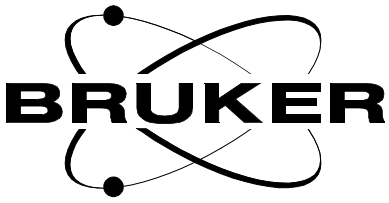


Bruker Automated Control Systems

B-ACS 60/120
Installation Manual

Version 001

BRUKER

The information in this manual may be altered without notice.

BRUKER accepts no responsibility for actions taken as a result of use of this manual. BRUKER accepts no liability for any mistakes contained in the manual, leading to coincidental damage, whether during installation or operation of the instrument. Unauthorized reproduction of manual contents, without written permission from the publishers, or translation into another language, either in full or in part, is forbidden.

This manual was written by

Stanley J. Niles

Rheinstetten, Germany

P/N: Z31597
DWG-Nr: 1309001

Contents

Contents

Contents

Declaration of Conformity

1

DECLARATION OF CONFORMITY

The undermentioned products

B-ACS 60 Sample Changer H1080
B-ACS 60/500 Sample Changer SAG H41000
B-ACS 60/500 Sample Changer Magnex H31080
B-ACS 60/600 Sample Changer OXF H11080
B-ACS 60/600 Sample Changer Magnex H21080
B-ACS 60/600 Sample Changer SAG H5895
B-ACS 60/700 Sample Changer SAG H51080
B-ACS 120 Sample Changer H800
B-ACS 120/500 Sample Changer Magnex H3800
B-ACS 120/500 Sample Changer SAG H6800
B-ACS 120/600 Sample Changer H1800
B-ACS 120/600 Sample Changer Magnex H8800
B-ACS 120/600 Sample Changer SAG H4800
B-ACS 120/700 Sample Changer SAG H9800

conform to the main requirements set by the commission for the Harmonization of Regulations of the EU Member States with regards to electromagnetic compatibility regulations (EMI: 89/336/ECC), safety regulations (Low Voltage Electrical Equipment: 72/23/ECC), and machinery directives (89/392/EEC).

For the assessment the following norms were applied:

EMI: EN 55 011; EN 50 082 - 1

Safety: EN 61 010 - 1

Machinery Directives: EN 292 - 1 & 2

Test report: UNI KA 9522
Documentation: Z31285 Docu Standard: Sample Changer

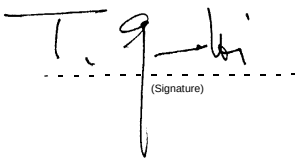
Manufacturer's Name: Bruker Analytik
Manufacturer's Address: 76287 Rheinstetten, Akazienweg 2, Germany

Declaration approved by:

Dr. Tonio Gianotti

Head of Development

Rheinstetten July 21, 1995


(Signature)

Introduction 2

BRUKER Automatic Sample Changer 2.1

The BRUKER Automatic Sample Changer, used in conjunction with BRUKER XWINNMR software, provides dialog-guided facilities which allow the user to easily and effectively perform automatic (continuous) experiments. Features include a 60 or 120 sample capacity, random accessing of samples, positive sample identification with the optional barcode reader, and temperature control of individual samples with the optional sample heater unit.

The standard NMR software includes the comprehensive automation package required for the Automatic Sample Changer. It features automatic instrument optimization, phasing, integration and plotting. Specialized routines assist data interpretation. Easy set-up procedures are accomplished via dialog software at three user-interface levels.

Site Considerations 2.2

The Automatic Sample Changer should be setup in a standard laboratory environment. Maximum room temperature should not exceed 30°C. For more information refer to the Avance Spectrometer manual on site planning.

Contact for Additional Technical Assistance 2.3

For further technical assistance, please contact us at:

BRUKER Analytik GmbH

Siberstreifen

D-76287 Rheinstetten

Tel.: [+49] 721 5161 0

Fax: [+49] 721 5171 01

Safety Considerations 3

Before Mounting the Automatic Sample Changer 3.1

Make sure the magnet is firmly secured to its base in order to prevent the instrumentation from tipping over.

While Mounting the Column 3.2

When assembling the column, do not tighten the top fastening ring too hard, as this may cause damage to the column surfaces.

When fixing the column to the magnet, mount both bottom arms to prevent obstruction when manipulating or changing probes.

When handling tools, screws, or any metallic parts beware of the strong magnetic field.

During Operation 3.3

Excessive tension of the magazine belt will damage the belt and wheel bearings. (Refer to *"Cabinet and Magazine Belt Adjustment" on page 31* for adjustment of the tension of the magazine belt).

Beware of the strong magnetic field while working around the magnet. Keep all metal objects, such as tools, screws, or any metallic parts away from the magnet. Remove any mechanical watches or metallic objects while working around the magnet.

When the Automatic Sample Changer is running, avoid putting hands or objects in the path of the arm, magazine belt or pinchers, as this may cause personal injury or damage to the equipment.

Potentially Hazardous Areas 3.4

The symbol shown on the left indicates a **potentially hazardous area** (ISO 3864; DIN 40008).

The symbol is placed on the following areas of the Automatic Sample Changer:

1. On the upper left half of the front side (side that is away from the magnet) of the vertical cylinder. **Warning**: When the sample changer is in operation keep

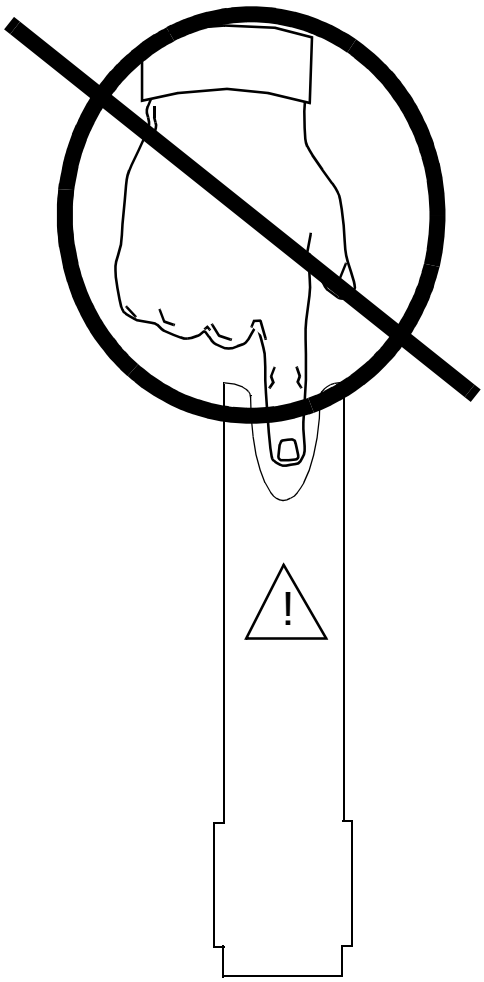
hands and other objects away from the pinchers on the end of the vertical cylinder.

2. On the front side of the upper column assembly. **Warning**: Keep hands and other objects away from the path of the pneumatic arm and magazine belt (figure 4.7) during operation of the sample changer.

Extreme Temperatures *3.5*

The sample warmer located on the magazine belt reaches extreme temperatures: **Warning**: Do not insert your fingers into the sample warmer. When the sample warmer is operating it can reach temperatures exceeding 70°C (figure 3.1).

Figure 3.1. Extreme Temperature Warning



Warning! Extreme Temperature! Do not put your finger into the sample warmer!

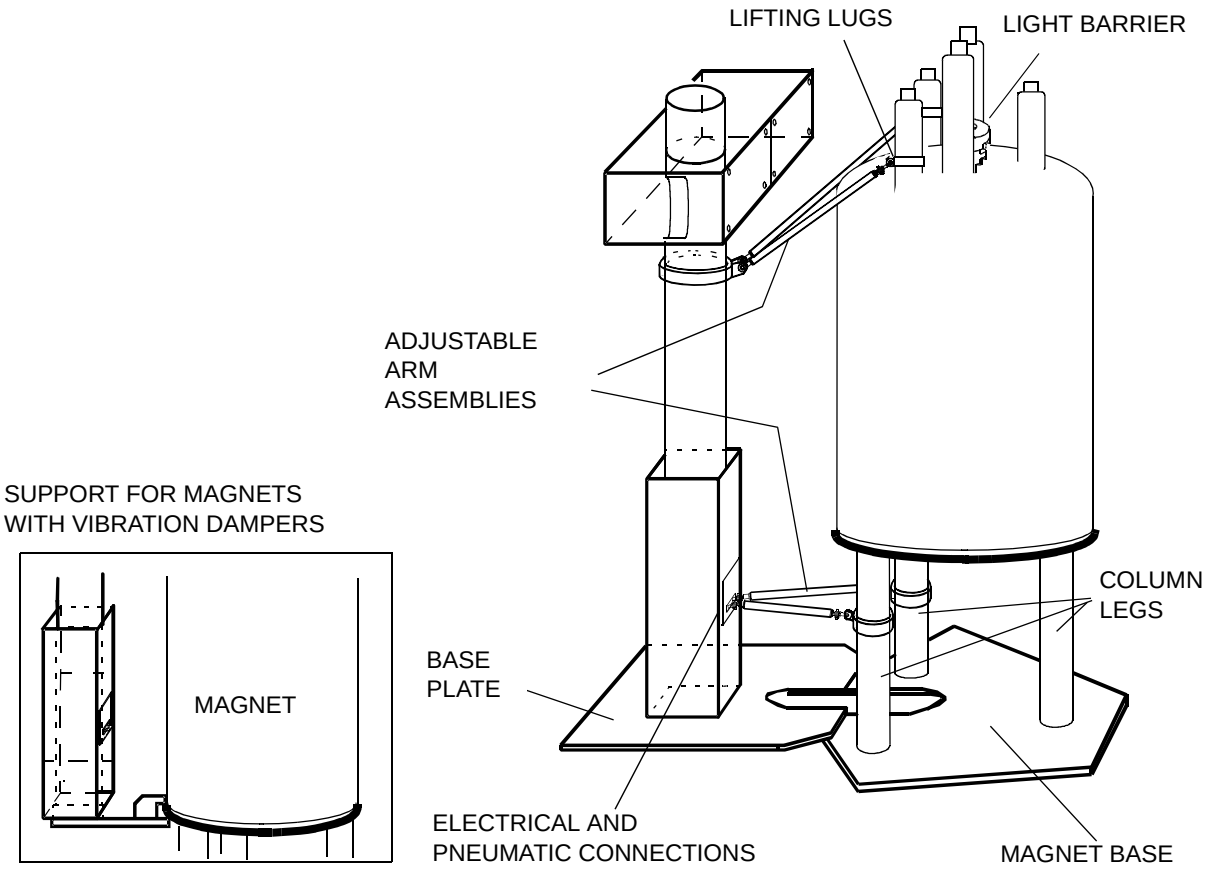
Mounting Instructions

4

Caution 4.1

Before mounting the Automatic Sample Changer, it is important to make sure that the magnet is firmly anchored to its base in order to prevent the instrumentation from tipping over. When doing so, carefully align the legs and lifting lugs used to secure the Sample Changer. The Sample Changer is held to the magnet by four adjustable arm assemblies (two for magnets with active dampers or TMC legs). The arm assemblies should be aligned with the magnet as shown in ***Figure 4.1.***.

Figure 4.1. Location of Adjustable Arm Assemblies



Preparing the Magnet for Installation 4.2

The bottom arms of the sample changer are designed to fit 65 mm ϕ legs, they are adjustable in length to allow for compensation of construction tolerance.

If for some reason it is not possible to move, fix, or align the legs of the magnet, new bottom arms at the proper length can be delivered as an option. Please inform a Bruker representative about the misalignment angle or the necessary arm length, new arms will be shipped as soon as possible.

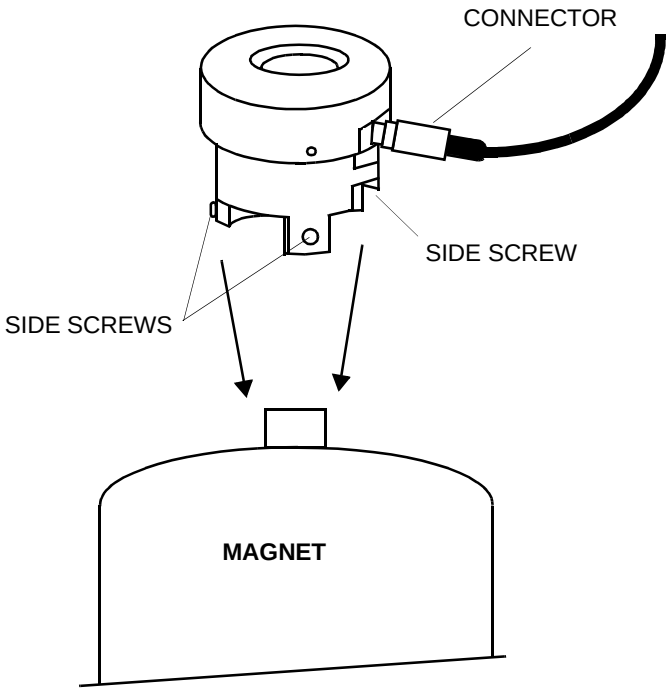
Connecting the Light Barrier Assembly 4.3

Note: Magnets with the BOSS 1 and BOSS 2 Shim Systems do not require this step, they are delivered with the light barrier cylinder already installed.

Figure 4.2. Magnet with BOSS Shim System Already Mounted

Mount the light barrier cylinder by placing it onto the top of the shim system and fastening the three side screws (***Figure 4.3.***). To correctly place the light cylinder barrier, push the cylinder down firmly while turning the cylinder into position (the fitting may be tight). This will guarantee minimal loss of sample lift air between the shim system and the cylinder.

Figure 4.3. Light Barrier for the Shim System



Mounting the Cabinet *4.4*

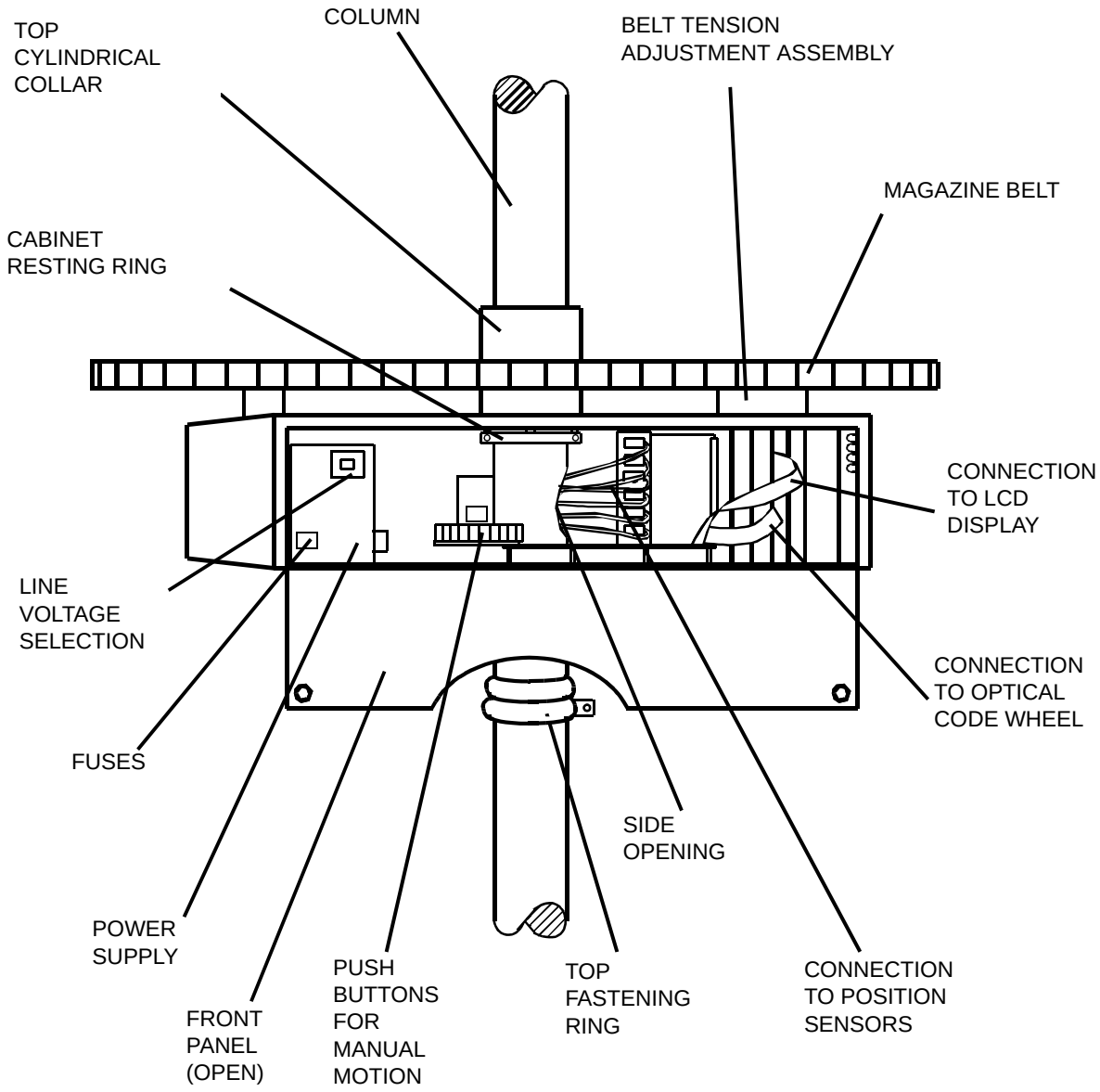
The sample changer cabinet is fitted with a display unit on the front side. The rear side is the side that faces the magnet. Remove the two rear side panels from the rear of the cabinet. The cabinet is fixed to the column by a cylindrical collar. Loosen the screws from the top cylindrical collar (***Figure 4.4.***) before mounting the unit onto the column.

Place the cabinet on its side on a soft surface such as a blanket or carpet. This position will make it easier to slide the column through the cabinet. Open the front panel of the cabinet by loosening the screws.

Note: The top end of the round column piece is the end with the shortest distance from the side opening to the end of the column piece.

Insert the top end of the round column piece from the bottom side of the cabinet into the cabinet cylindrical collar, pushing it through until the side opening on the column disappears inside the cabinet (***Figure 4.4.***). Mount the cabinet resting ring between the side opening and the cylindrical collar. Tighten both the resting ring and the collar in the position shown in ***Figure 4.4.***.

Figure 4.4. Front view of the Automatic Sample Changer



Preparing the Column for Assembly *4.5*

Slide the clamp cover and the square clamp (see ***Figure 4.5.***) over the bottom of the round column towards the bottom of the cabinet. The clamp cover should be next to the cabinet and the square clamp underneath the cover. Do not tighten the clamp.

To prepare the square column piece for mounting, pull the cables and pneumatic hoses out of the inside of the top of the square column piece. Insert these cables and hoses (upwards) through the round column piece. Reach through the cabinet opening and the side opening of the round column piece and pull the cables and hoses through until the ends are outside the side opening of the round piece (see ***Figure 4.5.***).

Measure the distance from the top of the shim system of the magnet to the ground. If the Column is fitted with a base plate, then measure from the top of the shim system to the top of the base plate (***figure 4.1***). In either case subtract 0,5 cm from the measurement. This is the length that the column needs to be from the bottom of the square column piece to the top of the belt of the cabinet. You will need this measurement for the assembly of the column.

Assembling the Column *4.6*

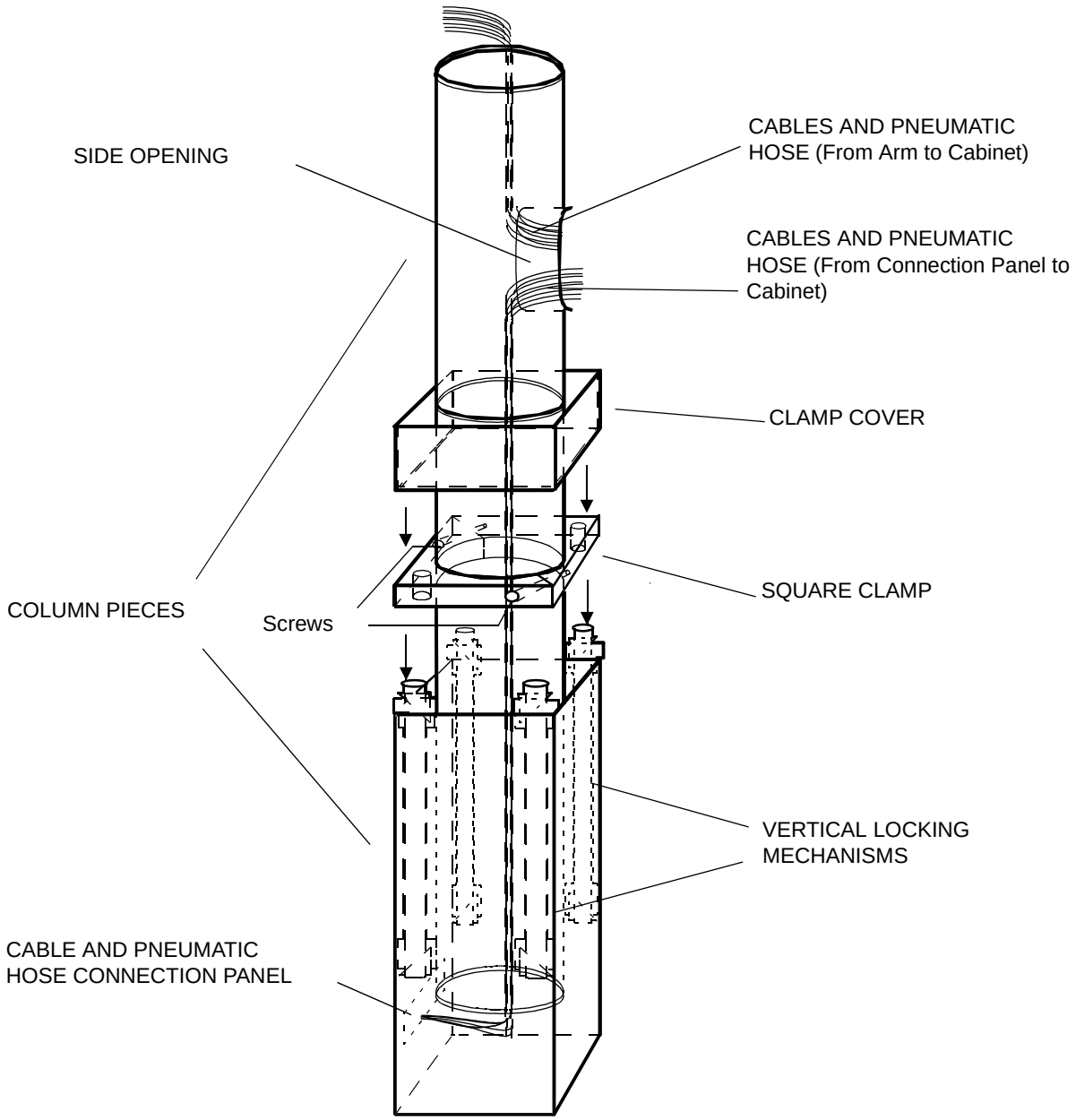
Refer to ***Figure 4.5.*** for this step.

Assemble the two column pieces, placing the square piece over the round piece. Using the measurement obtained in ***section 4.4*** align the distance of the bottom of the square piece to the top of the belt of the cabinet. It is **important** for the proper operation of the sample changer that this length matches the distance from the ground (or the top of the base plate for the column assembly) to the top of the shim system minus 0,5 cm.

Fasten the two column pieces together by placing the four vertical locking mechanisms in the inside corners of the square column piece. Recheck the length of the column as described above, and adjust if necessary.

Slide the square clamp downwards until it sets over the locking mechanisms. Tighten the clamp securely. Slide the clamp cover downwards until it sets firmly against the square clamp.

Figure 4.5. Column Assembly



Mounting the Column Assembly to the Magnet *4.7*

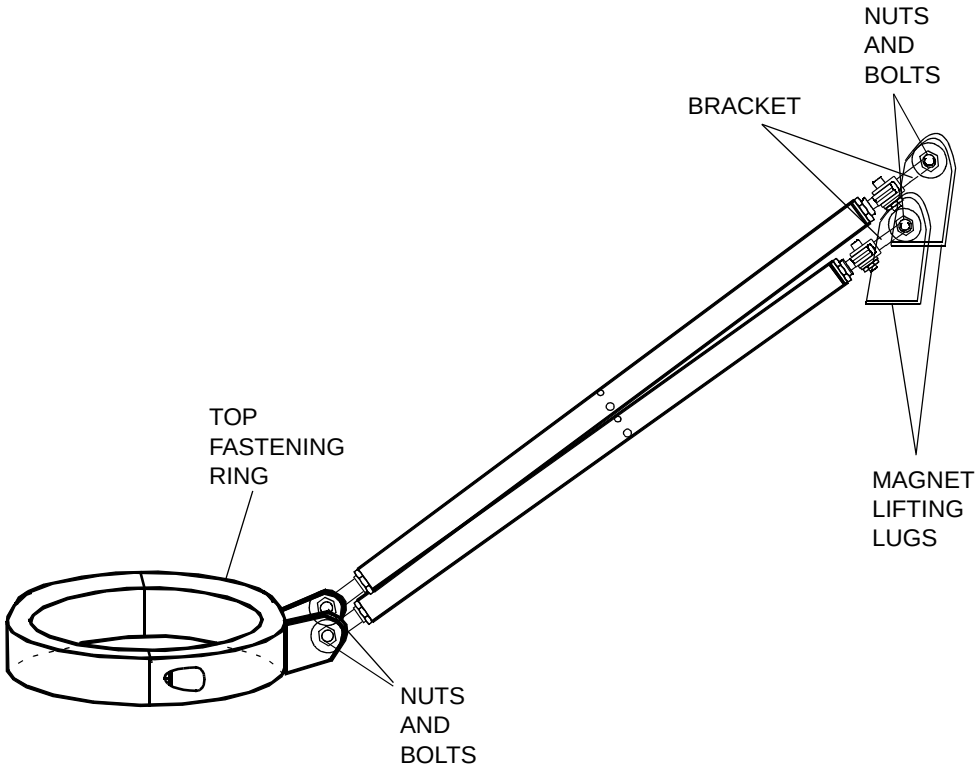
Fasten the two top adjustable arm assemblies to the round portion of the column.

For Magnets without N2 Towers:

Remove the bolts and brackets (see ***Figure 4.6.***) from the magnet end of the adjustable arms and place them next to the magnet lifting lugs.

Lift the column assembly upwards so that the cabinet is on the top. Secure the two top adjustable arms to the lifting lugs of the magnet with the bolts and brackets.

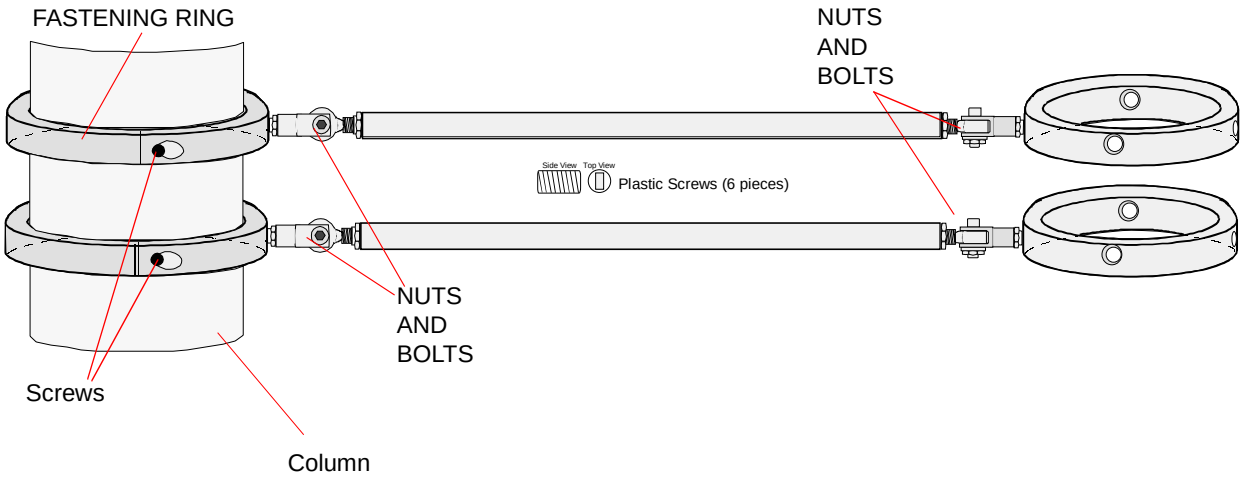
Figure 4.6. Adjustable Arm Assembly for Magnets without N2 Tower



For Magnets with N2 Towers:

Remove the screws from the adjustable arm assemblies for N2 magnets (***Figure 4.7.***), and move the arm assemblies and column the to the N2 towers. Place the outer half of the fastening rings around the N2 towers and rescrew the fastening rings together. Do not tighten the rings until you have completed the step below.

Figure 4.7. Adjustable Arm Assembly for Magnets with N2 Tower

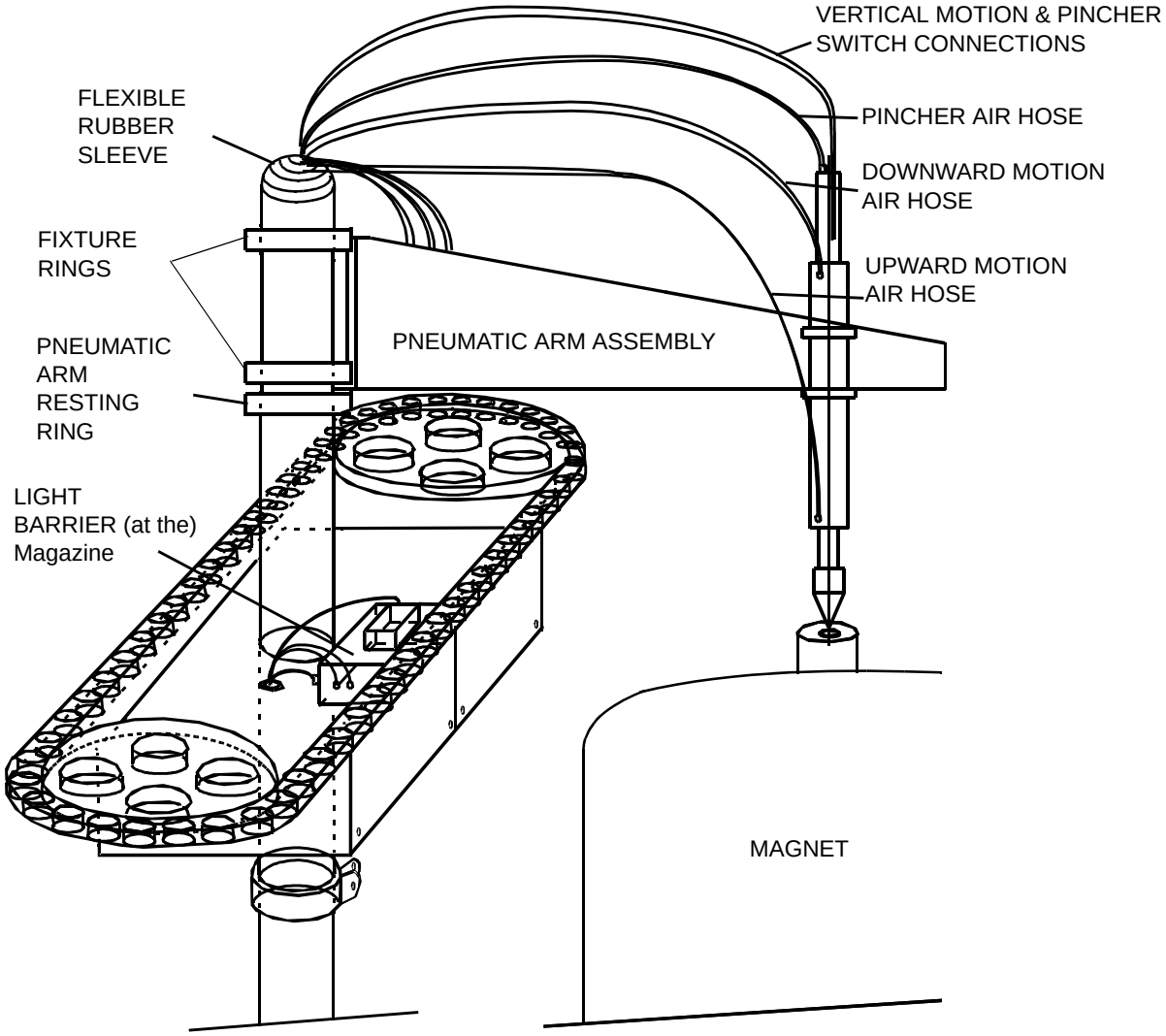


Regardless if you have N2 tower or not, the column should be turned in such a way that the connections at the bottom are directed towards the magnet

(see ***Figure 4.1.***). **Tip:** It is easier to accomplish this step with two people, one to hold the column vertical and the other to secure the adjustable arms.

Note: If the magnet has Vibration Dampers and the column uses a support pictured in ***Figure 4.1.***, then the column must be leveled at this time (as described in ***section 4.9***) before mounting the pneumatic arm assembly.

Figure 4.8. Arrangement of Arm and Cabinet Assemblies



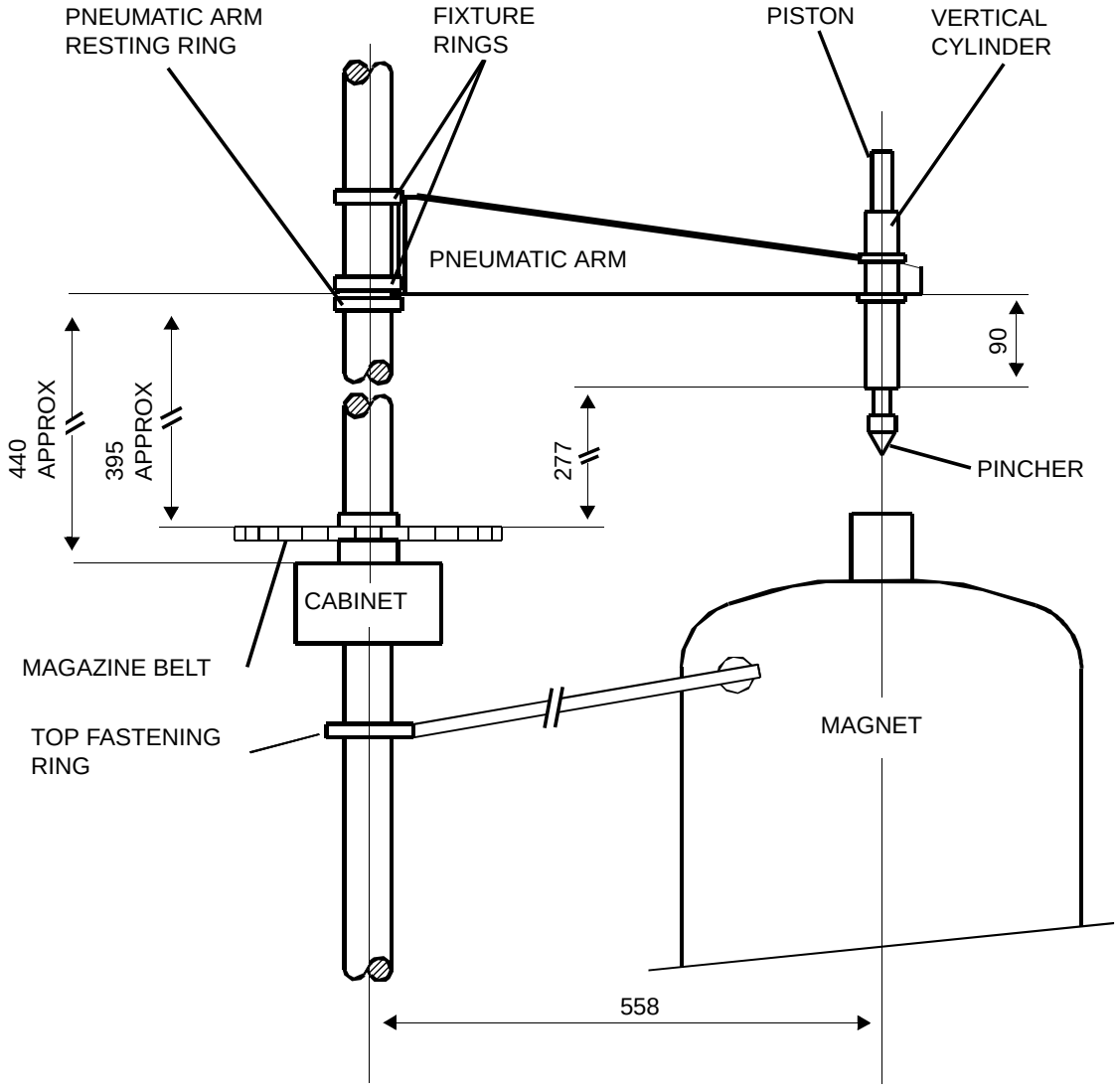
Mounting the Pneumatic Arm Assembly *4.8*

Slide the pneumatic arm resting ring (***Figure 4.8.***) over the top of the round column piece and let it rest on the top of the cabinet (don't tighten it). The resting ring gives a vertical support to the arm which can still rotate horizontally. A key and slot system allows for a free rotation of the arm of about 90° around the column. This is necessary on wide bore magnets where the arm has to swing away from the top opening when handling larger samples.

Place the pneumatic arm assembly over the top of the column, sliding the two fixture rings (***Figure 4.8.***) over the round column piece. Tighten the rings just enough to keep the pneumatic arm assembly from sliding down.

Rotate the pneumatic arm assembly (***Figure 4.8.***) until the pincher is directly over the shim system ***Figure 4.10.***). The distance between the bottom of the pincher (when the cylinder is in the down position) and the top of the shim system should be 3 cm. Adjust this distance by loosening the fixture rings and raising or lowering the pneumatic arm assembly. When the correct distance is achieved, tighten the fixture rings. Raise the pneumatic arm resting ring until it rests firmly against the bottom fixture ring and tighten it securely.

Figure 4.9. Position of the Pneumatic Arm on the Column



Securing the Bottom of the Column Assembly *4.9*

Using a level measuring device, check to see if the round column piece is vertically level. Move the bottom of the column assembly as needed to adjust the level.

Once this is accomplished, connect the two remaining (bottom) adjustable arm assemblies to the electrical and pneumatic connector plate on the square column piece. Connect the other end of the arms to the legs of the magnet using the round clamps (see ***Figure 4.1.***).

If you are mounting a sample changer on a 600 MHz magnet that has **Vibration Dampers,** then the bottom of the column sets on the support as pictured in ***Figure 4.1.***. To position the column so that it is vertically level, turn the adjustable arms to move the column. When the support is used, the bottom adjustable arms are not required.

When the column is fully assembled, place the warning triangle sticker shown at the left, on the upper front half of the column assembly. This warning indicates that hands and objects should be kept out of the path of the pneumatic arm (refer to ***"Potentially Hazardous Areas" on page 11***).

Before using the sample changer in automatic mode, perform the fine adjustment procedure for the pincher as described in "Fine Adjustment Procedures" on page 32.

Connecting the Hoses and Cables *4.10*

Slip the pneumatic hoses and electrical cables from the arm to the cabinet through the flexible rubber sleeve down, through the column to the side opening into the cabinet (see ***Figure 4.5.***). Connect the pneumatic hoses and the electrical cables from the pneumatic arm assembly, and from the connector panel on the bottom of the column assembly (see ***Figure 4.5.***) to the pneumatic hose connection assembly and electrical sensor connector assembly in the cabinet (see ***Figure 4.8.***, ***Figure 4.9.***, and ***Figure 4.10.***).

Important: All of the electrical cables, electrical connections, air hoses and air hose connections are number-coded. Plug the numbered cable/hose into the corresponding connection (for example: cable # 6 to connection # 6 on the Sensor Connector Assembly).

When fixing air hoses allow for a stress free loop in order to avoid hoses being squashed at narrow bends or corners.

Figure 4.10. Rear View of the Automatic Sample Changer

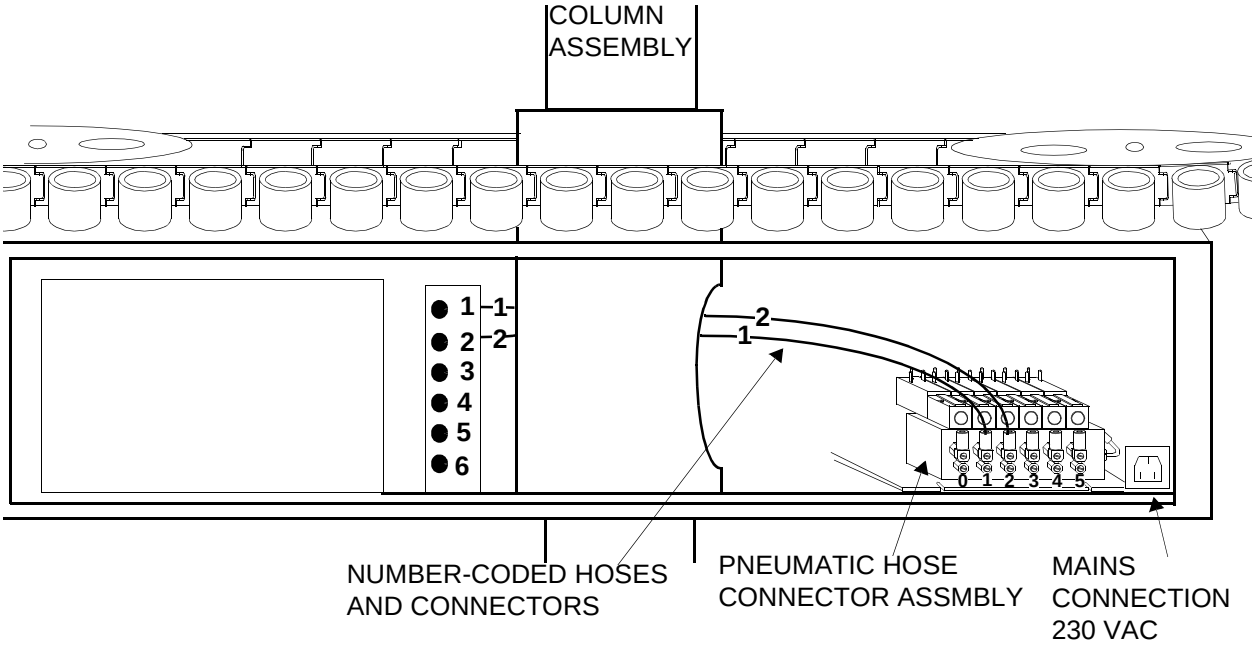
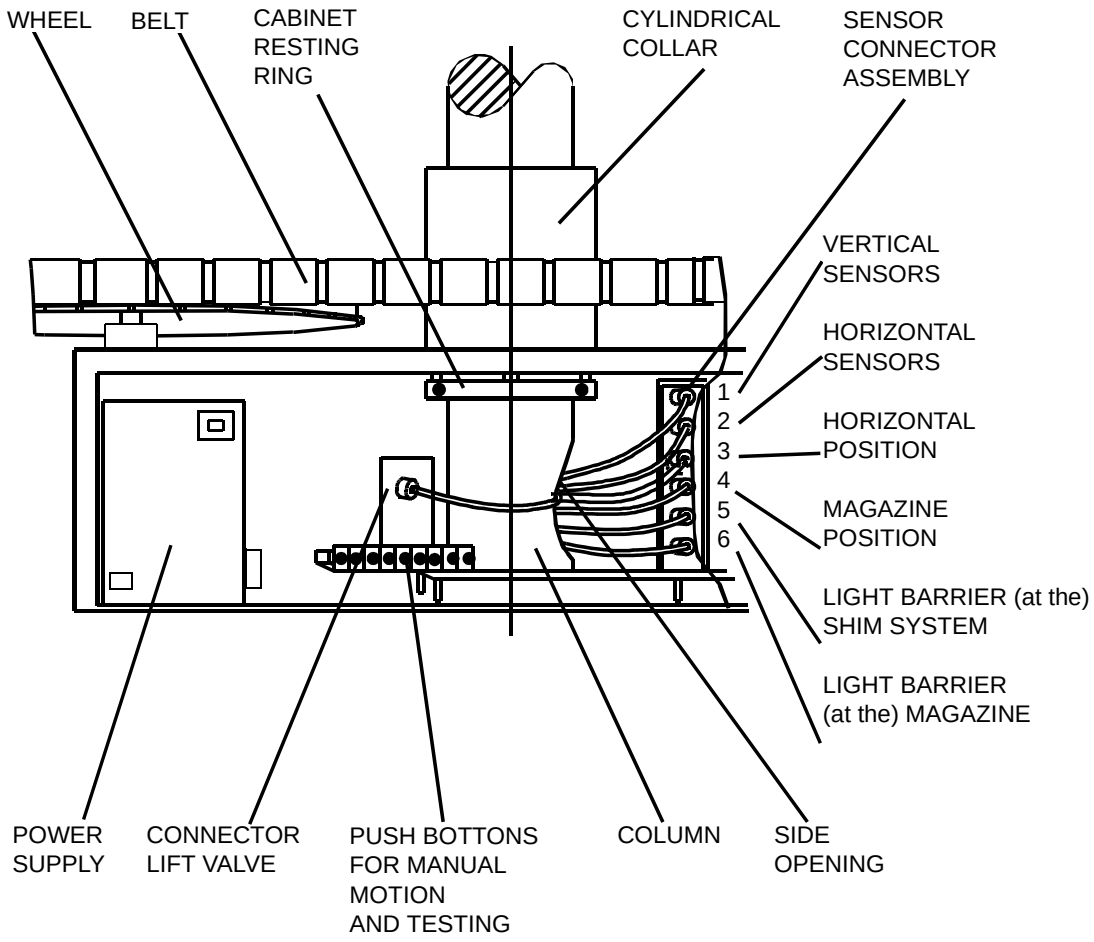


Figure 4.11. Partial Front View of Column and Cabinet



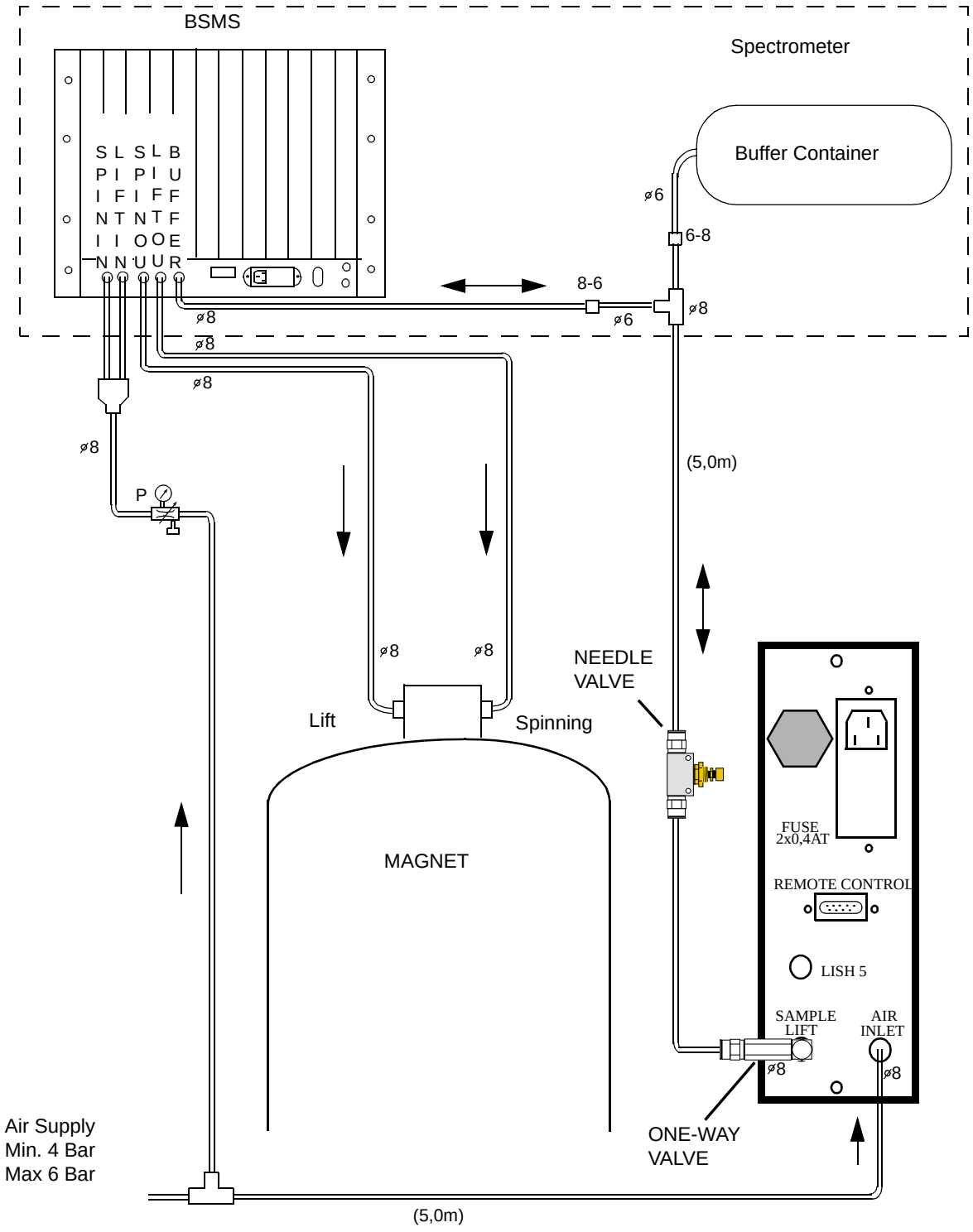
Remote Hose Connections *4.10.1*

The pressure of the compressed air supply should be between 4 and 6 bar (50-60 PSI). Connect the one-way valve supplied in the accessory kit to the sample lift valve on the Cable and Pneumatic Hose Connection Panel as shown in ***Figure 4.12.***and ***Figure 4.13.***. Add the needle valve supplied in the accessory kit between the sample lift valve and the BSMS as shown in ***Figure 4.12.***. Assemble the pneumatic piping on and around the sample changer as shown in ***Figure 4.13.***.

Open the compressed air supply.

Using the regulator at the rear of the lower column assembly, set the air pressure to 4 bar (50 PSI). Plug the Sample Changer pneumatic connections to the console as shown in ***Figure 4.13.***.

Figure 4.12. Pneumatic Connections to Magnet and Console.



Connecting the Mains and RS232 Cable *4.10.2*

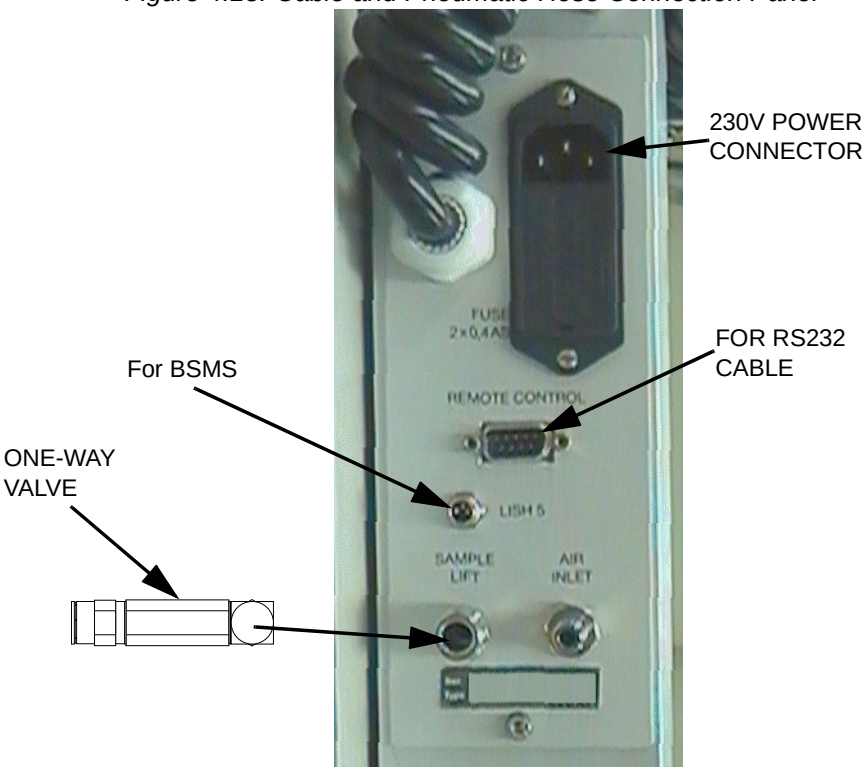
Connect the 230V main power cable from an electrical outlet to the Cable and Pneumatic Connection Panel (figure 4.11). Connect the Connection Panel to Cab-

inet end of the 230V power cable to the Mains Connection as shown in ***Figure 4.10.***.

Connect cable # 5 to LISH 5 on the Cable and Pneumatic Hose Connection Panel (***Figure 4.5.*** and ***Figure 4.13.***). Connect the other end of the cable to the Light Barrier for the Shim System as shown in ***Figure 4.3.***. For magnets with the BOSS 1 and BOSS 2 Shim Systems (see ***Figure 4.2.***) the cable is connected directly to the BSMS SLCB board, Sample Control connector.

Connect the RS232 connector and cable from the computer to the Remote Control 9-pin female connection on the Cable and Pneumatic Hose Connection Panel (***Figure 4.13.***).

Figure 4.13. Cable and Pneumatic Hose Connection Panel



Description of Input and Output Locations *4.11*

Refer to ***Figure 4.13.***.

Input: Mains connection - The 230V Connector

Air Input - Air Inlet

Light Barrier Shim System Input

Output: Sample lift air output - Sample Lift. Parallel with buffer.

Input and Output: RS232 Cable connection to computer - Remote Control

Settings and Adjustments

5

General 5.1

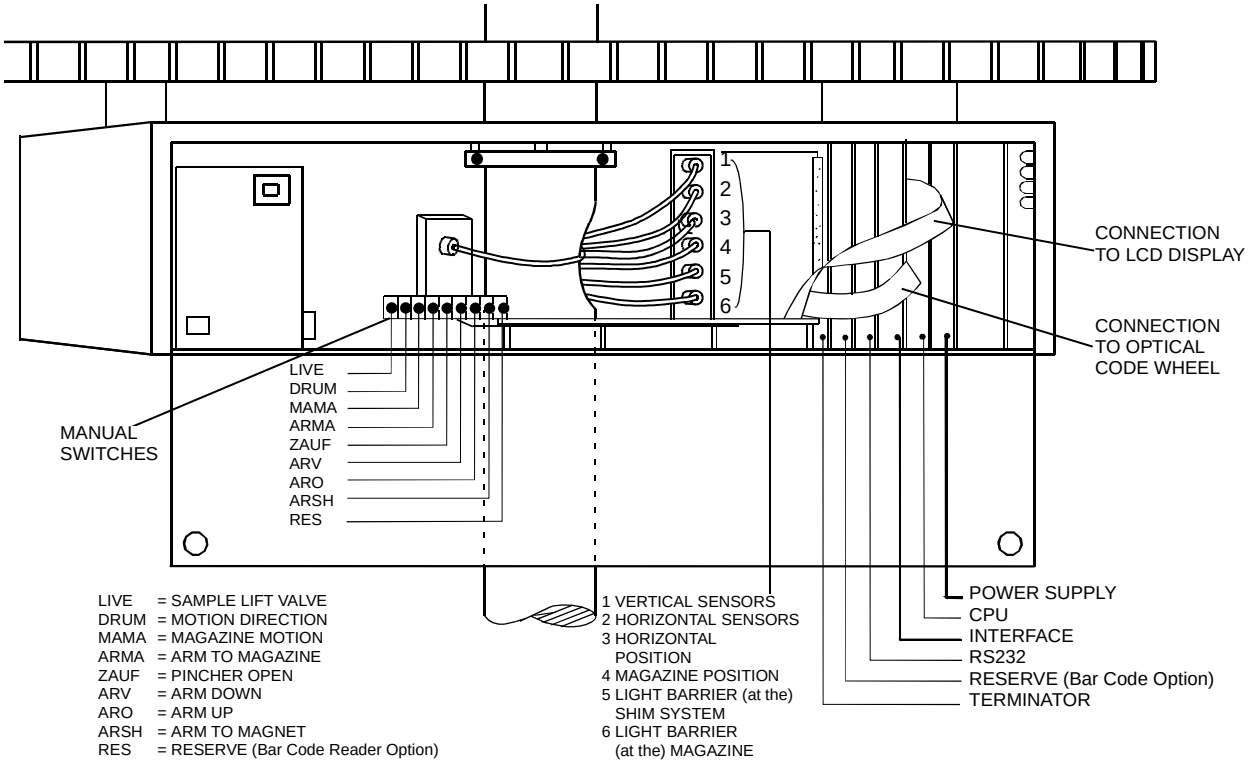
This chapter will lead you through the mechanical settings, fine adjustment procedures, pneumatic cylinder setting, and final setup of the automatic sample changer. These adjustments should be made only after the sample changer has been mounted in accordance with the instructions in chapter 4.

Mechanical Settings 5.2

Before making the following adjustments, make sure that the light barrier cylinder has been properly fitted on the top of the shim system and that cable #5 is connected to the Cable and Pneumatic Hose Connection Panel (refer to*"Connecting the Hoses and Cables" on page 22*).

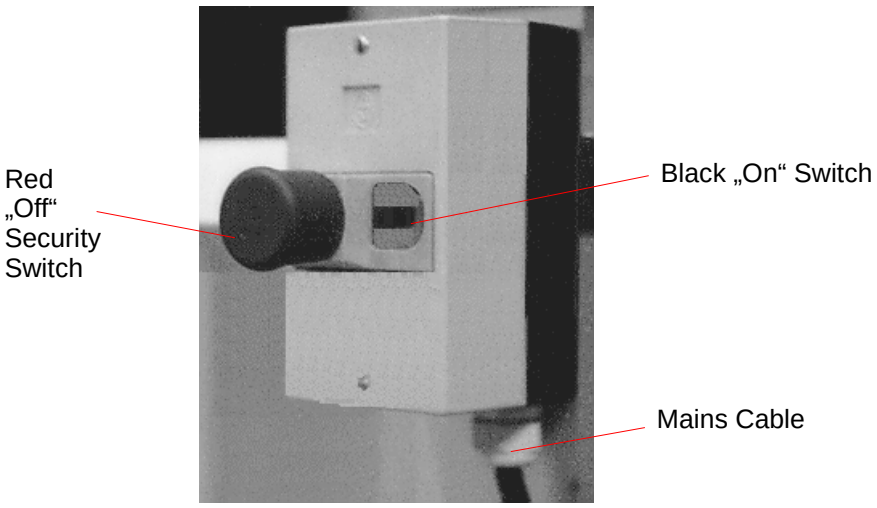
Important: Pull the CPU board and the interface board half ways out (*Figure 5.1.*).

Figure 5.1. Cabinet View Showing Boards and Pneumatic Assembly



Make sure the mains connector is plugged into the connection panel of the square column piece (see ***Figure 4.12.***). Pull the red security switch outwards and push the black start switch (***Figure 5.2.***). All mechanical functions can now be switched manually by pressing the push buttons on the pneumatic assembly (***Figure 5.1.***).

Figure 5.2. Security Switch

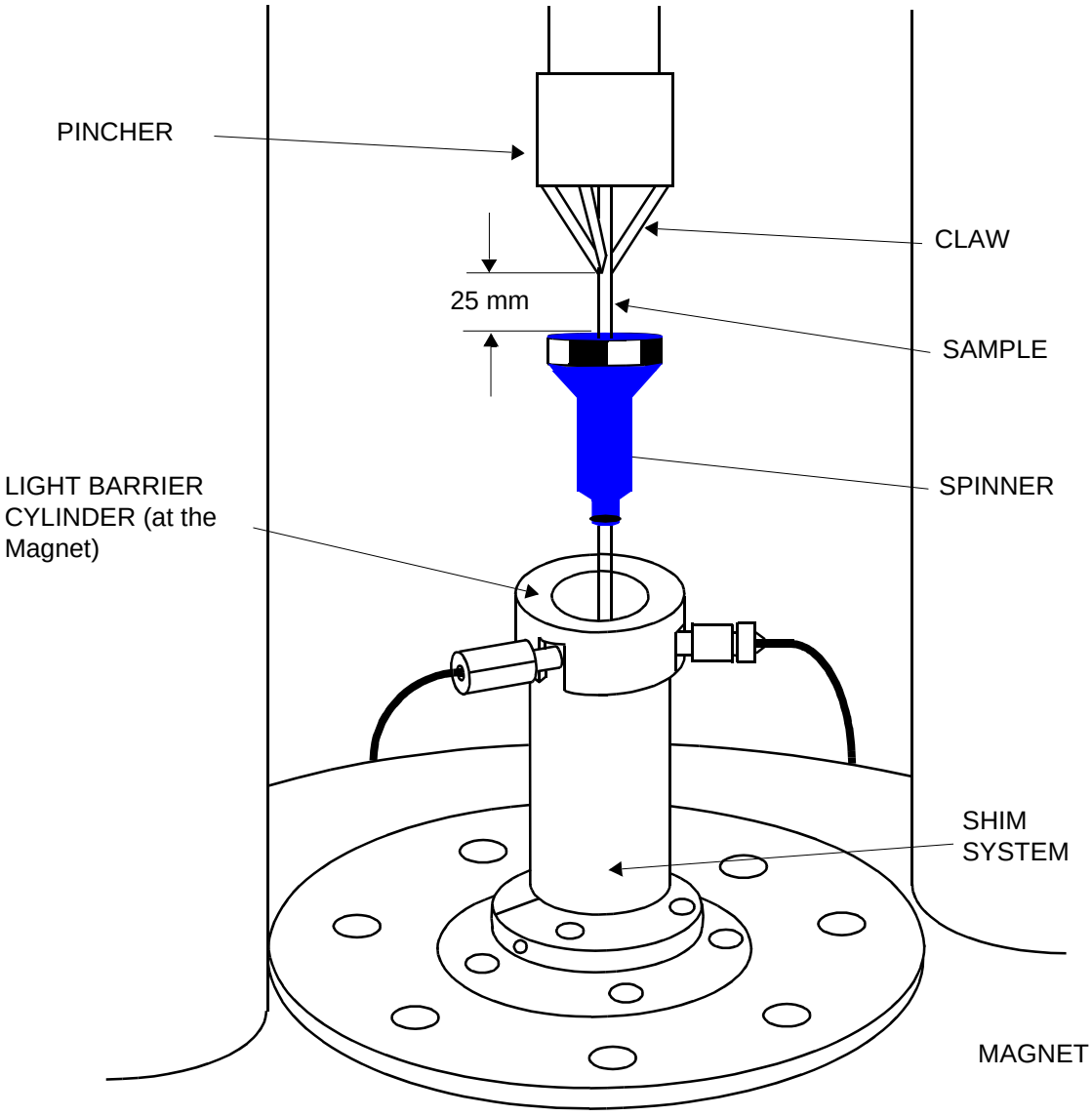


Pneumatic Arm Adjustment *5.2.1*

For all of the following settings use a 5 mm ϕ dummy sample (supplied with the B-ACS accessories). The tube should be fitted in a spinner like any normal 5 mm sample.

Caution: Make sure the arm is in the up position before moving inwards (towards the magazine) or outwards (towards the magnet).

Figure 5.3. Sample in Pincher on Top of Shim System



Perform the following tasks with the manual switches shown in ***figure 5.1***:

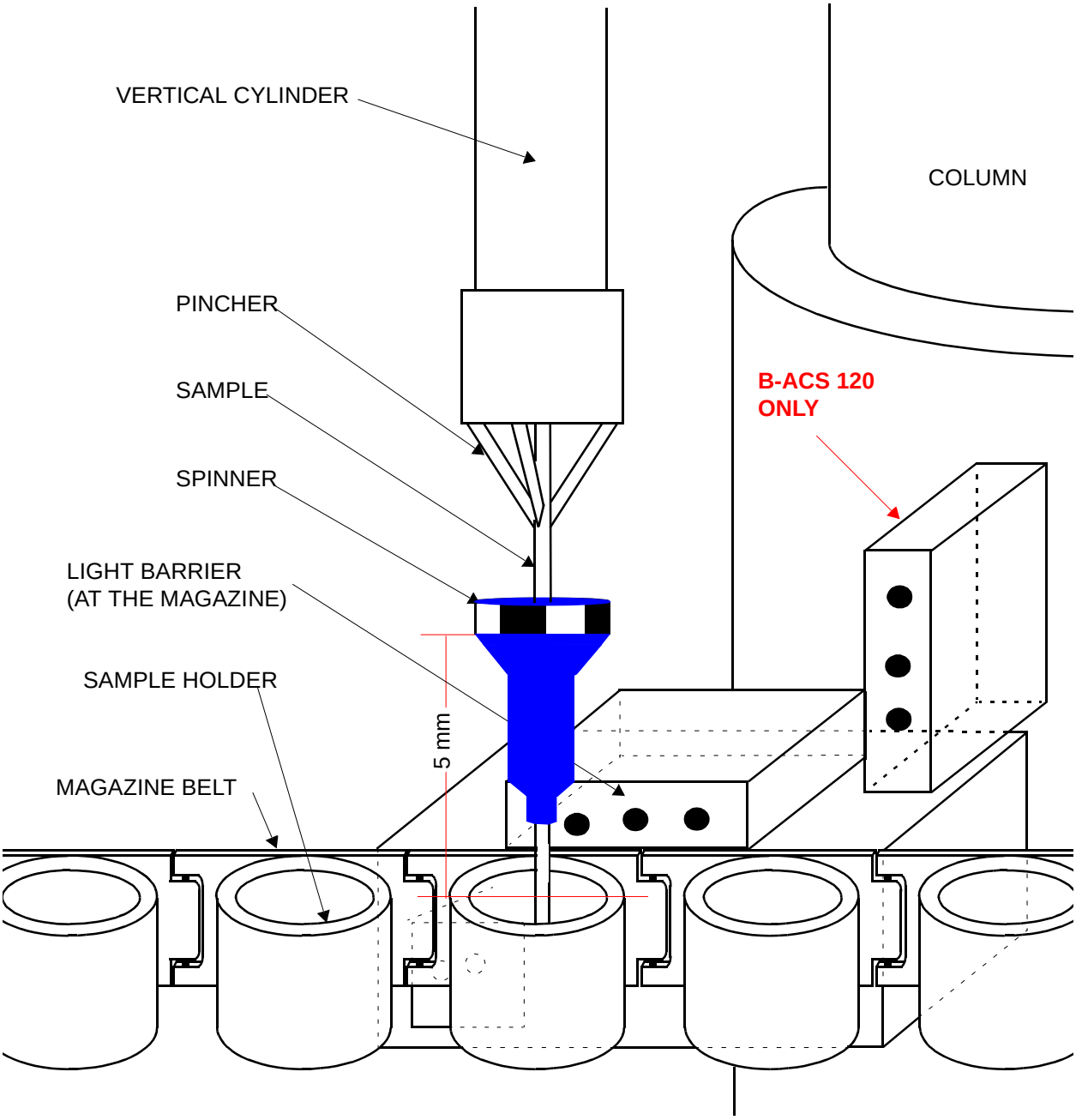
Arm up. (ARO)

Pincher Open. (ZAUF)

Put the sample in the pincher and close it.

The arm should now be holding the sample. Adjust the sample so that it hangs loosely (***figure 5.3, 5.4)***.

Figure 5.4. Sample in Pincher on Tip of Magazine Belt



Now move the sample to just over the light barrier cylinder:

Arm outwards. (ARSH)

Arm down slowly. (ARV)

The sample should be just over the light barrier cylinder, but probably not centered.

The sample now has to be maneuvered to the exact center of the shim system, while the column is kept in the upright position. To accomplish this, adjust the distance between the sample changer and the magnet by rotating the four adjustable arm assemblies (***Figure 4.1.***, ***Figure 4.7.***). Adjust the arm direction by loosening its fixture on the column. Let down the sample in short steps while adjusting. If the pincher seems to get too close to the light barrier cylinder, then the whole arm has to be lifted.

Once the sample is centered, complete the following steps to verify the correct arm position:

Arm down. (ARV)

Lift on. (LIVE)

Pincher open (ZAUF).

Let the sample float a few seconds on the cushion of air to allow it to stabilize.

Close the pincher (by releasing the ZAUF switch).

The arm position is correct when the pincher holds the sample 25 mm above the spinner. If necessary, adjust the arm's height and repeat the sequence: lift on, pincher open, wait, pincher closed, until the setting is correct.

Cabinet and Magazine Belt Adjustment *5.2.2*

Following the pneumatic arm setting procedure, keep the sample in the pincher in the same position it was grasped after the sample lift. Perform the following steps to check the position of the cabinet with the magazine belt:

Sample lift off (LIVE).

Arm up (ARO).

Arm to magazine (ARMA).

Arm down slowly (ARV).

Rotate the cabinet slightly if the sample, when approaching the magazine, is not centered perfectly in the sample holder of the magazine belt (see ***Figure 5.5.***).

Move the arm further down.

If the inward position of the vertical cylinder is not correct, then see ***section 5.2.3***, Vertical Cylinder Adjustment. If the spinner tip edge gets too close to the sample holder (less than 5 mm) move the cabinet further down. The correct distance between the spinner top edge and the magazine should be approx. 5 mm as shown in ***Figure 5.5..***

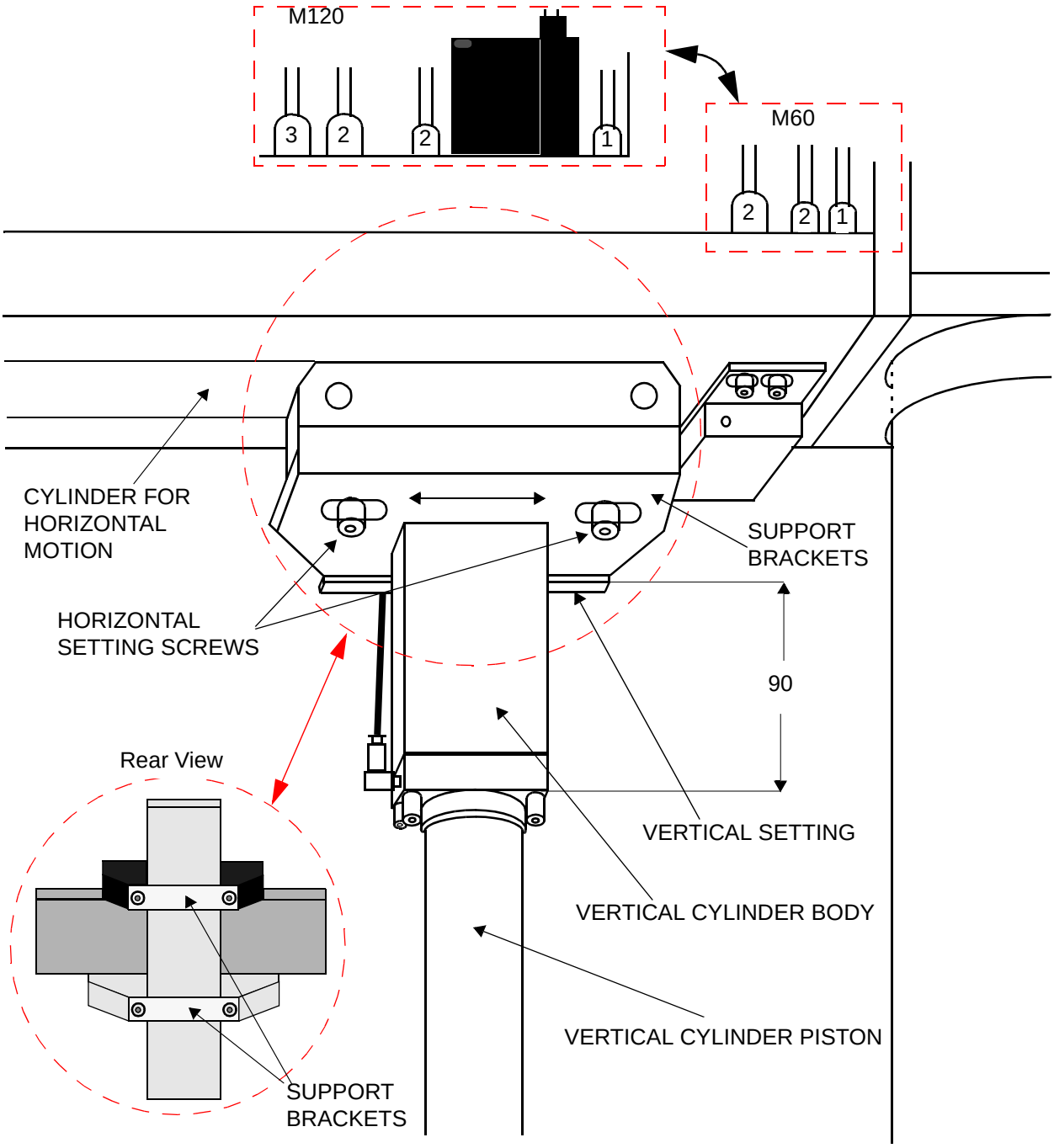
Vertical Cylinder Adjustment *5.2.3*

The vertical position of the vertical cylinder is factory set and normally does not need any adjustment. However, if it becomes absolutely necessary, the cylinder can be shifted vertically and horizontally by loosening the support bracket (***Figure 5.5.***). Generally the vertical position should be kept at a 90 mm position.

Caution: Do not tighten the support bracket too much, as this will damage the thin cylinder walls.

To adjust the horizontal position, loosen the two screws under the bottom support bracket (*Figure 5.5.*). To obtain compensation for guide play, press the top and bottom brackets together when tightening the mounting screws.

Figure 5.5. Mounting the Vertical Cylinder



Fine Adjustment Procedures *5.3*

The following procedures are used as:

An aid in making a final check of the Sample Changer.

As a check list for readjusting a running Sample Changer at regular intervals.

Settings at the Magnet *5.3.1*

Prepare the Sample Changer as Follows:

1. Switch the power off using the red security switch pictured in (***Figure 5.2.***).
2. Unplug the interface and the CPU boards (***Figure 5.1.***), and pull them half ways out.
3. Pull the red security switch outwards and push the black start button to turn the power back on.

Use the manual switches (Figure 5.1.) to perform the following functions (the correct switches to use are in parenthesis):

4. Arm Forwards (ARSH) - until the pincher rests over the shim system.
5. Obtain a dummy sample with a spinner.
6. Open the Pincher (ZAUF)
7. Place the sample in the pincher and release the ZAUF switch, allowing the pincher to close.
8. Lower the arm down (ARU) to over the shim system.
9. Turn the sample lift air on.
10. Open the pincher to release the sample (ZAUF).
11. Let the sample float for a few seconds to stabilize.
12. Close the pincher by releasing the ZAUF switch.
13. Turn the sample lift off.

The distance between the pincher and spinner should be 10 to 15 mm. If necessary, adjust the arm's height at the column (***Figure 5.2.***).

Without changing the sample position in the pincher, perform the following steps:

14. Raise the arm slightly (ARO).
15. Check the concentricity of the spinner and the shim system. The concentricity can be adjusted by turning the bars of the adjustable arm assemblies (loosen the locking nuts (***Figure 4.1.***, ***Figure 4.7.***), or by rotating the pneumatic arm.

16. Adjust the perpendicularity of the column by turning the bars of the bottom adjustable arm assemblies. Repeat steps 14-16 until an optimum position has been obtained.
17. Tighten the locking nuts and the fastening bolts of the four adjustable arm assemblies.

Settings at the Magazine *5.3.2*

1. Raise the arm (ARO).
2. Move the arm towards the magazine (ARMA).

Caution: Carefully follow the movement of the sample to prevent collisions with any part of the cabinet or magnet.

3. Lower the arm (ARU) to the magazine belt.
4. Check the concentricity of the sample spinner and the sample holder on the magazine belt. The concentricity can be adjusted by turning (rotating) the cabinet assembly around the column slightly.

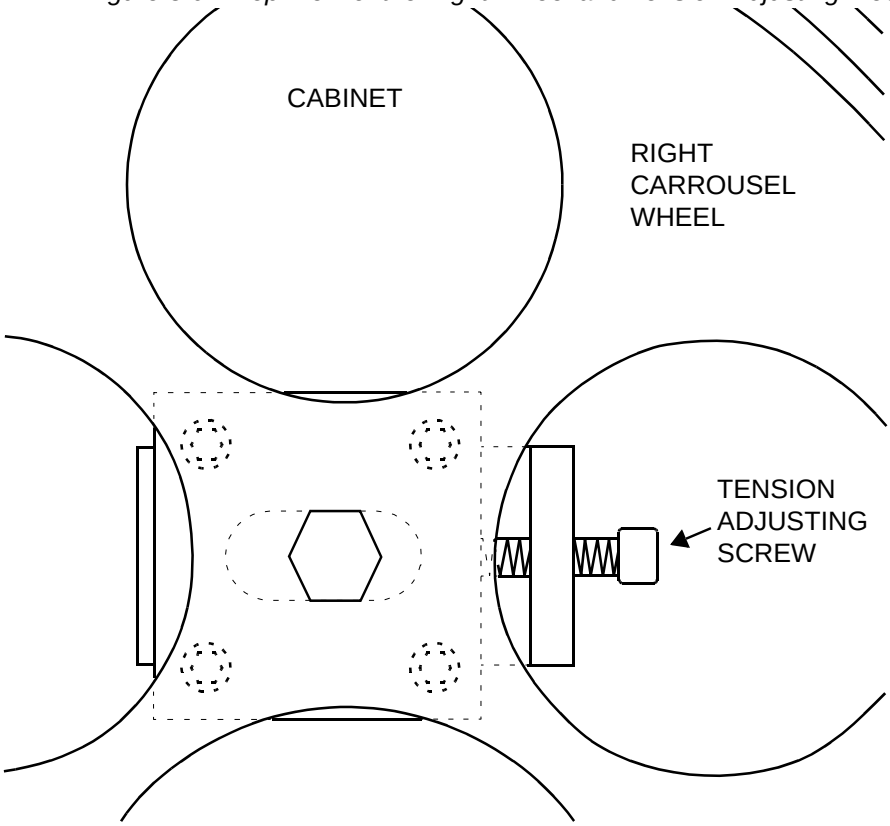
The sample spinner should not rest on the sample holder, but should stop approximately 5 mm over it (see ***Figure 5.4.***). The sample has to fall into the sample holder when the pincher opens. If necessary adjust the cabinet vertical position.

Adjustment of the Tension of the Magazine Belt *5.3.3*

The adjustment mechanism under the right carrousel wheel (***Figure 5.6.***) is used for adjusting the tension of the magazine belt. The tension should be increased only when the belt, when filled with samples, hangs more than 5 to 8 mm under the wheel line of the space between the two carrousel wheels.

Caution: Excessive tension will damage the belt and wheel bearings.

Figure 5.6. Top View of the Right Wheel and Tension Adjusting Mechanism.



Pneumatic Cylinder Settings *5.4*

The speed of both the vertical and horizontal cylinder can be varied by regulating the outlet air flows of the cylinder supply connections. A small needle valve is fitted on the exhaust outlet of each of the magnetic valves 1, 2, 4, and 5 (***Figure 5.7.***). The needle valves can be manually set to change the linear speed of the cylinder (by using a screwdriver).

Additionally the ORIGA horizontal cylinder is provided with two „end of course“regulation needle valves to set the slowing down of the cylinder when reaching the end position (see ***Figure 5.8.***).

Figure 5.7. Outlet Needle Valves on the Cylinder Supply Connections

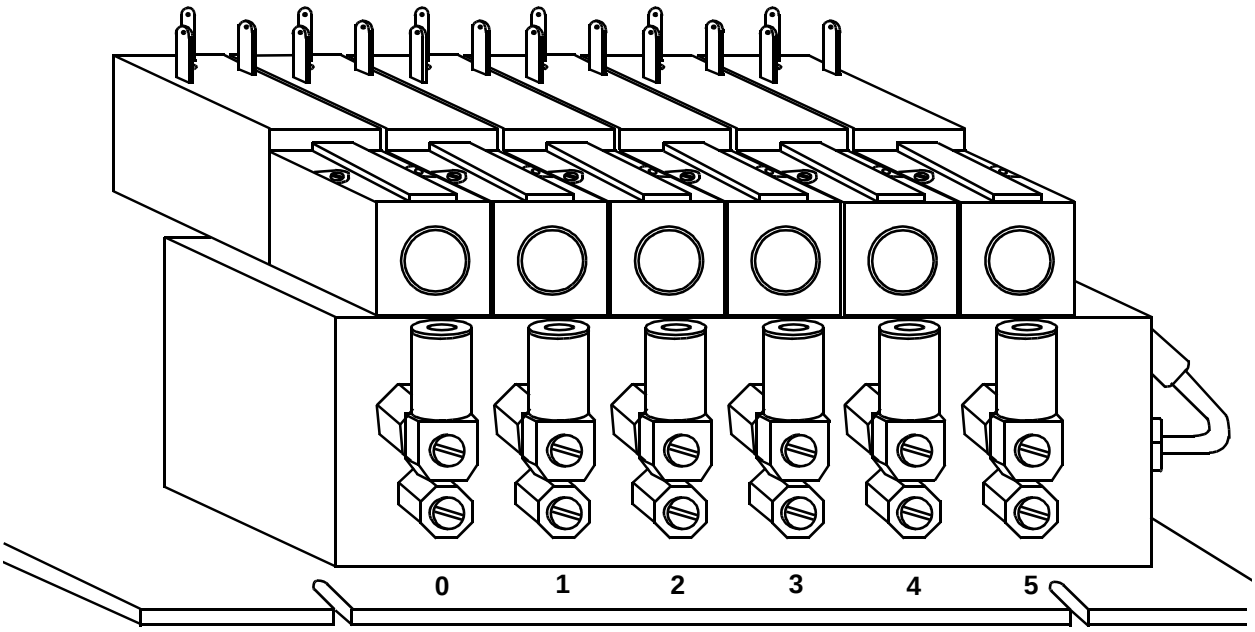
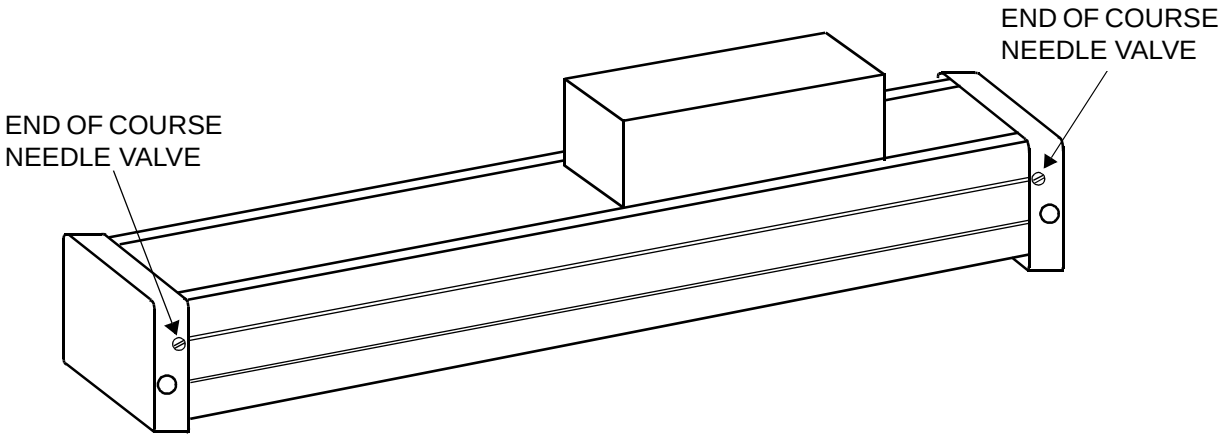


Figure 5.8. ORIGA Horizontal Cylinder Pneumatic Setting



Final Setup *5.5*

Switch off the power by pushing the red security switch (***Figure 5.2.***).

Push all boards in firmly.

Check the following connections:

9 lead flat cable to the RS232.

16 lead flat cable to the Interface Board.

9 lead flat cable from the Front Panel to the Interface Board.

Switch the power on by pulling the red security switch out and pushing the black start button (***Figure 5.2.***).

The initialization routine will automatically begin.

Operating Instructions

6

General 6.1

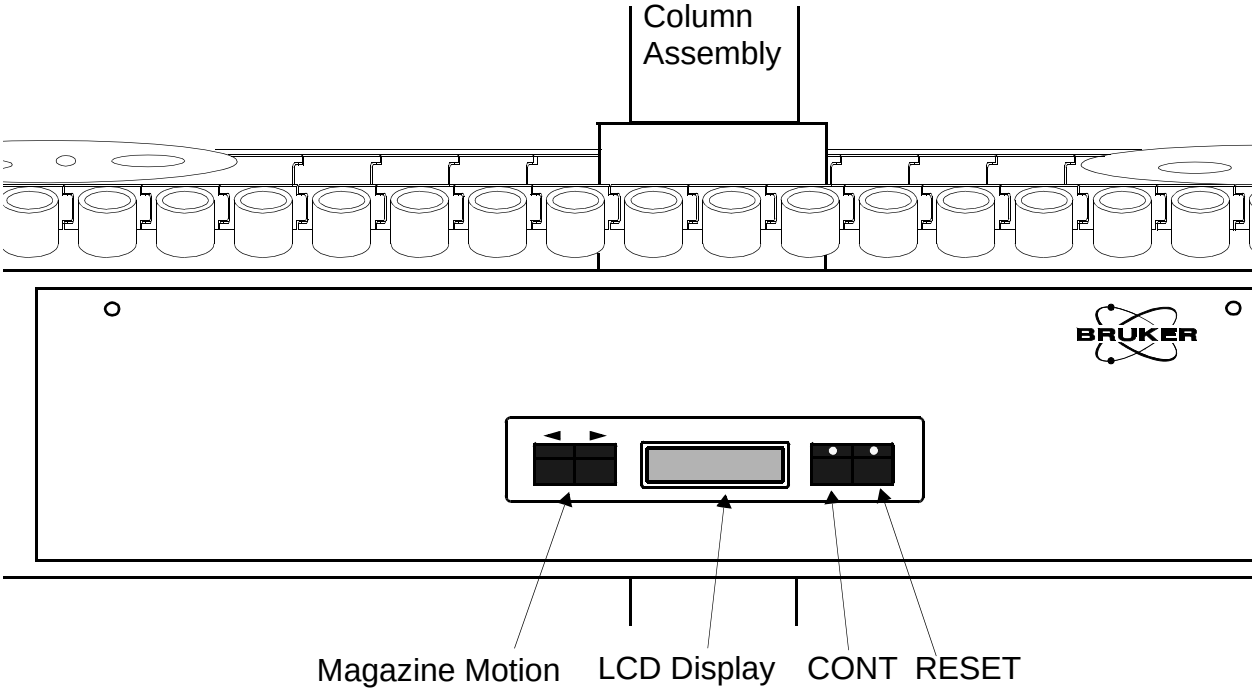
In the present version, the B-ACS 60 Automatic Sample Changer can handle a capacity of 60 samples for NMR measurements with superconducting magnets. The B-ACS 120 can handle 120 samples. The Sample Changer is linked to the host computer via a RS232 cable.

Front Panel Controls 6.1.1

The following controls are located on the front panel (figure 6.1):

1. **LCD DISPLAY:** Used for the current status and for error messages.
2. **RESET:** A push button for system initialization.
3. **CONT:** A push button for continuation after a failure occurs.
4. **MAGAZINE MOTION:** Push buttons for manual magazine motion.

Figure 6.1. Front Panel of Automatic Sample Change



Connections *6.1.2*

After installation, the sample changer needs to be connected to the host computer with a RS232 cable. The sample changer can then be started through use of the power switch.

Starting the B-ACS 60 or 120 *6.2*

The sample changer can be started either by pressing the power switch or by pressing the RESET button. The arm will then move to its stand-by position, i.e. the vertical cylinder up and the pincher on top of the opening at the magnet. The internal logic will then check the pincher status and if no sample is found in the pincher, will enter the READY waiting loop. If the pincher is holding a sample, the sample changer will try to place it in the actual magazine position (XX) or, if this one is not available, into the next available magazine position. The sample changer will then either, enter the READY loop and wait for an external command or, when all positions are occupied, interrupt the initialization and display error message No. 10.

During the initialization the following message will be shown on the LCD display:

SAMPLE CHANGER

INITIALIZATION

After the initialization, and during the READY loop, the following message is displayed:

POSITION No.

(XX) or (XX / XXX)

The XX represents the current magazine position.

Fitting Samples into the Sample Magazine *6.3*

The belt magazine of the B-ACS 60 sample changer has a maximum capacity of 60 samples. The B-ACS 120 has a maximum capacity of 120 samples. Gaps of one or more empty spaces are allowed between samples. This allows similar solvents to be grouped in contiguous positions in order to speed up the locking procedure.

Similarly, it is practical to leave a few free spaces between groups, which can be filled up at the last minute, with similar solvent samples. You may even do this when the sample changer is running.

Individual Commands via the RS-232 *6.4*

The host computer controls various elements of the sample changer through the use of software commands. With a host running XWINNMR with a version less than 2.5 the sample changer is controlled from ICONNMR or SET & RUN. With a host running XWINNMR version 2.5 and greater the sample changer is controlled from ICONNMR only.

Test for Sample in Magnet

If a sample is present in the magnet, a further check will be performed to see if the sample is spinning and/or locked.

When a sample is found it will be removed and placed in the magazine. If no sample is found then a security test (SE) will be performed.

At the end of this test the normal sample changing procedure will begin. During this procedure the sample changer will automatically look for the next sample to be handled. The following message will be displayed during the normal changing procedure:

POSITION No.

BUSY! No. YY

Where **XX** indicates the current position of the magazine, and **YY** the current sample number.

At the end of a sample changing procedure the following message will be displayed:

POSITION No.

(XX) or (XX / XXX)

Manual Motion (Control) of the Magazine Belt *6.5*

Manual control of the movement of the magazine belt is accomplished by pushing the two buttons located on the side panel of the magazine. The push buttons are active only when the sample changer is not busy, i.e. idling in the ready loop.

The Occurrence of a Failure *6.6*

If a failure occurs during operation, the sample changer interrupts the current procedure, causing the red 'CONT' LED on the front panel to flash on and off. An error message, consisting of a code number and text, also show up on the display and an error signal is transmitted to the host.

To resume operation after the error has been corrected, press the 'CONT' button. The sample changer will then continue at the same point it had reached just before the failure occurred. The host will be informed of the successful correction. On rare occasions it may be necessary to do a new initialization, if the above mentioned intervention did not correct the error.

Software Commands 7

B-ACS 60/120 Command Implementation 7.1

Release: 19990701

A command always consists of two letters which in some cases are followed by a space and a parameter. The space between the command and the parameter is essential. A command must always be terminated with <CR>. If this syntax is not respected, the sample changer gives the message: "Invalid Parameter" or "Invalid Command".

The answer of any command is terminated with <CR><LF> or still is only <CR><LF>.

The sample changer software commands have been divided into three modes:

1. Operation Mode

   This is the actual sample changer operating mode in which complete sample exchange sequences can be run by a host computer.

2. Error Mode

   This mode has only two commands: one to continue the program after an error has been observed, and one to move to the defined neutral position "HOME".

3. Diagnostic Mode

   This mode offers the user a range of commands to test all the different sample changer functions.

The different commands are described in detail in the following sections.

Operation Mode 7.1.1

The following list gives a detailed description of all operation commands in alphabetical order.

Standard Commands

Table 7.1. Standard Commands

Instruction:	**AP** (**A**uto**P**rep)
Format:	AP<CR>
Description:	AutoPrep and barcode reader present test.
Reply:	<CR><LF>

Instruction:	**EJ** (**EJ**ect)
Format:	EJ<CR>
Description:	Get sample from shim system and insert it in the magazine.
Reply:	<CR><LF>

Instruction:	**HO** (**HO**me)
Format:	HO<CR>
Description:	The sample changer arm moves to its „HOME“ position over the magazine. If a sample is in the pincher, it is placed in the magazine when the given position is free
Reply:	<CR><LF>

Instruction:	**IJ** (**I**n**J**ect)
Format:	IJ XXX<CR>
Description:	Get sample from position XXX from the magazine and insert it in the shim system.
Reply:	<CR><LF>

Instruction:	**NM** (total **N**umber of **M**agazine positions)
Format:	NM<CR>
Description:	Report the number of available magazine positions.
Reply:	N<number><CR><LF>

Instruction:	**RP** (**R**eport **P**osition)
Format:	RP<CR>
Description:	Read actual magazine position.
Reply:	P<number><CR><LF>

Table 7.1. Standard Commands

Instruction:	**SE** (**SE**curity)
Format:	SE<CR>
Description:	Security Test. Start a sample lift lasting 30 sec's to ensure that there is no sample in the magnet. If a sample is found, the sample lift is kept on and the message S1 is sent back. If no sample is found, the message given is: "S0".
Reply:	S0<CR><LF> or S1<CR><LF>

Instruction:	**SP** (**S**ample **P**resent in magazine)
Format:	SP XXX<CR>
Description:	Report sample status of magazine position XXX. The message "S1" means sample found, "S0" means no sample found.
Reply:	S0<CR><LF> or S1<CR><LF>

Instruction:	**VS** (**V**ersion of **S**oftware)
Format:	VS<CR>
Description:	Report Firmware version. Format YYMMDD, which means YEAR MONTH DAY. Example 991013.
Reply:	YYMMDD<CR><LF>

Instruction:	**ZY** (**Z**ero **Y**ell)
Format:	ZY<CR>
Description:	Repeat the answer of the last command.
Reply:	Last reply followed by <CR><LF>

Instruction:	**ESC.** (**ESC**ape key + "**.**")
Format:	ESC.<CR>
Description:	Switch to the Diagnostic mode.
Reply:	SAMPLECHANGER DIAGNOSTIC MODE!

Barcode Option Commands

Table 7.2. Bar Code Option Commands

Instruction:	**BD** (**B**arcode **D**igit)
Format:	BD XX<CR>
Description:	Set barcode digit length to 4, 6 or 12 digits
Reply:	<CR><LF>

Instruction:	**BS** (**B**arcode **S**tatus)
Format:	BS <CR>
Description:	Report of the selected barcode digit length and the associated code type.
Reply:	BD 4<CR><LF> BD 6<CR><LF> BD 12<CR><LF>

Instruction:	**CL** (**CL**ear)
Format:	CL XXX<CR>
Description:	Clear label entry for position XXX.
Reply:	<CR><LF>

Instruction:	**EX** (**EX**periment number)
Format:	EX XXX<CR>
Description:	Report experiment for sample in position XXX.
Reply:	E<number><CR><LF> if the reading was correct. E0<CR><LF> if there was a reading error.

Instruction:	**LL** (**L**oad **L**abel)
Format:	LL<CR>
Description:	Read labels from actual reader position.
Reply:	<CR><LF>

Table 7.2. Bar Code Option Commands

Instruction:	**RL** (**R**ead **L**abel)
Format:	RL XXX<CR>
Description:	Read label number from sample in position XXX.
Reply:	L<number><CR><LF> if the reading was correct. L0<CR><LF> if there was a reading error.

Instruction	**SB** (**S**ample Check at **B**arcode Reader)
Format:	SB XXX<CR>
Description	Check if a sample is present in the barcode reader at magazine position XXX.
Reply:	S1<CR><LF> Sample is present. S0<CR><LF> No sample found at position XXX.

Instruction	**SO** (**SO**lvent)
Format:	SO XXX<CR><LF>
Description	Report solvent for sample in position XXX.
Reply:	V<number><CR><LF> if the reading was correct. V0<CR><LF> if there was a reading error.

Instruction:	**UR** (**U**se**R** ID)
Format:	UR XXX<CR>
Description:	Report user for sample in position XXX.
Reply:	U<number><CR><LF> if the reading was correct U0<CR><LF> if there was a reading error.

Error Mode *7.1.2*

In this mode the following two commands will be accepted:

Table 7.3. Error Mode Commands

Instruction:	**CO** (**CO**ntinue)
Format:	CO<CR>
Description:	Continue after error. The program will continue at the point where it was interrupted when the error showed up.
Reply:	<CR><LF>

Table 7.3. Error Mode Commands

Instruction:	**HO** (**HO**me)
Format:	HO<CR>
Description:	Move to home (nearly a soft reset). The sample changer moves to its "HOME" position at the magazine. If a sample is in the pincher, it is placed in the magazine when the given position is free.
Reply:	<CR><LF>

Diagnostic Mode *7.1.3*

In the diagnostic mode all operation mode commands are accepted. In the diagnostic mode command characters are "echoed" to the input terminal and the message "EXECUTED!" is send before the <CR><LF> when the command is finished.

The additional commands of the diagnostic mode are listed below.

Table 7.4. Diagnostic Mode Commands

Instruction:	**AD** (**A**rm **D**own)
Format:	AD<CR>
Description:	Vertical cylinder down
Reply:	EXECUTED!<CR><LF>

Instruction:	**AS** (**A**rm to **S**him)
Format:	AS<CR>
Description:	Move to shim system. If the pincher was in the lower position the arm will move up before moving to the position above the shim system.
Reply:	EXECUTED!<CR><LF>

Instruction:	**AU** (**A**rm **U**p)
Format:	AU<CR>
Description:	Vertical cylinder up.
Reply:	EXECUTED!<CR><LF>

Table 7.4. Diagnostic Mode Commands

Instruction:	**A1** (**A**rm to magazine position **1**)
Format:	A1<CR>
Description:	Move to inner magazine position. If the pincher was in the lower position, the arm will move up before moving to the inner magazine position.
Reply:	EXECUTED!<CR><LF>

Instruction:	**A2** (**A**rm to position **2**)
Format:	A2<CR>
Description:	Move to outer magazine position. If the pincher was in the lower position, the arm will move up before moving to the outer magazine position.
Reply:	EXECUTED!<CR><LF>

Instruction:	**BT** (**B**arcode **T**est)
Format:	BT<CR>
Description:	Barcode reader test. Start the bar code reader test. the message "TEST CHANNEL A" shows up. Use the front panel keys "<" and ">" to switch from channel A to channel B and back. The active channel is always displayed. Pressing the CONT button stops the test.
Reply:	EXECUTED!<CR>

Instruction:	**CA** (**C**ode wheel **A**djust)
Format:	CA<CR>
Description:	Code wheel adjust. The code wheel will be read and shown continuously on the LC display. Pressing the CONT button stops the test.
Reply:	EXECUTED!<CR><LF>

Instruction:	**DT** (**D**isplay **T**est)
Format:	DT<CR>
Description:	Display test. Calls the display test program with the character pattern check routine. Pressing the CONT button stops the test.
Reply:	EXECUTED!<CR><LF>

Table 7.4. Diagnostic Mode Commands

Instruction:	**HL** (**H**orizontal **L**oop)
Format:	HL<CR>
Description:	Test loop for horizontal movement. The loop count will be displayed on the terminal. Pressing the CONT button when the red LED is on stops the test.
Reply:	EXECUTED!<CR><LF>

Instruction:	**LB** (**L**oop **B**ackwards)
Format:	LB<CR>
Description:	Magazine loop backward. Pressing the CONT button stops the program.
Reply:	EXECUTED!<CR><LF>

Instruction:	**LD** (**L**ift **D**own)
Format:	LD<CR>
Description:	Lift down.
Reply:	EXECUTED!<CR><LF>

Instruction:	**LF** (**L**oop **F**orwards)
Format:	LF<CR>
Description:	Magazine loop forward. Pressing the CONT button stops the test.
Reply:	EXECUTED!<CR><LF>

Instruction:	**LU** (**L**ift **U**p)
Format:	LU<CR>
Description:	Lift up.
Reply:	EXECUTED!<CR><LF>

Instruction:	**MB** (**M**agazine one step **B**ack)
Format:	MB<CR>
Description:	Move magazine one position backward.
Reply:	EXECUTED!<CR><LF>

Table 7.4. Diagnostic Mode Commands

Instruction:	**MF** (**M**agazine one step **F**orwards)
Format:	MF<CR>
Description:	Move magazine one position forward.
Reply:	EXECUTED!<CR><LF>

Instruction:	**MP** (**M**ove to **P**osition)
Format:	MP XXX<CR>
Description:	Move magazine to position XXX.
Reply:	EXECUTED!<CR><LF>

Instruction:	**OH** (**O**ptics on **H**orizontal cylinder)
Format:	OH<CR>
Description:	Test for light barriers for horizontal positioning. Pressing the CONT button stops the test. The message given on the display during the optic test is: REFLECTION OK 1 or NO REFLECTION 0.
Reply:	EXECUTED!<CR><LF>

Instruction:	**OM** (**O**ptics at **M**agazine)
Format:	OM<CR>
Description:	Test for light barriers at magazine. Pressing the CONT button stops the test. The message given on the display during the optic test is: SAMPLE PRESENT 1 or SAMPLE MISSING 0.
Reply:	EXECUTED!<CR><LF>

	OS (**O**ptic **S**him)
	OS<CR>
	Test for light barrier at the shim system. Pressing the CONT button stops the test. The message given on the display during the optic test is: SAMPLE PRESENT 1 or SAMPLE MISSING 0.
	EXECUTED!<CR><LF>

Table 7.4. Diagnostic Mode Commands

Instruction:	**PC** (**P**incher **C**lose)
Format:	PC<CR>
Description:	Close pincher.
Reply:	EXECUTED!<CR><LF>

Instruction:	**PL** (**P**incher **L**oop)
Format:	PL<CR>
Description:	Test loop for pincher movement. Loop count will be displayed on the terminal. Pressing the CONT button when the red LED is on stops the test.
Reply:	EXECUTED!<CR><LF>

Instruction:	**PO** (**P**incher **O**pen)
Format:	PO<CR>
Description:	Open pincher.
Reply:	EXECUTED!<CR><LF>

Instruction:	**PT** (**P**ressure **T**est)
Format:	PT<CR>
Description:	Pressure test. This command starts a loop program which checks continuously the condition of the pressure switch and indicates it on the LC display. If the air pressure exceeds the threshold value, the message displayed will be: "SUFFICIENT AIR PRESSURE". If the pressure falls below the threshold, the message given on the display is: "INSUFFICIENT AIR PRESSURE". Pressing the CONT button stops the test.
Reply:	EXECUTED!<CR><LF>

Instruction:	**TL** (**T**est **L**oop)
Format:	TL<CR>
Description:	Complete sample changing test loop. The magazine moves on until a sample has been found and then a sample change is executed. The number of executed sample changes will be displayed on the terminal. Pressing the CONT button when the red LED is on stops the test.
Reply:	EXECUTED!<CR><LF>

Table 7.4. Diagnostic Mode Commands

Instruction:	**VL** (**V**ertical **L**oop)
Format:	VL<CR>
Description:	Test loop for vertical movement. The loop count will be displayed on the terminal. Pressing the CONT button when the red LED is on stops the test.
Reply:	EXECUTED!<CR><LF>

Instruction:	**ESC?** (**ESC**ape key +,"**?**")
Format:	<ESC>?<CR>
Description:	Switch to the operation mode.
Reply:	SAMPLECHANGER OPERATION MODE! <CR><LF>

Error List B-ACS 60/120 *7.2*

General *7.2.1*

During the operation of the sample changer, two kinds of error messages may occur:

- Errors requiring user intervention
- Errors in the communication between sample changer and host computer.

These two kinds of failures will be treated differently, and are explained in detail in the following section.

Error Messages *7.2.2*

In principle an error message consists of two parts:

- a two-digit error code and
- an explicit error message

A RUB character (decimal 255) will precede any error message transmitted via the SIO channel.

Errors Requiring User Intervention

Failures requiring user intervention have error codes between 1 and 49. A full list of error numbers and messages with comments is given below. the messages will be displayed and transmitted over the SIO channel.

1. Insufficient Air Pressure

The actual air pressure is below the allowed limit of 3 bar.

2. Downward Motion Failed

The pincher did not reach its lower vertical position within 10 seconds.

3. Upward Motion Failed

The pincher did not reach its upper vertical position within 10 seconds.

4. Outward Motion Failed

The pincher did not reach its outer position at the magnet within 30 seconds.

5. Inward Motion Failed

The pincher did not reach its inner magazine position within 30 seconds.

6. Pincher Opening Failed

The pincher did not open.

7. Pincher Closing Failed

The pincher did not close.

8. Carrousel Motion Failed

The magazine did not move.

9. Carrousel Position Undefined

The magazine does not lock in the changing position.

10. Sample Holder Not Empty

The magazine position in which the sample should be inserted is already occupied.

11. Sample Detect at Magnet Failed

The optical detector at the magnet sees no sample held by the pincher.

12. Sample Detect at Carrousel Failed

The optical detector at the magazine sees no sample.

13. Sample Detect at Magnet Failed

The optical detector at the magnet sees no sample within 30 seconds of lift on.

14. Sample Grasping Failed

The sample could not be removed.

16. CDW Detection Failed

The number read from the internal code wheel is not within the allowed range between 1 and 60.

21. CDW MISADJUSTED FOR POSITION No: XX

Code XX could not be read from the code wheel.

22. No Free Magazine Position

No free magazine position could be found for the sample in the pincher.

23. Sample Missing

No sample could be found in the present magazine position.

25. Failure of Spinning Device

The mechanism of the bar code reader is no in its required idle position.

26. Arm Positioning Failed

The exact outer magazine position (61 to 120) could not be reached.

If one of the above mentioned failures is observed the program branches off into an error correction routine. It can be restarted by pressing the CONT button or by giving the command „CO“ via the RS 232C link. As an alternative the command „HO'' can be used to move the sample changer into its „HOME'' position.

Communication Errors *7.3*

Failures in the communication between the Sample Changer and the Host Computer can occur if an incorrect command is given by the host computer, or if unconnected hardware is addressed. Following such an error message, the sample changer will accept a new command and not enter the error mode. Error messages are not displayed but are sent back to the host computer. If any of these errors occur consult your operating instructions, or a BRUKER service representative.

50. Bar Code Reader Not Present

An attempt was made to call a command related to the bar code reader even thought this is not installed.

51. Invalid Command

The received command was invalid.

52. Invalid Parameter

The command contained an invalid or incorrect parameter.

53. Timeout RS232 ASPECT 3000

A time-out error of the RS232 host TTY has occurred.

54. Horizontal Optic Not Present

The test program for the horizontal optic was called, even though no option is installed on the B-ACS 60.

Special Tools 8

Special Tools for the Automatic Sample Changer 8.1

Table 8.1. Tools for mounting the Automatic Sample Changer

Part Number	Part Name
14667	Open End Wrench 13/17
14478	Allen Key Wrench 1.5 mm CU-BE
10500	Allen Key Wrench Set (with 1.5, 2, 2.5, 3, 4, 5, 6, 8, and 10 mm wrenches)
17744	Allen Key Wrench with handle 5 mm
H5042	B-ACS Grease-Box for Vertical Assembly (light-brown color)
H5043	B-ACS Grease-Box for Horizontal Assembly (clear-white color)

Operator Maintenance

9

Greasing the Horizontal Arm 9.1

The horizontal arm should be lubricated bi-annually (at least) with B-ACS grease P/N H5043 (has a clear-white color) to allow for smooth operation.

Greasing the Vertical Cylinder 9.2

The moving parts of the vertical cylinder should be lubricated bi-annually (at least) with B-ACS grease P/N H5042 (has a light brown color) to allow for smooth up and down movement.

Arm Adjustment 9.3

The arm should be adjusted initially, and rechecked periodically to ensure that the samples are being properly grasped by the pincher. Refer to chapter 5, Settings and Adjustments.

Cabinet Adjustment 9.4

The cabinet will need adjusting if the sample, when approaching the magazine belt, is not centered perfectly in the sample holder of the magazine belt. If the inward position of the vertical cylinder is not correct, then refer to the chapter 5, Settings and Adjustments. If the spinner tip edge gets too close to the sample holder (less than 5 mm) move the cabinet downwards on the column (refer to chapter 5l, Settings and Adjustments). The correct distance between the spinner top edge and the magazine belt should be approximately 5 mm.

Vertical Cylinder 9.5

The vertical position of the vertical cylinder is factory set and does not need adjusting. The horizontal position can be adjusted by loosening the two screws under the bottom support bracket of the vertical cylinder (refer to chapter 5, Settings and Adjustments).

Magazine Belt Tension Adjustment *9.6*

The adjustment mechanism under the right carrousel wheel serves for setting the tension of the magazine belt. The tension should be increased only when the belt filled with samples hangs more than 5 to 8 mm under the wheel line on the strip between the two wheels. Excessive tension will damage belt and wheel bearings.

Pneumatic Cylinder Setting *9.7*

The speed of both vertical and horizontal cylinder can be varied by regulating the outlet air flows of the cylinder supply connections. Refer to section 5.4, Settings and Adjustments for details.

Cleaning the Inside of the Vertical Cylinder *9.8*

When an „Upward Motion Failed“ or „Downward Motion Failed“ error message occurs, it may be necessary to clean the inside of the Vertical Cylinder. This is accomplished by: turning the sample changer off, disconnecting the sensor and hydraulic lines to the vertical cylinder, marking the current position of the cylinder with i.e. a pencil, removing the four screws and cover plate located just above the pincher, and sliding the cylinder out. To clean, wipe the inside of the cylinder with a clean cloth and alcohol. Apply vertical grease P/N H5042 (light brown color) to the cylinder and replace the cylinder, cover and screws and return the cylinder to its original position (that you marked earlier) before tightening. Once you have tightened the screws plug in the sensor and hydraulic lines (for the vertical cylinder) and turn on the sample changer.

Technical Data 10

Equipment Identification 10.1

Equipment type: B-ACS

Part Number:

B-ACS 60 Sample Changer H1080

B-ACS 60/500 Sample Changer SAG H41080

B-ACS 60/500 Sample Changer Magnex H31080

B-ACS 60/600 Sample Changer OXF H11080

B-ACS 60/600 Sample Changer Magnex H21080

B-ACS 60/600 Sample Changer SAG H5895

B-ACS 60/700 Sample Changer SAG H51080

B-ACS 120 Sample Changer H800

B-ACS 120/500 Sample Changer Magnex H3800

B-ACS 120/500 Sample Changer SAG H6800

B-ACS 120/600 Sample Changer H1800

B-ACS 120/600 Sample Changer Magnex H8800

B-ACS 120/600 Sample Changer SAG H4800

B-ACS 120/700 Sample Changer SAG H9800

Power Supply Requirements 10.2

110/230V ~, 50/60 Hz

Current carrying capacity: 0.2A

Fuse Protection 10.3

2 x 0.4 AT (slow-blow fuse)

Air Requirements 10.4

3.5-4.5 bar (50-64 psi)

The air source must be **clean, dry and oil-free**.

Circuit Diagrams 11

Automatic Sample Changer Circuit Diagrams 11.1

Circuit Diagrams

Figure 11.1. Circuit Block Diagram

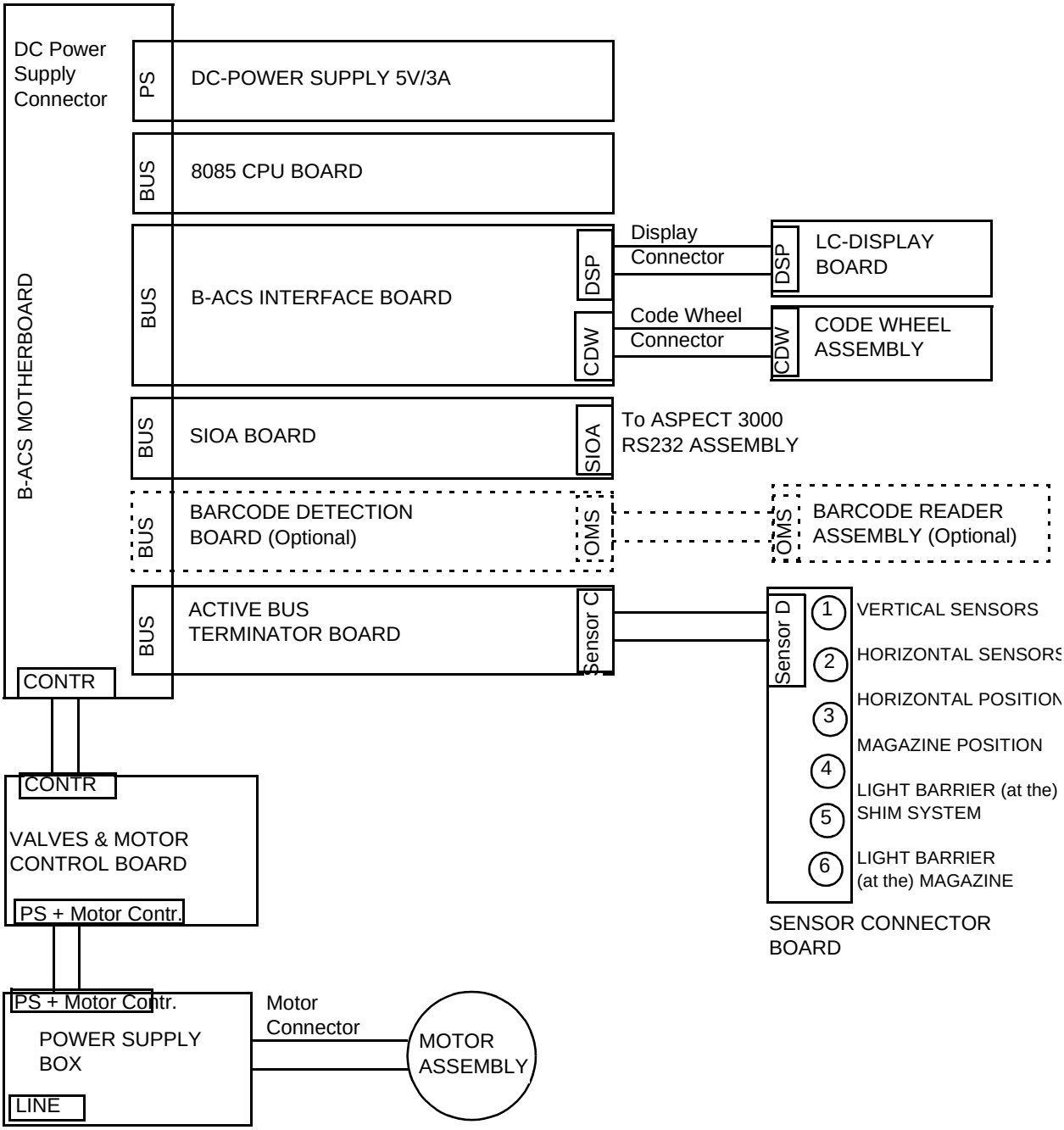


Figure 11.2. Internal Connections Diagram

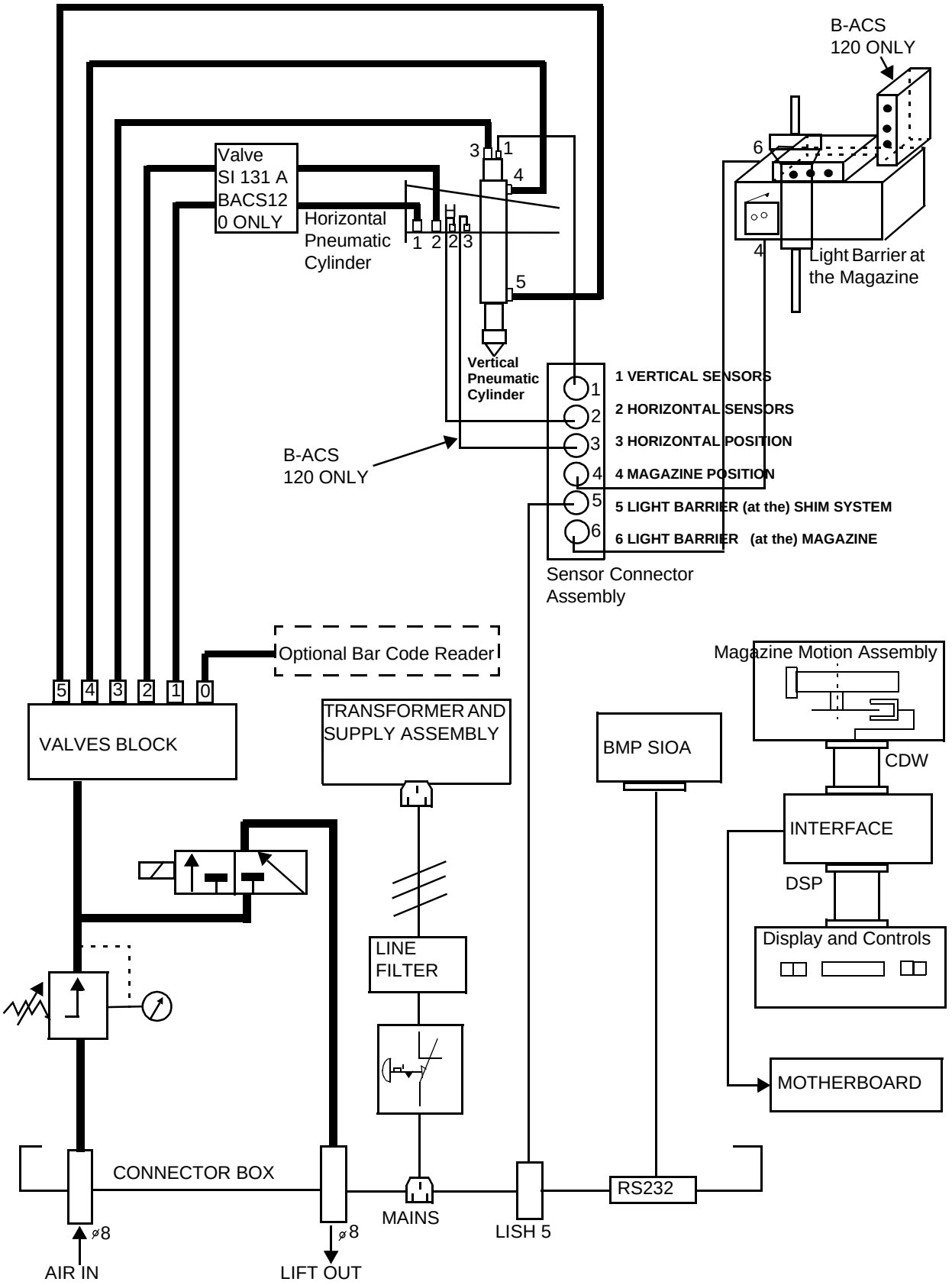
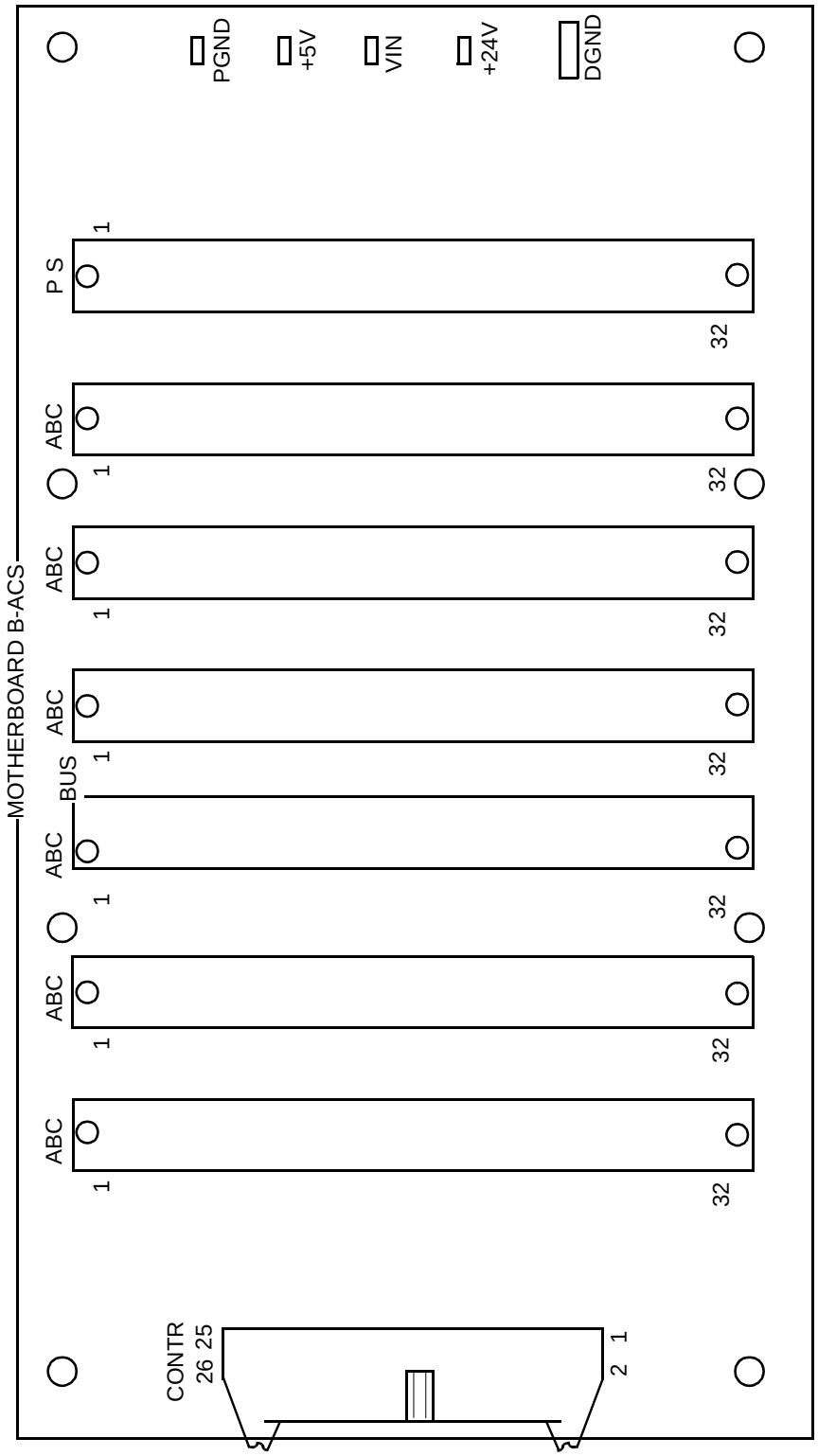


Figure 11.3. Motherboard Design



Connector Type: Siemens C4233-A192-A503 **Name**: B-ACS System Bus 85

Table 11.1. Pin Assignment System Bus 85

Pin Number	Row A Function	Row B Function	Row C Function
1			
2		PGND	
3		S0	S1
4	CLK85	LEVEL2	FORW
5		SIGMA	A12
6	RESET	AS3000	A0
7		SIGSH	A13
8	MEMR	UARSH	A1
9	RESIN	UARMA	A14
10	MEMW	UARO	A2
11		UARU	A15
12	RDYIN	UZAUF	A3
13		SID	SOD
14	DB0	UPRES	A4
15		Z1	COUT1
16	DB1	DRUM	A5
17		TREN	COUT2
18	DB2	SENSE3	A6
19	INT	POSIG	SIGHO1
20	DB3	SENSE4	A7
21			SIGHO2
22	DB4	LEVEL3	A8
23	INTA	MAMA	RST 5.5
24	DB5	ZAUF	A9
25	BACK	ARU	RST 6.5
26	DB6	ARO	A10
27	Z4	ARSH	RST 7.5
28	DB7	ARMA	A11
29		LIVE	TRAP
30	IOW	+24V	IOR
31		DRND	DRND
32	+5V		

Figure 11.4. B-ACS Power Supply +5V Switching Regulator Board

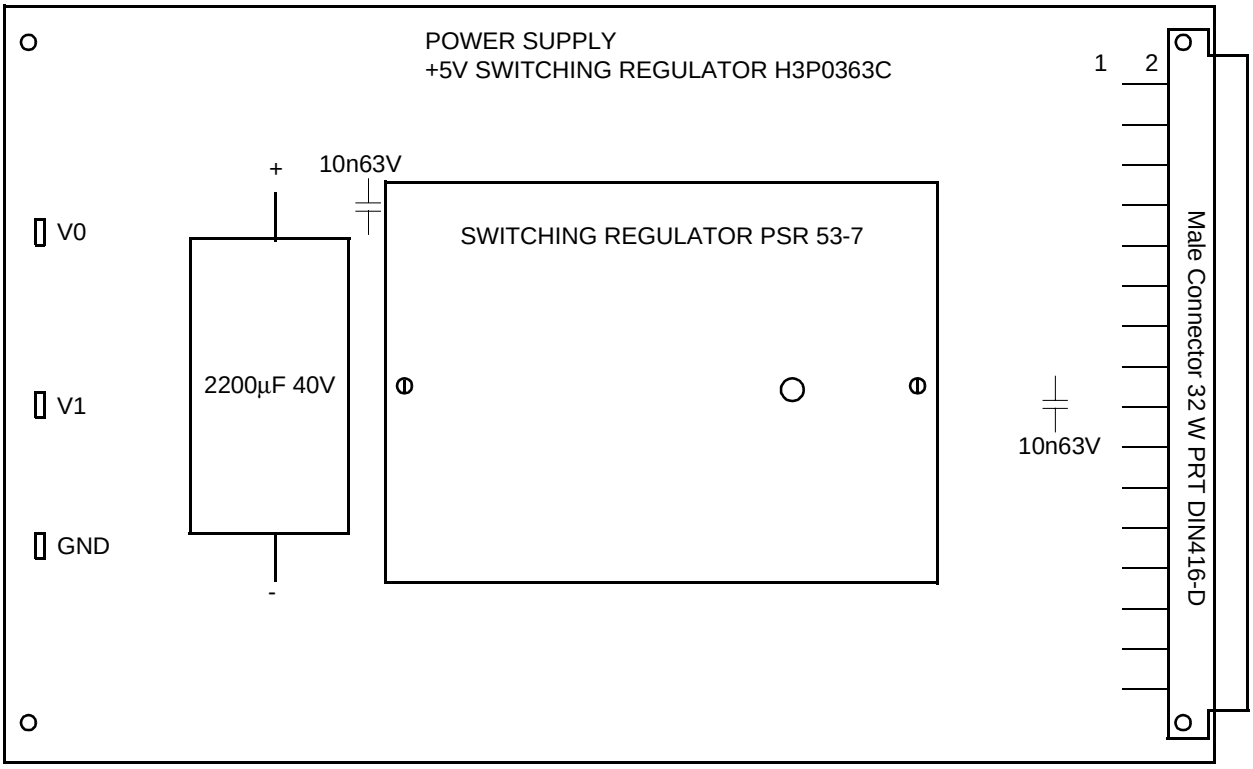
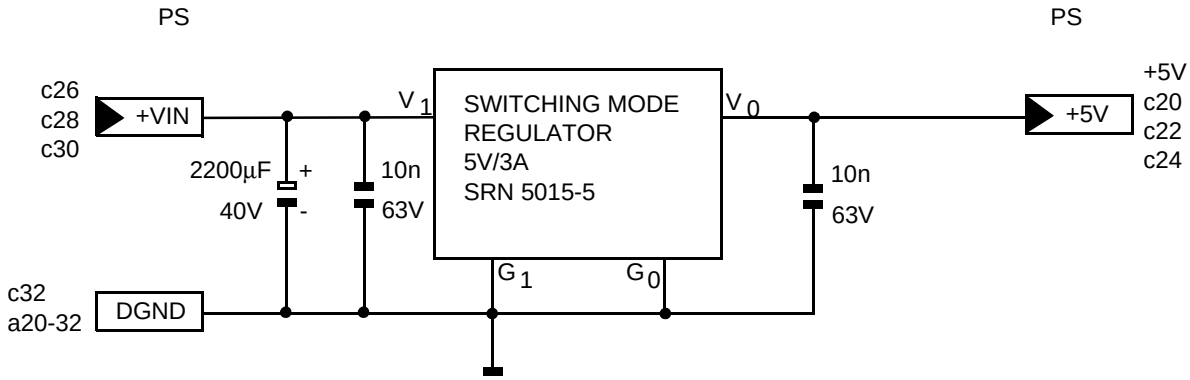


Figure 11.5. B-ACS Power Supply +5V Switching Regulator Circuit Diagram



Connector Type: Siemens C42334-A192-A204 **Name:** PS

Table 11.2. Pin Assignment: Power Supply +5V/3A

Pin Number	Row A Function	Row C Function
2		
4		
6		
8		
10		
12		
14		
16		
18		
20	DGND	+ 5V
22	DGND	+ 5V
24	DGND	+ 5V
26	DGND	VIN
28	DGND	VIN
30	DGND	VIN
32	DGND	DGND

CPU Board H25 *11.2.2*

Figure 11.6. CPU Board Diagram H25

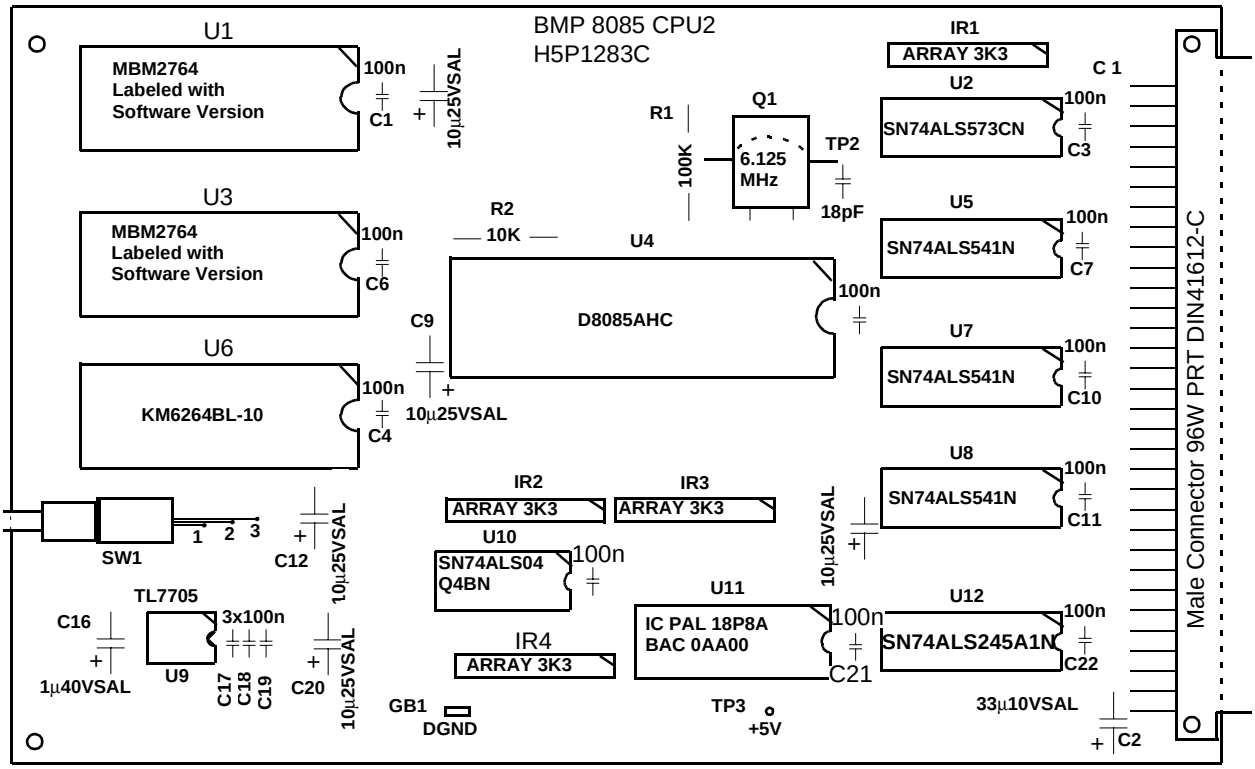
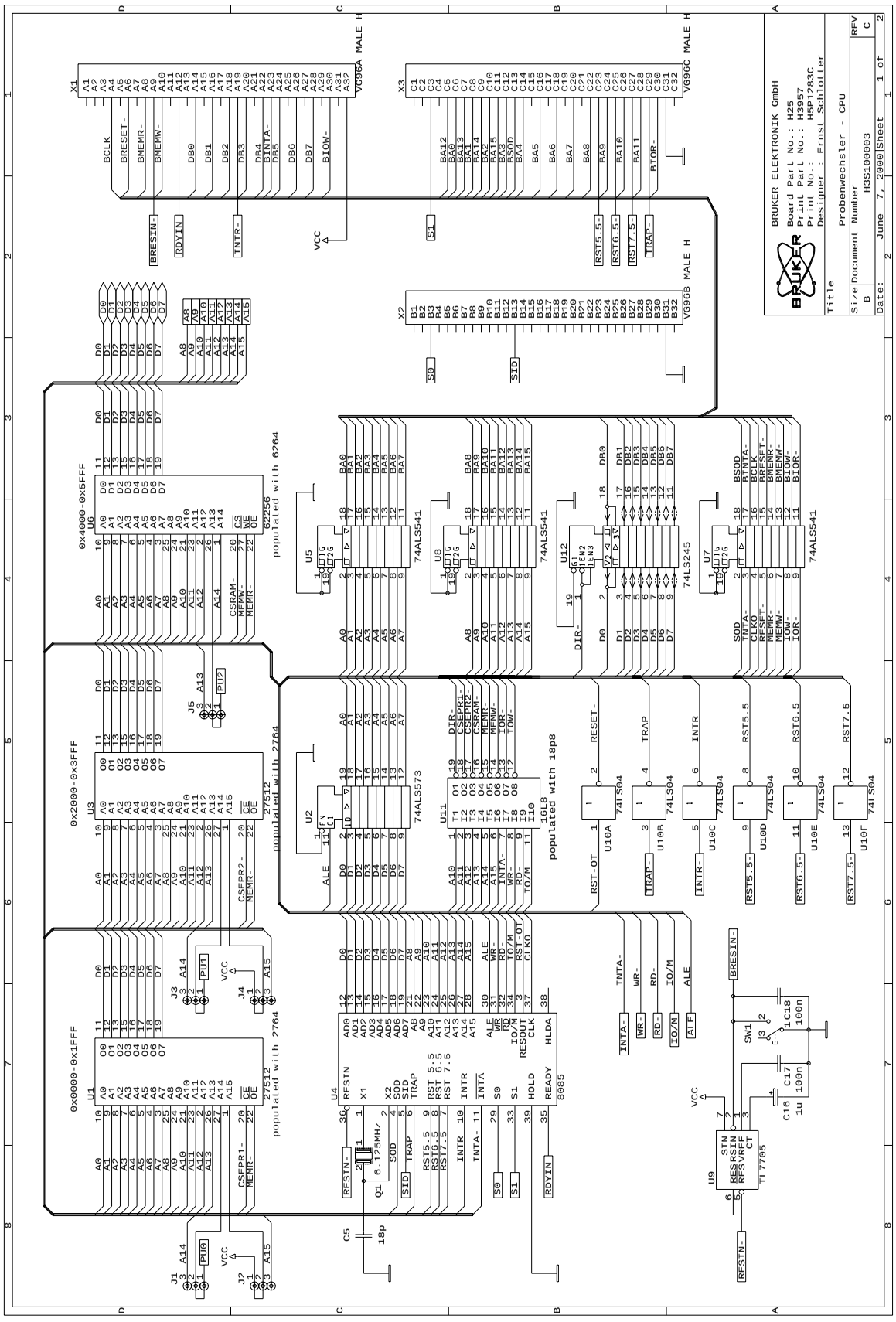


Figure 11.7. CPU Board H25: Processor Circuit Diagram



CPU Board: EPROM & RAM Circuit Diagram

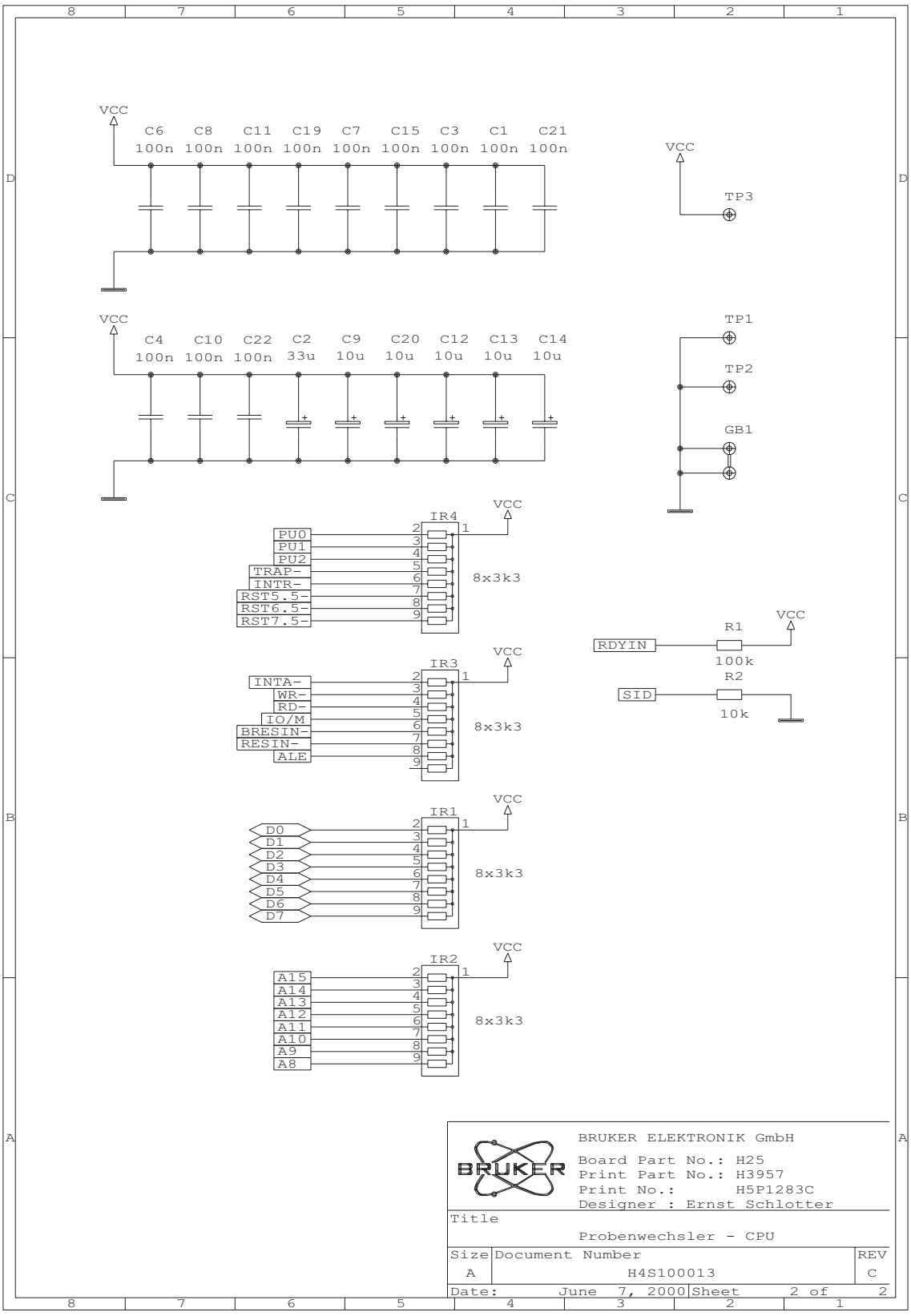


Figure 11.8. CPU Board Diagram H10022

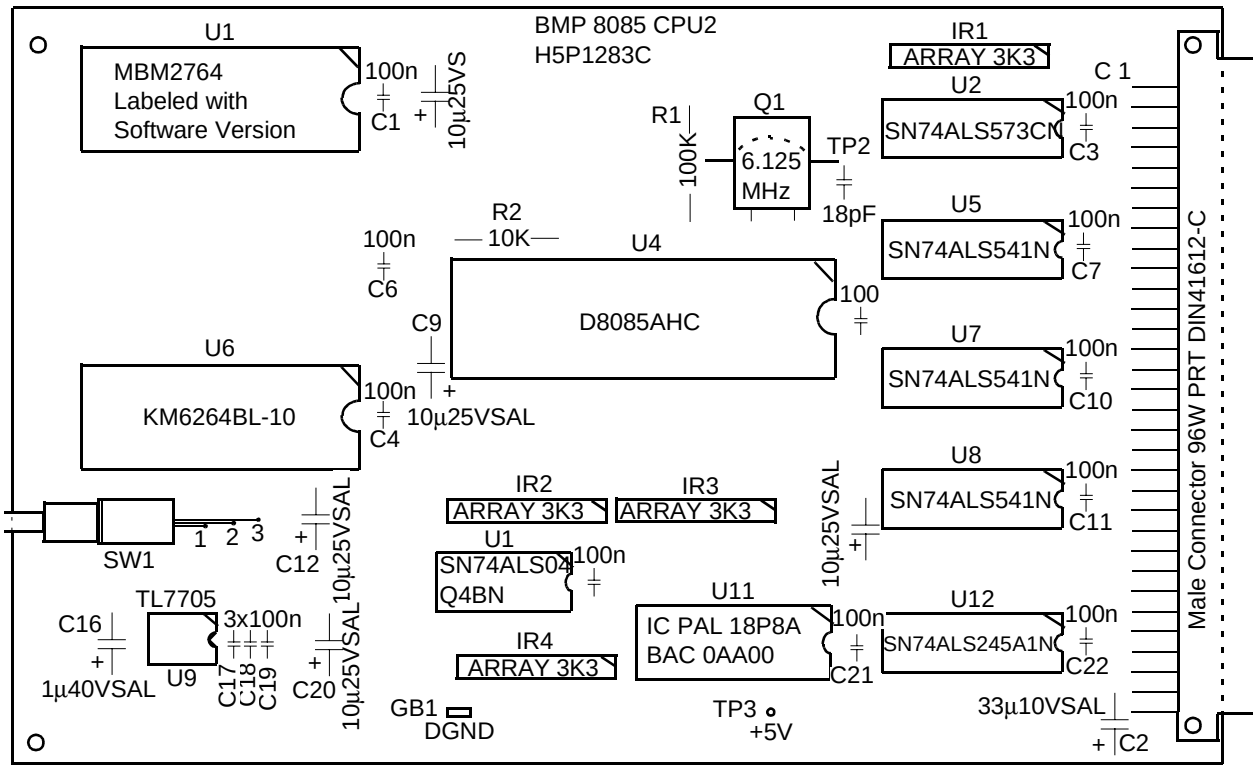


Figure 11.9. CPU Board H10022: Processor Circuit Diagram

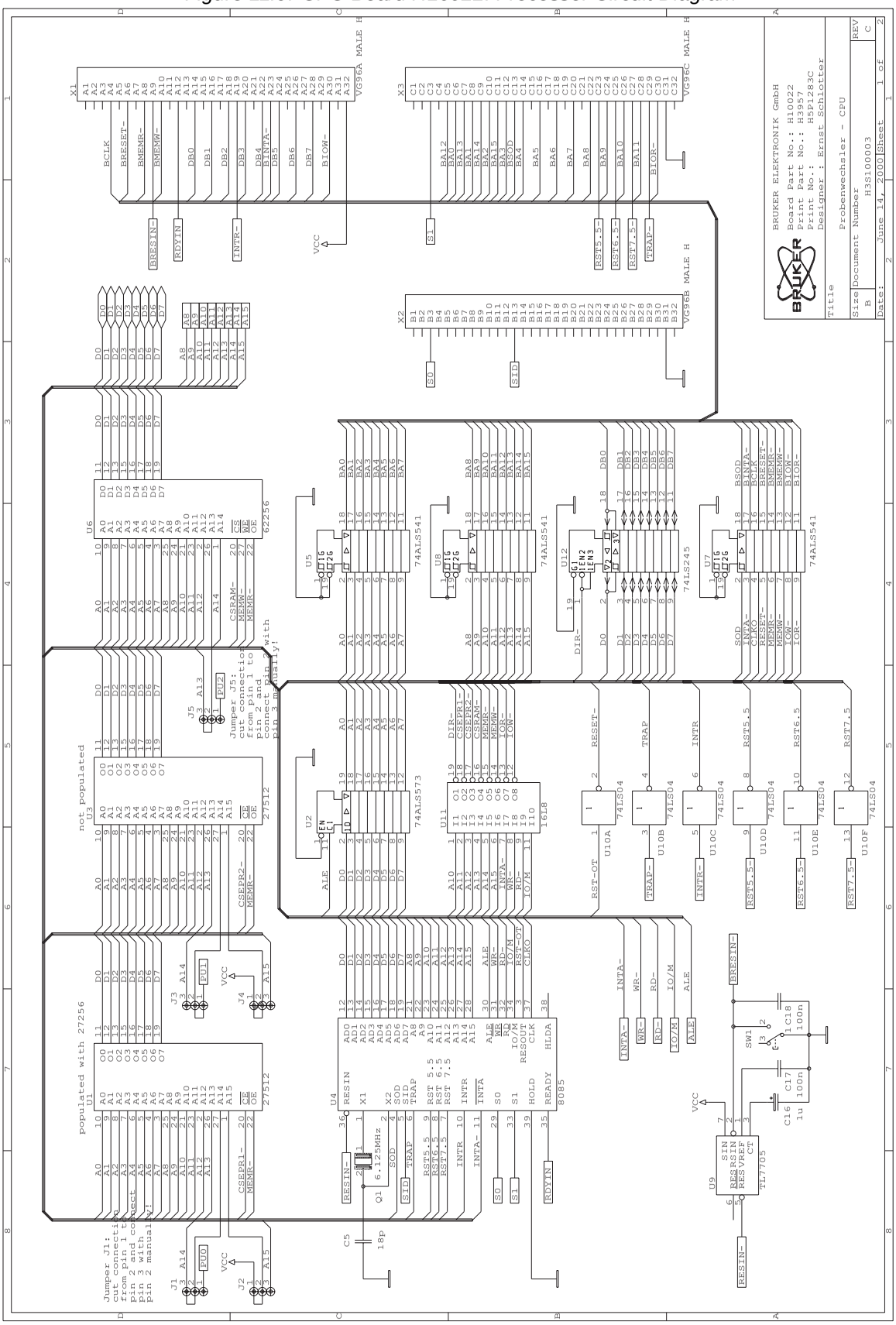
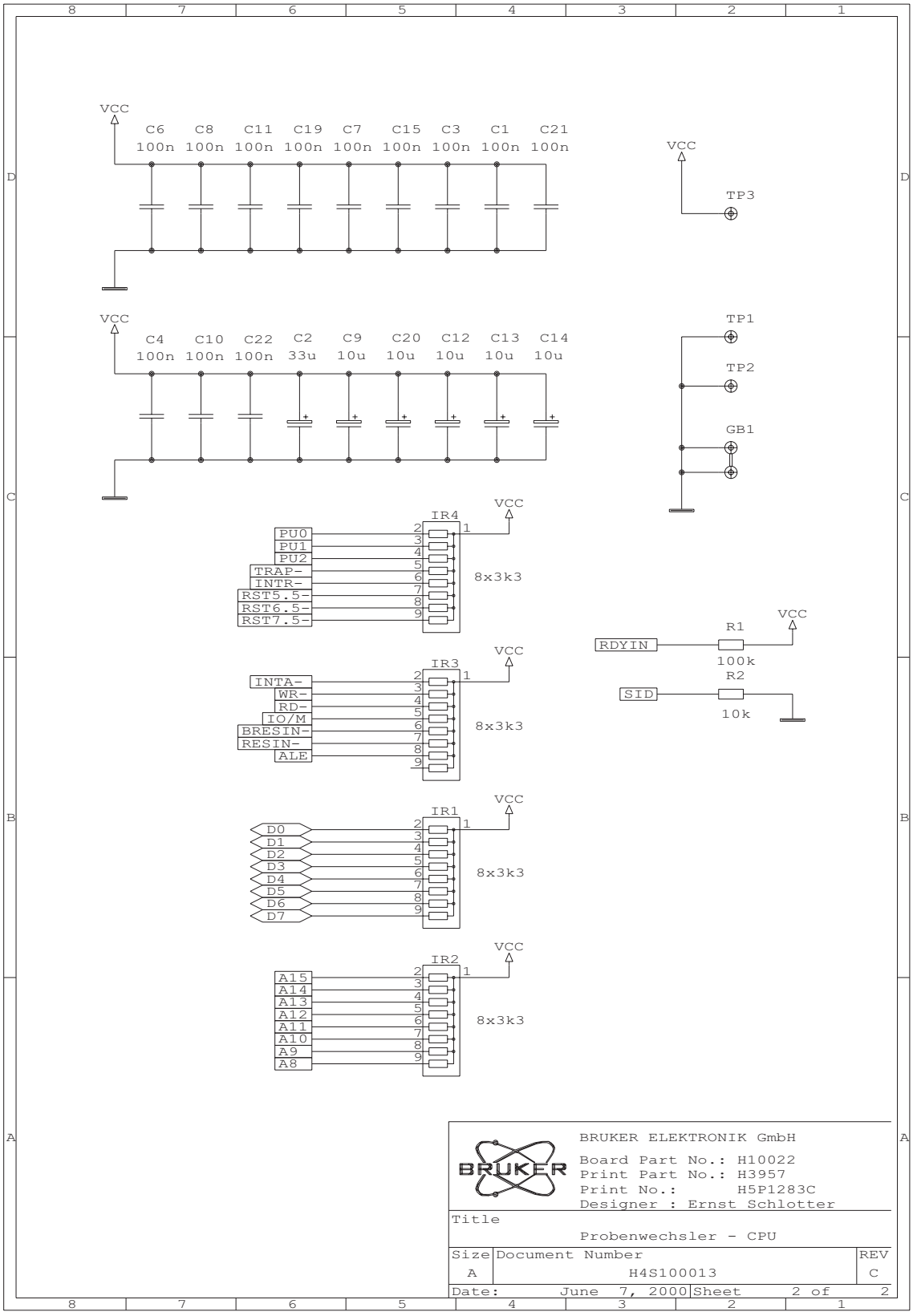


Figure 11.10.CPU Board H10022: EPROM & RAM Circuit Diagram



B-ACS Interface Board Diagram *11.3*

Figure 11.11.Interface Board Diagram

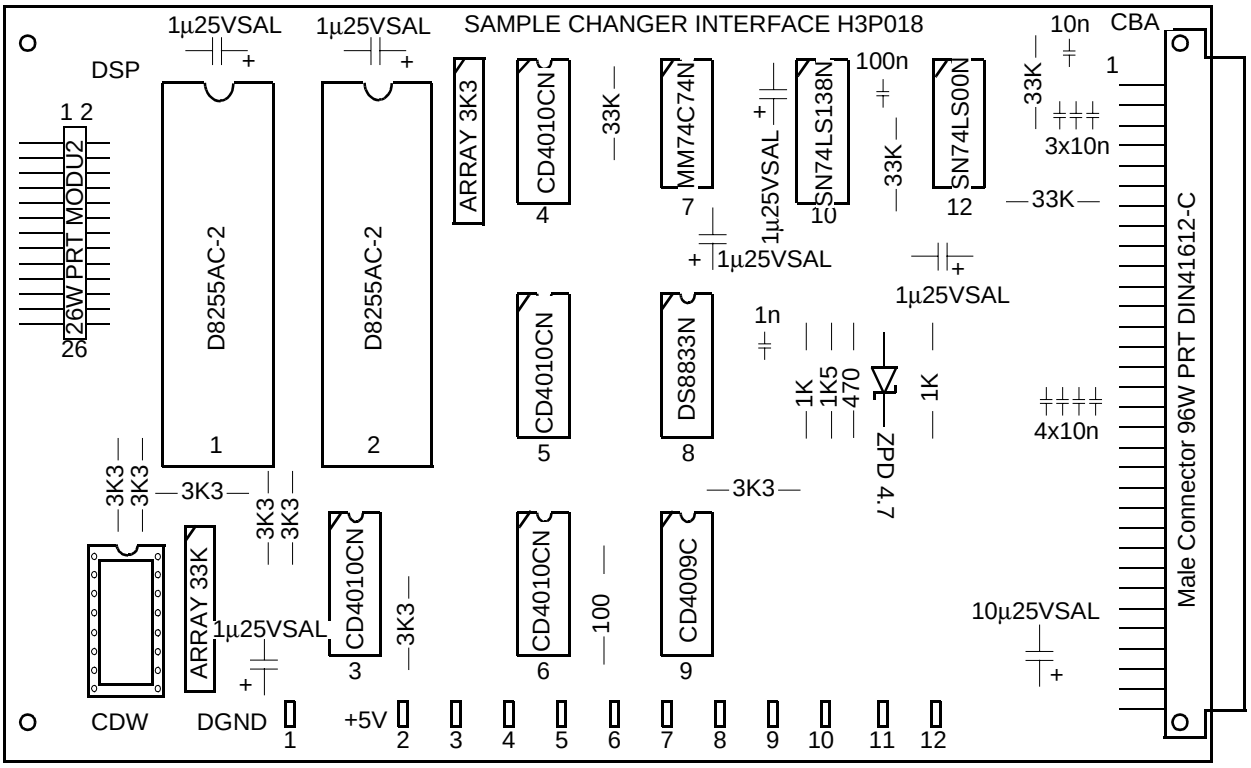


Figure 11.12.Interface Board General Circuit Diagram

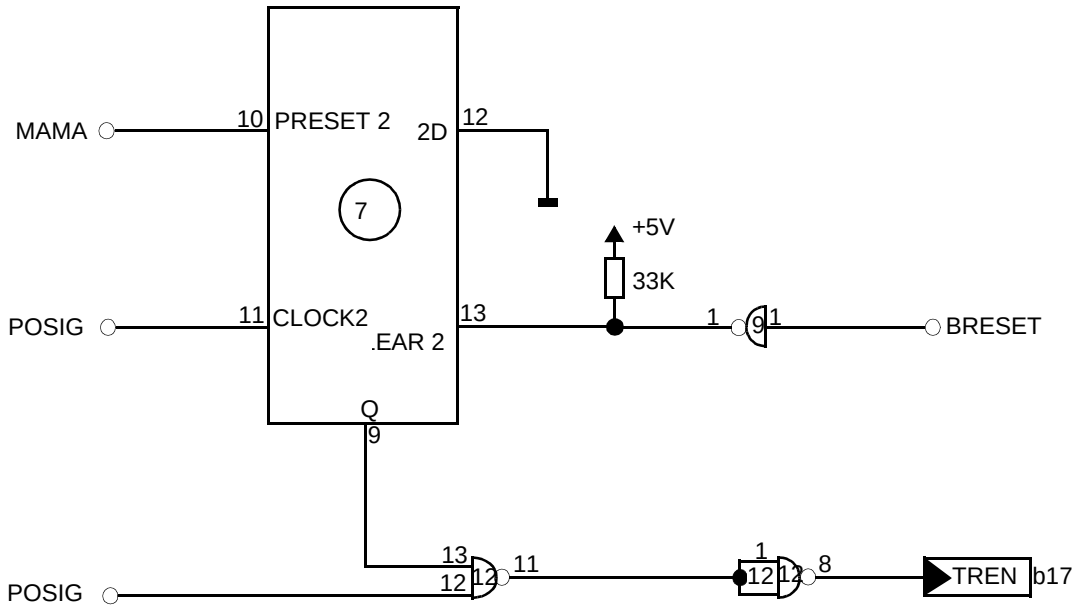
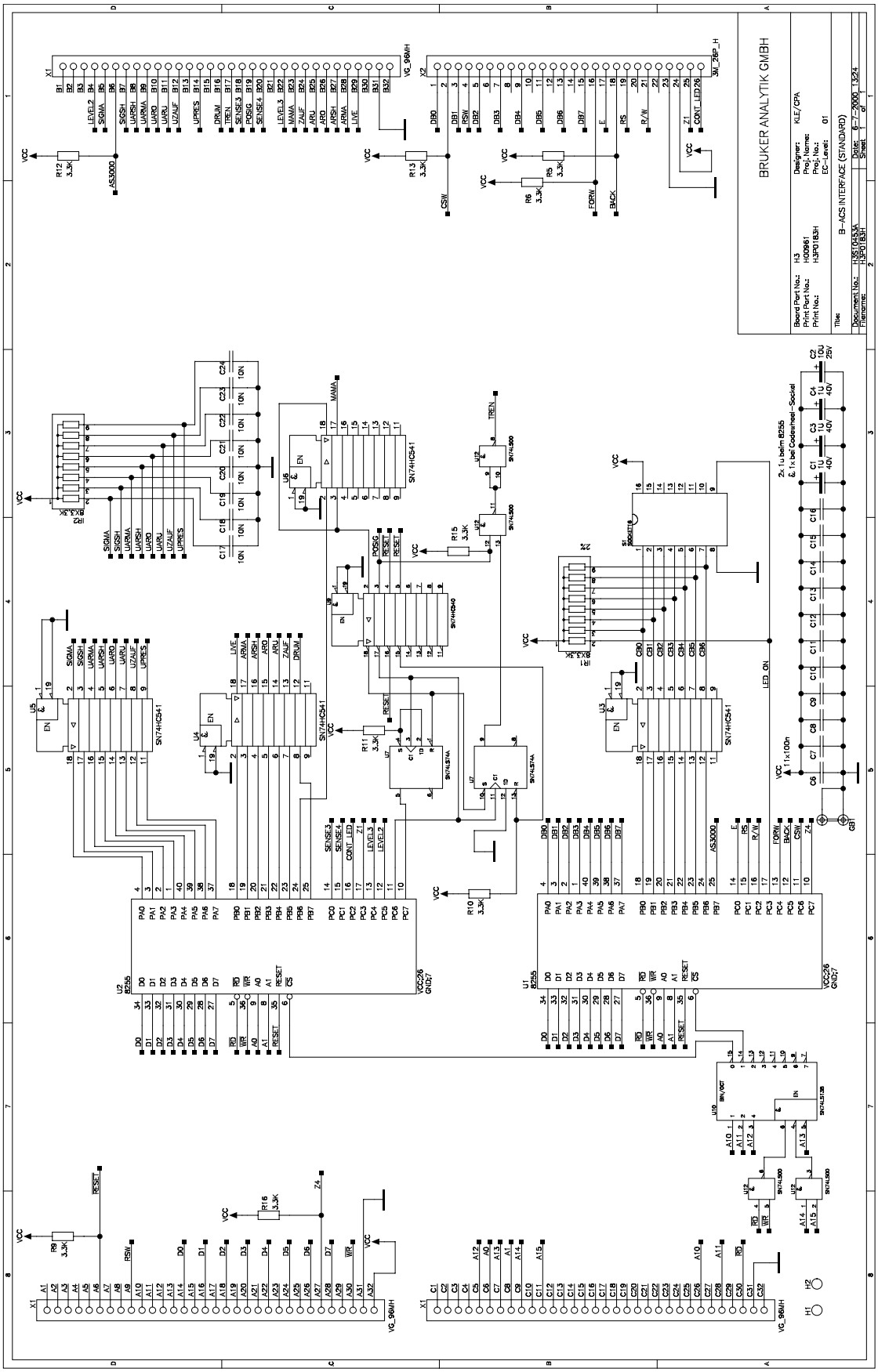


Figure 11.13.Interface Board Circuit Diagram



LC-Display Board *11.3.1*

Figure 11.14.Display Board Diagram

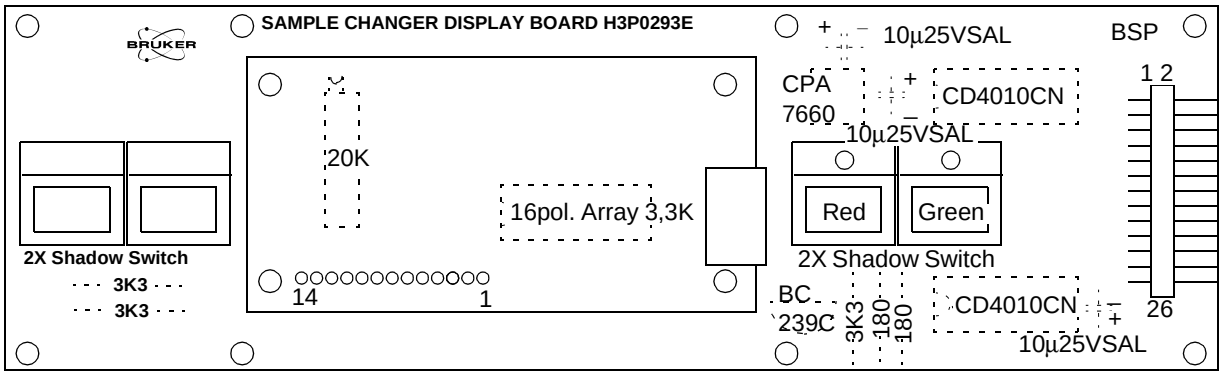
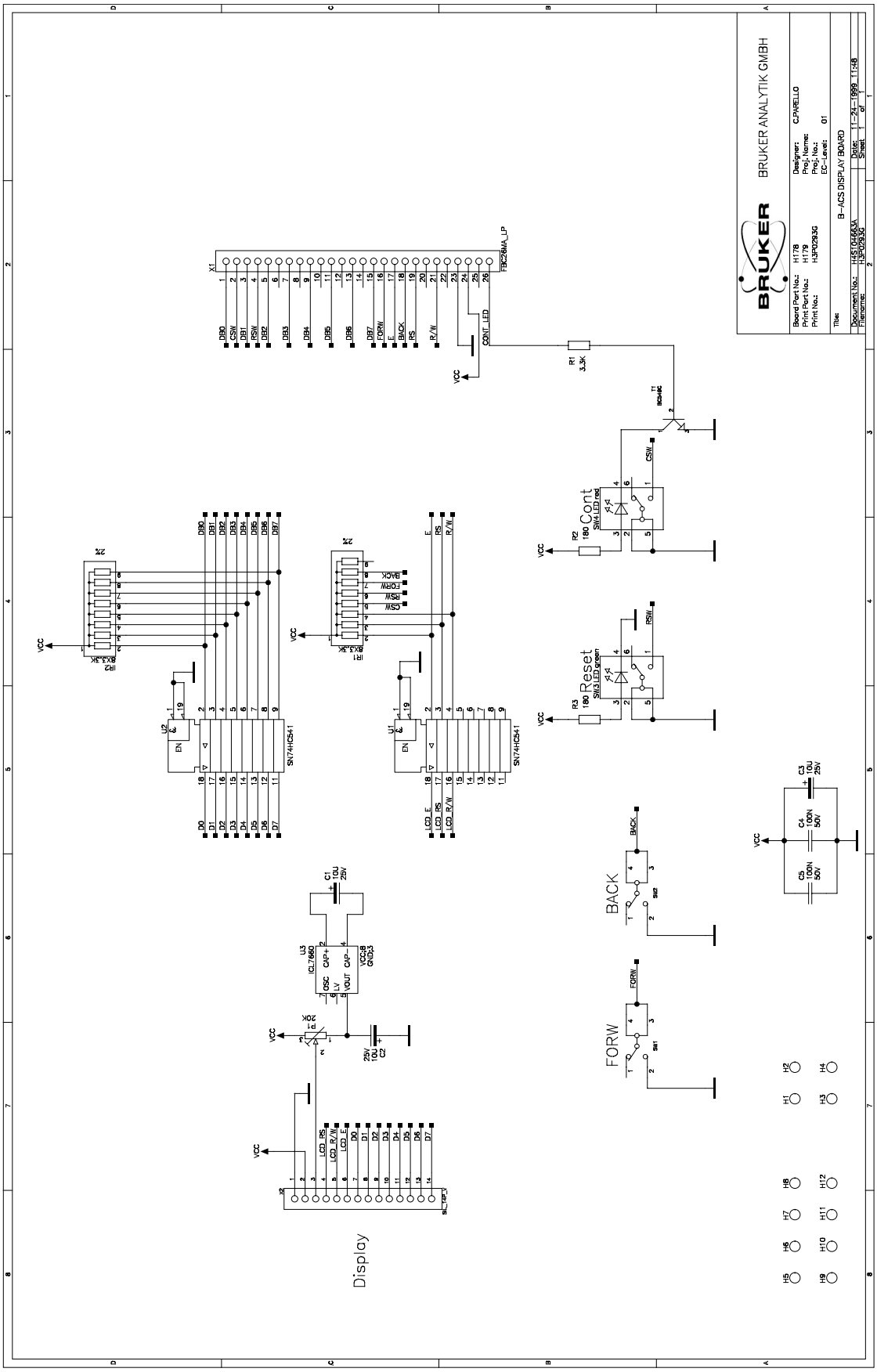


Figure 11.15.Display Board Circuit Diagram

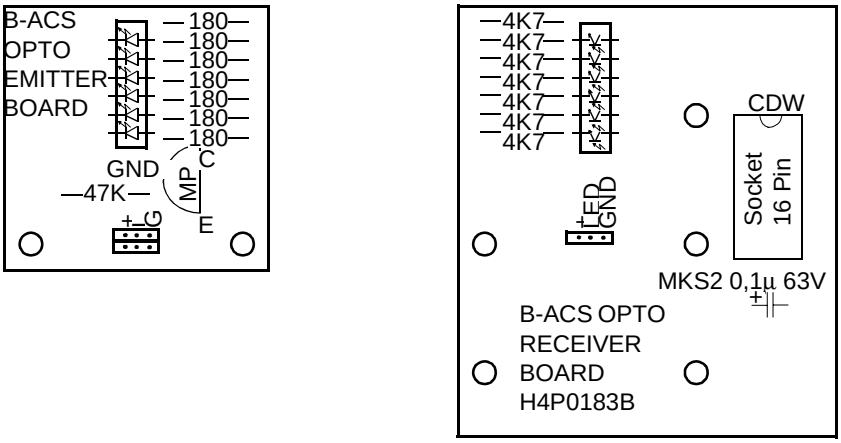


Connector Type: AMP 1-826 634-3 **Name:** DSP

Table 11.3. Pin Assignment: Display Board Connector

Pin Number	Function
1	DB0
2	CSW
3	DB1
4	RSW
5	DB2
6	
7	DB3
8	
9	DB4
10	
11	DB5
12	
13	DB6
14	
15	DB7
16	FORW
17	E
18	BACK
19	RS
20	
21	R/W
22	
23	DGND
24	+5V
25	Z1
26	CONT LED

Figure 11.16.Opto Emitter and Opto Receiver Boards



Connector Type: CAB P-316 BOZ

Table 11.4. Pin Assignment: Code Wheel Connector at Interface and Detector Board

Pin Number	Function
1	
2	
3	
4	
5	
6	
7	
8	DGND
9	LED ON
10	
11	
12	
13	
14	
15	
16	+5V

Figure 11.17.B-ACS Opto Emitter Board

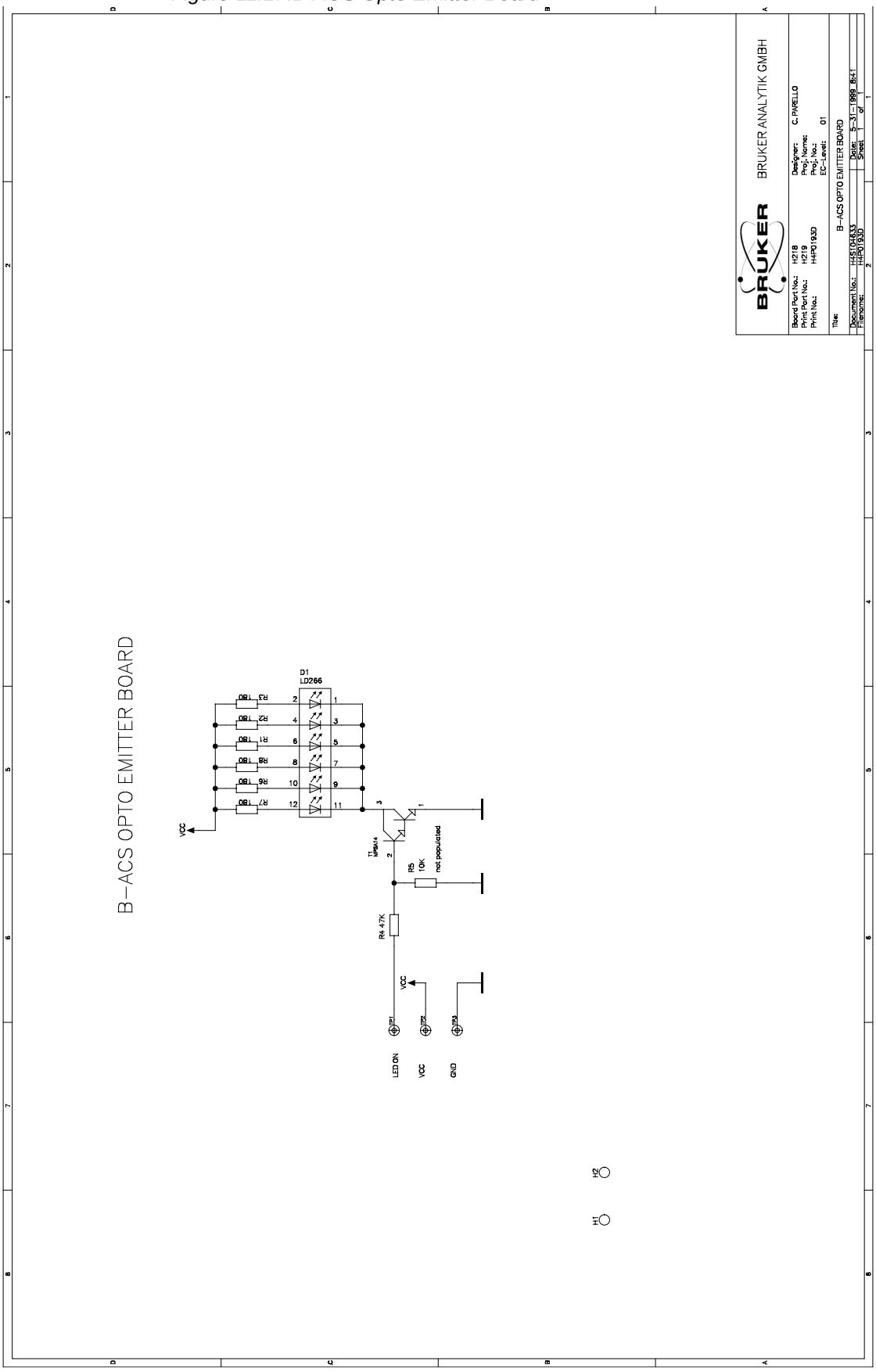
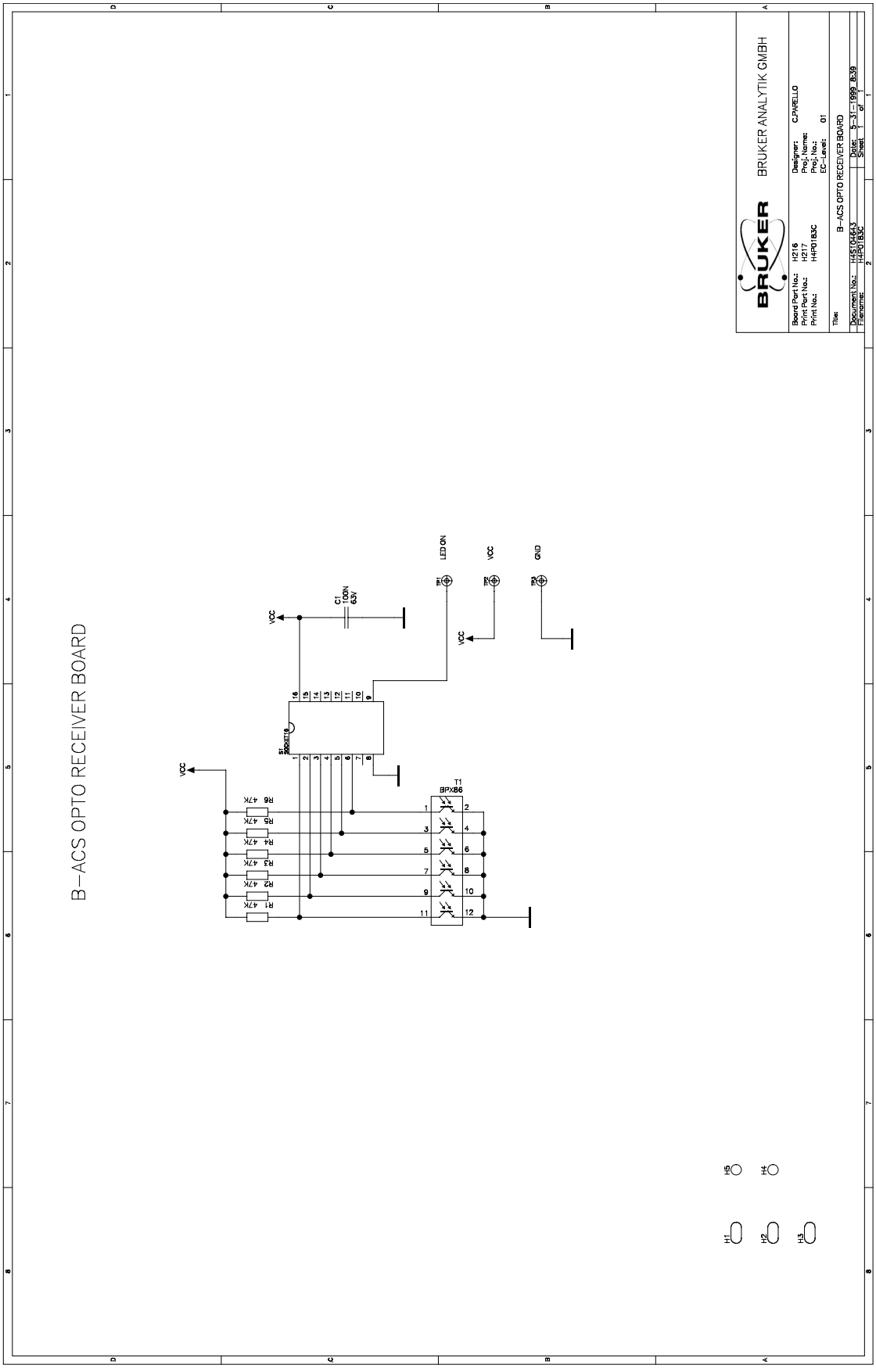


Figure 11.18.B-ACS Opto Receiver Board

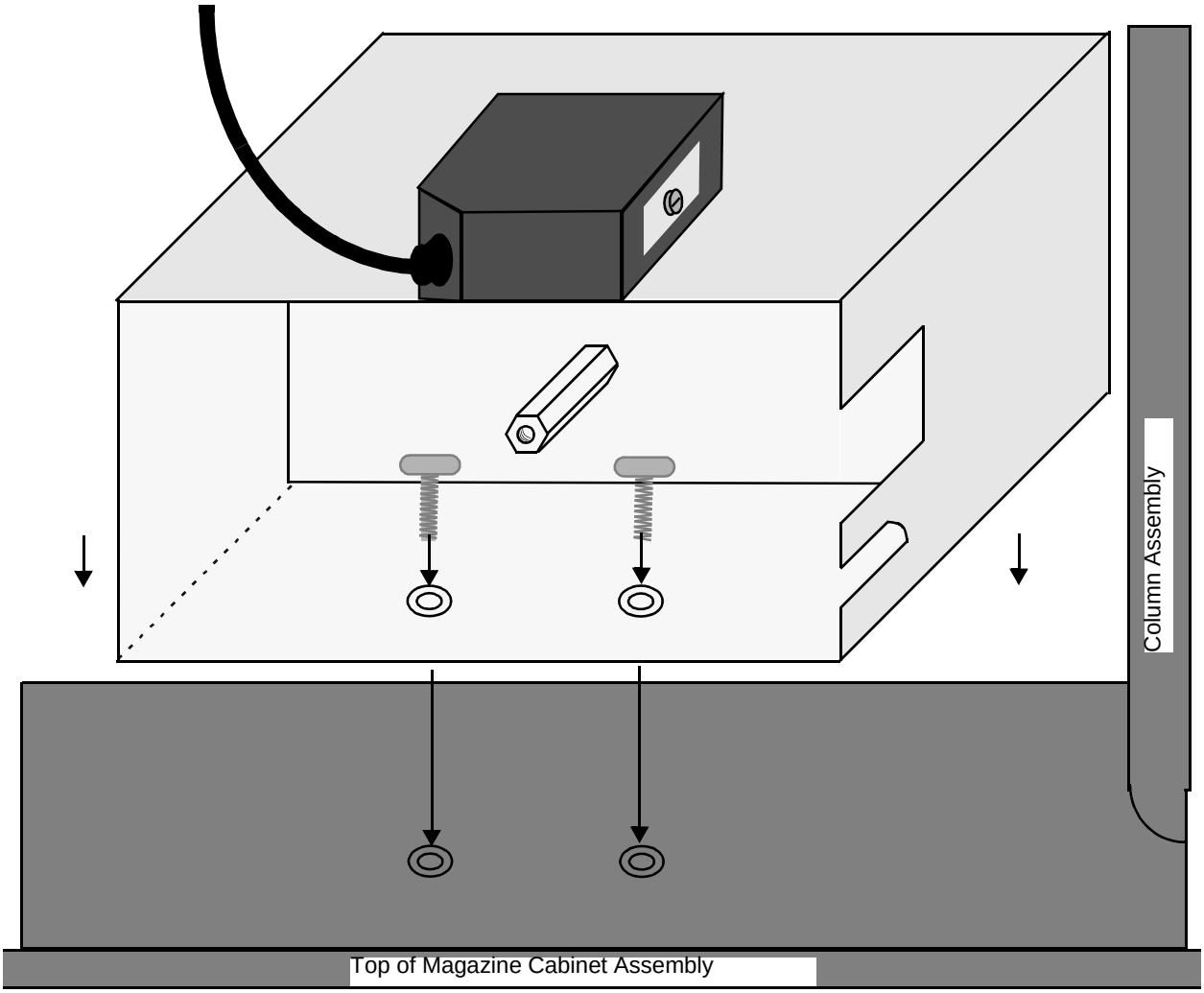


Mounting the Light Barrier Cabinet on the Magazine *11.3.3*

Mounting Instructions

Remove the rear panel of the cabinet assembly. Remove the rear panel of the light barrier cabinet. Fasten the light barrier cabinet onto the top of the Magazine Cabinet Assembly as shown in figure 11.16.

Figure 11.19.Mounting the Light Barrier Cabinet on the Cabinet Assembly



Place the position switch cables through the opening at the top of the cabinet as illustrated in ***figure 4.6***. Connect the two cables (No. 4 and No. 6) to the Sensor Connector Board (***figure 11.11***) as follows:

Position Switch (cable 4)Plug No. 4POSIG

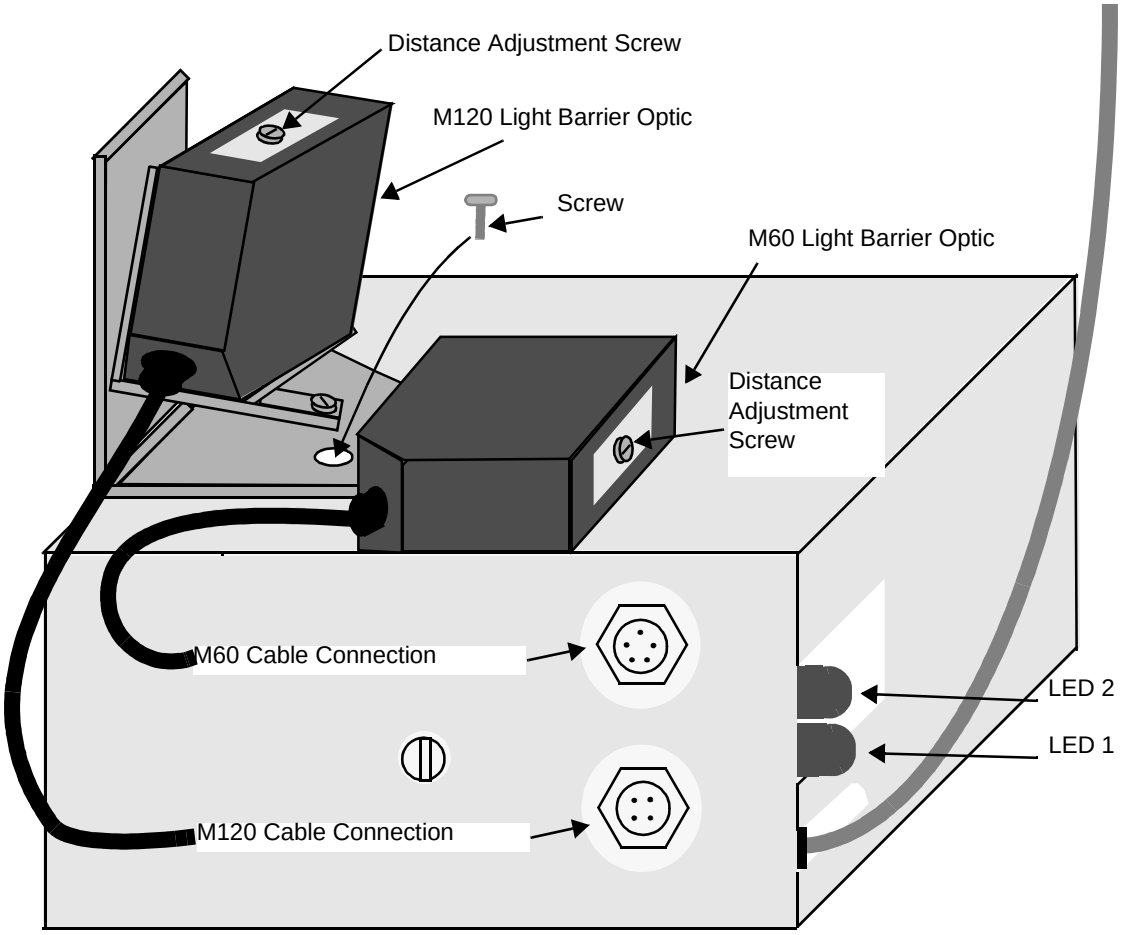
Light Barrier at Magazine (cable 6)Plug No. 6LIMA

On the back of the light barrier cabinet there are two plug connections, the top one is for the B-ACS 60 light barrier optic cable and the bottom one is for the B-ACS 120 light barrier optic cable (***figure 11.17***).

When you are using a B-ACS 120 you must install a second light barrier optic at a right angle to the first as illustrated in ***figure 11.17***. The B-ACS 120 optic is secured with a screw on top of the light barrier cabinet. Plug the cable from the B-ACS 120 light barrier optic into the bottom plug connector at the back of the light barrier case.

Three optic sensors within the optics, indicate whether the inside (M60) or outside (M120) position of the magazine belt is occupied (***figure 11.18***).

Figure 11.20.Rear Side of the Light Barrier Cabinet

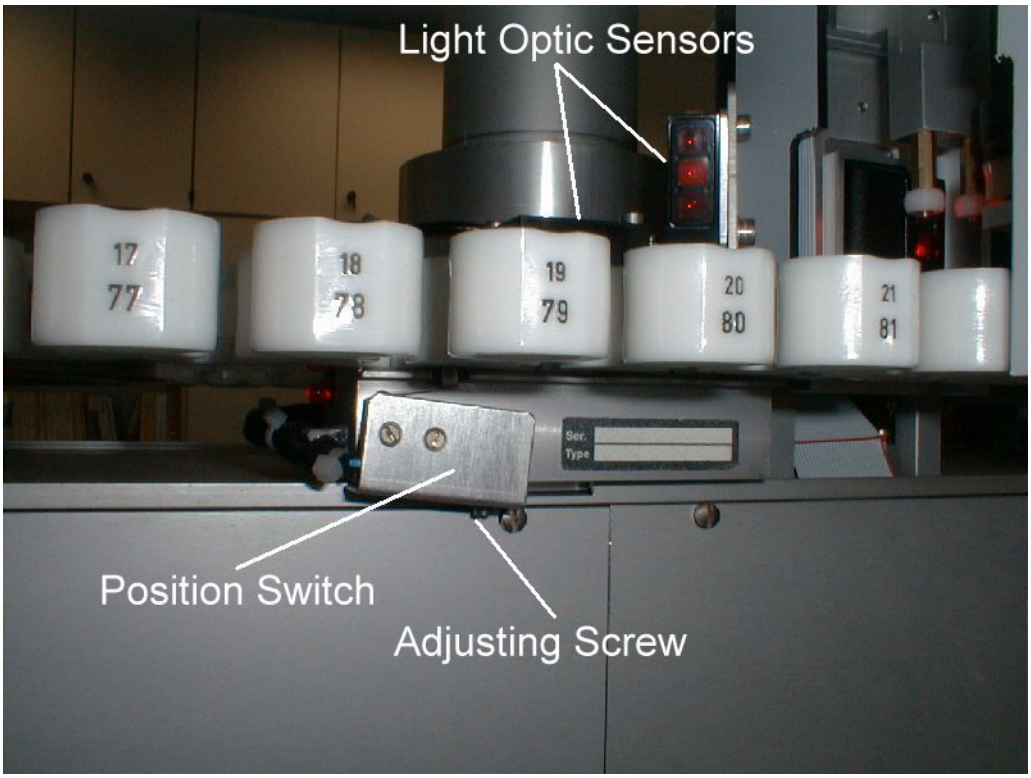


Position Switch

The position of a sample on the magazine belt is adjusted with the position switch located at the bottom of the Optic (***figure 11.18***). This adjustment will ensure that the pneumatic arm reaches the exact position repeatedly when the magazine belt moves forwards or backwards.

To make the adjustment turn the screw at the bottom of the switch until the pincher on the pneumatic arm is in the middle of the sample position on the magazine belt.

Figure 11.21.Location of the Position Switch on the Light Barrier Cabinet



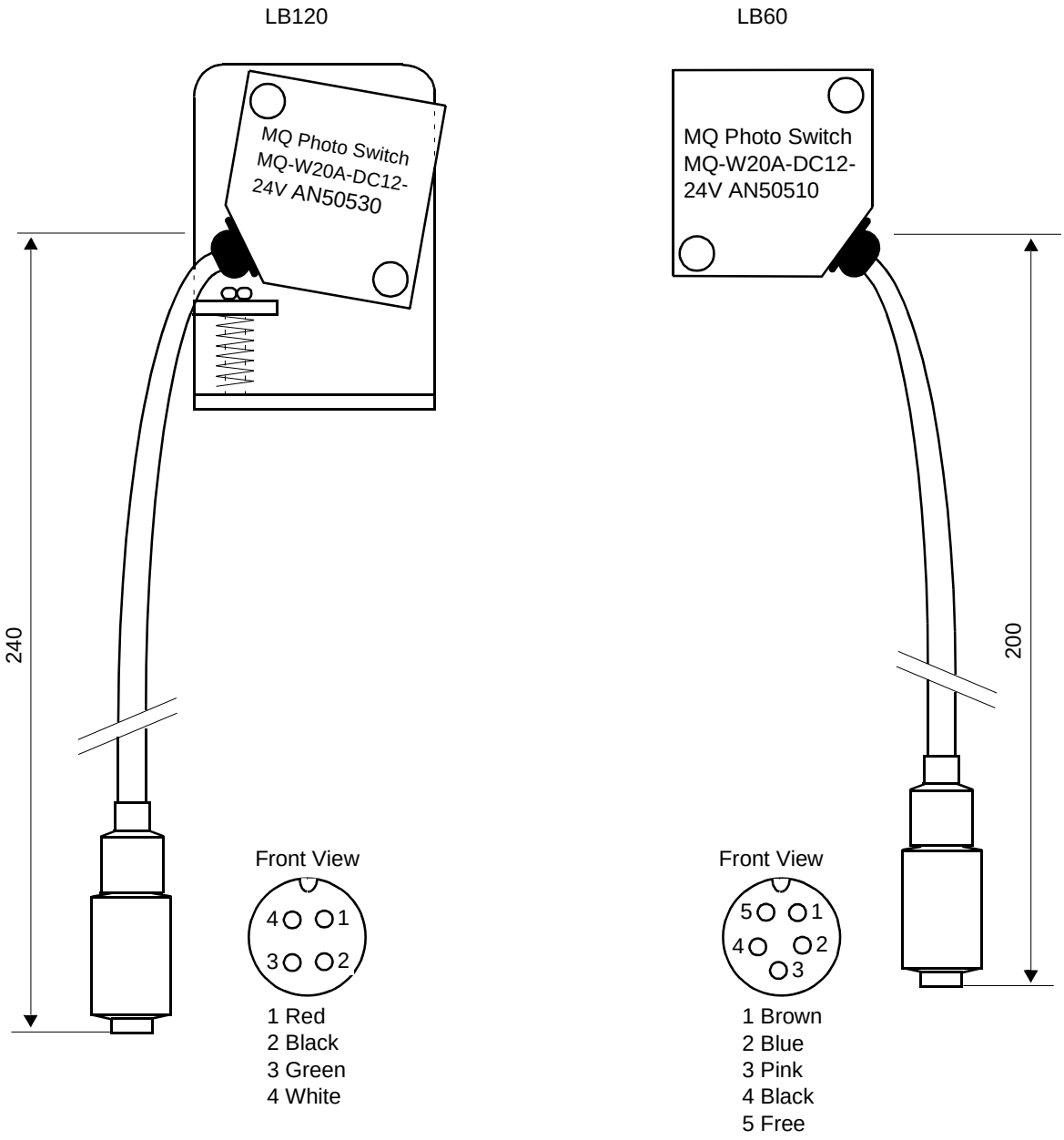
Adjusting the M60 Light Barrier Optic

The adjustment of the reflex key for the detection of a sample at the inside position of the magazine belt is made through a distance adjustment screw on the side of the sensor optic (***figure 11.17***). The range of the optics view should be between the middle and the outside of the magazine belt position.

You must ensure that the M60 optic detects a sample only in the inside magazine belt position, not the outside position, and likewise that the M120 optic detects a sample only in the outside position, not the inside.

The Light Barrier Magazine Board is located on the rear side of the rear panel of the light barrier cabinet. The M60 Optic cable (***figure 11.19***) is connected to this board through the upper connector on the rear panel of the light barrier cabinet as shown in ***figure 11.17***.

Figure 11.22.Light Barrier Magazine Optic



Adjusting the M120 Optic

The adjustment of the reflex key for the detection of a sample in the outside position of the magazine belt is made through a distance adjustment screw on the side of the sensor optic. With this adjustment you must reach two objectives:

1. The detection of a sample in the outside magazine position.
2. A negative detection of a sample in the inside magazine position, that is, the optic must not read the inside position on the magazine, only the outside.

With the adjustment of the distance, an increase in the aperture of the background for reflected surfaces is reached. The range of the optics view should be between the middle and the outside of the magazine belt position.

The M120 optic is connected to the lower connection (4 Pol.) on the back of the light barrier cabinet (***figure 11.17***).

Adjustment Procedures

1. Adjustment of the angle of inclination (tilt):

   The magazine belt position should be unoccupied.

   The Distance Adjustment Screw (***figure 11.18***) is set on maximum „FAR“.

   With a reflective background a reduction of the distance adjustment is possible. The Distance Adjustment Screw is turned counter clockwise to „NEAR“ until the display „OPE“ is no longer activated (this provide an increase in the aperture of the background).

   The optic is first adjusted as far as possible to the bottom, until the magazine belt is detected, then turned back gradually until the belt can no longer be detected.

   You must ensure that the M120 optic detects a sample only in the outside magazine belt position, not the inside position.

2. Adjustment of the distance:

   The magazine belt position should be occupied.

   The Distance Adjustment Screw is set on minimum „NEAR“.

   Turn the Distance Adjustment Screw clockwise to „FAR“ until the display is activated.

Note: Excessive dust or dirt at the lens surface of the optics reduces the optics recognition performance. Keep these surfaces clean.

Light Barrier at Shim System *11.3.5*

Figure 11.23.Light Barrier Magazine Board H1288

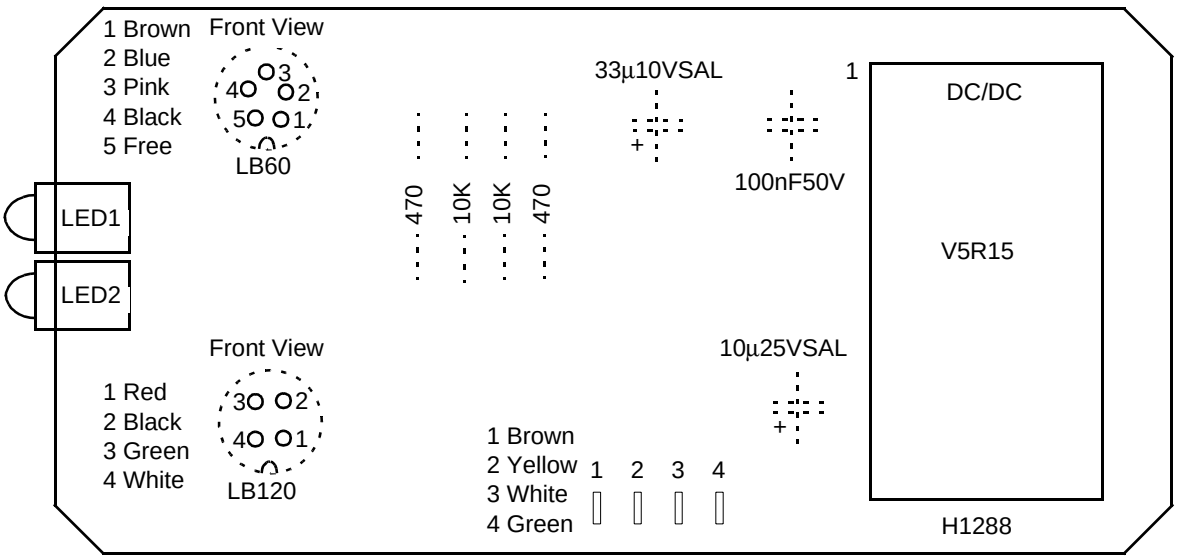


Figure 11.24.B-ACS 60/120 Light Barrier Magazine

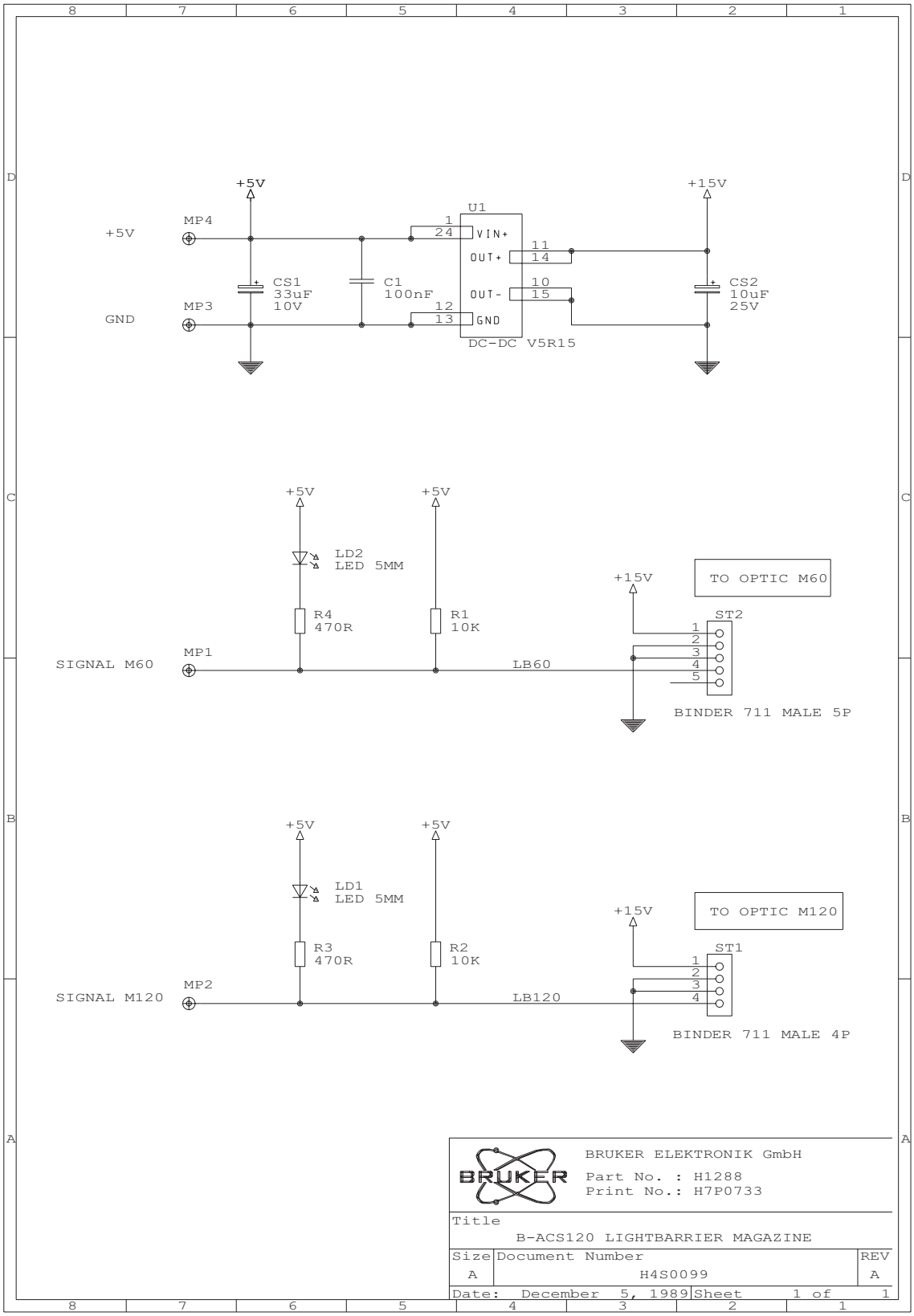
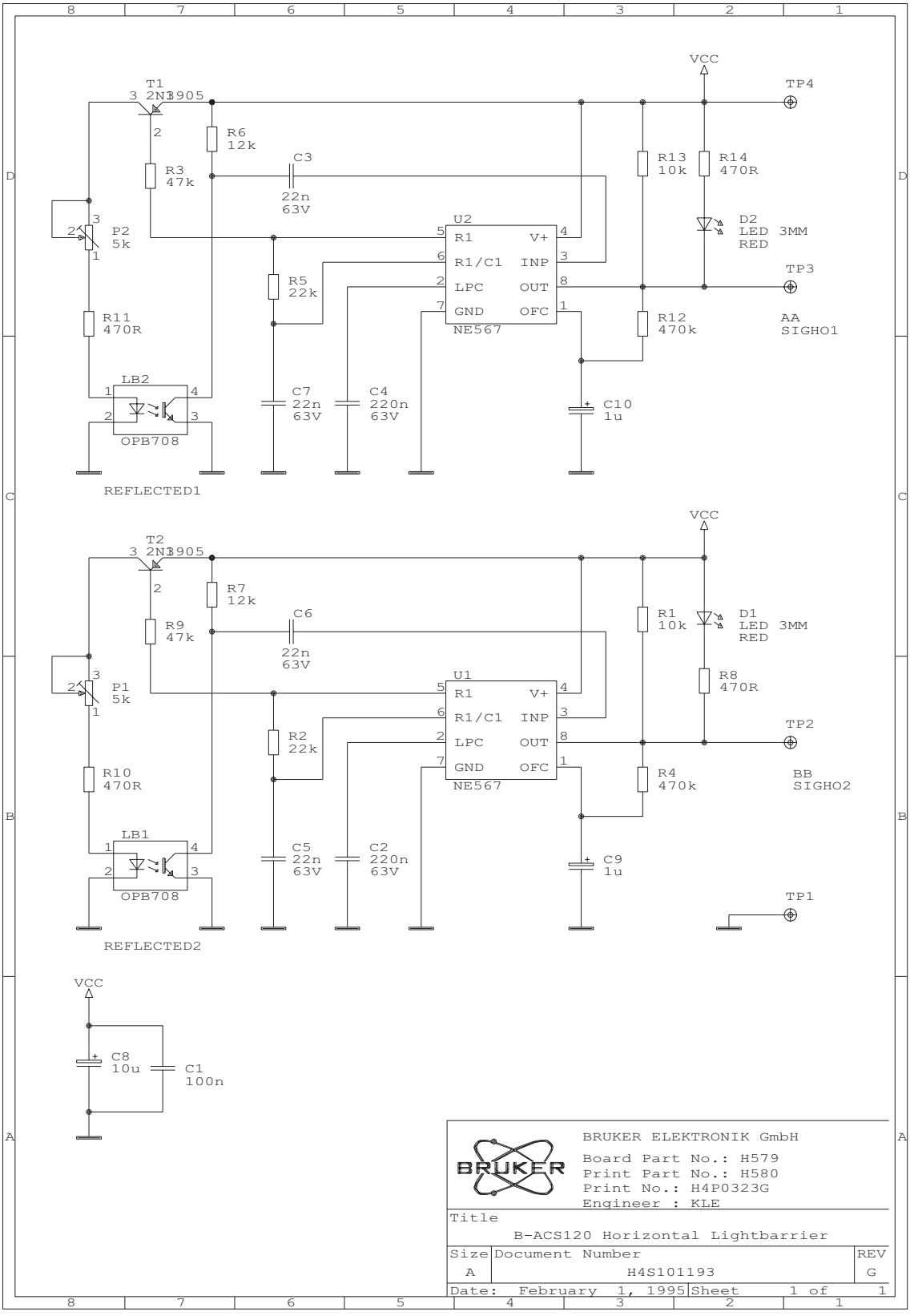


Figure 11.25.Horizontal Positioning Optic

B-ACS 120 Horizontal Light Barrier



Connector Type: Soldering Lug **Name**: Horizontal Light Barrier

Table 11.5. Pin Assignment: Horizontal Light Barrier

Pin Number	Function	Color
1	+5V	White
2	$\overline{\text{SIGH01}}$	Green
3	$\overline{\text{SIGH02}}$	Brown
4	DGND	Yellow

B-ACS SIOA *11.4*

Figure 11.26.B-ACS SIOA Block Diagram

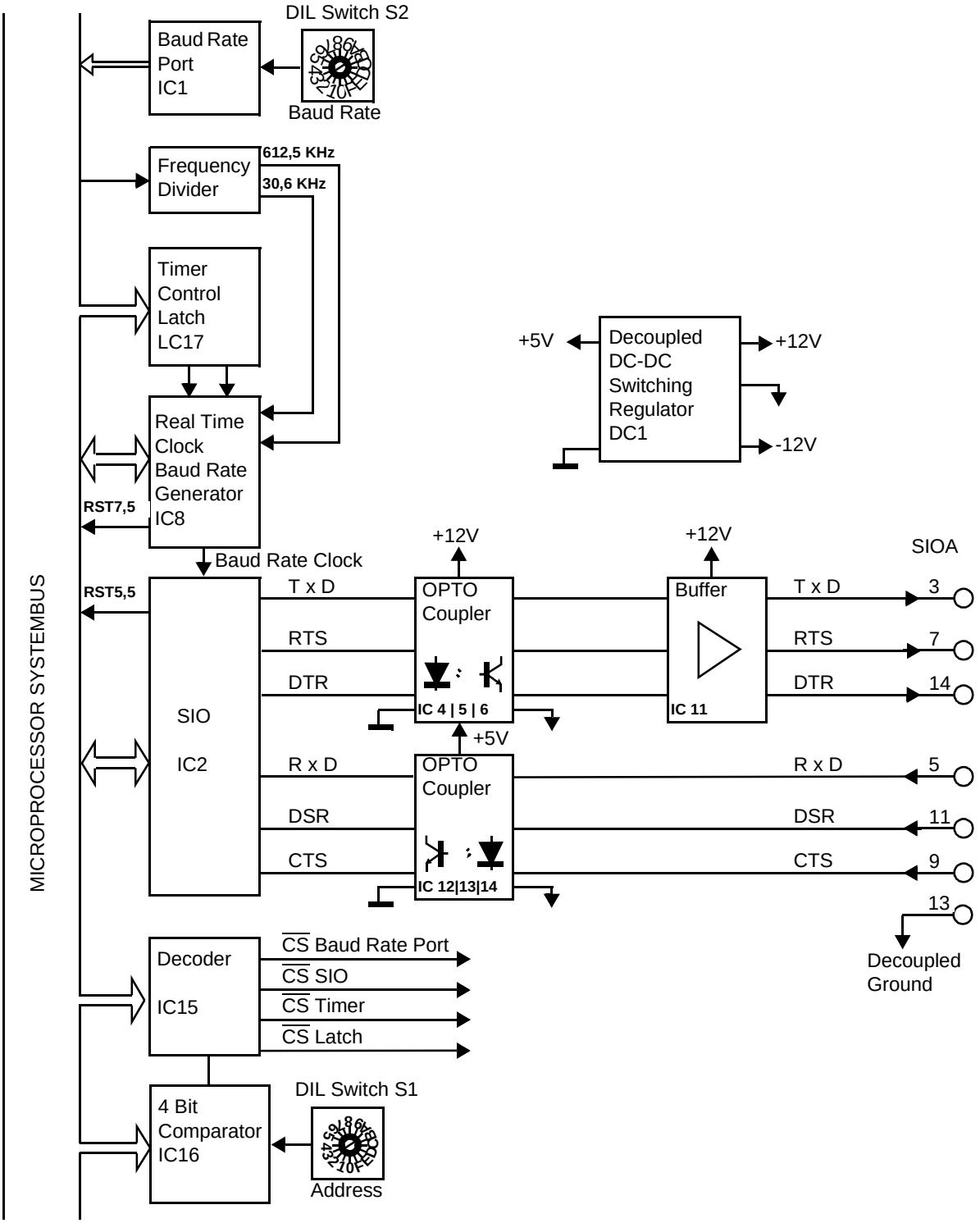


Figure 11.27.BMP-SIOA Board H650

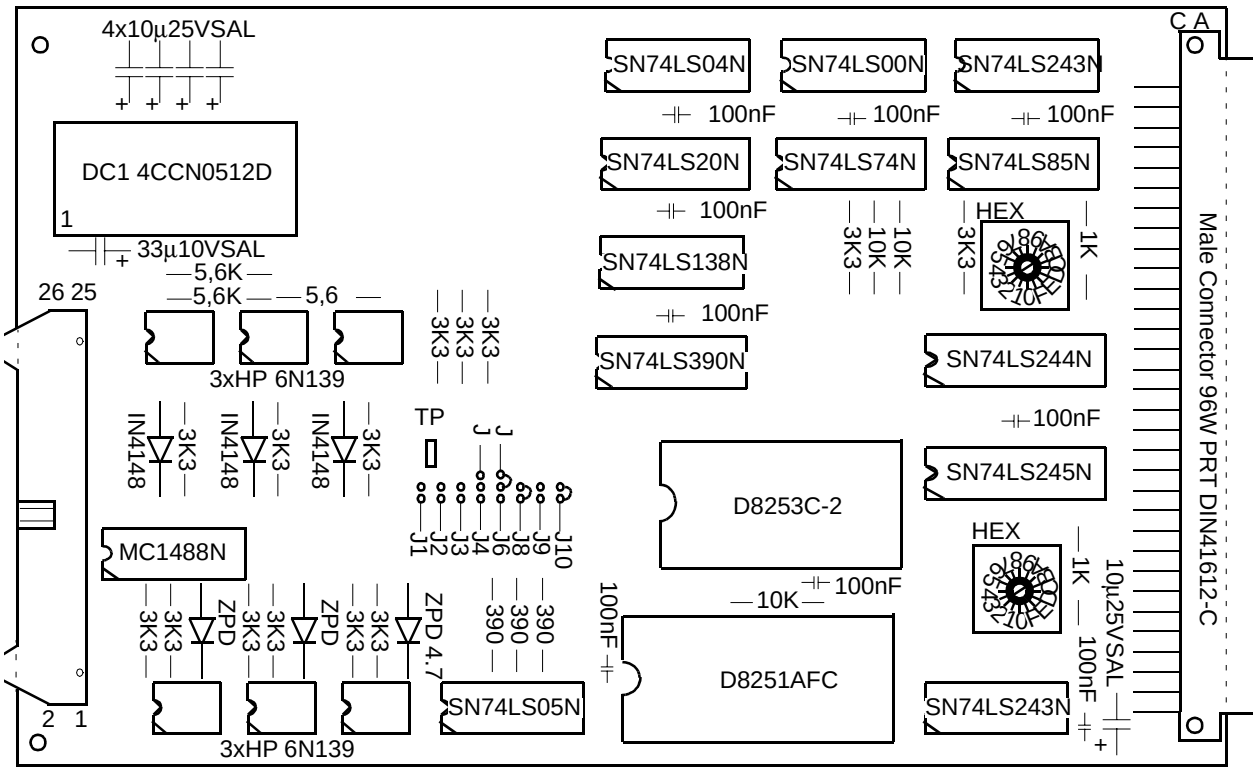


Figure 11.28.BMP-SIOA Circuit Diagram Page 1

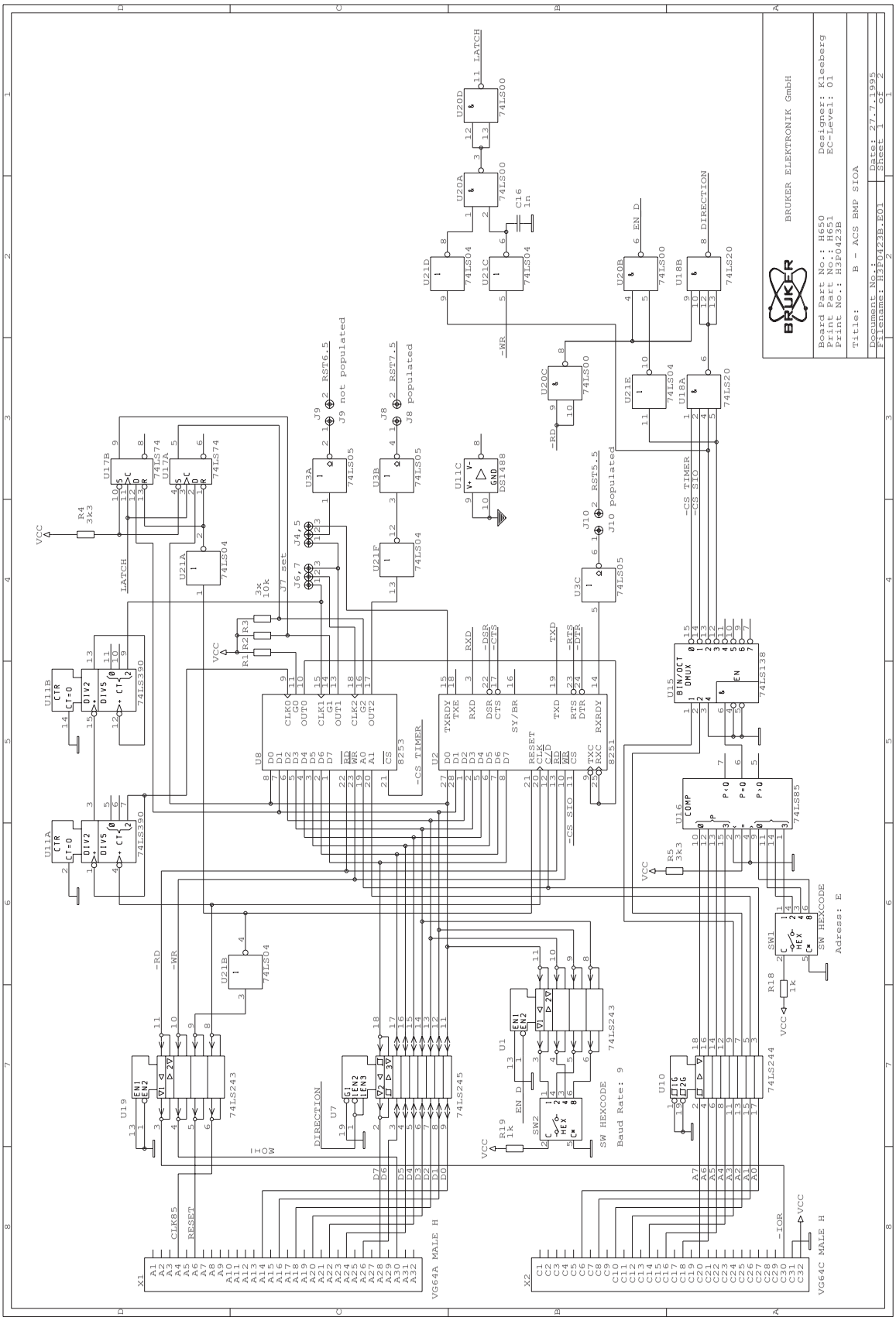
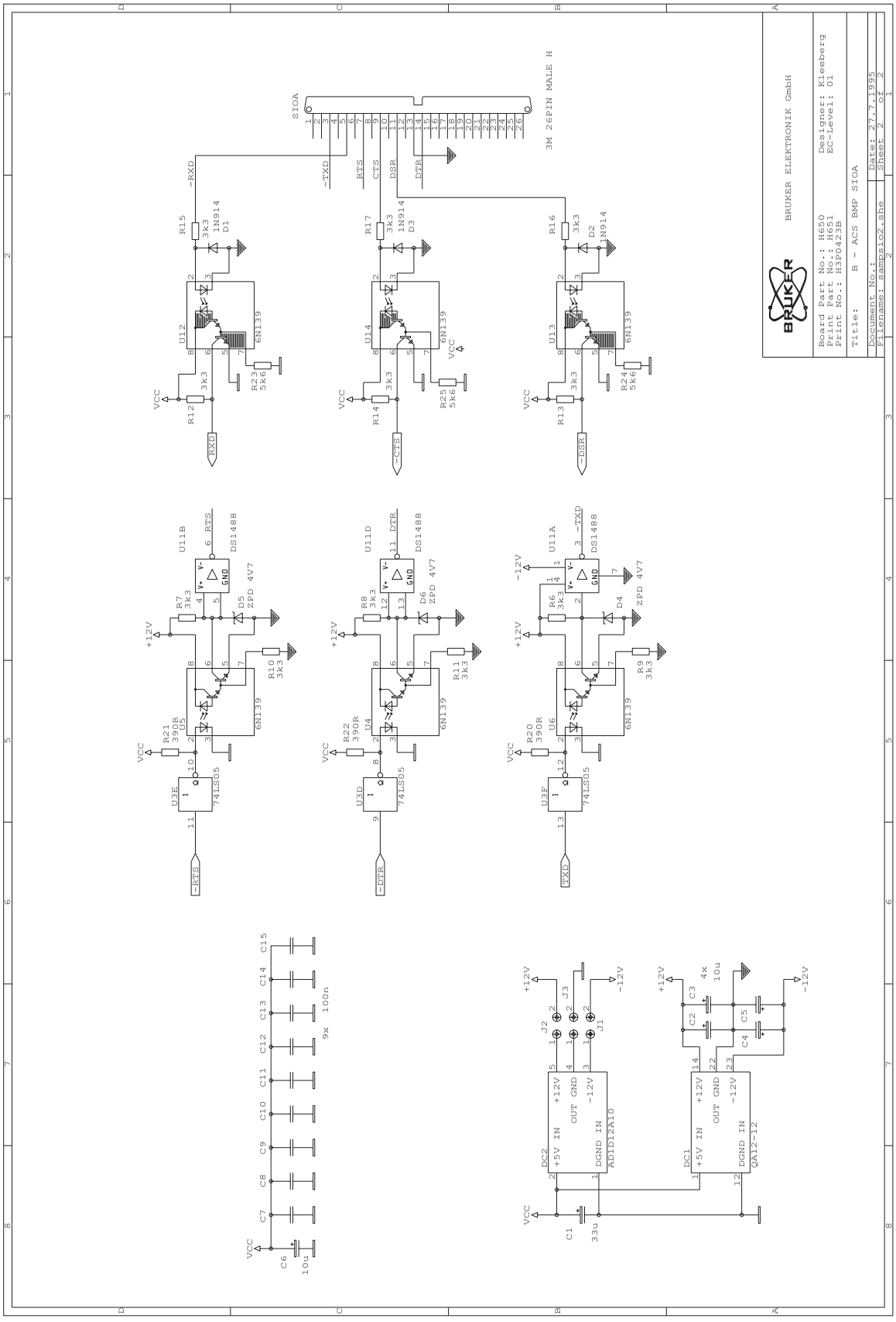


Figure 11.29.BMP-SIOA Circuit Diagram Page 2



B-ACS RS232C Serial Link 11.5

In its standard configuration the B-ACS sample changer is able to handle 60 or 120 samples, and is controlled via a RS232C serial link. The sample changer software defines the transmission mode of the RS232 channel as follows:

8 data bits (data bit 8 = „1“)

2 stop bits

no parity

System Parameters 11.5.1

The following system parameters have to be adjusted or taken in consideration:

1. Check the DIL switch setting on the BMP SIOA board. Switch S1 serves for setting the I/O address of the SIO board. It should be set at E. The transmission baud rate can be set with switch S2 according to the following table:

Table 11.6. Transmission Baud Rate for RS232

Baud Rate	Switch Position
50	0
75	1
110	2
150	3
300	4
600	5
1200	6
2400	7
4800	8
9600	9
19200	A to F

The standard value is 9600 baud, i.e. position 9. The location of the switches are shown in the implementation diagram, ***figure 11.28*** (Factory settings: S1 = „E“, S2 = „9“).

Figure 11.30.Implantation Diagram for the BMP SIOA Board

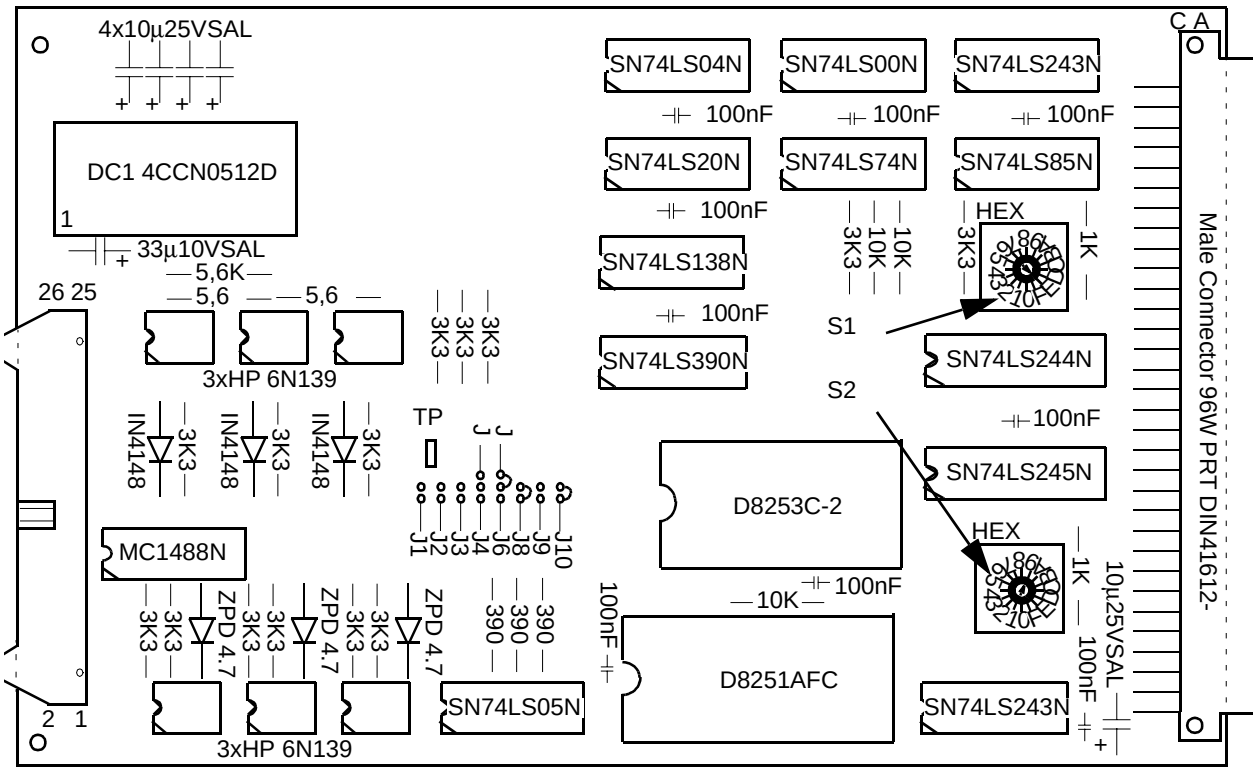
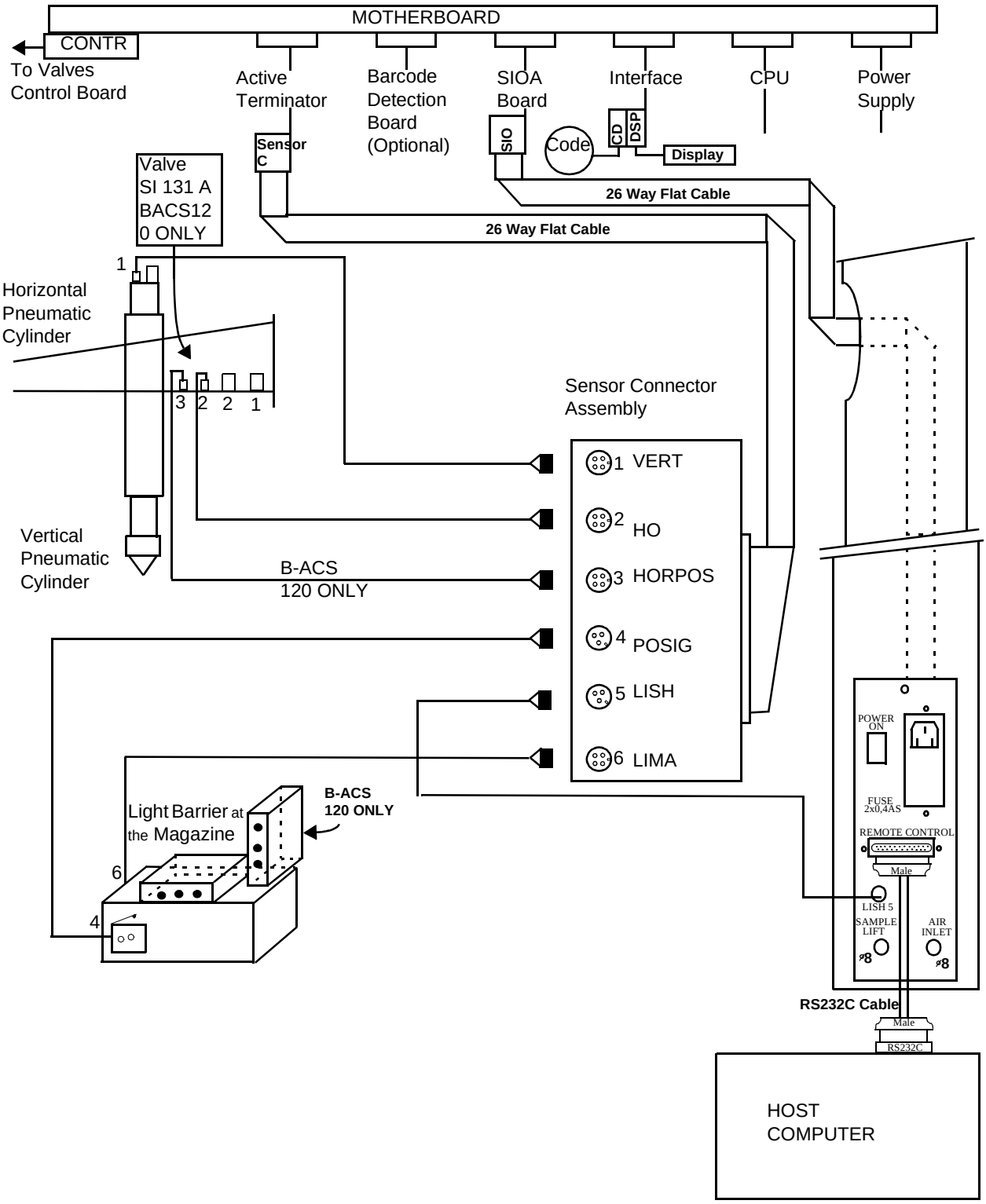


Figure 11.31.Connections for Operation of the RS232C



Testing the Installation *11.5.2*

Copy the program BACSTEST from the floppy onto your hard drive. Go into the monitor program and key in „BACSTEST“. You can now control the sample changer by entering commands through the keyboard. For further information refer to the B-ACS ***command list***.

B-ACS Bus Terminator *11.6*

Figure 11.32.B-ACS Bus Terminator Board

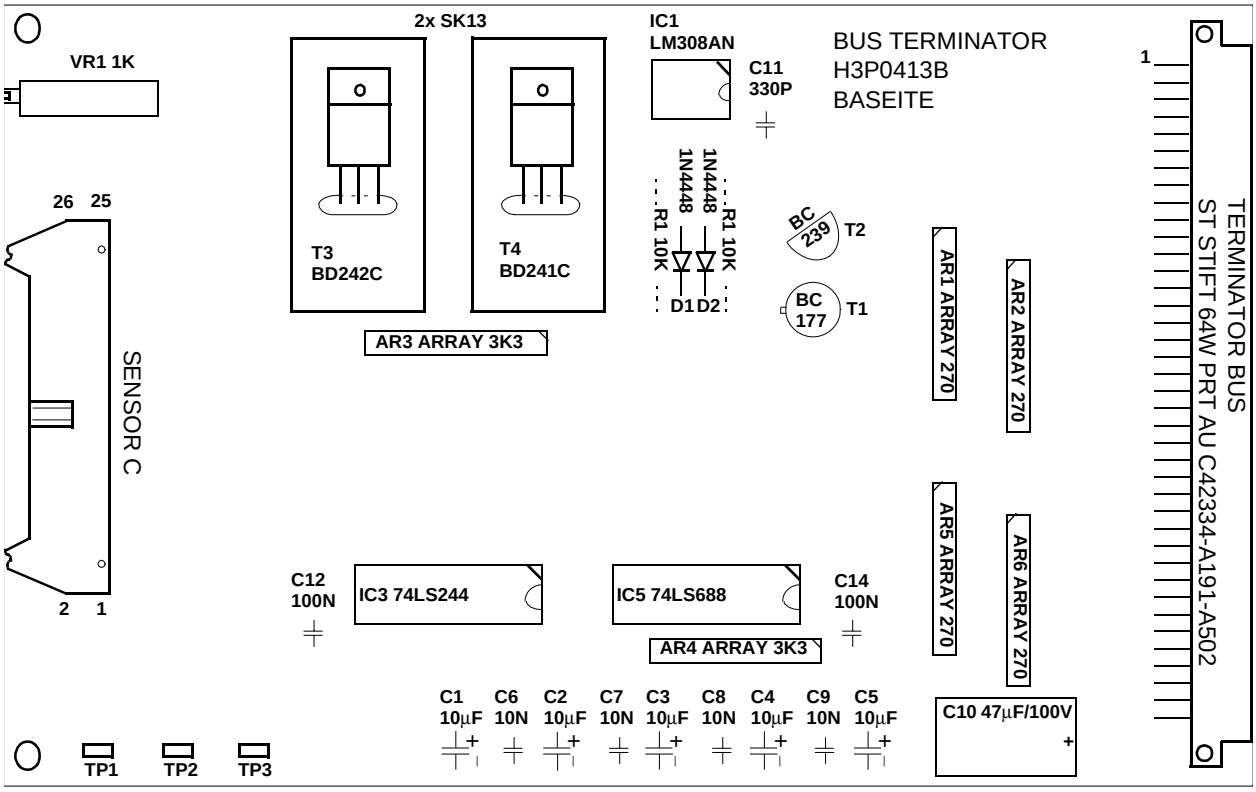


Figure 11.33.B-ACS Terminator Circuit Diagram

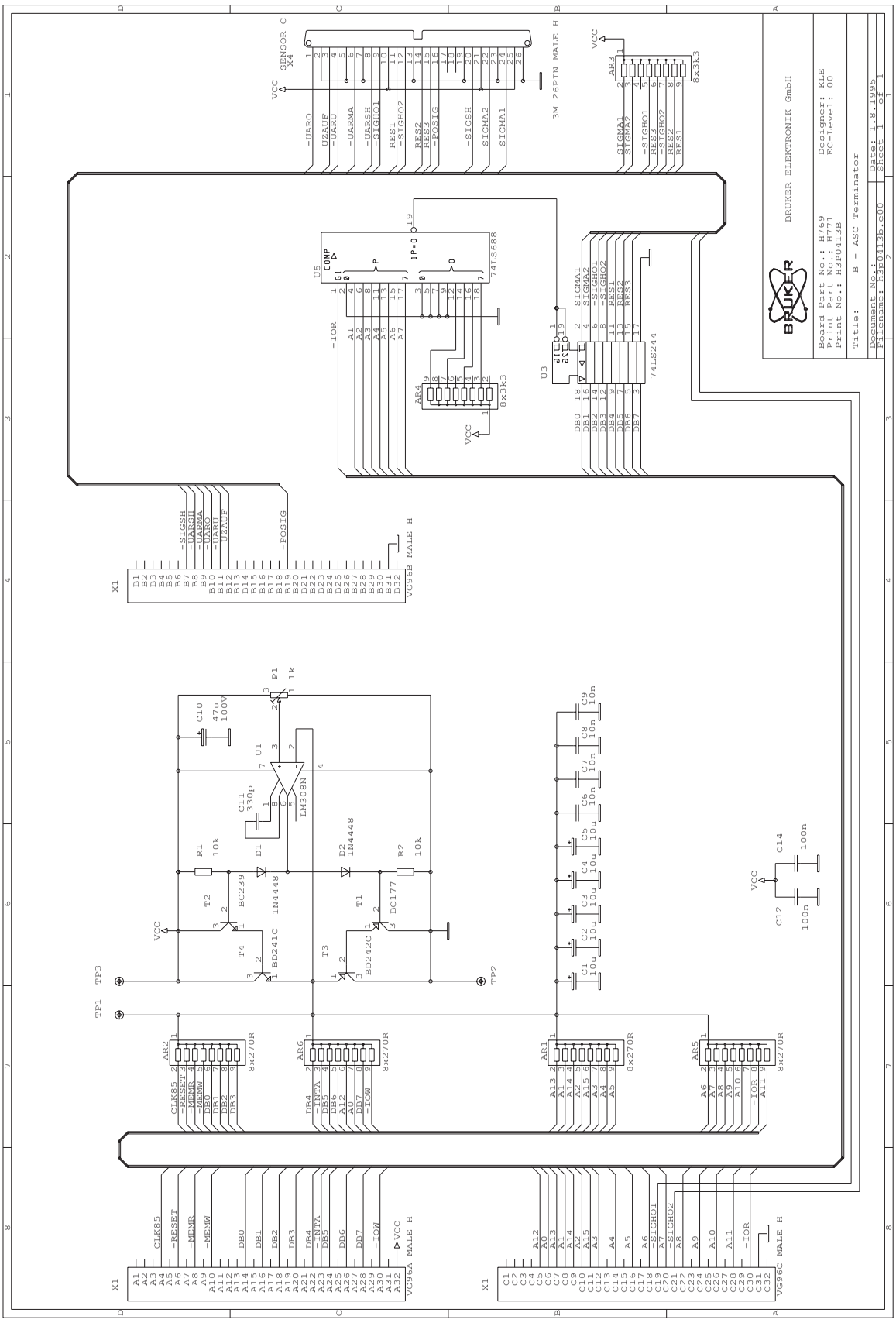


Table 11.7. Pin Assignment: Sensor Connectors

Connector Type: Binder Ser. 711 309-0081-00-04

Name: Horizontal Sensors

Pin Number	Function
1	DGND (UARSH)
2	$\overline{\text{UARSH}}$
3	DGND (UARMA)
4	$\overline{\text{UARMA}}$

Connector Type: Binder Ser. 711 309-0081-00-04

Name: Vertical Sensors

Pin Number	Function
1	UZAUF
2	$\overline{\text{UARU}}$
3	$\overline{\text{UARO}}$
4	DGND

Connector Type: Binder Ser. 711 309-0081-00-04

Name: Horizontal Position

Pin Number	Function
1	+5V
2	$\overline{\text{SIGHO1}}$
3	DGND
4	$\overline{\text{SIGHO2}}$

Connector Type: Binder Ser. 711 309-0081-00-03

Name: Magazine Position

Pin Number	Function
1	NC
2	$\overline{\text{POSIG}}$
3	DGND

Table 11.7. Pin Assignment: Sensor Connectors

Connector Type: Binder Ser. 711 309-0081-00-03

Name: Light Barrier Shim System

Pin Number	Function
1	+5V
2	$\overline{\text{SIGSH}}$
3	DGND

Connector Type: Binder Ser. 711 309-0081-00-04

Name: Light Barrier Magazine

Pin Number	Function
1	+5V
2	SIGMA1
3	DGND
4	SIGMA2

Figure 11.34.Valves and Motor Control Board H480

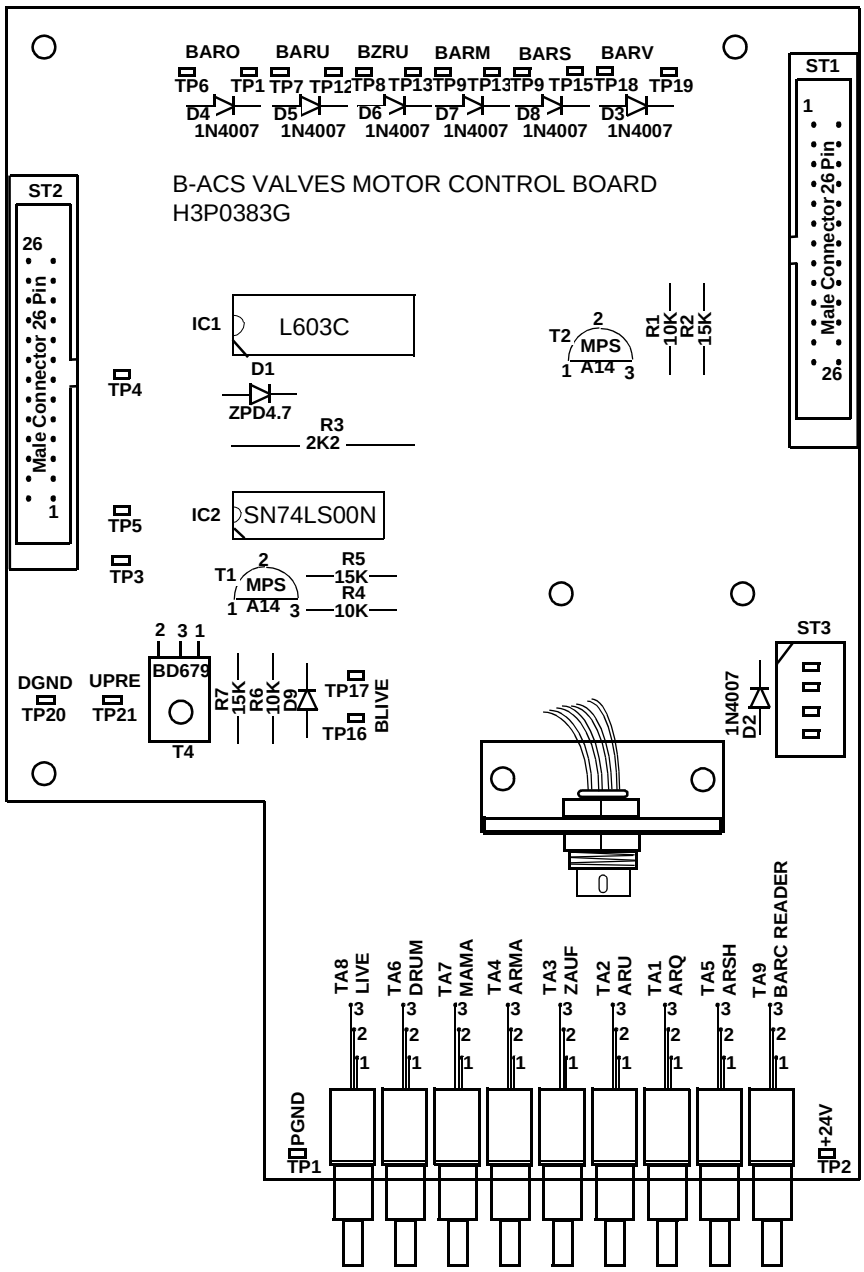
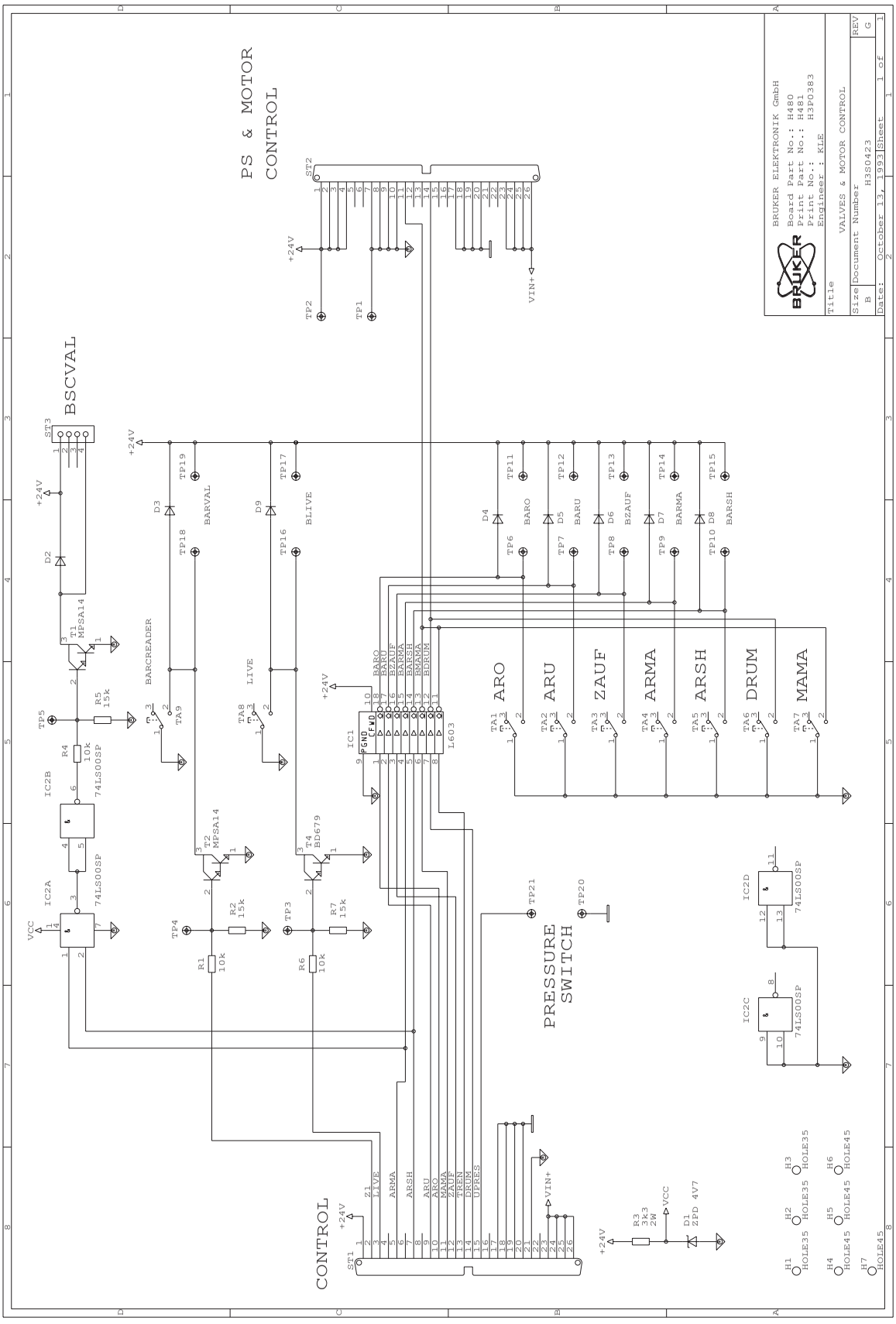
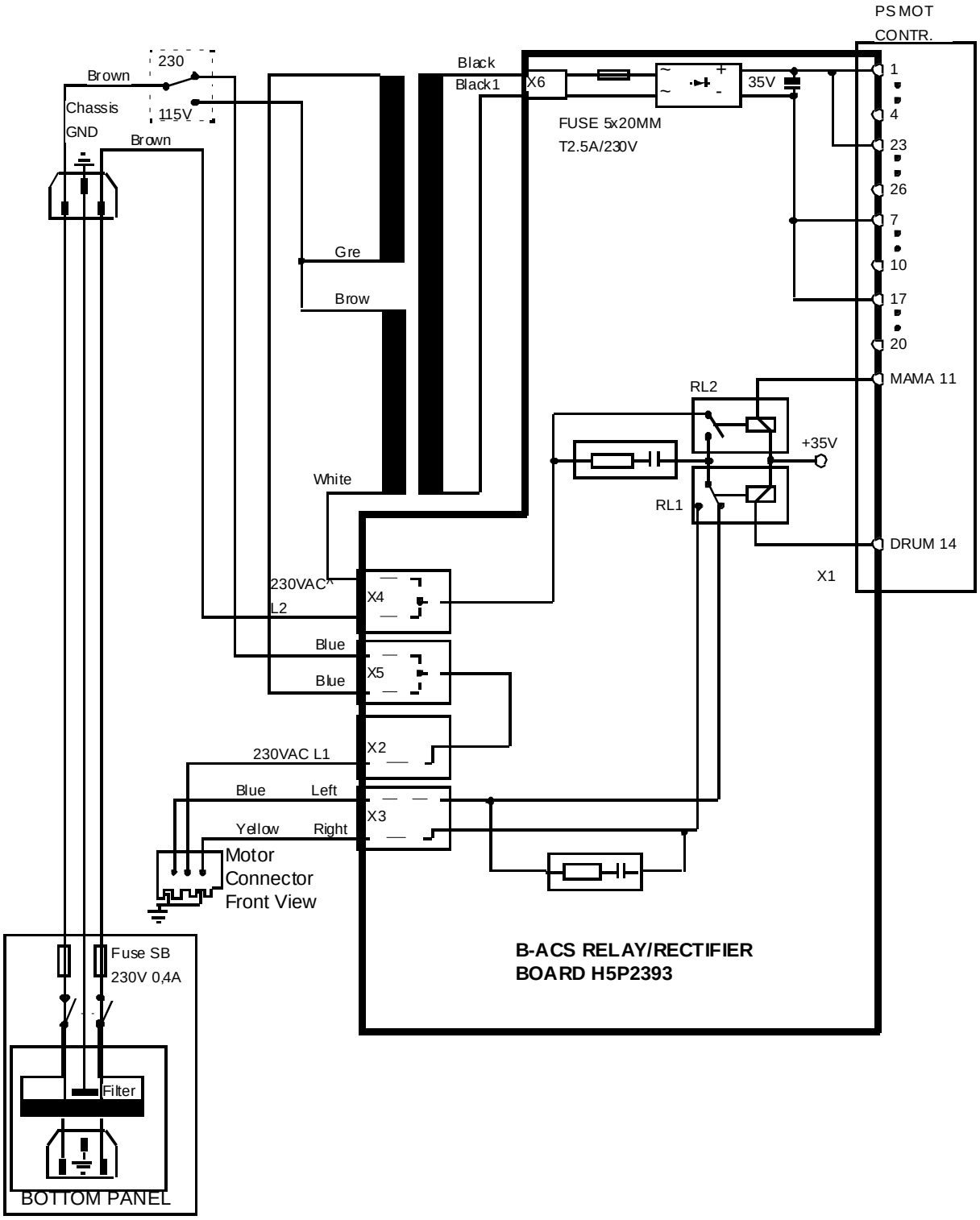


Figure 11.35.Valves and Motor Control Circuit Diagram



Power Supply Box ***11.6.1***

Figure 11.36.Power Supply Box Wiring Diagram



B-ACS Rectifier Board

Figure 11.37.Rectifier Board H457

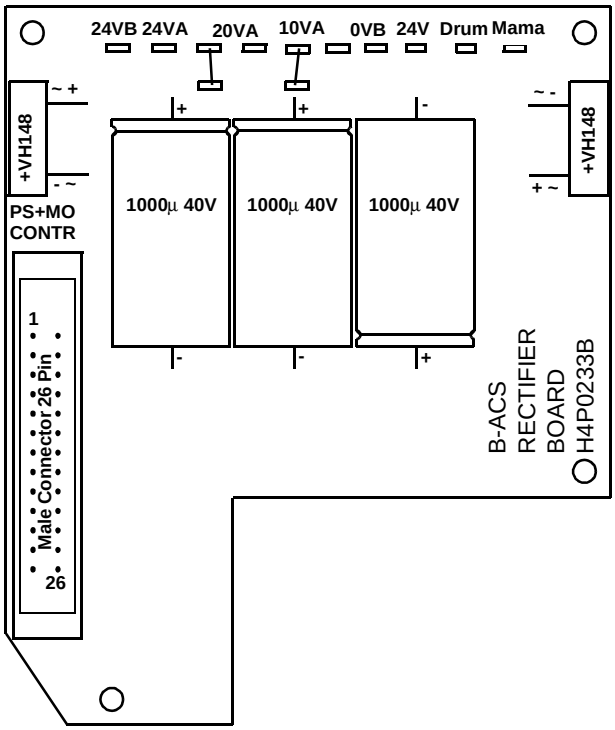
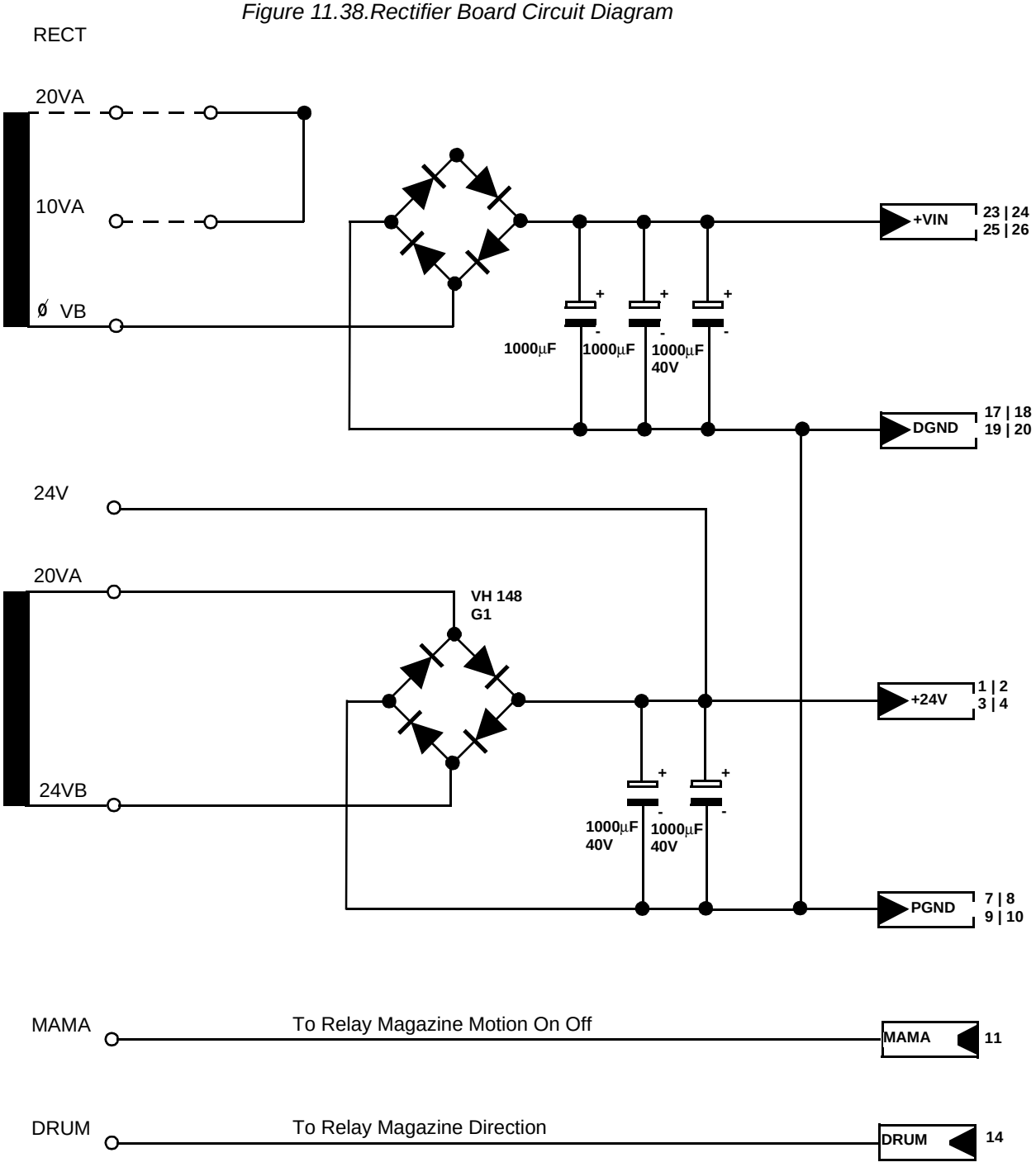


Figure 11.38.Rectifier Board Circuit Diagram



B-ACS Relay Board

Figure 11.39.Relay Board

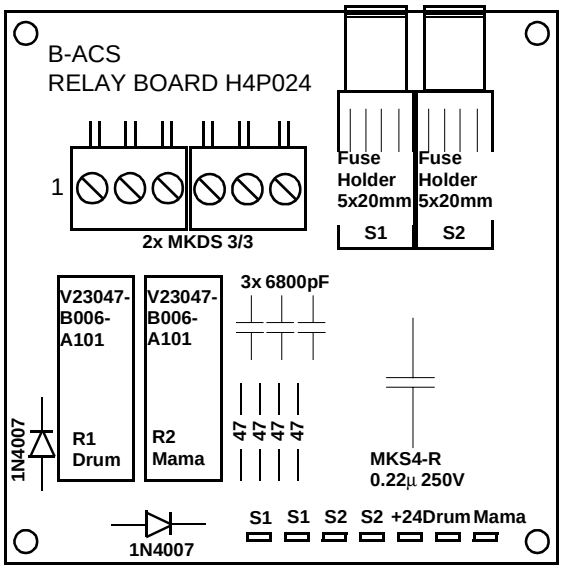
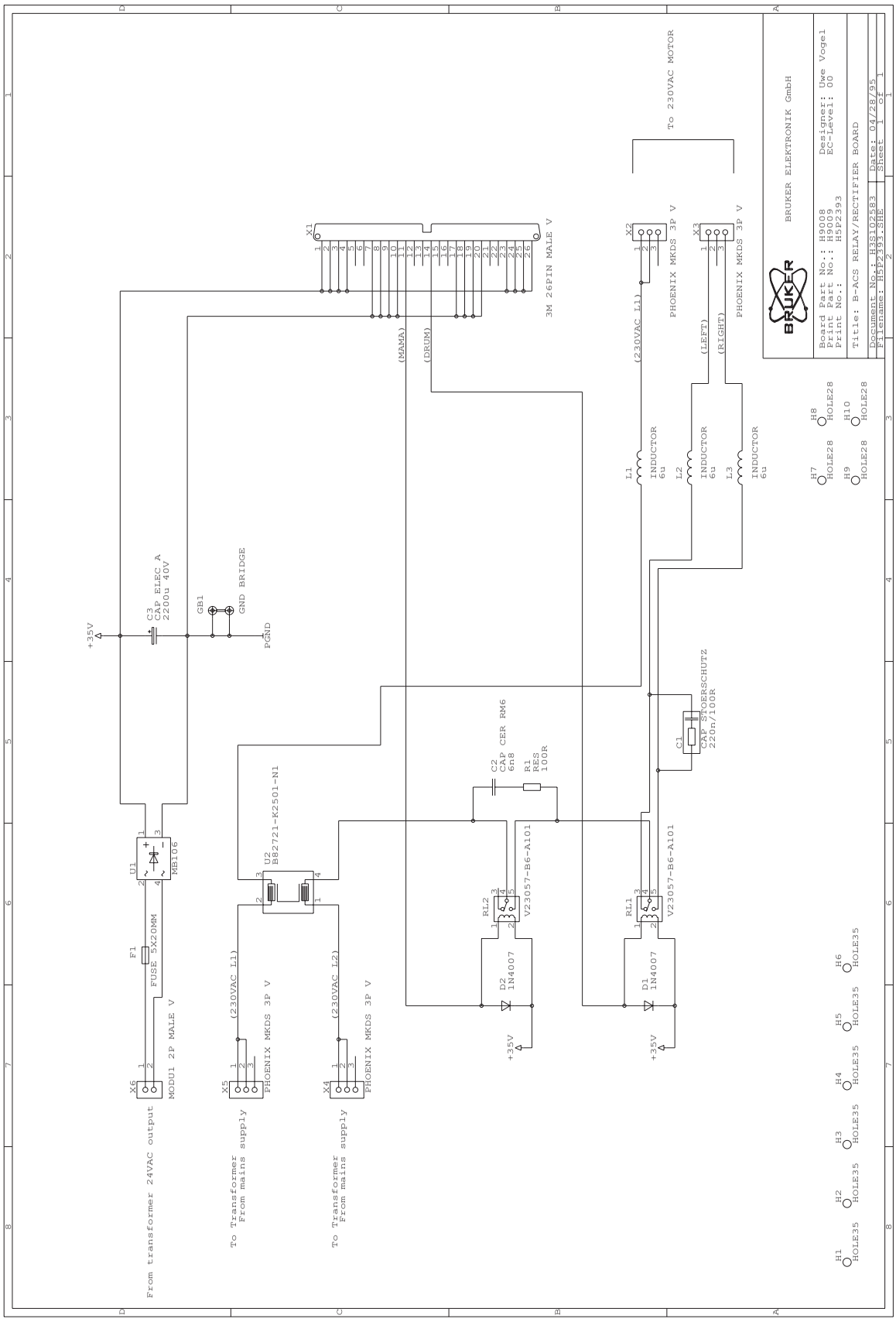


Figure 11.40.Relay Board Circuit Diagram



Barcode Reader Option

12

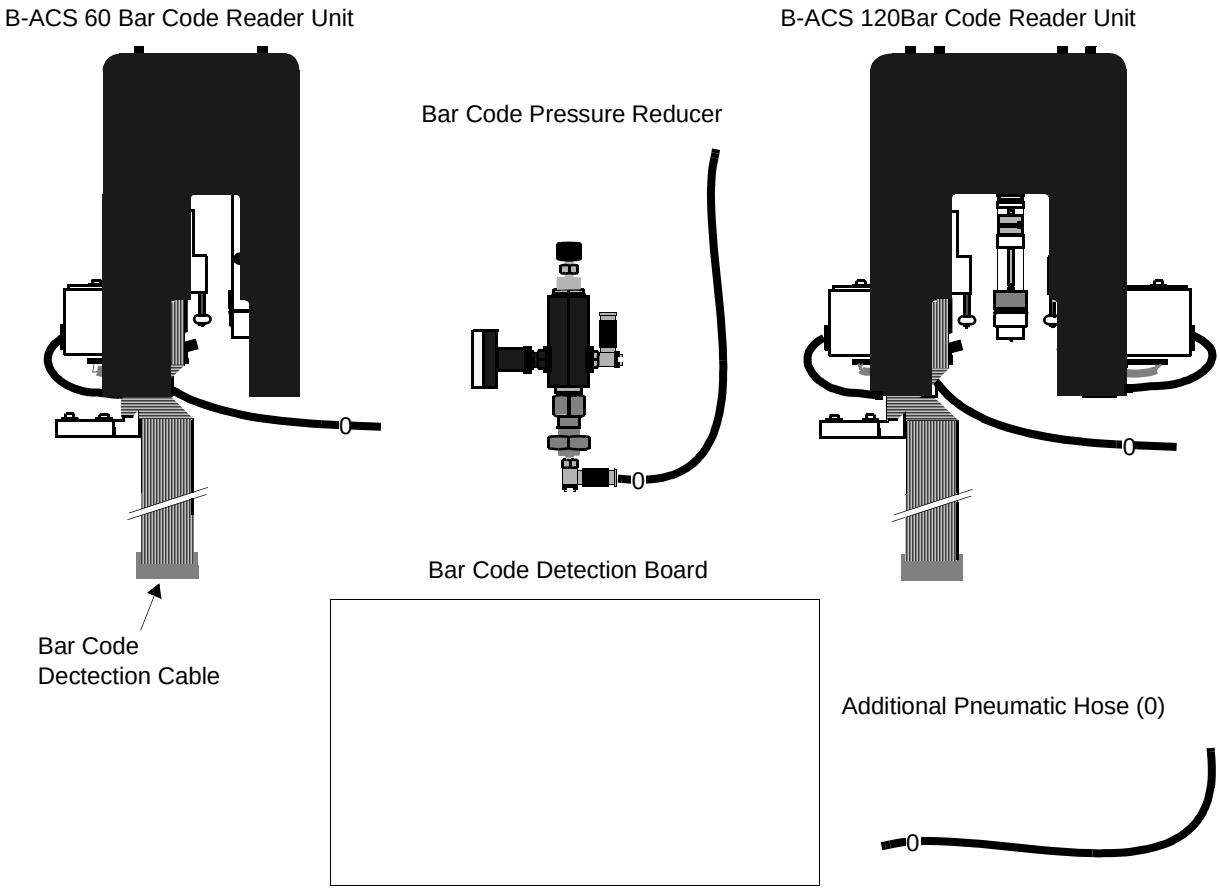
Installation 12.1

This chapter deals with the installation and operation of the Bar Code Reader option for the B-ACS 60 or 120.

Required parts (refer to ***figure 12.1***):

- Bar Code Detection Board
- Bar Code Detection Cable
- Bar Code Reader Unit (B-ACS 60 or B-ACS 120)
- Bar Code Pressure Reducer with Manometer and Pneumatic Hose (0)
- Additional Pneumatic Hose (0)

Figure 12.1. Parts Required for Installation of the Bar Code Reader



WARNING: Disconnect the Sample Changer from its power source before preceding!!!

Mounting Instructions *12.1.1*

Installing the Bar Code Detection Board

Insert the bar code detection board into the free slot of the electronic assembly inside the automatic sample changer (second slot from the left - refer to figure 5.1).

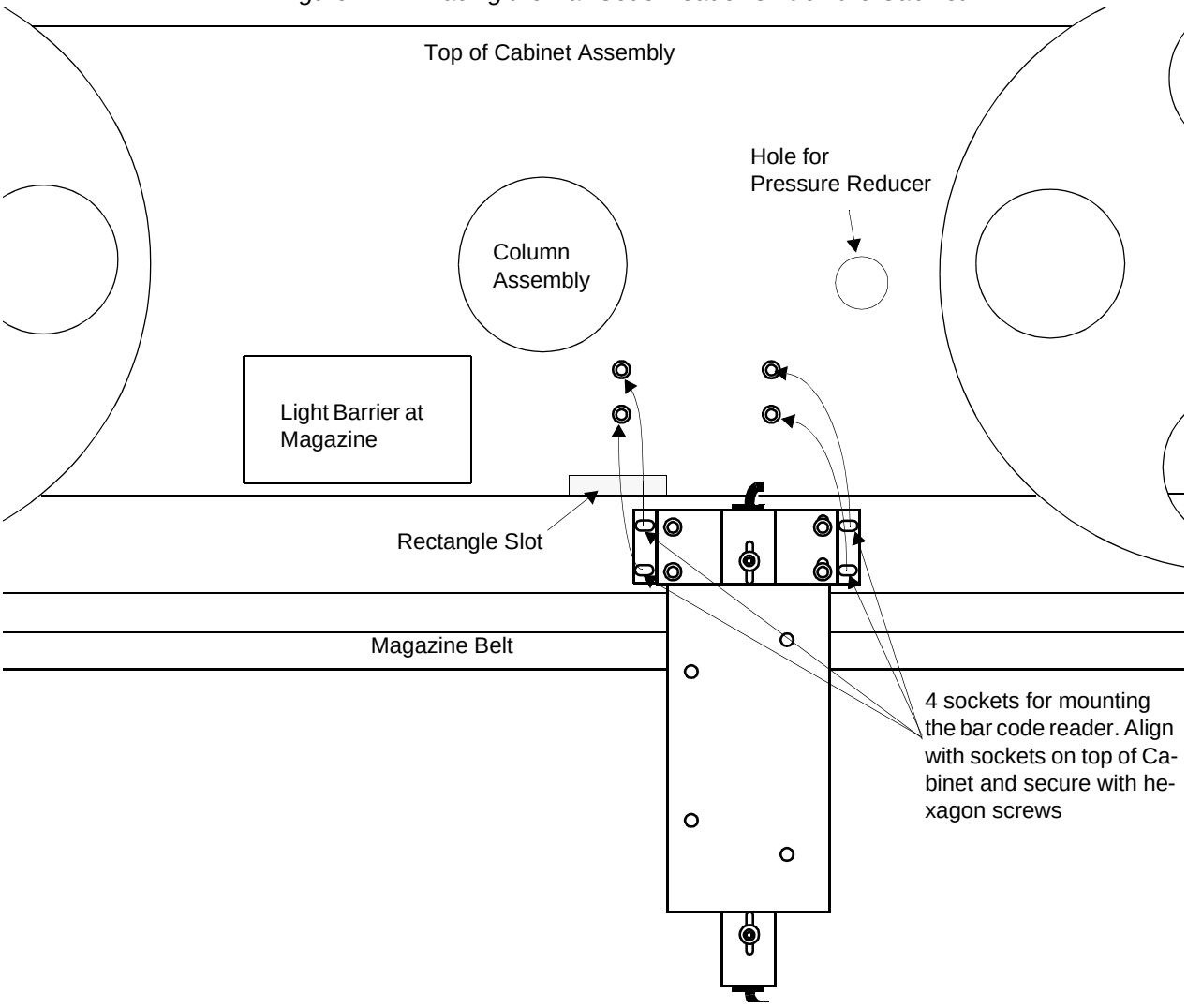
Preparing the Sample Changer and Bar Code Reader Unit

Remove the outer cover of the Bar Code Reader Unit (loosen the black thumb screws on top of the cover - refer to ***figure 12.1***).

Remove the ***Rear Panel*** of the Sample Changer Cabinet.

Remove the metal support bracket located in the center of the rear of the cabinet, and slide the Bar Code Detection Cable (flat cable) of the Reader Unit through the rectangle slot on the top of the rear of the sample changer cabinet (***figure 12.2***).

Figure 12.2. Placing the Bar Code Reader Unit on the Cabinet



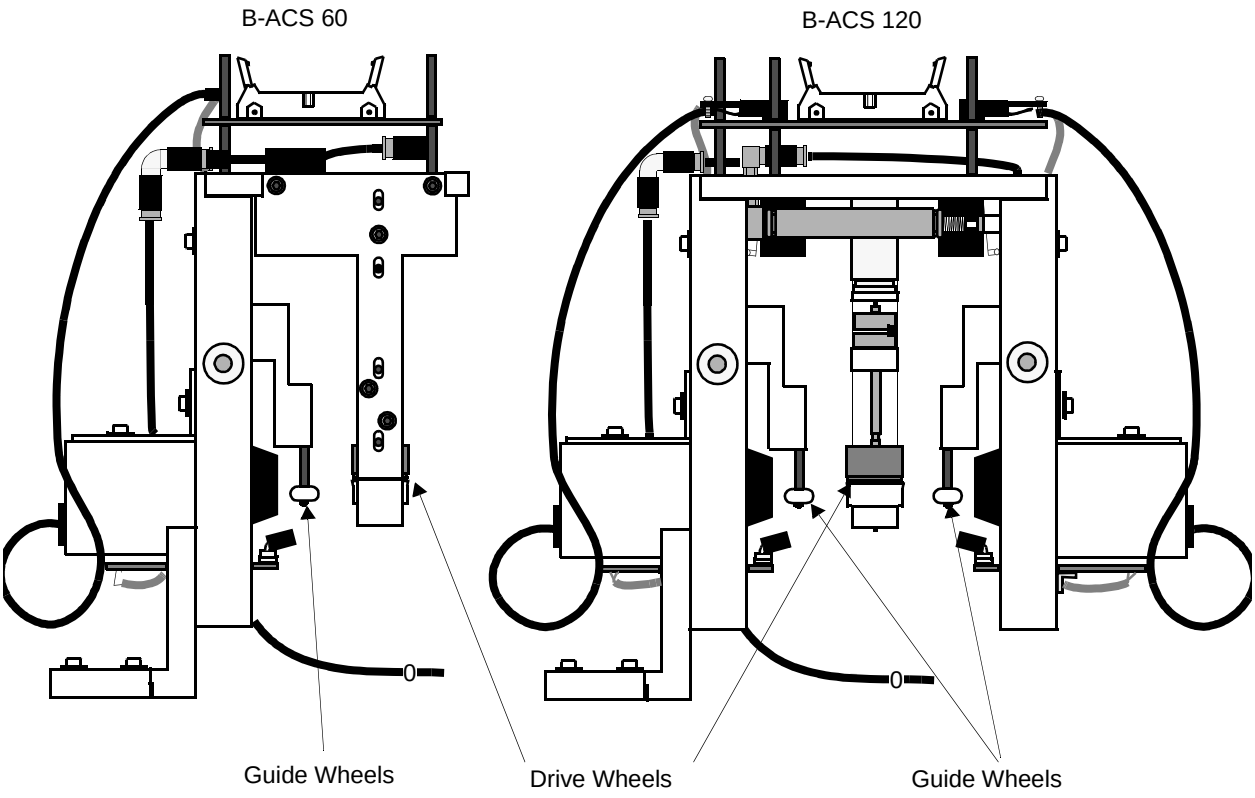
Mounting the Bar Code Reader Unit on the Cabinet

Mount the Bar Code Reader Unit over the cabinet and sample belt carrousel, aligning the four hexagon socket head cap screws over the holes in the top of the cabinet (***figure 12.2***). Tighten the screws slightly, allowing for some movement of the reader unit for later adjustment.

Adjust the reader unit to ensure a uniform contact of the wheels on the bar code sleeve (see ***figure 12.3***). The sample position between the guide wheels must be checked carefully. Move the Unit forwards or backwards, then left or right to adjust the position.

Connect the end of the bar code detection cable to the bar code detection board.

Figure 12.3. Location of the Guide and Drive Wheels



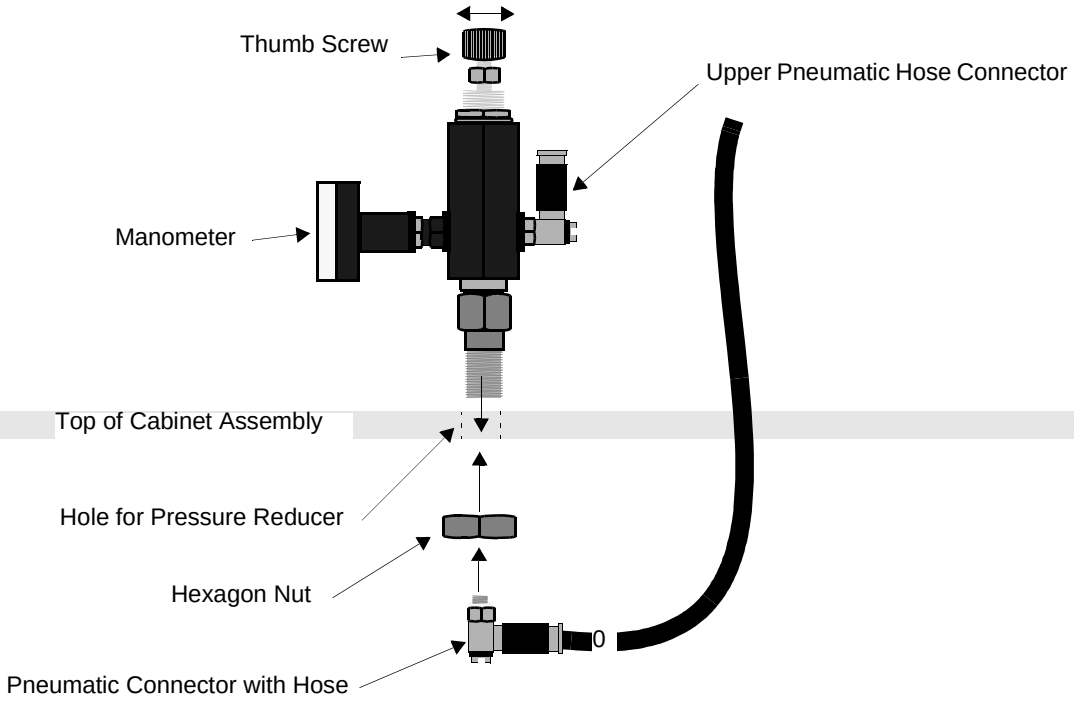
Mounting the Bar Code Pressure Reducer

Mount the Bar Code Pressure Reducer (with manometer) by placing it in the round hole provided at the top of the cabinet (refer to ***figures 12.2*** and ***12.4***). Secure the unit with the hexagon nut. Place the pneumatic hose connector with hose onto the end of the bottom of the pressure reducer and screw it on tightly.

Connect the pneumatic hose (#0) from the bottom of the pressure reducer to the pneumatic connector (position 0) on the ***Valves and Motor Control Board***.

Connect the second pneumatic hose (#0) from the Reader Unit to the upper pneumatic hose connector on the pressure reducer.

Figure 12.4. Bar Code Pressure Reducer with Manometer



Putting the Bar Code Reader Into Operation *12.1.2*

Reconnect the power supply cable to the sample changer and turn the sample changer on.

Prepare samples by printing and placing a bar code label on each sample as indicated in the Bar Code Printer manual. Insert the samples into the carrousel belt positions near the Bar Code Reader.

Adjusting the Air Pressure of the Bar Code Reader

To adjust the air pressure of the bar code reader, run the following tests:

Move a sample tube with a bar code to the read position on the bar code reader by rotating the belt with the appropriate keyboard command.

Type the following sample changer commands on the host computer keyboard.

Instruction	**Command**
Diagnostic Mode	ESC
Enter Bar Code Length	BD 12
Begin Bar Code Reader Test	BT

The Bar Code Reader should begin to read the bar code on the sample.

Adjust the air pressure to approximately 4 bar (or until the sample spinner rotates freely) by turning the adjusting screw on top of the pressure reducer (***figure 12.4***).

Note: If the RESET button is pushed you must re-enter the bar code length. To abort the test at any time, press CONTINUE.

Centering the Samples in the Bar Code Reader

Center the samples between the guide and drive wheels by moving the Reader Unit towards or away from the column, then right or left. Once the samples are centered, tighten the hexagon screws holding the Reader Unit.

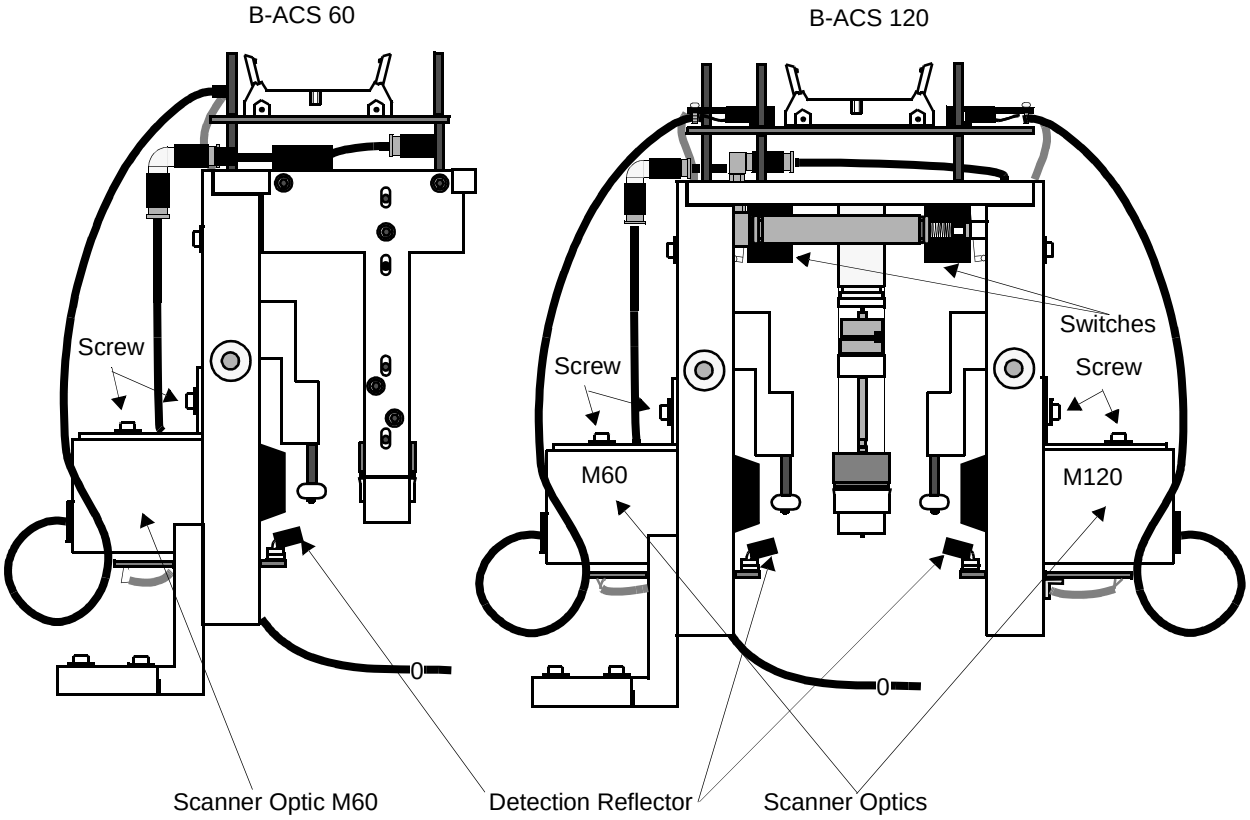
Adjusting the Scanner Optics on the Bar Code Reader

With the samples still in the read position, adjust the scanner optics as follows:

If the bar code reader is not in the test mode, repeat the ***ESC***, ***BD 12*** and ***BT*** commands as ***mentioned above***.

Loosen the screw on top of Scanner Optic Unit (if you have a B-ACS 120, the unit closest to the sample changer column) and adjust the optics by moving the unit forwards or backwards and up or down (***figure 12.5***). The distance between the label of the sample and the bar code reader optic is optimal when LED 2 on the bar code detection board flashes at regular intervals and LED 1 flickers. When the optimal distance has been obtained tighten the screw on top of the Scanner Optic Unit.

Figure 12.5. Location of the Scanner Optics



If you have a B-ACS 120 change the test to Channel B by pushing the '>' or '<' key on the front panel of the Sample Changer Cabinet and repeat the above step for the outer Scanner Optic Unit.

Note for B-ACS 120 Owners: A spinner in the outer position of the carrousel should not be able to be detected by the inner spinner detector and vice-versa. If this should be the case then decrease the sensitivity of the spinner detection reflector by using the trim pod on the Barcode Adapter board.

Final Step

Once you have completed the adjustments, replace the Bar Code Reader Unit cover and the back panel of the cabinet. This completes the installation of the Bar Code Reader.

Test points on the Adapter Boards *12.1.3*

M120

TP1:	LIGHT BARRIER SIGNAL M60
TP2: +5V	LIGHT BARRIER SUPPLY LB M60
TP3:	BARCODE SIGNAL M60
TP4:	LIGHT BARRIER SIGNAL M120
TP5: +5V	LIGHT BARRIER SUPPLY LB M120
TP6:	BARCODE SIGNAL M120

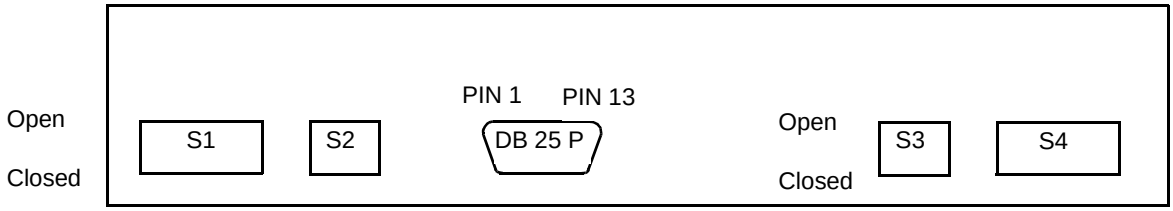
M60

TP1:	LIGHT BARRIER SIGNAL M60
TP2: +5V	LIGHT BARRIER SUPPLY LB M60
TP3:	BARCODE SIGNAL M60

Communication Protocols for the Thermoprinter V3.1 *12.2*

The DIP switch settings for setting the parameters are located on the rear of the printer (refer to the printer description)

Figure 12.6. Rear Side of Label Printer



.

Table 12.1. Serial Interface Switch Positions

Serial Interface Switch Position	
Switch S1	V24 input and output data are inverted, 2 stop bits, 7 or 8 data bits, no parity. S1.1 = Closed S1.2 = Closed S1.3 = Open S1.4 = Open S1.5 = Closed S1.6 = Closed S1.7 = Open S1.8 = Depends on the computer used.
Switch S2	Baud Rate = 9600 bauds S2 = 7
Switch S3	Automatic Form Feed until TOF, print speed and without XON-XOFF protocol. S3.1 = Closed S3.2 = Open S3.3 = Open S3.4 = Closed
Switch S4	Preset the delay time to 1400 msec, the label set to 39mm and with label synchronization. S4.1 = Open S4.2 = Open S4.3 = Open S4.4 = Closed S4.5 - S4.8 = Closed

DIP Switch Setting Overview for the F&O Label Printer *12.2.1*

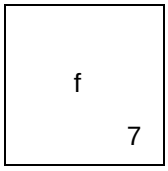
Table 12.2. Label Printer Connected to ASPECT and Station

Switch 1:			X	X			X		Open
	X	X			X	X		X	Closed
	1	2	3	4	5	6	7	8	

Table 12.3. Label Printer Connected to IBM-PC

Switch 1:			X	X			X	X	Open
	X	X			X	X			Closed
	1	2	3	4	5	6	7	8	

Switch 2:



Switch 3:

	X	X		Open
X			X	Closed
1	2	3	4	

Switch 4:

X	X	X						Open
			X	X	X	X	X	Closed
1	2	3	4	5	6	7	8	

Label Handling *12.2.2*

When placing the barcode label onto the collar of the sample, make sure the label is fastened correctly. The label should be fixed parallel on the collar, with no overhang and no fold over.

To remove the label from the collar, lay the collar for a short time in methanol or a similar solvent.

Schematic Diagrams *12.3*

Figure 12.7. Barcode Reader Block Diagram

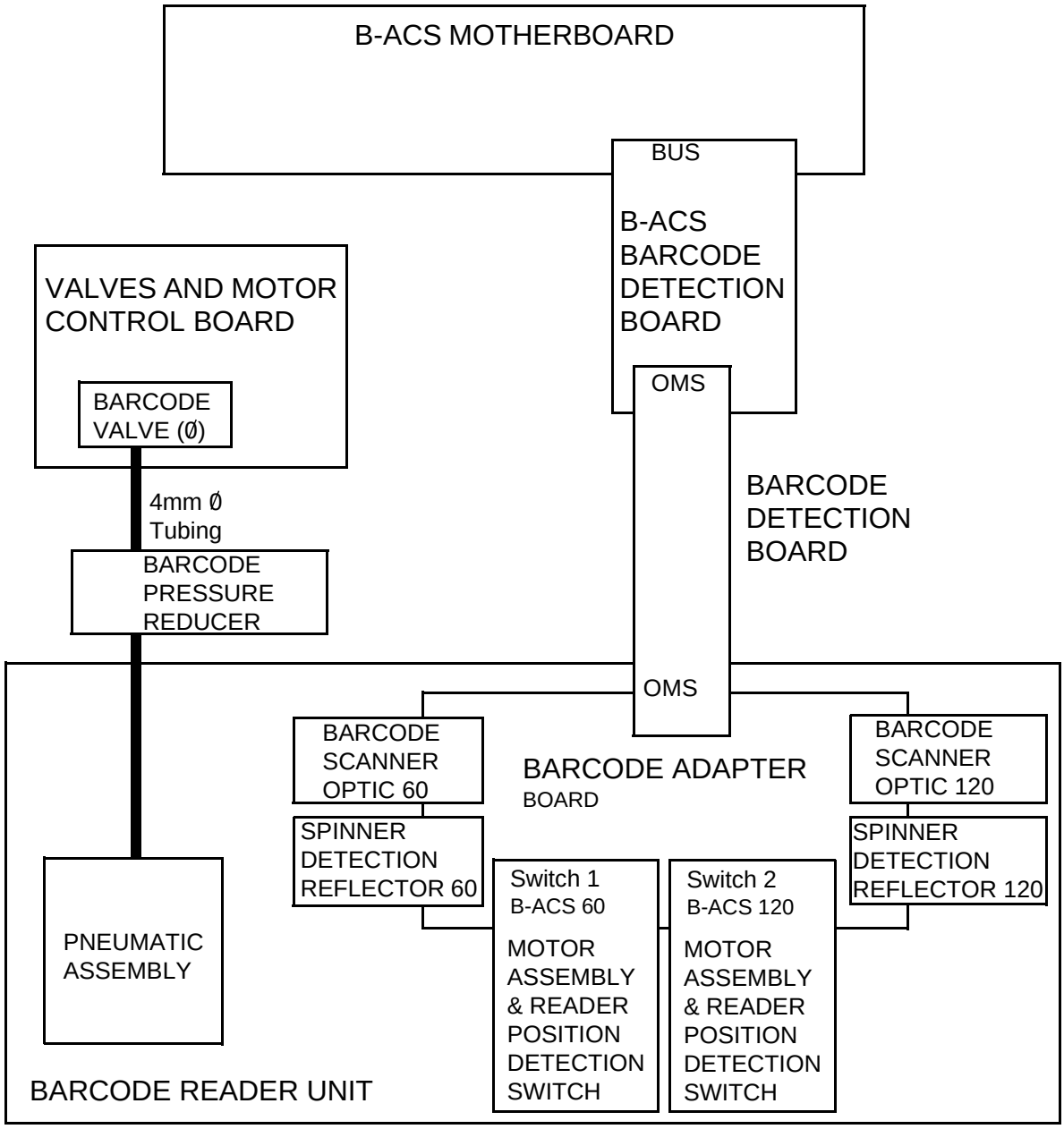


Figure 12.8. Barcode Reader Overview Block Diagram

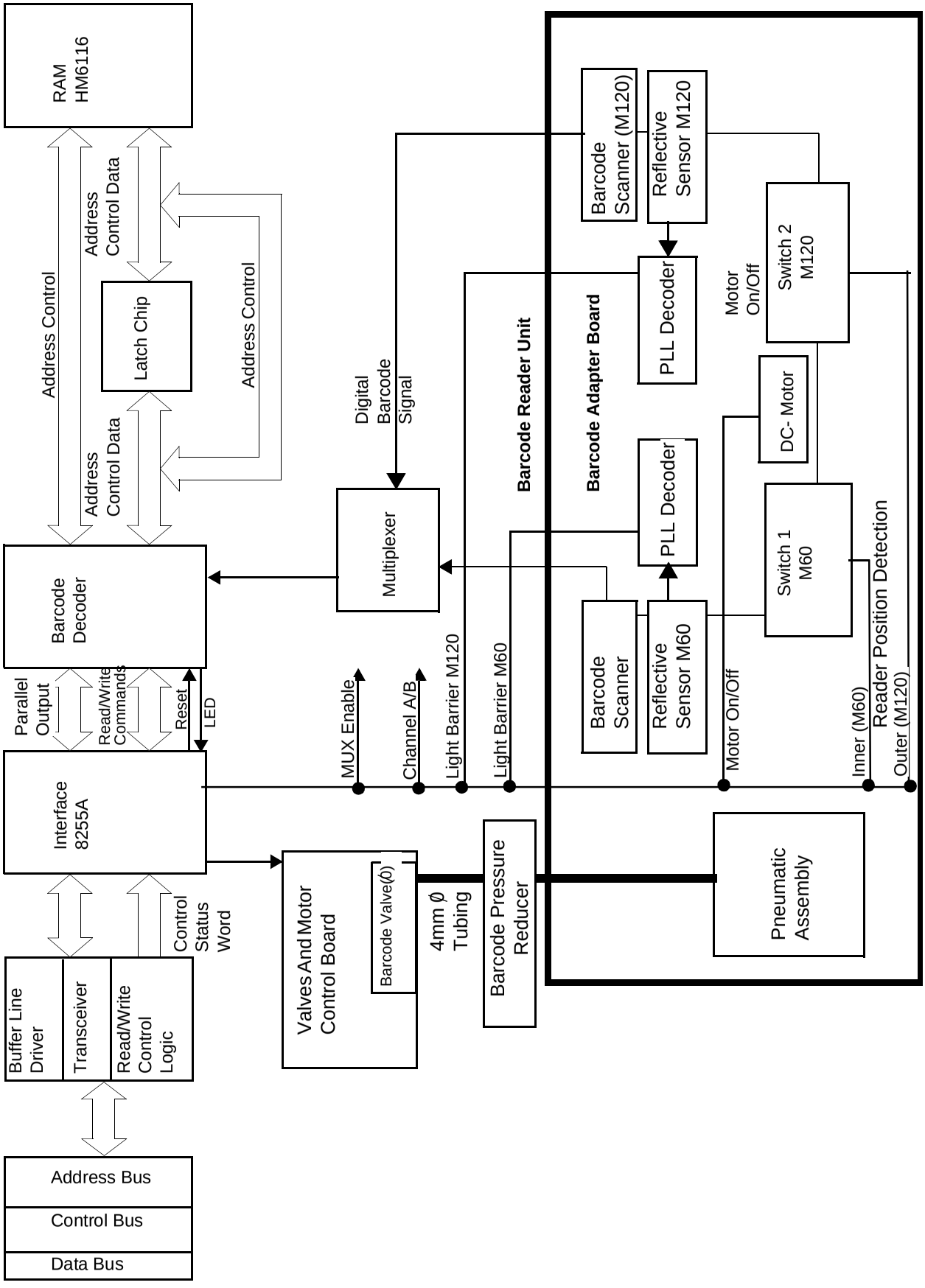


Figure 12.9. Barcode Detection Board Circuit Diagram (Root)

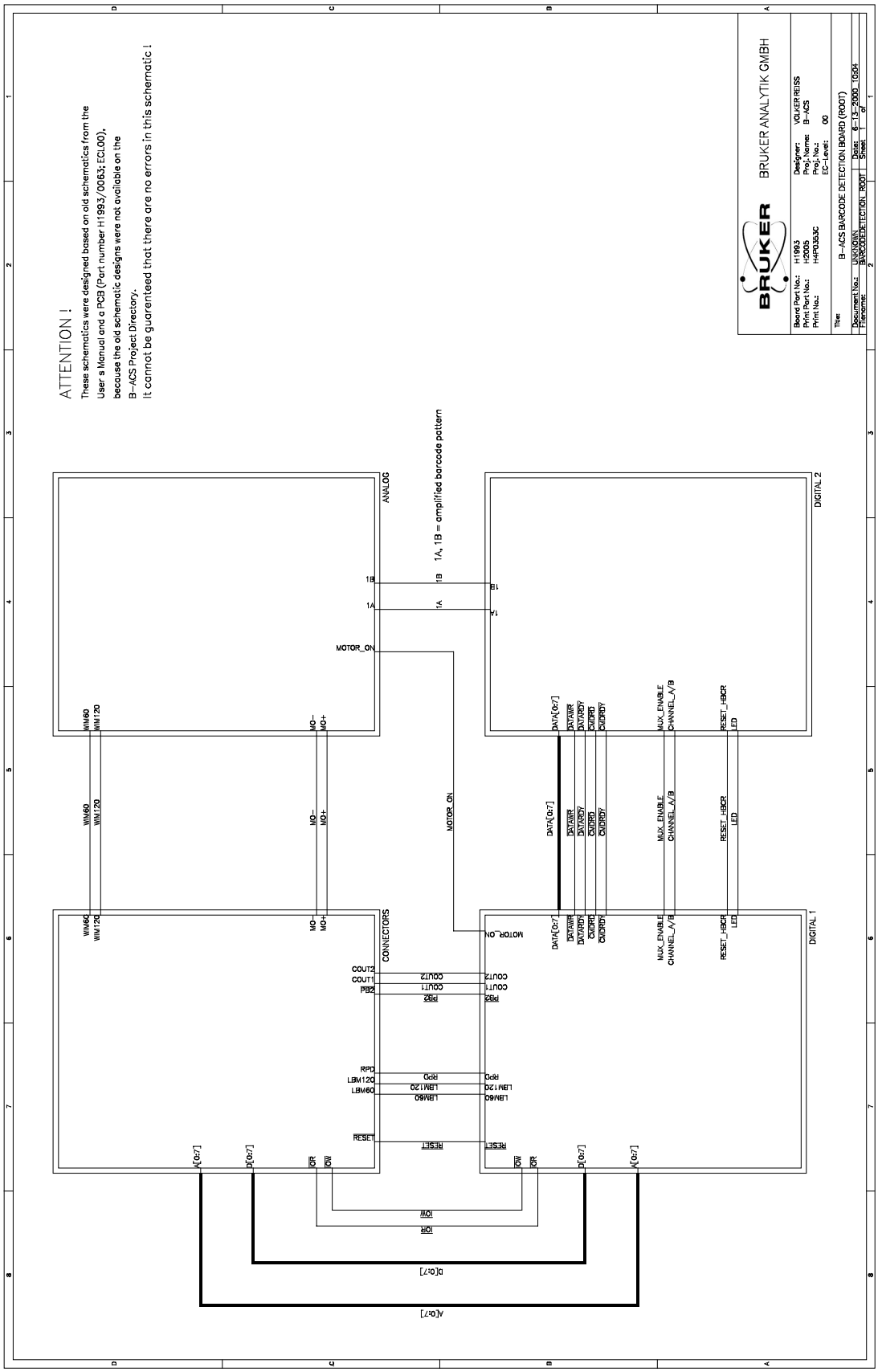


Figure 12.10.Barcode Detection Board Circuit Diagram (Connectors)

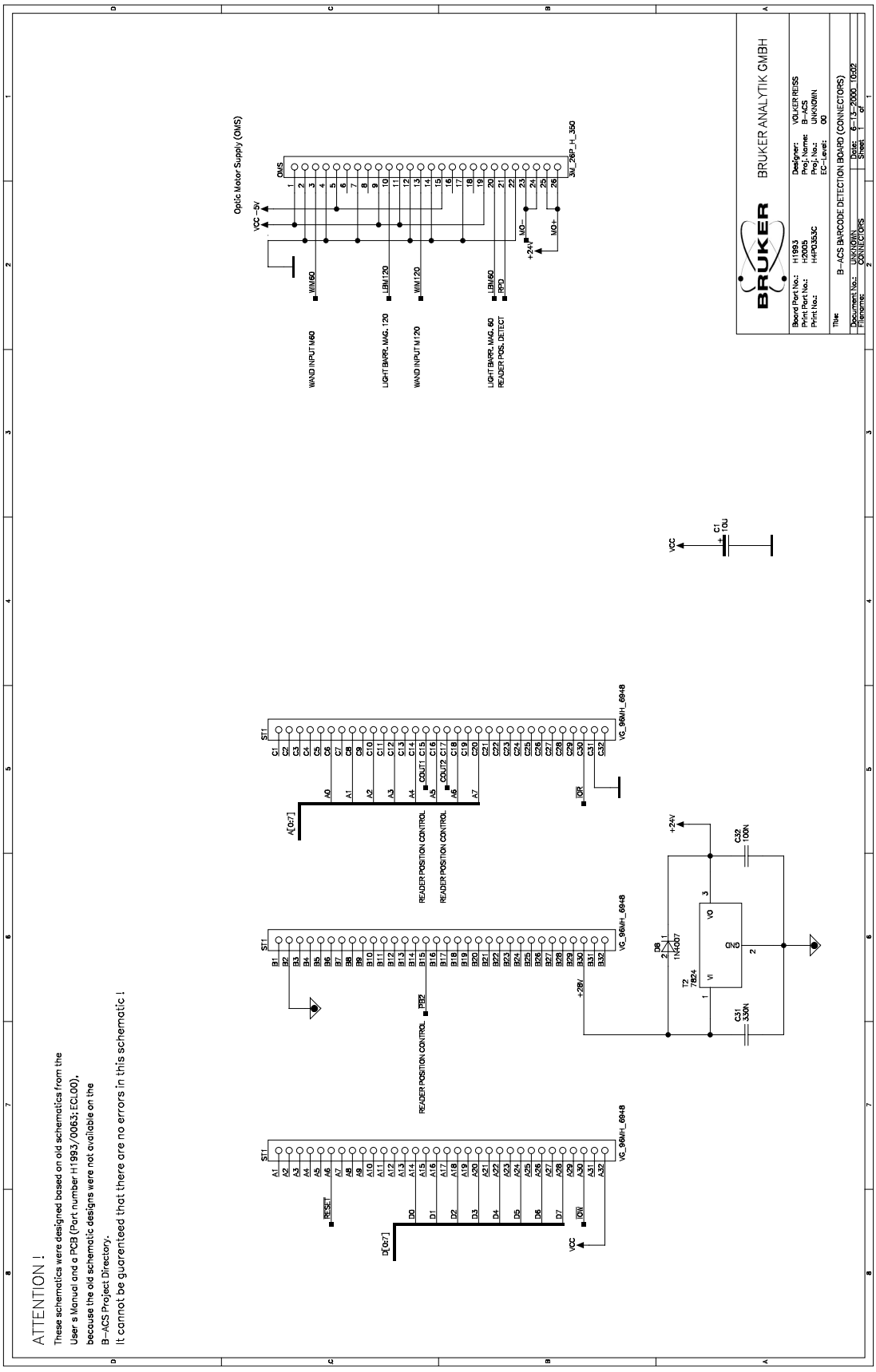


Figure 12.11.Barcode Detection Board Circuit Diagram (Analog)

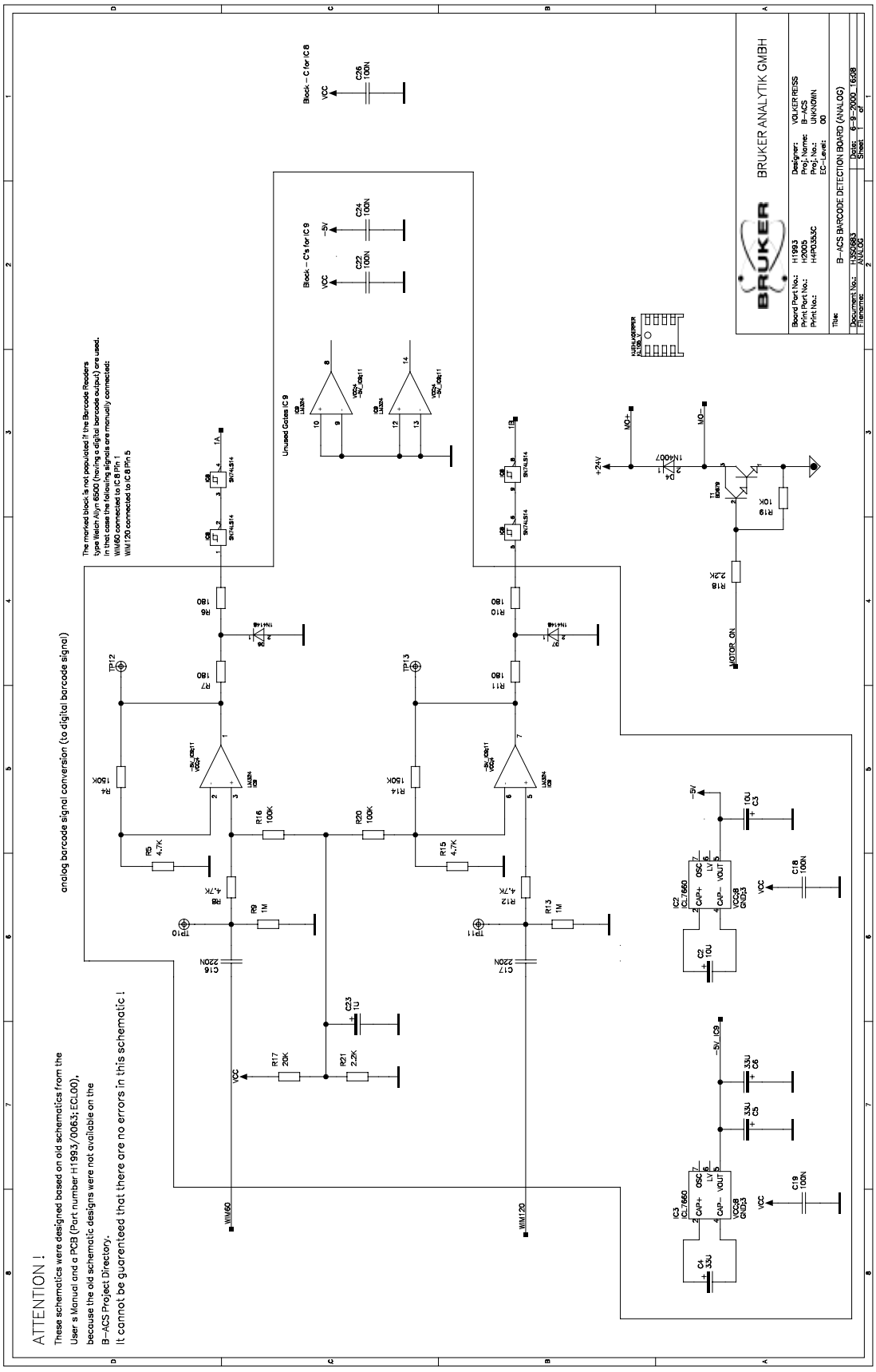


Figure 12.12.BarCode Detection Board (Digital 1)

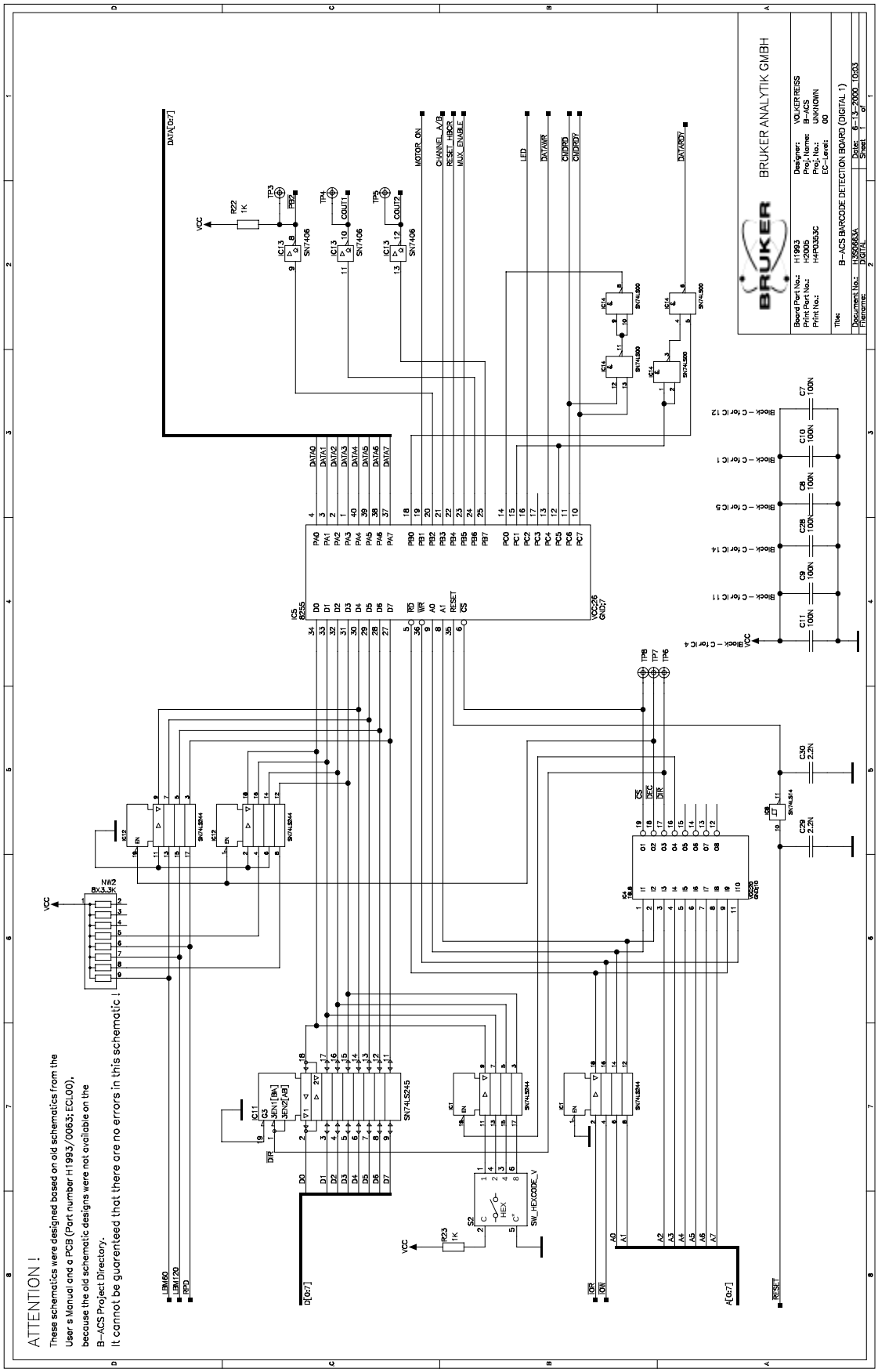


Figure 12.13.Barcode Detection Board (Digital 2)

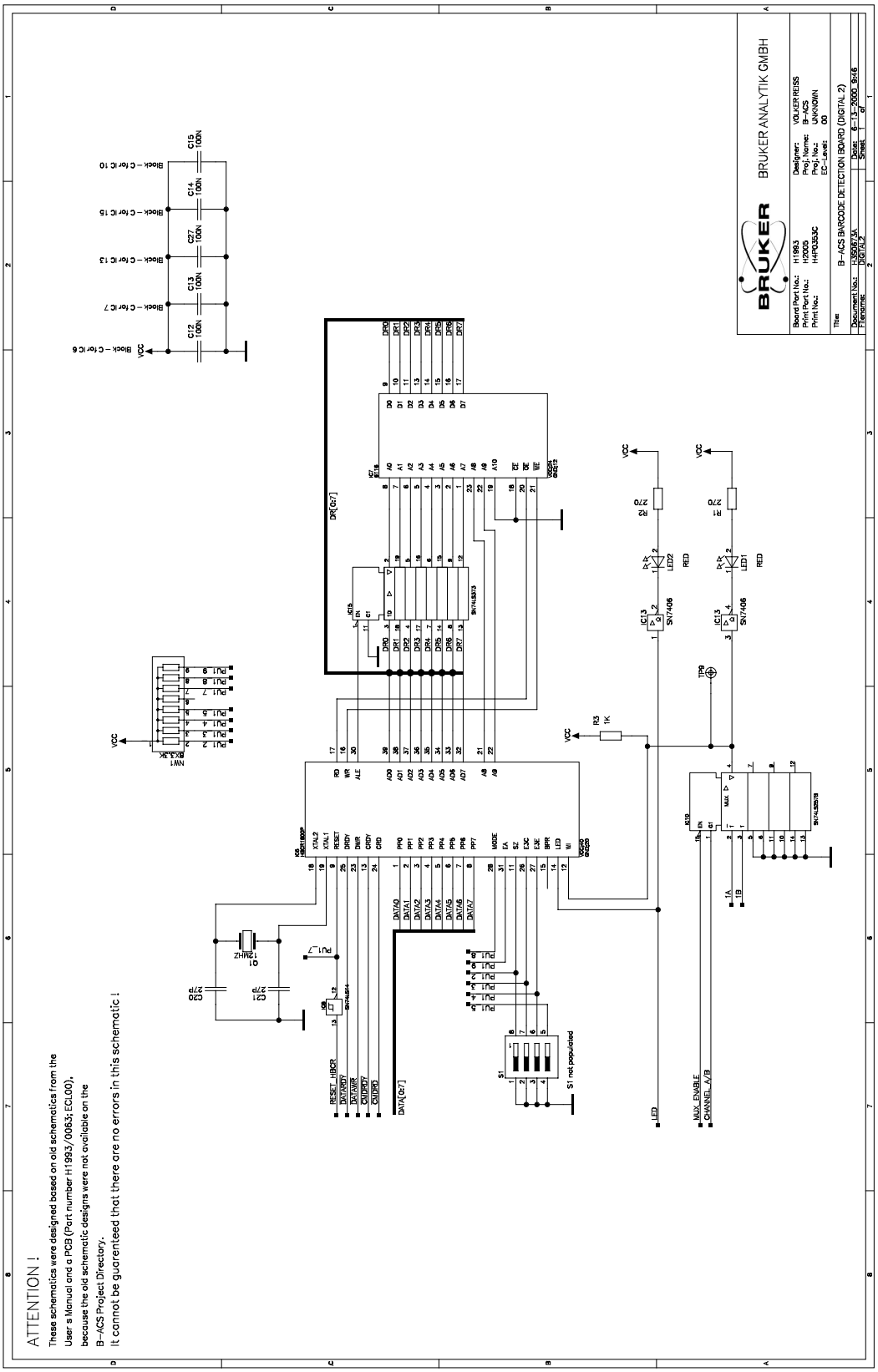


Figure 12.14.Barcode Adapter Board Component Layout B-ACS 60

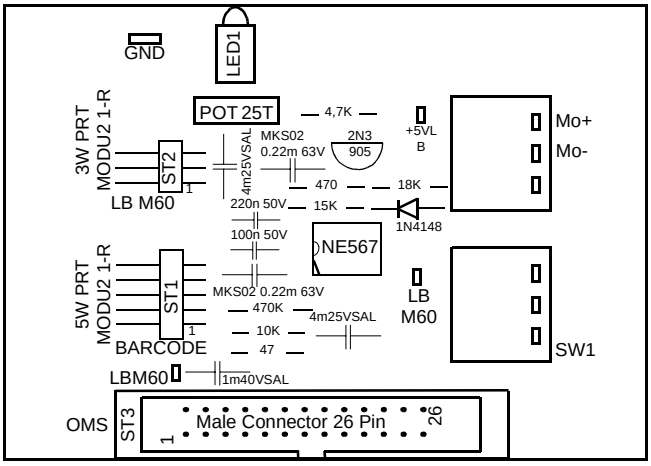


Figure 12.15.Barcode Adapter Board Component Layout B-ACS 120

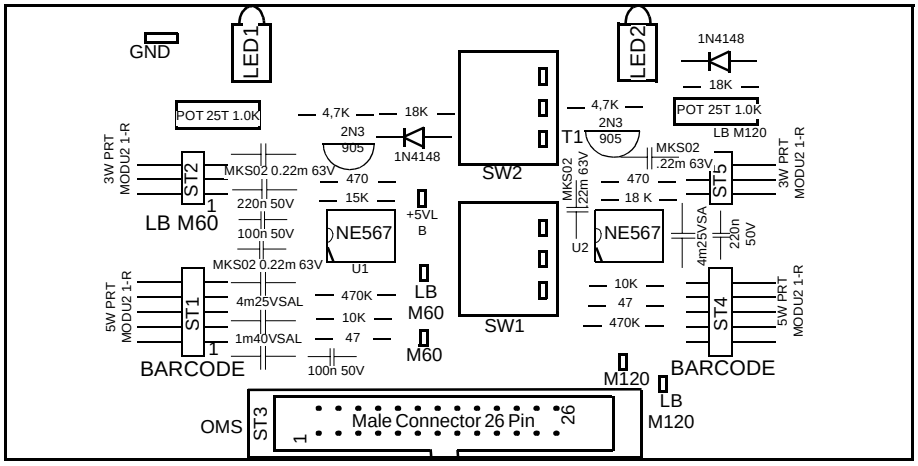


Figure 12.16.Barcode Adapter Board B-ACS 60

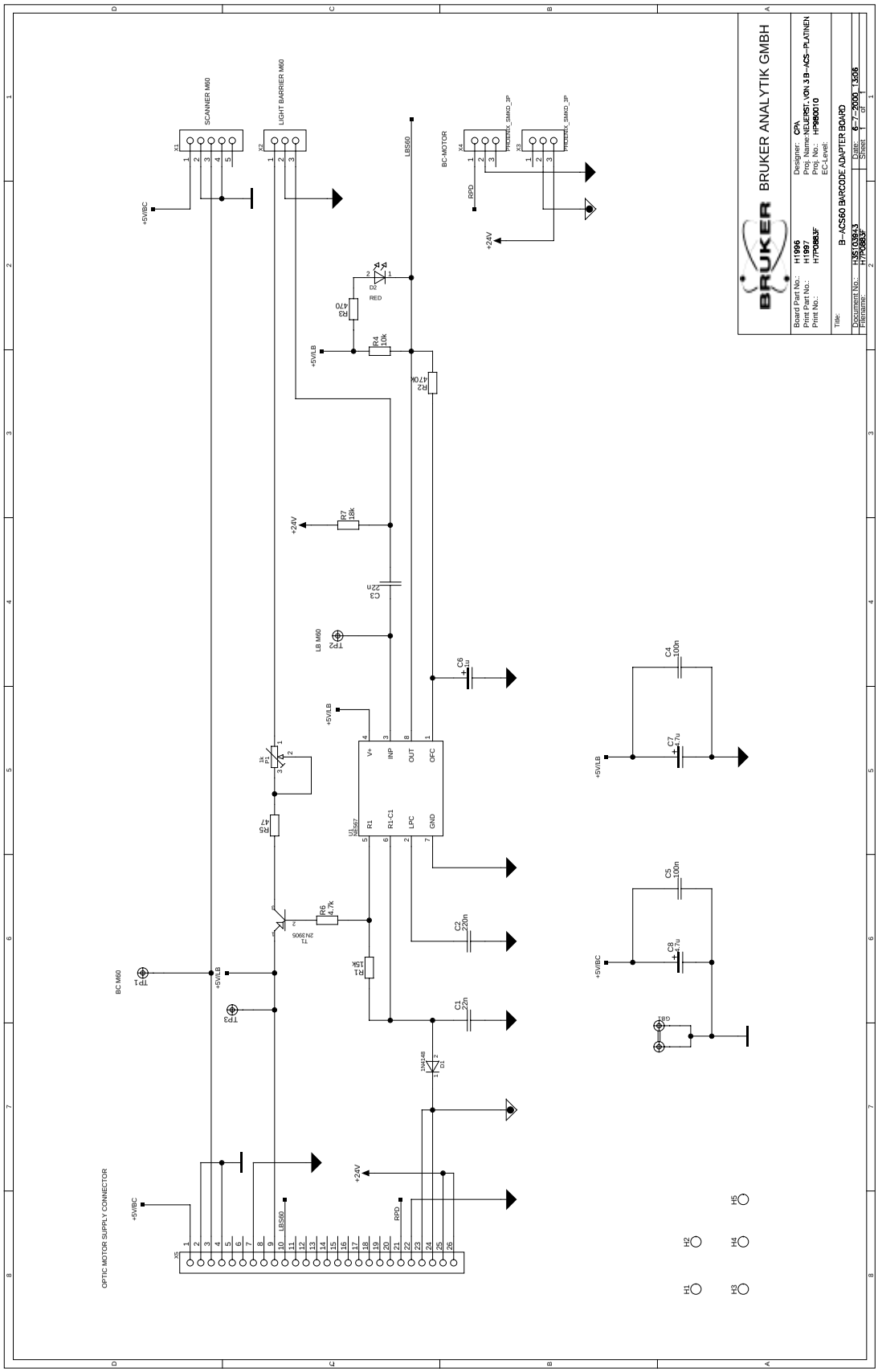


Figure 12.17.Barcode Adapter Board B-ACS 120

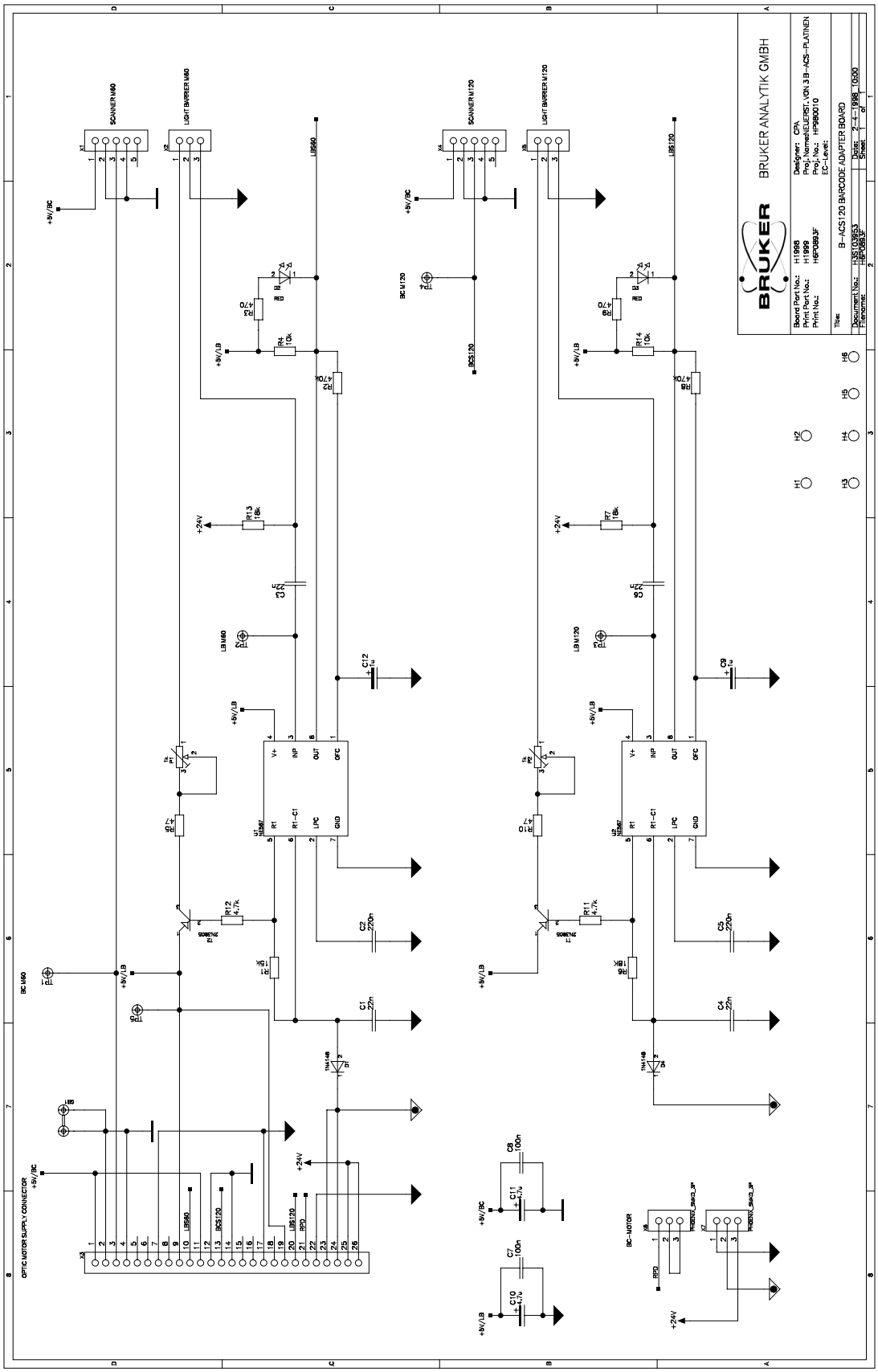
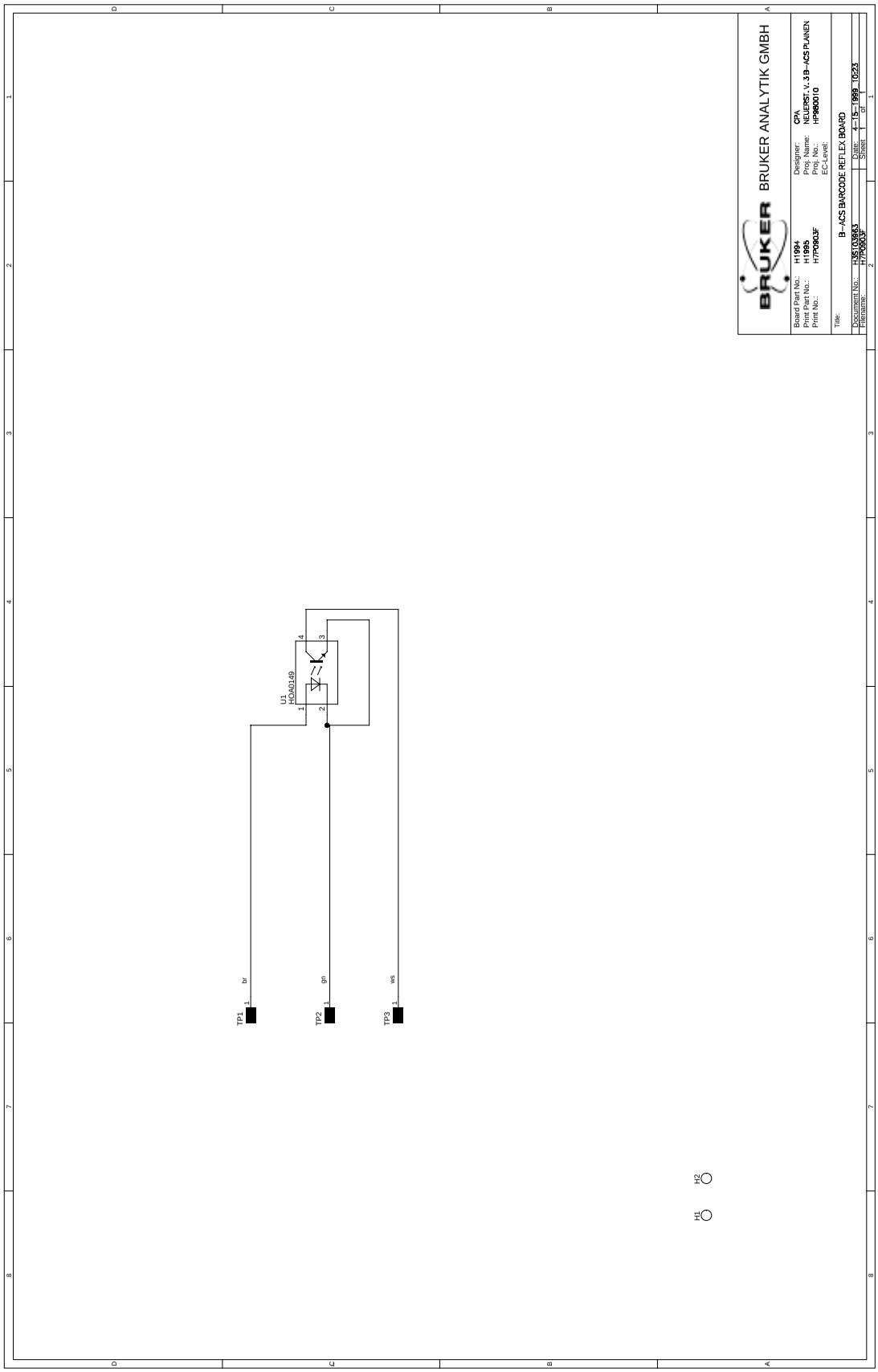


Figure 12.18.Barcode Reflex Board



Sample Heater Option 13

General Information 13.1

The B-ACS SAMPLE HEATER 120C (*figure 13.2*) is used in connection with the BRUKER AUTOMATIC SAMPLE CHANGER (B-ACS 60, B-ACS 120) for NMR Spectrometer's.

Using the B-ACS Sample Heater it is possible to preheat NMR probes to a range of +30°C and +120°C depending upon the ambient temperature.

Prerequisites 13.1.1

Before installing the SAMPLE HEATER, the following points must be observed:

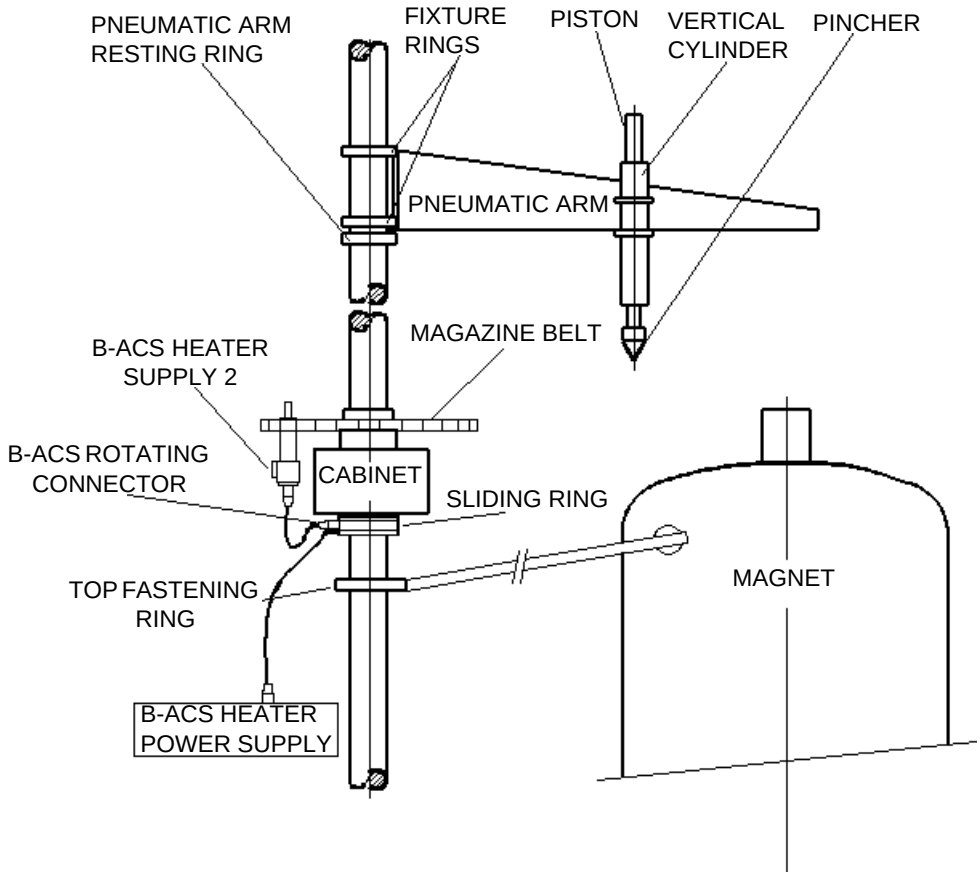
The B-ACS LIGHT BARRIER MAGAZINE.

The new Sample Changer must have a new version of the Light Barrier Magazine. If this is not the case, it must be exchanged for our new one, because the Magazine belt will not turn with the Sample Heater using the old Light Barrier.

Therefore if you are using the old version B-ACS 60 Part No. H1082, or the old version B-ACS 120 Part No. H655, you will need to replace it with the new version B-ACS 60 / Part No. H1402, or the B-ACS 120 Part No. H1403.

In addition, a sliding ring for transmission from the DC power supply, must be placed directly under the cabinet (see *figure 13.1*).

Figure 13.1. B-ACS: Sample Heater Mounted on Cabinet Assembly



For operation of Sample Heaters the following units must be present:

- B-ACS Heater Power Supply Cpl. (Part No. H1491) for DC-supply.

Table 13.1. B-ACS Heater Supply Kit

Part Number	Description
H1455	B-ACS HEATER POWER SUPPLY (***figure 13.4***) or (***figure 13.5***)
H5806	B-ACS HEATER SUPPLY 2 (***figure 13.2***)
H5886	B-ACS ROTATING CONNECTOR (***figure 13.1***)
H1496	CABLE RD 6P10000
3000	CABLE RD ST NETZ

- B-ACS Sample Heaters 120C (Part No. H1385) (***figure 13.2***).

Installation *13.1.2*

To install the sample heater, the following procedures must be performed:

Snap the Sample Heaters directly onto the Magazine Belt.

Note: When using the B-ACS 120 Sample Changer, use the inside chain positions for installation of the heaters. The outside positions, next to the positions used for the heaters, can not be used for samples as this would result in the PWR24 cables being disturbed.

Connect the heaters together using PWR24 cable (Part No. H1484), the first heater to the second, the second heater to the third, and so on forming a chain as illustrated in ***figure 13.2***.

The B-ACS Heater Supply 2 ***figure 13.2*** has a fixed pin inside to signify a busy position.

If you are installing the maximum number of heaters (30), then the Heater Supply 2 (Part/No. H5806) should be positioned in the middle, leaving 15 samples on each side of the supply chain.

Connect the Power Supply (Part/No. H1455) to the sliding ring (Part/No. H5886) under the cabinet using the enclosed cable (***figure 13.1***).

Connect the sliding ring (Part/No. H5886) to the Heater Supply 2 (***figure 13.1***).

The Power Supply, should be placed a minimum of 2 meters away from the magnet.

Operating instructions *13.1.3*

After switching on the power supply, the green LED in front of the Heater Supply should be on. The adjustment of the nominal temperature is accomplished by using the milled knob on the lower position of the heater.

The desired temperature (look on the knob) is selected by aligning the required scale value with the white marker on the heater.

The red LED displays the heater condition.

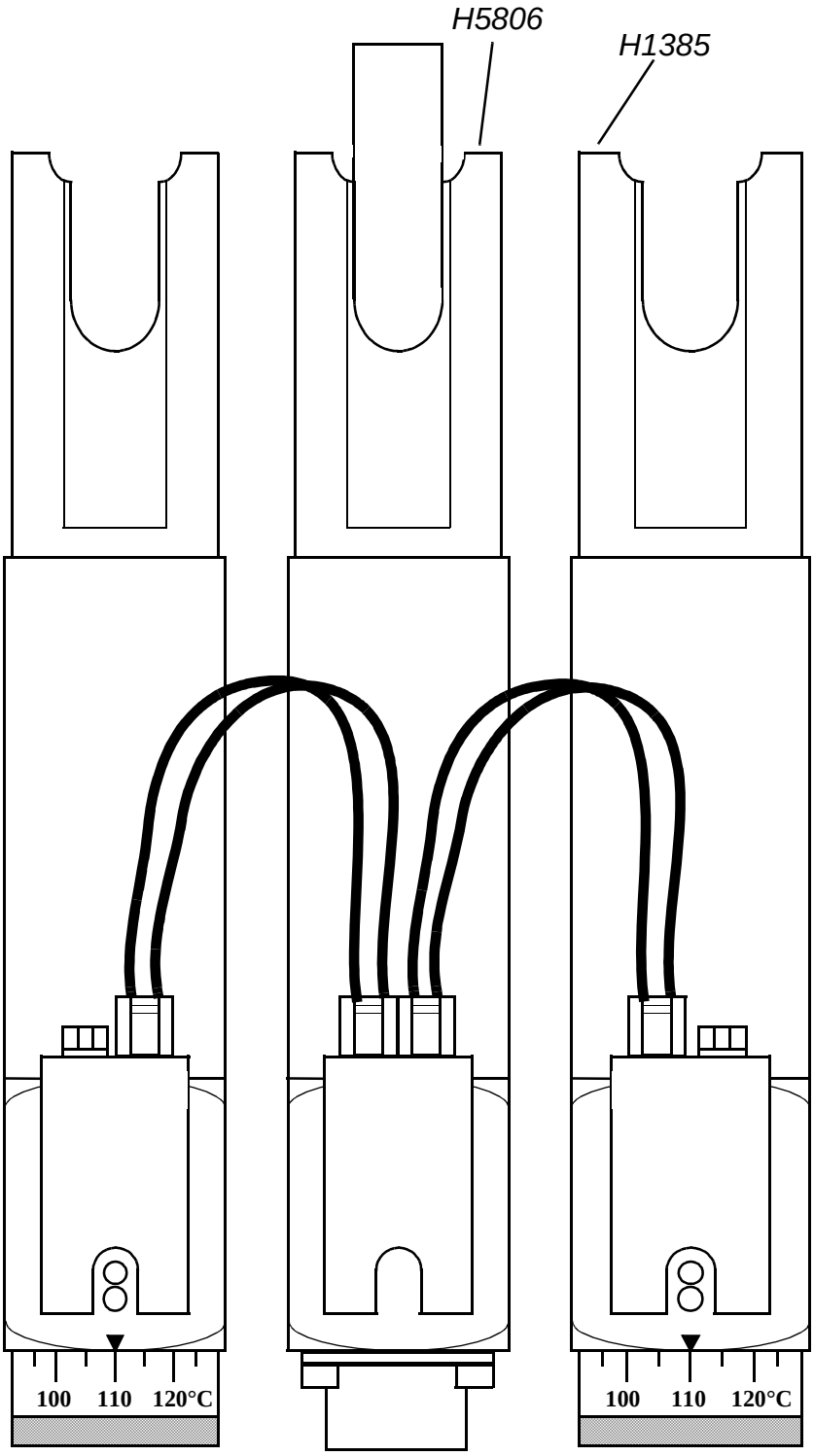
During the heating cycle the red LED should be on.

After reaching the selected temperature, the red LED should turn off.

LED ON signifies heating cycle.

LED OFF signifies that the nominal temperature has been reached

Figure 13.2. B-ACS HEATER



Extreme Temperatures ***13.1.4***

The sample heater located on the magazine belt reaches extremely high temperatures:

Warning: Do not insert your fingers into the samples heater. When the sample heater is operating it can reach temperatures exceeding 120°C.

Start-up *13.1.5*

The B-ACS Sample Heater 120C operates between **+30°C and 120°C.**

After switching on the power supply, the green LED, in front of the Sample Heater, should be on.

The adjustment of nominal temperature is accomplished using the middle knob on the lower position of the heater.

The red LED displays the heater condition.

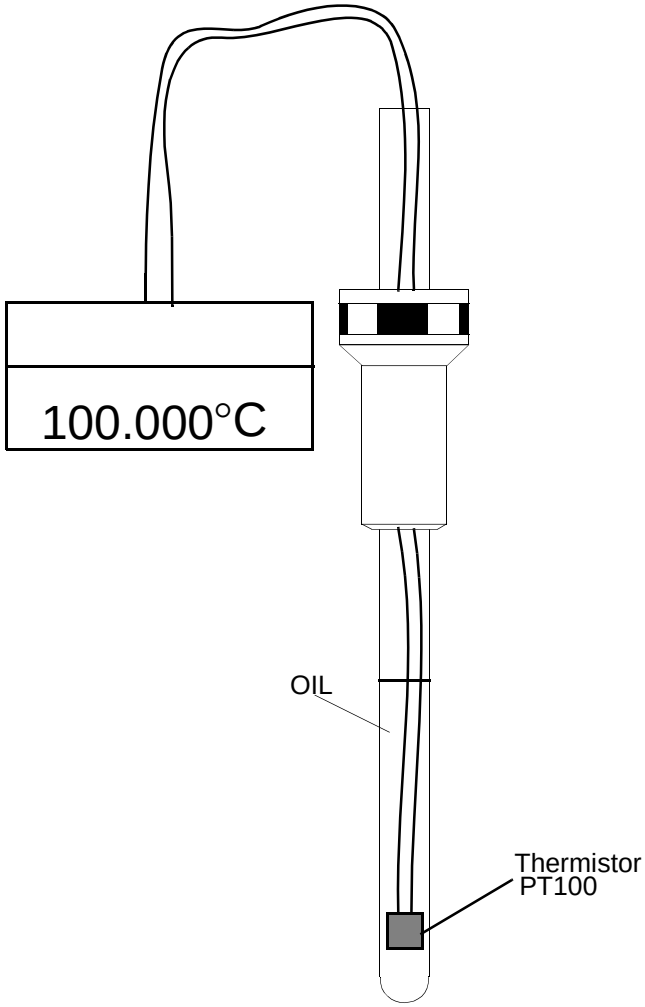
Test conditions *13.1.6*

- Sample tube 10mm
- Filled with oil to a height of 65mm
- Temperature measured with digital thermometer

Table 13.2. Test measure

Position of tuning knob	Oil temperature reached
30°C	30°C
60°C	59°C
90°C	92°C
120°C	122°C

Figure 13.3. TEST MEASURE



B-ACS Heater Power Supply *13.2*

The B-ACS HEATER POWER SUPPLY (Part No. H1455) is used in connection with the B-ACS SAMPLE HEATER 120C (Part No. H1385).

The Unit, up to series No.34, contains two PK100 (Part/No.14514) modules from VERO, each 22-26V / 5A, so the Power Supply will run at a maximum of 10A ***figure 13.4***.

The Unit at series No. 35 contains one PK240 (Part/No.16524) module from VERO 22-26V/10A ***figure 13.5***.

Adjusting the PK100 parallel *13.2.1*

Take out one of the two power Modules (PK100) and perform the following steps with the remaining one.

ADJUSTMENT OF THE OVERVOLTAGE PROTECTION (OVP)

To adjust the OVP the sense lines must be connected over a 100 Ω / 10Watt Resistor and the over voltage protection measured directly on the output voltage connector.

Adjust the OVP using the external pot on the front panel of the Power Supply, named OVP_{adj}.

Here the OVP = 30V.

ADJUSTMENT OF THE OUTPUT VOLTAGE (Vout)

With parallel operation, each output voltage must be adjusted as closely as possible to the same value, due to the equal current distribution in the units.

Connect the +Sense (Pin G) to the +UA (Pin A) and the -Sense (Pin E) to the -UA (Pin C) on the Burndy Connector located on the rear panel power supply.

Adjust the output voltage using the external pot on the front panel of the Power Supply, named V_{adj}.

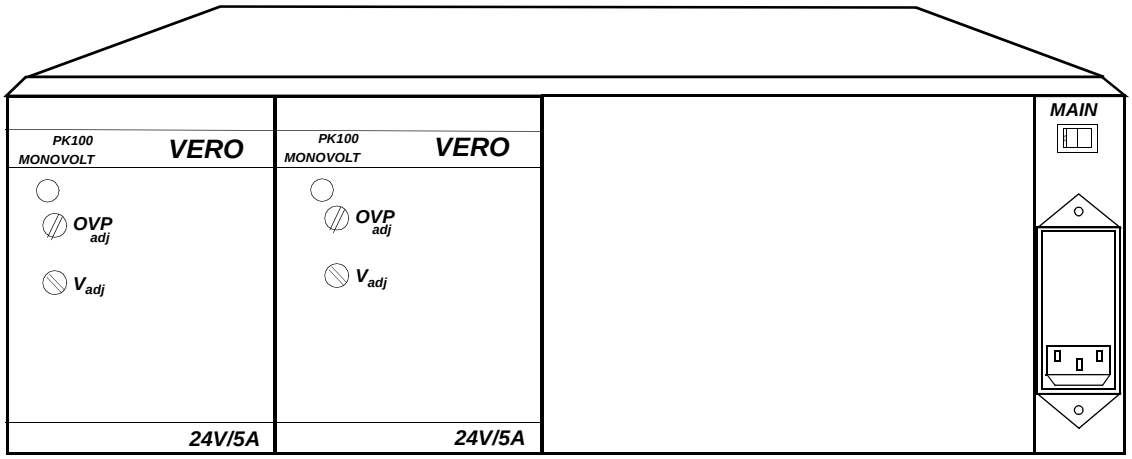
Here the UA = 26V.

Replace the power module that you removed previously and remove the module that has been adjusted. Repeat the steps listed above on the second module that is now present in the unit.

Do not shorten the sense lines, as this may cause damage to the power supply.

This adjustment is normally not required as the unit has already been correctly set by the manufacturer.

Figure 13.4. HEATER SUPPLY (until Ser.No.34)



Connectors on the PK100 Supply Module 13.2.2

Table 13.3. H15 connector

PIN	FUNCTION
4,6	+UA
12,14	-UA
10	-Sensor
8	+Sensor
24	230VAC
26	230VAC Phase
32	Protected Earth

Adjusting the PK240 13.2.3

ADJUSTMENT OF THE OVER VOLTAGE PROTECTION (OVP)

To adjust the OVP the sense lines must be connected over a 100 Ω / 10Watt Resistor and the over voltage protection measured directly on the output voltage connector or on the front-panel connector named TEST.

Adjust the OVP using the external pot on the front panel of the Power Supply, named OVP_{adj}.

Here the OVP = 30V.

ADJUSTMENT OF THE OUTPUT VOLTAGE (Vout)

Connect the +Sense (Pin G) to the +UA (Pin A) and the -Sense (Pin E) to the -UA (Pin C) on the Burndy Connector located on rear panel power supply.

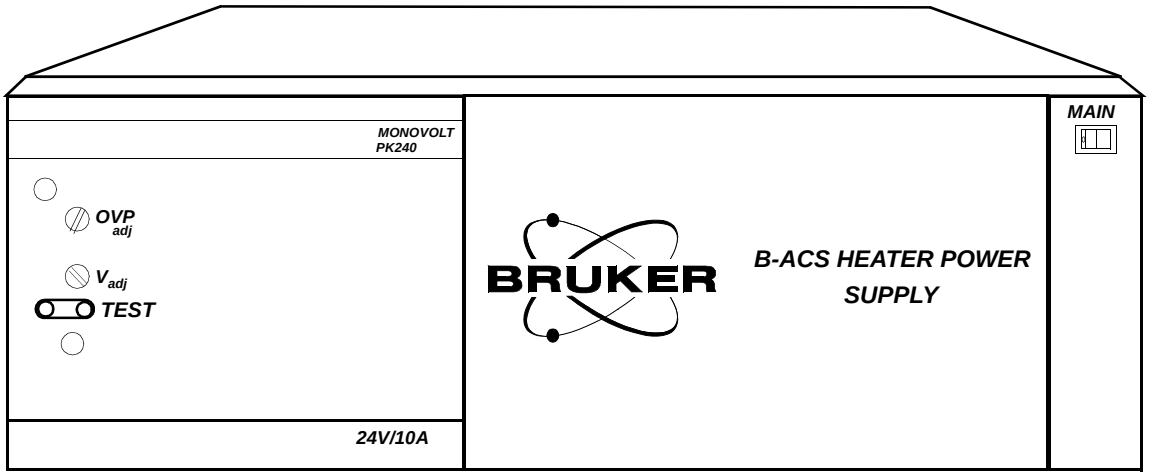
Adjust the output voltage using the external pot on the front panel of the Power Supply, named V_{adj}.

Here the UA = 26V.

Do not shorten the sense lines, as this may cause damage to the power supply.

This adjustment is normally not required as the unit has already been correctly set by the manufacturer.

Figure 13.5. HEATER SUPPLY (at Ser.No.35)



Connector on PK240 Supply Module *13.2.4*

Table 13.4. H15+2HA connector

PIN	FUNCTION
I	+UA
II	-UA
14	+Sensor
16	-Sensor
22	Ext. ON/OFF
24	Power fail-signal Q
28	230VAC
30	230VAC Phase
32	Protected Earth

Pin assignment rear panel *13.2.5*

Figure 13.6. Burndy connector B-ACS HEATER POWER SUPPLY

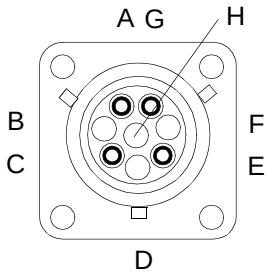


Table 13.5. Burndy connector B-ACS HEATER POWER SUPPLY

PIN	FUNCTION	COLOUR
A	+UA (26V)	brown/red
B	----------	
C	-UA (GND)	yellow
D	----------	
E	- SENS	yellow
F	----------	
G	+SENS	brown/red
H	----------	

Electrical characteristics *13.2.6*

Input Voltage 230V/50-60Hz

Fuses in main filter 2x1.6A/250V time lag

Output Voltage 22-26V/10A

Schematic Diagrams *13.3*

B-ACS Temperature Regulator Board *13.3.1*

Figure 13.7. B-ACS Temperature Regulator Board

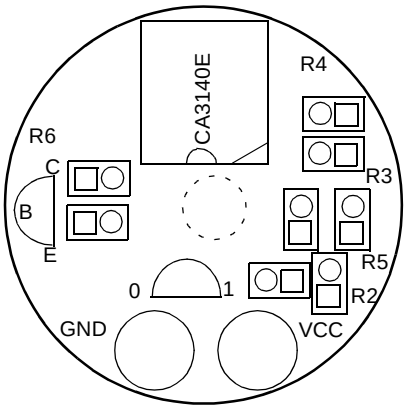


Figure 13.8. B-ACS Temperature Regulator Board

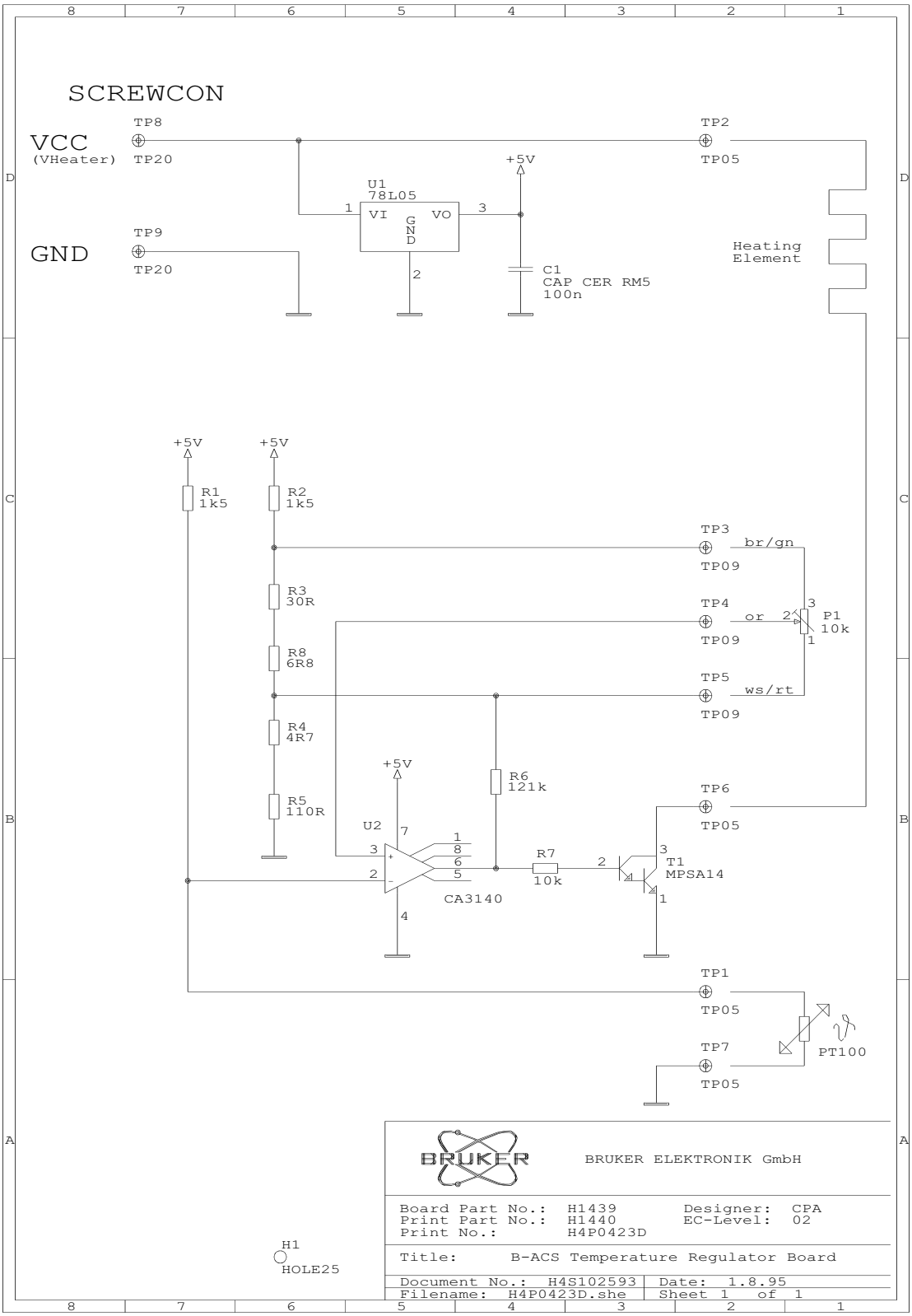


Figure 13.9. B-ACS PWR 24 Board - Implantation Diagram

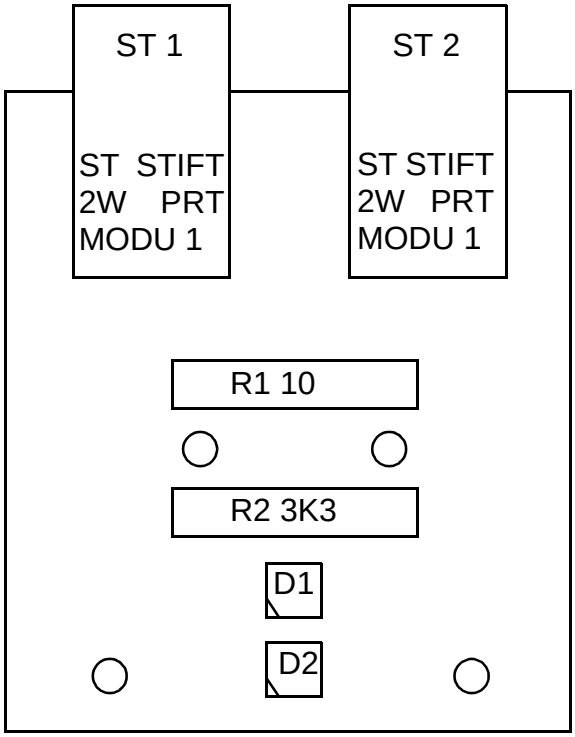


Figure 13.10.B-ACS PWR 24 Board

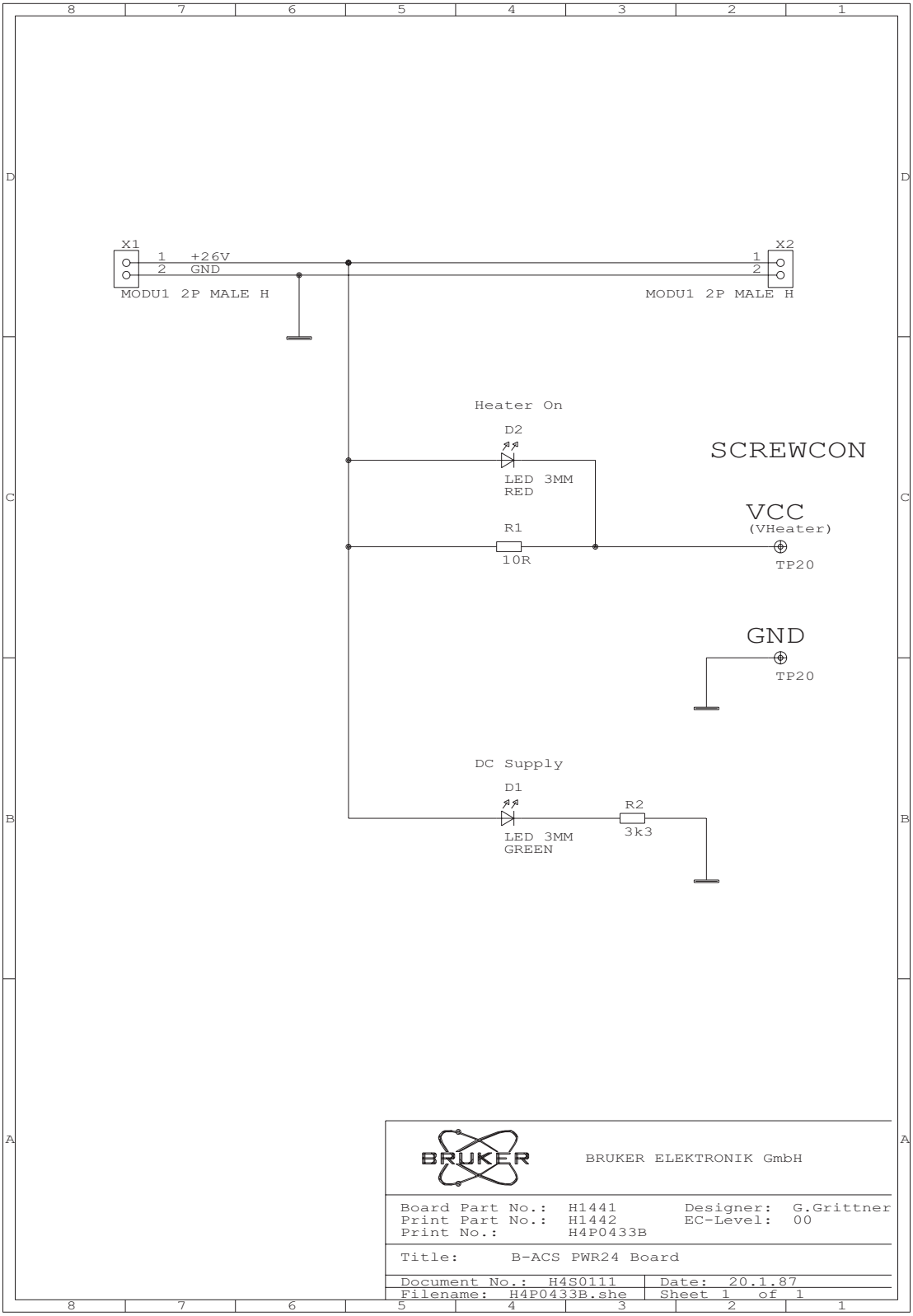
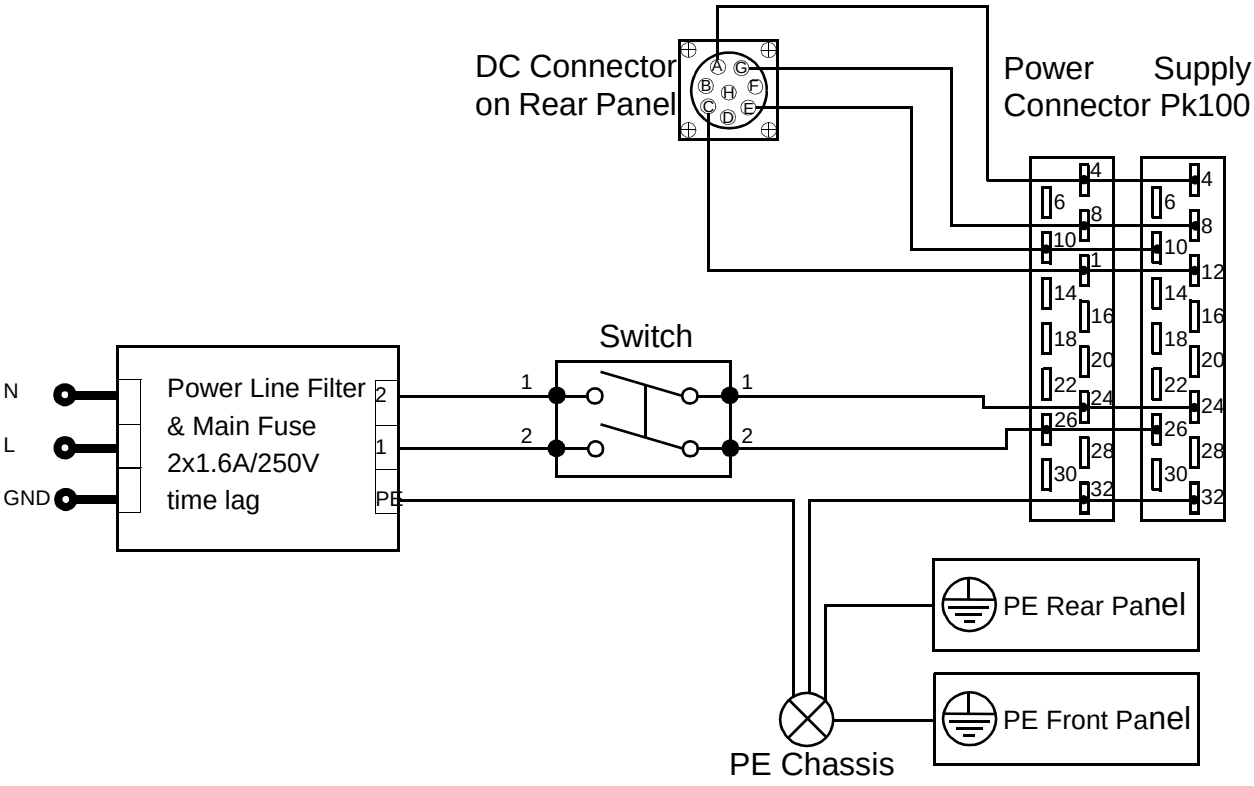


Figure 13.11.B-ACS Heater Power Supply Wiring PK100

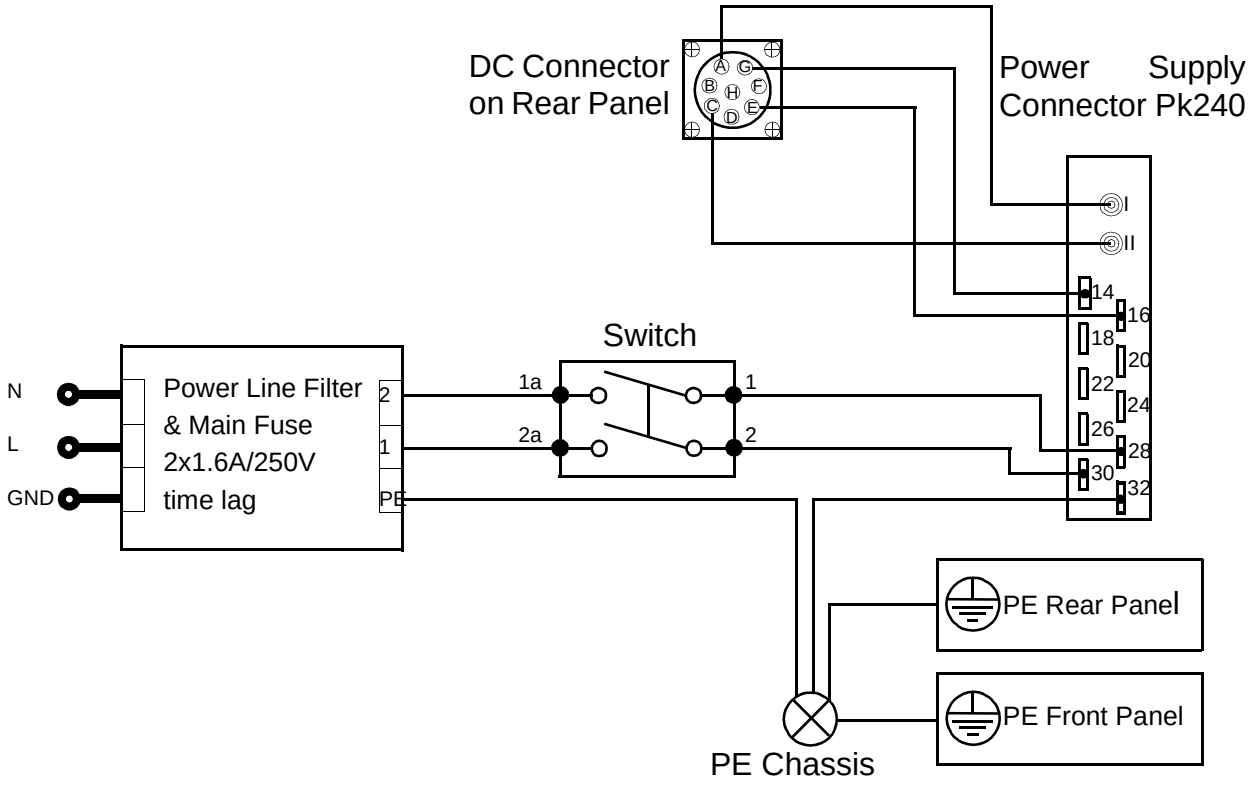
B-ACS Heater Power Supply H1455 up to Ser. No. 34

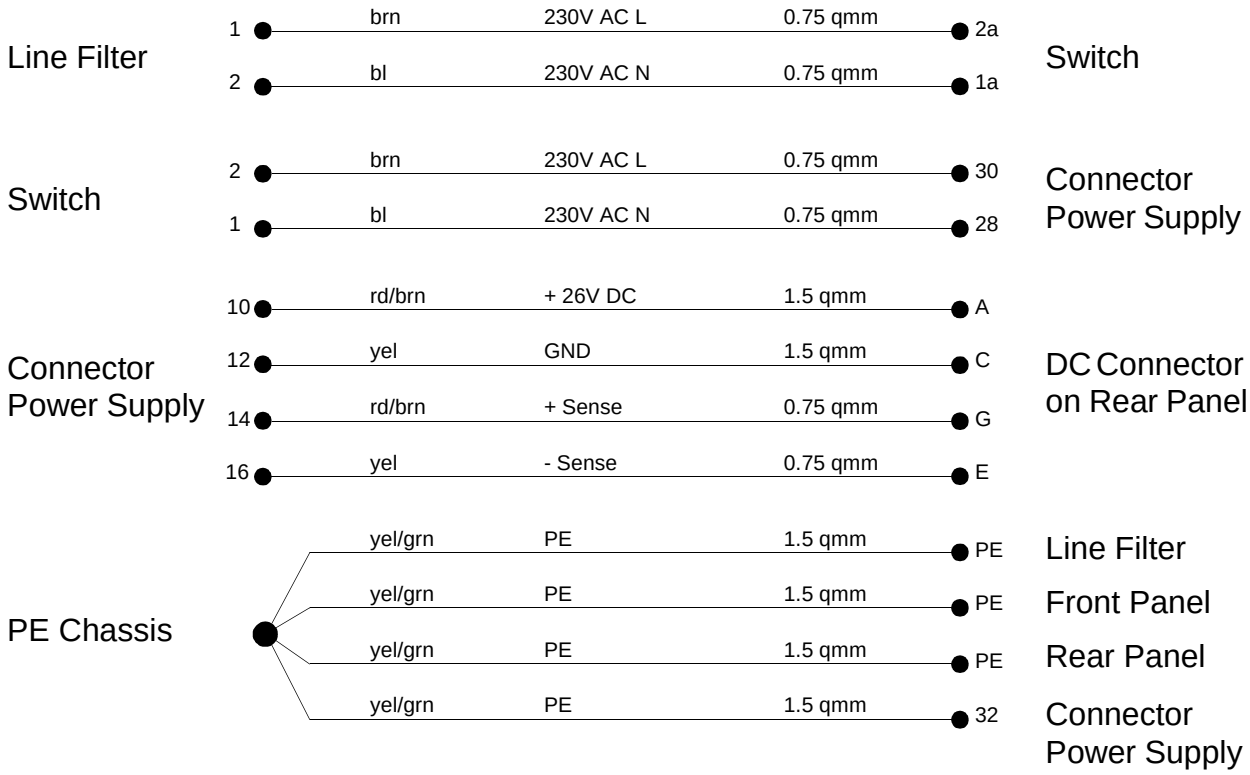


Line Filter	1	brn	230V AC L	0.75 qmm	2a Switch
	2	bl	230V AC N	0.75 qmm	1a
Switch	2	brn	230V AC L	0.75 qmm	26 Connector Power Supply
	1	bl	230V AC N	0.75 qmm	24
Connector Power Supply	4,6	rd/brn	+ 26V DC	1.5 qmm	A DC Connector on Rear Panel
	12,14	yel	GND	1.5 qmm	C
	8	rd/brn	+ Sense	0.75 qmm	G
	10	yel	- Sense	0.75 qmm	E
PE Chassis		yel/	PE	1.5 qmm	P Line Filter
		yel/grn	PE	1.5 qmm	P Front Panel
		yel/grn	PE	1.5 qmm	P Rear Panel
		yel/grn	PE	1.5 qmm	32 Connector Power Supply

Figure 13.12.B-ACS Heater Power Supply Wiring PK240

B-ACS Heater Power Supply H1455 from Ser. No. 35





Magnex Magnets

Introduction A.1

This is a supplement to the BRUKER Automatic Control Systems installation manual - mounting instructions (chapter 4) for the mounting of a sample changer on a Magnex Magnet.

Mounting Instructions A.2

Preparation A.2.1

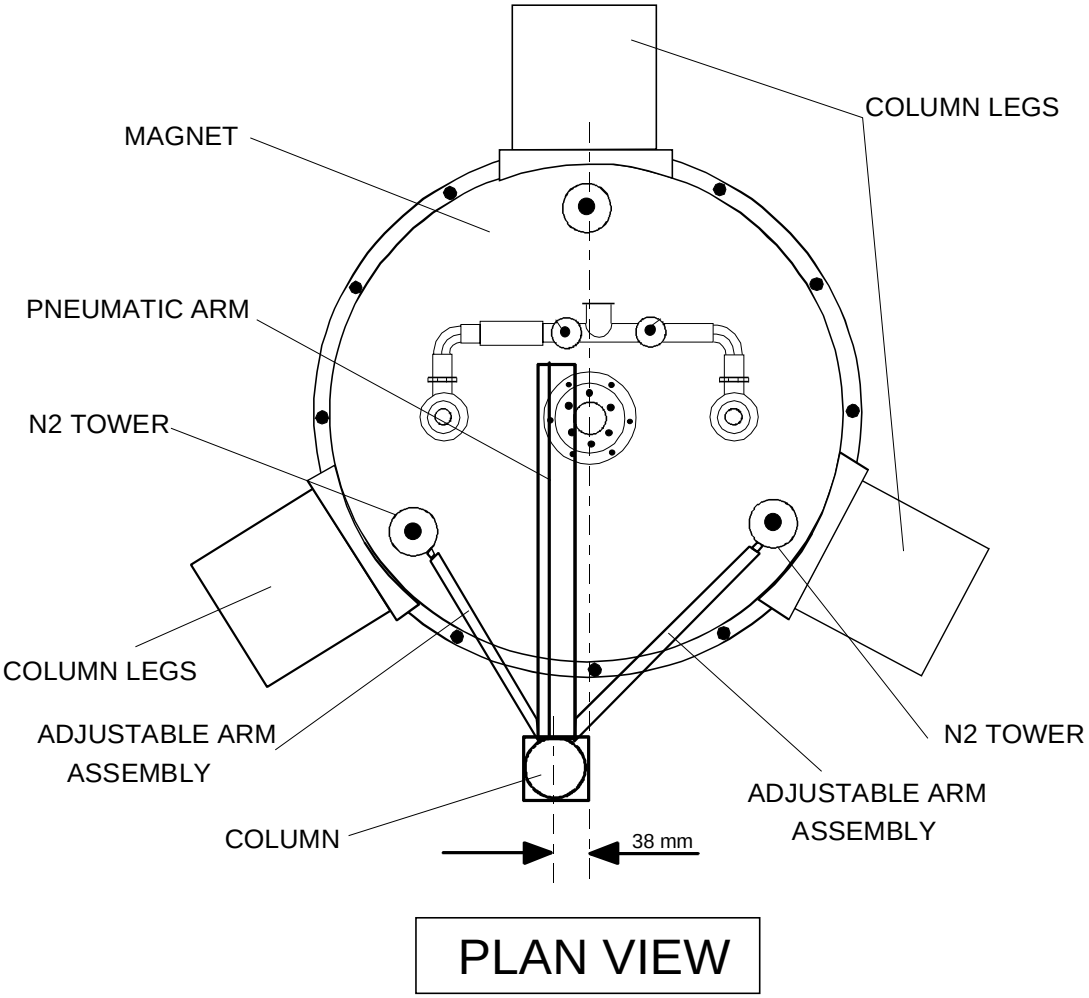
Prepare the light barrier assembly, cabinet and column assembly as described in the chapter 2 of the BRUKER Automatic Control Systems installation manual.

Mounting the Base Plate A.2.2

Connect the adjustable arm assemblies to the round column part just below the cabinet, and tighten it loosely.

Remove the holding screw that will hold the base plate to the magnet (refer to figure A.1). Place the base plate on the rim of the magnet and fasten it using the base plate adjustment screw (refer to figure A.2). Do not tighten the screw completely, allow some movement for adjustments.

Figure A.1. Top View of the Magnex Magnet with Sample Changer



Place the column assembly with the attached cabinet on to the stand column plate of the base plate in such a manner that the square column piece is perpendicular to the center of the magnet (see figure A.1).

Place the magnet end of the adjustable arm assemblies over the N2 towers as shown in figures A.3 and A.4. Align the arms so they are as horizontally level as possible, ensuring that the arms do not touch the magnet. Refer to figures A.2 and A.4.

Figure A.2. Base Plate and Adjustable Arm Assembly

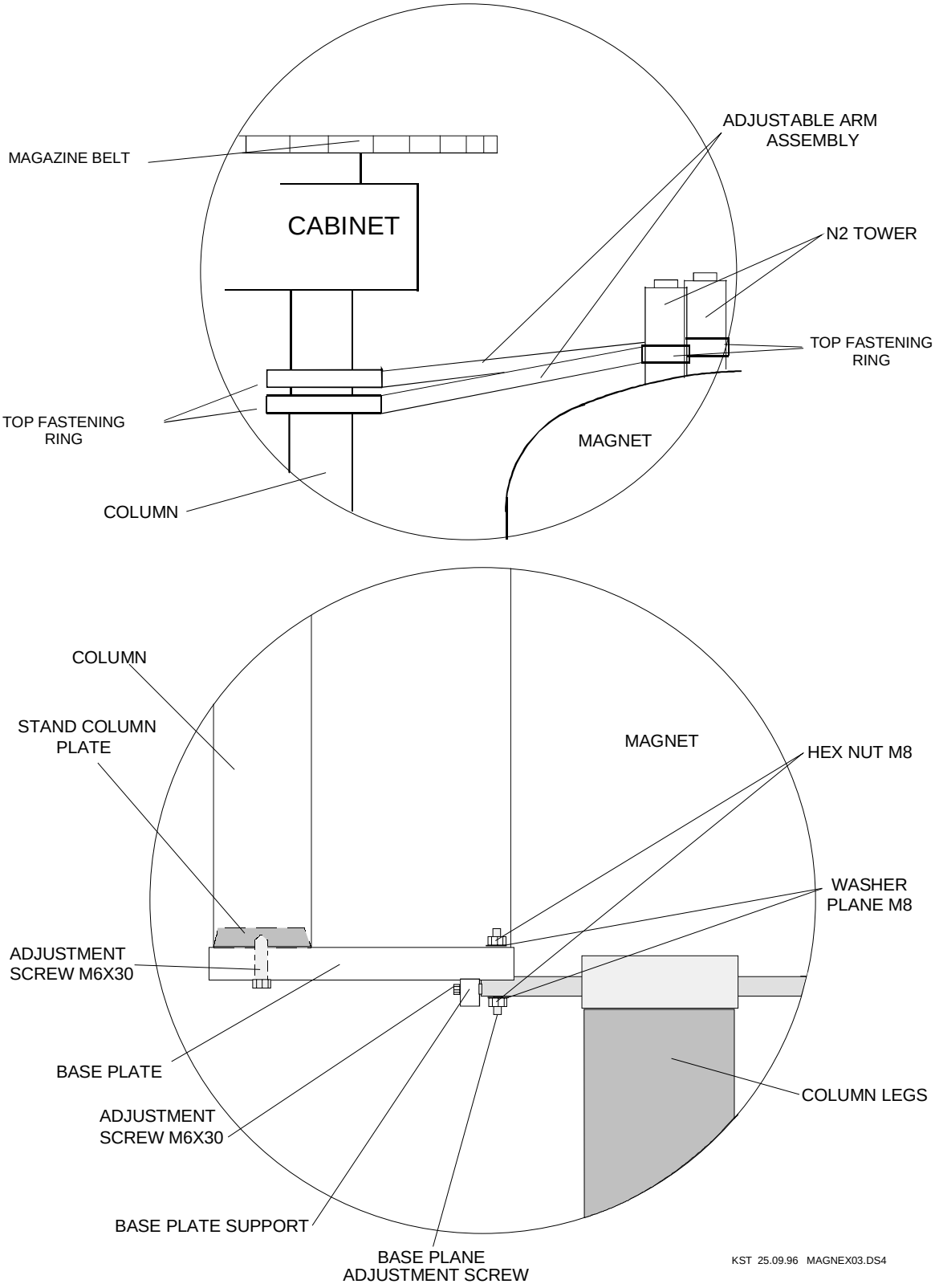
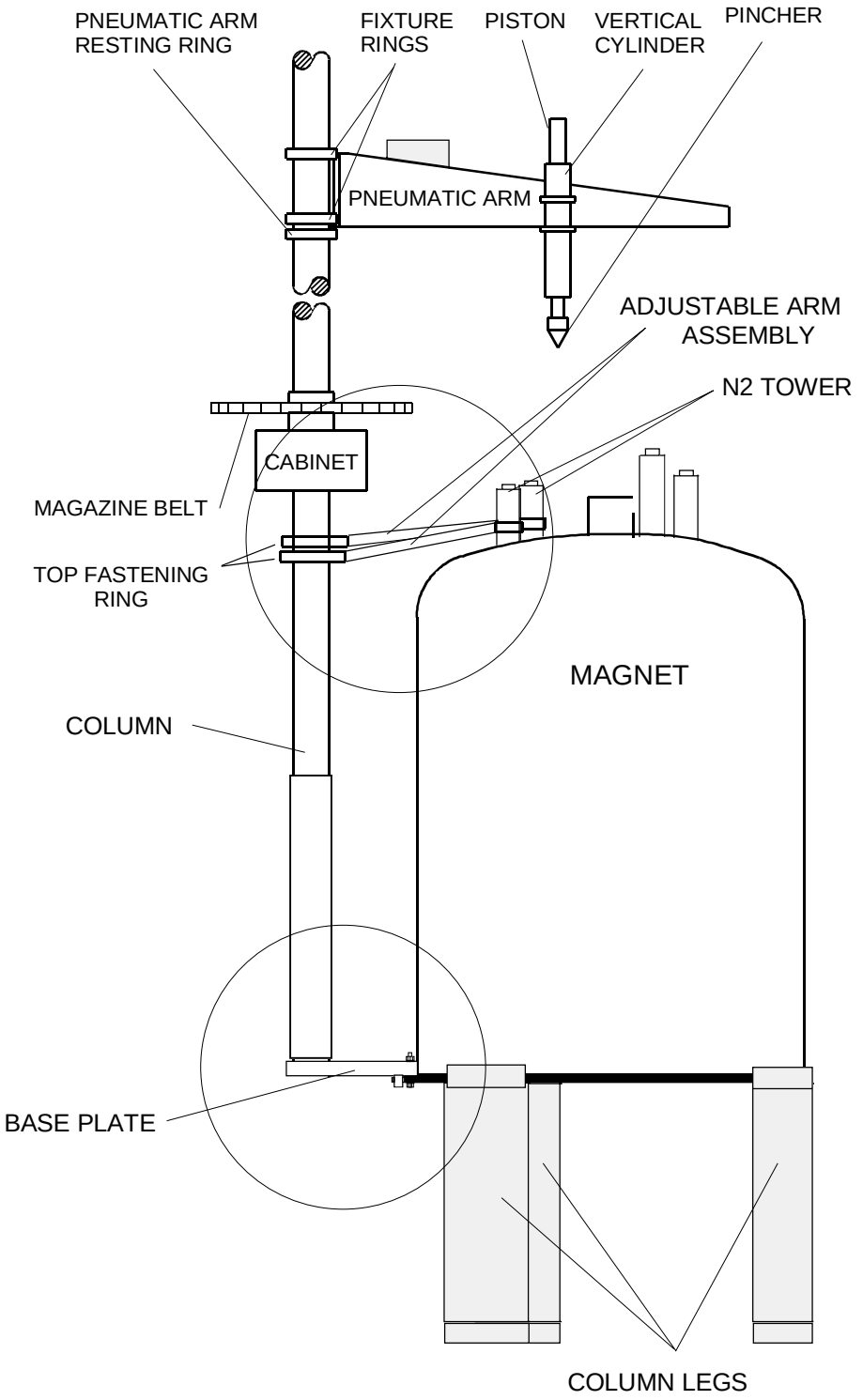


Figure A.3. Overview of the Sample Changer on a Magnex Magnet

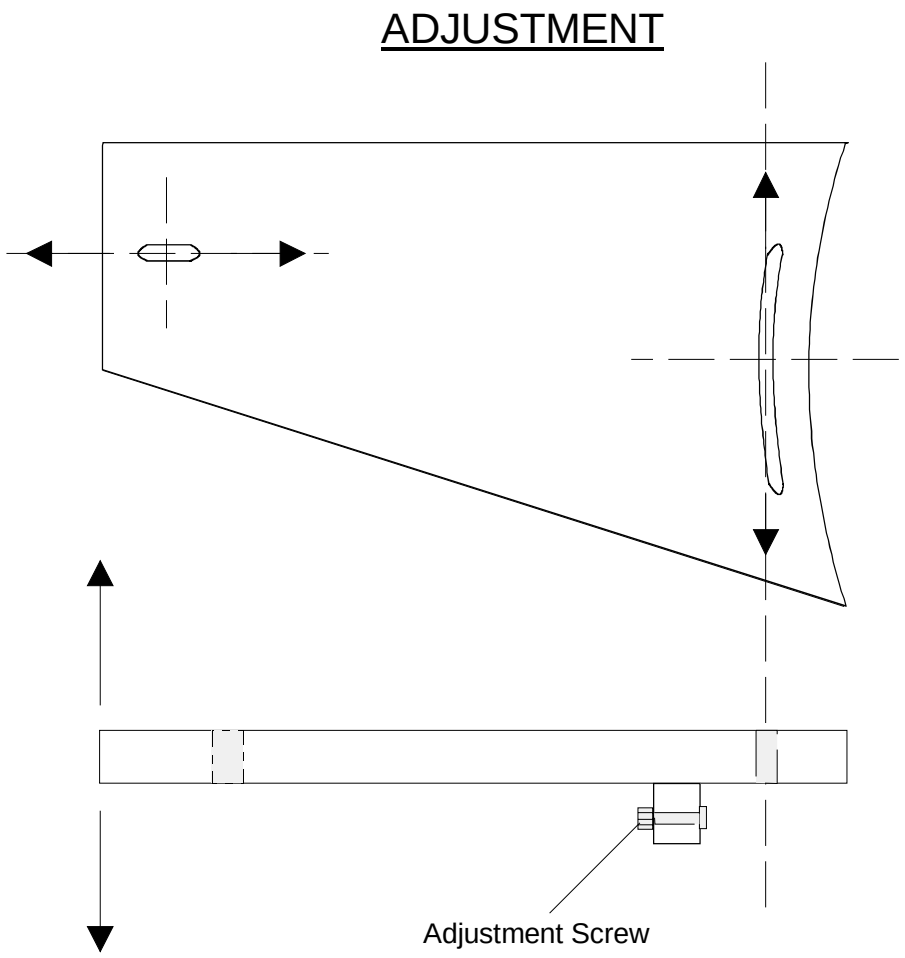


KST 25.09.96 MAGNEX02.DS4

Move the column assembly until it is approximately horizontally and vertically level. Tighten the adjustable arm assembly (both ends). Move the column and base plate to the left or right until the right side of the square column (as you face the magnet) is 38mm to the left of the center of the magnet (as shown in figure A.1).

Recheck the horizontal and vertical level using a water level. Adjust the adjustable arm assemblies and/or the adjustment screws on the base plate (figure A.1 and A.4) until the column is horizontally and vertically level.

Figure A.4. Adjustment Possibilities on the Base Plate



Check the column once again to see if the right side of the column is still 38mm from the center of the magnet. Adjust if necessary.

Recheck the horizontal and vertical level and the distance, making adjustments until both are correct.

Tighten all of the remaining screws.

500 MHz and 600 MHz SAG Magnets

Introduction B.1

This is a supplement to the BRUKER Automatic Control Systems installation manual - mounting instructions (chapter 4) for the mounting of a sample changer on a 500 MHz Magnet with Vibration Dampers (figure B.1).

Figure B.1. 500 MHz Magnet

Mounting Instructions B.2

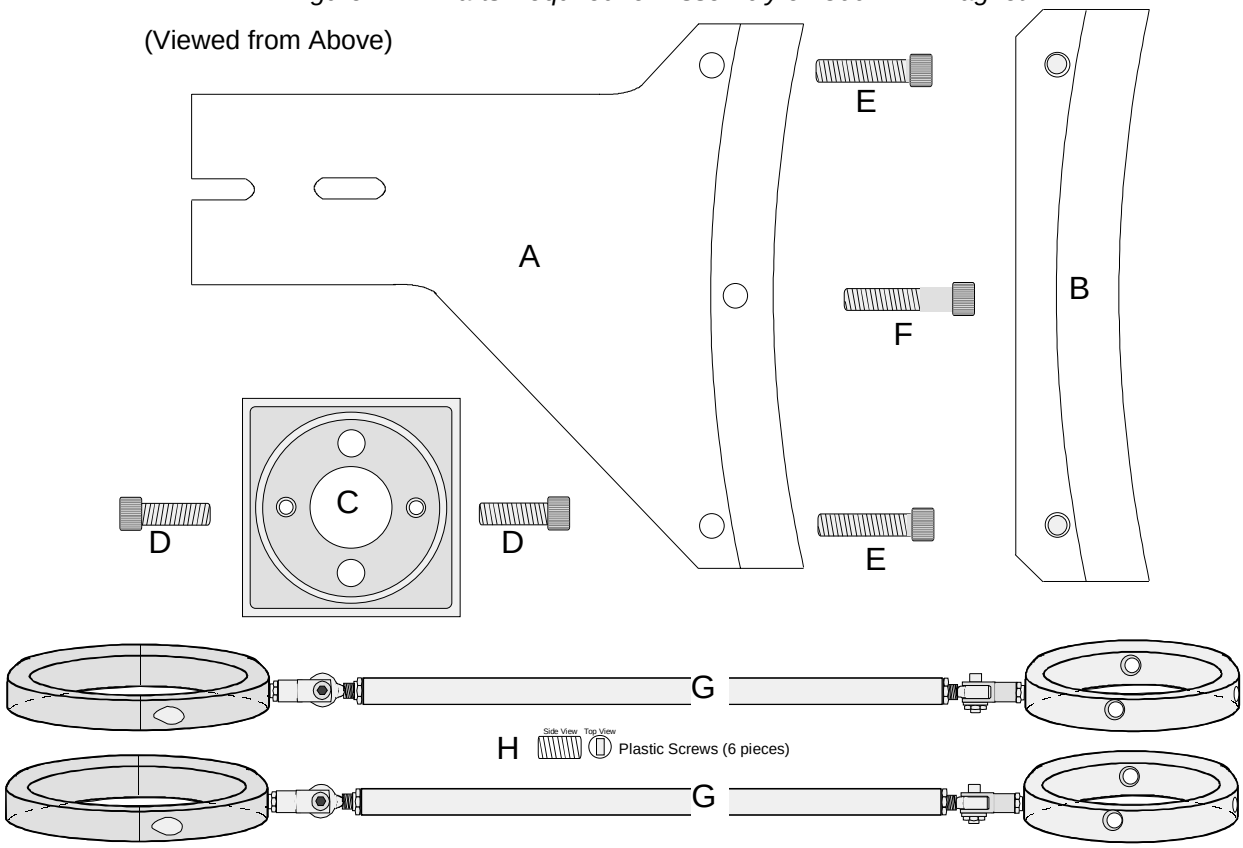
Preparation B.2.1

Prepare the light barrier assembly, cabinet and column assembly as described in chapter 4 of this installation manual.

Ensure that you have all of the parts required to mount the B-ACS sample changer to the 500 MHz magnet, as shown in figure B.2.

Connect the adjustable arm assemblies (figure B.2) to the round column part just below the cabinet (figure B.6), and tighten them loosely. (Note: the larger two segment ring is the column end of the assembly).

Figure B.2. Parts Required for Assembly on 500 MHz Magnet



Part Requirements:

Item	Quantity	Description
A	1	Base Plate
B	1	Upper Support Bracket
C	1	Column Support Bracket
D	2	Machine Screws 3.3 cm
E	2	Machine Screws 4.3 cm
F	1	Machine Screw 4.7 cm
G	2	Adjustable Arm Assembly
H	6	Plastic Screw

Mounting the Base Plate *B.2.2*

Remove the holding screw from the front of the magnet as shown in figure B.3. Place the base plate under the rim of the magnet and fasten it to the magnet, using the 4.7 cm machine screw (refer to figure B.4). Do not tighten the screw completely, allow some movement for adjustments.

Place the upper support bracket on top of the base plate as shown in figure B.4. Secure it using the two 4.3 cm machine screws. Tighten these two screws and the screw holding the base plate securely.

Mount the column support bracket with the bottom side down (as shown in figure B.4), using the two 3.3 cm machine screws. Tighten the screws hand tight, allowing some free play for later adjustments.

Figure B.3. Holding Screw on the Magnet

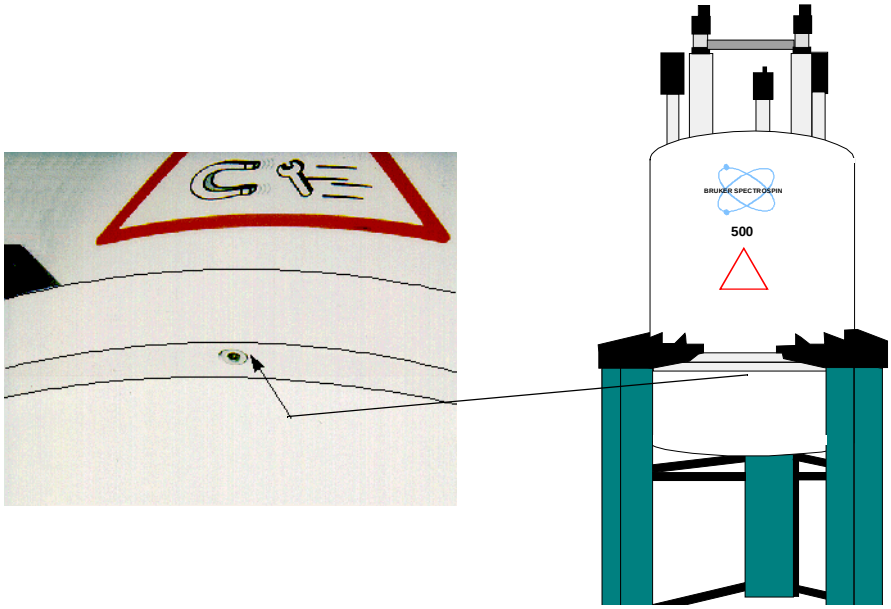
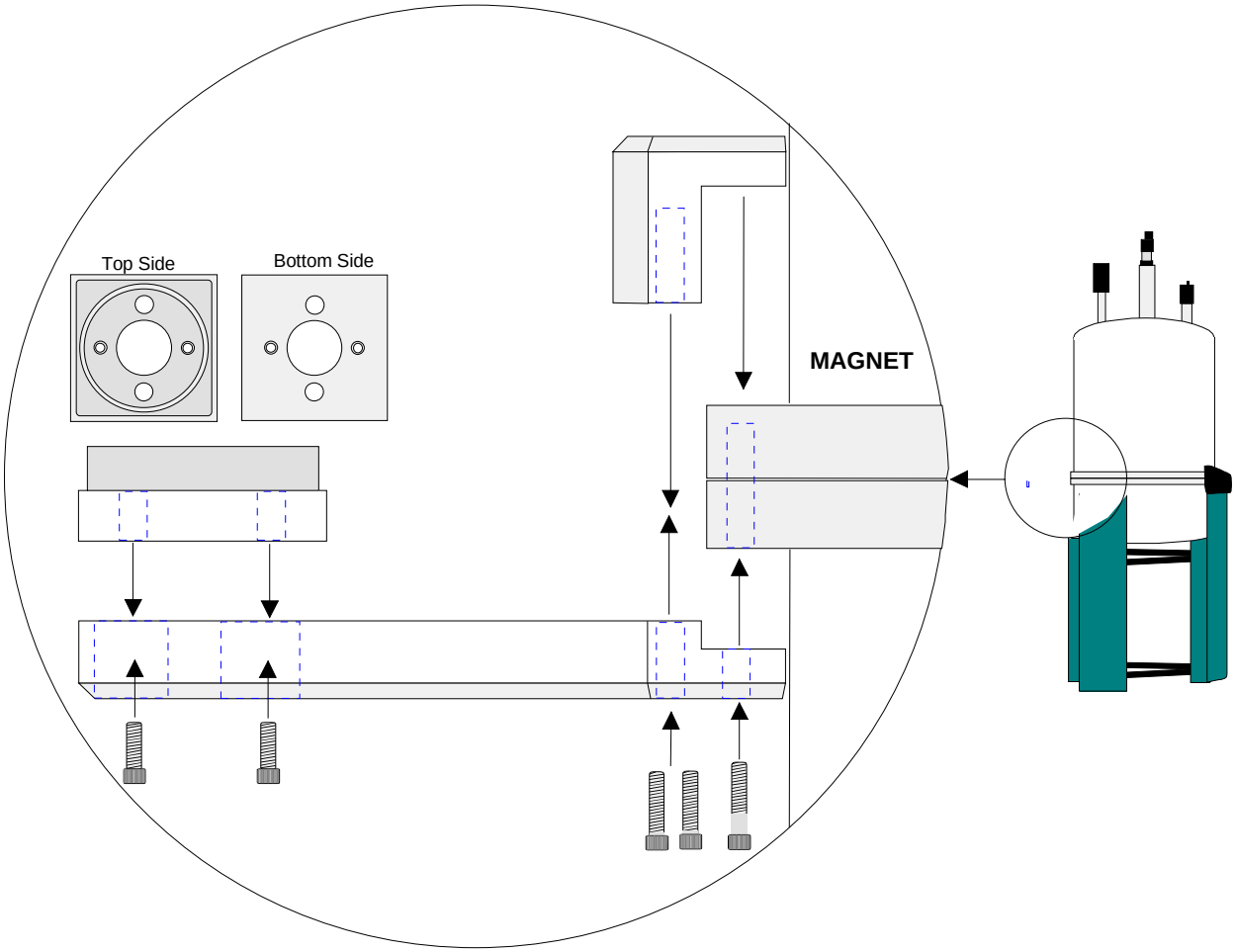
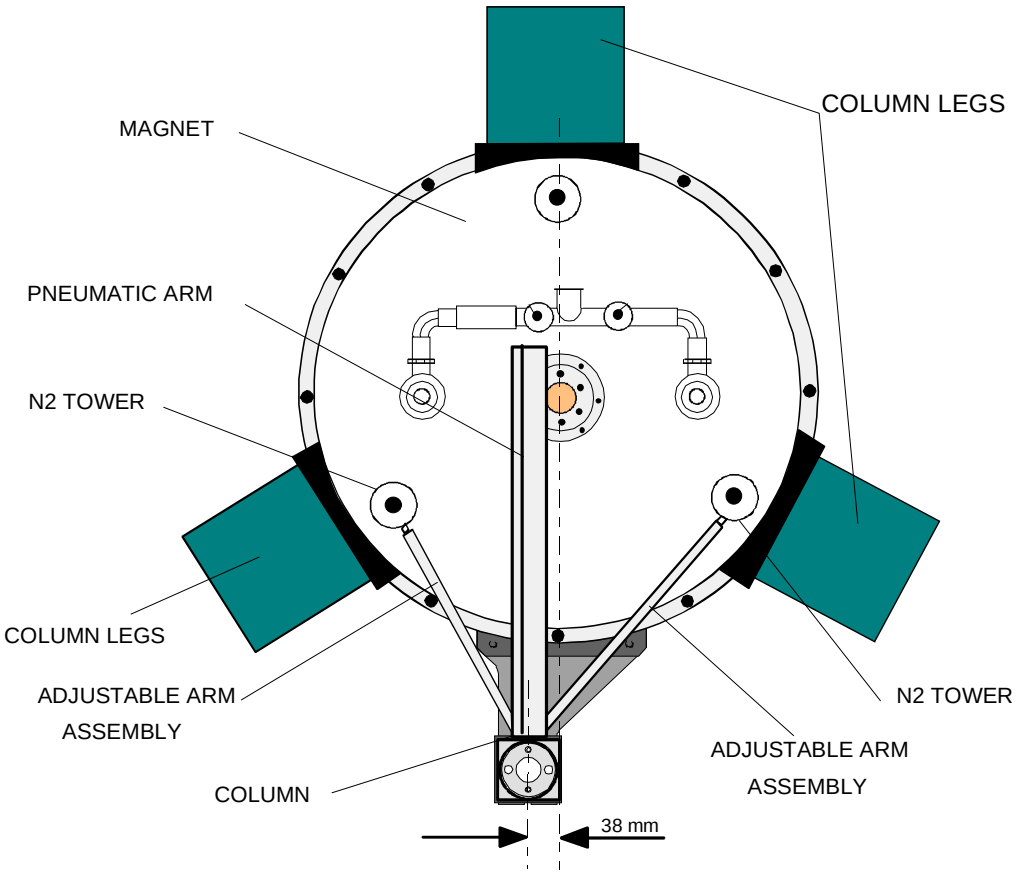


Figure B.4. Mounting the Base Plate and Supports



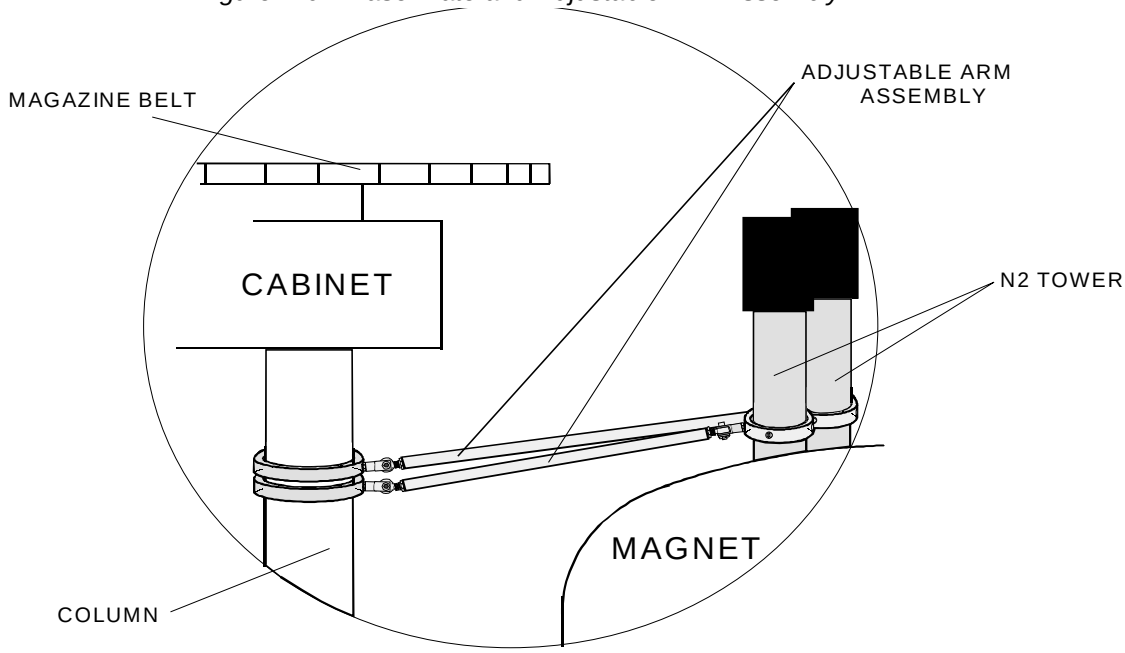
Place the column assembly with the attached cabinet onto the column support bracket so that the square column piece is perpendicular to the center of the magnet (see figure B.5).

Figure B.5. Top View of the 500 MHz Magnet with Sample Changer



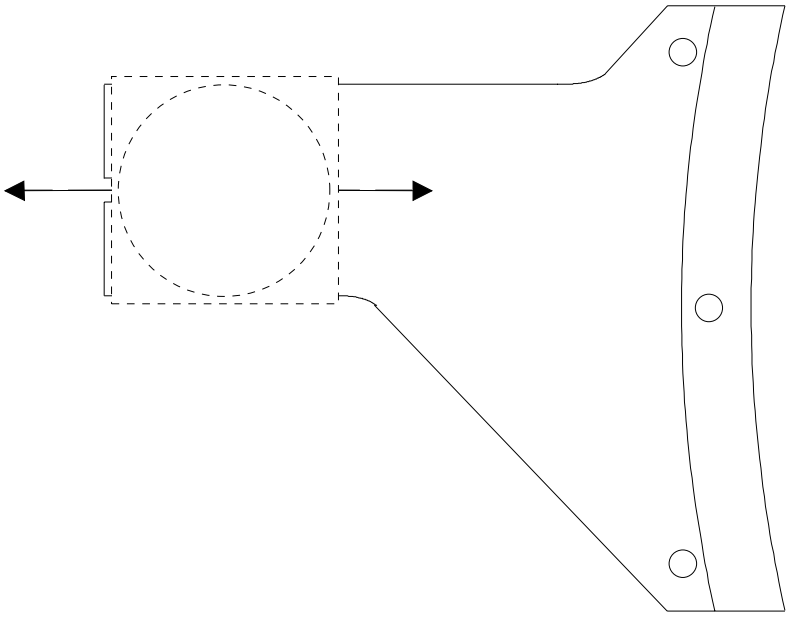
Place the magnet end (the smaller ring) of the adjustable arm assemblies over the N2 towers as shown in figures B.5, B.6 and B.8. Align the arms so they are as horizontally level as possible, ensuring that the arms do not touch the magnet.

Figure B.6. Base Plate and Adjustable Arm Assembly



Move the column assembly until it is approximately horizontally and vertically level by intermittently turning the adjustable arm assembly rods and the column support bracket forwards or backwards (figure B.8). Tighten the adjustable arm assembly (both ends) and the two screws holding the column support bracket.

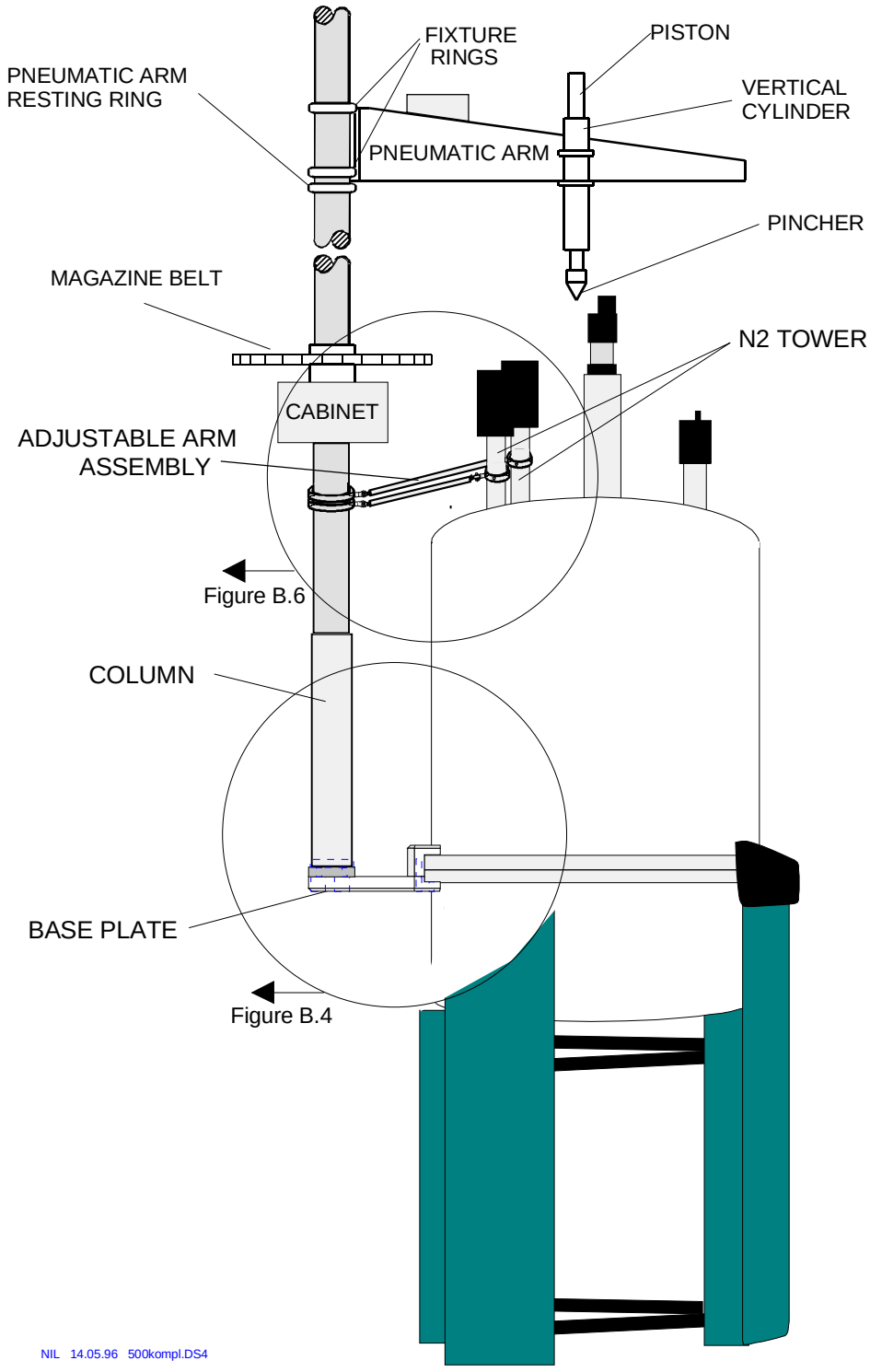
Figure B.7. Adjustment Possibilities for the Column Assembly



Recheck the horizontal and vertical level using a water level. Adjust the adjustable arm assemblies and/or the column support bracket on the base plate as needed (repeat until the column is horizontally and vertically level).

Check once again that all of the screws and the adjustable arm assemblies are tight.

Figure B.8. Overview of the Sample Changer on a SAG Magnet



Figures

Figures

Tables

Tables

Index

D

E

F

H

L

M

N

O

P

R

S

T

V

W