VME - ASIO16

16 serial Interfaces

N O T E

The information in this document has been carefully checked and is believed to be entirely reliable. **esd** makes no warranty of any kind with regard to the material in this document, and assumes no responsibility for any errors that may appear in this document. **esd** reserves the right to make changes without notice to this, or any of its products, to improve reliability, performance or design.

esd assumes no responsibility for the use of any circuitry other than circuitry which is part of a product of **esd** gmbh.

esd does not convey to the purchaser of the product described herein any license under the patent rights of **esd** gmbh nor the rights of others.

esd electronic system design gmbh
Vahrenwalder Str. 207
D-30165 Hannover
Germany

Phone: +49-511-37298-0
FAX: +49-511-37298-68

Described PCB version	ASIO16 1.1

Described firmware version	ASIO4.0

Changes in the chapters

The changes in the user's manual listed below affect changes in the **firmware**, as well as changes in the **description** of the facts only.

Chapter	Alternations versus rev. 1.6
1.4.3.1	Correction of P2's pin assignment in fig. 1.4.2

Further technical data are subject to change without notice.

Content **Page**

1. Hardware 5

1.1 Block Diagram 5

1.2 Technical Data 6
1.2.1 Overview 6
1.2.2 Real-time Software 6
1.2.3 Summary of the Technical Data 7
1.2.4 Order Information 9

1.3 Address Selection on the VME-ASIO16 11

1.4 Configuration Jumpers 13
1.4.1 Default Setting 14

1.4.2 VMEbus Interface Jumpers 15
1.4.2.1 The Address Modifier (AM) and DS1 at BR3 15
1.4.2.2 Base Address Decoding via Jumpers BR1 and BR2 19
1.4.2.3 Interrupt Levels 20

1.4.3 Jumperfields of the Serial Interfaces 21
1.4.3.1 Feeding of the Power Supply 21
1.4.3.2 Selection between RS-232 and TTY Interfaces 23
1.4.3.3 Control Signals of the Serial Interfaces 26

1.5 Serial Interfaces 29
1.5.1 Circuitry of the Serial Interfaces 29
1.5.2 The RS-232 Interface 30
1.5.3 The TTY Interface 30

1.6 Interrupt Processing 31

2. RTOS-UH Software Support 33

2.1 Survey Channel Structure 33

2.2 Parameter Channel 34
2.2.1 Structure of the Parameter Channel Ix.PARA (Px.) 34
2.2.2 Description of the Parameters in Particular . . 35

Content **Page**

3. Appendix 39

3.1 Connector Pin Assignments 39
3.1.1 VMEbus P1 39
3.1.2 I/O Connector P2 (at Internal Supply of the TTY Interface) . . . 40
3.1.3 I/O Connector P2 (at External Supply of the TTY Interface) . . . 41
3.1.4 I/O-Connector P2 (if ASIO RS422 Add On is used) 42

3.2 ASIO16 Adaptor (VME-ASIO-ADAPT) 43
3.2.1 General 43
3.2.2 View of the ASIO16 Adaptor 44

3.2.3 Jumpers of the ASIO16 Adaptor 45
3.2.3.1 Power Supply Selection via BR21 to BR25 45
3.2.3.2 Fixing of the Connector Pin Assignment via BR1 to BR16 47

3.2.4 Covering of the 14 pole Connector Plug on the ASIO16 P2 Adapter 49
3.2.5 Connector Pin Assignment RS-232 via Flat Cable to DSUB-15 or to DSUB-25 Females 50
3.2.6 Connector Pin Assignment TTY via Flat Cable to DSUB-9, DSUB-15 or to DSUB-25 Females 51
3.2.7 Connector Pin Assignment RS422 via Flat Cable to DSUB-15 or to DSUB-25 Females 52

3.3 Add-On 'ASIO-422' 53
3.3.1 General 53
3.3.2 View of the ASIO422-Add-Ons 53

3.3.3 Jumpers of the ASIO422 Add-On 54
3.3.3.1 Selection of the Power Supply via the Jumpers J1 to J3 54

3.4 Front Panel 55

3.5 Circuit Diagrams 57

3.6 Data Sheets 59

Contents of Figures **Page**

Fig. 1.1.1: Block Diagram of the VME-ASIO16 5
Fig. 1.4.1: Position of the Jumpers on the ASIO16 13
Fig. 1.4.2: Wiring of the External TTY Interfaces Power Supply 22
Fig. 1.4.3: Block Diagram of the Interfaces 23
Fig. 1.5.1: Circuitry of the Serial Interfaces (Example: Channel 1) 29
Fig. 3.2.1: View of the ASIO16 Adapter with Designation of the Jumpers 44
Fig. 3.3.1: Top Overlay Placement of the RS-422 Add-Ons with Marking of the Jumpers 53

Contents of Tables

Table 1.2.1: General Data of the VME-ASIO16 8
Table 1.2.2: Order Information 9
Table 1.3.1: Address Model of the VME-ASIO16 11
Table 1.4.1: Default Jumper Setting 14
Table 1.4.2: AM Configuration of the VME-ASIO16 15
Table 1.4.3: Recommended Access Modes for Standard Accesses (A24) 17
Table 1.4.4: Recommended Access Modes for Standard Accesses (A16) 18
Table 1.4.5: Channel Assignment to the Jumpers BR33 to BR40 . . 26
Table 1.4.6: Functions of the DUART68681 Ports 26
Table 2.1.1: Data Station Designation 33

1. Hardware

1.1 Block Diagram

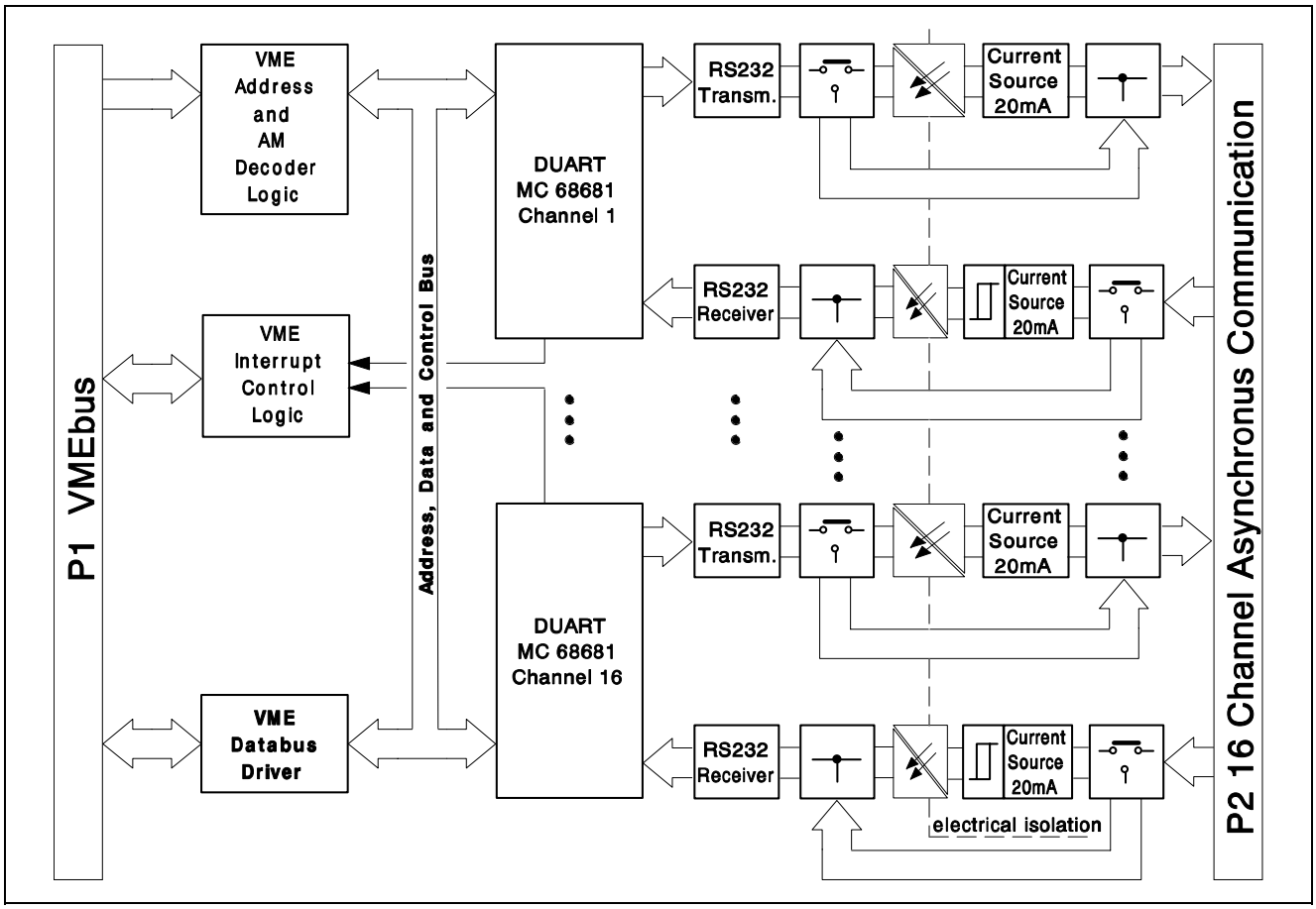
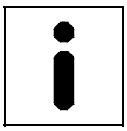


Fig. 1.1.1: Block Diagram of the VME-ASIO16



1.2 Technical Data

1.2.1 Overview

The VME-ASIO16 is an input/output board for asynchronous serial data transfer via 16 channels. Each channel can be operated as a RS-232 interface or as a 20 mA current loop. The operation mode can be selected for each channel separately by jumpers. All signal and supply lines are fed via the P2 connector.

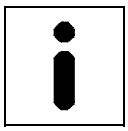
The current loop interfaces are provided with electrical isolation via optocouplers. For operation as current loop interfaces ±12 V power can be supplied either externally via P2 or internally via the VMEbus. The current sources for transmission and reception signals are located on the board (active current source). At operation as RS-232C interface the data lines and handshakes are available even in the base version.

An interrupt logic with priority control generates a common interrupt on the VMEbus for each two channels. The interrupt level is selectable from 1 to 7 by jumpers. An interrupt is also generated at a line break of the 20 mA current loop.

Alternatively (Add-on-Board) the board can be equipped with up to 12 channels of RS-422 (optoisolated) and 4 channels of RS-232.
The channel handling is performed by up to 8 DUART 68681, depending on the equipment of the board.

1.2.2 Real-time Software

Driver packages for the VME-ASIO16 are available for operating systems such as VxWorks, OS-9 and others.



1.2.3 Summary of the Technical Data

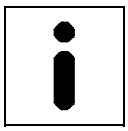
VMEbus specification	
VMEbus interface	IEEE P1014/D1.2 (Rev. C)
data transfer options	SADO24 - slave with A24/D16 access SD16 - slave with A16/D16 access
address modifier (AM)	complete evaluation of AM0 to AM5, additionally with don't care mode
base address	selectable via jumpers over the whole address range of 16 Mbytes. The board covers 256 bytes.

serial interfaces	
controller	three to eight DUART68681 for each two channels
standard interfaces	up to 16 serial asynchronous interfaces RS-232C or TTY selectable via jumpers
programmable interface parameters	Baud rate : 75 baud - 38.4 kbaud, (max. 9600 baud at TTY) characters: 5, 6, 7, 8 parity : NONE, ODD, EVEN, FORCE PARITY ODD, FORCE PARITY EVEN stop bits: 0.563 to 2.000 programmable in steps of 1/16
options	ADD-ON for 12 x RS-422 and 4 x RS-232

General Data	
temperature range	0...70° C
humidity	max. 90%, non-condensing
connector types	P1 - DIN 41612-C96 P2 - DIN 41612-C64
board size	160 mm x 233 mm
VME dimensions	6 U height/ 1 slot width front panel with pc board ejectors
weight	460g at insertion of 16 channels of RS-232/TTY (without add-on and adapters)
power consumption	VMEbus P1: 5V ±5% / max. 1A VMEbus P2: +12V ±5% / 200mA *1) -12V ±5% / 200mA *1)

*1) At external supply of the TTY interfaces

Table 1.2.1: General Data of the VME-ASIO16



1.2.4 Order Information

Name	Description	Order no.
VME-ASIO16-6	6 channels RS-232 or 20 mA current loop (active) *)	V.1401.06
VME-ASIO16-8	8 channels RS-232 or 20 mA current loop (active) *)	V.1401.08
VME-ASIO16-12	12 channels RS-232 or 20 mA current loop (active) *)	V.1401.12
VME-ASIO16-16	16 channels RS-232 or 20 mA current loop (active) *)	V.1401.16
VME-ASIO-422	add-on for VME-ASIO16, for max. 12x RS-422 + 4x RS-232	V.1401.00
VME-ASIO16-ADAPT	adapter module with connector plugs for connection of DSUB females to P2	V.1401.02
VME-ASIO16-ISO	Special version of the VME-ASIO16 'TTY passive'	V.1401.30
VME-ASIO16-C	C driver for OS-9 as source code	P.1401.50
VME-ASIO16-MD	user's manual in German	M.1401.20
VME-ASIO16-ME	user's manual in English	M.1401.21

*) A user's manual (available in German and in English) is contained in the extent of delivery.

Table 1.2.2: Order Information

1.3 Address Selection on the VME-ASIO16

The setting of the base board address ensues via jumpers of the jumperfields BR1 and BR2. The base address can be selected over the whole address range of 16 Mbytes in steps of 256 bytes.

Additionally it is possible to use the VME addressing mode 'SHORT - I/O'. At this addressing the address lines A16 to A23 are ignored and the base address of the VME-ASIO16 is placed into the 'SHORT I/O' address range (64 kbytes) of the VMEbus system.

The peripheral components DUART 68681 are provided with an 8 bits wide data bus and with 4 address lines (A1 to A4). The addresses A5 to A7 select the desired DUART on the VME-ASIO16.

address (HEX)	DUART 68681	component
xxxx00-1F	1	J26
xxxx20-3F	2	J25
xxxx40-5F	3	J24
xxxx60-7F	4	J23
xxxx80-9F	5	J22
xxxxA0-BF	6	J21
xxxxC0-DF	7	J20
xxxxE0-FF	8	J19

xxxx.....base address of the ASIO16

Table 1.3.1: Address Model of the VME-ASIO16

For reduced versions of the VME-ASIO16 with less than 16 channels only a part of the DUARTs will be inserted: starting at the end with DUART no. 8, e.g. when the board is equipped with 4 channels, the DUARTs 8 and 7 will be inserted, for 10 channels the DUARTs 8, 7, 6, 5 and 4 will be inserted.

The register model and the meaning of the single bits can be obtained from the data sheet of the DUART 68681 in the appendix.

1.4 Configuration Jumpers

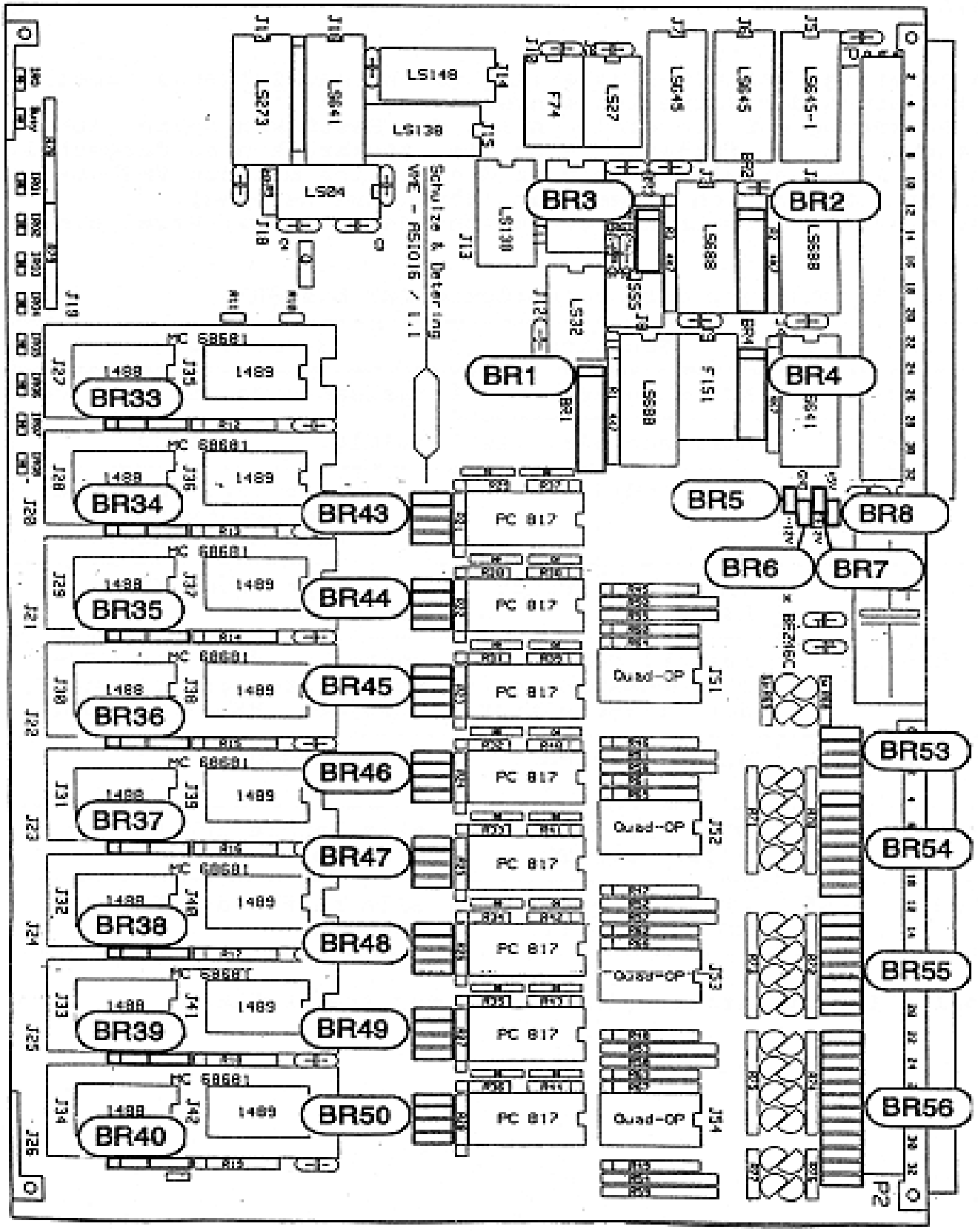


Fig. 1.4.1: Position of the Jumpers on the ASIO16

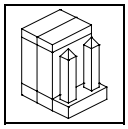
1.4.1 Default Setting

The factory-set (see following table) configuration of the boards is indicated.
The jumpers location can be obtained from the insertion diagram (Fig.1.4.1). In the following the jumpers are displayed from the view of the user, when the board is located in front of him with the VMEbus connectors to the right (and components on top).
An inserted jumper corresponds to the '0'(low) level of a signal.

Default jumper setting BR1 to BR50 :

jumper	function	setting
BR1	addresses A8...A15	base board address
BR2	addresses A16...A23	ASIO16: $800000
BR3	address modifier AM	AM2=don't care, i.e. access in the supervisory or user mode (A24)
BR4	VMEbus interrupt level	interrupt level IRQ4 inserted
BR5-BR8	selection of the power supply of the TTY interface	inserted, i.e. the TTY interfaces are supplied via the VMEbus
BR33...BR40	handshake mode	'DTR handshake'
BR43...BR50	DTR, TXD - to RS-232 or TTY	all channels to RS-232 operation
BR53...BR56	CTS, RXD - to RS-232 or TTY	all channels to RS-232 operation

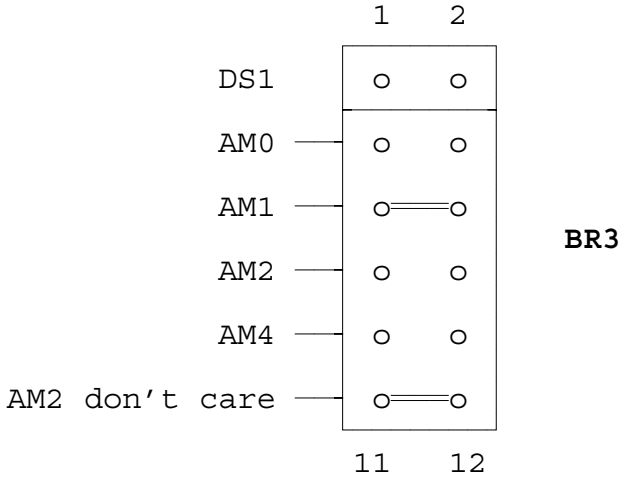
Table 1.4.1: Default Jumper Setting



1.4.2 VMEbus Interface Jumpers

1.4.2.1 The Address Modifier (AM) and DS1 at BR3

The address modifier setting ensues at jumperfield BR3. The address modifiers AM0 to AM5 are completely evaluated. Factory-set is 'Standard Supervisory and Nonprivileged Data Access' (A24 mode):



The 'AM' configurations permissible for the VME-ASIO16 are:

CODE	AM_5	AM_4	AM_3	AM_2	AM_1	AM_0	function
$3E	1	1	1	1	1	0	standard supervisory program access
$3D	1	1	1	1	0	1	standard supervisory data access
$3A	1	1	1	0	1	0	standard nonprivileged program access
$39	1	1	1	0	0	1	standard nonprivileged data access
$2D	1	0	1	1	0	1	short supervisory I/O access
$29	1	0	1	0	0	1	short nonprivileged I/O access

0 = (LOW) jumper inserted, 1 = (HIGH) jumper not inserted

Table 1.4.2: AM Configuration of the VME-ASIO16

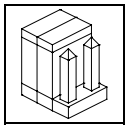
Only the configurations listed above are meaningful for the addressing of the board. The evaluation of the address modifiers AM3 and AM5 cannot be changed by the user. It is fixed to 'H' by the hardware.
For the evaluation of the address modifiers also the signal 'LWORD' is used. It is fixed to 'H', because the VME-ASIO16 is not addressed for 32 bit 'LONGWORD'.

If the addressing mode 'SHORT SUPERV. I/O ACCESS' or 'SHORT NONPRIV. I/O ACCESS' is selected, the jumperfield BR2, which fixes the addresses A16-A23, is not evaluated when the board is addressed. The setting of the base address in the 16 Mbyte address range is ineffectual.

As an additional option for the addressing of the VME-ASIO16 the address modifier AM2 can be set to 'don't care' by inserting the corresponding jumper. As a consequence a 'SUPERVISORY' access as well as a 'NONPRIVILEGED' access will address the board.

ATTENTION ! The address modifier configuration $3F or $3B respectively, corresponding to 'STANDARD SUPERV. ASCENDING ACCESS' or 'STANDARD NON-PRIV. ASCENDING ACCESS' respectively, are possible, but not meaningful because the VME-ASIO16 does not support these addressing modes.

The jumperfield BR3 is shown with the meaningful combinations of the AM signals as follows in the table.



Meaningful combinations of the address modifier jumpers for A24 accesses are recommended as follows:

Jumper BR4	permissible AM codes		addressing mode
	A A A A A A M M M M M M 5 4 3 2 1 0	HEX	
1 o o 2 3 o o 4 5 o═o 6 7 o o 8 9 o o 10 11 o═o 12	1 1 1 0 0 1 1 1 1 1 0 1	39 3D	standard non-privileged data access or standard supervisory data access
1 o o 2 3 o o 4 5 o═o 6 7 o o 8 9 o o 10 11 o o 12	1 1 1 1 0 1	3D	standard supervisory data access
1 o o 2 3 o o 4 5 o═o 6 7 o═o 8 9 o o 10 11 o o 12	1 1 1 0 0 1	39	standard non-privileged data access

Table 1.4.3: Recommended Access Modes for Standard Accesses (A24)

Meaningful combinations of the address modifier jumpers for A16 accesses are recommended as follows:

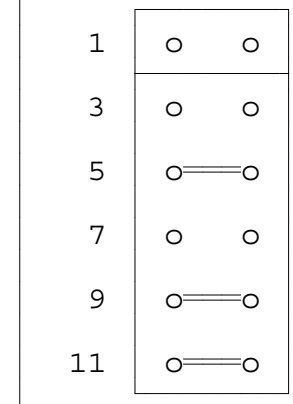
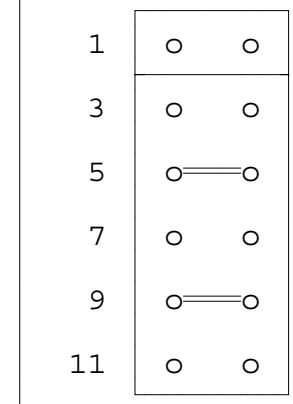
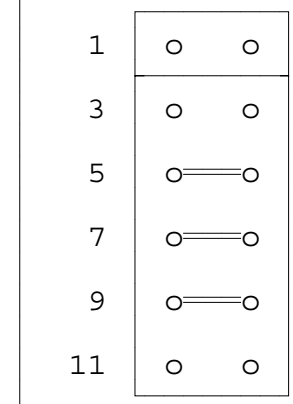
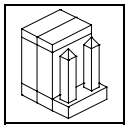
jumper BR4	permissible AM codes		addressing mode
	AM5 AM4 AM3 AM2 AM1 AM0	HEX	
	1 0 1 0 0 1	29	short non-privileged data access or
	1 0 1 1 0 1	2D	short supervisory data access
	1 0 1 1 0 1	2D	short supervisory data access
	1 0 1 0 0 1	29	short non-privileged data access

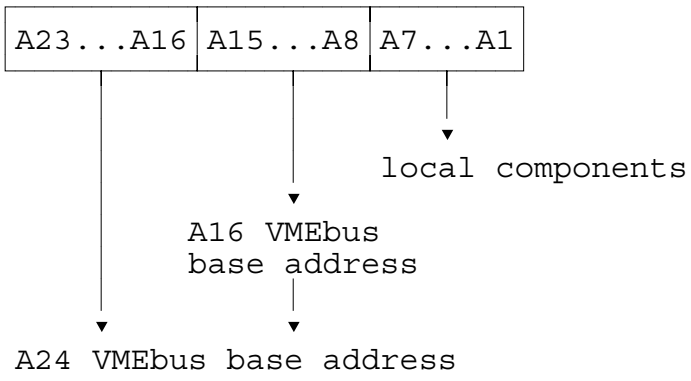
Table 1.4.4: Recommended Access Modes for Standard Accesses (A16)



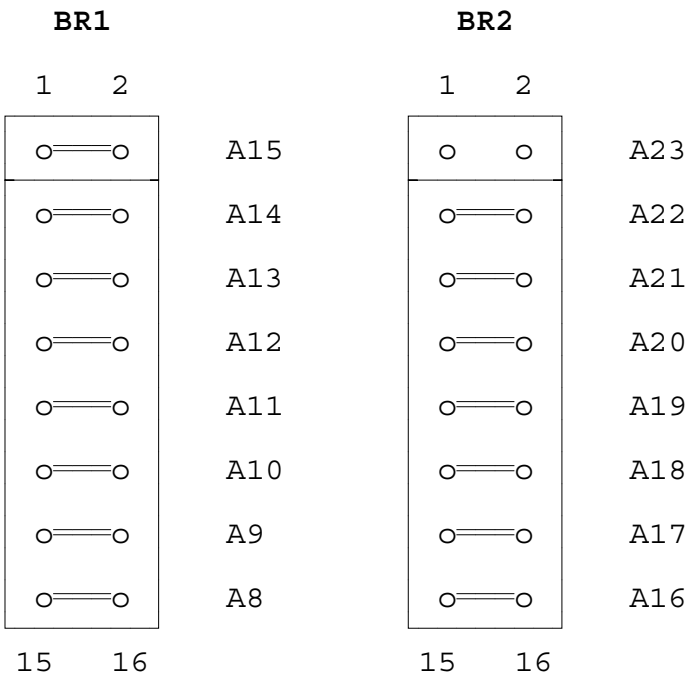
1.4.2.2 Base Address Decoding via Jumpers BR1 and BR2

The setting of the base board address ensues via jumpers at the jumperfields BR1 and BR2. The base address can be selected in steps of 256 bytes over the whole address range of 16 Mbytes. Furthermore, it is possible to use the VME addressing 'SHORT I/O'. At this addressing the address lines A16 to A23 are ignored and the base address of the VME-ASIO16 is placed into the 'SHORT I/O' address range (64 kbytes) of the VMEbus system.

The address decoder logic generates a 'CARDSELECT' signal, which serves as an enable signal for the decoder logic of the DUARTs.



An inserted jumper corresponds to '0' (low) level of an address bit.



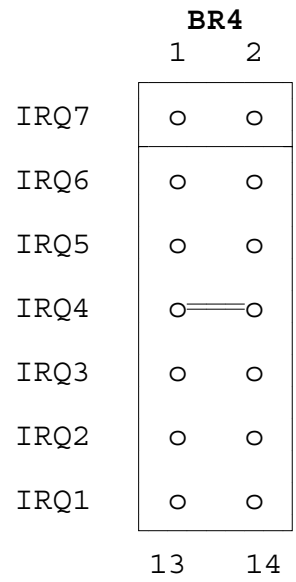
Standard setting of the base address: $800000

1.4.2.3 Interrupt Levels

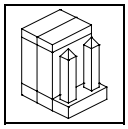
The VME-ASIO16 can generate an interrupt with freely selectable 'INTERRUPT LEVEL' I(1) - I(7) on the VMEbus and can serve the interrupt vector.

The interrupt level is set via the jumperfield BR4. The level is set by inserting the corresponding jumper. Factory-set is an inserted interrupt 'IRQ4'.

It is not allowed to insert more than one interrupt level at the same time!



The VME-ASIO16 is factory-set with an inserted interrupt 'IRQ4'.



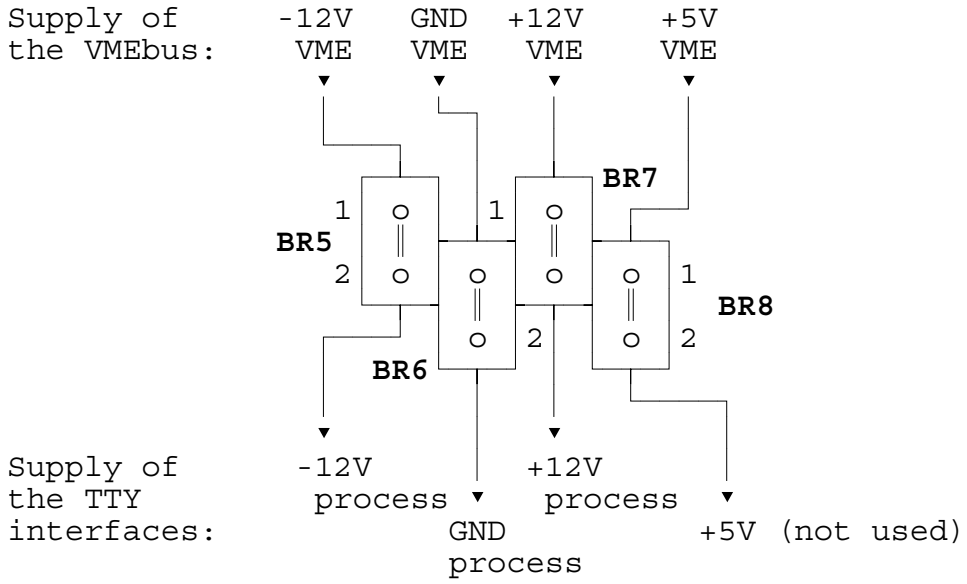
1.4.3 Jumperfields of the Serial Interfaces

1.4.3.1 Feeding of the Power Supply

Near to VMEbus P1 connector pin 32 there are the jumpers BR5 to BR8, which connect the power supplies of the VMEbus to the TTY interface.

If these jumpers are removed, the corresponding voltage must be supplied via the P2 connector of the VME-ASIO16.
To guarantee an electrical isolation in the TTY mode, the voltages +12V, -12V and GND, must be fed by an external power supply (the pin assignment can be obtained from the appendix).
To this the pins of the handshake signals of the channels 13 to 16 on P2 are used, which are not necessary for TTY operation. Connection is performed by means of wrap wires from the pins '2' of the jumpers BR5 to BR8 to jumperfields BR43 and BR44, pins 2 and 8, and to jumperfields BR53 and BR54, pins 3 and 6 (see fig. 1.4.2).

Default setting: All jumpers inserted.



External power supply:

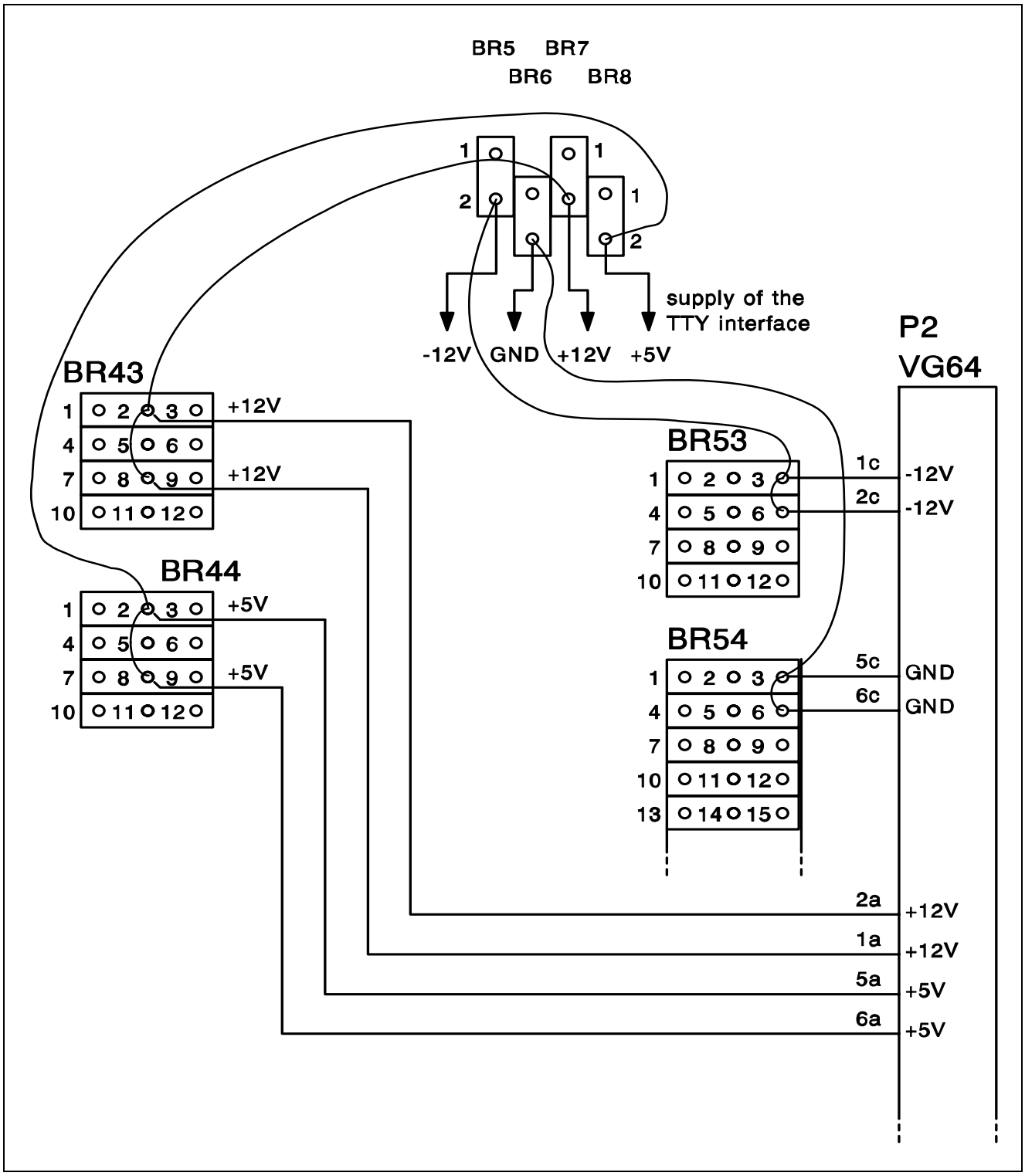
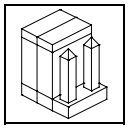


Fig. 1.4.2: Wiring of the External TTY Interfaces Power Supply



1.4.3.2 Selection between RS-232 and TTY Interfaces

The jumpers BR43 to BR50 convert the signals DTRx and TXDx from RS-232 operation to TTY operation. The jumpers BR53 to BR56 convert the signals CTSx and RXDx from RS-232 operation to TTY operation.

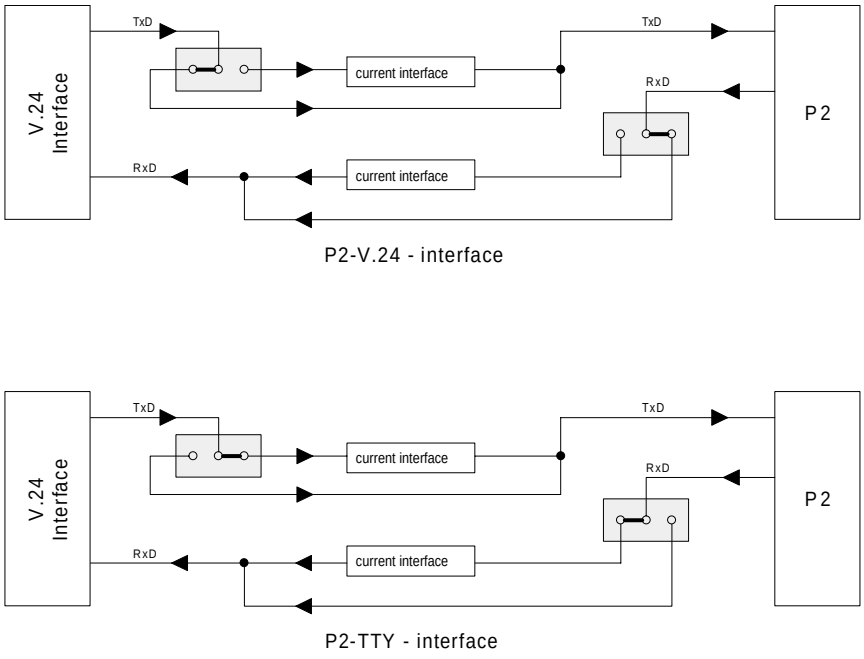


Fig. 1.4.3: Block Diagram of the Interfaces

Factory-set for all channels is RS-232 operation.

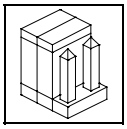
If the board shall be operated in the current loop mode (TTY), the jumpers of the corresponding TXDx at BR43-BR50 must be reinserted to the right.

o o═o Current loop (TTY) TXDx

The jumpers for RXDx on the right side of the board (BR50-BR56) must be reinserted to the left.

Current loop (TTY) RXDx o═o o

The following figures display the jumperfields for the interface setting on the ASIO16 according to their geometric arrangement on the board (VMEbus connectors P1, P2 at the right; view to component side; the altitude misalignment between right and left jumperfield was not considered in this view).



Jumpers Configuration

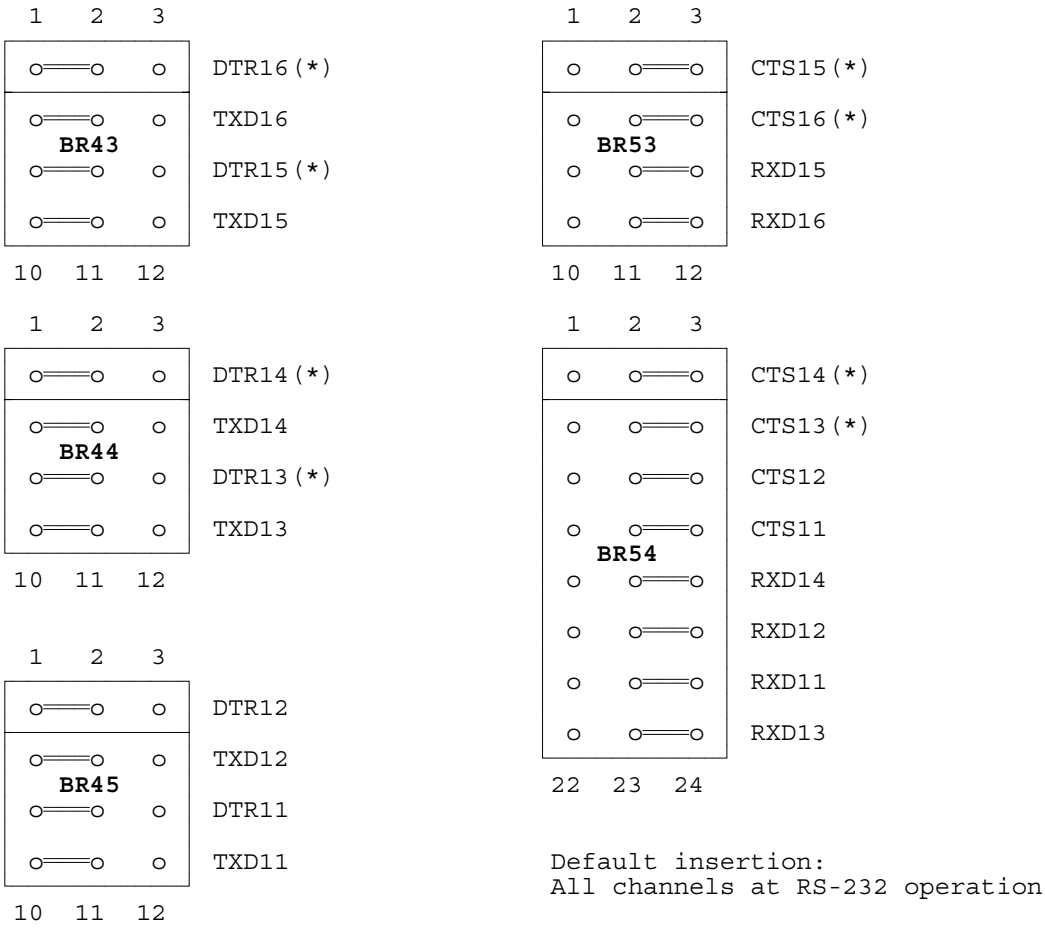
The position of the jumpers for the handshake signals (DTRx, CTSx) can remain unchanged, because the TTY interfaces run without 'hardware handshake'. Besides, the function of the handshake signals can be varied via the jumpers BR33 to BR40 (see also chapter 1.4.3.3).

A survey of the combination of the several jumpers is displayed in figure 1.5.1 'Circuitry of the Serial Interfaces'

For a better orientation jumpers of different colours are factory-inserted for data and handshake signals.

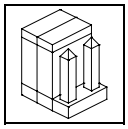
jumper	
left	right
RS232	TTY

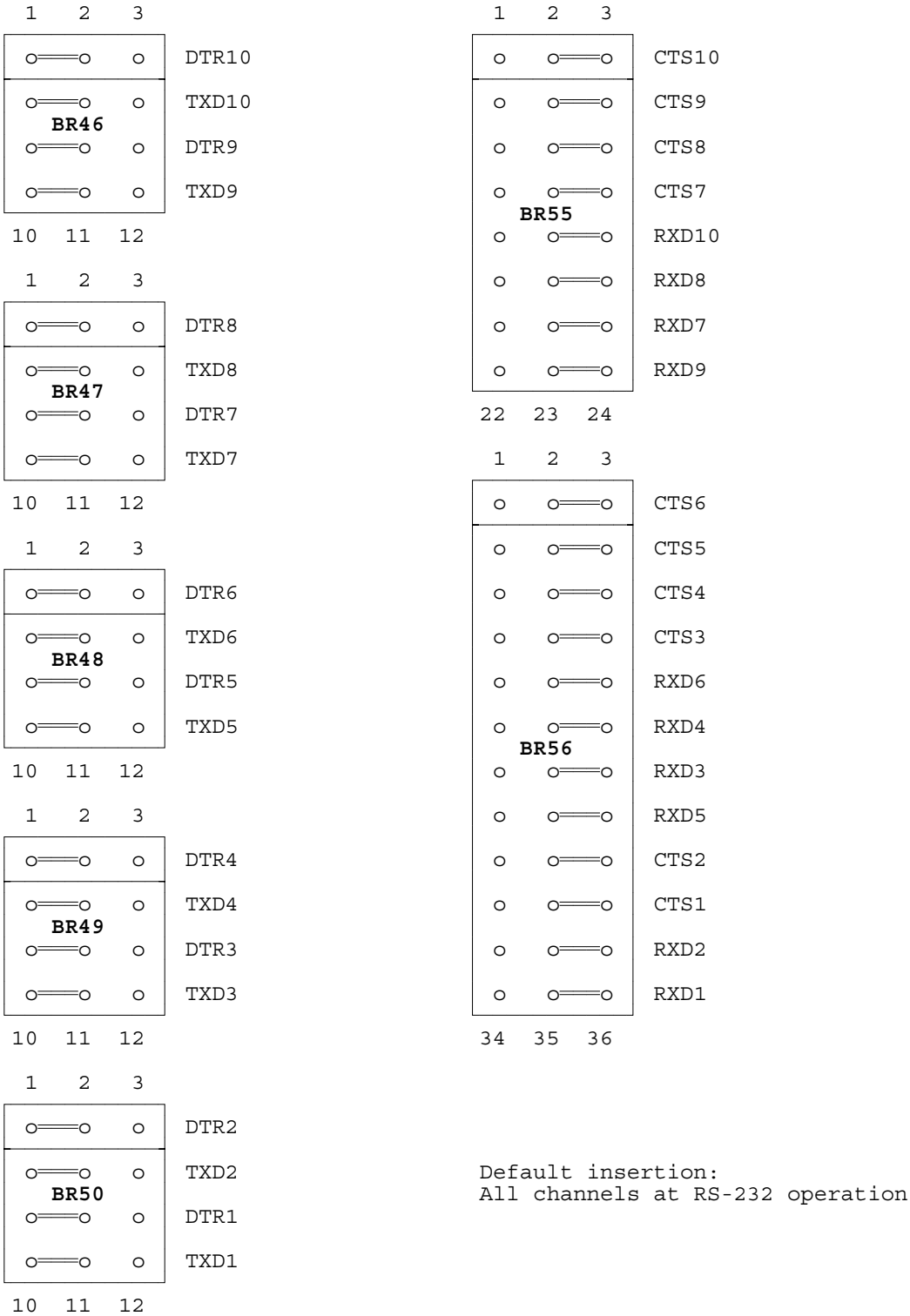
jumper	
left	right
TTY	RS232



Default insertion:
All channels at RS-232 operation

The signals marked with a (*) are necessary for the voltage feeding at the connection of external power supplies (see chapter 1.4.3.1).





Default insertion:
All channels at RS-232 operation

1.4.3.3 Control Signals of the Serial Interfaces

The jumpers BR33 to BR40 cover the lines DTR1 to DTR16 with the control lines RTS or DTR, if the jumpers BR43 to BR50 are set correspondingly. A switch-over between these signals ensues only in combination with the firmware!

> A survey of the combination of the several jumpers is displayed in figure 1.5.1 'Circuitry of the Serial Interfaces'

The jumpers assignment to the channels is as follows:

channel	jumper	signals at P2
1+2	BR40	DTR1, DTR2
3+4	BR39	DTR3, DTR4
5+6	BR38	DTR5, DTR6
7+8	BR37	DTR7, DTR8
9+10	BR36	DTR9, DTR10
11+12	BR35	DTR11, DTR12
13+14	BR34	DTR13, DTR14
15+16	BR33	DTR15, DTR16

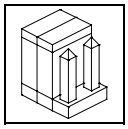
Table 1.4.5: Channel Assignment to the Jumpers BR33 to BR40

The jumpers set the ports OP4 and OP5, or OP0 and OP1 respectively, of the DUART68681 (via drivers) to the local signal lines 'RTS/DTR'. These lines are connected to the I/O connector P2 via the jumpers BR43 to BR50 and BR53 to BR56.

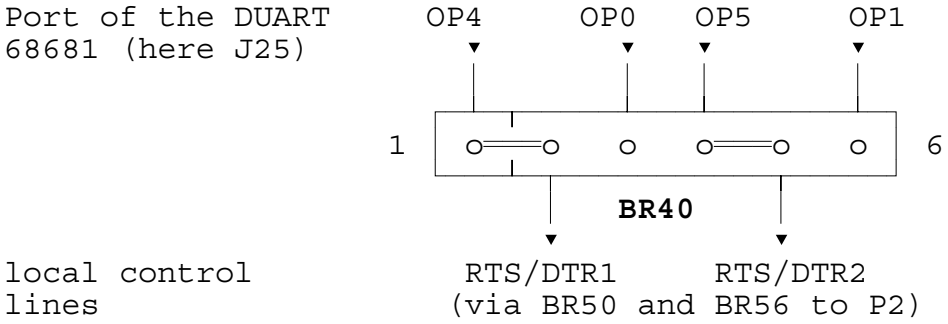
Following functions are assigned to the ports by firmware:

port	signal	remark
OP0, OP1	RTS	'Request To Send': announcement of a transmit process (e.g. for modem operation)
OP4, OP5 **default setting**	DTR	'Data Terminate Ready': handshake control for receiver input

Table 1.4.6: Functions of the DUART68681 Ports



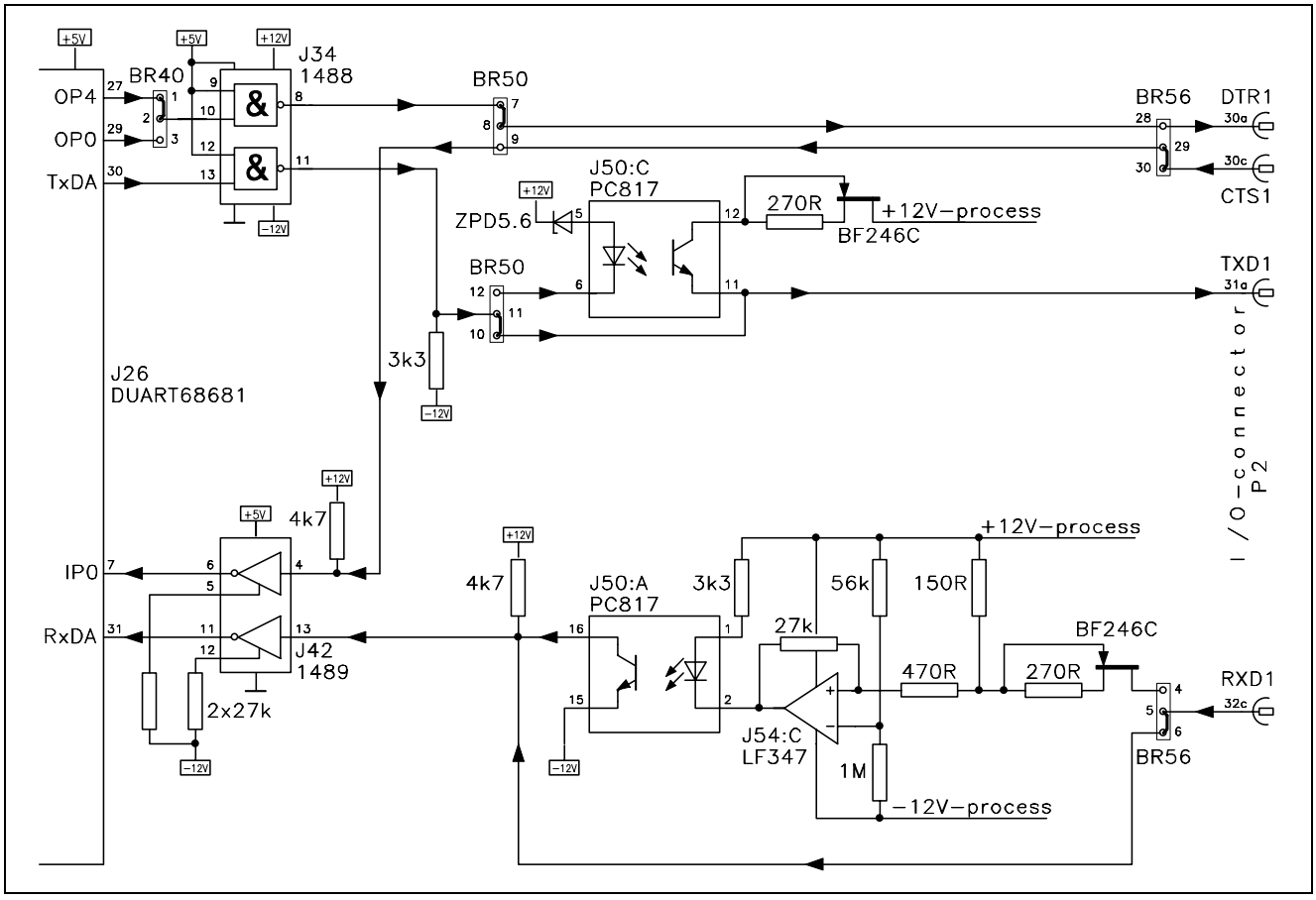
Display example: control lines of channel 1+2 to jumper BR40
(the default setting is displayed)



1.5 Serial Interfaces

1.5.1 Circuitry of the Serial Interfaces

One DUART68681 operates two serial interfaces at a time on the ASIO16. The interfaces can be operated as RS-232 interfaces or as TTY interfaces corresponding to the jumpers position.
For reduced version of the VME-ASIO16 with less than 16 channels only a part of the DUARTs will be inserted, beginning at the end with DUART no. 8, e.g. at a 4 channel insertion the DUARTs 8 and 7 will be inserted, at 10 channels the DUARTs 8, 7, 6, 5 and 4 will be inserted.



The displayed jumper positions correspond to the factory-setting of the board (RS-232 operation, DTR handshake).
The power supplies of the electrically isolated components (+12V process, -12V process) can be supplied externally or be connected to the local (VMEbus) power supplies.

Fig. 1.5.1: Circuitry of the Serial Interfaces (Example: Channel 1)

1.5.2 The RS-232 Interface

The interface controller DUART 68681 processes tranmsit and receive signals of TTL level. The interface to V24 or RS-232-C respectively, is realized by integrated level transformers MC1488 (transmitter) and MC1489 (receiver). Both components are located on the board below the corresponding DUART.

1.5.3 The TTY Interface

The current loop interface is located behind the V.24 voltage interface, i.e. the V.24 level is transformed into 20 mA current level to be transmitted. Current loop receive signals are transformed vice versa. The current loop signals are electrically isolated from the VMEbus to fulfill the requirements of process automation. (When ’using’ the electrical isolation the power supply of the TTY interface must be supplied externally.)

The current loop transmitter consists of a switched constant current source. Beside a constant current source the receiver contains a Schmitt-Trigger for the signal preparation and for noise suppression.

The VME-ASIO16 current loop interface is designated as "non isolated", because all necessary current sources are located on the board; thus the process section must not be equipped with current sources!

1.6 Interrupt Processing

A circuitry on the VME-ASIO16 connects the interrupt requests of all DUARTs with a common IRQ and coordinates the arbitration. At this, priorities are assigned to the single DUARTs, so that simultaneously occurring interrupts are processed with respect to their priority.

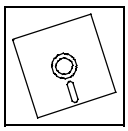
Each interrupt request of DUARTs is indicated by LEDs (green). So at a failure the user can recognize, at which IRQ no service ensues via the VMEbus.

The VMEbus interrupt level can be selected via jumper BR4. Factory-set at the VME-ASIO16 is 'IRQ4'.

The LED 'IRQ' at the front panel indicates, that at least one of the interrupt outputs of the DUARTs is active.

The LEDs 1/2, 3/4, 5/6, and so on indicate the active condition of the interrupt signal of the single DUARTs 68681.

(see also chapter 'Front Panel')



2. RTOS-UH Software Support

2.1 Survey Channel Structure

For PEARL/RTOS-UH users an integrated driver with complete interrupt support is contained in the extent of delivery of the VME-ASIO16 (EPROM resident). Parameters such as baudrate, bits/character, parity among other things, can be configured for each channel in clear.

To each serial ASIO16 channel a data station designation and a RTOS-UH-LDN are assigned. Basically a serial channel consists of an input and an output channel, furthermore a parameter channel is available. In the following table the data station designations for two completely equipped VME-ASIO16 in one system are listed. Please consider, that the ASIO software channel 1 is fed to the hardware interface of the DUART no. 8 of the first board, and the ASIO software channel 17 is fed to the hardware interface of the DUART no. 8 of the second board.

RTOS desig.	PEARL desig.	LDN	description
I1/	I1.	11/00	Input ASIO channel 1
O1/	O1.	12/00	Output ASIO channel 1
P1/	P1.	11/06	Param. ASIO channel 1
...	...	...	
I32/	I32.	4F/00	Input ASIO chann. 32
O32/	O32.	50/00	Output ASIO chann. 32
P32/	P32.	4F/06	Param. ASIO chann. 32

Table 2.1.1: Data Station Designation Survey

For future implementations of the ASIO driver under PEARL/RTOS-UH the parameter channel Px. should not be used any more, but instead of this it should be represented as Ix.PARA (input channel with file name), however the set of parameters of the channel Ix.PARA remains identcal to the parameter channel Px described in the following.

In the PEARL SYSTEM section e.g. the statement
para_channel_x: Px.PARA <->; can subsequently easily be changed to
para_channel_x: Ix.PARA <->;

For the data channels following format is valid:

input_channel : Ix.input
output_channel: Ox.output

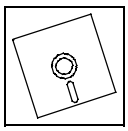
2.2 Parameter Channel

2.2.1 Structure of the Parameter Channel Ix.PARA (Px.)

```
STATUS: OK  (ASIO-Kanal-No.)
BITS=8 ( 5 6 7 8 )
STOP=1 ( 0.5 1 1.5 2 )
PARITY=NONE ( NONE ODD EVEN )
MODE=I/O ( USER  TERMINAL  I/O  BINARY )
HANDSHAKE=XON/XOFF ( DSR XON/XOFF MODEM XON&MODEM )
BREAK=OFF ( OFF ON )
TFU= 128 ( variable )
TO1=30000 ( TIMEOUT_(first char) )
TO2=300 ( TIMEOUT_(char/char) )
TELEGRAM=OFF ( OFF BDE SAE8 TWG ZM400 SEAB SINEC 3964R MDROP)
HUNTBYTE=00  ( variable )
ENDBYTE=00  ( variable )
BLOCKCHECK=00  ( variable )
RECEIVER=OFF ( OFF  ON  MULTIDROP )
BAUD= 9600 ( 38400 19200 9600 7200 4800 2400 2000 1800 1200 )
           ( 1050 600 300 200 150 135 110 75 )
BUFFERLENGTH = 256 ( 16 32 64 128 256 )
CLEAR / RESET / FORCE_BREAK / STATUS ( command )
```

The actual mode setting is listed directly behind the sign of equality (e.g. BITS=8: 8 data bits). Values indicated in parentheses represent possible alternatives.

Setting of the parameters in the parameter channels is possible in PEARL e.g. by the statement : **PUT 'MODE=BINARY' TO para_kanal BY A,SKIP;**
The parameter channel can be read from the operating system side, e.g. with the command **type /px** (with x=[1...32]).



2.2.2 Description of the Parameters in Particular

STATUS - feedbacks of the parameter handing-over ('STATUS' is of type 'read only'):

'OK'.....	parameter was handed over correctly.
'Invalid Codeword'.....	the command could not be identified.
'Invalid Parameter'.....	the parameter inserted by the user has been inserted incorrectly or is not implemented.
'End of Record Missing'.	the command was not completed by a <RETURN> or <;> (semicolon).
'Wrong Baudrate'.....	the baudrate was inserted incorrectly.
'Telegramm-Link Missing'	the telegram mode was selected, but the parameters 'HUNTBYTE' and/or 'ENDBYTE' were not handed over or were handed over incorrectly.
'User-Link Missing'.....	the telegram mode was selected, but the user-specific procedures at IRQ level are missing or are indicated incorrectly.

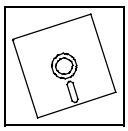
BITS number of data bits
possible values: 5, 6, 7, 8

STOP number of stop bits
possible values: (0.5), 1, (1.5), 2
values in () are not to be supported any more

PARITY type of parity bit
- NONE no parity bit
- ODD odd parity
- EVEN even parity

MODE setting mode of the serial interface
- USER the interface accepts the connection of a RTOS-UH user (log in possible via Ctrl-A etc.)
- TERMINAL as USER, but without possibility of log in
- I/O ASCII (7 bits) without support of cursor characters and without Ctrl-A
- BINARY all characters allowed, no end identification

HANDSHAKE	setting mode of the serial interface data handshake - XON/XOFF software handshake mode with Xon/Xoff (Ctrl-S/Ctrl-Q) - DSR hardware handshake - MODEM with RTS for mode control - XON&MODEM as MODEM, additionally with software handshake
BREAK	- ON interrupt generation at line break - OFF no interrupt generation at line break
TFU	dynamically variable number of characters in the internal communication elements buffer (CE), important for instance for end recognition at BINARY protocol in the MODE parameter default value: 128
TO1	time-out of **GET...** to the first character, in [ms]; default = 30,000 ms; set to 0 for USER MODE or TERMINAL MODE (time-out disabled)
TO2	time-out between 2 characters while the transmission, indicated in [ms]; default = 300 ms
TELEGRAM	selection of the transfer protocol, internal interface at interrupt level for transfer procedures written by the user. A description of the protocols is available upon request. - OFF no protocol selected others e.g.: BDE, SAE8, TWG, ZM400, SEAB, SINEC, 3964R, MDROP For the future the selection ensues as a file name in the channel, e.g. I17.3964R;
HUNTBYTE	start character at telegram transfer as far as required by the telegram
ENDBYTE	end character at telegram transfer as far as required by the telegram
BLOCKCHECK	initial sum for CRC checks at telegram transfer as far as required by the telegram
RECEIVER	- ON interrupt generation for received characters - OFF no interrupt generation, e.g. if the data line is not used or not connected - MULTIDROP only at telegram mode



BAUD setting of the transfer rate in [baud]
permissible values: 75, 110, 135, 150, 200, 300, 600, 1050, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 19200, 38400

BUFFERLENGTH number of characters buffered by the ASIO driver at interrupt level, e.g. select small for USER, select big for BINARY
permissible values: 16, 32, 64, 128, 256

CLEAR (command) reset of the interrupt buffer

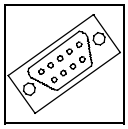
RESET (command) base initialization of the channel

FORCE_BREAK (command) transmit BREAK signal on TxD line, necessary e.g. at several SIEMENS protocols

STATUS (command) reset of the parameter channel STATUS

Attention: If at GET or PUT an error occurred, following instruction are necessary in PEARL:

CLOSE input_kanal; or **CLOSE output_kanal;**	returns a faulty communication element (CE), by **ST(...) /= 0;** back to the operating system
GET FROM input_kanal BY LIST; or	resets the status of the input channel in the run-time system (**ST(...) := 0;**)
PUT TO output_kanal BY LIST;	resets the status of the output channel in the run-time system (**ST(...) := 0;**)



3. Appendix

3.1 Connector Pin Assignments

3.1.1 VMEbus P1

pin	row a	row b	row c
1	DATA 0	-	DATA 8
2	DATA 1	-	DATA 9
3	DATA 2	-	DATA 10
4	DATA 3	BG0IN* ┐	DATA 11
5	DATA 4	BG0OUT* ┘	DATA 12
6	DATA 5	BG1IN* ┐	DATA 13
7	DATA 6	BG1OUT* ┘	DATA 14
8	DATA 7	BG2IN* ┐	DATA 15
9	GND	BG2OUT* ┘	GND
10	SYSCLOCK	BG3IN* ┐	-
11	GND	BG3OUT* ┘	BERR*
12	DS1*	-	SYSRESET*
13	DS0*	-	LWORD*
14	WRITE*	-	AM5
15	GND	-	ADDR 23
16	DTACK*	AM0	ADDR 22
17	GND	AM1	ADDR 21
18	AS*	AM2	ADDR 20
19	GND	AM3	ADDR 19
20	IACK*	GND	ADDR 18
21	IACKIN*	-	ADDR 17
22	IACKOUT*	-	ADDR 16
23	AM4	GND	ADDR 15
24	ADDR 7	IRQ7*	ADDR 14
25	ADDR 6	IRQ6*	ADDR 13
26	ADDR 5	IRQ5*	ADDR 12
27	ADDR 4	IRQ4*	ADDR 11
28	ADDR 3	IRQ3*	ADDR 10
29	ADDR 2	IRQ2*	ADDR 9
30	ADDR 1	IRQ1*	ADDR 8
31	- 12V	-	+ 12V
32	+ 5V	+ 5V	+ 5V

P1 connector according to DIN 41 612-C 96 / a+b+c

Signals with * : active low
Current rating : max 1.0 A per pin

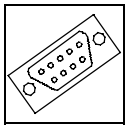
-....not connected
┐ ...connected
┘

3.1.2 I/O Connector P2 (at Internal Supply of the TTY Interface)

pin	row a	row c
1	DTR 15	CTS 15
2	DTR 16	CTS 16
3	TxD 15*	RxD 15*
4	TxD 16*	RxD 16*
5	DTR 14	CTS 14
6	DTR 13	CTS 13
7	DTR 12	CTS 12
8	DTR 11	CTS 11
9	TxD 11*	RxD 14*
10	TxD 14*	RxD 12*
11	TxD 13*	RxD 11*
12	TxD 12*	RxD 13*
13	DTR 10	CTS 10
14	DTR 9	CTS 9
15	DTR 8	CTS 8
16	DTR 7	CTS 7
17	TxD 7*	RxD 10*
18	TxD 10*	RxD 8*
19	TxD 9*	RxD 7*
20	TxD 8*	RxD 9*
21	DTR 6	CTS 6
22	DTR 5	CTS 5
23	DTR 4	CTS 4
24	DTR 3	CTS 3
25	TxD 3*	RxD 6*
26	TxD 6*	RxD 4*
27	TxD 5*	RxD 3*
28	TxD 4*	RxD 5*
29	DTR 2	CTS 2
30	DTR 1	CTS 1
31	TxD 1*	RxD 2*
32	TxD 2*	RxD 1*

P2 connector according to DIN 41612-C64 - a+c

Signals with * : active low
TxD* : Transmitted Data (Output)
RxD* : Received Data (Input)
DTR : Data Terminal Ready (Output)
CTS : Clear To Send (Input)



3.1.3 I/O Connector P2 (at External Supply of the TTY Interface)

pin	row a	row c
1	+12V	-12V
2	+12V	-12V
3	TxD 15* (RS232)	RxD 15* (RS232)
4	TxD 16* (RS232)	RxD 16* (RS232)
5	+5V	GND
6	+5V	GND
7	DTR 12	CTS 12
8	DTR 11	CTS 11
9	TxD 11*	RxD 14* (RS232)
10	TxD 14* (RS232)	RxD 12*
11	TxD 13* (RS232)	RxD 11*
12	TxD 12*	RxD 13* (RS232)
13	DTR 10	CTS 10
14	DTR 9	CTS 9
15	DTR 8	CTS 8
16	DTR 7	CTS 7
17	TxD 7*	RxD 10*
18	TxD 10*	RxD 8*
19	TxD 9*	RxD 7*
20	TxD 8*	RxD 9*
21	DTR 6	CTS 6
22	DTR 5	CTS 5
23	DTR 4	CTS 4
24	DTR 3	CTS 3
25	TxD 3*	RxD 6*
26	TxD 6*	RxD 4*
27	TxD 5*	RxD 3*
28	TxD 4*	RxD 5*
29	DTR 2	CTS 2
30	DTR 1	CTS 1
31	TxD 1*	RxD 2*
32	TxD 2*	RxD 1*

P2 connector according to DIN 41612-C64 - a+c

Signals with * : active low
TxD* : Transmitted Data (Output)
RxD* : Received Data (Input)
DTR : Data Terminal Ready (Output)
CTS : Clear To Send (Input)
TxD* (RS232) : Transmitted Data (only valid for RS232 operation)
RxD* (RS232) : Received Data (only valid for RS232 operation)

+12V,-12V, +5V, GND : Externally supplied power supply of the TTY interface

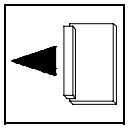
3.1.4 I/O-Connector P2 (if ASIO RS422 Add On is used)

pin	row a	row c
1	+12V	-12V
2	+12V	-12V
3	TxD 15* (RS232)	RxD 15* (RS232)
4	TxD 16* (RS232)	RxD 16* (RS232)
5	+5V	GND
6	+5V	GND
7	TxD 12+	RxD 12+
8	TxD 11+	RxD 11+
9	TxD 11-	RxD 14* (RS232)
10	TxD 14* (RS232)	RxD 12-
11	TxD 13* (RS232)	RxD 11-
12	TxD 12-	RxD 13* (RS232)
13	TxD 10+	RxD 10+
14	TxD 9+	RxD 9+
15	TxD 8+	RxD 8+
16	TxD 7+	RxD 7+
17	TxD 7-	RxD 10-
18	TxD 10-	RxD 8-
19	TxD 9-	RxD 7-
20	TxD 8-	RxD 9-
21	TxD 6+	RxD 6+
22	TxD 5+	RxD 5+
23	TxD 4+	RxD 4+
24	TxD 3+	RxD 3+
25	TxD 3-	RxD 6-
26	TxD 6-	RxD 4-
27	TxD 5-	RxD 3-
28	TxD 4-	RxD 5-
29	TxD 2+	RxD 2+
30	TxD 1+	RxD 1+
31	TxD 1-	RxD 2-
32	TxD 2-	RxD 1-

P2 connector according to DIN 41612-C64 - a+c

Signal with * : active low
TxD* (RS232) : Transmitted Data (RS232 XON/XOFF only)
RxD* (RS232) : Received Data (RS232 XON/XOFF only)
TxD+, TxD- : Transmitted Data RS422
RxD+, RxD- : Received Data RS422

+12V,-12V, +5V, GND : Externally supplied power supply of the RS422 Add On



3.2 ASIO16 Adaptor (VME-ASIO-ADAPT)

3.2.1 General

The VME-ASIO16 P2 adaptor offers 16 times 14 pole connector plugs for the direct connection of the serial interfaces to a flat cable. Moreover, on the adaptor there are screw terminals available for the connection of external power supplies.

To avoid overvoltages on the TXD line, pin 2 of the 14 pole connector plug is connected with the +12 V potential via a 24 V Z-diode.

The connector plugs are covered with the signals of the RS-232 interface or of the TTY interface via the jumpers BR1 to BR16.

The externally supplied voltages are fed via the jumpers BR21 to BR26 to the P2 connector of the ASIO16.

Attention: If the power supplies are fed externally via the ASIO adaptor, the ASIO16 must be configured correspondingly (see chapter 'Feeding of the Power Supply')!

If no external power supplies are connected, the VMEbus voltages +12V, -12V and GND must be connected with the corresponding terminals! The jumpers BR21 and BR24 to BR26 must remain not inserted. (The jumpers BR22 and BR23 remain not inserted only, if the ASIO-422 add-on is not inserted.)

3.2.2 View of the ASIO16 Adaptor

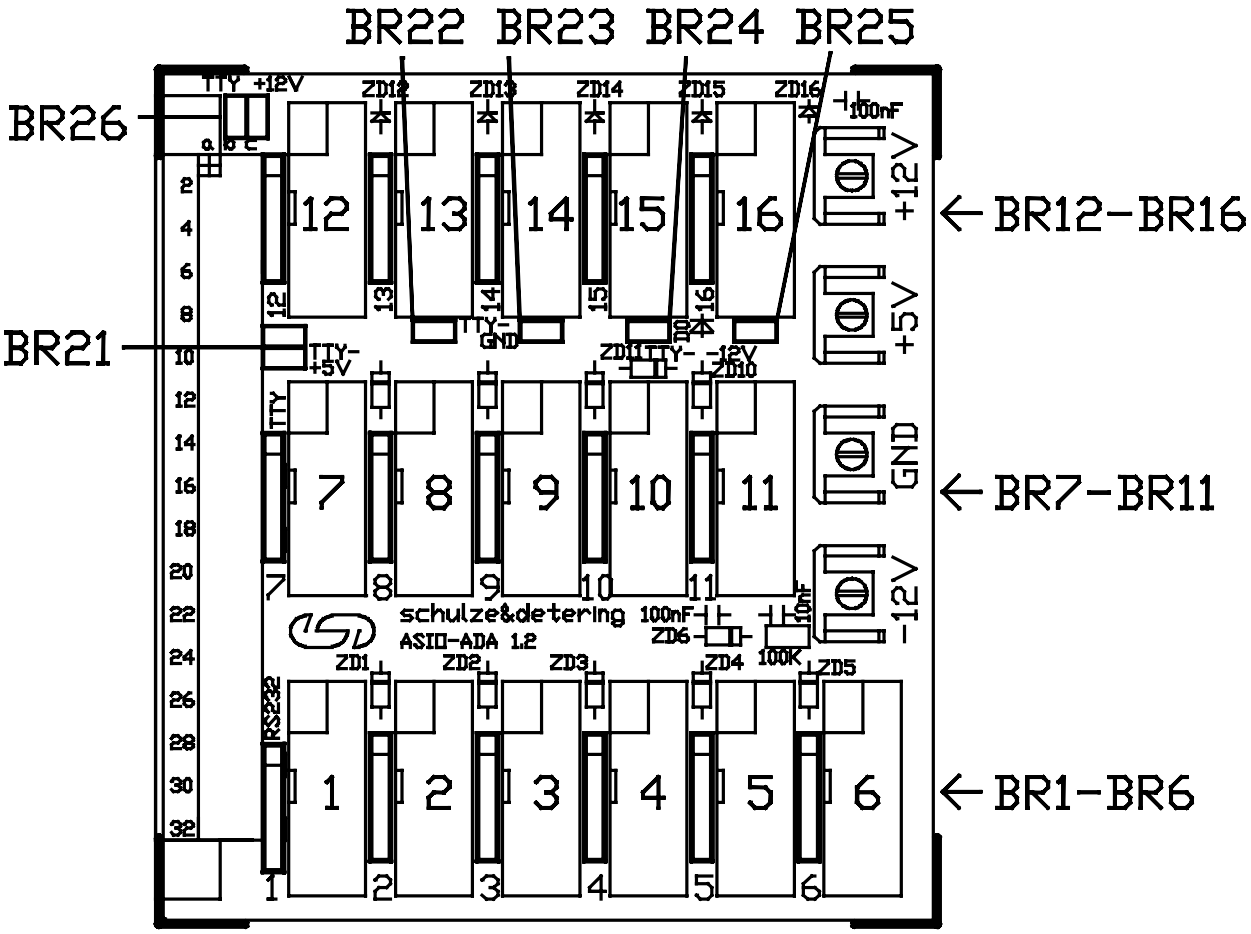
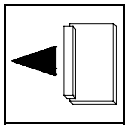


Fig. 3.2.1: View of the ASIO16 Adaptor with Designation of the Jumpers



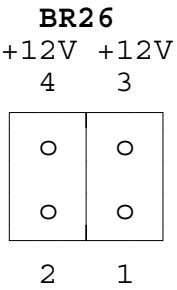
3.2.3 Jumpers of the ASIO16 Adaptor

3.2.3.1 Power Supply Selection via BR21 to BR25

The following jumpers must only be inserted, if an external power supply is desired for the TTY interfaces.

> The jumpers may only be inserted, if the ASIO16 is configured for external power supply!
> If the interfaces are supplied by the local ASIO16 VMEbus supply, the jumpers must not be inserted (different P2 connector pin assignment)!
>
> An exception is the GND jumpers BR22 and BR23, which must always be inserted, if the ASIO-422 add-on is inserted. This is necessary to fed the reference potential of the DC/DC converter to the adaptor!

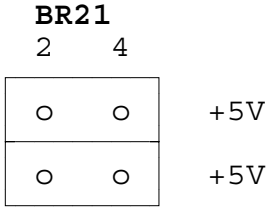
Connection of the +12V supply of the adaptor with P2 of the ASIO16 via jumper BR26:



Local supply on the ASIO16:
jumpers not inserted
(default setting)

External power supply:
jumpers 1-3 and 2-4 inserted

Connection of the +5V supply of the adaptor with P2 of the ASIO16 via jumper BR21:



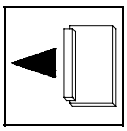
Local supply on the ASIO16:
jumpers not inserted
(default setting)

External power supply:
jumpers 1-3 and 2-4 inserted

Connection of the GND potential of the adaptor with P2 of the ASIO16 via jumper BR22 and BR23:

Local supply on the ASIO16 and
ASIO-422 not inserted:
jumpers not inserted
(default setting)

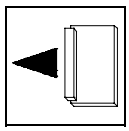
External power supply
and/or ASIO-422 add-on inserted:
jumpers 1-2 inserted



Adaptor

Connection of the -12V supply of the adaptor with P2 of the ASIO16 via jumper BR24 and BR25:

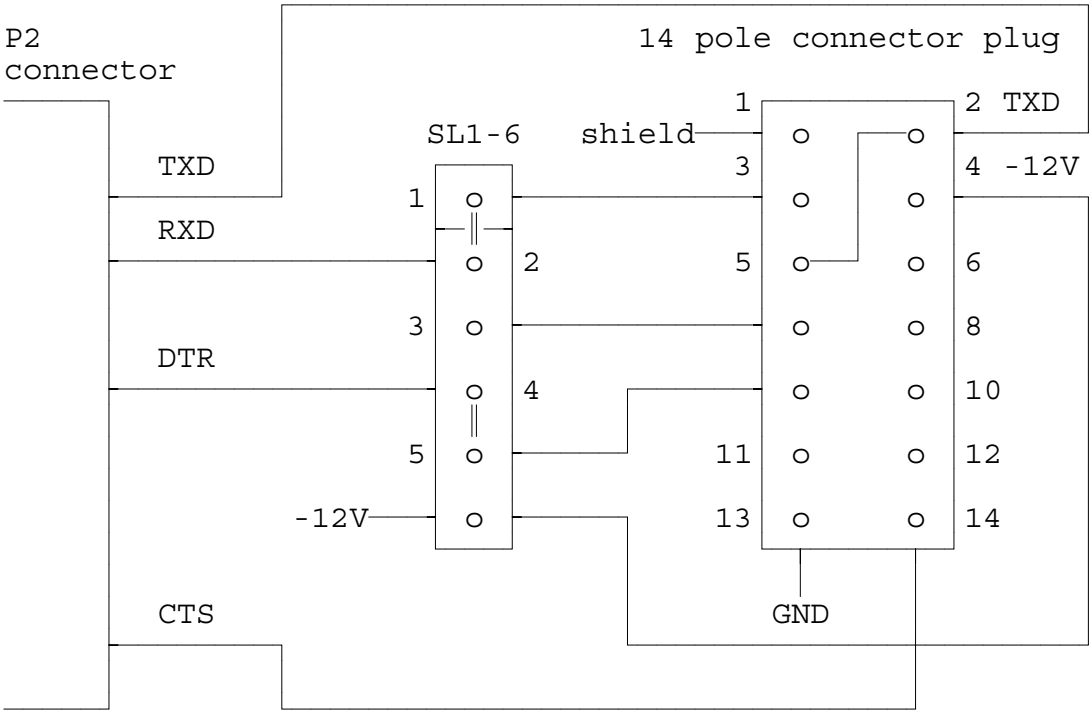
	BR24	**BR25**	
Local supply on the ASIO16: jumpers not inserted **(default setting)**	o o	o o	+12V
External power supply: jumpers 1-2 inserted	1 2	1 2	



3.2.3.2 Fixing of the Connector Pin Assignment via BR1 to BR16

The jumpers BR1 to BR16 are in each case located directly beneath the corresponding 14 pole connector plug of the single interface channels (drawn bold in fig. 3.2.1). With these jumpers the assignment of the pins 3, 7 and 9 of the connector plug is selected.

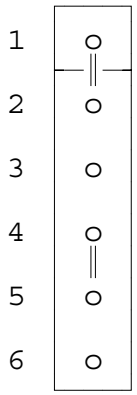
The jumpers and connector plugs are covered as follows:

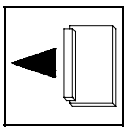


Example shown: jumpers configuration for RS-232 operation

Following jumpers configurations are possible for the various operating modes:

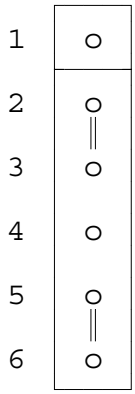
<u>1. Jumpers configuration BR1 to BR16 for RS-232 and RS-422 operation</u>





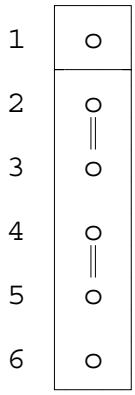
Adaptor

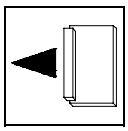
2. Jumpers configuration BR1 to BR16 for TTY operation (active)



3. Jumpers configuration BR1 to BR16 for TTY operation (passive)

This assignment is only possible, if the channel on the ASIO16 is equipped for 'passive operation' (option: 'VME-ASIO16-ISO').



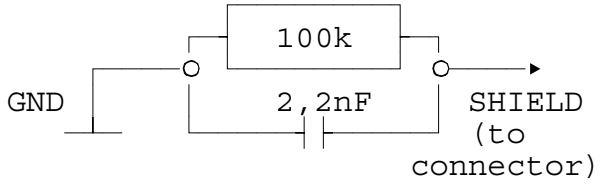


3.2.4 Covering of the 14 pole Connector Plug on the ASIO16 P2 Adaptor

RS232			
signal	Pin		signal
SHIELD	1	2	-
RXD(in)	3	4	-
TXD(out)	5	6	-
-	7	8	-
DTR(out)	9	10	-
-	11	12	-
GND	13	14	CTS(in)

14 pole connector plug

Connecting of the SHIELD signals at the ASIO P2 Adaptor:



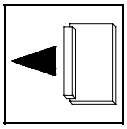
TTY active			
signal	pin		signal
SHIELD	1	2	TXD+
-	3	4	TXD-
-	5	6	-
RXD+	7	8	-
RXD-	9	10	-
-	11	12	-
GND	13	14	-

14 pole connector plug

TTY passive *1)			
signal	pin		signal
SHIELD	1	2	TXD-
-	3	4	-
-	5	6	-
RXD-	7	8	-
RXD+	9	10	-
-	11	12	-
GND	13	14	TXD+

14 pole connector plug

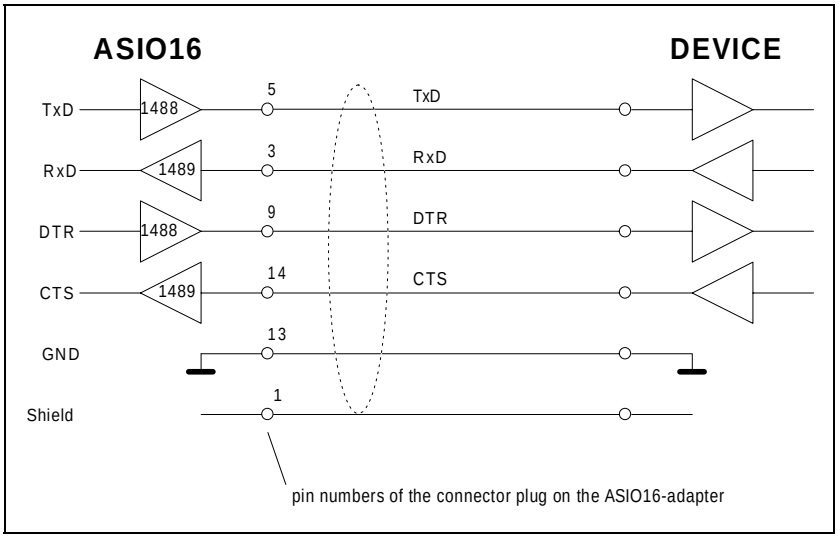
1*) Only at special equipment of the corresponding channel on the ASIO16.



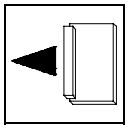
Adaptor

3.2.5 Connector Pin Assignment RS-232 via Flat Cable to DSUB-15 or to DSUB-25 Females

7	6	5	4	3	2	1	DSUB-15/25
GND	-	DTR	-	TxD	RxD	Sh	
13	11	9	7	5	3	1	connector at
14	12	10	8	6	4	2	ASIO16 adaptor
CTS	-	-	-	-	-	-	
15	14	13	12	11	10	9	DSUB-15
20	19	18	17	16	15	14	DSUB-25

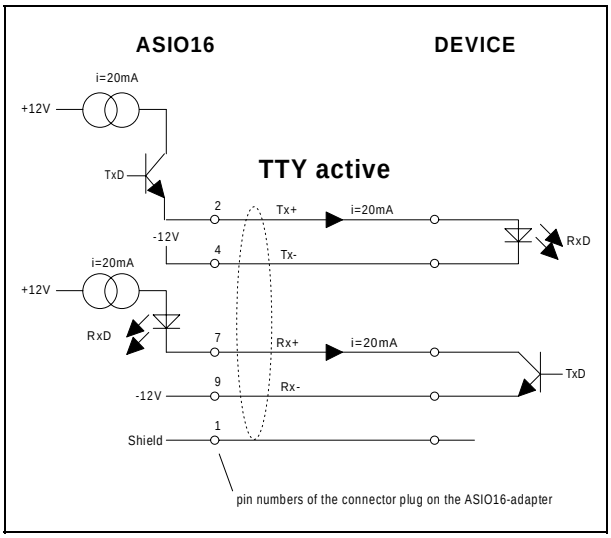


Connection of the RS-232 Interface

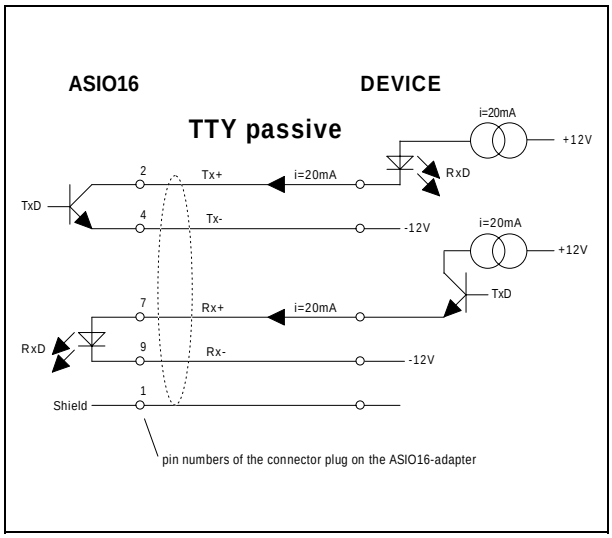


3.2.6 Connector Pin Assignment TTY via Flat Cable to DSUB-9, DSUB-15 or to DSUB-25 Females

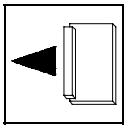
7	6	5	4	3	2	1	DSUB-15/25
-	-	5	4	3	2	1	DSUB-9
-	-	Rx-	Rx+	-	-	Sh	connector at ASIO16 adaptor
13	11	9	7	5	3	1	
14	12	10	8	6	4	2	
-	-	-	-	-	Tx-	Tx+	
-	-	-	9	8	7	6	DSUB-9
15	14	13	12	11	10	9	DSUB-15
20	19	18	17	16	15	14	DSUB-25



Connection of the Active TTY Interface



Connection of the Passive TTY Interface

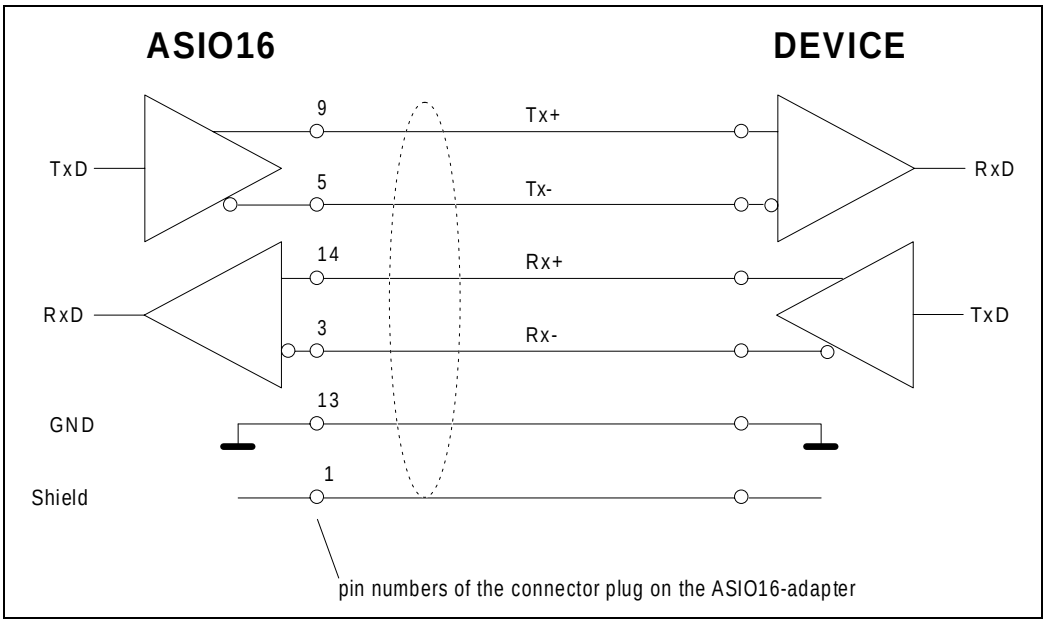


Adaptor

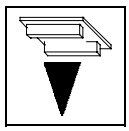
3.2.7 Connector Pin Assignment RS422 via Flat Cable to DSUB-15 or to DSUB-25 Females

(only in combination with the ASIO422-Add-On)

7	6	5	4	3	2	1	DSUB-15/25
GND	-	Tx+	-	Tx-	Rx-	Sh	
13	11	9	7	5	3	1	connector at
14	12	10	8	6	4	2	ASIO16 adaptor
Rx+	-	-	-	-	-	-	
15	14	13	12	11	10	9	DSUB-15
20	19	18	17	16	15	14	DSUB-25



Connection of the RS-422 Interface



3.3 Add-On 'ASIO-422'

3.3.1 General

The RS-422 add-on, available as an option, has to be inserted into the jumperfields BR43 to BR50, BR53 to BR56 and BR5 to BR8. If the add-on shall be inserted, the components of the TTY interfaces must not be inserted, because this area is required for the add-on.

The add-on offers a maximum of 12 interfaces, electrically isolated from the VMEbus and from the local components, with a simultaneous possibility of using 4 RS-232 interfaces in the 'XON/XOFF-only' operation (channel 13 to 16 - on the base board). Partial insertion of 4 (channel 9 to 12) or 8 (channel 5 to 12) RS-422 interfaces, respectively, is possible.

The electrical isolation of the RS-422 interfaces ensues by means of a DC/DC converter on the add-on. The feeding of the power supply for the add-on (including DC/DC converter) can ensue from the ASIO16 (VMEbus supply) or externally via the ASIO16 P2 connector.
When using the ASIO P2 adaptor it must be taken care that the add-on reference potential (GND) has to be fed via the adaptor jumpers BR22 and BR23 to the 14 pole connector plug. These jumpers must also be inserted if no external power supply is fed to the board!

3.3.2 View of the ASIO422-Add-Ons

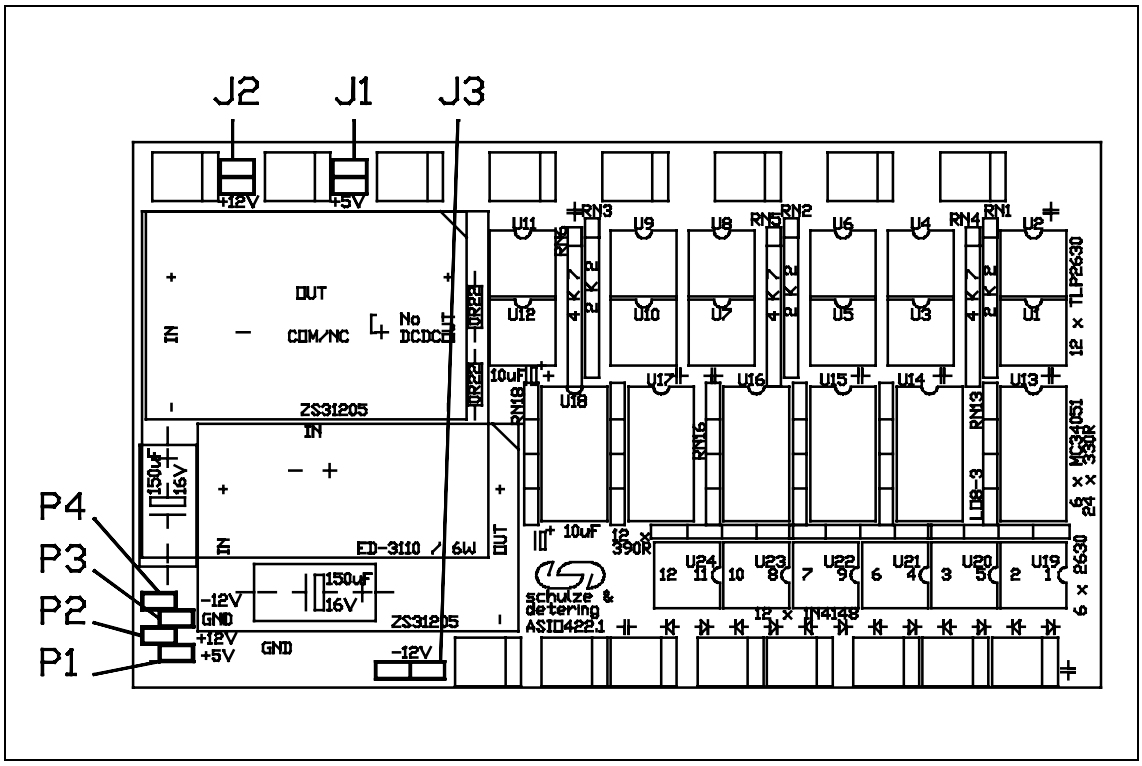


Fig. 3.3.1: Top Overlay Placement of the RS-422 Add-Ons with Marking of the Jumpers

3.3.3 Jumpers of the ASIO422 Add-Ons

3.3.3.1 Selection of the Power Supply via the Jumpers J1 to J3

If an external power supply of the ASIO422 add-ons is desired, the jumpers J1 to J3 must be inserted.
Attention:
In this case the connectors P1 to P4 must not be inserted on the add-ons.(see fig.3.3.1)!

Connection of the +5V power supply of the add-ons with P2 of the ASIO16 via jumper J1:

J1

4 3

Local supply +5V/VME:
jumpers not inserted
(default setting)

o o +5V

o o +5V

External power supply:
jumpers 1-2 and 3-4 inserted

2 1

Connection of the +12V power supply of the add-ons with P2 of the ASIO16 via jumper J2:

J2

4 3

DC/DC converter supplied via +12V/VME:
jumpers not inserted
(default setting)

o o +12V

o o +12V

External power supply:
jumpers 1-2 and 3-4 inserted

2 1

Connection of the -12V power supply of the add-ons with P2 of the ASIO16 via jumpers BR24 and BR25:

Local supply -12V/VME:
jumper not inserted
(default setting)

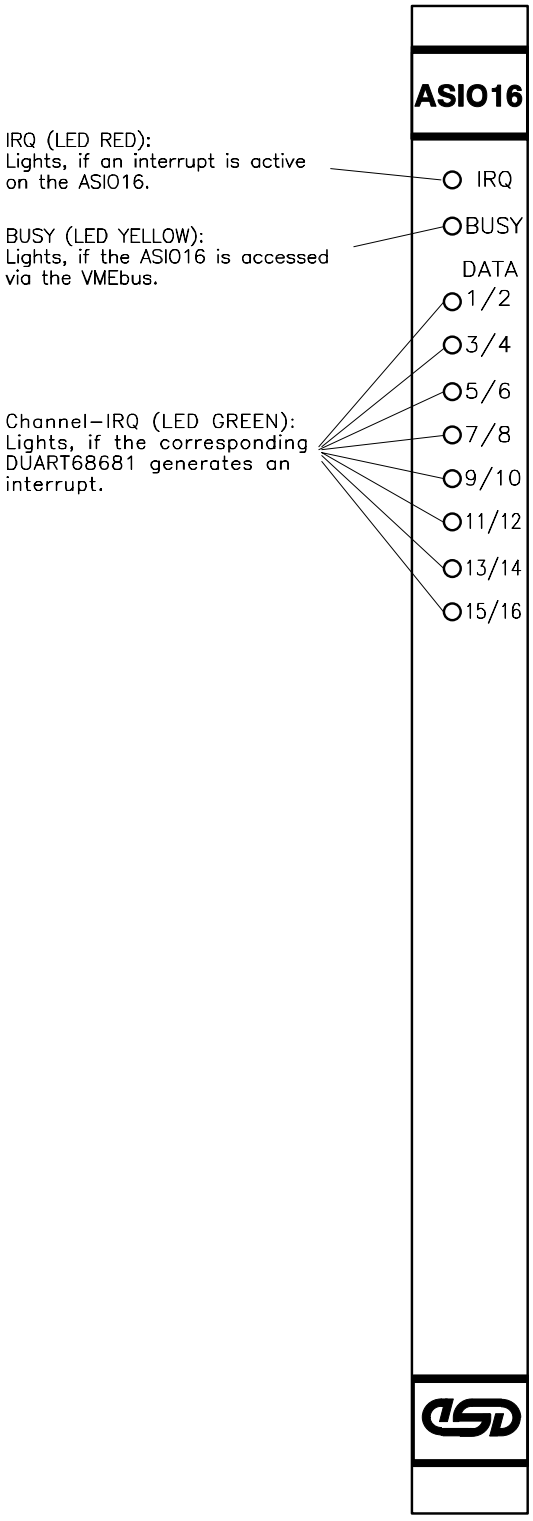
J3

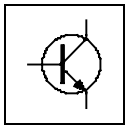
o o o o -12V

1 2 3 4

External power supply:
jumpers 1-2 and 3-4 inserted

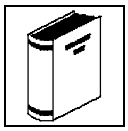
3.4 Front Panel





3.5 Circuit Diagrams

The circuit diagrams are not included in the PDF-file.



3.6 Data Sheets

The data sheets are not included in the PDF-file.