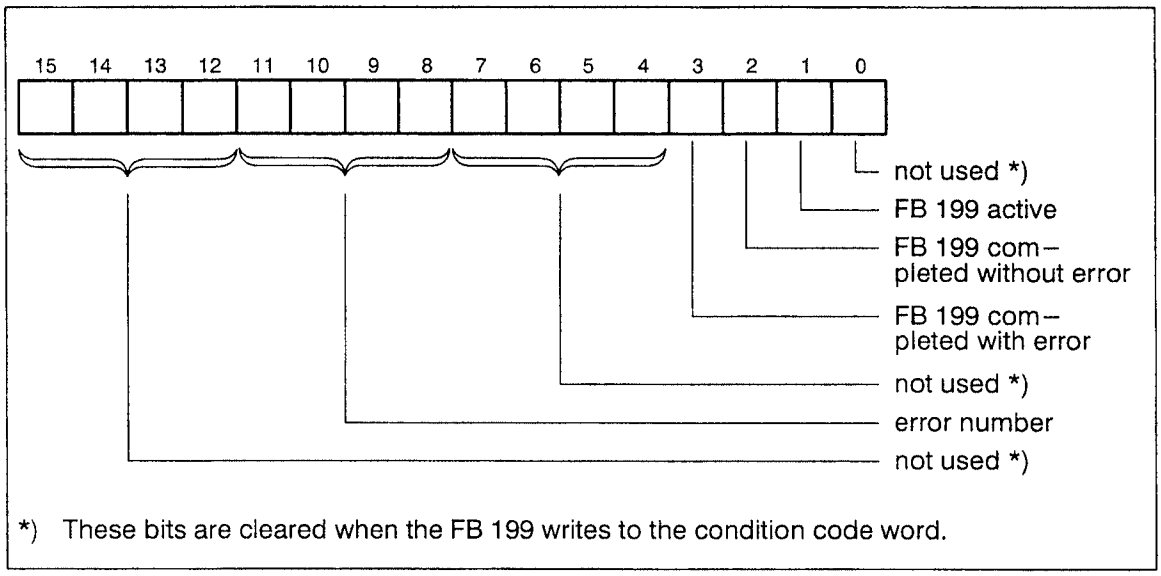
High byte = 0: condition code word is located in the flag area; the low byte (right hand byte specifies the flag word address of the condition code word).

High byte > 0: condition code word is located in the data block; the high byte (left hand byte) contains the number of the data block which contains the condition code word. The low byte contains the data word address of the condition code word.

Parameter types: data / KY

valid range: 0,0 ... 0,254 (flag area)
3,0 ... 254,255 (data block)

Structure of the condition code word



*) These bits are cleared when the FB 199 writes to the condition code word.

Figure 2.2 Structure of the condition code word

If the FB 199 returns the message "request completed with error" in bit 3 of the condition code word, bits 8 to 11 contain an error number which specifies the reason for the termination.

Error numbers in the condition code word

(1 – 5 : errors recognised by the FB 199)
(6 – F H : errors recognised by the CP 516)

0 = no error
1 = parameterisation error (additional information contained in the PAFE parameter)
2 = operating mode switch of the CP 516 set to STOP
3 = operating mode HS: data block does not exist on CP 516; header gap risk
4 = operating mode MS: data block on CPU too short
operating mode HS: data block on CP 516 too short; middle gap risk
5 = ZAHL = wildcard length: excessive source data block (QU–B) size; data block without block header exceeds 2048 data words.
6 = hardware error (check sum error on memory card)

7 = Memory Card not formatted
8 = Memory Card replaced or full
operating mode AB or BA: not formatted
9 = operating mode MS or LB: data block does not exist on CP 516
AH = not used
BH = incorrect request
CH = handshake error
DH = operating mode MS, NS, LS, LB, DS or DX:
sector name (data set name) does not exist on CP 516
EH = operating mode NS: sector name (data set name) already exists on CP 516
FH = Memory Card not inserted

2.2.4 BETR: Operating Mode

Specification of the function (described in section 1.4) the FB 199 is supposed to carry out. The following are valid entries:

HS: transfer a data block from the CPU to the CP 516
MS: transfer a data block from the CP 516 to the CPU
NS: rename a sector
LS: delete a sector
LB: delete a data block (DB or DX) within a sector
DS: transfer a directory (data block list) of a sector to a DB data block in the CPU memory
DX: transfer a directory (data block list) of a sector to a DX data block in the CPU memory
MI: transfer Memory Card related data to a DB or DX data block in the CPU memory
AB: transfer the contents of Memory Card A: to Memory Card B:
BA: transfer the contents of Memory Card B: to Memory Card A:
FO: Formatting a Memory Card

Parameter types: data / KC
valid range: the ASCII characters listed above

2.2.5 NAM: Name of the Memory Card, Sector Name

When addressing a data block in the CP 516, the Memory Card name (NAM1) and the sector name (NAM2 to NAM7) must be specified.
In both Memory Cards identical sector names may be used.
Different sectors may contain data blocks with identical numbers.

In the operating mode "transfer Memory Card related data" (MI) "A:" or "B:" must be specified (only plugged in Memory Cards must be specified).

NAM1: Name of the Memory Card,

The Memory Card must be specified preceding each sector name:
The upper Memory Card has the name "A:";
Lower Memory Card has the name "B:".

Parameter types: data / KC
valid range: A:, B:

NAM2 to NAM7: Sector name

The sector name consists of up to 8 ASCII characters to the left of the full stop and up to 3 ASCII characters to the right. If there are no ASCII characters to the right of the full stop, the full stop may be omitted.

Parameter type: data / KC

valid range: all ASCII characters

Examples

1) A:ANTON1.NEU
2) B:BERTA.1
3) A:SEKTOR_X
4) B:SEKTOR99.DAT
5) A: (selecting a Memory Card)

Example		*1)*	*2)*	*3)*	*4)*	*5)*
NAM1	KC:	A:	B:	A:	B:	A:
NAM2	KC:	AN	BE	SE	SE	
NAM3	KC:	TO	RT	KT	KT	
NAM4	KC:	N1	A.	OR	OR	
NAM5	KC:	.N	1	_X	99	
NAM6	KC:	EU			.D	
NAM7	KC:				AT	

2.2.6 TYP: Data Block Type

Specification of the data block type or the setting of the indirect parameter specification (section 2.1.2). The following settings are possible:

DB: DB data block

DX: DX data block

B: DB and DX data blocks;
transfer of a sector directory

XX: indirect parameter specification

Parameter type: data / KC

valid range: the ASCII characters listed above

2.2.7 QU-B: Source Data Block Number

With direct parameter specification:
Specification of the number of the source data block from which the FB 199 is transferred.

With indirect parameter specification:
Specification of the number of the data block which contains the parameter list.

The FB 199 evaluates the source data block number only in the operating modes HS and MS; in all other operating modes it is irrelevant.

Parameter types:	data / KF	
valid range:	+ 2 ... + 254	(BETR = HS, TYP = DB)
	+ 1 ... + 254	(BETR = MS, TYP = DB)
	+ 1 ... + 255	(TYP = DX)
	+ 3 ... + 254	(indirect parameter specification)

2.2.8 QUDW: Source Data Word Number

With direct parameter specification:
Specification of the number of the first data word in the source data block which the FB 199 should transfer.

With indirect parameter specification:
Specification of the number of the data word which contains the start of the parameter list.

The FB 199 evaluates the source data word number only in the operating modes HS and MS; in all other operating modes it is irrelevant.

Parameter types:	data / KF	
valid range:	+ 0 ... + 2048	(direct parameter specification)
	+ 0 ... + 250	(indirect parameter specification)

2.2.9 ZI-B: Target Data Block Number

Specification of the number of the target data block the FB 199 should make a transfer to.

The target data block number is irrelevant in the operating modes LS, NS, AB, BA and FO.

Parameter types:	data / KF	
valid range:	+ 1 ... + 254 (	BETR = HS, TYP = DB,
		BETR = LB, TYP = DB)
	+ 2 ... + 254 (	BETR = MS, TYP = DB)
		BETR = MI, TYP = DB)
	+ 1 ... + 255 (	BETR = HS, TYP = DX,
		BETR = MS, TYP = DX,
		BETR = LB, TYP = DX)
		BETR = MI, TYP = DX)

2.2.10 ZIDW: Target Data Word Number

Specification of the number of the first data word the FB 199 should make a transfer to starting at this word.

The target data word number is irrelevant in the operating modes LS, NS, AB, BA and FO.

Parameter types:	data / KF
valid range:	+ 0 ... + 2048

2.2.11 ZAHL: Number of Data Words to transfer

Specification of the number of data words to transfer.

The FB 199 evaluates the number of data words only in the operating modes HS and MS; in all other operating modes it is irrelevant.

If ZAHL = –1 is specified, the FB 199 transfers the source data block in the current length.
The parameter QUDW is irrelevant, i.e., the FB 199 sets it to zero:
The transfer starts at the source data block at DW 0.

Parameter types:	data / KF
valid range:	+ 1 ... + 2048 – 1 (wildcard length)

2.2.12 PAFE: Parameterisation Error Byte

The FB 199 sets this flag output or input byte if it encounters a parameterisation error.

Parameter type:	Output / BY
valid range:	AB 0 ... AB 127 MB 0 ... MB 255

Structure of the parameterisation error byte

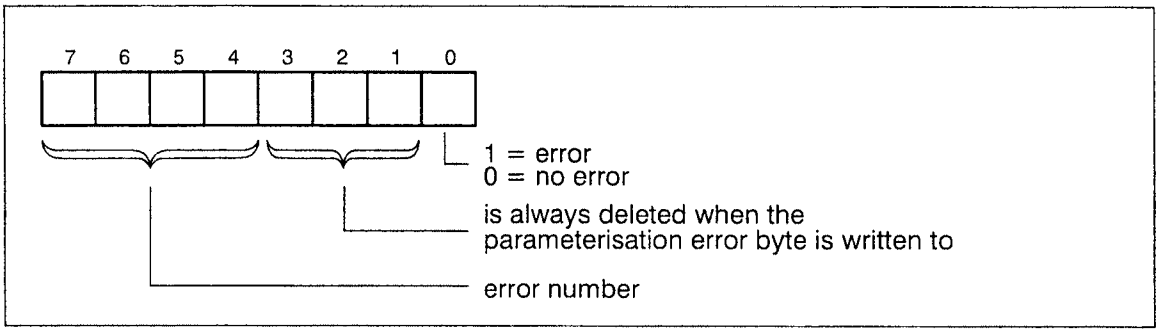


Figure 2.3 Structure of the parameterisation error byte

The error numbers in the parameterisation error byte have the following significance:

0 no error.

1 Data block for indirect parameterisation not available or too short, address for parameter set invalid (greater than DW 246) or data block number invalid (DB–NR < 2, DB–NR = 255). (Without error message in the condition code word.)

2 Invalid parameter specified for SSNR (interface number):
specified SSNR does not exist or SSNR is not within interface window.
(Without error message in the condition code word.)

3 Invalid parameter specified for ANZW (condition code word):
Data block for the parameter not available or too short or data block number invalid (DB–NO < 2 or DB–NO = 255).
(Without error message in the condition code word.)

4 Invalid parameter specified for BTR (operating mode):
only HS, MS, NS, LS, LB, DS, DX, MI, AB, BA and FO are valid.

5 Invalid parameter specified for TYP (data block type):
only DB, DX, B, XX are valid;
with BETR = NS all except XX.

6 Invalid parameter specified for QU–B, ZI–B (data block number):
invalid are:

BETR = HS:	TYP = DB :	QU–B < 2; QU–B > 254;	ZI–B < 1, ZI–B > 254;
BETR = MS:	TYP = DB :	QU–B < 1; QU–B > 254;	ZI–B < 2, ZI–B > 254;
BETR = HS/MS:	TYP = DX :	QU–B > 255;	ZI–B > 255;
BETR = LB:	TYP = DB :		ZI–B < 1; ZI–B > 254;
BETR = LB:	TYP = DX :		ZI–B < 1; ZI–B > 255;
BETR = DS:	:		ZI–B < 2; ZI–B > 254;
BETR = DX:	:		ZI–B < 1; ZI–B > 255;
BETR = MI:	TYP = DB :		ZI–B < 2; ZI–B > 254;
BETR = MI:	TYP = DX :		ZI–B < 1; ZI–B > 255.

7 Data block does not exist in AG or is too short:

BETR = HS:	QU–B;	QUDW > DB length;	QUDW + ANZ > DB length
BETR = MS:	ZI–B;	ZIDW > DB length;	ZIDW + ANZ > DB length
BETR = MI:		ZIDW + U > DB length;	
BETR = DS, DX:	ZI–B;	ZIDW > DB length;	ZIDW + 32 (Type: B) > DB length ZIDW + 16 (Type: DB o. DX) > DB length

8 Invalid parameter specified for QUDW, ZIDW (data word number)
invalid are
QUDW, ZIDW < 0;
QUDW, ZIDW > 2048.

9 Invalid parameter specified for ZAHL (number)
invalid are
ZAHL < –1;
ZAHL = 0;
ZAHL > 2048.

A H Data block DB 255 does not exist or is too short.

B H wrong Memory Card selected: NAM1 ≠ „A:" and NAM1 ≠ „B:".

2.3 Summary Direct Parameterisation

The following tables show the parameters required depending on the operating modes (BETR).

Call:
FB EXT-155U :SPB FB199
NAME :EXT-155U

2.3.1 Direct Parameterisation of SSNR, ANZW, BETR, NAM1 to NAM7

Trigger bit	ANST:		++	++	++	++	++	++	++	++	++	++	++
Interface number	SSNR:	KY	++	++	++	++	++	++	++	++	++	++	++
CC–word address	ANZW:	KY	++	++	++	++	++	++	++	++	++	++	++
Operating mode	BETR:	KC	MS	HS	NS	LS	LB	DS	DX	MI	AB	BA	FO
Memory Card name	NAM1:	KC	++	++	++	++	++	++	++	++	++	++	++
Sector name	NAM2:	KC	++	++	++	++	++	++	++				
	to												
	NAM7:	KC	++	++	++	++	++	++	++				

++: These params are evaluated by theFB 199.
Specifications in vacant field are irrelevant

Table 2.1 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 at the FB 199 with direct parameterisation

2.3.2 Direct Parameterisation of TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL

	Operating mode:		MS	HS	NS	LS	LB	DS	DX	MI	AB	BA	FO
Block type	TYP:	KC	++	++	**		++	++	++	++			
Source data block no.	QU–B:	KF+	++	++									
Source data word no.	QUDW:	KF+	++	++									
Target data block no.	ZI–B:	KF+	++	++			++	++	++	++			
Target data word no.	ZIDW:	KF+	++	++				++	++	++			
Number	ZAHL:	KF+	++	++									
Param. error byte	PAFE:	KF+	++	++	++	++	++	++	++	++	++	++	++

**: direct parameter specification not available with BETR=NS

++: These params are evaluated by the FB 199.
Specifications in vacant field are irrelevant.

Table 2.2 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL at the FB 199 with direct parameterisation

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2.4 Summary Indirect Parameterisation

The following tables show the parameters required depending on the operating mode (BETR).

Call:

```
FB EXT-155U          :A DB n      (open data block)
                     :SPB FB199
               NAME  :EXT-155U
```

2.4.1 Indirect Parameterisation of SSNR, ANZW, BETR, NAM1 to NAM7

Trigger bit	ANST:		++
Interface number	SSNR:	KY	++
CC word address	ANZW:	KY	
Operating mode	BETR:	KC	++
Memory Card name	NAM1:	KC	
Sector name	NAM2:	KC	
	to		
	NAM7:	KC	

++: these params are evaluated by the FB 199. specifications in vacant fields are irrelevant.

Table 2.3 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 at the FB 199 with indirect parameterisation

The parameter set must be entered into the data block opened prior to calling the FB 199.

The low byte (right hand byte) of the parameter SSNR (section 2.2.2) is a pointer to this parameter set. The valid parameters must be entered starting at the data word specified here.

The length of the parameter set is always 10 data words, even if the FB 199 does not evaluate all parameters in some operating modes.

Parameter	*Format*	*DW*	*DB n*										
SSNR	KY	m	++	++	++	++	++	++	++	++	++	++	++
ANZW	KY	m+1	++	++	++	++	++	++	++	++	++	++	++
BETR	KC	m+2	MS	HS	NS	LS	LB	DS	DX	MI	AB	BA	FO
NAM1	KC	m+3	++	++	++	++	++	++	++	++	++	++	++
to	KC	to	++	++	++	++	++	++	++				
NAM7	KC	m+9	++	++	++	++	++	++	++				

++: these parameters are evaluated by the FB 199. specifications in vacant fields are irrelevant.

Table 2.4 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 in the open data block with indirect parameterisation

2.4.2 Indirect Parameterisation of TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL

Block type	TYP:	KC	XX
Source data block no.	QU–B:	KF+	++
Source data word no.	QUDW:	KF+	++
Target data block no.	ZI–B:	KF+	
Target data word no.	ZIDW:	KF+	
Number	ZAHL:	KF+	
Param. error byte	PAFE:	KF+	++

++: these params are evaluated by the FB 199. specifications made in vacant fields are irrelevant.

Table 2.5 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL at the FB 199 with indirect parameterisation

The parameter set is entered into the DB data block specified by the parameter QU–B starting at the data word specified in the parameter QUDW.

The length of the parameter set is always 6 data words, although in some operating modes the FB 199 does not evaluate all parameters.

In the operating modes LS, AB, FO and BA this parameter set is not evaluated by the FB 199.

Operating mode:		MS	HS	NS	LB	DS	DX	MI
Parameter	*Format*	*DW*	*DB a*					
TYP:	KC	b	++	++	++	++	++	++	++
QU–B:	KF+	b+1	++	++	++				
QUDW:	KF+	b+2	++	++	++				
ZI–B:	KF+	b+3	++	++	++	++	++	++	++
ZIDW:	KF+	b+4	++	++	++		++	++	++
ZAHL:	KF+	b+5	++	++	++				

++: these params are evaluated by the FB 199. specifications made in vacant fields are irrelevant.

Table 2.6 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL in the data block specified with QU–B with indirect parameterisation

3 Program Examples

The program examples are based on the following assumptions:
- The CP 516 is configured as interface number 2.
- The FB 199 stores the condition code word in the flag word MW 180.
- The FB 199 stores incorrect parameter specifications in the flag byte MB 50.

3.1 Direct Parameterisation

3.1.1 Operating Mode HS

100 data words of the data block DB 35 starting at DW 0 are to be transferred from the CPU to the CP 516.

By setting the trigger bit M 100.0 the user issues the request to the FB 199.

The trigger bit (M 100.0) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.0      trigger flag
        :UN     M 100.0     trigger bit
        :R      M 90.0      reset activation flag
        :S      M 100.0     set trigger bit
        :SPA    FB199       call FB EXT-155U
NAME    :EXT-155U
ANST    :       M 100.0     trigger bit: M 100.0
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCHS        0peration mode: HS
NAM1    :       KCB:        Memory Card B:
NAM2    :       KCSE        sector name: SEKTOR12.DAT
NAM3    :       KCKT
NAM4    :       KCOR
NAM5    :       KC12
NAM6    :       KC.D
NAM7    :       KCAT
TYP     :       KCDB        data block typee: DB
QU-B    :       KF+35       source data block number: 35
QUDW    :       KF+0        source data word number: DW 0
ZI-B    :       KF+40       target data block number: 40
ZIDW    :       KF+0        target data word number: DW 0
ZAHL    :       KF+100      number: 100 data words
PAFE    :       MB50        parameterisation error byte : MB 50
:
:
```

3.1.2 Operating Mode LS

Delete the sector SEKT0R1 in Memory Card A:.

By setting the trigger bit M 100.1 the user issues the request to the FB 199.

The trigger bit (M 100.1) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U      M 90.1      trigger flag
          :UN     M 100.1     trigger bit
          :R      M 90.1      reset activation flag
          :S      M 100.1     set trigger bit
          :SPA    FB199       call FB EXT-155U
NAME      :EXT-155U
ANST      :       M 100.1     trigger bit: M 100.1
SSNR      :       KY0,2       interface number: 2
ANZW      :       KY0,180     condition code word address: MW 180
BETR      :       KCLS        operating mode: delete a sector
NAM1      :       KCA:        Memory Card A:
NAM2      :       KCSE        sector name: SEKT0R1
NAM3      :       KCKT
NAM4      :       KCOR
NAM5      :       KC1
NAM6      :       KC
NAM7      :       KC
TYP       :       KC          irrelevant
QU-B      :       KF+0        irrelevant
QUDW      :       KF+0        irrelevant
ZI-B      :       KF+0        irrelevant
ZIDW      :       KF+0        irrelevant
ZAHL      :       KF+0        irrelevant
PAFE      :       MB50        parameterisation error byte : MB 50
:
:
```

3.1.3 Operating Mode LB

Delete the extended data block DX 10 in the sector SEKT0R2 in Memory Card A:.

By setting the trigger bit M 100.2 the user issues the request to the FB 199.

The trigger bit (M 100.2) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.2          trigger flag
        :UN     M 100.2         trigger bit
        :R      M 90.2          reset activation flag
        :S      M 100.2         set trigger bit
        :SPA    FB 199          call FB EXT-155U
NAME    :EXT-155U
ANST    :       M 100.2         trigger bit: M 100.2
SSNR    :       KY0,2           interface number: 2
ANZW    :       KY0,180         condition code word address: MW 180
BETR    :       KCLB            operating mode: delete a data block
NAM1    :       KCA:            Memory Card A:
NAM2    :       KCSE            sector name: SEKT0R2
NAM3    :       KCKT
NAM4    :       KCOR
NAM5    :       KC2
NAM6    :       KC
NAM7    :       KC
TYP     :       KCDX            data block typee: DX
QU-B    :       KF+0            irrelevant
QUDW    :       KF+0            irrelevant
ZI-B    :       KF+10           target data block number: 10
ZIDW    :       KF+0            irrelevant
ZAHL    :       KF+0            irrelevant
PAFE    :       MB50            parameterisation error byte: MB 50
:
:
```

3.1.4 Operating Mode DX

Transfer the data block list of all existing data block types of the sector TEST.DDD in Memory Card B: to the extended data block DX 11 of the CPU starting at DW 10.

By setting the trigger bit M 100.3 the user issues the request to the FB 199.

The trigger bit (M 100.3) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.3      trigger flag
        :UN     M 100.3     trigger bit
        :R      M 90.3      reset activation flag
        :S      M 100.3     set trigger bit
        :SPA    FB199       call FB EXT-155U
NAME    :EXT-155U
ANST    :       M 100.3     trigger bit: M 100.3
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCDX        operating mode: transfer data block list of a sector
                            to data block DX
NAM1    :       KCB:        Memory Card B:
NAM2    :       KCTE        sector name: TEST.DDD
NAM3    :       KCST
NAM4    :       KC.D
NAM5    :       KCDD
NAM6    :       KC
NAM7    :       KC
TYP     :       KCB         data block typee: B (list of data block typees DB and DX)
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+11       target data block number: 11
ZIDW    :       KF+10       target data word number: DW 10
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte: MB 50
:
:
```

3.1.5 Operating Mode MI

Transfer Memory Card information to the extended data block DX 11 of the CPU starting at DW 100.

By setting the trigger bit M 100.4 the user issues the request to the FB 199.

The trigger bit (M 100.4) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U      M 90.4      trigger flag
          :UN     M 100.4     trigger bit
          :R      M 90.4      reset activation flag
          :S      M 100.4     set trigger bit
          :SPA    FB199       call FB EXT-155U
NAME      :EXT-155U
ANST      :       M 100.4     trigger bit: M 100.4
SSNR      :       KY0,2       interface number: 2
ANZW      :       KY0,180     condition code word address: MW 180
BETR      :       KCMI        operating mode: Memory Card info
NAM1      :       KCB:        Memory Card B: (or A:)
NAM2      :       KC          irrelevant
NAM3      :       KC          irrelevant
NAM4      :       KC          irrelevant
NAM5      :       KC          irrelevant
NAM6      :       KC          irrelevant
NAM7      :       KC          irrelevant
TYP       :       KCDX        data block type: DX
QU-B      :       KF+0        irrelevant
QUDW      :       KF+0        irrelevant
ZI-B      :       KF+11       target data block number: 11
ZIDW      :       KF+100      target data word number: DW 100
ZAHL      :       KF+0        irrelevant
PAFE      :       MB50        parameterisation error byte: MB 50
:
:
```

3.1.6 Operating Mode AB

Copy the contents of Memory Card A: to Memory Card B:.

By setting the trigger bit M 100.5 the user issues the request to the FB 199.

The trigger bit (M 100.5) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.5      trigger flag
        :UN     M 100.5     trigger bit
        :R      M 90.5      reset activation flag
        :S      M 100.5     set trigger bit
        :SPA    FB199       call FB EXT-155U
NAME    :EXT-155U
ANST    :       M 100.5     trigger bit: M 100.5
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCAB        operating mode:  Copy contents of Memory Card A:
                                             to Memory Card B:
NAM1    :       KCB:        target Memory Card B:
NAM2    :       KC          irrelevant
NAM3    :       KC          irrelevant
NAM4    :       KC          irrelevant
NAM5    :       KC          irrelevant
NAM6    :       KC          irrelevant
NAM7    :       KC          irrelevant
TYP     :       KC          irrelevant
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+0        irrelevant
ZIDW    :       KF+0        irrelevant
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte: MB 50
:
:
```

3.1.7 Operating Mode FO

Format Memory Card A:.

By setting the trigger bit M 100.6 the user issues the request to the FB 199.

The trigger bit (M 100.6) is reset by the FB 199 after the request has been processed.

In order to avoid accidental formatting, the function FO must be called twice:
the formatting process starts if the second function call immediately follows the first call.
If another function is called between these two calls, the FB 199 deletes the first call.

```
OB 1
:
:
        :U      M 90.6      trigger flag
        :UN     M 100.6     trigger bit
        :R      M 90.6      reset activation flag
        :S      M 100.6     set trigger bit
        :SPA    FB199       call FB EXT-155U
NAME    :EXT-155U
ANST    :       M 100.6     trigger bit: M 100.6
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCFO        operating mode: format a Memory Card
NAM1    :       KCA:        Memory Card A:
NAM2    :       KC          irrelevant
NAM3    :       KC          irrelevant
NAM4    :       KC          irrelevant
NAM5    :       KC          irrelevant
NAM6    :       KC          irrelevant
NAM7    :       KC          irrelevant
TYP     :       KC          irrelevant
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+0        irrelevant
ZIDW    :       KF+0        irrelevant
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte: MB 50
:
:
```

3.2 Indirect Parameterisation

The parameters SSNR, ANZW, BETR, NAM1 to NAM7 are specified in the data block DB 101 starting at DW 10.

The parameters TYP, QU–B, QUDW, ZI–B, ZIDW and ANZ are specified in the data block DB 110 starting at DW 1.

By setting the trigger bit M 100.7 the user issues the request to the FB 199.

The trigger bit (M 100.7) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U        M 90.7      trigger flag
          :UN       M 100.7     trigger bit
          :R        M 90.7      reset activation flag
          :S        M 100.7     set trigger bit
          :A        DB101       call parameter DB for
                                  SSNR, ANZW, BETR, NAM1 bis NAM7 <----------+
          :SPA      FB199                                                    |
NAME      :EXT-155U                                                        |
ANST      :         M 100.7     trigger bit: M 100.7                       |
SSNR      :         KY255,10    left hand parameter byte > 0: indirect     |
                                  parameterisation                         |
                                  right hand parameter byte:  parameters   |
                                                              are located  |
                                                              in DB 101    |
                                                              starting at  |
                                                              DW 10 <------+
ANZW      :         KY0,0       irrelevant
BETR      :         KC          irrelevant
NAM1      :         KC          irrelevant
NAM2      :         KC          irrelevant
NAM3      :         KC          irrelevant
NAM4      :         KC          irrelevant
NAM5      :         KC          irrelevant
NAM6      :         KC          irrelevant
NAM7      :         KC          irrelevant
TYP       :         KCXX        indirect parameterisation
QU–B      :         KF+110      parameter for TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL
                                  in DB 110
QUDW      :         KF+1        parameter list starts with DW 1
ZI–B      :         KF+0        irrelevant
ZIDW      :         KF+0        irrelevant
ZAHL      :         KF+0        irrelevant
PAFE      :         MB50        parameterisation error byte: MB 50
:
:
```


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3.2.1 Operating Mode HS

100 data words of the data block DB 35 starting at DW 0 are transferred from the CPU to the data block DB 40 starting at DW 0 in Memory Card A: in sector DATUM1.A.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= HS	operating mode: BETR = HS
	13 :	KC= A:	Memory Card A:
	14 :	KC= DA	sector name: DATUM1.A
	15 :	KC= TU	
	16 :	KC= M1	
	17 :	KC= .A	
	18 :	KC	
	19 :	KC	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL

DB 110

DW	1 :	KC= DB	data block type: DB
	2 :	KF= +35	source data block: DB 35
	3 :	KF= +0	source data word: DW 0
	4 :	KF= +40	target data block: DB 40
	5 :	KF= +0	target data word: DW 00
	6 :	KF= +100	number: 100 data words

3.2.2 Operating Mode LS

The sector SEKT0R12 in Memory Card B: is to be deleted.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= LS	operating mode: delete a sector
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	sector name: SEKT0R12
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC	
	19 :	KC	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.2.3 Operating Mode LB

Delete the extended data block DX 10 in Memory Card B: in the sector SEKT0R12.DAT.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= LB	operating mode: delete a data block
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	sector name: SEKT0R12.DAT
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC= .D	
	19 :	KC= AT	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

DB 110

DW	1 :	KC= DX	data block type: DX
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +10	target data block: DX 10
	5 :	KF= +0	irrelevant
	6 :	KF= +0	irrelevant

3.2.4 Operating Mode DX

Transfer the data block list of all existing data block types of the sector SEKT0R12.DAT in Memory Card A: to the extended data block DX 11 of the CPU starting at DW 10.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= DX	operating mode: transfer data block list in data block DX
	13 :	KC= A:	Memory Card A:
	14 :	KC= SE	sector name: SEKT0R12.DAT
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC= .D	
	19 :	KC= AT	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

DB 110

DW	1 :	KC= B	data block type = B (list data block types DB and DX)
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +11	target data block: DX 11
	5 :	KF= +10	target data word: DW 10
	6 :	KF= +0	irrelevant

3.2.5 Operating Mode MI

Transfer Memory Card info to the extended data block DX 11 of the CPU starting at DW 100.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= MI	operating mode: Memory Card info
	13 :	KC= B:	Memory Card B: (or A:)
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

DB 110

DW	1 :	KC= DX	data block type: DX
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +11	target data block: DX 11
	5 :	KF= +100	target data word: DW 100
	6 :	KF= +0	irrelevant

3.2.6 Operating Mode AB

Copy the contents of Memory Card A: to Memory Card B:.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= AB	operating mode: copy contents of one Memory Cards to another
	13 :	KC= B:	target Memory Card
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.2.7 Operating Mode NS

The sector SEKT012.DAT in Memory Card B: is renamed to TEST1234.EXT.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7 (with old sector name)

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= NS	operating mode: rename sector
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	old sector name: SEKT0R12.DAT
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC= .D	
	19 :	KC= AT	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL (with new sector name)

DB 110

DW	1 :	KC= TE	new sector name: TEST1234.EXT
	2 :	KC= ST	
	3 :	KC= 12	
	4 :	KC= 34	
	5 :	KC= .E	
	6 :	KC= XT	

3.2.8 Operating Mode FO

Format Memory Card B:.

In order to avoid accidentally formatting the Card, the function FO must be called twice:
the formatting starts if the second call to this function is made immediately after completion message of the first call has arrived.
If another function is called between these two calls, the FB 199 deletes the first call.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= FO	operating mode: format Memory Card
	13 :	KC= B:	Memory Card B:
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.3 Startup and Restart

In the startup and restart branch, for each installed CP 516 the FB SYNCHRON must be called with the appropriate interface number.

Error messages issued by the FB SYNCHRON must be evaluated by the user, because the FB 199 assumes perfect synchronisation of the parameterised interface.

For each CP 516, in the data block DB 255 the internal status word and the auxiliary data are of the FB 199 must be deleted.
For the interfaces 7 and 8, the internal status word can be deleted only using direct addressing, since in this case the length of the DB 255 exceeds 256 DW.

```
OB 20; OB 21; OB 22 :
:
:
          :SPA      FB125     call to data handling block
NAME      :SYNCHRON           SYNCHRON
SSNR      :KY0,2              interface number: 2
BLGR      :KY0,4              Block size e.g.: 4 (128 byte)
PAFE      :MB255              parameterisation error byte: MB 255
          :
          :
          :A        DB255     data buffer for the FB 199
          :L        KB0
          :T        DW0       delete auxiliary data area
          :T        DW1       delete auxiliary data area
          :T        DW13      delete auxiliary data area
          :T        DW38      delete auxiliary data area
          :T        DW42      delete auxiliary data area
          :T        DW43      delete status word interface 1
          :T        DW81      delete status word interface 2
          :T        DW119     delete status word interface 3
          :T        DW157     delete status word interface 4
          :T        DW195     delete status word interface 5
          :T        DW233     delete status word interface 6
          :SPA      FBnnn     call a function block (nnn = number of the FB)
          :
          :
```

```
FBnnn     :MBR      EECFF     start addresss DB 255
          :LRW      0
          :SLD      4         load
          :MAB                into BR register
          :L        KB0
          :TRW      + 271     delete status word interface 7
          :TRW      + 309     delete status word interface 8
```

4 The SYNCHRON Data Handling Block

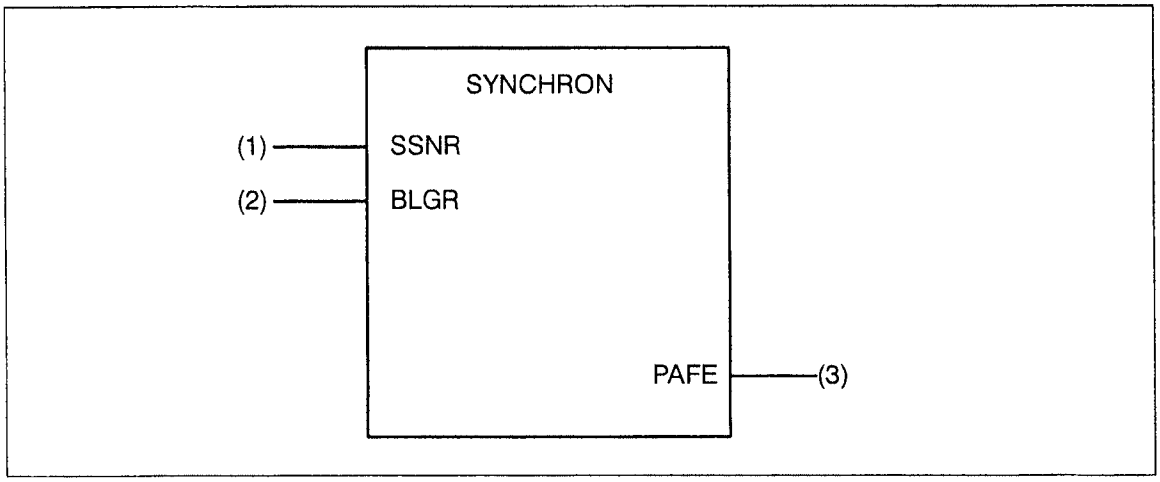

Figure 4.1 The SYNCHRON data handling block

4.1 Function

The SYNCHRON data handling block (FB 125) synchronises the CP 516 and the CPU. It sets the interface number for the related CP 516 and deletes the auxiliary data area and the internal status word for the interface.

The SYNCHRON data handling block is called during "Manual startup" (OB 20), "Manual restart" (OB 21) and "Automatic restart" (OB 22).

Because of its execution time, the data handling block SYNCHRON can only be called in these start phases.

At the data handling block SYNCHRON, the following parameters must be entered:
SSNR = interface number,
BLGR = block size,
PAFE = parameterisation error byte.

Section 3.3 contains a parameterisation example for the SYNCHRON.

4.2 Parameter Description

4.2.1 SSNR: Interface Number

Number of the interface the CP 516 is addressed under.

Parameter types:	Datum / KY
valid range:	0,0... 0,255
High byte = 0:	Direct parameterisation; low byte = SSNR
High byte > 0:	Indirect parameterisation; low byte = pointer to parameter field; in the data block opened prior to calling the FB SYCHRON starting at the data word specified here the parameters SSNR and BLGR are stored in the order and format used for direct parameterisation.

4.2.2 BLGR: Blocksize

BLGR allows the user to define the maximum number of data words the FB 199 (or the data handling blocks SEND and REC–A) will transfer in one go.
If the value of the parameter ZAHL specified with FB 199 exceeds the value defined in BLGR, the FB 199 automatically transfers any subsequent blocks.

For the sake of high transfer rates, select large blocksize values (which extends the cycle time).

In order to minimise the execution time of the function blocks, select low blocksize values (which reduces the data rate).

For more detailed information refer to the technical specifications (section 1.5).

Parameter types: Datum / KY

valid range: 0,0 ... 0,255

The following blocksize values can be specified with BLGR:

BLGR	*Blocksize*
0	max 256 byte ; default value
1	max. 16 byte
2	max. 32 byte
3	max. 64 byte
4	max. 128 byte
5	max. 256 byte
6	max. 512 byte
7...254	max. 256 byte ; default value
255	Blocksize set to 512 byte

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Instruction Manual: SIMATIC S5, CP 516, SFB EXT–155U

4.2.3 PAFE: Parameterisation Error Byte

This flag–, output or input byte is set by SYNCHRON if it recognises a parameterisation error.

Parameter types: output / BY

valid range: EB 0 ... EB 127
AB 0 ... AB 127
MB 0 ... MB 255

Structure of the parameterisation error byte

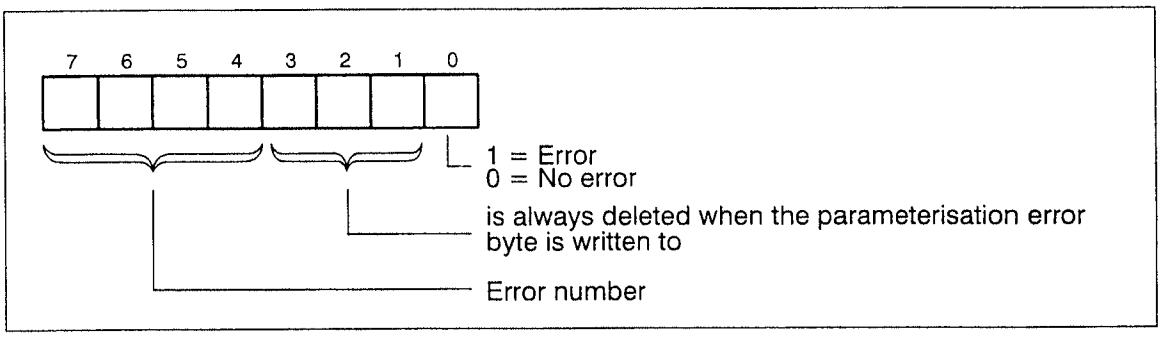

Figure 4.2 Structure or the parameterisation error byte

The error numbers in the parameterisation error byte have the following significance:

0 no error

1–4 source/target parameter incorrect

1 range incorrect

2 DB or DX do not exist

3 range size too small

4 range does not exist

5 condition code word incorrect

6 not used

7 interface does not exist

8 interface not ready

9 interface overload

AH interface used by another CPU

BH invalid request number

CH interface timeout

DH miscellaneous interface errors, e.g.
- invalid handshake acknowledgement
- blocksize of interface not within range 1..255

EH miscellaneous errors at the data handling block, e.g.
- missing call of a data block with indirect parameterisation
- software error in CPU or data handling block

FH FB call invalid, e.g.
- double call with interruptibility at command borders
- invalid modification of standard function blocks.

5 Multi Processor Operation

5.1 Interfaces

The FB 199 supports multi processor operation. The parameters are specified in each of the CPUs as if it was executing in a single processor environment.

On the CP 516, 4 (consecutive) interface numbers can be set. This allows 4 CPUs to access one CP 516. The CP 516 handles the access procedures. There is no need for the user to provide for interlocking in his program. Each CPU must be assigned a different interface number.

For example:
ZBG 1: SSNR = 20
ZBG 2: SSNR = 21
ZBG 3: SSNR = 22
ZBG 4: SSNR = 23

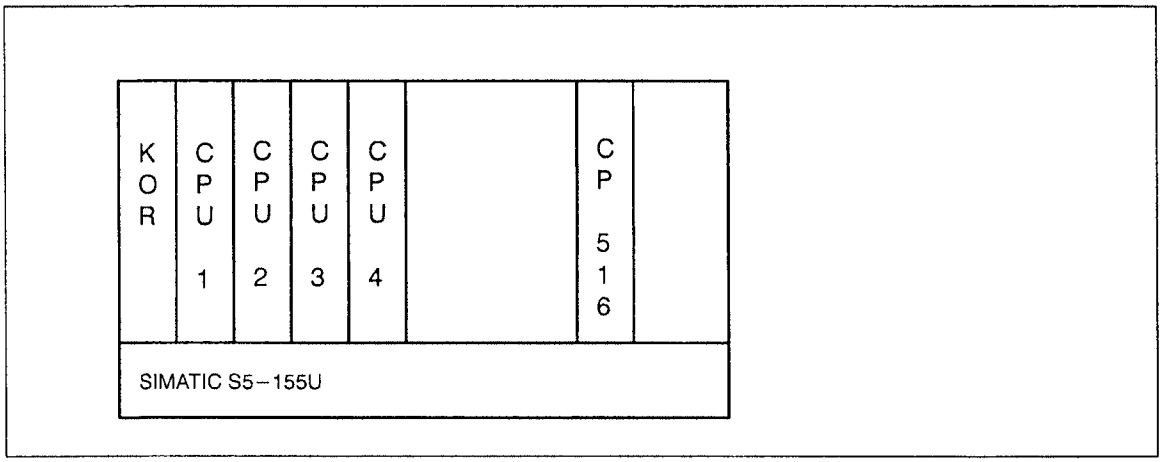

Figure 5.1 Multi processor operation with the CP 516

5.2 Startup and Restart

In single and multi processor operation, the interfaces must be synchronised by the data handling block SYNCHRON (chapter 4).
Each CPU synchronises the interface assigned to it independently of the other CPUs.

To

Siemens AG

ANL A441–WA
Günther–Scharowsky–Str.2

D–91058 Erlangen

SIMATIC S5

Memory Module CP 516

Standard function block EXT–155U for
AG S5–155U(CPU 946/947)
AG S5–155H(CPU 946R/947R)

Instruction Manual

Order No.: T89120–E3031–U3–*–7619
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SIMATIC S5

Memory Module CP 516

Standard Function Block EXT-150U for AG S5-150U

Instruction Manual

Edition February 1995

Version 3

To

Siemens AG

ANL A441 – WA
Günther – Scharowsky – Str.2

D – 91058 Erlangen

SIMATIC S5

Memory Module CP 516

Standard function block EXT – 150U for AG S5 – 150U

Instruction Manual

Order No.: T89120 – E3031 – U4 – * – 7619
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Table of Contents

Note:

These instructions do not purport to cover all details in equipment, nor to provide for every possible contingency to be met in connection with operation.

Should further information be desired or should particular problems arise which are not covered sufficiently for the Purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

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In an emergency, you can reach us over our "hotline" telephone number ..9131–7–22888.

1 Description

1.1 Range of Application

The memory module CP 516 can be used in programmable controllers (AG) of the SIMATIC S5 series. This instruction manual refers to the AG

- SIMATIC S5–150U.

Data (data blocks DB) can be swapped from the memory of the CPU to the memory module CP 516.
The CP 516 can accommodate 2 Memory Cards (addressed as "A:" and "B:"). Memory Cards are available as RAM based and as FLASH EPROM based versions.
Each Memory Card can be organised in sectors (addressed using names composed of 8+3 ASCII characters). Different sectors may contain data blocks of identical numbers.

From within the CPU program, the CP 516 is addressed like a communication processor (CP) by specifying an interface number (SSNR). The CP 516 hardware is configurable to provide either 1 or 4 (for multiprocessor operation; see chapter KEIN MERKER) interfaces.
Depending on the configuration, either a maximum of 2 or a maximum of 8 CP 516 can be operated in a programmable controller.

The standard function block

- FB EXT-150U

is called by the number 199.

Therefore in this instruction manual it is designated as **FB 199** further on.

The standard function block FB 199 handles the data transfer between the CPU of the AG and the memory module CP 516.
In addition, the FB 199 handles file management tasks.

The FB 199 handles up to 8 interfaces.

1.1.1 Required Software Modules

In addition to the standard function block FB 199 the following data handling blocks are required:

- FB 180: SEND,
- FB 182: FETCH,
- FB 181: RECEIVE,
- FB 185: SYNCHRON.

The following items must be available within the CPU

- OB 20 (startup) and OB 21 and OB 22 (restart),
- DB 255 (data buffer).

1.2 Program Structure

The data handling block SYNCHRON (chapter 4) synchronises the CPU and the CP 516:
The FB 199 cannot be executed unless the SYNCHRON data handling block parameterised by the user has executed successfully in the startup branch (startup with OB 20 or restart with OB 21, OB 22) of the AG. This is a prerequsite for a sensible communication between the data handling blocks SEND, FETCH and RECEIVE and the CP 516.

The data handling block SYNCHRON must be called for each of the interfaces of the AG with the corresponding parameters.

The FB 199 is called in the cyclic section of the program (OB 1); the specified interface number must be identical to that of the corresponding call to SYNCHRON.

Parameters for the FB 199 are optionally specified in direct or in indirect mode (section 2.1):

- in direct mode, the parameters are entered into the FB 199 directly.
- in indirect mode, the two mandatory parameters plus two pointers to parameter fields are entered at the FB 199.
  Indirect parameterisation allows the user to specify the required parameters for the FB 199 only once.

To initialise the FB 199, the user sets a trigger bit. After this, the FB 199 requires several cycles to complete the data transfer.
During this period of time, the user must not modify the trigger bit nor any other parameters of the FB 199; i.e. he must not initiate another request for the FB 199 before the previous request for a specific interface has either been completed successfully or has been terminated with an error.

After completion or termination of a request, the FB 199 automatically resets the trigger bit.

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Instruction Manual: SIMATIC S5, CP 516, SFB EXT–150U

1.3 The Data Structure of the DB 255

The data block DB 255 must be reserved for the communication between the CPU and the CP 156 with the FB 199. It acts as a data buffer with internal status words for the parameterised interfaces and the auxiliary data area. Its length depends on the number of interfaces used for the FB 199:

Its minimum length is 81 data words (DW 0 to DW 80) for one interface.

Its maximum length is 347 data words (DW 0 to DW 346) for eight interfaces.

The DB 255 must be dimensioned, installed and initialised as described in section 3.3, "Startup and Restart", by the user in the CPU RAM (figure 1.1).

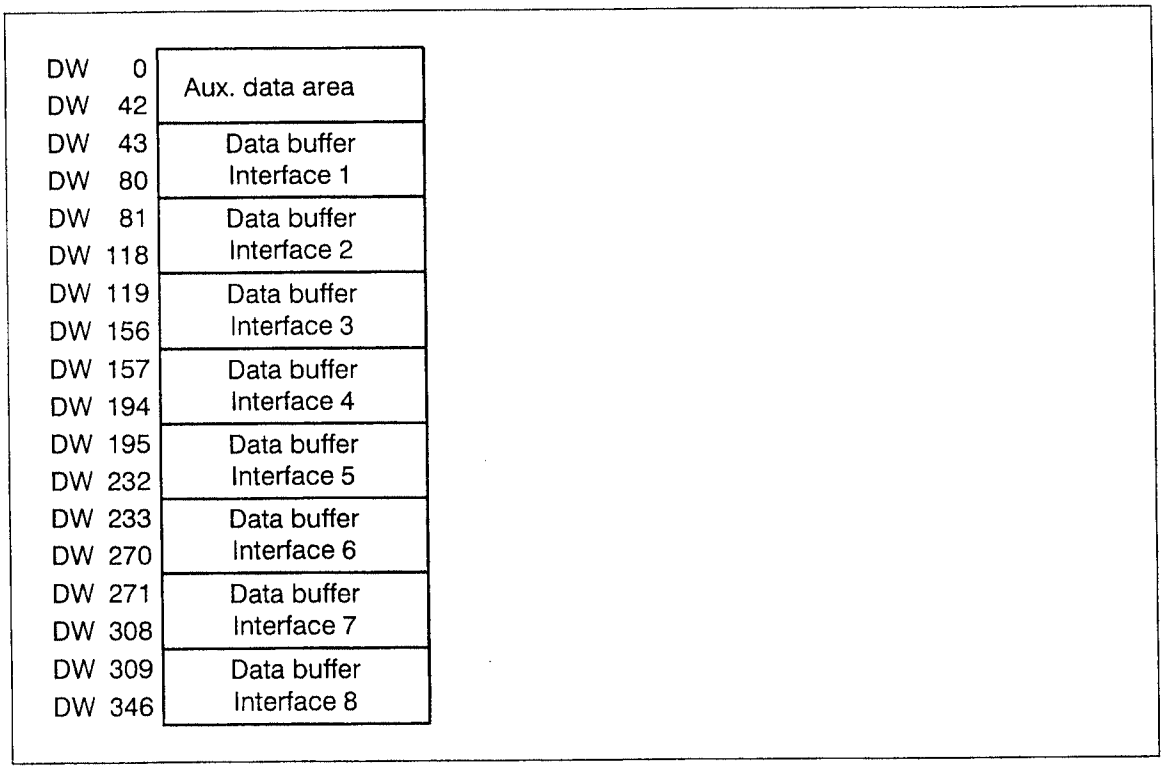

Figure 1.1 Structure of the DB 255

1.4 **Functions** (Modes of Operation)

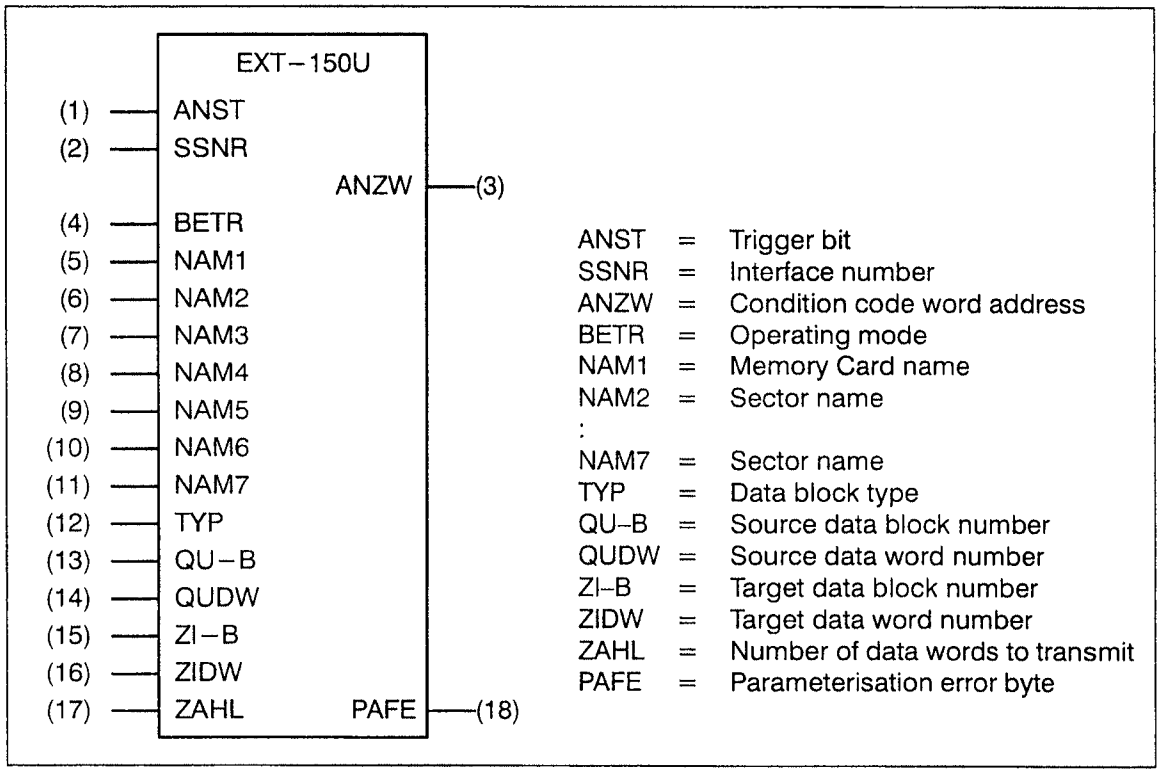

Figure 1.2 Function diagram of the FB 199

The functions of the FB 199 described herein depend on the operating mode specified; i.e., they depend on the value specified for the parameter BETR of the FB 199. Additional parameters must be assigned according to the function. Parameters not required for a function may optionally be specified. The individual parameters are described in chapter 2.

1.4.1 Transmitting Data Blocks

If more than one CP 516 or interface is used, the interface numbers must be within one interface window (section 2.2.2).

The numbers of source and target data block may differ. The transmission is possible only between data blocks of identical types (both DB).

Data blocks may be transmitted either in parts or as a whole:
Required parameters are the data block number, the number of the first data word to transfer and the number of data words to transfer.

The maximum length of a source or target block is 4096 data words (DW 0 to DW 4095).

Up to 2048 data words can be transmitted in one call.

Data blocks with identical numbers can be created in different sectors.

Data transfer from the CPU to the CP 516 (BETR = HS)

Data blocks can be transferred from the CPU memory to the CP 516 even if there has no target data block been set up. The FB 199 automatically sets up the target data block.

The new length of the target data block is the larger one of the two values:
- length of the existing target data block (length = 0 if there is none);
- target data word number (ZIDW) + number (ZAHL) of the data blocks to be transferred.

The FB 199 carries out any required corrections in the header of the target data block automatically.

During the transfer, no undefined gaps my occur.
Examples:
A transfer with a target data word number greater than zero is not permitted unless there already is a target data block (this would create an undefined leading gap).
A transfer with a target data word number greater than the length of the target data block is not permitted (this would create an undefined gap in the middle).

Data transfer from the CP 516 to the CPU (BETR = MS)

A data block can be transferred from the CP 516 to the CPU RAM only if a target data block has been set up at the destination.

1.4.2 Management Functions

In addition to the transfer of data blocks, the FB 199 provides the following management functions for the Memory Card, sectors and data blocks on the CP 516.

- Rename a sector,
- Delete a sector,
- Delete individual data blocks of a sector,
- Transfer the directory of a sector,
- Memory Card info,
- Copy the contents of Memory Card A: to B: or vice versa,
- Format a Memory Card.

Renaming a sector (BETR = NS)

A sector on a Memory Card is assigned a new name; the old sector name ceases to exist.

The sector and the data blocks of that sector can only be addressed under the new sector name.

Renaming a sector requires indirect parameterisation (section 2.1).
The parameter NAM1 contains the name of the Memory Card. The parameters NAM2 to NAM7 contain the old sector names. The new sector name is specified in the parameters TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL; data format: KC.

Deleting a sector (BETR = LS)

A sector on a Memory Card is deleted.

If a sector is deleted, all data blocks stored in this sector are deleted together with the sector name.
On RAM based Memory Cards, the storage space occupied by this sector is returned to the memory pool.

Deleting individual data blocks of a sector (BETR = LB)

A data block (TYP = DB) in a Memory Card sector is deleted; the storage space occupied by this data block is returned to the memory pool.

If the last data block of a sector is deleted, the corresponding sector name still exists in the list of sector names.
The sector name can be deleted by calling the function "Delete a sector" (BETR = LS).

Transferring the directory of a sector to the CPU (BETR = DS)

The directory (list of data blocks) of a sector is transferred to a target data block type DB in the CPU.

A sufficiently dimensioned target data block for the data block list must have been set up in the CPU memory.

Depending on the value of the parameter TYP (= DB) the following data block lists can be transferred:
- Only DB data blocks (—> length of the data block list is 16 data words).

In the data block list, one bit is allocated for each of the 256 possible data blocks of a type (DB 0 to DB 255):
If the data block exists in the selected sector, the bit is set (= 1).
If the data block does not exist in the selected sector, the bit is cleared (= 0).

The allocation of the individual bits of the data block list (for one data block type) to data block numbers in the CPU data block is shown in figure 1.3.

Bit–No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DW n	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DW n+1	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
⋮	⋮		⋮		⋮		⋮		⋮		⋮		⋮		⋮	
DW n+14	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	224
DW n+15	255	254	253	252	251	250	249	248	247	246	245	244	243	242	241	240

Figure 1.3 Structure of the data block list (for one data block type) for the directory of a sector

Memory Card info (BETR = MI)

Data on the two Memory Cards are transferred to a target data block (TYP = DB) in the CPU.

A sufficiently dimensioned target data block for the data (4 words) must be set up in the CPU memory.

For NAM1, optionally "A:" or "B:" may be specified. The data is transferred for each inserted Memory Card.

Figure 1.4 shows the structure of the info list for the two Memory Cards. The significance is

- memory size — hexadecimal specification of memory size (e.g. 800H: 2 Mbyte)
- Memory Card type: 0 H: no Memory Card inserted; 1 H: RAM; 2 H: FLASH-EPROM

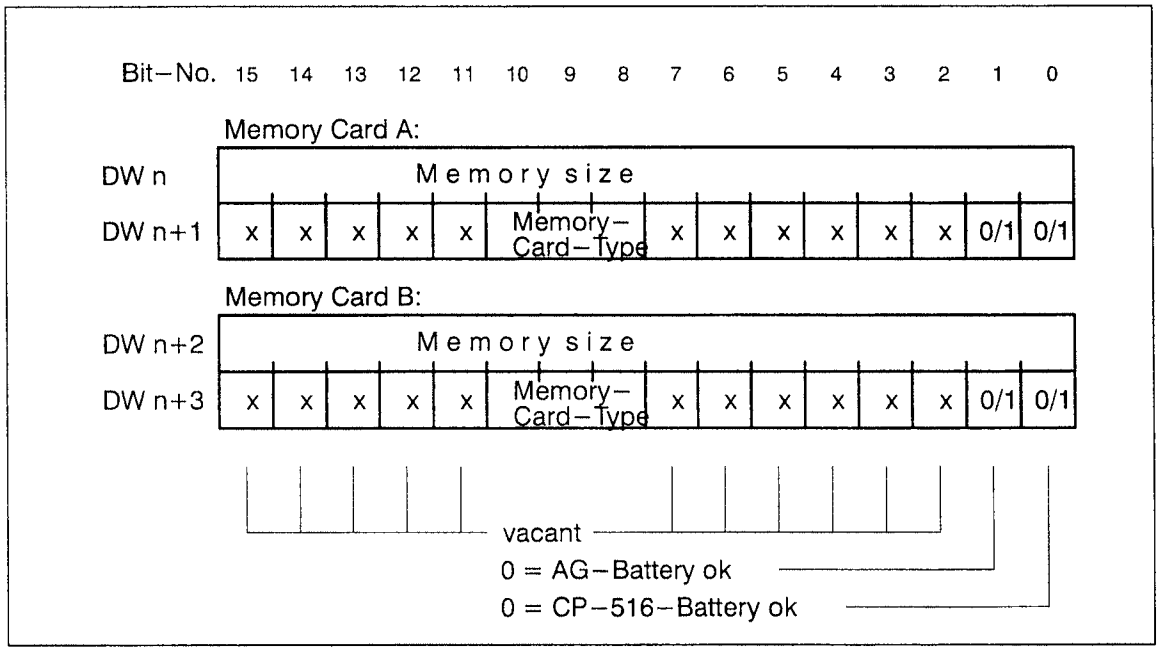

Figure 1.4 Structure of Memory Card data list

Copy contents from Memory Card A: to B: or from B: to A: (BETR = AB, = BA)

The entire contents of a Memory Card is copied to another Memory Card. Any data on the target Memory Card are overwritten.
In the parameter NAM1 the target Memory Card (A: or B:) is specified.

Formatting a Memory Card (BETR = FO)

The Memory Card is formatted. Any data stored on that card are deleted.

In order to avoid accidental formatting, the function FO must be called twice:
The formatting process starts after the second call if the second call was made immediately following the first call.
If another function is called between the two calls, the FB 199 deletes the first call.

1.5 Technical Specifications

Order numbers:

– S5–DOS (PCP/M)	6ES5 848–8GC11 (german) 6ES5 848–8GC21 (english) 6ES5 848–8GC31 (french)
– MS–DOS and S5–DOS/MT	6ES5 848–6GC11 (german) 6ES5 848–6GC21 (english) 6ES5 848–6GC31 (french)
Block number:	FB 199
Block name:	EXT–150U
Block length:	1168 words
Call length:	20 words
Processing time:	approximately 1 s to 8 s
Nesting depth:	1
called function blocks:	FB 180 SEND FB 182 FETCH FB 181 RECEIVE
called data blocks:	DB 255 Data buffer DB xx with indirect parameter specification DB yy with indirect parameter specification DB nn or flag word for condition code word
occupied flag area: (scratch area)	MW 200 to MW 238

Data transfer time

The data transfer time for 1 kbyte (512 data words) is approximately 1 to 8 seconds (at a constant cycle time of 100 ms), depending on the block size (BLGR) set at the data handling block SYNCHRON and the operating mode (BETR) set at the FB 199:

	BETR = MS	BETR = HS		Number of cycles
BLGR	ZAHL = 512			
1 (16 Byte)	approx. 7.0 s	approx. 6.9 s	DB does not exist on CP 516	70
		approx. 7.1 s	Extend DB on CP 516	72
		approx. 6.8 s	DB exists on CP 516	69
6 (512 Byte)	approx. 0.8 s	approx. 0.7 s	DB does not exist on CP 516	8
		approx. 0.9 s	Extend DB on CP 516	10
		approx. 0.6 s	DB exists on CP 516	7

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2 Parameter Specification

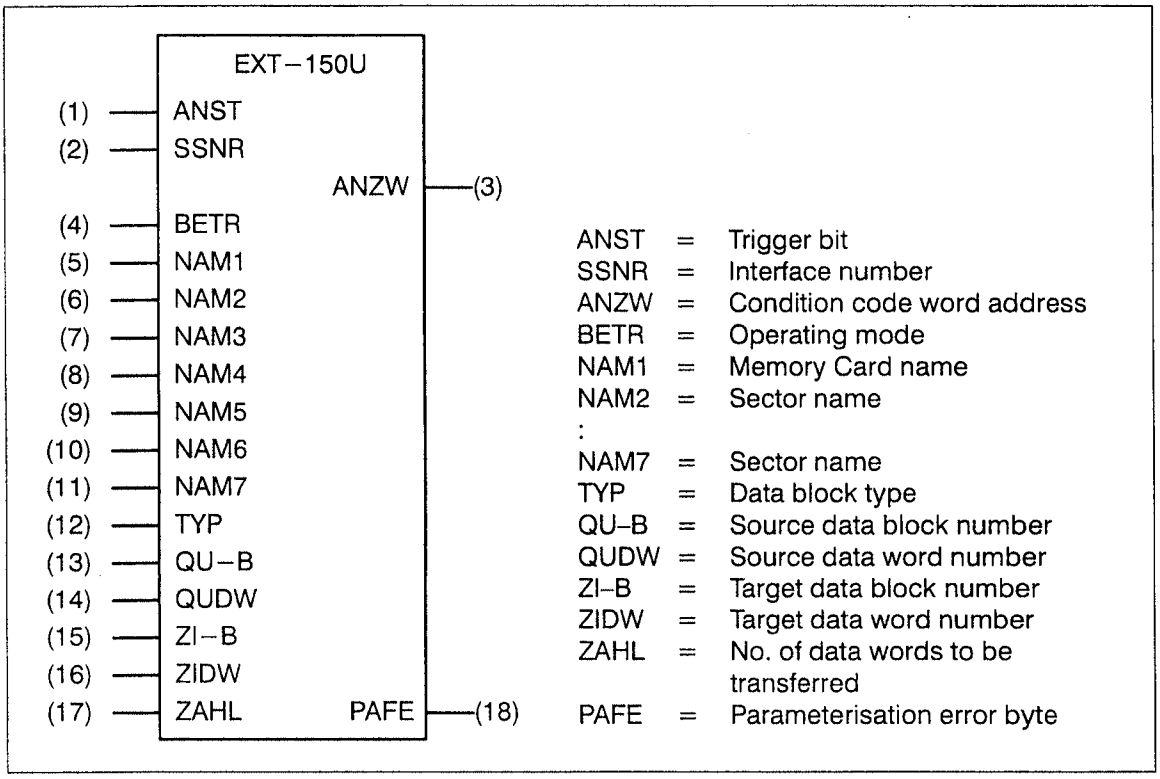


Figure 2.1 Parameters of the FB 199

2.1 Direct and Indirect Specification of Parameters

The parameters for the FB 199 are organised in two subsets:
– SSNR, ANZW, BETR, NAM1 bis NAM7 and
– TYP, QU–B, QUDW, ZI–B, ZIDW, ZAHL.

The FB 199 may be assigned parameters optionally for both subsets either directly or indirectly:

- If the parameters are specified directly (summary see section 2.3), they are entered at the FB 199.
- If the parameters are specified indirectly (summary see section 2.4), for each of the subsets a pointer to a parameter field is passed in two separate data blocks. At the positions pointed to, the two subsets must be specified without gaps in the order used for direct parameter specification.
  Indirect parameter specification allows the user to parameterise the FB 199 once.
  The trigger bit (ANST) and the parameterisation error byte (PAFE) must be specified directly at the FB 199 even if indirect parameter specification is used.

2.1.1 Parameter Set SSNR, ANZW, BETR, NAM1 to NAM7

Direct specification of parameters

In the high byte (left hand byte) of the parameter SSNR, "0" is entered.

In the low byte (right hand byte) of the parameter SSNR the interface number is entered.

Any other parameters are entered directly at the FB 199.

Indirect specification of parameters

In the high byte (left hand byte) of the parameter SSNR at the FB 199 the number of the data block containing the parameters must be entered.

In the low byte (right hand byte) of the parameter SSNR at the FB 199 the number of a data word must be entered.
Starting at this data word, the parameters SSNR, ANZW, BETR, NAM1 to NAM7 must be stored in ascending order in the data block.

The length of the parameter set is always 10 data words, even if in some operating modes the FB 199 does not evaluate all of the parameters.

With indirect specification of parameters, the parameters specified directly (ANZW, BETR, NAM1 to NAM7) at the FB 199 are irrelevant.

2.1.2 Parameter Set TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL

Direct specification of parameters

The parameters are entered directly at the FB 199.

Indirect specification of parameters

Enter "XX" at the parameter TYP at the FB 199 (data format KC).

Enter the number of the data block containing the parameters to be transferred at the parameter QU-B at the FB 199.

Enter the number of a data word at the parameter QUDB at the FB 199. Starting at this data word, the parameters TYP, QU-B, QUDW, ZI-B, ZIDW and ZAHL must be entered in ascending order.

The length of the parameter set is always 6 data words, even if in some operating modes the FB 199 does not evaluate all of the parameters.

With indirect parameter specification, the parameters ZI-B, ZIDW and ZAHL, which are entered directly at the FB 199, are irrelevant.

2.2 Description of the Parameters

2.2.1 ANST: Trigger bit

The user sets the trigger bit in order to initiate a request
- for data transfer between the CPU and the CP 516 or
- for the management of data blocks or sectors on the CP 516.

After completion or termination of a request, the FB 199 resets the ANST bit.

Parameter types:	Input / bit
valid range:	A 0.0 ... A 127.7 M 0.0 ... M 255.7

2.2.2 SSNR: Interface Number

Specification of the interface number used for addressing the CP 516 or setting of indirect parameter specification (section 2.1.1).

The interface number must match the interface number specified for this CP 516 at the data handling block SYNCHRON.

Any values between 0 and 255 are valid SSNR numbers.
The up to 8 valid interfaces for one FB 199 must be within one interface window. An interface window contains 8 numbers and starts with a multiple of 8 (0, 8, 16 ... 248).

Parameter types:	data / KY
valid range:	0,0 ... 255,255
High byte = 0:	Direct parameter specification; low byte = SSNR
High byte > 0:	Indirect parameter specification; Number of data block with the parameters to be transferred low byte = pointer to parameter field (number of the data word in the specified data block, starting at which the parameters are stored ascendingly.)

2.2.3 ANZW: Condition Code Word Address

In the condition code word, the FB 199 indicates the processing of a job.

It contains the status and/or error messages generated by the CP 516 firmware and by the FB 199. After completion or termination of the job, these messages are available to the user.

The condition code word (16 bit) may optionally be stored in the flag area or in a data block (type DB). Switching criterion is the high byte (left hand byte) of the parameter ANZW:

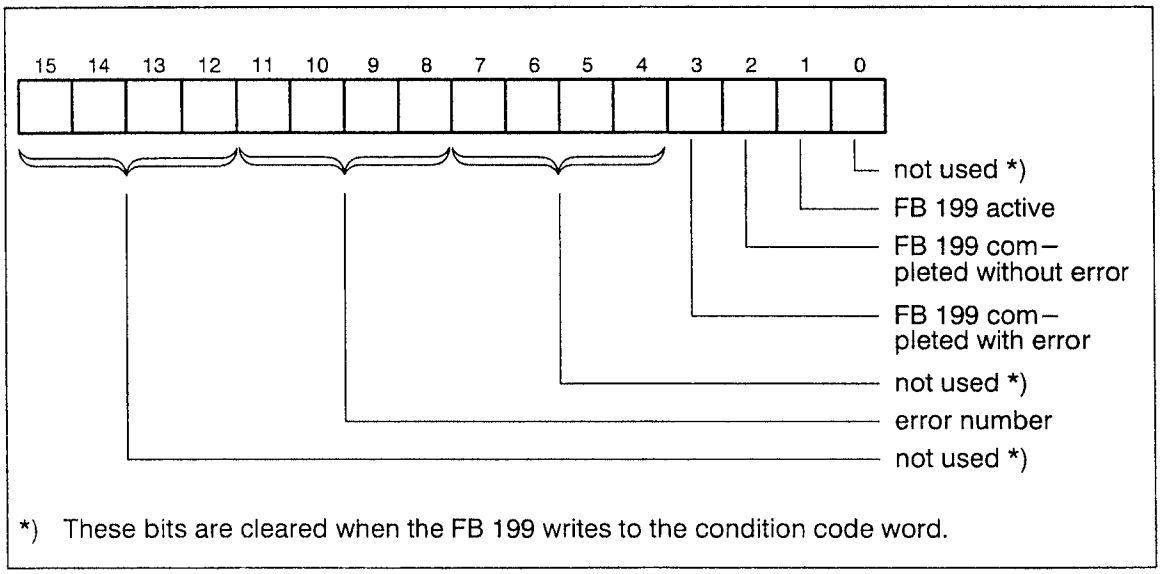
High byte = 0: condition code word is located in the flag area; the low byte (right hand byte specifies the flag word address of the condition code word).

High byte > 0: condition code word is located in the data block; the high byte (left hand byte) contains the number of the data block which contains the condition code word. The low byte contains the data word address of the condition code word.

Parameter types: data / KY

valid range: 0,0 ... 0,254 (flag area)
3,0 ... 254,255 (data block)

Structure of the condition code word



*) These bits are cleared when the FB 199 writes to the condition code word.

Figure 2.2 Structure of the condition code word

If the FB 199 returns the message "request completed with error" in bit 3 of the condition code word, bits 8 to 11 contain an error number which specifies the reason for the termination.

Error numbers in the condition code word

(1 – 5 : errors recognised by the FB 199)
(6 – F H : errors recognised by the CP 516)

0 = no error
1 = parameterisation error (additional information contained in the PAFE parameter)
2 = operating mode switch of the CP 516 set to STOP
3 = operating mode HS: data block does not exist on CP 516; header gap risk
4 = operating mode MS: data block on CPU too short
operating mode HS: data block on CP 516 too short; middle gap risk
5 = ZAHL = wildcard length: excessive source data block (QU–B) size; data block without block header exceeds 2048 data words.
6 = hardware error (check sum error on memory card)

7 = Memory Card not formatted
8 = Memory Card replaced or full
operating mode AB or BA: not formatted
9 = operating mode MS or LB: data block does not exist on CP 516
AH = not used
BH = incorrect request
CH = handshake error
DH = operating mode MS, NS, LS, LB or DS:
sector name (data set name) does not exist on CP 516
EH = operating mode NS: sector name (data set name) already exists on CP 516
FH = Memory Card not inserted

2.2.4 **BETR:** Operating Mode

Specification of the function (described in section 1.4) the FB 199 is supposed to carry out. The following are valid entries:

HS: transfer a data block from the CPU to the CP 516

MS: transfer a data block from the CP 516 to the CPU

NS: rename a sector

LS: delete a sector

LB: delete a data block (DB) within a sector

DS: transfer a directory (data block list) of a sector to a DB data block in the CPU memory

MI: transfer Memory Card related data to a DB data block in the CPU memory

AB: transfer the contents of Memory Card A: to Memory Card B:

BA: transfer the contents of Memory Card B: to Memory Card A:

FO: Formatting a Memory Card

Parameter types: data / KC

valid range: the ASCII characters listed above

2.2.5 **NAM:** Name of the Memory Card, Sector Name

When addressing a data block in the CP 516, the Memory Card name (NAM1) and the sector name (NAM2 to NAM7) must be specified.
In both Memory Cards identical sector names may be used.
Different sectors may contain data blocks with identical numbers.

In the operating mode "transfer Memory Card related data" (MI) "A:" or "B:" must be specified (only plugged in Memory Cards must be specified.

NAM1: Name of the Memory Card,

The Memory Card must be specified preceding each sector name:
The upper Memory Card has the name "A:";
Lower Memory Card has the name "B:".

Parameter types: data / KC

valid range: A:, B:

NAM2 to NAM7: Sector name

The sector name consists of up to 8 ASCII characters to the left of the full stop and up to 3 ASCII characters to the right. If there are no ASCII characters to the right of the full stop, the full stop may be omitted.

Parameter type: data / KC

valid range: all ASCII characters

Examples

1) A:ANTON1.NEU
2) B:BERTA.1
3) A:SEKTOR_X
4) B:SEKTOR99.DAT
5) A: (selecting a Memory Card)

Example		*1)*	*2)*	*3)*	*4)*	*5)*
NAM1	KC:	A:	B:	A:	B:	A:
NAM2	KC:	AN	BE	SE	SE	
NAM3	KC:	TO	RT	KT	KT	
NAM4	KC:	N1	A.	OR	OR	
NAM5	KC:	.N	1	_X	99	
NAM6	KC:	EU			.D	
NAM7	KC:				AT	

2.2.6 TYP: Data Block Type

Specification of the data block type or the setting of the indirect parameter specification (section 2.1.2). The following settings are possible:

DB: DB data block

XX: indirect parameter specification

Parameter type: data / KC

valid range: the ASCII characters listed above

2.2.7 QU-B: Source Data Block Number

With direct parameter specification:
Specification of the number of the source data block from which the FB 199 is transferred.

With indirect parameter specification:
Specification of the number of the data block which contains the parameter list.

The FB 199 evaluates the source data block number only in the operating modes HS and MS; in all other operating modes it is irrelevant.

Parameter types:	data / KF	
valid range:	+ 2 ... + 254	(BETR = HS, TYP = DB)
	+ 1 ... + 254	(BETR = MS, TYP = DB)
	+ 3 ... + 254	(indirect parameter specification)

2.2.8 QUDW: Source Data Word Number

With direct parameter specification:
Specification of the number of the first data word in the source data block which the FB 199 should transfer.

With indirect parameter specification:
Specification of the number of the data word which contains the start of the parameter list.

The FB 199 evaluates the source data word number only in the operating modes HS and MS; in all other operating modes it is irrelevant.

Parameter types:	data / KF	
valid range:	+ 0 ... + 2048	(direct parameter specification)
	+ 0 ... + 250	(indirect parameter specification)

2.2.9 ZI–B: Target Data Block Number

Specification of the number of the target data block the FB 199 should make a transfer to.

The target data block number is irrelevant in the operating modes LS, NS, AB, BA and FO.

Parameter types:	data / KF	
valid range:	+ 1 ... + 254 (	BETR = HS, TYP = DB,
		BETR = LB, TYP = DB)
	+ 2 ... + 254 (	BETR = MS, TYP = DB)
		BETR = MI, TYP = DB)

2.2.10 ZIDW: Target Data Word Number

Specification of the number of the first data word the FB 199 should make a transfer to starting at this word.

The target data word number is irrelevant in the operating modes LS, NS, AB, BA and FO.

Parameter types:	data / KF
valid range:	+ 0 ... + 2048

2.2.11 ZAHL: Number of Data Words to transfer

Specification of the number of data words to transfer.

The FB 199 evaluates the number of data words only in the operating modes HS and MS; in all other operating modes it is irrelevant.

If ZAHL = –1 is specified, the FB 199 transfers the source data block in the current length.
The parameter QUDW is irrelevant, i.e., the FB 199 sets it to zero:
The transfer starts at the source data block at DW 0.

Parameter types:	data / KF
valid range:	+ 1 ... + 2048 – 1 (wildcard length)

2.2.12 PAFE: Parameterisation Error Byte

The FB 199 sets this flag output or input byte if it encounters a parameterisation error.

Parameter type:	Output / BY
valid range:	AB 0 ... AB 127 MB 0 ... MB 255

Structure of the parameterisation error byte

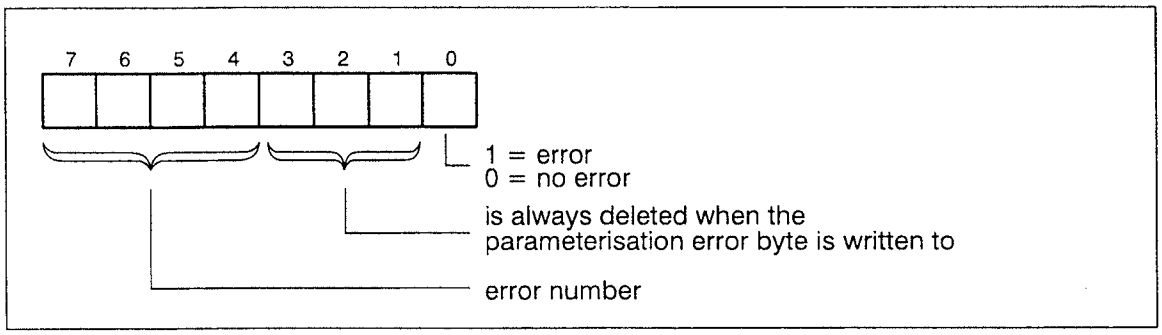


Figure 2.3 Structure of the parameterisation error byte

The error numbers in the parameterisation error byte have the following significance:

0 no error.

1 Data block for indirect parameterisation not available or too short, address for parameter set invalid (greater than DW 246) or data block number invalid (DB–NR < 2, DB–NR = 255). (Without error message in the condition code word.)

2 Invalid parameter specified for SSNR (interface number):
specified SSNR does not exist or SSNR is not within interface window.
(Without error message in the condition code word.)

3 Invalid parameter specified for ANZW (condition code word):
Data block for the parameter not available or too short or data block number invalid (DB–NO < 2 or DB–NO = 255).
(Without error message in the condition code word.)

4 Invalid parameter specified for BTR (operating mode):
only HS, MS, NS, LS, LB, DS, MI, AB, BA and FO are valid.

5 Invalid parameter specified for TYP (data block type):
only DB, XX are valid;
with BETR = NS all except XX.

6 Invalid parameter specified for QU–B, ZI–B (data block number):
invalid are:

BETR = HS:	TYP = DB :	QU–B < 2; QU–B > 254;	ZI–B < 1,	ZI–B > 254;
BETR = MS:	TYP = DB :	QU–B < 1; QU–B > 254;	ZI–B < 2,	ZI–B > 254;
BETR = LB:	TYP = DB :		ZI–B < 1;	ZI–B > 254;
BETR = DS:	:		ZI–B < 2;	ZI–B > 254;
BETR = MI:	:		ZI–B < 2;	ZI–B > 254;

7 Data block does not exist in AG or is too short:

BETR = HS:	QU–B;	QUDW > DB length;	QUDW + ANZ > DB length
BETR = MS:	ZI–B;	ZIDW > DB length;	ZIDW + ANZ > DB length
BETR = MI:		ZIDW + U > DB length;	
BETR = DS:	ZI–B;	ZIDW > DB length;	ZIDW + 16 > DB length

8 Invalid parameter specified for QUDW, ZIDW (data word number)
invalid are
QUDW, ZIDW < 0;
QUDW, ZIDW > 2048.

9 Invalid parameter specified for ZAHL (number)
invalid are
ZAHL < –1;
ZAHL = 0;
ZAHL > 2048.

A H Data block DB 255 does not exist or is too short.

B H wrong Memory Card selected: NAM1 ≠ „A:" and NAM1 ≠ „B:".

2.3 Summary Direct Parameterisation

The following tables show the parameters required depending on the operating modes (BETR).

Call:
FB EXT-150U :SPB FB199
NAME :EXT-150U

2.3.1 Direct Parameterisation of SSNR, ANZW, BETR, NAM1 to NAM7

Trigger bit	ANST:		++	++	++	++	++	++	++	++	++	++
Interface number	SSNR:	KY	++	++	++	++	++	++	++	++	++	++
CC–word address	ANZW:	KY	++	++	++	++	++	++	++	++	++	++
Operating mode	BETR:	KC	MS	HS	NS	LS	LB	DS	MI	AB	BA	FO
Memory Card name	NAM1:	KC	++	++	++	++	++	++	++	++	++	++
Sector name	NAM2:	KC	++	++	++	++	++	++				
	to											
	NAM7:	KC	++	++	++	++	++	++				

++: These params are evaluated by theFB 199.
Specifications in vacant field are irrelevant

Table 2.1 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 at the FB 199 with direct parameterisation

2.3.2 Direct Parameterisation of TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL

			Operating mode:	MS	HS	NS	LS	LB	DS	MI	AB	BA	FO
Block type	TYP:	KC		++	++	**		++	++	++			
Source data block no.	QU–B:	KF+		++	++								
Source data word no.	QUDW:	KF+		++	++								
Target data block no.	ZI–B:	KF+		++	++			++	++	++			
Target data word no.	ZIDW:	KF+		++	++				++	++			
Number	ZAHL:	KF+		++	++								
Param. error byte	PAFE:	KF+		++	++	++	++	++	++	++	++	++	++

**: direct parameter specification not available with BETR=NS

++: These params are evaluated by the FB 199.
Specifications in vacant field are irrelevant.

Table 2.2 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL at the FB 199 with direct parameterisation

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2.4 Summary Indirect Parameterisation

The following tables show the parameters required depending on the operating mode (BETR).

Call:

```
FB EXT-150U          :A DB n      (open data block)
                     :SPB FB199
              NAME   :EXT-150U
```

2.4.1 Indirect Parameterisation of SSNR, ANZW, BETR, NAM1 to NAM7

Trigger bit	ANST:		++
Interface number	SSNR:	KY	++
CC word address	ANZW:	KY	
Operating mode	BETR:	KC	++
Memory Card name	NAM1:	KC	
Sector name	NAM2: to NAM7:	KC	

++: these params are evaluated by the FB 199. specifications in vacant fields are irrelevant.

Table 2.3 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 at the FB 199 with indirect parameterisation

The parameter set must be entered in the high byte of the data block specified by SSNR.

The low byte (right hand byte) of the parameter SSNR (section 2.2.2) is a pointer to this parameter set. The valid parameters must be entered starting at the data word specified here.

The length of the parameter set is always 10 data words, even if the FB 199 does not evaluate all parameters in some operating modes.

Parameter	*Format*	*DW*	*DB n*									
SSNR	KY	m	++	++	++	++	++	++	++	++	++	++
ANZW	KY	m+1	++	++	++	++	++	++	++	++	++	++
BETR	KC	m+2	MS	HS	NS	LS	LB	DS	MI	AB	BA	FO
NAM1	KC	m+3	++	++	++	++	++	++	++	++	++	++
to	KC	to	++	++	++	++	++	++				
NAM7	KC	m+9	++	++	++	++	++	++				

++: these parameters are evaluated by the FB 199. specifications in vacant fields are irrelevant.

Table 2.4 Parameter set SSNR, ANZW, BETR and NAM1 to NAM7 in the open data block with indirect parameterisation

2.4.2 Indirect Parameterisation of TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL

Block type	TYP:	KC	XX
Source data block no.	QU–B:	KF+	++
Source data word no.	QUDW:	KF+	++
Target data block no.	ZI–B:	KF+	
Target data word no.	ZIDW:	KF+	
Number	ZAHL:	KF+	
Param. error byte	PAFE:	KF+	++

++: these params are evaluated by the FB 199. specifications made in vacant fields are irrelevant.

Table 2.5 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL at the FB 199 with indirect parameterisation

The parameter set is entered into the DB data block specified by the parameter QU–B starting at the data word specified in the parameter QUDW.

The length of the parameter set is always 6 data words, although in some operating modes the FB 199 does not evaluate all parameters.

In the operating modes LS, AB, FO and BA this parameter set is not evaluated by the FB 199.

			Operating mode:	MS	HS	NS	LB	DS	MI
Parameter	*Format*	*DW*	*DB a*						
TYP:	KC	b		++	++	++	++	++	++
QU–B:	KF+	b+1		++	++	++			
QUDW:	KF+	b+2		++	++	++			
ZI–B:	KF+	b+3		++	++	++	++	++	++
ZIDW:	KF+	b+4		++	++	++		++	++
ZAHL:	KF+	b+5		++	++	++			

++: these params are evaluated by the FB 199. specifications made in vacant fields are irrelevant.

Table 2.6 Parameter set TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL in the data block specified with QU–B with indirect parameterisation

3 Program Examples

The program examples are based on the following assumptions:

- The CP 516 is configured as interface number 2.
- The FB 199 stores the condition code word in the flag word MW 180.
- The FB 199 stores incorrect parameter specifications in the flag byte MB 50.

3.1 Direct Parameterisation

3.1.1 Operating Mode HS

100 data words of the data block DB 35 starting at DW 0 are to be transferred from the CPU to the CP 516.

By setting the trigger bit M 100.0 the user issues the request to the FB 199.

The trigger bit (M 100.0) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.0      trigger flag
        :UN     M 100.0     trigger bit
        :R      M 90.0      reset activation flag
        :S      M 100.0     set trigger bit
        :SPA    FB199       call FB EXT-150U
NAME    :EXT-150U
ANST    :       M 100.0     trigger bit: M 100.0
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCHS        0peration mode: HS
NAM1    :       KCB:        Memory Card B:
NAM2    :       KCSE        sector name: SEKTOR12.DAT
NAM3    :       KCKT
NAM4    :       KCOR
NAM5    :       KC12
NAM6    :       KC.D
NAM7    :       KCAT
TYP     :       KCDB        data block typee: DB
QU-B    :       KF+35       source data block number: 35
QUDW    :       KF+0        source data word number: DW 0
ZI-B    :       KF+40       target data block number: 40
ZIDW    :       KF+0        target data word number: DW 0
ZAHL    :       KF+100      number: 100 data words
PAFE    :       MB50        parameterisation error byte : MB 50
:
:
```

3.1.2 Operating Mode LS

Delete the sector SEKT0R1 in Memory Card A:.

By setting the trigger bit M 100.1 the user issues the request to the FB 199.

The trigger bit (M 100.1) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.1      trigger flag
        :UN     M 100.1     trigger bit
        :R      M 90.1      reset activation flag
        :S      M 100.1     set trigger bit
        :SPA    FB199       call FB EXT-150U
NAME    :EXT-150U
ANST    :       M 100.1     trigger bit: M 100.1
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCLS        operating mode: delete a sector
NAM1    :       KCA:        Memory Card A:
NAM2    :       KCSE        sector name: SEKT0R1
NAM3    :       KCKT
NAM4    :       KCOR
NAM5    :       KC1
NAM6    :       KC
NAM7    :       KC
TYP     :       KC          irrelevant
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+0        irrelevant
ZIDW    :       KF+0        irrelevant
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte : MB 50
:
:
```

3.1.3 Operating Mode LB

Delete the extended data block DB 10 in the sector SEKT0R2 in Memory Card A:.

By setting the trigger bit M 100.2 the user issues the request to the FB 199.

The trigger bit (M 100.2) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.2          trigger flag
        :UN     M 100.2         trigger bit
        :R      M 90.2          reset activation flag
        :S      M 100.2         set trigger bit
        :SPA    FB 199          call FB EXT-150U
NAME    :EXT-150U
ANST    :       M 100.2         trigger bit: M 100.2
SSNR    :       KY0,2           interface number: 2
ANZW    :       KY0,180         condition code word address: MW 180
BETR    :       KCLB            operating mode: delete a data block
NAM1    :       KCA:            Memory Card A:
NAM2    :       KCSE            sector name: SEKT0R2
NAM3    :       KCKT
NAM4    :       KCOR
NAM5    :       KC2
NAM6    :       KC
NAM7    :       KC
TYP     :       KCDB            data block typee: DB
QU-B    :       KF+0            irrelevant
QUDW    :       KF+0            irrelevant
ZI-B    :       KF+10           target data block number: 10
ZIDW    :       KF+0            irrelevant
ZAHL    :       KF+0            irrelevant
PAFE    :       MB50            parameterisation error byte: MB 50
:
:
```

3.1.4 Operating Mode MI

Transfer Memory Card information to the extended data block DB 11 of the CPU starting at DW 100.

By setting the trigger bit M 100.4 the user issues the request to the FB 199.

The trigger bit (M 100.4) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U      M 90.4        trigger flag
          :UN     M 100.4       trigger bit
          :R      M 90.4        reset activation flag
          :S      M 100.4       set trigger bit
          :SPA    FB199         call FB EXT-150U
NAME      :EXT-150U
ANST      :       M 100.4       trigger bit: M 100.4
SSNR      :       KY0,2         interface number: 2
ANZW      :       KY0,180       condition code word address: MW 180
BETR      :       KCMI          operating mode: Memory Card info
NAM1      :       KCB:          Memory Card B: (or A:)
NAM2      :       KC            irrelevant
NAM3      :       KC            irrelevant
NAM4      :       KC            irrelevant
NAM5      :       KC            irrelevant
NAM6      :       KC            irrelevant
NAM7      :       KC            irrelevant
TYP       :       KCDB          data block type: DB
QU-B      :       KF+0          irrelevant
QUDW      :       KF+0          irrelevant
ZI-B      :       KF+11         target data block number: 11
ZIDW      :       KF+100        target data word number: DW 100
ZAHL      :       KF+0          irrelevant
PAFE      :       MB50          parameterisation error byte: MB 50
:
:
```

3.1.5 Operating Mode AB

Copy the contents of Memory Card A: to Memory Card B:.

By setting the trigger bit M 100.5 the user issues the request to the FB 199.

The trigger bit (M 100.5) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
        :U      M 90.5      trigger flag
        :UN     M 100.5     trigger bit
        :R      M 90.5      reset activation flag
        :S      M 100.5     set trigger bit
        :SPA    FB199       call FB EXT-150U
NAME    :EXT-150U
ANST    :       M 100.5     trigger bit: M 100.5
SSNR    :       KY0,2       interface number: 2
ANZW    :       KY0,180     condition code word address: MW 180
BETR    :       KCAB        operating mode:  Copy contents of Memory Card A:
                                             to Memory Card B:
NAM1    :       KCB:        target Memory Card B:
NAM2    :       KC          irrelevant
NAM3    :       KC          irrelevant
NAM4    :       KC          irrelevant
NAM5    :       KC          irrelevant
NAM6    :       KC          irrelevant
NAM7    :       KC          irrelevant
TYP     :       KC          irrelevant
QU-B    :       KF+0        irrelevant
QUDW    :       KF+0        irrelevant
ZI-B    :       KF+0        irrelevant
ZIDW    :       KF+0        irrelevant
ZAHL    :       KF+0        irrelevant
PAFE    :       MB50        parameterisation error byte: MB 50
:
:
```

3.1.6 Operating Mode FO

Format Memory Card A:.

By setting the trigger bit M 100.6 the user issues the request to the FB 199.

The trigger bit (M 100.6) is reset by the FB 199 after the request has been processed.

In order to avoid accidental formatting, the function FO must be called twice:
the formatting process starts if the second function call immediately follows the first call.
If another function is called between these two calls, the FB 199 deletes the first call.

```
OB 1
:
:
          :U      M 90.6      trigger flag
          :UN     M 100.6     trigger bit
          :R      M 90.6      reset activation flag
          :S      M 100.6     set trigger bit
          :SPA    FB199       call FB EXT-150U
NAME      :EXT-150U
ANST      :       M 100.6     trigger bit: M 100.6
SSNR      :       KY0,2       interface number: 2
ANZW      :       KY0,180     condition code word address: MW 180
BETR      :       KCFO        operating mode: format a Memory Card
NAM1      :       KCA:        Memory Card A:
NAM2      :       KC          irrelevant
NAM3      :       KC          irrelevant
NAM4      :       KC          irrelevant
NAM5      :       KC          irrelevant
NAM6      :       KC          irrelevant
NAM7      :       KC          irrelevant
TYP       :       KC          irrelevant
QU-B      :       KF+0        irrelevant
QUDW      :       KF+0        irrelevant
ZI-B      :       KF+0        irrelevant
ZIDW      :       KF+0        irrelevant
ZAHL      :       KF+0        irrelevant
PAFE      :       MB50        parameterisation error byte: MB 50
:
:
```


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3.2 Indirect Parameterisation

The parameters SSNR, ANZW, BETR, NAM1 to NAM7 are specified in the data block DB 101 starting at DW 10.

The parameters TYP, QU–B, QUDW, ZI–B, ZIDW and ANZ are specified in the data block DB 110 starting at DW 1.

By setting the trigger bit M 100.7 the user issues the request to the FB 199.

The trigger bit (M 100.7) is reset by the FB 199 after the request has been processed.

```
OB 1
:
:
          :U        M 90.7      trigger flag
          :UN       M 100.7     trigger bit
          :R        M 90.7      reset activation flag
          :S        M 100.7     set trigger bit

          :SPA      FB199
NAME      :EXT-150U
ANST      :         M 100.7     trigger bit: M 100.7
SSNR      :         KY101,10    left hand parameter byte: Parameters in data block 101
                                 right hand parameter byte:  parameters are located in
                                                             DB 101 starting at DW 10
ANZW      :         KY0,0       irrelevant
BETR      :         KC          irrelevant
NAM1      :         KC          irrelevant
NAM2      :         KC          irrelevant
NAM3      :         KC          irrelevant
NAM4      :         KC          irrelevant
NAM5      :         KC          irrelevant
NAM6      :         KC          irrelevant
NAM7      :         KC          irrelevant
TYP       :         KCXX        indirect parameterisation
QU–B      :         KF+110      parameter for TYP, QU–B, QUDW, ZI–B, ZIDW and ZAHL
                                 in DB 110
QUDW      :         KF+1        parameter list starts with DW 1
ZI–B      :         KF+0        irrelevant
ZIDW      :         KF+0        irrelevant
ZAHL      :         KF+0        irrelevant
PAFE      :         MB50        parameterisation error byte: MB 50
:
:
```

3.2.1 Operating Mode HS

100 data words of the data block DB 35 starting at DW 0 are transferred from the CPU to the data block DB 40 starting at DW 0 in Memory Card A: in sector DATUM1.A.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= HS	operating mode: BETR = HS
	13 :	KC= A:	Memory Card A:
	14 :	KC= DA	sector name: DATUM1.A
	15 :	KC= TU	
	16 :	KC= M1	
	17 :	KC= .A	
	18 :	KC	
	19 :	KC	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, ZAHL

DB 110

DW	1 :	KC= DB	data block type: DB
	2 :	KF= +35	source data block: DB 35
	3 :	KF= +0	source data word: DW 0
	4 :	KF= +40	target data block: DB 40
	5 :	KF= +0	target data word: DW 00
	6 :	KF= +100	number: 100 data words

3.2.2 Operating Mode LS

The sector SEKT0R12 in Memory Card B: is to be deleted.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= LS	operating mode: delete a sector
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	sector name: SEKT0R12
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC	
	19 :	KC	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.2.3 Operating Mode LB

Delete the extended data block DB 10 in Memory Card B: in the sector SEKT0R12.DAT.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= LB	operating mode: delete a data block
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	sector name: SEKT0R12.DAT
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC= .D	
	19 :	KC= AT	

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

DB 110

DW	1 :	KC= DB	data block type: DB
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +10	target data block: DB 10
	5 :	KF= +0	irrelevant
	6 :	KF= +0	irrelevant

3.2.4 Operating Mode MI

Transfer Memory Card info to the extended data block DB 11 of the CPU starting at DW 100.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= MI	operating mode: Memory Card info
	13 :	KC= B:	Memory Card B: (or A:)
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

DB 110

DW	1 :	KC= DB	data block type: DB
	2 :	KF= +0	irrelevant
	3 :	KF= +0	irrelevant
	4 :	KF= +11	target data block: DB 11
	5 :	KF= +100	target data word: DW 100
	6 :	KF= +0	irrelevant

3.2.5 Operating Mode AB

Copy the contents of Memory Card A: to Memory Card B:.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= AB	operating mode: copy contents of one Memory Cards to another
	13 :	KC= B:	target Memory Card
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU-B, QUDW, ZI-B, ZIDW, Zahl

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.2.6 Operating Mode NS

The sector SEKT012.DAT in Memory Card B: is renamed to TEST1234.EXT.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7 (with old sector name)

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= NS	operating mode: rename sector
	13 :	KC= B:	Memory Card B:
	14 :	KC= SE	old sector name: SEKT0R12.DAT
	15 :	KC= KT	
	16 :	KC= OR	
	17 :	KC= 12	
	18 :	KC= .D	
	19 :	KC= AT	

Parameter list TYP, QU–B, QUDW, ZI–B, ZIDW, ZAHL (with new sector name)

DB 110

DW	1 :	KC= TE	new sector name: TEST1234.EXT
	2 :	KC= ST	
	3 :	KC= 12	
	4 :	KC= 34	
	5 :	KC= .E	
	6 :	KC= XT	

3.2.7 Operating Mode FO

Format Memory Card B:.

In order to avoid accidentally formatting the Card, the function FO must be called twice:
the formatting starts if the second call to this function is made immediately after completion message of the first call has arrived.
If another function is called between these two calls, the FB 199 deletes the first call.

Parameter list SSNR, ANZW, BETR, NAM1 to NAM7

DB 101

DW	10 :	KY= 0,2	interface number: SSNR = 2
	11 :	KY= 0,180	condition code word address: MW 180
	12 :	KC= FO	operating mode: format Memory Card
	13 :	KC= B:	Memory Card B:
	14 :	KC	irrelevant
	15 :	KC	irrelevant
	16 :	KC	irrelevant
	17 :	KC	irrelevant
	18 :	KC	irrelevant
	19 :	KC	irrelevant

Parameter list TYP, QU–B, QUDW, ZI–B, ZIDW, ZAHL

This parameter list is not evaluated by the FB 199; any specifications made here are irrelevant.

3.3 Startup and Restart

In the startup and restart branch, for each installed CP 516 the FB SYNCHRON must be called with the appropriate interface number.

Error messages issued by the FB SYNCHRON must be evaluated by the user, because the FB 199 assumes perfect synchronisation of the parameterised interface.

For each CP 516, in the data block DB 255 the internal status word and the auxiliary data are of the FB 199 must be deleted.
For the interfaces 7 and 8, the internal status word can be deleted only using direct addressing, since in this case the length of the DB 255 exceeds 256 DW.

```
OB 20; OB 21; OB 22 :
:
:
          :SPA      FB185     call to data handling block
NAME      :SYNCHRON           SYNCHRON
SSNR      :KY0,2              interface number: 2
BLGR      :KY0,4              Block size e.g.: 4 (128 byte)
PAFE      :MB255              parameterisation error byte: MB 255
          :
          :
          :A        DB255     data buffer for the FB 199
          :L        KB0
          :T        DW0       delete auxiliary data area
          :T        DW1       delete auxiliary data area
          :T        DW13      delete auxiliary data area
          :T        DW38      delete auxiliary data area
          :T        DW42      delete auxiliary data area
          :T        DW43      delete status word interface 1
          :T        DW81      delete status word interface 2
          :T        DW119     delete status word interface 3
          :T        DW157     delete status word interface 4
          :T        DW195     delete status word interface 5
          :T        DW233     delete status word interface 6
          :SPA      FBnnn     call a function block (nnn = number of the FB)
          :
          :


FBnnn     :L KH     DCBD      start address DB 255
          :LIR      1         load
          :ADD      KF+271
          :L        KB0
          :T AK
          :TIR      3         delete status word interface 7
          :ADD      KF+38
          :TIR      3         delete status word interface 8
```


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Instruction Manual: SIMATIC S5, CP 516, SFB EXT-150U

4 The SYNCHRON Data Handling Block

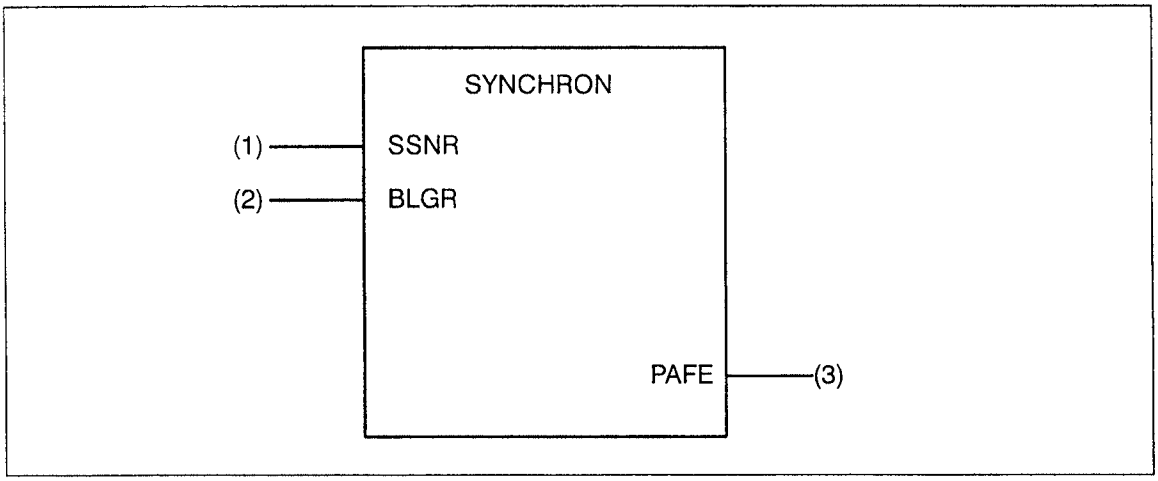

Figure 4.1 The SYNCHRON data handling block

4.1 Function

The SYNCHRON data handling block (FB 185) synchronises the CP 516 and the CPU. It sets the interface number for the related CP 516 and deletes the auxiliary data area and the internal status word for the interface.

The SYNCHRON data handling block is called during "Manual startup" (OB 20), "Manual restart" (OB 21) and "Automatic restart" (OB 22).

Because of its execution time, the data handling block SYNCHRON can only be called in these start phases.

At the data handling block SYNCHRON, the following parameters must be entered:
SSNR = interface number,
BLGR = block size,
PAFE = parameterisation error byte.

Section 3.3 contains a parameterisation example for the SYNCHRON.

4.2 Parameter Description

4.2.1 SSNR: Interface Number

Number of the interface the CP 516 is addressed under.

Parameter types:	Datum / KY
valid range:	0,0... 0,255
High byte = 0:	Direct parameterisation; low byte = SSNR
High byte > 0:	Indirect parameterisation; low byte = pointer to parameter field; in the data block opened prior to calling the FB SYCHRON starting at the data word specified here the parameters SSNR and BLGR are stored in the order and format used for direct parameterisation.

4.2.2 BLGR: Blocksize

BLGR allows the user to define the maximum number of data words the FB 199 (or the data handling blocks SEND and REC–A) will transfer in one go.
If the value of the parameter ZAHL specified with FB 199 exceeds the value defined in BLGR, the FB 199 automatically transfers any subsequent blocks.

For the sake of high transfer rates, select large blocksize values (which extends the cycle time).

In order to minimise the execution time of the function blocks, select low blocksize values (which reduces the data rate).

For more detailed information refer to the technical specifications (section 1.5).

Parameter types: Datum / KY

valid range: 0,0 ... 0,255

The following blocksize values can be specified with BLGR:

BLGR	*Blocksize*
0	max 256 byte ; default value
1	max. 16 byte
2	max. 32 byte
3	max. 64 byte
4	max. 128 byte
5	max. 256 byte
6	max. 512 byte
7...254	max. 256 byte ; default value
255	Blocksize set to 512 byte

4.2.3 PAFE: Parameterisation Error Byte

This flag–, output or input byte is set by SYNCHRON if it recognises a parameterisation error.

Parameter types: output / BY

valid range: EB 0 ... EB 127
AB 0 ... AB 127
MB 0 ... MB 255

Structure of the parameterisation error byte

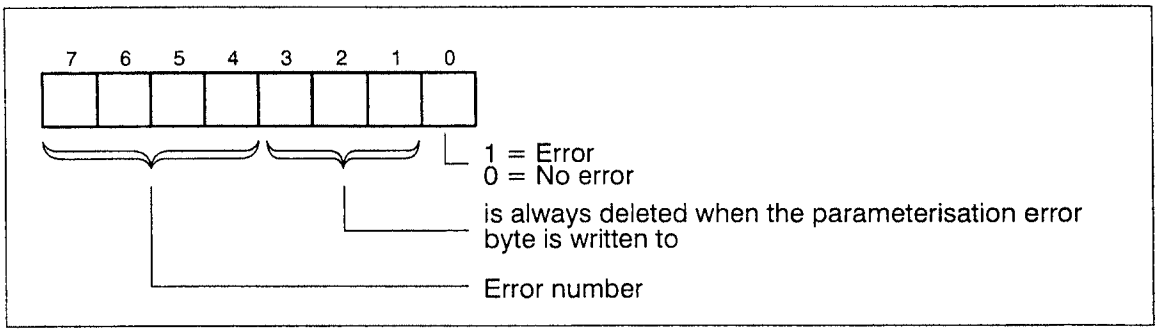

Figure 4.2 Structure or the parameterisation error byte

The error numbers in the parameterisation error byte have the following significance:

0 no error

1–4 source/target parameter incorrect

1 range incorrect

2 DB does not exist

3 range size too small

4 range does not exist

5 condition code word incorrect

6 not used

7 interface does not exist

8 interface not ready

9 interface overload

AH interface used by another CPU

BH invalid request number

CH interface timeout

DH miscellaneous interface errors, e.g.
- invalid handshake acknowledgement
- blocksize of interface not within range 1..255

EH miscellaneous errors at the data handling block, e.g.
- missing call of a data block with indirect parameterisation
- software error in CPU or data handling block

FH FB call invalid, e.g.
- double call with interruptibility at command borders
- invalid modification of standard function blocks.

To

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SIMATIC S5

Memory Modul CP 516
Product Manual

Order No.: 6ES5998–1EB21
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