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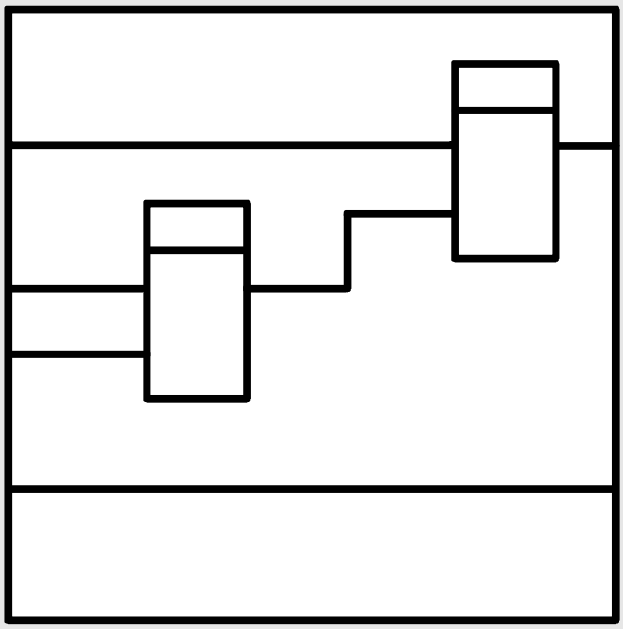
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Find the *Siemens 6DD1602-0AE0 PS16* at our website: *Click HERE*

SIMADYN D
Digital Control System

User Manual

Prozessor module PS16



Edition 05.95

DK-Nr. 223142

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User Manual, Prozessor module PS16

Edition		Edition status
1	Prozessor module PS16	03.91
2	Prozessor module PS16	05.95

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We have checked the contents of this Manual to ensure that they coincide with the described hardware and software. However, deviations cannot be completely ruled-out, so we cannot guarantee complete conformance. However, the information in this document is regularly checked and the necessary corrections included in subsequent editions. We are thankful for any recommendations or suggestions.

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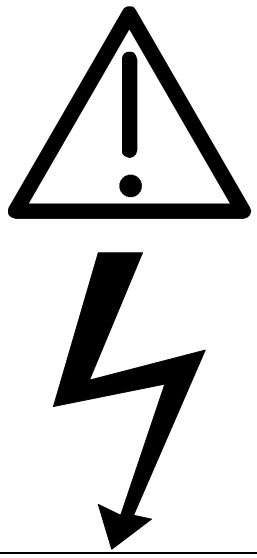
N O T E !

The information in this Manual does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, please contact your local Siemens office.

Further, the contents of this Manual shall not become a part of or modify any prior or existing agreement, committment or relationship. The sales contract contains the entire obligation 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 nor modify the existing warranty.

Warning information



W A R N I N G !

Electrical equipment has components which are at dangerous voltage levels.

If these instructions are not strictly adhered to, severe bodily injury and material damage can result.

Only appropriately qualified personnel may work on this equipment or in its vicinity.

This personnel must be completely knowledgeable about all the warnings and service measures according to this User Manual.

The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.

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Definitions

* **QUALIFIED PERSONNEL**

For the purpose of this User Manual and product labels, a „Qualified person“ is someone who is familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved. He or she must have the following qualifications:

1. Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety procedures.
2. Trained in the proper care and use of protective equipment in accordance with established safety procedures.
3. Trained in rendering first aid.

* **DANGER**

For the purpose of this User Manual and product labels, „Danger“ indicates death, severe personal injury and/or substantial property damage will result if proper precautions are not taken.

* **WARNING**

For the purpose of this User Manual and product labels, „Warning“ indicates death, severe personal injury or property damage can result if proper precautions are not taken.

* **CAUTION**

For the purpose of this User Manual and product labels, „Caution“ indicates that minor personal injury or material damage can result if proper precautions are not taken.

* **NOTE**

For the purpose of this User Manual, „Note“ indicates information about the product or the respective part of the User Manual which is essential to highlight.



C A U T I O N !

This board contains components which can be destroyed by electrostatic discharge. Prior to touching any electronics board, your body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. bare metal cabinet components, socket protective conductor contact).



W A R N I N G !

Hazardous voltages are present in this electrical equipment during operation.

Non-observance of the safety instructions can result in severe personal injury or property damage.

It is especially important that the warning information in all of the relevant Operating Instructions are strictly observed.

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1. Order Designation:

6DD 1602-0AE0 Processor board PS16 (SIMOVERT S)

2. Function Description

The processor board PS16 is designed to process technological control, numerical and regulating functions in the SIMADYN D system. The board is especially suitable for the software processing of actual values in converters. The board is designed around the 16 microprocessor 80C186 with the corresponding peripherals.

Plug-in memory modules are used to contain the user programs as well as the system firmware (operating system, monitor program and function module code). These modules (MS...) are plugged into the board connector X50. The user programs run on the processor under the SIMADYN D real time operating system. This guarantees interrupt controlled fixed cycle times, dependent upon the configuration, of ≥ 1ms .

The PS16 board contains 8 binary inputs (plug connector X6) that may also be configured as interrupt controlled inputs. The processor interrupts the current cyclic processing, when an edge occurs at one of these inputs and immediately begins processing the interrupt controlled function packet (process interrupt job, PIJ). The inputs are connected with the various SIMADYN D interface modules via a 10 conductor ribbon cable.

The board is designed with 8 Frequency/digital converter inputs for the acquisition of actual values (plug connector X7). Frequency modulated signals can be read via these inputs and converted to digital values for further processing. The analog actual values are channeled via the SE21 interface module, whereby 2, 4, 8 of the input channels may be selected and read in parallel. In addition, the board contains 4 binary outputs on the X7 plug connector.

The inputs and outputs of the processor internal timers T0 and T1 can be externally accessed via the X5 plug connector. The serial interface (plug connector X01) is designed for diagnostics using the SIMADYN D host terminals PG 675 or PG 685.

The 7 segment display H1 on the board front panel indicates the configured processor ID code in normal operation. The display flashes with an error code when an fault occurs on the board.

The error messages are described in the processor board user manual /1/.

The display shows a "-" during system start up.

The HEX monitor is activated if the S1 key is pressed and an error code is being displayed.

A board reset (start up) can be forced using the test jacks X10 and X11 . The test jacks should be bridged with either a switch or a shorting jumper. The board is designed with a 50 pin (X4) and a 10 pin (X9) plug connector for hardware diagnostics using a logic analyzer or for the connection of a passive recorder.

Three "watchdogs" are available for each processor module to monitor the hardware and software functionality.

The hardware monitor checks:

- whether the processor generates new addresses within a certain time
- whether addresses are accessed that are not used

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The software monitor checks:

- whether the processor is still running a cyclic program
- whether the interrupt controller of the serial interfaces, timers and inputs are operating without error

A non-maskable interrupt (NMI) is generated when the monitor detects an error. The processor tries to eliminate the cause of the error and resume normal cyclic operation. If the cause of error lies with the processor itself, then the board switches itself inactive, the red dot on the 7 segment display is activated and bus line "system error" activated.

3. Board Design

* SIMADYN D local bus connection
* CPU 80C186 16 Mhz
* RAM 64 k Byte; battery back-up from the power supply (PS)
* Plug recess for the program memory sub-modules MS...
* 8 Frequency inputs without voltage isolation with frequency/digital converter
* 8 Binary inputs without voltage isolation; interrupt capability
* 4 Binary outputs
* Processor timer inputs and outputs
* Serial interface; optional V24 (RS232) or 20 mA (TTY)
* Real time clock; resolution 10 ms, battery back-up from the PS
* 7 segment display for the configured processor number and error display
* Hardware and software monitor through 'watchdogs'
* Test connector for the connection of logic analyzers or recorders

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4. Application notes

The processor board can be implemented in both the wide racks (SR1/5) and the narrow racks (SR2/4). It requires two rack slots.

The board must be fixed to the rack by screws, even in the commissioning phase, to ensure perfect operation.

The front panel must be shorted to the rack by a short conductor when the board is placed on an adapter board.

The board must never either be inserted or removed from the rack when under power.

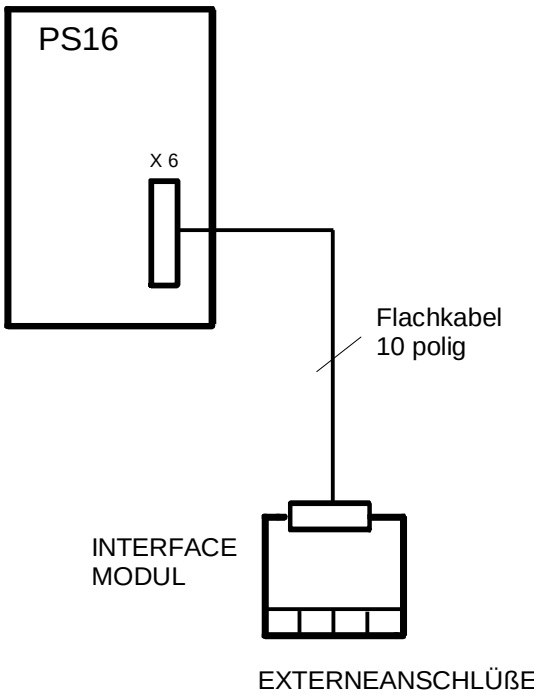
A thick film circuit (hybrid module) must be installed on the X51 location when the serial interface X01 is to be used. The following hybrid modules are currently available:

SS1 : 20 mA (TTY)
SS2 : V.24 (RS 232)

Warning: Correct installation important (See screen print)

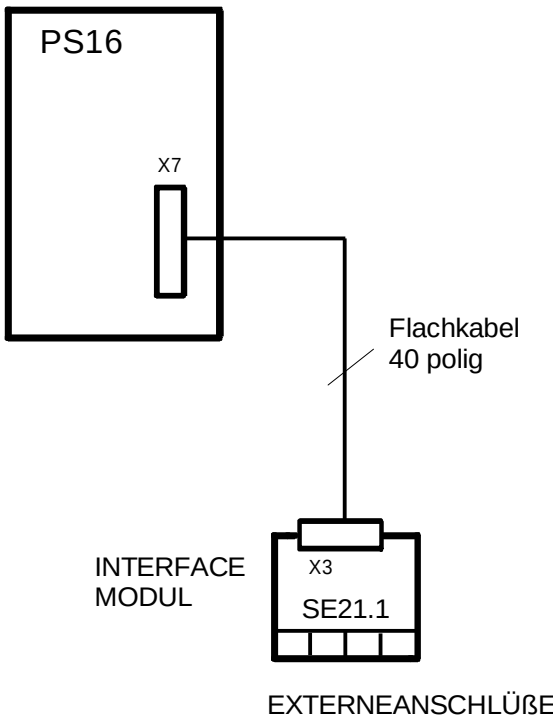
Connection possibilities for the PS16 processor module:

a) Binary inputs



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b) Frequency/Digital inputs and Binary outputs



c) Processor timer inputs and outputs

Currently no connection implemented

Supplementary components for the PS16 :

a) Serial interface

* Hybrid interface	SS1 (20 mA)	6DD 1688-1AA0
* Hybrid interface	SS2 (V24)	6DD 1688-1AB0
* Cable PS16-PG 685	SC32 20 mA, 10 m	6DD 1684-0DC0
* Set of parts 25 pin Cannon plug	SM3.1	6DD 1680-0AD0

b) Ribbon cable

* 10-pin	2.0 m	SC7	6DD 1684-0AH0
* 40-pin ---> 4x10-pin	2.0 m	SC13	6DD 1684-0BD0
* 40-pin	2.0 m	SC18	6DD 1684-0BJ0

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c) Interface Module

* SE3.1 16 Binary inputs and 16 Binary outputs no voltage isolation	6DD 1681-0AD1
* SE4.1 8 Binary inputs or 8 Binary outputs no voltage isolation	6DD 1681-0AE1
* SE5.3 8 Binary inputs 220 V voltage isolation	6DD 1681-0AF3
* SE21.2 PS11/16 Interface for frequency inputs	6DD 1681-0CB2
* SE41.1 8 Binary inputs 48 V voltage isolation	6DD 1681-0EB1

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5. Technical Specification

INSULATION GROUP	A to VDE 0110 paragraph 13, group 2 at 24, 15 and 5 VDC
AMBIENT TEMPERATURE	0 to 55 deg. C
STORAGE TEMPERATURE	-40 to +70 deg. C
HUMIDITY CLASS	F to DIN 40040
ALTITUDE RATING	S to DIN 40040
MECHANICAL STRESS	Installation in fixed vibration resistant devices
PACKAGING SYSTEM	ES 902 C
DIMENSIONS	233.4 x 220 mm
BOARD WIDTH	2 2/3 SEP = 2 Slot = 40.28 mm
WEIGHT	0.6 Kg
CURRENT CONSUMPTION	
	+ 5 VDC 2.8 A
	+15 VDC 50 mA
	-15 VDC 50 mA
	VCRAM 0.5 mA
BINARY INPUTS	
NUMBER	8 not voltage isolated
INPUT VOLTAGE	+24 V Rated value
INPUT VOLTAGE	
FOR 0 SIGNAL	-1 V to +6 V; or Binary inputs open
FOR 1 SIGNAL	+13 V to +33 V
INPUT CURRENT	
AT 1 SIGNAL	Typ. 3 mA
DELAY TIME	< 200 us
BINARY OUTPUTS	
NUMBER	4 not voltage isolated
SUPPLY VOLTAGE	supply externally
-RATED VALUE	24 VDC
-HARMONICS	3.6 VDC
-PERM. RANGE	+ 20 to + 30 V incl. harmonics
-TRANSIENTS	+ 35 V smaller than 0,5 sec.
OUTPUT CURRENT AT 1 SIGNAL	
-RATED VALUE	50 mA
-PERM. RANGE	0.2 mA to 50 mA
SHORT CIRCUIT PROTECT.	electronic
INDUCTIVE LIMIT	
TRIPPING VOLTAGE	to Vcc + 1V
MAXIMUM LOADING	80% at 50 Deg. C. all outputs 50 mA
RESIDUAL CURRENT	20 uA at 0 Signal
SIGNAL LEVEL	
-AT 0 SIGNAL	max. 3V
-AT 1 SIGNAL	min. supply - 2,5V
Switching delay	15 uS
FREQUENCY INPUTS	
NUMBER	8 not voltage isolated
MINIMUM	
INPUT FREQUENCY	30 kHz
MAXIMUM	
INPUT FREQUENCY	90 kHz
INPUT VOLTAGE	24 V Rated valu&e
FOR 0 SIGNAL	-1 V at +6 V
FOR 1 SIGNAL	+13 V at +33 V
INPUT CURRENT	
AT 1 SIGNAL	Typ. 2 mA
DELAY TIME	< 6.6 uS

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6. Pin Allocation of the PS16

6.1. Pin Allocation of the serial Interface X01

PIN	V 24		20 MA (TTY)	
1	FRAME GROUND		FRAME GROUND	
2	TRANSMIT DATA OUT	T*D	---	
3	RECEIVE DATA IN	R*D	---	
4	REQUEST TO SEND OUT	*RTS	---	
5	CLEAR TO SEND	*CTS	---	
6	DATA SET READY IN		---	
7	GROUND		GROUND	
8	DATA CARRIER DETECT IN	*DCD	---	
9	GROUND		GROUND	
10	---		CURRENT LOOP + TRANSMIT	+T*D
11	+15 V		+15 V	
12	---		20 MA SOURCE 1	
13	---		CURRENT LOOP + RECEIVE	+R*D
14	---		CURRENT LOOP - RECEIVE	-R*D
15	RECEIVE/TRANSMIT CLOCK	*RT*C	---	
16	---		20 MA SOURCE 2	
17	RECEIVE/TRANSMIT CLOCK		---	
18	GROUND		GROUND	
19	---		CURRENT LOOP - TRANSMIT	-T*D
20	DATA TERMINAL READY OUT		---	
21	---		20 MA DRAIN 2	
22	+5 V		+5 V	
23	+5 V		+5 V	
24	TRANSMIT RECEIVE CLOCK	*TR*C	20 MA DRAIN 1	
25	-15 V		-15 V	

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6.2. Timer inputs and outputs X5 pin allocation

Pin	Designation
1	Timer 0 Output
2	Timer 1 Output
3	| ---
4	| ---
5	Timer 0 Input
6	Timer 1 Input
7	| ---
8	| ---
9	P external
10	M external

6.3. Pin allocation of the binary inputs X6

Pin	Designation	Plug section
1	Input 1	X6 A
2	Input 2	X6 A
3	Input 3	X6 A
4	Input 4	X6 A
5	Input 5	X6 A
6	Input 6	X6 A
7	Input 7	X6 A
8	Input 8	X6 A
9	P external	X6 A
10	M external	X6 A

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6.4. Pin allocation of the frequency inputs X7

Pin	Designation	Plug section
1	shield	
2	shield	
3	Input 1	X7 A
4	shield	
5	shield	
6	Input 2	X7 B
7	shield	
8	BAG 1	X7 C
9	P external	
10	M external	
11	shield	
12	shield	
13	Input 3	X7 C
14	shield	
15	shield	
16	Input 4	X7 D
17	shield	
18	BAG 2	X7 I
19	P external	
20	M external	
21	shield	
22	shield	
23	Input 5	X7 E
24	shield	
25	shield	
26	Input 6	X7 F
27	shield	
28	BAG 3	X7 I
29	P external	
30	M external	
31	shield	
32	shield	
33	Input 7	X7 G
34	shield	
35	shield	
36	Input 8	X7 H
37	shield	
38	BAG 4	X7 I
39	P external	
40	M external	

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7. STRUC L-Mask of the PS16 board in the master program

```
      : PS16            "processor module SIMOVERT S, L-bus"
PIJ 1N = 0              "alarm processing FP"
SFJ 1N = 0              "system error FP"
PRX 1N = 0              "special communication FP receive"
PJ1 1N = ?              "1. permanent processing FP"
PJ2 1N = 0
PJ3 1N = 0
PJ4 1N = 0
PJ5 1N = 0
PJ6 1N = 0
PJ7 1N = 0
PJ8 1N = 0
PTX 1N = 0              "special communication FP transmit"
ILS IK = 0              "L-Bus-Interrupt transmit"
T0  TG = ?              "basic sampling time"
T1  TS = ?              "1. s.t.*T0,produced LB-conn."
T2  TS = ?              "2. s.t.      "          "
T3  TS = ?              "3. s.t.      "          "
T4  TS = ?              "4. s.t.      "          "
T5  TS = ?              "5. s.t.      "          "
TY  TX = T?             "sampling time of system FP"
SSM 2C = 0              "Length SAVE-area, (n*1+2) kByte"
ISE 1C = N              "Ignore failed message (RDYINT) (Y/N) ?"
CCT 8R = 0              "Transmitter communication names.Tx"
CCR 8R = 0              "Receiver communication names.Tx"
COP 8R = 0              "Service communication names.Tx"
CMS 8N = 0              "Message system names"
CTS 8N = 0              "Comm. transport system names"
MS  2M = 0              "Message systems"
X6A 8K <                "Binary inp.,intrpt. contr."
X7A 1K <                "F/D converter 1"
X7B 1K <                "F/D converter 2"
X7C 1K <                "F/D converter 3"
X7D 1K <                "F/D converter 4"
X7E 1K <                "F/D converter 5"
X7F 1K <                "F/D converter 6"
X7G 1K <                "F/D converter 7"
X7H 1K <                "F/D converter 8"
X7I 4K >                "Binary outputs"
```

The PS16 requires 1 sub-module

* 1 x Program memory

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The connectors X6 and X7 can be accessed, for the frequency and binary inputs, by the following function modules:

Plug section Function module

X6A ----
- BII8 Binary input (8 Binary values)
- BID8 Binary input (8 Binary values, normal mode)
- SBI Input status byte

X7A - X7B - --
- IST F/D converter (1-8)
- FDC
- IWE

X7C - X7D - --
- IST
- FDC
- IWE

X7E - X7F - --
- IST
- FDC
- IWE

X7G - X7H - --
- IST
- FDC
- IWE

X7I -------- /

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8. Appendices

8.1. Block diagram

Block diagram	3GE.465 602.9004.00 SU

8.2. Scale drawing with table of the plug connector

Scale drawing with view of the front panel and the table of the used plug connectors:	3GE.465 602.9004.00 MB

8.3. Allocation diagram

Allocation diagram	3GE.465 602.9004.00 AO

9. Miscellaneous

9.1. Designations/Abbreviations

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10. ECB instructions

Components which can be destroyed by electrostatic discharge (ECB)

Generally, electronic boards should only be touched when absolutely necessary.

The human body must be electrically discharged before touching an electronic board. This can be simply done by touching a conductive, grounded object directly beforehand (e.g. bare metal cubicle components, socket outlet protective conductor contact.

Boards must not come into contact with highly-insulating materials - e.g. plastic foils, insulated desktops, articles of clothing manufactured from man-made fibers.

Boards must only be placed on conductive surfaces.

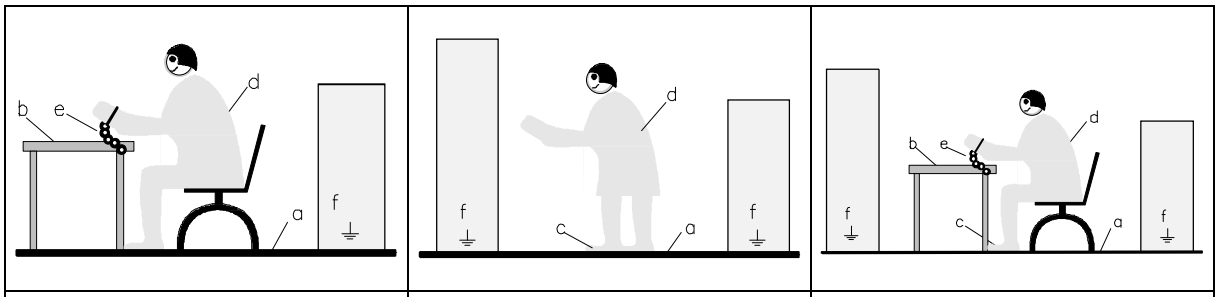
When soldering, the soldering iron tip must be grounded.

Boards and components should only be stored and transported in conductive packaging (e.g. metalized plastic boxes, metal containers).

If the packing material is not conductive, the boards must be wrapped with a conductive packing material, e.g. conductive foam rubber or household aluminum foil.

The necessary ECB protective measures are clearly shown in the following diagram.

a = Conductive floor surface
b = ECB table
c = ECB shoes
d = ECB overall
e = ECB chain
f = Cubicle ground connection

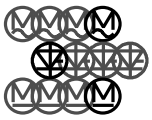


Seated	Standing	Standing/sitting

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