BTSPS MON 1 200/60C5U

Technical Manual
Power supply

Version 00

BRUKER

The information in this manual may be altered without notice.

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This manual describes the units as they are at the time of printing. On request, the manufacturer shall supply circuit diagrams, lists of components, descriptions, calibrating instructions and any other information for use by qualified personnel of the user, in charge of repairing the parts of the unit which have been stated by the manufacturer to be "repairable". Such supply shall in no event constitute permission to modify or repair the units or approval of the same.

This unit is not designed for any type of use which is not specifically described in this manual. Such use may be hazardous.

BRUKER BIOSPIN

June 2004

Wissembourg, France

Unit P/N W1213137

Manual P/N : W1213142

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Generalities 1

Power supply identification 1.1

UNIT/TYPE	BTSPS MON 1 200/60C5U	DATE	16/06/2004
SERIAL N°	W1213137	TESTED BY	A. KREISS
CUSTOMER	UNI LEUVEN BELGIQUE	SIGNATURE	

Output specifications 1.2

CHANNEL	OUTPUT VOLTAGE	OUTPUT CURRENT	OUTPUT POWER	LOAD RESISTANCE
1	200V	60A	12KW	3.33ohm

Input specifications *1.3*

Power line

Type :

- Mono phase
- Three phase X
- With neutral
- Without neutral X

Voltage.....400 V

Line fuses/protection.....40 A

Nomimal power ..... 17 KVA

Auxiliary line

Voltage.....V

Current .....A

Cooling mode

- Water X
- Air X

Max input pressure .....10 Bars

Water circuit tested at 16 Bars/1H

Minimum flow rate..... 2 l/mn

Requested delta pressure in/out.....1.5 Bars

Max water input temperature .....30°C

Ambiant air

Max temperature .....30°C

Stability ∆I/I at I Max *1.4*

StabilityDI/I at I max .....

Warmup time = 30mn

DC to 10Hz..... per mn .....1.10^{-5}

DC to 10Hz..... per 8 hours .....5.10^{-5}

Temperature coef

Shunt.....+/-5 ppm/°C

Regulation..... 10 ppm/°C

Cabinet

- Dimensions Height .....1345 mm
- Lenght.....600 mm
- Depth .....600 mm
- Weight..... 199 kg

Technical contact *1.5*

BRUKER BIOSPIN

Power Electronik Department

34, Rue de l’industrie

67166 WISSEMBOURG CEDEX (FRANCE)

TEL : +33 (0)3 88 73 69 42

FAX : +33 (0)3 88 73 68 86

E-MAIL : power-elec.support@bruker.fr

General installation instructions 2

INSTALLATION - General instructions.

The installation of the device must be done only by an authorized and qualified technician, in total accordance with the running standards. Every breakdown due to a non-respect of the following instructions will not be attributable to Bruker and will not be covered by the guarantee clauses.

A) To offer an optimum ventilation:

- Respect a 20 cm minimum distance between the device and the walls.
- Do not seal the different air admissions.
- Do not cover air extractions.
- The non-respect of these instructions can lead to an over-heating of the device and deteriorations can be a result.

B) Connections:

- *Cooling circuit* (for water-cooled devices only): connect the cold water input to the 'Water IN' connector. Connect the warm water output to the 'Water OUT' connector. For water flow, pressure and quality please refer to the *Characteristics* chapter.
- *Mains input*: connect the mains input cable to the *Line IN* or *Mains* connector or terminals. In case of connection on terminals must the protective earth cable be connected to the foreseen and adequate terminal. Use the provided cables. The cables may not be provided for specific devices. In that case, types and sections of cables must be in accordance with the running standards. Too narrow a section can lead to an excessive heating or even fire. The type must be in accordance with the voltage of the equipment. Flash or electrocution risk !!! The upstream cable protection must also be in accordance with its section. Refer to the *Characteristics* chapter.
- *Outputs to the load*: connect the '+' cable of the load to *DC OUT+* terminal and the '-' cable of the load to *DC OUT –* terminal. Please respect the instructions of the previous paragraph.
- *Load interlock cables*: connect the cable of the load interlock circuit to *Sec.Ext* or *TB1* terminals. In case of device equipped with two interlock circuits, connect the first circuit to '*ec.Ext1* or *TB1-1/2* terminals and the second one to *Sec.Ext2* or *TB1-3/4* terminals. The circuit must be closed in both cases to start the equipment. Don't never apply any voltage between these two terminals. The contact(s) of the load must be floating, open = default (U≤15V, I≤20mA).
- *Special cables*: please refer to the *Installation – Specific instructions* chapter.

Safety instructions 3

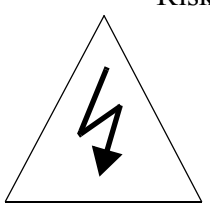
- This device is an electric generator (supply) and must be used for its especially designed applications only. Please refer to the *Star up/Running* and *Control module* description chapters.
- This latter contains live parts and running without his protection panels or doors opened is forbidden. Switching off imperatively the mains inputs before opening is obligatory. **Electrocution risk !** In certain types of device and depending the configuration, an electric potential can be generated between the analogue ground and the protective earth. Be sure of voltage absence before every intervention on the device.
- The different wirings must be done by an authorized and qualified technician. Use only the provided cables. For specific devices, cables may not be provided. In that case, types and sections of cables must be in accordance with the running standards. Too narrow a section can lead to an excessive heating or even fire. The type must be in accordance with the voltage of the equipment. **Risk of flash or electric shock !**
- For high voltage devices, please respect attentively indications, installation and start up instructions.
- Never disconnect any cable during the use of the device. Flash, burning and electrocution risk !
- Sprinkling or pouring liquids on the device is forbidden. Use a wet or alcohol soaked rag to clean the machine.
- For any maintenance operation, refer to the chapter *Maintenance*. The different operations must be done by an authorized and qualified technician or contact the Bruker's After Sales Service. Email: power-elec.support@bruker.fr
- Warning concerning the pacemakers: the device emits EM waves and the magnet produces a strong magnetic field that can disrupt the functioning of pacemakers.

Information:

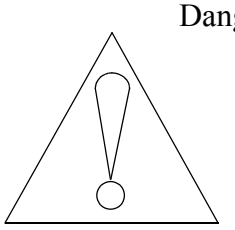
- The model identification plate is placed at the upper front or rear side from the cabinet frame. This plate is placed at the rear side in case of rack modules.

- Symbols :

Risk of electrocution



Danger



Maintenance 4

MAINTENANCE – LOW VOLTAGE DEVICE

Every intervention on the device must be carried out by an authorized and qualified person. Any failure due to a non-respect of the following instructions will not be attributable to Bruker and will not be covered by the guarantee clauses. Before any intervention, please read the safety instructions described under the heading *Safety Instructions*.

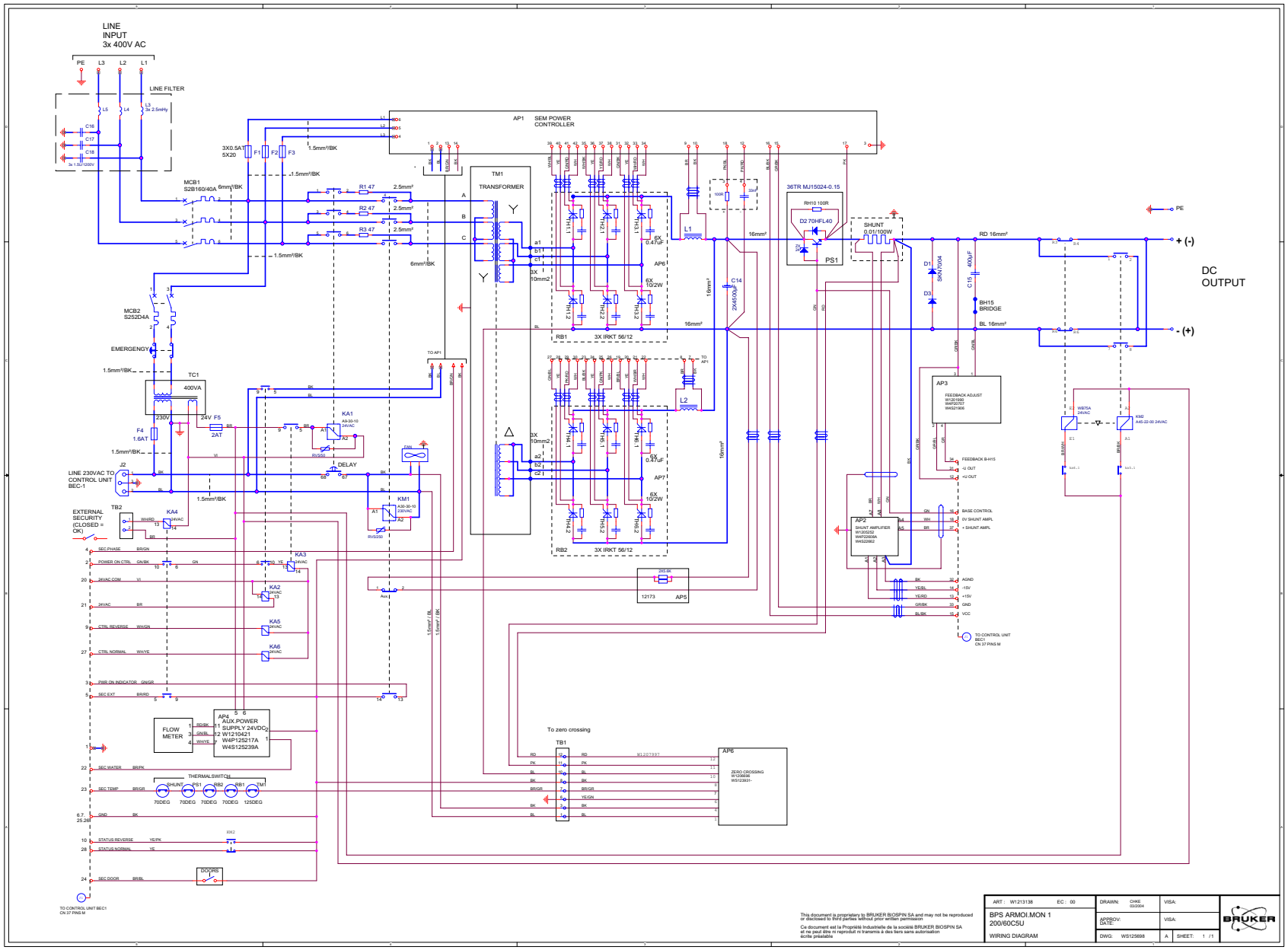
A) Points to check every three months:

- *Visual checking*: proceed to visual inspection of the device.
- *Water tightness of the cooling system*: check the absence of leak or drops at the connections level. Replace any defective tubing or connector.
- *Functionality of the water flow sensor*: stop the water inlet and check that *Water Error* is displayed. If the default is not detected, check or replace the flow meter.
- *Functionality of the fans*: check the fans for easily and silently operating. Replace if necessary.
- *Functionality of the interlock systems*: check the different circuits and the corresponding error messages. Be sure of their efficiency.

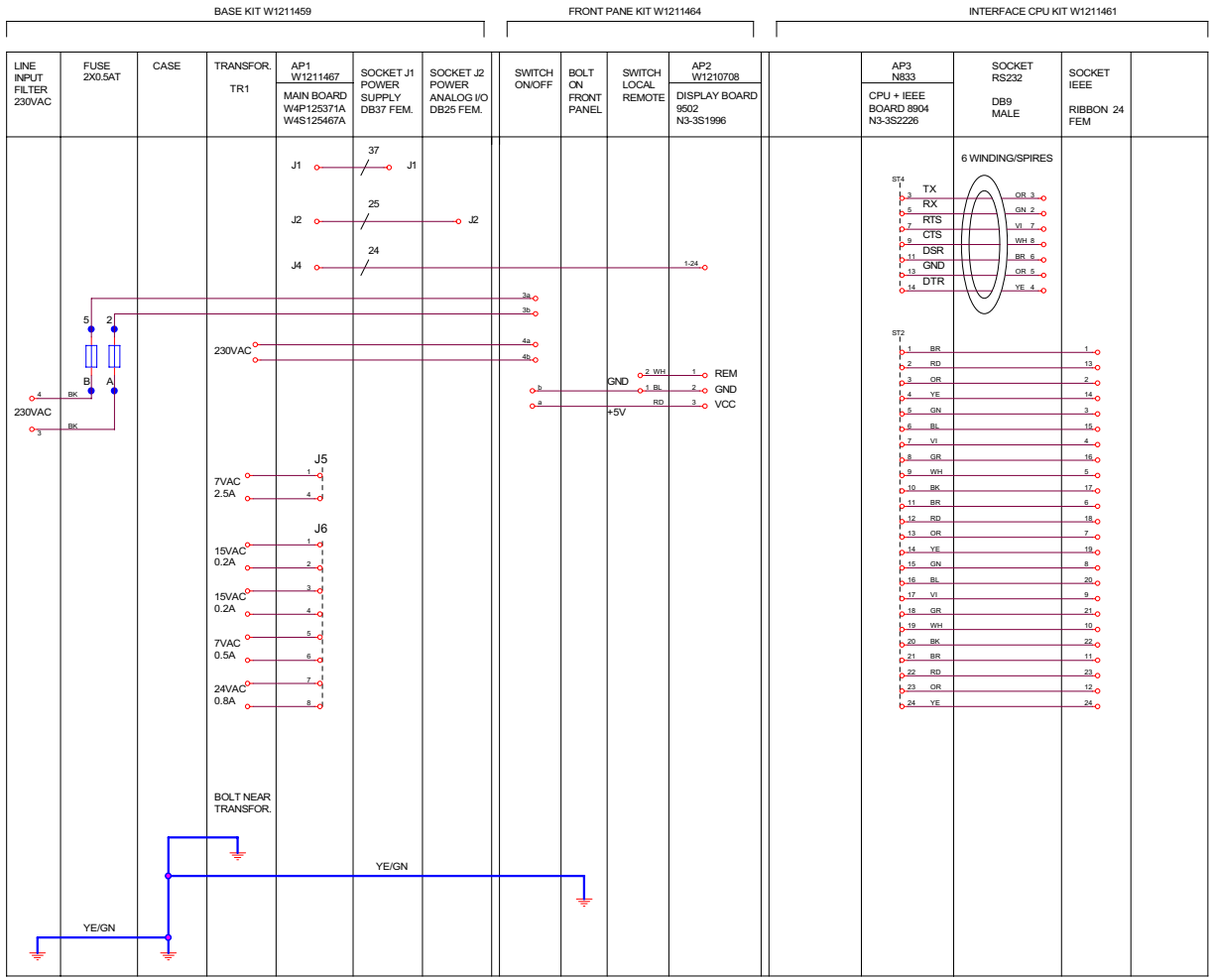
B) Complementary checks to carry out every six months:

- *Cleaning out the components and the filters.* Any dust or mess must be removed by vacuum extraction or with a soft bristle brush. Clean the dust filters (only on certain types of devices) or replace if necessary. For any cleaning of components, please use a 90° alcohol impregnate rag. Don't never use water.
- *Checking hoses and cooling plates*: replace any defective, porous or harden component.
- *Power circuit*: check the tightness of screws and connectors of the power circuit. Replace components or cables which are altered by time or by an over-heating due to a misconnection.
- *Transistor power stage* (only on power supplies fitted with serial regulation): check the state of every emitter fuse. Any broken fuse must be replaced, the corresponding transistor as well. To dismantle the transistor, remove tin from the two pins with an unsolder pump and remove the two fixing screws from the case. Replace the transistor by the same type or equivalent. Keep in mind the drop of thermal paste under the middle of the transistor. Put back in place the two screws and solder the two pins.

Wiring diagrams 5



ART : W1213138 EC : 00	DRAWN: CHKE 03/2004	VISA:	BRUKER
BPS ARMOI.MON 1 200/60C5U	APPROV: DATE:	VISA:	
WIRING DIAGRAM	DWG: WS125698	A	SHEET: 1 /1



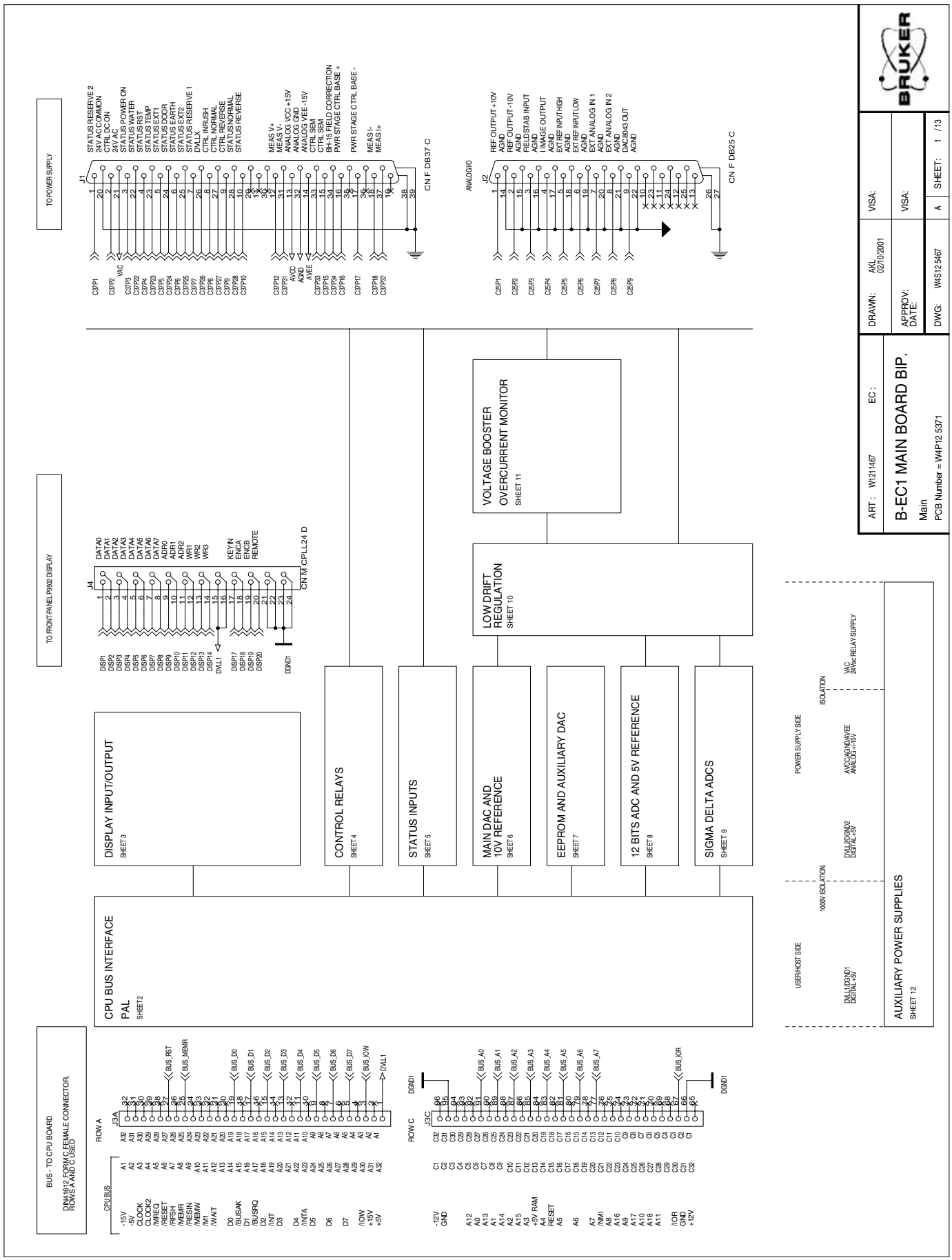
REV	MODIFIED/DATE	NUMBER	COMMENTS

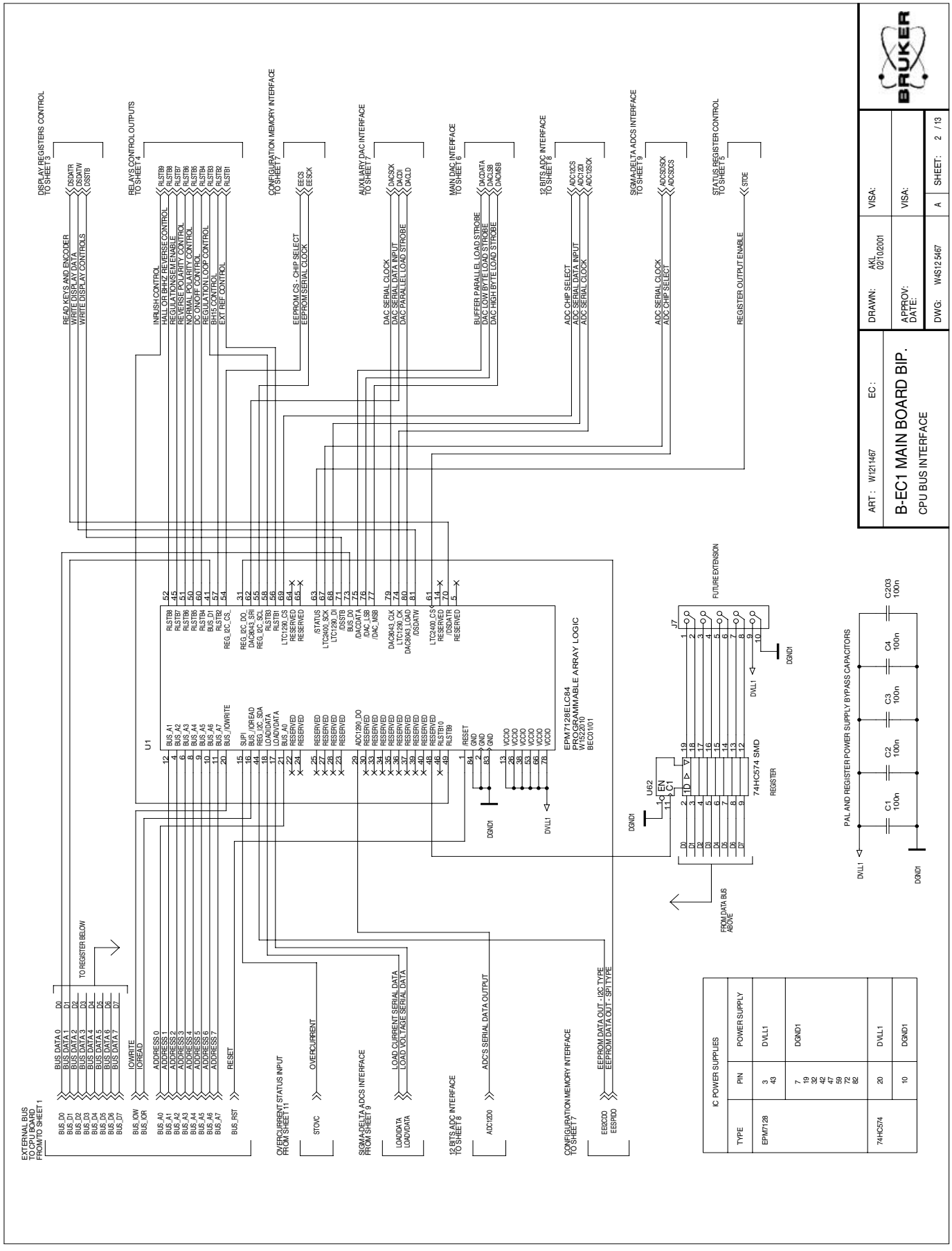
ART : W1211454 EC :		DRAWN: SF DATE: 02/01	VISA :
BPS LOCAL CTRL UNIT BIPOLAR BEC-1 RS232+IEEE WIRING DIAGRAM		APPROV: DATE:	VISA :
		DWG : W2S125413	A SHEET : 1/1

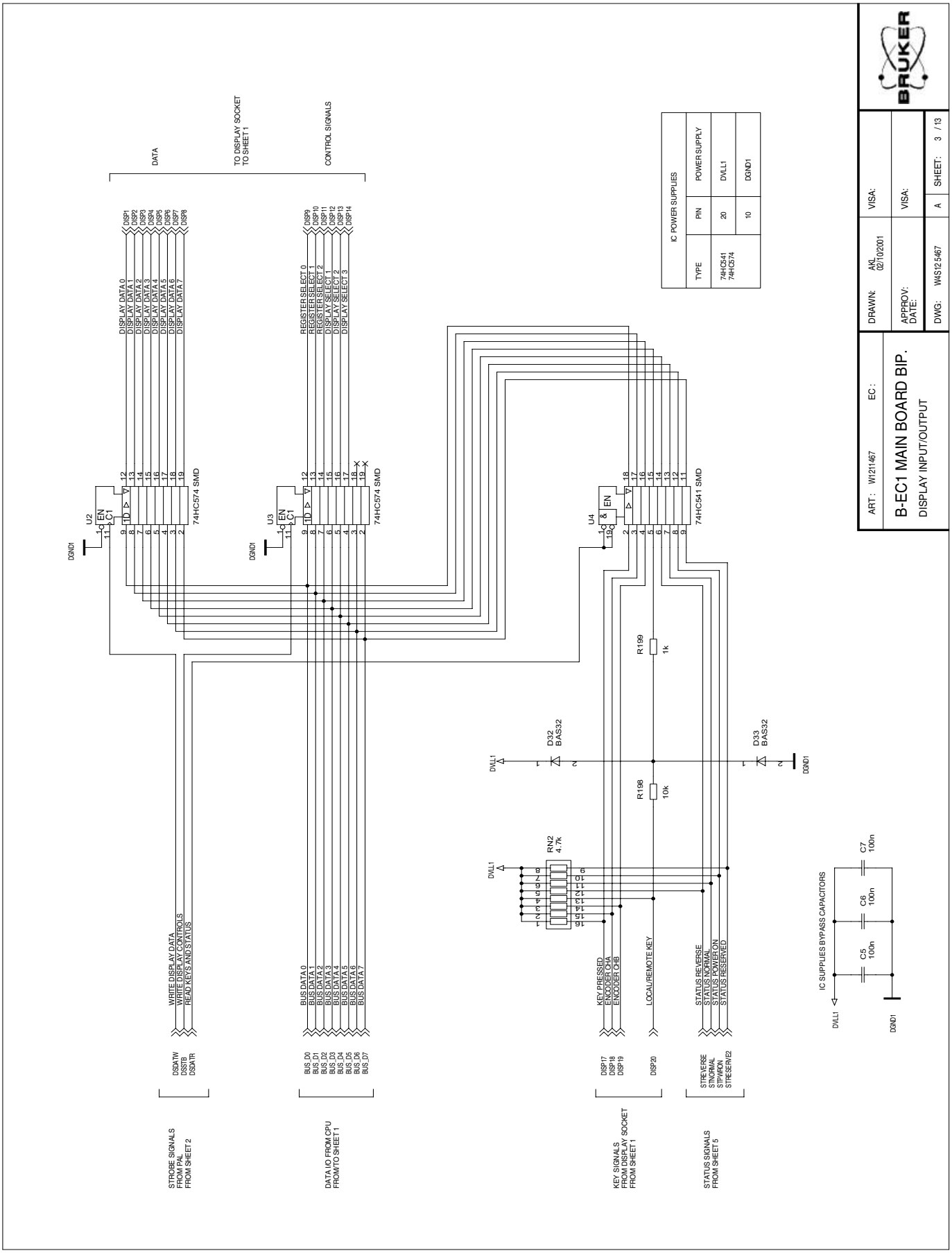
Wiring diagrams

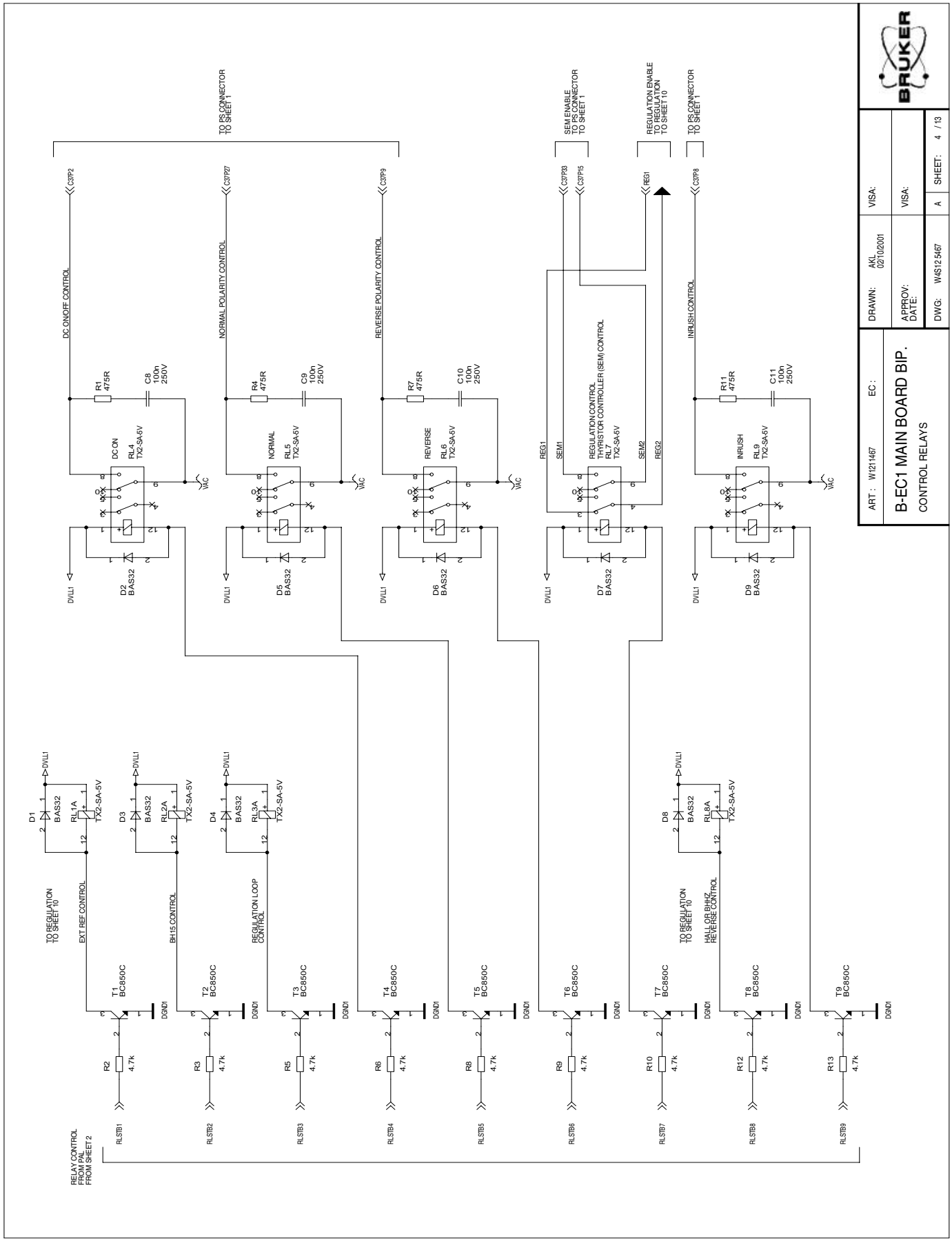
B-EC1 Main board

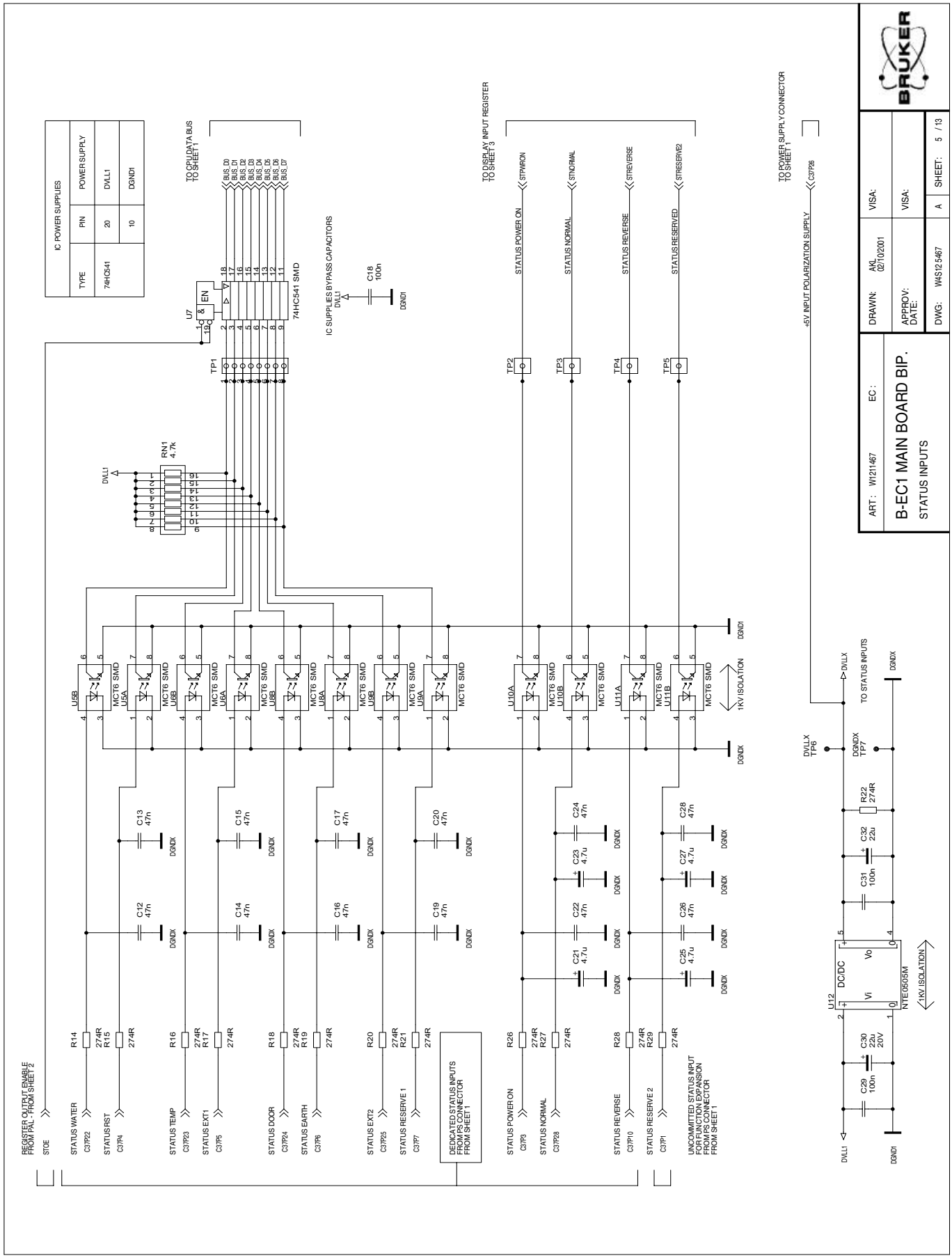
DWG : WS125467A

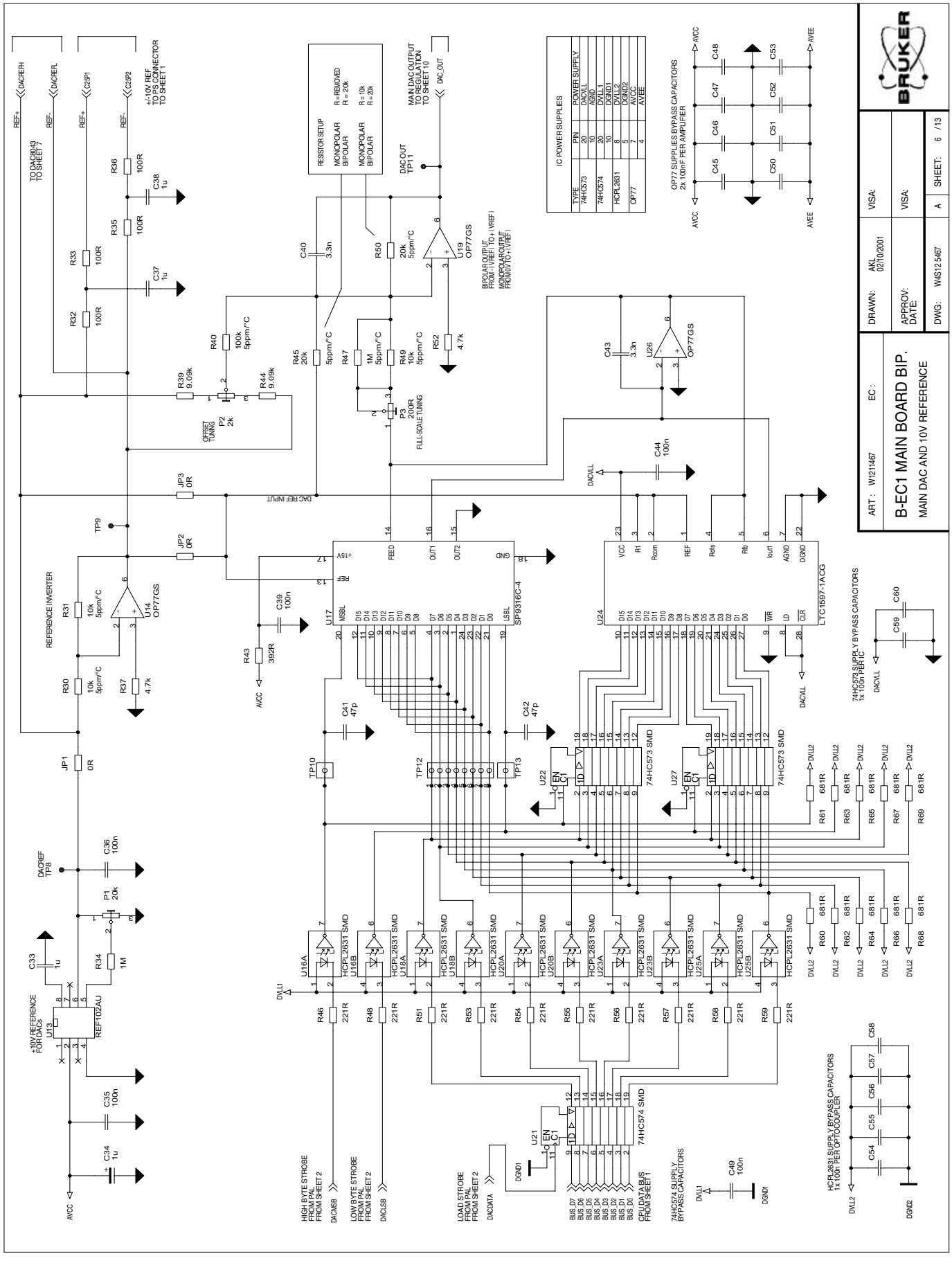

B-EC1 MAIN BOARD BIP.
Main
PCB Number = W4P12 5371
ART : W121467
EC :
DRAWN: AKL 02/10/2001
APPROV:
DATE:
VISA:
DWG: W4S12 5467
A
SHEET: 1 /13
BRUKER
BUS - TO CPU BOARD
DIN41612 FORM C FEMALE CONNECTOR, ROWS A AND C USED
CPU BUS
ROW A
ROW C
CPU BUS INTERFACE PAL
SHEET2
DISPLAY INPUT/OUTPUT
SHEET 3
CONTROL RELAYS
SHEET 4
STATUS INPUTS
SHEET 5
MAIN DAC AND 10V REFERENCE
SHEET 6
EEPROM AND AUXILIARY DAC
SHEET 7
12 BITS ADC AND 5V REFERENCE
SHEET 8
SIGMA DELTA ADCS
SHEET 9
LOW DRIFT REGULATION
SHEET 10
VOLTAGE BOOSTER OVERCURRENT MONITOR
SHEET 11
AUXILIARY POWER SUPPLIES
SHEET 12
TO FRONT PANEL P9302 DISPLAY
TO POWER SUPPLY
CN M CPLL24 D
CN F DB37 C
CN F DB25 C
ANALOG/IO
USER/HOST SIDE
POWER SUPPLY SIDE
1000V ISOLATION
ISOLATION

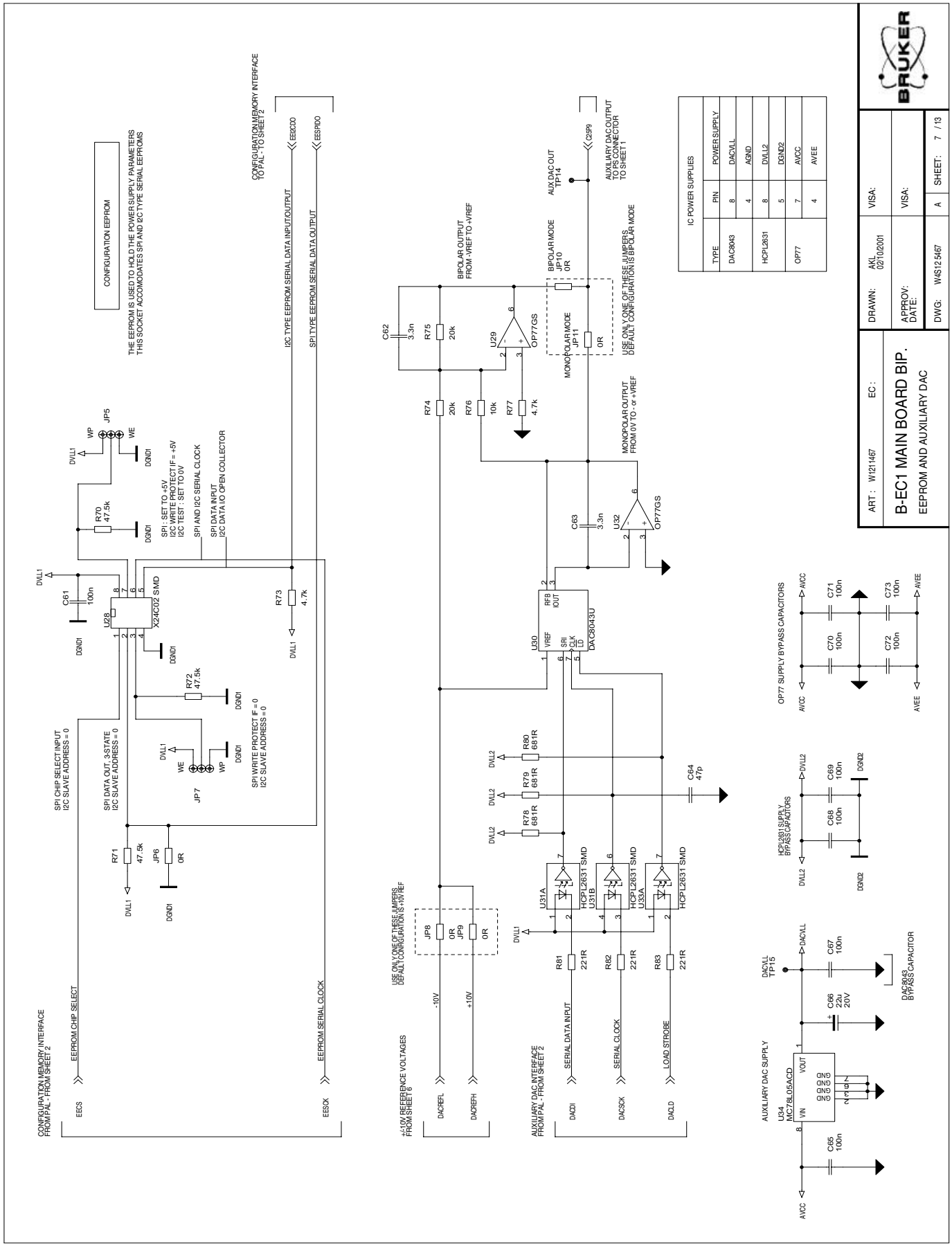

B-EC1 MAIN BOARD BIP.
CPU BUS INTERFACE
ART : W1211467
EC :
DRAWN: AKL 02/10/2001
APPROV.:
DATE:
DWG: W4S12 5467
VISA:
VISA:
A
SHEET: 2 / 13
BRUKER
DISPLAY REGISTERS CONTROL TO SHEET 5
RELAYS CONTROL OUTPUTS TO SHEET 4
CONFIGURATION MEMORY INTERFACE TO SHEET 7
AUXILIARY DAC INTERFACE TO SHEET 7
MAIN DAC INTERFACE TO SHEET 6
12 BITS ADC INTERFACE TO SHEET 8
SIGMA-DELTA ADCS INTERFACE TO SHEET 9
STATUS REGISTER CONTROL TO SHEET 5
READ KEYS AND ENCODER
WRITE DISPLAY DATA
WRITE DISPLAY CONTROLS
INRUSH CONTROL
HALL CONVERTER ENABLE
REGULATION ENABLE
REVERSE POLARITY CONTROL
NORMAL POLARITY CONTROL
DC ON/OFF CONTROL
REGULATION LOOP CONTROL
BH15 CONTROL
EXT REF CONTROL
EEPROM CS - CHIP SELECT
EEPROM SERIAL CLOCK
DAC SERIAL CLOCK
DAC SERIAL DATA INPUT
DAC PARALLEL LOAD STROBE
BUFFER PARALLEL LOAD STROBE
DAC LOW BYTE LOAD STROBE
DAC HIGH BYTE LOAD STROBE
ADC CHIP SELECT
ADC SERIAL DATA INPUT
ADC SERIAL CLOCK
ADC SERIAL CLOCK
ADC CHIP SELECT
REGISTER OUTPUT ENABLE
EXTERNAL BUS TO CPU BOARD FROM/TO SHEET 1
BUS_D0
BUS_D1
BUS_D2
BUS_D3
BUS_D4
BUS_D5
BUS_D6
BUS_D7
BUS_IOW
BUS_IOR
BUS_RST
TO REGISTER BELOW
IOWRITE
IOREAD
RESET
OVERCURRENT STATUS INPUT FROM SHEET 11
OVERCURRENT
SIGMA-DELTA ADCS INTERFACE FROM SHEET 9
LOAD CURRENT SERIAL DATA
LOAD VOLTAGE SERIAL DATA
LOADIDATA
LOADVDATA
12 BITS ADC INTERFACE TO SHEET 8
ADC12D0
ADC'S SERIAL DATA OUTPUT
CONFIGURATION MEMORY INTERFACE TO SHEET 7
EEDATO
EESPIDO
EEPROM DATA OUT - I2C TYPE
EEPROM DATA OUT - SPI TYPE
U1
EPM7128ELC84
PROGRAMMABLE ARRAY LOGIC
W1522010
BEC01101
U62
74HCS74 SMD
REGISTER
J7
FUTURE EXTENSION
FROM DATA BUS ABOVE
DGND1
DVLL1
PAL AND REGISTER POWER SUPPLY BYPASS CAPACITORS
C1 100n
C2 100n
C3 100n
C4 100n
C203 100n
IC POWER SUPPLIES
TYPE
PIN
POWER SUPPLY
EPM7128
3, 43
DVLL1
7, 19, 32, 42, 47, 59, 72, 82
DGND1
74HC574
20
DVLL1
10
DGND1

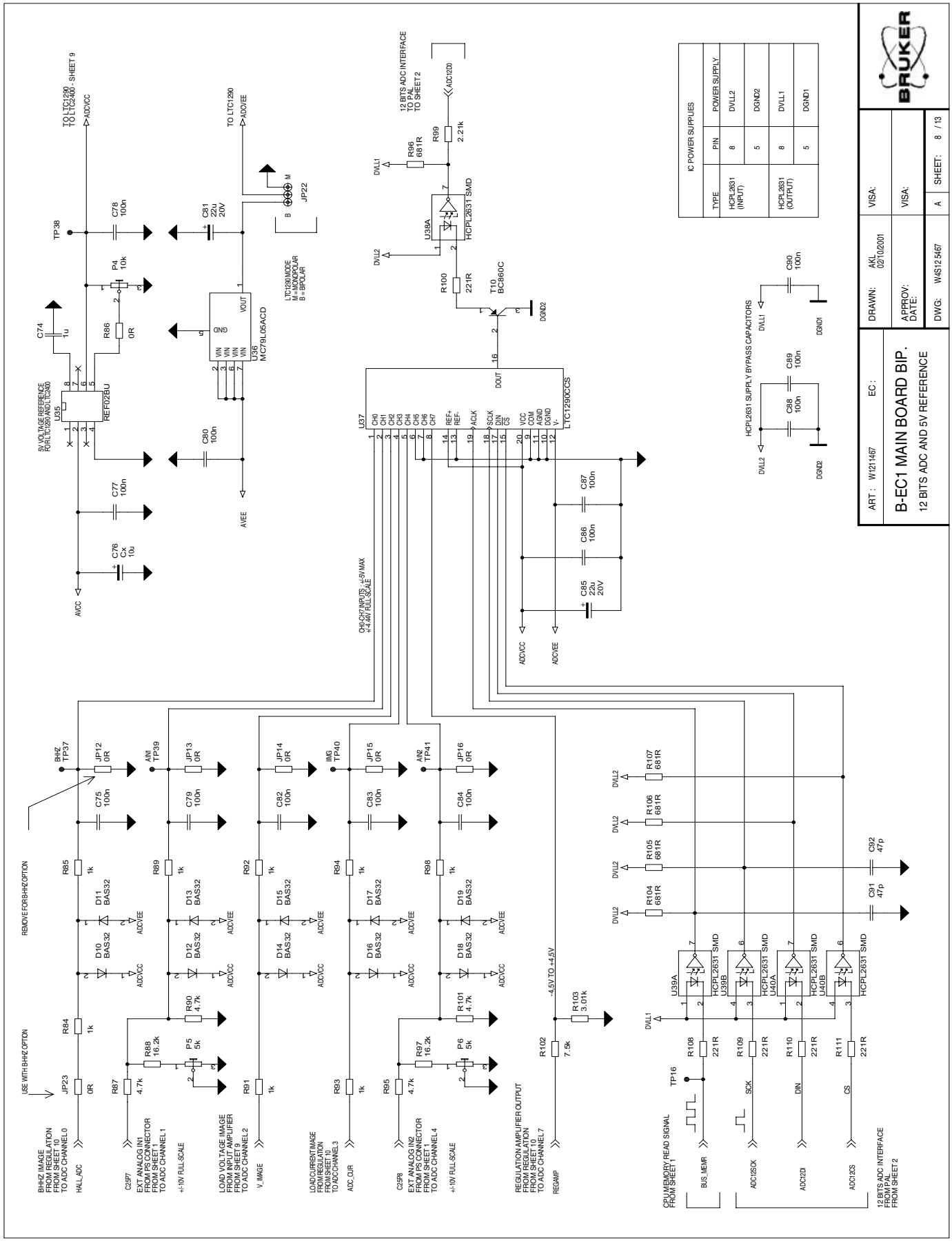

B-EC1 MAIN BOARD BIP.
DISPLAY INPUT/OUTPUT
ART.: W1211467
EC :
DRAWN: AK 02/10/2001
APPROV.:
DATE:
VISA:
VISA:
DWG: W4S12 5467
A
SHEET: 3 /13
BRUKER
DATA
TO DISPLAY SOCKET
TO SHEET 1
CONTROL SIGNALS
IC POWER SUPPLIES
TYPE
PIN
POWER SUPPLY
74HC541
74HC574
20
DVLL1
10
DGND1
U2
U3
U4
74HC574 SMD
74HC574 SMD
74HC541 SMD
DISPLAY DATA 0
DISPLAY DATA 1
DISPLAY DATA 2
DISPLAY DATA 3
DISPLAY DATA 4
DISPLAY DATA 5
DISPLAY DATA 6
DISPLAY DATA 7
REGISTER SELECT 0
REGISTER SELECT 1
REGISTER SELECT 2
DISPLAY SELECT 1
DISPLAY SELECT 2
DISPLAY SELECT 3
WRITE DISPLAY DATA
WRITE DISPLAY CONTROLS
READ KEYS AND STATUS
BUS DATA 0
BUS DATA 1
BUS DATA 2
BUS DATA 3
BUS DATA 4
BUS DATA 5
BUS DATA 6
BUS DATA 7
KEY PRESSED
ENCODER CHA
ENCODER CHB
LOCAL/REMOTE KEY
STATUS REVERSE
STATUS NORMAL
STATUS POWER ON
STATUS RESERVED
D32 BAS32
D33 BAS32
R199 1k
R198 10k
RN2 4.7k
C5 100n
C6 100n
C7 100n
IC SUPPLIES BYPASS CAPACITORS
STROBE SIGNALS FROM PAL FROM SHEET 2
DATA I/O FROM CPU FROM/TO SHEET 1
KEY SIGNALS FROM DISPLAY SOCKET FROM SHEET 1
STATUS SIGNALS FROM SHEET 5

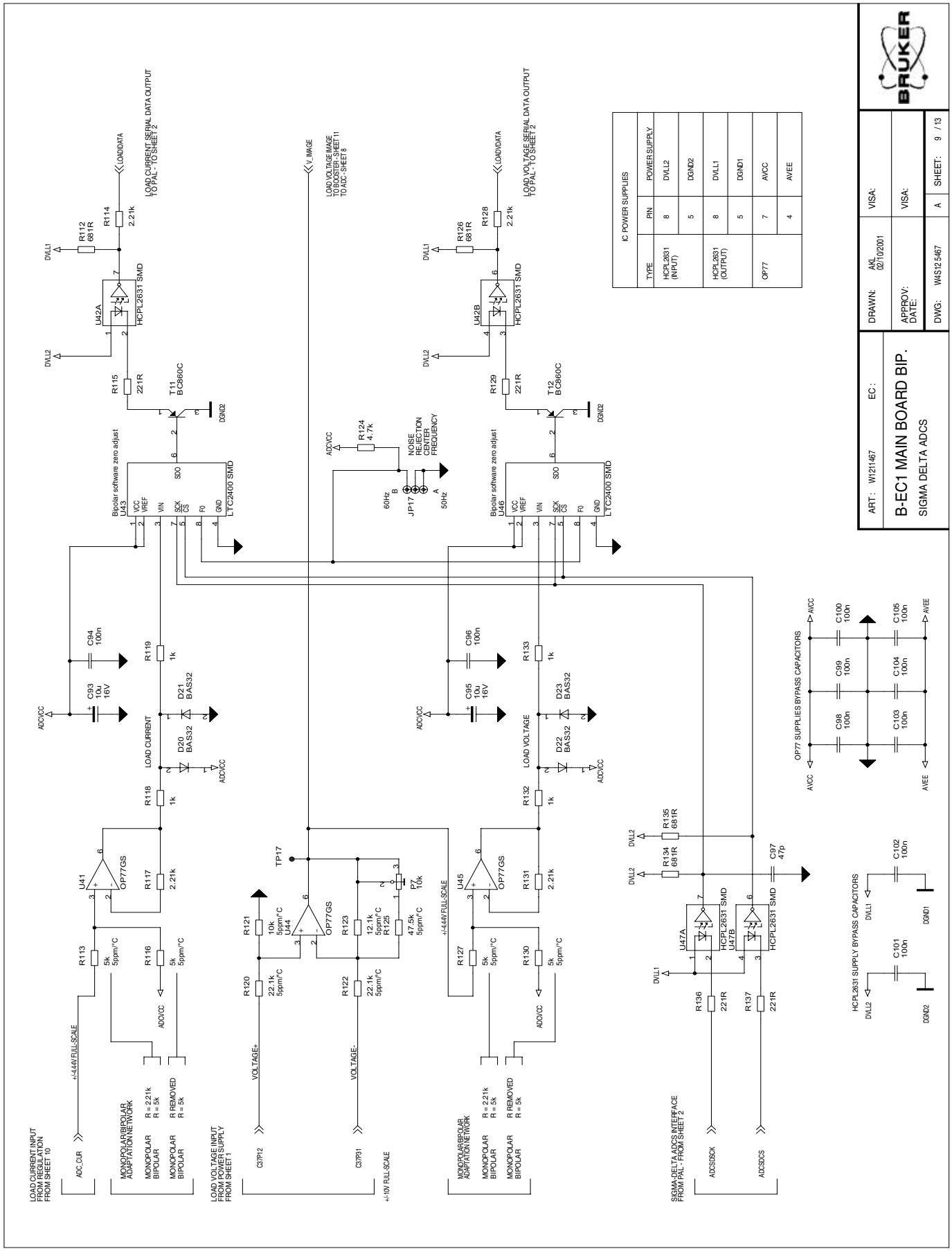

B-EC1 MAIN BOARD BIP.
CONTROL RELAYS
ART : W1211467
EC :
DRAWN: AKL 02/10/2001
APPROV:
DATE:
VISA:
VISA:
DWG: W4S12 5467
A
SHEET: 4 / 13
BRUKER
DC ON/OFF CONTROL
NORMAL POLARITY CONTROL
REVERSE POLARITY CONTROL
REGULATION CONTROL THYRISTOR CONTROLLER (SEM) CONTROL
INRUSH CONTROL
TO PS CONNECTOR TO SHEET 1
SEM ENABLE TO PS CONNECTOR TO SHEET 1
REGULATION ENABLE TO REGULATION TO SHEET 10
TO REGULATION TO SHEET 10
EXT REF CONTROL
BH15 CONTROL
REGULATION LOOP CONTROL
HALL OR BH15 REVERSE CONTROL
RELAY CONTROL FROM PAL FROM SHEET 2
DC:ON
NORMAL
REVERSE
INRUSH
BAS32
TX2-SA-5V
BC850C
4.7k
475R
100n 250V
DVLI1
VAC
DGND

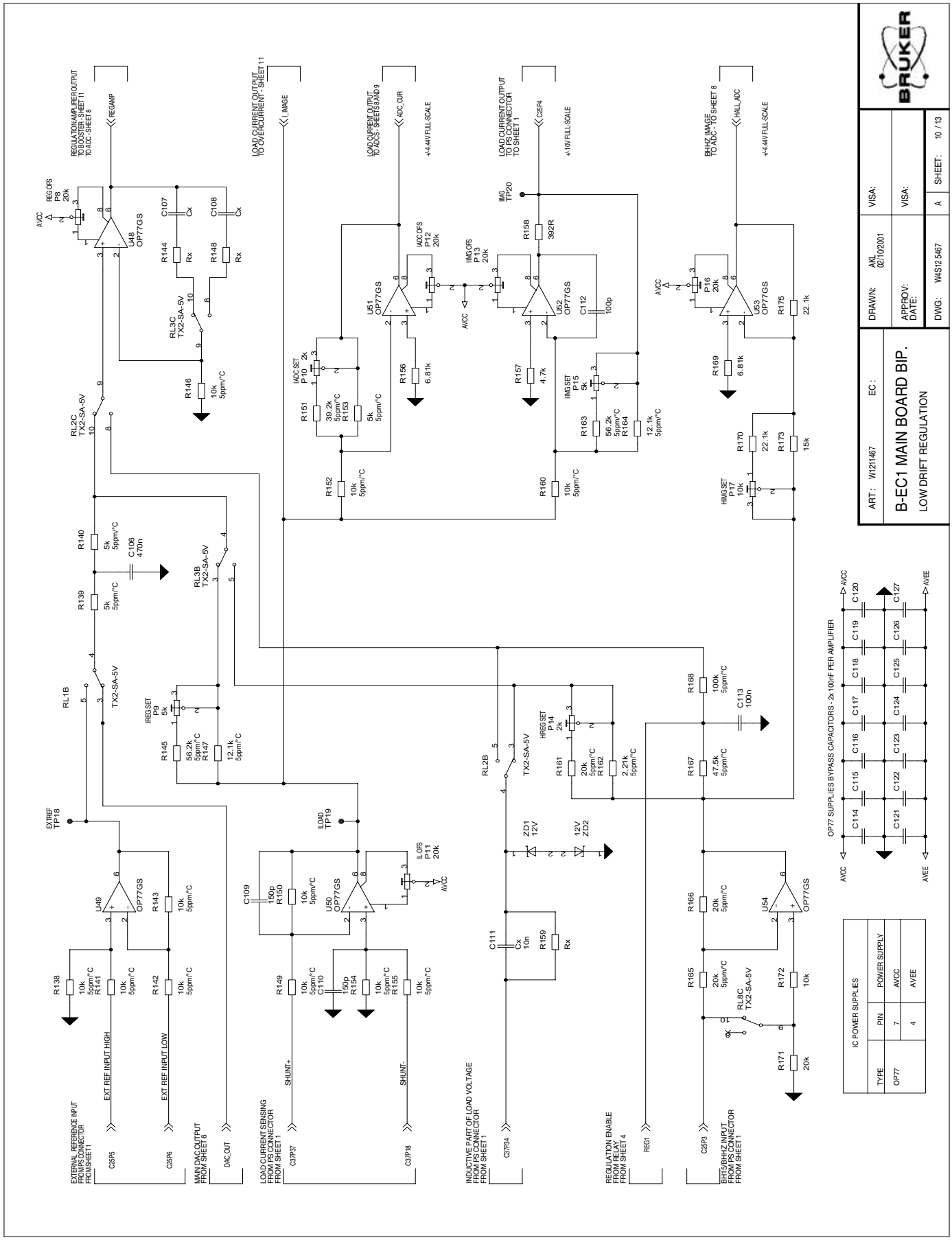

IC POWER SUPPLIES
TYPE
PIN
POWER SUPPLY
74HC541
20
DVLL1
10
DGND1
TO CPU DATA BUS
TO SHEET 1
BUS_D0
BUS_D1
BUS_D2
BUS_D3
BUS_D4
BUS_D5
BUS_D6
BUS_D7
U7
74HC541 SMD
IC SUPPLIES BYPASS CAPACITORS
C18
100n
TO DISPLAY INPUT REGISTER
TO SHEET 3
STPWRON
STNORMAL
STREVERSE
STRESERVE2
STATUS POWER ON
STATUS NORMAL
STATUS REVERSE
STATUS RESERVED
TO POWER SUPPLY CONNECTOR
TO SHEET 1
-5V INPUT POLARIZATION SUPPLY
C37P26
RN1
4.7k
TP1
TP2
TP3
TP4
TP5
MCT6 SMD
U5B
U5A
U6B
U6A
U7B
U7A
U8B
U8A
U9B
U9A
U10A
U10B
U11A
U11B
1KV ISOLATION
DGNDX
DGND1
DVLL1
C13 47n
C12 47n
C15 47n
C14 47n
C17 47n
C16 47n
C20 47n
C19 47n
C24 47n
C23 4.7u
C22 47n
C21 4.7u
C28 47n
C27 4.7u
C26 47n
C25 4.7u
R14 274R
R15 274R
R16 274R
R17 274R
R18 274R
R19 274R
R20 274R
R21 274R
R26 274R
R27 274R
R28 274R
R29 274R
STATUS WATER
STATUS RST
STATUS TEMP
STATUS EXT1
STATUS DOOR
STATUS EARTH
STATUS EXT2
STATUS RESERVE 1
STATUS POWER ON
STATUS NORMAL
STATUS REVERSE
STATUS RESERVE 2
C37P22
C37P4
C37P23
C37P5
C37P24
C37P6
C37P25
C37P7
C37P3
C37P28
C37P10
C37P1
REGISTER OUTPUT ENABLE
FROM PAL - FROM SHEET 2
STOE
DEDICATED STATUS INPUTS
FROM PS CONNECTOR
FROM SHEET 1
UNCOMMITTED STATUS INPUT
FOR FUNCTION EXPANSION
FROM PS CONNECTOR
FROM SHEET 1
DVLLX
TP6
DGNDX
TP7
TO STATUS INPUTS
R22 274R
C32 22u
C31 100n
U12
DC/DC
Vi
Vo
NTE 0505M
1KV ISOLATION
C30 22u 20V
C29 100n
ART: W1211467
EC:
B-EC1 MAIN BOARD BIP.
STATUS INPUTS
DRAWN: AKL 02/10/2001
APPROV:
DATE:
VISA:
VISA:
DWG: W4S12 5467
A
SHEET: 5 / 13
BRUKER

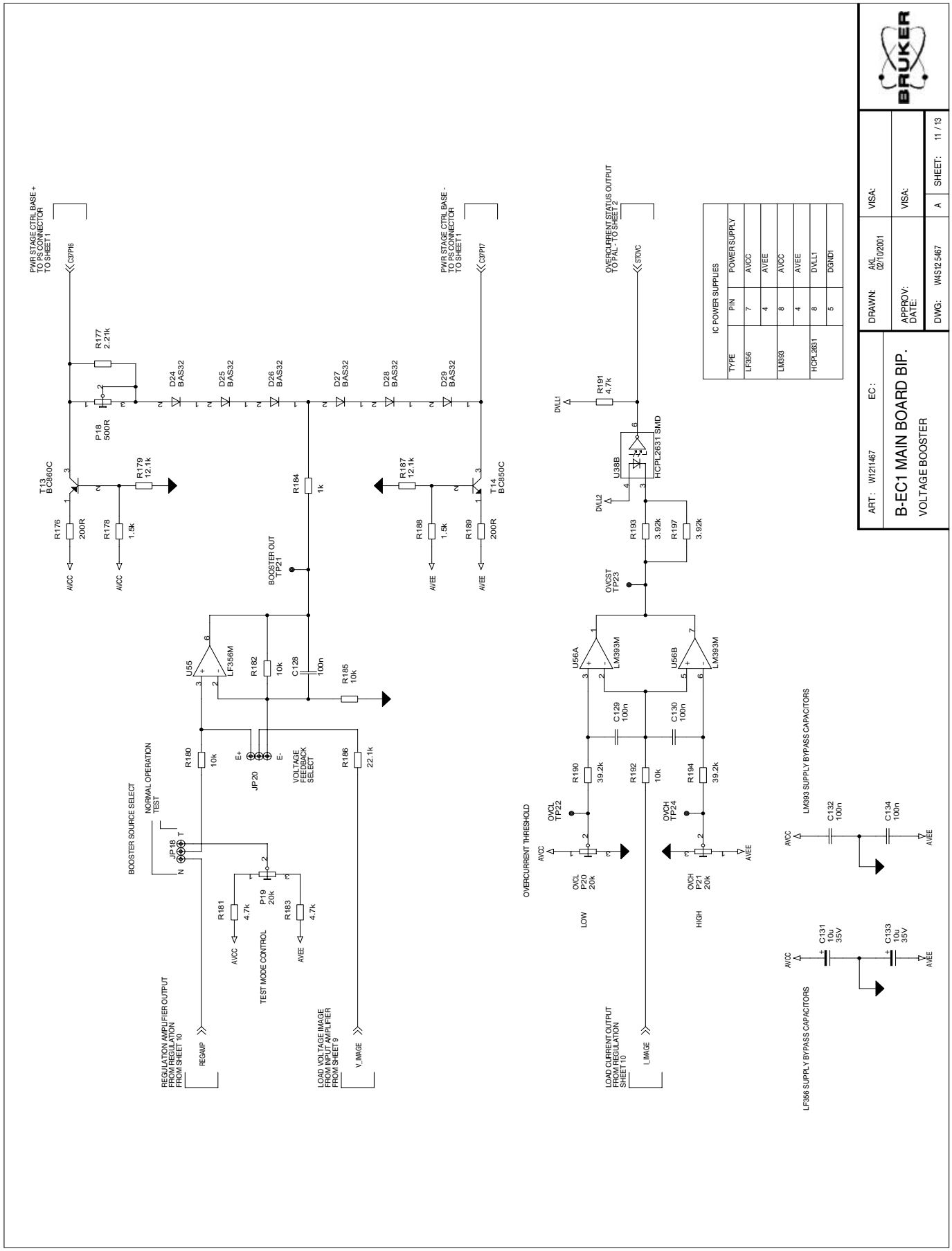

B-EC1 MAIN BOARD BIP.
MAIN DAC AND 10V REFERENCE
ART : W1211467
EC :
DRAWN: AKL 02/10/2001
APPROV:
DATE:
VISA:
VISA:
DWG: W4S12 5467
A
SHEET: 6 /13
BRUKER
IC POWER SUPPLIES
TYPE P/N POWER SUPPLY
74HC573 20 DACVLL
10 AGND
74HC574 20 DVLL1
10 DGND1
HCPL2631 8 DVLL2
5 DGND2
OP77 7 AVCC
4 AVEE
RESISTOR SETUP
MONOPOLAR R = REMOVED
BIPOLAR R = 20k
MONOPOLAR R = 10k
BIPOLAR R = 20k
OP77 SUPPLIES BYPASS CAPACITORS
2x 100nF PER AMPLIFIER
REFERENCE INVERTER
±10V REFERENCE FOR DACs
REF102AU
SP9316C-4
LTC1597-1ACG
74HC573 SUPPLY BYPASS CAPACITORS
1x 100nF PER IC
74HC574 SUPPLY BYPASS CAPACITORS
HCPL2631 SUPPLY BYPASS CAPACITORS
1x 100n PER OPTOCOUPLER
HCPL2631 SMD
74HC573 SMD
74HC574 SMD
OP77GS
DAC REF INPUT
OFFSET TUNING
FULL-SCALE TUNING
MAIN DAC OUTPUT TO REGULATION TO SHEET 10
+/-10V REF TO PS CONNECTOR TO SHEET 1
TO DAC8043 TO SHEET 7
HIGH BYTE STROBE FROM PAL FROM SHEET 2
LOW BYTE STROBE FROM PAL FROM SHEET 2
LOAD STROBE FROM PAL FROM SHEET 2
CPU DATA BUS FROM SHEET 1

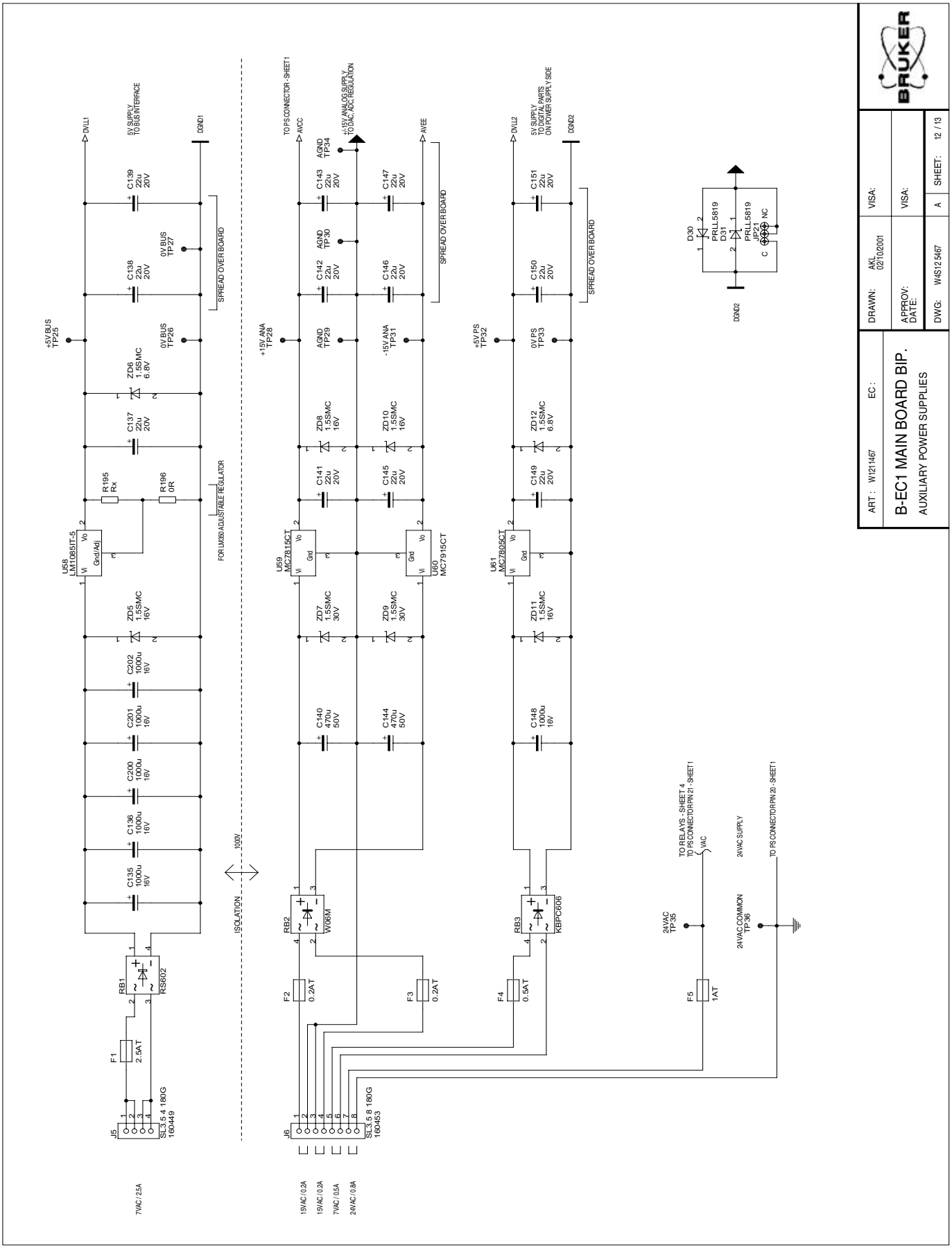

CONFIGURATION EEPROM
THE EEPROM IS USED TO HOLD THE POWER SUPPLY PARAMETERS
THIS SOCKET ACCOMODATES SPI AND I2C TYPE SERIAL EEPROMS
CONFIGURATION MEMORY INTERFACE
TO PAL - TO SHEET 2
I2C TYPE EEPROM SERIAL DATA INPUT/OUTPUT
SPI TYPE EEPROM SERIAL DATA OUTPUT
EEDCIO
EESPDO
SPI : SET TO +5V
I2C WRITE PROTECT IF = +5V
I2C TEST : SET TO 0V
SPI AND I2C SERIAL CLOCK
SPI DATA INPUT
I2C DATA I/O OPEN COLLECTOR
SPI CHIP SELECT INPUT
I2C SLAVE ADDRESS = 0
SPI DATA OUT, 3-STATE
I2C SLAVE ADDRESS = 0
SPI WRITE PROTECT IF = 0
I2C SLAVE ADDRESS = 0
CONFIGURATION MEMORY INTERFACE
FROM PAL - FROM SHEET 2
EEPROM CHIP SELECT
EEPROM SERIAL CLOCK
EECS
EESCK
BIPOLAR OUTPUT
FROM -VREF TO +VREF
MONOPOLAR OUTPUT
FROM 0V TO - or +VREF
BIPOLAR MODE
JP10
0R
MONOPOLAR MODE
JP11
0R
AUX DAC OUT
TP14
AUXILIARY DAC OUTPUT
TO PS CONNECTOR
TO SHEET 1
USE ONLY ONE OF THESE JUMPERS
DEFAULT CONFIGURATION IS BIPOLAR MODE
IC POWER SUPPLIES
TYPE
PIN
POWER SUPPLY
DAC8043
8
DACVLL
4
AGND
HCPL2631
8
DVLL2
5
DGND2
OP77
7
AVCC
4
AVEE
OP77GS
DAC8043
VREF
RFB
IOUT
SRI
CLK
LD
HCPL2631 SMD
X24C02 SMD
OP77 SUPPLY BYPASS CAPACITORS
HCPL2631 SUPPLY
BYPASS CAPACITORS
DAC8043
BYPASS CAPACITOR
AUXILIARY DAC SUPPLY
MC78L05ACD
+/-10V REFERENCE VOLTAGES
FROM SHEET 6
USE ONLY ONE OF THESE JUMPERS
DEFAULT CONFIGURATION IS +10V REF
-10V
+10V
DACREFL
DACREFH
AUXILIARY DAC INTERFACE
FROM PAL - FROM SHEET 2
SERIAL DATA INPUT
SERIAL CLOCK
LOAD STROBE
DACDI
DACSCK
DACLD
DACVLL
TP15
ART : W1211467
EC :
B-EC1 MAIN BOARD BIP.
EEPROM AND AUXILIARY DAC
DRAWN:
AKL
02/10/2001
APPROV.:
DATE:
VISA:
VISA:
DWG: W4S125467
A
SHEET: 7 / 13
BRUKER

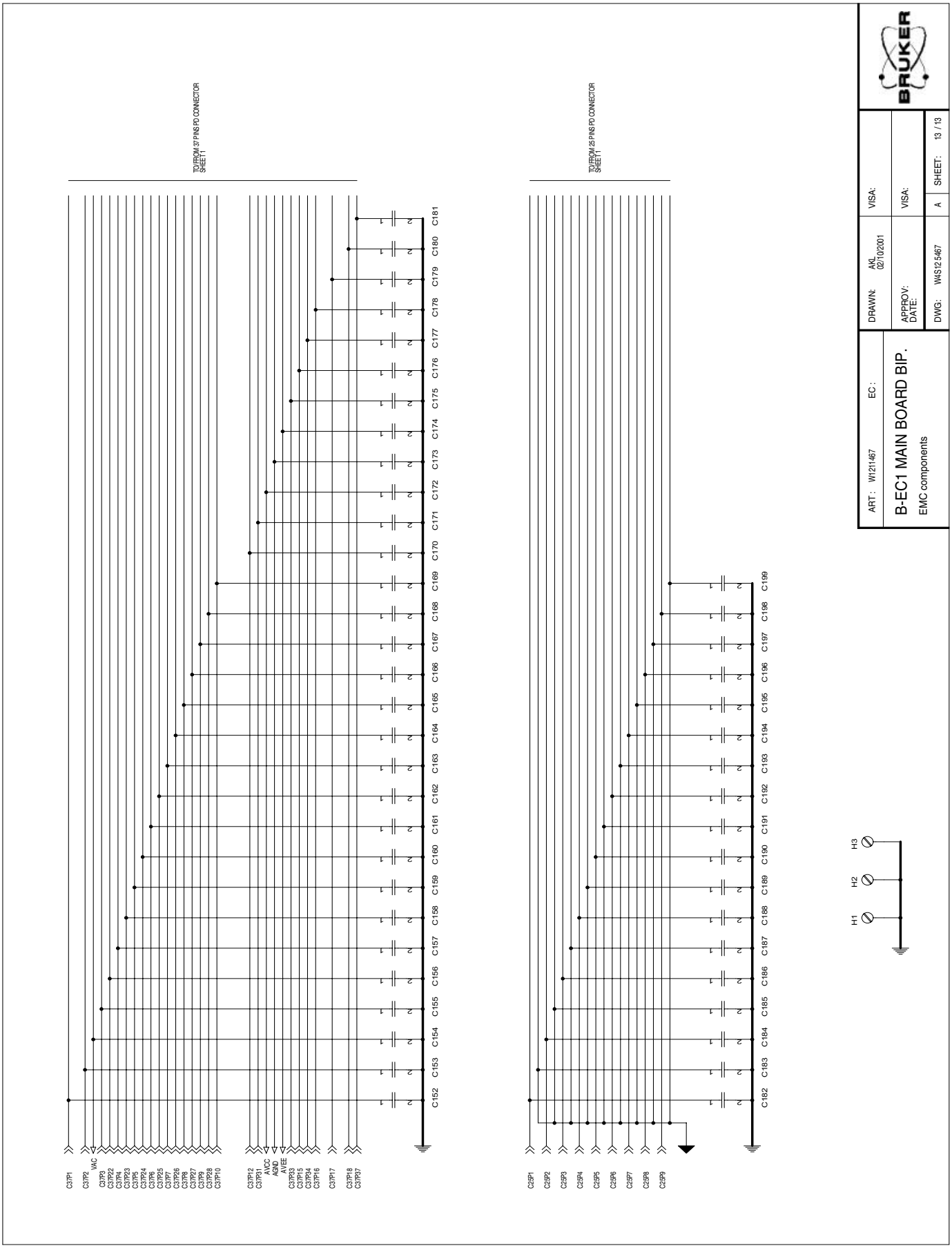

B-EC1 MAIN BOARD BIP.
12 BITS ADC AND 5V REFERENCE
ART : W1211467
EC :
DRAWN: AKL 02/10/2001
APPROV:
DATE:
VISA:
DWG: W4S125467
A
SHEET: 8 / 13
BRUKER
IC POWER SUPPLIES
TYPE
PIN
POWER SUPPLY
HCPL2631 (INPUT)
8
DVLL2
5
DGND2
HCPL2631 (OUTPUT)
8
DVLL1
5
DGND1
5V VOLTAGE REFERENCE FOR LTC1290 AND LTC2400
REF02BU
MC79L06ACD
LTC1290 MODE M = MONOPOLAR B = BIPOLAR
TO LTC1290 TO LTC2400 - SHEET 9
TO LTC1290
12 BITS ADC INTERFACE TO PAL TO SHEET 2
HCPL2631 SUPPLY BYPASS CAPACITORS
CH0-CH7 INPUTS : +/-5V MAX +/-4.44V FULL SCALE
LTC1290CCS
REMOVE FOR BHHZ OPTION
USE WITH BHHZ OPTION
BHHZ IMAGE FROM REGULATION FROM SHEET 10 TO ADC CHANNEL0
HALL_ADC
EXT.ANALOG IN1 FROM PS CONNECTOR FROM SHEET 1 TO ADC CHANNEL 1
+/-10V FULL SCALE
LOAD VOLTAGE IMAGE FROM INPUT AMPLIFIER FROM SHEET 9 TO ADC CHANNEL 2
V_IMAGE
LOAD CURRENT IMAGE FROM REGULATION FROM SHEET 10 TO ADC CHANNEL 3
ADC_OUR
EXT.ANALOG IN2 FROM PS CONNECTOR FROM SHEET 1 TO ADC CHANNEL 4
+/-10V FULL SCALE
REGULATION AMPLIFIER OUTPUT FROM REGULATION FROM SHEET 10 TO ADC CHANNEL 7
REGAMP
-4.5V TO +4.5V
CPU MEMORY READ SIGNAL FROM SHEET 1
BUS_MEMR
ADC12SCK
ADC12DI
ADC12SS
12 BITS ADC INTERFACE FROM SHEET 2
HCPL2631 SMD


B-EC1 MAIN BOARD BIP.
SIGMA DELTA ADCS
ART.: W1211467
EC:
DRAWN: AK 02/10/2001
APPROV:
DATE:
VISA:
DWG: W4S12 5467
A
SHEET: 9 /13
BRUKER
IC POWER SUPPLIES
TYPE
PIN
POWER SUPPLY
HCPL2631 (INPUT)
HCPL2631 (OUTPUT)
OP77
LOAD CURRENT SERIAL DATA OUTPUT TO PAL - TO SHEET 2
LOAD VOLTAGE SERIAL DATA OUTPUT TO PAL - TO SHEET 2
LOAD VOLTAGE IMAGE TO BOOSTER - SHEET 11 TO ADC - SHEET 8
V_IMAGE
Bipolar software zero adjust
LTC2400 SMD
NOISE REJECTION CENTER FREQUENCY
60Hz
50Hz
JP17
OP77 SUPPLIES BYPASS CAPACITORS
HCPL2631 SUPPLY BYPASS CAPACITORS
LOAD CURRENT INPUT FROM REGULATION FROM SHEET 10
LOAD VOLTAGE INPUT FROM POWER SUPPLY FROM SHEET 1
SIGMA-DELTA ADCS INTERFACE FROM PAL - FROM SHEET 2
MONOPOLAR/BIPOLAR ADAPTATION NETWORK
LOAD CURRENT
LOAD VOLTAGE
+/-444/FULL-SCALE
+/-10V/ FULL-SCALE
VOLTAGE+
VOLTAGE-
ADCSDSCK
ADCSDCS


B-EC1 MAIN BOARD BIP.
LOW DRIFT REGULATION
ART: W1211467
EC:
DRAWN: AKL 02/10/2001
APPROV:
DATE:
VISA:
VISA:
DWG: W4S12 5467
A
SHEET: 10 / 13
BRUKER
REGULATION AMPLIFIER OUTPUT TO BOOSTER - SHEET 11 TO ADC - SHEET 8
LOAD CURRENT OUTPUT TO OVERCURRENT - SHEET 11
LOAD CURRENT OUTPUT TO ADCS - SHEETS 8 AND 9
LOAD CURRENT OUTPUT TO DAC CONNECTOR TO SHEET 1
BHHZ IMAGE TO ADC - TO SHEET 8
+/-4.44V FULL-SCALE
+/-10V FULL-SCALE
OP77 SUPPLIES BYPASS CAPACITORS - 2x 100nF PER AMPLIFIER
IC POWER SUPPLIES
TYPE
PIN
POWER SUPPLY
OP77
7
AVCC
4
AVEE
EXTERNAL REFERENCE INPUT FROM PS CONNECTOR FROM SHEET 1
MAIN DAC OUTPUT FROM SHEET 6
LOAD CURRENT SENSING FROM PS CONNECTOR FROM SHEET 1
INDUCTIVE PART OF LOAD VOLTAGE FROM PS CONNECTOR FROM SHEET 1
REGULATION ENABLE FROM RELAY FROM SHEET 4
BH15/BHHZ INPUT FROM PS CONNECTOR FROM SHEET 1
EXT. REF. INPUT HIGH
EXT. REF. INPUT LOW
SHUNT+
SHUNT-
DAC_OUT
I_IMAGE
ADC_CUR
HALL_ADC
REGAMP
C25P5
C25P6
C37P37
C37P18
C37P34
REG1
C25P3
C25P4
U48 OP77GS
U49 OP77GS
U50 OP77GS
U51 OP77GS
U52 OP77GS
U53 OP77GS
U54 OP77GS
RL1B TX2-SA-5V
RL2B TX2-SA-5V
RL2C TX2-SA-5V
RL3B TX2-SA-5V
RL3C TX2-SA-5V
RL8C TX2-SA-5V
REG OFS P8 20k
IREG SET P9 5k
IMG OFS P13 20k
IMG SET P15 5k
HIMG SET P17 10k
IADC SET P10 2k
IADC OFS P12 20k
HREG SET P14 2k
HMG OFS P16 20k
ILOAD TP19
ILOFS P11 20k
EXTREF TP18
IMG TP20
AVCC
AVEE

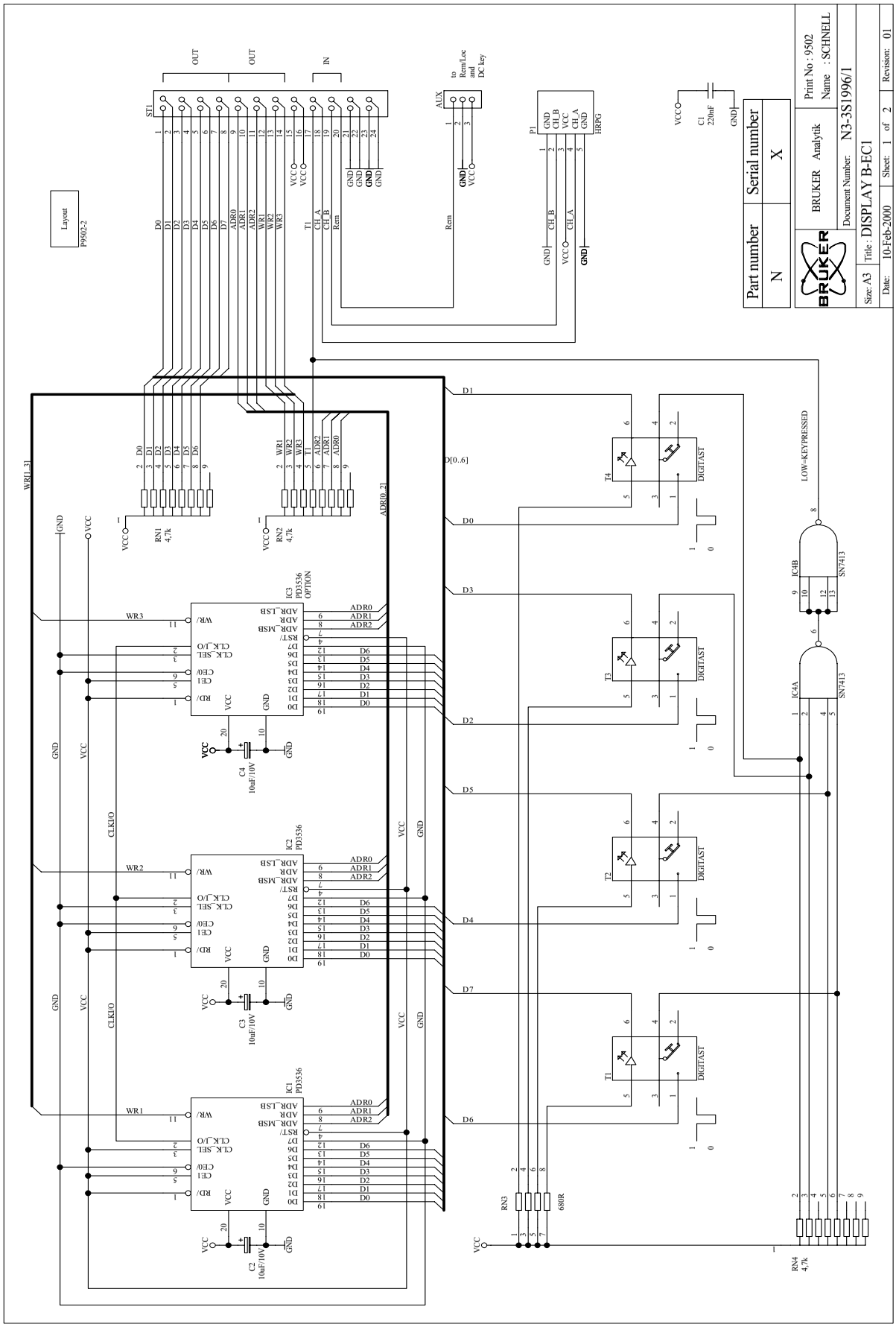

PWR STAGE CTRL BASE +
TO PS CONNECTOR
TO SHEET 1
C37P16
R177
2.21k
P18
500R
D24
BAS32
D25
BAS32
D26
BAS32
D27
BAS32
D28
BAS32
D29
BAS32
PWR STAGE CTRL BASE -
TO PS CONNECTOR
TO SHEET 1
C37P17
T13
BC860C
R179
12.1k
R176
200R
R178
1.5k
AVCC
AVCC
R184
1k
R187
12.1k
R188
1.5k
R189
200R
AVEE
AVEE
T14
BC850C
BOOSTER OUT
TP21
U55
LF356M
R182
10k
C128
100n
R185
10k
BOOSTER SOURCE SELECT
NORMAL OPERATION
TEST
JP18
R180
10k
E+
E-
JP20
VOLTAGE
FEEDBACK
SELECT
R186
22.1k
R181
4.7k
P19
20k
R183
4.7k
AVCC
AVEE
TEST MODE CONTROL
REGULATION AMPLIFIER OUTPUT
FROM REGULATION
FROM SHEET 10
REGAMP
LOAD VOLTAGE IMAGE
FROM MEASUREMENT AMPLIFIER
FROM SHEET 9
V_IMAGE
OVERCURRENT STATUS OUTPUT
TO PAL - TO SHEET 2
S70VC
R191
4.7k
DVLL1
U38B
HCPL2631 SMD
DVLL2
R193
3.92k
R197
3.92k
OVCST
TP23
U56A
LM393M
U56B
LM393M
C129
100n
C130
100n
R190
39.2k
R192
10k
R194
39.2k
OVCL
TP22
OVCH
TP24
OVCL
P20
20k
OVCH
P21
20k
AVCC
AVEE
LOW
HIGH
OVERCURRENT THRESHOLD
LOAD CURRENT OUTPUT
FROM REGULATION
SHEET 10
I_IMAGE
IC POWER SUPPLIES
TYPE
PIN
POWER SUPPLY
LF356
7
AVCC
4
AVEE
LM393
8
AVCC
4
AVEE
HCPL2631
8
DVLL1
5
DGND1
LM393 SUPPLY BYPASS CAPACITORS
C132
100n
C134
100n
C131
10u
35V
C133
10u
35V
LF356 SUPPLY BYPASS CAPACITORS
ART: W1211467
EC :
B-EC1 MAIN BOARD BIP.
VOLTAGE BOOSTER
DRAWN: AKL 02/10/2001
APPROV.:
DATE:
VISA:
VISA:
DWG: W4S12 5467
A
SHEET: 11 / 13
BRUKER

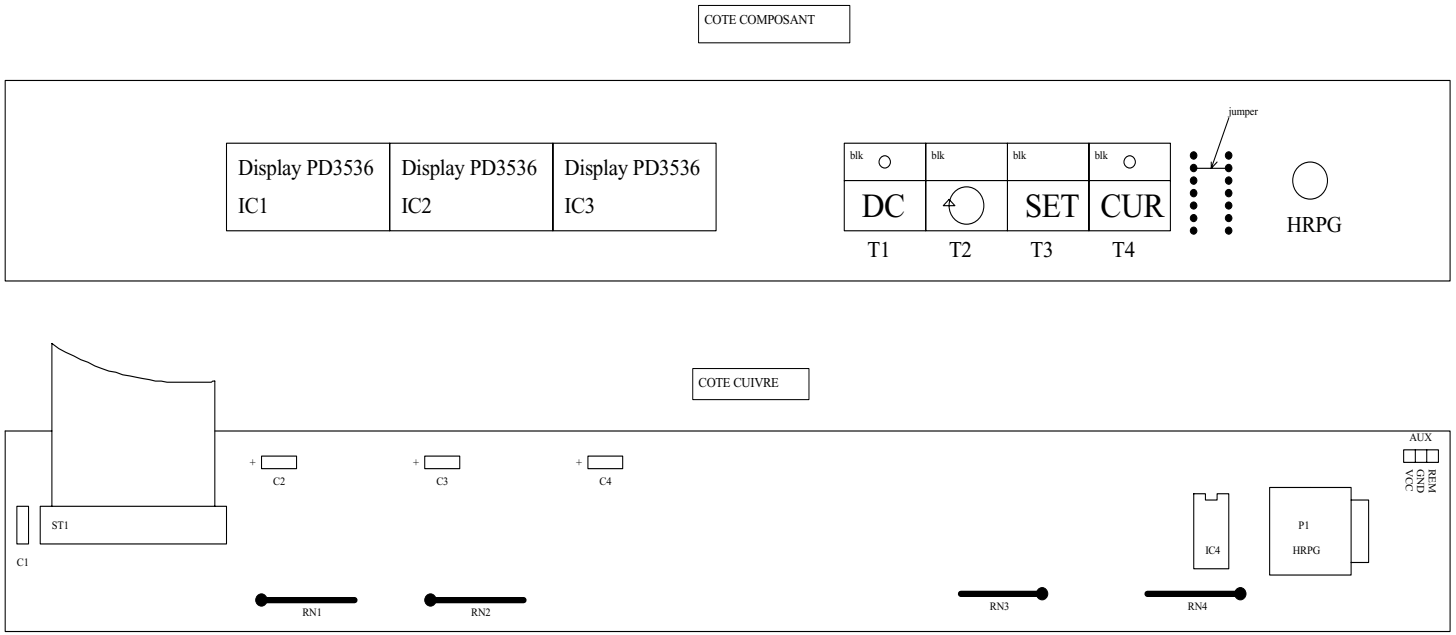

B-EC1 MAIN BOARD BIP.
AUXILIARY POWER SUPPLIES
ART : W1211467
EC :
DRAWN: AKL 02/10/2001
APPROV:
DATE:
VISA:
VISA:
DWG: W4S125467
A
SHEET: 12 / 13
BRUKER
+5V BUS TP25
0V BUS TP26
0V BUS TP27
5V SUPPLY TO BUS INTERFACE
SPREAD OVER BOARD
FOR LM350 ADJUSTABLE REGULATOR
ISOLATION
1000V
TO PS CONNECTOR - SHEET 1
+15V ANA TP28
-15V ANA TP31
AGND TP29
AGND TP30
AGND TP34
+15V ANALOG SUPPLY TO DAC, ADC REGULATION
AVCC
AVEE
+5V PS TP32
0V PS TP33
5V SUPPLY TO DIGITAL PARTS ON POWER SUPPLY SIDE
24VAC TP35
24VAC COMMON TP36
TO RELAYS - SHEET 4
TO PS CONNECTOR PIN 21 - SHEET 1
TO PS CONNECTOR PIN 20 - SHEET 1
24VAC SUPPLY
7VAC / 2.5A
15VAC / 0.2A
15VAC / 0.2A
7VAC / 0.5A
24VAC / 0.8A
U58 LM1085IT-5
U59 MC7815CT
U60 MC7915CT
U61 MC7805CT
RB1 RS602
RB2 W06M
RB3 KBPC606
D30 PRLL5819
D31 PRLL5819
JP21 NC
F1 2.5AT
F2 0.2AT
F3 0.2AT
F4 0.5AT
F5 1AT
J5 SL3.5 4 180G 160449
J6 SL3.5 8 180G 160453
R195 Rx
R196 0R
C135 1000u 16V
C136 1000u 16V
C200 1000u 16V
C201 1000u 16V
C202 1000u 16V
C137 22u 20V
C138 22u 20V
C139 22u 20V
C140 470u 50V
C141 22u 20V
C142 22u 20V
C143 22u 20V
C144 470u 50V
C145 22u 20V
C146 22u 20V
C147 22u 20V
C148 1000u 16V
C149 22u 20V
C150 22u 20V
C151 22u 20V
ZD5 1.5SMC 16V
ZD6 1.5SMC 6.8V
ZD7 1.5SMC 30V
ZD8 1.5SMC 16V
ZD9 1.5SMC 30V
ZD10 1.5SMC 16V
ZD11 1.5SMC 16V
ZD12 1.5SMC 6.8V


TO/FROM 37 PINS PD CONNECTOR SHEET 1
TO/FROM 25 PINS PD CONNECTOR SHEET 1
C37P1
C37P2 VAC
C37P3
C37P22
C37P4
C37P23
C37P5
C37P24
C37P6
C37P25
C37P7
C37P26
C37P8
C37P27
C37P9
C37P28
C37P10
C37P12
C37P32
AVCC
AGND
AVEE
C37P33
C37P15
C37P34
C37P16
C37P17
C37P18
C37P37
C152 C153 C154 C155 C156 C157 C158 C159 C160 C161 C162 C163 C164 C165 C166 C167 C168 C169 C170 C171 C172 C173 C174 C175 C176 C177 C178 C179 C180 C181
C25P1
C25P2
C25P3
C25P4
C25P5
C25P6
C25P7
C25P8
C25P9
C182 C183 C184 C185 C186 C187 C188 C189 C190 C191 C192 C193 C194 C195 C196 C197 C198 C199
H1
H2
H3
BRUKER
ART : W1211467
EC :
B-EC1 MAIN BOARD BIP.
EMC components
DRAWN: AKL 02/10/2001
APPROV:
DATE:
VISA:
VISA:
DWG: W4S12 5467
A
SHEET : 13 / 13

BEC-1 Display Board 7

DWG : N3-3S1996


Layout
P9502-2
OUT
OUT
IN
ST1
AUX
to Rem/Loc and DC key
P1
HRRG
C1 220nF
Part number
N
Serial number
X
BRUKER Analytik
Print No : 9502
Name : SCHNELL
Document Number: N3-3S1996/1
Title : DISPLAY B-EC1
Size: A3
Date: 10-Feb-2000
Sheet: 1 of 2
Revision: 01
D0
D1
D2
D3
D4
D5
D6
D7
ADR0
ADR1
ADR2
WR1
WR2
WR3
T1
CH_A
CH_B
Rem
GND
VCC
RN1 4,7k
RN2 4,7k
WR[1..3]
ADR[0..2]
D[0..6]
IC1 PD3536
IC2 PD3536
IC3 PD3536 OPTION
C2 10uF/10V
C3 10uF/10V
C4 10uF/10V
CLKIO
T1 DIGITAST
T2 DIGITAST
T3 DIGITAST
T4 DIGITAST
IC4A SN7413
IC4B SN7413
LOW=KEYPRESSED
RN3 680R
RN4 4,7k



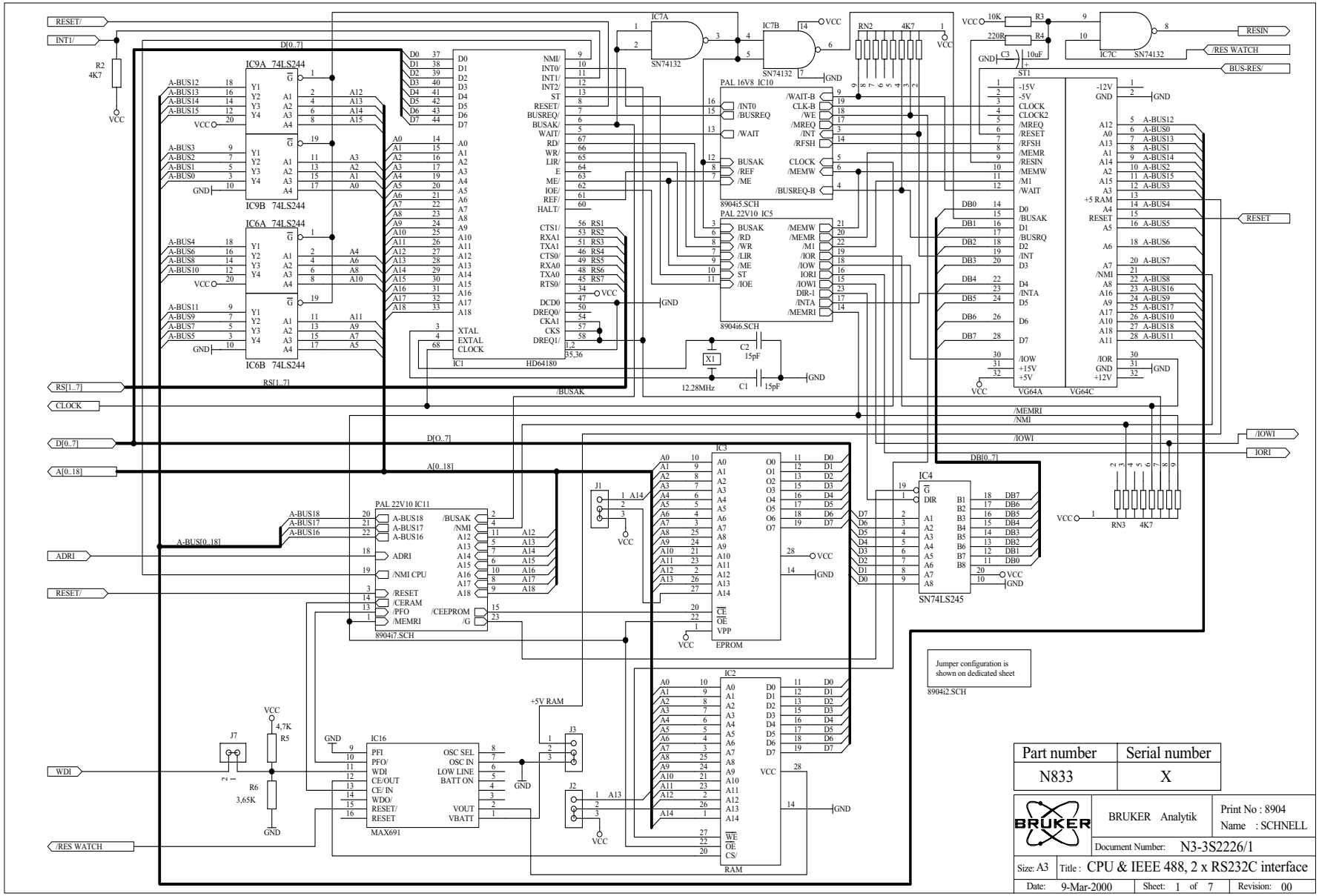
Part Number
W1210708

BRUKER	BRUKER Analytik	Print No : 9502 Name : SCHNELL
	Document Number: N3-3S1996/2	
Size: A3	Title : Layout display B-EC1	
Date: 21-Mar-2000	Sheet: 2 of 2	Revision: 01

BMC-20 CPU Interface board 2XRS IEEE

8

DWG : N3-3S2226



Part number	Serial number
N833	X

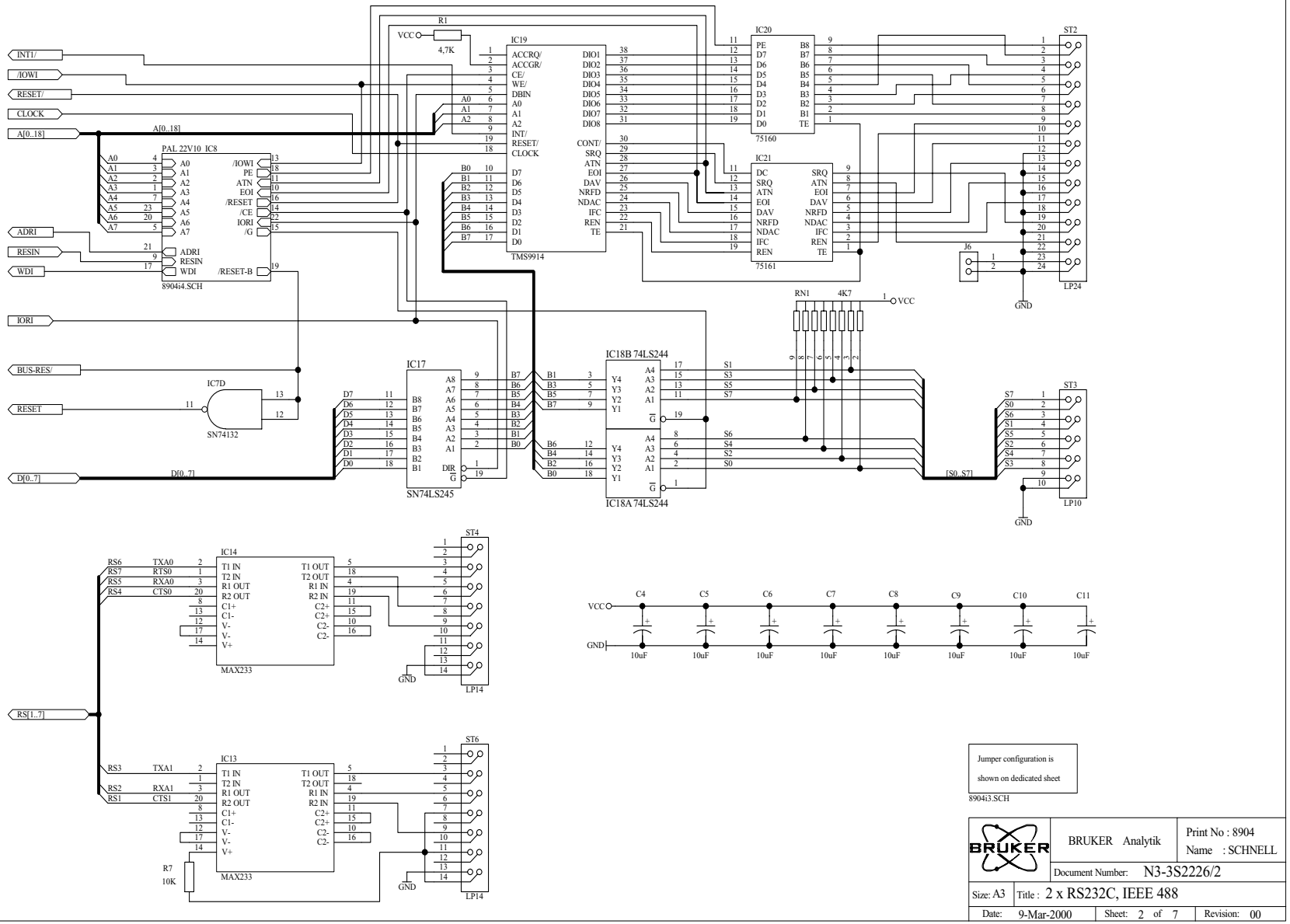
BRUKER Analytik

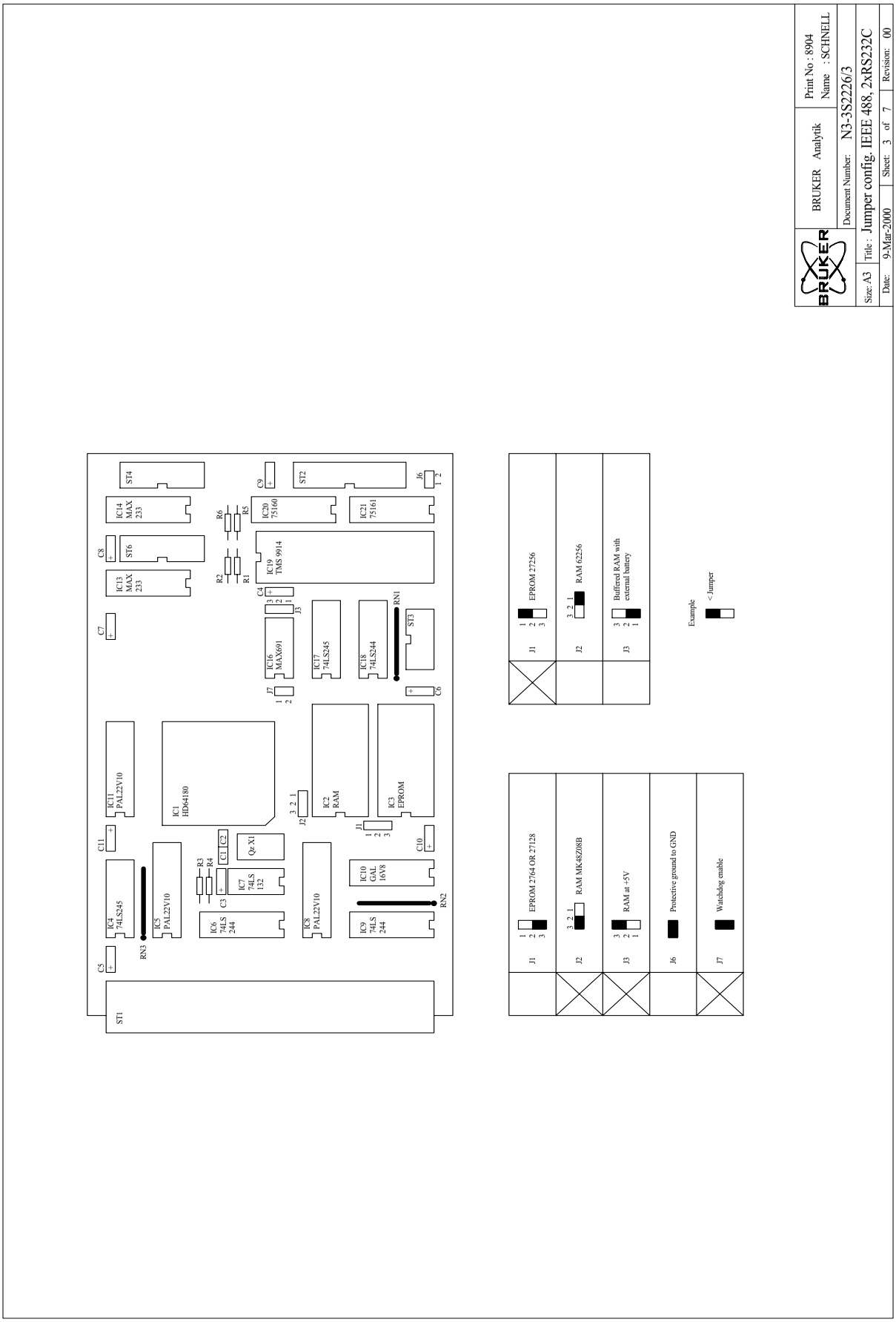
Print No : 8904
Name : SCHNELL

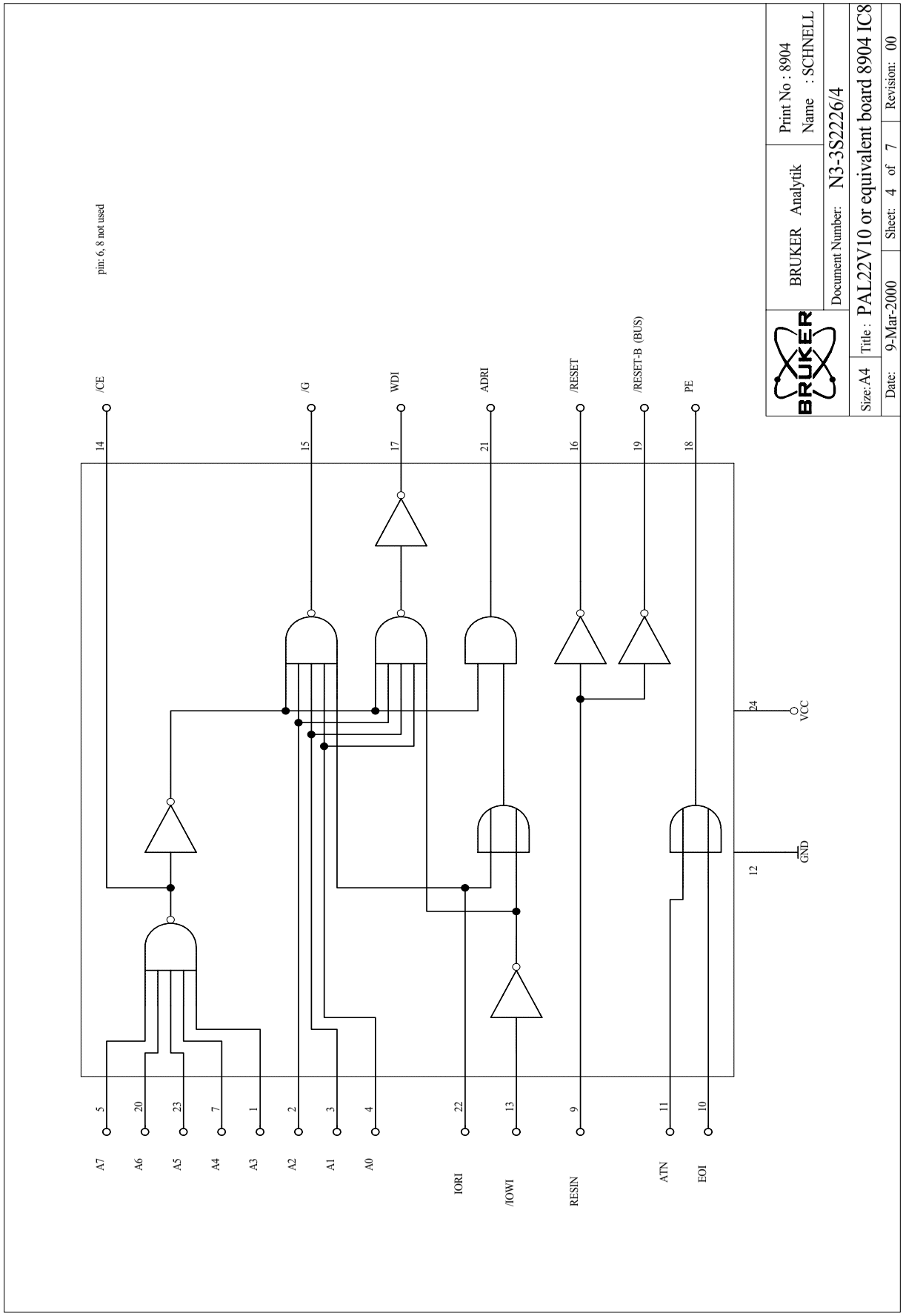
Document Number: N3-3S2226/1

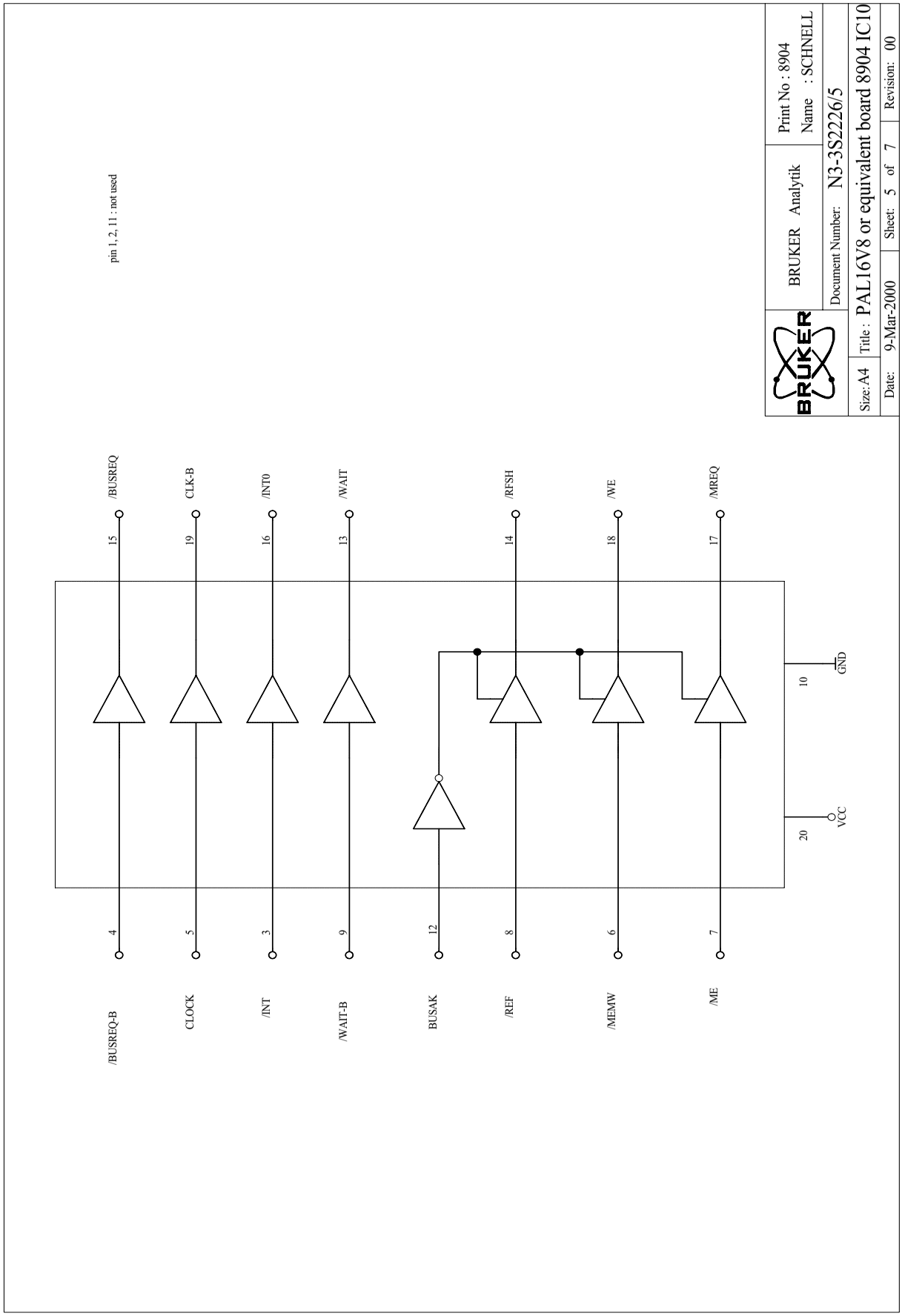
Size: A3 | Title : CPU & IEEE 488, 2 x RS232C interface

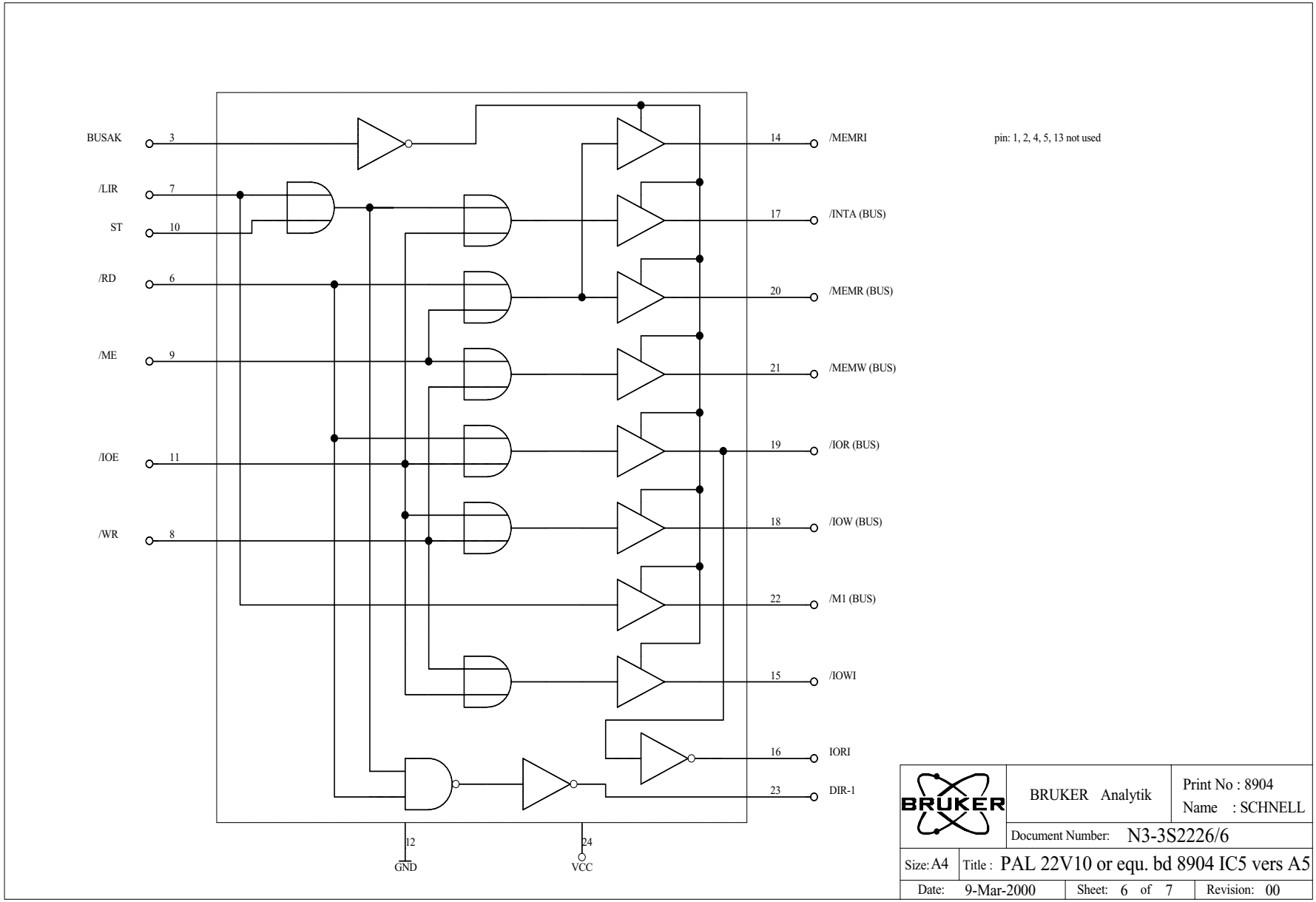
Date: 9-Mar-2000 | Sheet: 1 of 7 | Revision: 00

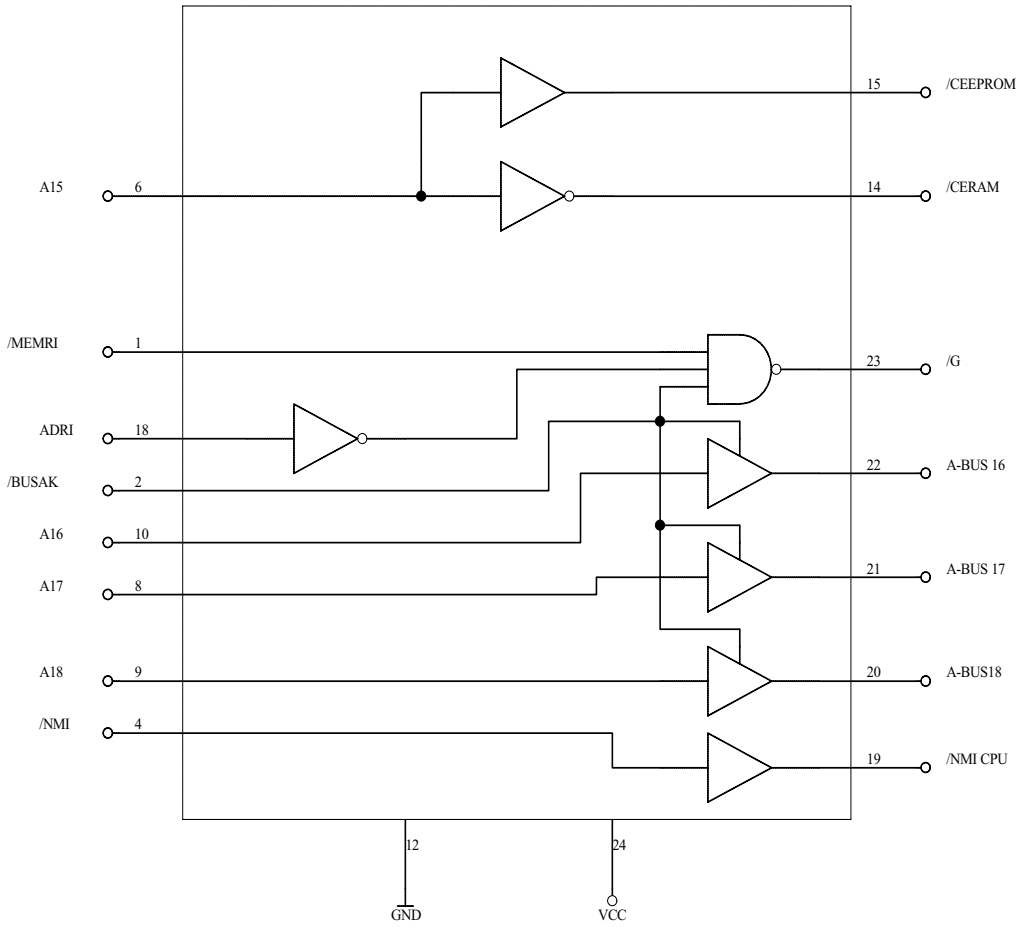

INT1/
/IOWI
RESET/
CLOCK
A[0..18]
ADRI
RESIN
WDI
IORI
BUS-RES/
RESET
D[0..7]
RS[1..7]
PAL 22V10 IC8
8904i4.SCH
IC19
TMS9914
IC20
75160
IC21
75161
IC17
SN74LS245
IC18B 74LS244
IC18A 74LS244
IC7D
SN74132
IC14
IC13
MAX233
R1
4,7K
R7
10K
RN1
4K7
VCC
GND
ST2
ST3
ST4
ST6
LP24
LP10
LP14
J6
C4
C5
C6
C7
C8
C9
C10
C11
10uF
Jumper configuration is
shown on dedicated sheet
8904i3.SCH
BRUKER Analytik
Print No : 8904
Name : SCHNELL
Document Number: N3-3S2226/2
Size: A3
Title : 2 x RS232C, IEEE 488
Date: 9-Mar-2000
Sheet: 2 of 7
Revision: 00


BRUKER Analytik
Print No : 8904
Name : SCHNELL
Document Number: N3-3S2226/3
Title : Jumper config. IEEE 488, 2xRS232C
Size: A3
Date: 9-Mar-2000
Sheet: 3 of 7
Revision: 00
ST1
ST2
ST3
ST4
ST6
IC1 HD64180
IC2 RAM
IC3 EPROM
IC4 74LS245
IC5 PAL22V10
IC6 74LS 244
IC7 74LS 132
IC8 PAL22V10
IC9 74LS 244
IC10 GAL 16V8
IC11 PAL22V10
IC13 MAX 233
IC14 MAX 233
IC16 MAX691
IC17 74LS245
IC18 74LS244
IC19 TMS 9914
IC20 75160
IC21 75161
Qz. X1
RN1
RN2
RN3
J1 EPROM 27256
J2 RAM 62256
J3 Buffered RAM with external battery
Example
< Jumper
J1 EPROM 2764 OR 27128
J2 RAM MK48Z08B
J3 RAM at +5V
J6 Protective ground to GND
J7 Watchdog enable


pin: 6, 8 not used
/CE
/G
WDI
ADRI
/RESET
/RESET-B (BUS)
PE
14
15
17
21
16
19
18
24
VCC
12
GND
5
20
23
7
1
2
3
4
22
13
9
11
10
A7
A6
A5
A4
A3
A2
A1
A0
IORI
/IOWI
RESIN
ATN
EOI
BRUKER Analytik
Print No : 8904
Name : SCHNELL
Document Number: N3-3S2226/4
Size: A4
Title : PAL22V10 or equivalent board 8904 IC8
Date: 9-Mar-2000
Sheet: 4 of 7
Revision: 00


pin 1, 2, 11 : not used
BRUKER Analytik
Print No : 8904
Name : SCHNELL
Document Number: N3-3S2226/5
Size: A4
Title : PAL16V8 or equivalent board 8904 IC10
Date: 9-Mar-2000
Sheet: 5 of 7
Revision: 00
/BUSREQ
CLK-B
/INT0
/WAIT
/RFSH
/WE
/MREQ
GND
VCC
/BUSREQ-B
CLOCK
/INT
/WAIT-B
BUSAK
/REF
/MEMW
/ME


BUSAK
3
/LIR
7
ST
10
/RD
6
/ME
9
/IOE
11
/WR
8
12
GND
24
VCC
14
/MEMRI
17
/INTA (BUS)
20
/MEMR (BUS)
21
/MEMW (BUS)
19
/IOR (BUS)
18
/IOW (BUS)
22
/M1 (BUS)
15
/IOWI
16
IORI
23
DIR-1
pin: 1, 2, 4, 5, 13 not used
BRUKER
BRUKER Analytik
Print No : 8904
Name : SCHNELL
Document Number: N3-3S2226/6
Size: A4
Title : PAL 22V10 or equ. bd 8904 IC5 vers A5
Date: 9-Mar-2000
Sheet: 6 of 7
Revision: 00

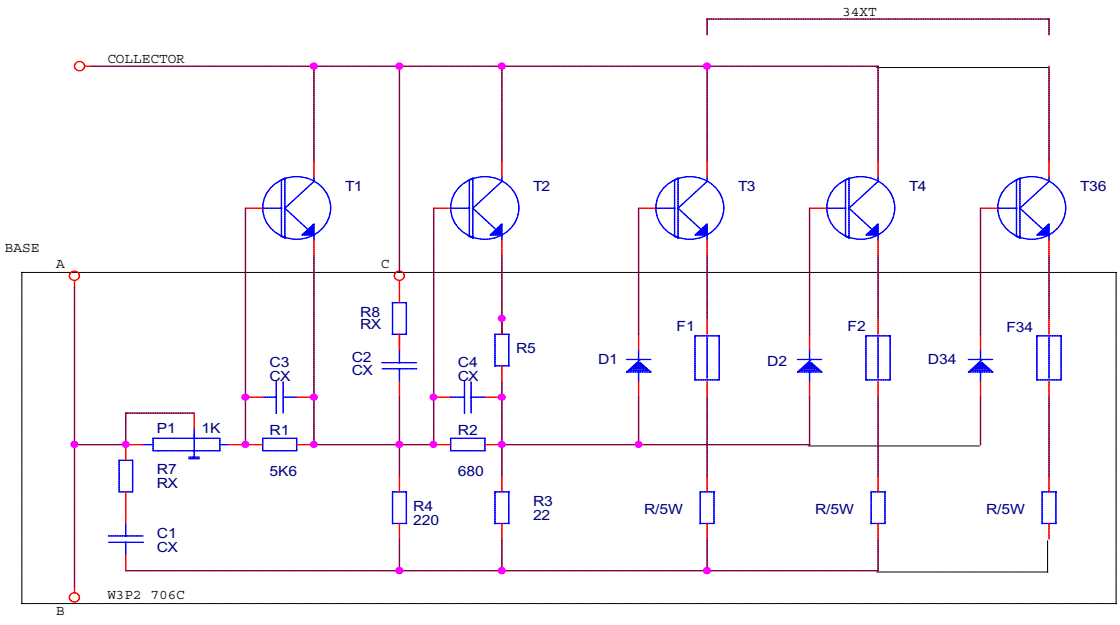


pin 3, 5, 7, 11
13, 16, 17
=> not used

BRUKER	BRUKER Analytik	Print No : 8904 Name : SCHNELL
	Document Number: N3-3S2226/7	
Size: A4	Title : PAL22V10 or equ. bd 8904 IC11 vers F11	
Date: 9-Mar-2000	Sheet: 7 of 7	Revision: 00

Power stage 9

P/N : W1205493



T1/T2=.....

T3/T36=.....

D=.....

R=..... (5W)

F=.....

R7=.....

C1=.....

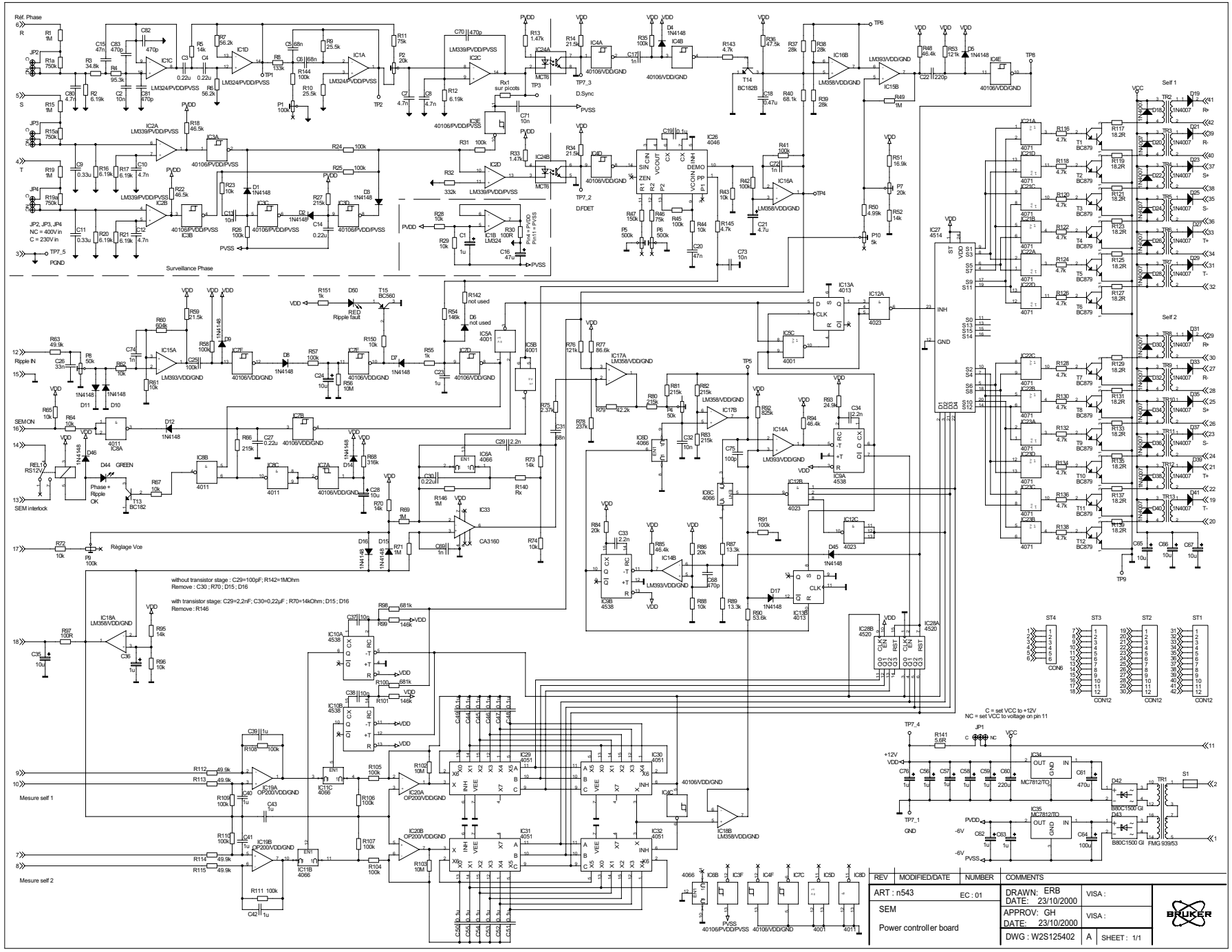
REV	MODIFIED/DATE	NUMBER	COMMENTS
A	SF/95/03		

ART:	EC:1	DRAWN: SF DATE: 95/03	VISA:
BPS POWER STAGE 36TR NPN		APPROV: DH DATE: 95/03	VISA:
		DWG: W4S12 3887	A SHEET: 1/1

S.a.d.i.s
BRUKER
SPECTROSPIN

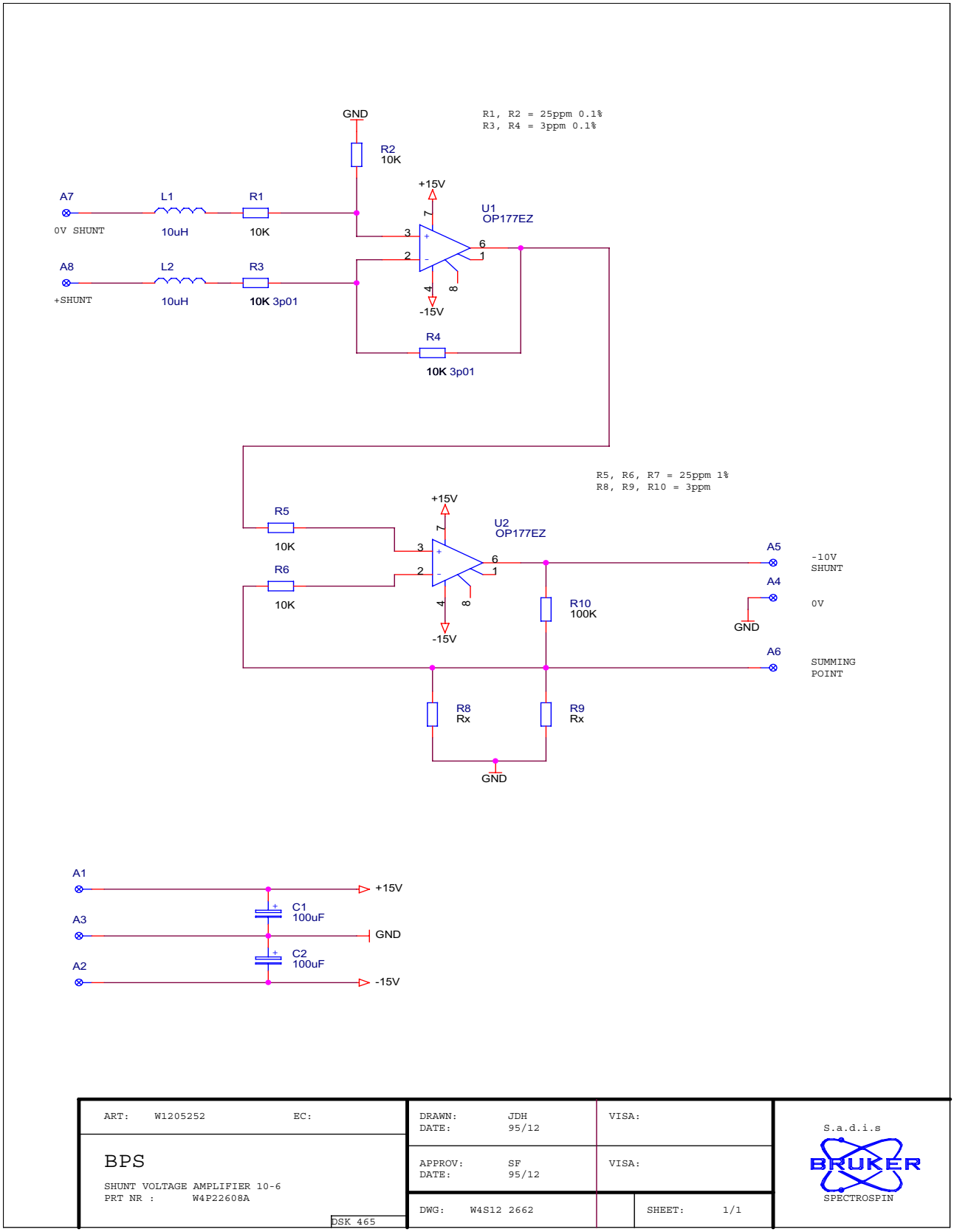
SEM Thyristor controller 10

DWG : WS125402A


Réf. Phase
Surveillance Phase
Ripple IN
SEM ON
SEM interlock
Règlage Vce
Mesure self 1
Mesure self 2
Self 1
Self 2
Ripple fault
without transistor stage : C29=100pF; R142=1MOhm
Remove : C30 ; R70 ; D15 ; D16
with transistor stage: C29=2,2nF; C30=0,22µF ; R70=14kOhm ; D15 ; D16
Remove : R146
C = set VCC to +12V
NC = set VCC to voltage on pin 11
REV | MODIFIED/DATE | NUMBER | COMMENTS
ART : n543 EC : 01
SEM
Power controller board
DRAWN: ERB DATE: 23/10/2000
APPROV: GH DATE: 23/10/2000
DWG : W2S125402 A SHEET : 1/1
VISA :
BRUKER

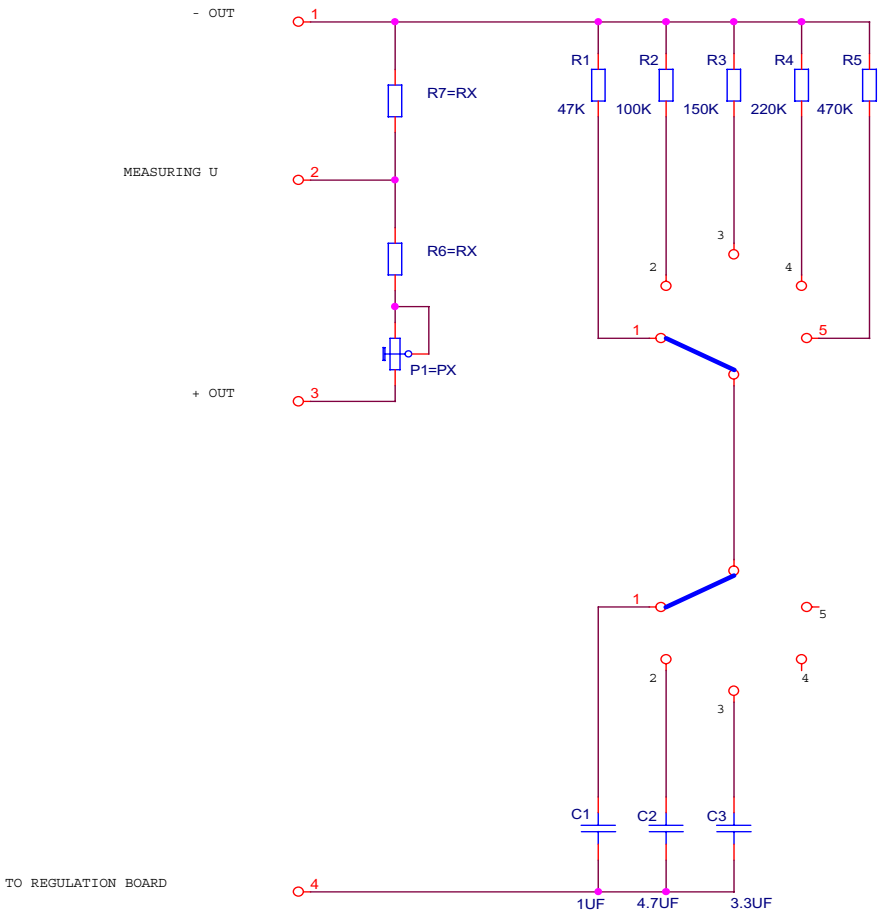
Shunt amplifier 11

DWG : WS122662A


GND
R1, R2 = 25ppm 0.1%
R3, R4 = 3ppm 0.1%
R2
10K
+15V
A7
L1
R1
0V SHUNT
10uH
10K
U1
OP177EZ
A8
L2
R3
+SHUNT
10uH
10K 3p01
-15V
R4
10K 3p01
R5, R6, R7 = 25ppm 1%
R8, R9, R10 = 3ppm
R5
10K
U2
OP177EZ
R6
10K
A5
-10V
SHUNT
A4
0V
R10
100K
GND
A6
SUMMING
POINT
R8
Rx
R9
Rx
GND
A1
+15V
C1
100uF
A3
GND
C2
100uF
A2
-15V
ART: W1205252 EC:
DRAWN: JDH
DATE: 95/12
VISA:
BPS
SHUNT VOLTAGE AMPLIFIER 10-6
PRT NR : W4P22608A
APPROV: SF
DATE: 95/12
VISA:
DSK 465
DWG: W4S12 2662
SHEET: 1/1
S.a.d.i.s
BRUKER
SPECTROSPIN

Divider U/BH15 Adjusment 12

DWG : WS121906A



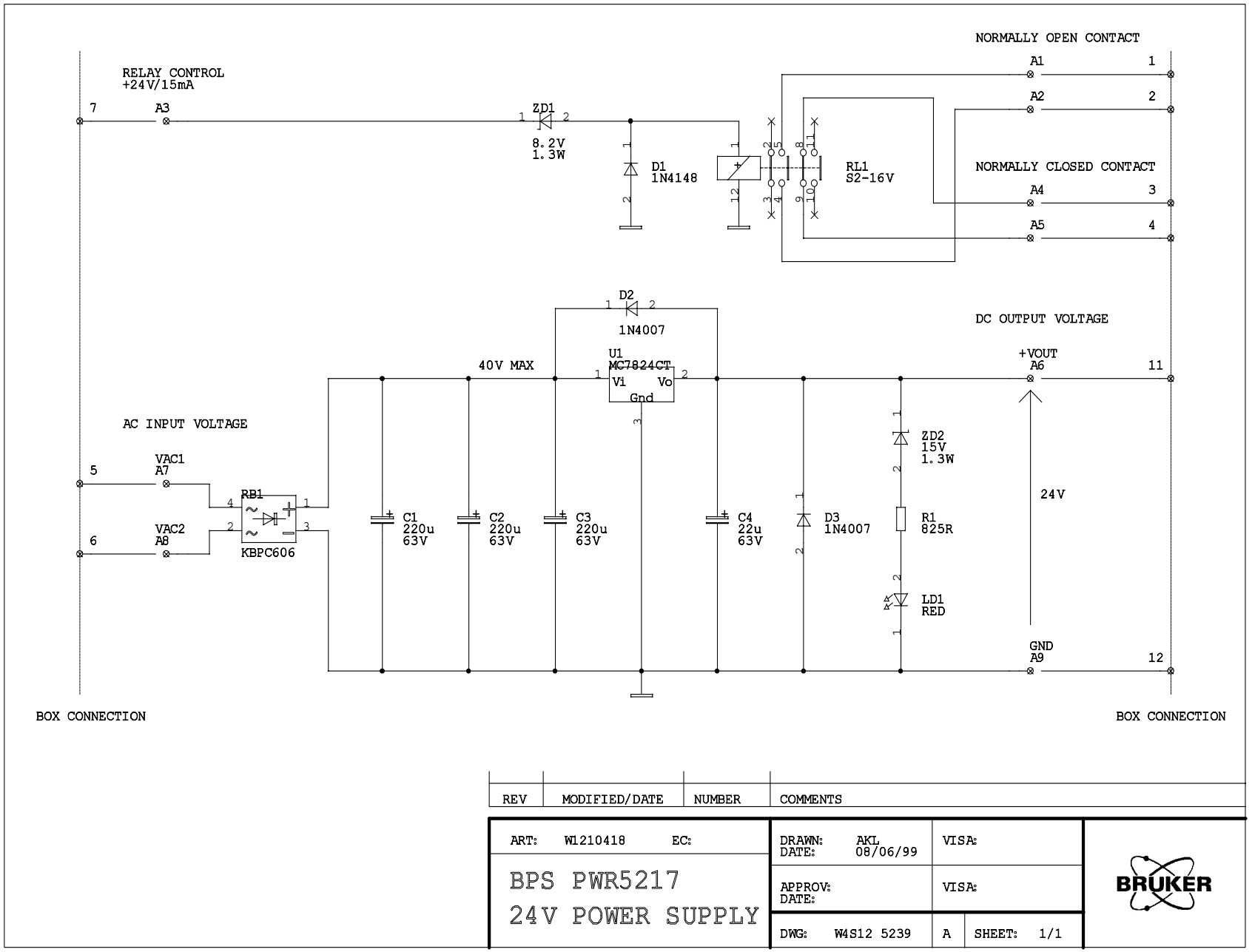
REV	MODIFIED DATE	NUMBER	COMMENTS
A	22/06/94		CORRECTION C1 C2 C3

ART: W1201990 EC:	DRAWN: SF DATE: 95/12	VISA:	S.a.d.i.s BRUKER SPECTROSPIN
BPS DIVIDER U / BH15 ADJUSTMENT	APPROV: PH DATE: 95/12	VISA:	
DSK 863	DWG: W4S12 1906	A SHEET: 1/1	

Board aux power supply

13

P/n : W1210421

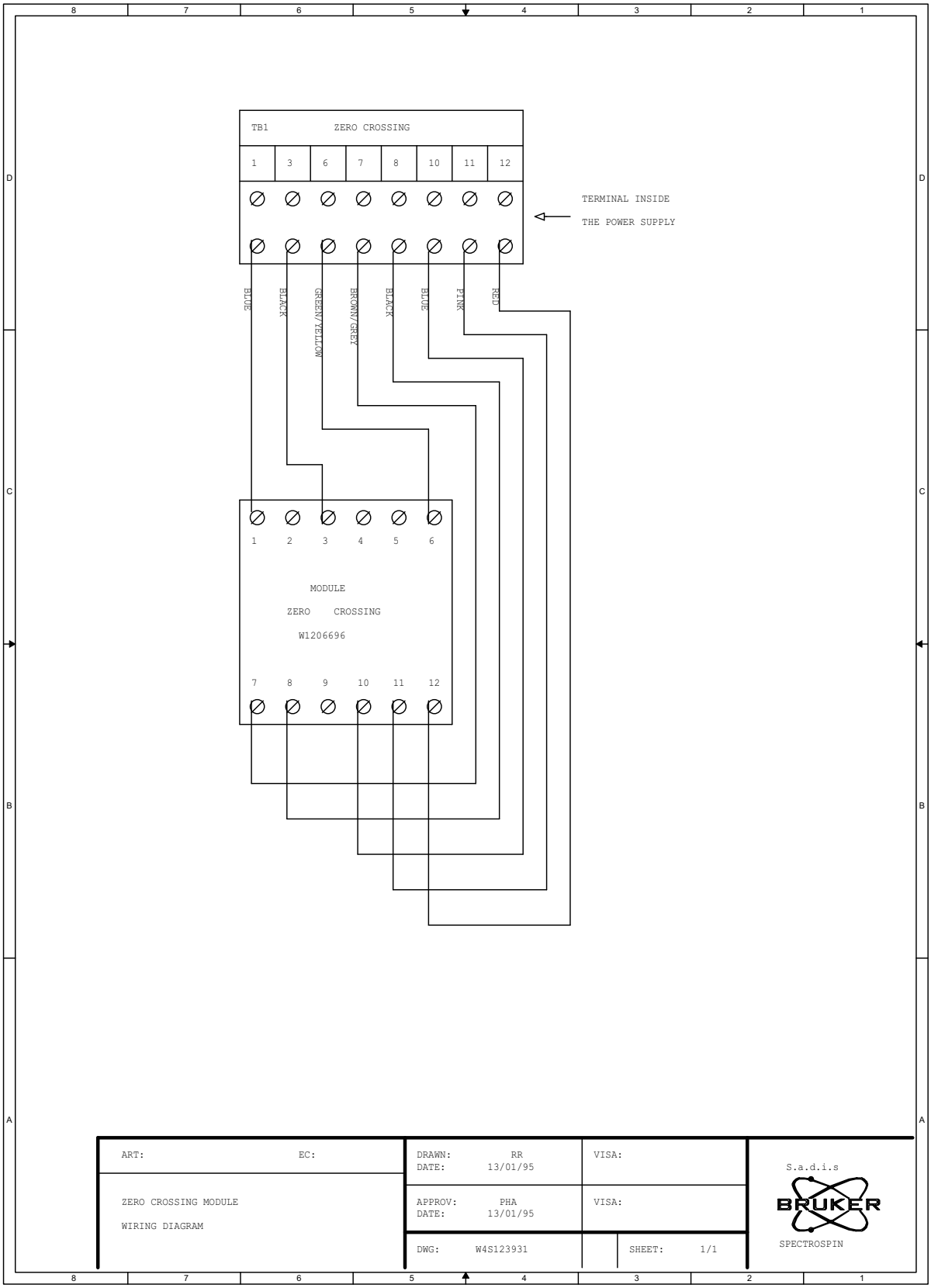


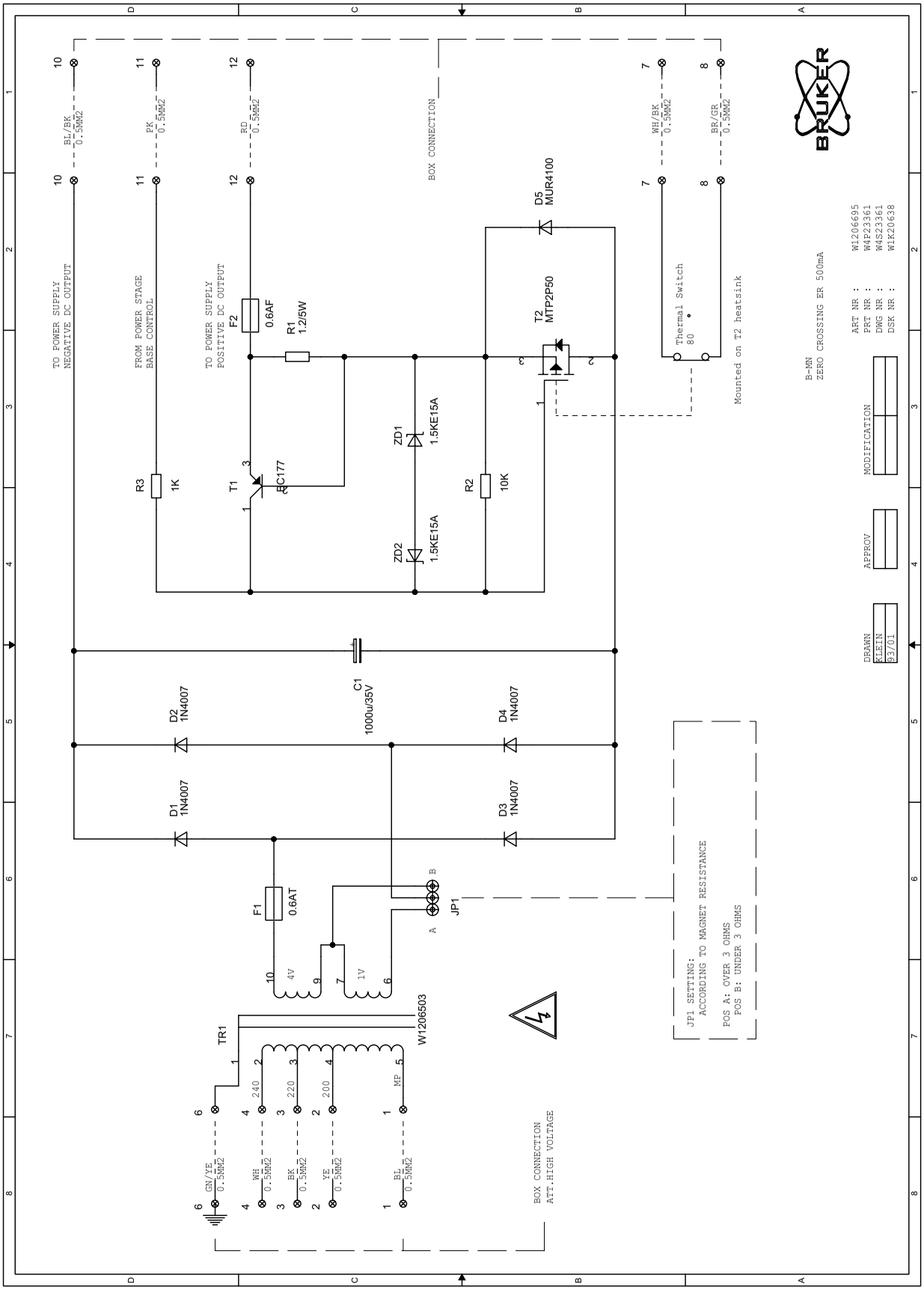
REV	MODIFIED/DATE	NUMBER	COMMENTS

ART: W1210418 EC:	DRAWN: AKL DATE: 08/06/99	VISA:	BRUKER
BPS PWR5217 24V POWER SUPPLY	APPROV: DATE:	VISA:	
	DWG: W4S12 5239	A	SHEET: 1/1

ZERO CROSSING KIT UNIVERSEL 14

P/N : W1209207


TB1 ZERO CROSSING
1 3 6 7 8 10 11 12
TERMINAL INSIDE
THE POWER SUPPLY
BLUE
BLACK
GREEN/YELLOW
BROWN/GREY
BLACK
BLUE
PINK
RED
1 2 3 4 5 6
MODULE
ZERO CROSSING
W1206696
7 8 9 10 11 12
ART: EC:
ZERO CROSSING MODULE
WIRING DIAGRAM
DRAWN: RR
DATE: 13/01/95
VISA:
APPROV: PHA
DATE: 13/01/95
VISA:
DWG: W4S123931
SHEET: 1/1
S.a.d.i.s
BRUKER
SPECTROSPIN


BOX CONNECTION
TO POWER SUPPLY
NEGATIVE DC OUTPUT
FROM POWER STAGE
BASE CONTROL
TO POWER SUPPLY
POSITIVE DC OUTPUT
BL/BK 0.5MM2
PK 0.5MM2
RD 0.5MM2
WH/BK 0.5MM2
BR/GR 0.5MM2
F2 0.6AF
R1 1.2/5W
D5 MUR4100
T2 MTP2P50
Thermal Switch 80 °
Mounted on T2 heatsink
R3 1K
T1 BC177
ZD1 1.5KE15A
ZD2 1.5KE15A
R2 10K
C1 1000u/35V
D2 1N4007
D1 1N4007
D4 1N4007
D3 1N4007
F1 0.6AT
JP1
4V
1V
TR1
W1206503
240
220
200
MP
GN/YE 0.5MM2
WH 0.5MM2
BK 0.5MM2
YE 0.5MM2
BL 0.5MM2
BOX CONNECTION
ATT.HIGH VOLTAGE
JP1 SETTING:
ACCORDING TO MAGNET RESISTANCE
POS A: OVER 3 OHMS
POS B: UNDER 3 OHMS
B-MN
ZERO CROSSING ER 500mA
ART NR : W1206695
PRT NR : W4P23361
DWG NR : W4S23361
DSK NR : W1K20638
MODIFICATION
APPROV
DRAWN
KLEIN
03/01
BRUKER

Warranty 15

WARRANTY Extracts of general conditions.

Unless otherwise specified on the offer/order documents, the warranty extends as follow:

- The warranty covers parts and labour.
- Handling and transport costs induced by a send back to Bruker from a device during the warranty period or costs related to a site servicing from an engineer are not covered and are in charge of the customer. During the warranty period, handling and transport costs from Bruker to the customer from a repaired device are in charge of Bruker.
- Contact the Bruker's After Sale Service before sending back a device.

  Mail: power-elec.support@bruker.fr
  Phone : +33 3 88 73 69 42

  A repair number will be affected in order to make easier the follow up and to short the repair time.
- The warranty will only be applied in case of trouble which results from a normal and as specified running.
- The warranty doesn't cower troubles which result from a no respect of the installation, start up, running and safety instructions.
- Warranted period: 12 months starting from the site installation made by a Bruker engineer, or at maximum 18 months from the delivery date.

Warranty