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CPP-2 Service Data

Nov. 1, 1984

DO NOT ATTEMPT TO REPAIR A CPP-2 PROCESSOR WITHOUT READING AND UNDERSTANDING THE CPP-2 OPERATING INSTRUCTIONS AND THIS SERVICE MANUAL.

## Chapter 1

### INTRODUCTION

This service manual covers repair of the CPP-2 processor. The CPP-2 is both a stand alone processor and a sub-component of the ATL-1 processor. When used as a portion of the ATL-1 it's basic functions are the same as when it is used alone. The only changes are to the mechanical attachment of the processor.

The CPP-2 processor has been available for many years. Recently the three circuit boards used in the processor have been redesigned to add improvements and also to take advantage of newer, improved electronic components. This manual will make reference to "OLD STYLE" and "NEW STYLE" circuit boards. (See Chapter 3 for details.) Because the actual function of the circuit boards has not been changed it is possible to replace "OLD STYLE" boards with "NEW STYLE" boards when replacement is necessary. Also, it is possible to receive units for repair that have some combination of "NEW" and "OLD STYLE" boards installed.

## Chapter 2

### FUNCTIONAL DESCRIPTION

The CPP-2 Processor provides three basic functions necessary for processing of photographic materials; tempering of chemicals, tempering of processing vessels (tanks & drums), and agitation of processing vessels. Tempering is accomplished by a recirculating temperature controlled water bath. Agitation is accomplished by a variable speed, two-directional D.C. motor.

The CPP-2 has three sub-systems which operate to provide the above mentioned functions. They are briefly described below:

#### 2.1 Water Pump

The tempering bath is recirculated in the CPP-2 by a built-in pump. This pump is controlled by the "PUMP" knob on the front panel of the CPP-2. This knob switches 120 Volt A.C. to both the pump motor and also to the heating element. The heating element is also controlled by this circuit as a protection so accidental heating cannot take place without the necessary circulation of water. The pump motor is found inside the "Motor Housing" of the CPP-2 and is attached to an external pump shaft. This shaft runs through the center of a hollow "pump housing" providing the impeller with power.

## 2.2 Temperature Control

(NOTE: All parts numbers used in this section refer to the NEW STYLE" board drawings.)

The CPP-2 utilizes an electronic temperature control circuit. A temperature controlled resistor (thermistor) is located in a brass shaft inside the pump housing. This sensor is connected to Board # 94008 and is routed to an analog amplifier (IC 46). The output of this amplifier is attached to the input of an A/D converter (IC 45). This converter provides output in the BCD format. This BCD data is used to control the 7 segment LED driver (IC 44) which controls the LED display giving a visual indication of temperature. The BCD signal is also routed to three comparator circuits (IC's 47-49, 51-53, and switches S40-42) which compare the actual temperature to the desired temperature which has been selected via three BCD switches. The three outputs of this comparator determine what tempering action is necessary. Heating, cooling or no action. The heating and cooling outputs are sent to Board #94004 which contains switching circuitry for the heating element and cooling solenoid valve.

The digital portion of the circuit is multiplexed. Hence, the same BCD data lines are used for all three LED's and all three comparators. A clock circuit exists to time the acquisition of the data by the appropriate components. The clock signals are supplied by IC 45 ( pins 3,4,& 5) and are modified by IC's 40-43.

The new style board also incorporates an automatic dimming circuit utilizing a photocell (R 51) and IC 42.

### 2.3 Agitation

(NOTE: All part numbers used in this section refer to the "NEW STYLE" boards.)

The CPP-2 processor utilizes rotary agitation. Rotation is provided by a D.C. motor which is controlled by an electronic circuit. The circuit provides control of rotation speed, direction reversal, and "ramping" of voltage.

Control and logic signals for the rotation motor are located on board #95114. These control signals are routed to T1 and RL2 on Board #94004. T1 controls voltage to the motor and hence rotation speed. RL2 reverses polarity to the motor which determines direction of rotation.

Rotation speed is controlled by IC 22 (Board #95114) and it's associated components. This circuit incorporates a feedback loop which maintains rotation speed regardless of the load on the rotation motor. As the rotation motor draws more current due to an increased load the voltage drop across R 8 (Board #94004) increases. This voltage is fed back to the IC 22 circuit which compensates for the increased load to maintain a consistent rotation speed. Speed range is adjusted by potentiometer P 21 and actual operating speed is adjusted by potentiometer P 23.

Direction of rotation is controlled by a microswitch assembly which is attached to IC 21 (Board #95114) and it's associated components. This circuit, in conjunction with T 21 and it's associated components, provides a "voltage ramp" which makes reversal of direction smooth. When the microswitch signals for a reversal of direction the circuit first begins to lower the voltage to the motor slowing it to almost a stop. At this point the circuit then signals the relay RL2 (Board # 94004) to reverse polarity to the motor. After polarity is reversed the voltage is then "ramped" back up to the operating voltage. This gradual transition provides for a much smoother operation and less strain on the processor.



### Chapter 3

#### "NEW STYLE" vs. "OLD STYLE" Circuit Boards

As mentioned in the introduction to this manual the three circuit boards for the CPP-2 processor have recently been redesigned. While their function remains the same, their layout has been changed to accommodate improved or more readily available components.

In the following sections some physical difference between the "NEW STYLE" and "OLD STYLE" version of each board is given. **This is given as a means of identification and is not necessarily the only difference between the two boards.** Also any functional difference between the new and old style of each board will be explained. It is possible to replace "OLD STYLE" boards with "NEW STYLE" boards on any processor if the need arises.

#### 3.1 Board # 94004 (Power Supply/Control Board)

The "NEW STYLE" version of the Power Supply/Control Board is distinguishable from the "OLD STYLE" by the opto-isolator used. The opto-isolator is located near the 12 pin connector. The "OLD STYLE" board uses a TIL153 opto-isolator in a normal 8 pin I.C. (DIP Package). The new style board uses a "TFK" brand part in a package about one-half inch high. The new style board also uses a larger motor relay.

IMPORTANT:

One electrical difference does exist between the new and old style Power Supply/Control boards and must be cared for when replacing boards. The "OLD STYLE" board had a 100 ohm, 1/4 watt resistor connected to the base of transistor TIP 140/TIP 3305. The "NEW STYLE" boards incorporate this resistor in the Switch/Motor Board (#95114). When installing a "NEW STYLE" Power Supply/Control Board (#94004) with an "OLD STYLE" Switch/Motor Board it is necessary to install the 100 ohm, 1/4 watt resistor in series with the base lead of the above mentioned transistor. Conversely, when installing a "NEW STYLE" Switch/Motor Board with an "OLD STYLE" Power Supply/Control Board it is necessary to remove the 100 ohm, 1/4 watt resistor from the Power Supply/Control Board and jumper the location where the resistor formerly was located.

3.2 Board # 95114 (Switch/Motor Board)

The Switch/Motor Board is distinguishable by two features. The "NEW STYLE" board has a capacitor (C 32) next to the 6.3 Amp main fuse. Also the "NEW STYLE" board does not have potentiometer P22. (See Parts Placement Diagram for "Old Style CPP-2 Switch/Motor Board")

There are no functional differences between the old and new style boards. P22 ( Reverse dwell time adjustment ) has been eliminated from the "NEW STYLE" board and replaced by a fixed circuit so this adjustment is no longer necessary.

3.3 Board #94008 (Temperature Control Board )

The "NEW STYLE" board is distinguishable by two characteristics. The switches to set temperature are discrete rotary switches while those on the "OLD STYLE" board were plated onto the P.C. board itself. Also the "NEW STYLE" board has a photocell to the left of the 7 segment LED displays.

The only functional difference between the old and new style boards is the "NEW STYLE" board incorporates an automatic dimmer circuit for the LED displays which lowers their light output in a darkened room.

#### Chapter 4

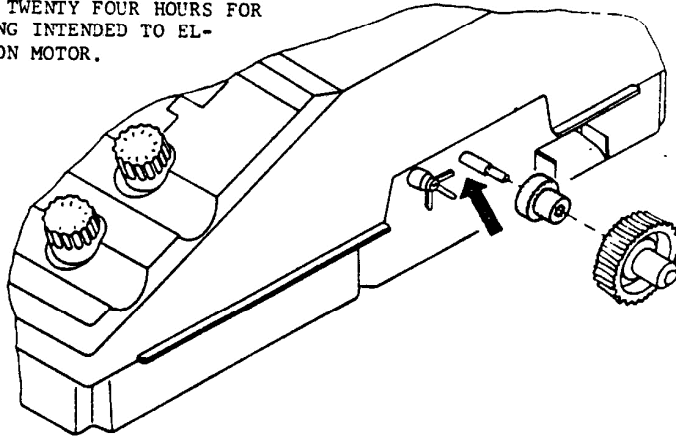
#### UPGRADING EXISTING CPP-2 PROCESSORS

Various changes and improvements have been made to the CPP-2 processor over the years of its existence. Many of these changes and improvements can be added to existing units to increase functionality and reliability. Some are simple enough and important enough that they should automatically be done whenever a unit is repaired.

Since the introduction of the Jobo-Lift accessory and the ATL-1 processor it has become necessary to improve the bearings of the rotation motor. Newer units come with a double bearing motor (Part # 32016). Older units should have a special plastic bearing glued into place before adding the Jobo-Lift accessory to insure reliable motor performance. This bearing (Part# 13034 ) comes with the Jobo-Lift accessory and can also be purchased separately. It should be glued into place with Isarplast glue. (Part# 16019) [NOTE: Some units have a white nylon bearing screwed onto the housing where the motor shaft protrudes. This bearing was installed by Jobo and takes the place of the plastic bearing mentioned above.]

4.0.1 "Add-on Bearing" Drawing

BEARING HAS TO BE GLUED WITH HOUSING  
 ALSO AVOID PUTTING TOO MUCH GLUE ON BEARING  
 TO AVOID GETTING GLUE ON MOTOR SHAFT, TURN  
 SHAFT TWO REVOLUTIONS AFTER FIRST FIVE MIN-  
 UTES OF DRYING, ALLOW TWENTY FOUR HOURS FOR  
 COMPLETE DRYING. BEARING INTENDED TO EL-  
 IMINATE EXCESS STRAIN ON MOTOR.



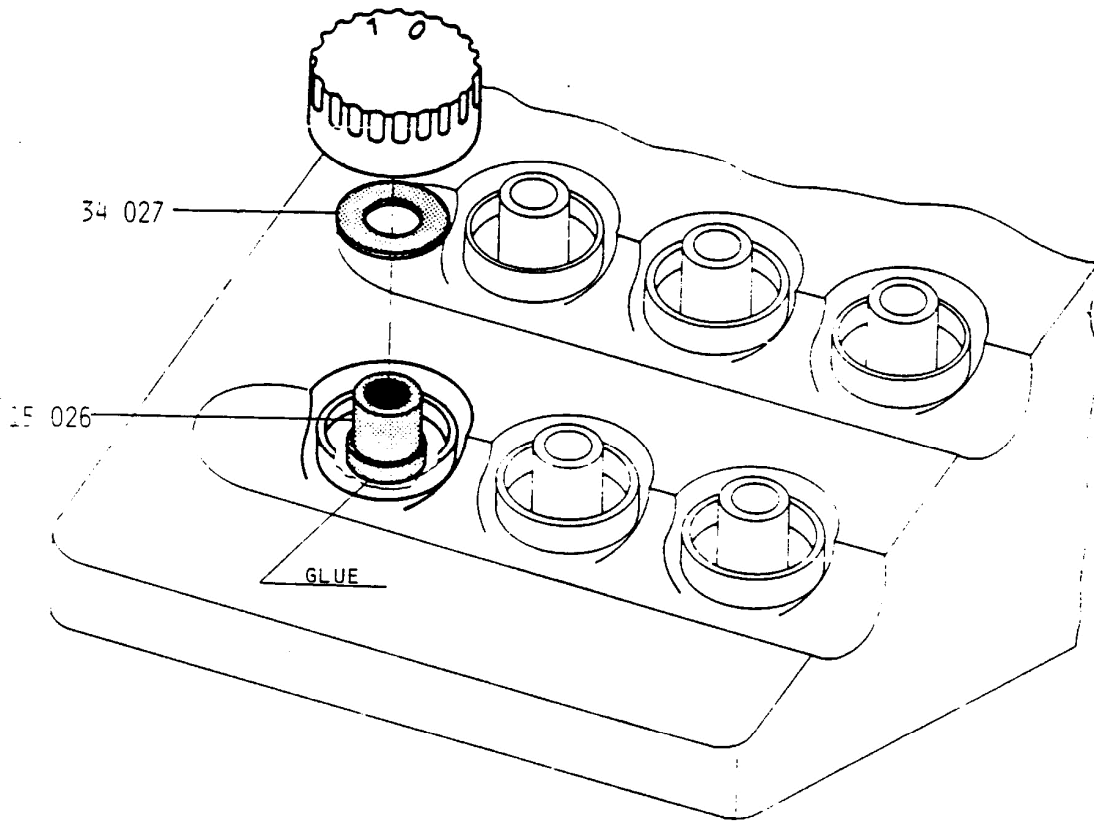
The introduction of the Jobo-Lift and ATL-1 also necessitated more water resistant motor units due to the presence of liquids above the control panel. Five areas may require attention to upgrade a CPP-2 Motor Unit to the latest standard of water resistance. These five areas should be checked on all units requiring service. The areas are:

1. A black rubber grommet should be placed over the white

reset button for the temperature overload sensor.

2. The upper air vent ( Located where the sloping control panel meets the top of the lid ) should be sealed. This area can be tested by removing the cover of the motor unit, turning it upside down, filling it with water and looking for leaks. If sealing is required a silicone sealer or plastic cement can be used to close this opening.
3. The red window for the LED displays must also be water tight. The window can be tested with the same method explained above for the air vent. If the red window leaks a thin bead of plastic cement should be applied around the edge of the red piece of plastic from the inside of the cover. Care should be taken to not get glue on the viewing section of the plastic.
4. The brass shaft containing the temperature sensor (Located inside the pump housing.) should be covered with heat shrink tubing to protect it from corrosion.
5. The "Dams" under the control knobs should be raised. Units shipped since the fall of 1984 have raised "Dams" molded into the plastic lid. Units before that time can be made water tight by glueing black seals (Part # 15026) around the switch shaft openings and installing felt washers (Part # 34027 ) under the knobs. (See Drawing on next page for detail.)

4.0.2 Knob Seal Drawing



Chapter 5

TROUBLE SHOOTING CPP-2 / CPA -2

Faulty Operation	cause of fault- parts to be checked out old	
	TRANSFORMER PC-board #94004	SWITCH PC-board #94004
heats up to a certain temperature only and at the wrong time	-C <sub>1</sub> defect	-jumper defect
improper cooling or no cooling	-O3 wrong or defect -relay 12001 defect -IC 1 defect	-jumper defect
no read out		-jumper defect
read out shows EEE		
numbers missing at read out		
read out shows 888 or part of it		
read out does not change by adjusting P41		
temperature display erratic. Makes large jumps		
motor stops then continues in same direction		-IC21 defect -corroded microswitch
motor fuse blows	-Install support bearing	
heat inaccurate one dim LED		
one LED missing segment (s)		
all LED's missing same segment (s)		
motor very erratic	-corrosion on traces, cold solder	



checked out old style		New style
TCH PC-board # 95114	READ OUT PC-board # 95068	READ OUT PC-board # 95068
jumper defect	-IC 44,45,46 defect -BCD switch defect -jumper defect -C 41,44,46 defect -T41-42 defect	-IC51,52,53 defect -BCD switch defect -jumper defect -c43,44,45 defect -T40,41,42 defect
jumper defect	-IC44,45,46 check for shorts,corrosion	-IC51,52,53 check for shorts
jumper defect	-IC47 defect -IC48 defect -T41-43 defect -readout defect	-read out defect -T40-42 defect -IC45 defect -IC44 defect
	-temp. sensing device defect or disconnected -IC48 defect -IC49 defect	-temperature sensing device defect or disconnected -IC45 defect -IC44 defect
	-IC41,42,43,or47 defect -T41,42,43 defect	-IC47,48,49 defect -T40,41,42 defect
	-IC47 defect	-IC44 defect
	-trimmer defect -IC 48 defect -IC49 defect	-trimmer defect -IC45 defect -IC46 defect
	-defective temperature sensor	-defective temperature sensor
-IC21 defect -corroded microswitch		
	-T41,42 or 43 defect	-T40,41,42 defect
	-LED defect	-LED defect
	-IC47 defect	-IC44 defect

TROUBLE SHOOTING CPP-2 / CPA

Faulty Operation	cause of fault - parts to be checked out old s		
	TRANSFORMER PC-board #94004	SWITCH PC-board #95114	READ OUT PC
drive motor does not function	-motor defect -R8 defect (high value) -D1,D2 defect -T2 defect -shorted jumper -T1 defect	-C24 or C28 defect -R31 defect -D22,D25 defect -IC22 defect -motor switch S23 defect	
motor polarity does not reverse	-D2, T2 defect	-micro switch defect/ corrosion -R22,R23 defect -IC21,IC22 defect	
motor speed does not change	-C1 defect	-P21 improper adjustment -P23 defect -D21,22 or 25 defect	
max R.P.M. is reached at control knob position "P"		-P21 improper adjustment	
motor speed is too slow		-T21 defect, improper unit	
P21, P22 do not respond		-trimmer defect -R28wrong -C25 defect -cold solder joint	
heater does not work	-reset over current device -R4 defect -IC1 defect, T11 153 defect -T3 defect, G11 defect -Triac MT1 defect -D4 in wrong -corrosion on board esp. at IC44		

ING CPP-2 / CPA-2

	Recked out old style	New Style
14	READ OUT PC-board #95068	READ OUT PC-board # 95068
effect		
t/		
t		
er unit		
ct		

**Chapter 6**  
**MOTOR UNIT TOP COVER**

6.1 Removal

1. Remove uppermost screw next to rotation motor shaft.
2. Remove six control knobs by pulling upwards on them.
3. Remove six brass screws from bottom edge of motor housing.
4. Lift off cover.

6.2 Replacement

To replace the top cover of the motor unit reverse the procedure listed above for removal. Before replacing the cover make sure the solenoid valve and overload sensor reset button are seated in their positions in the bottom housing.

## Chapter 7

### TEMPERATURE ADJUSTMENT OF TEMPERATURE CONTROL BOARD

Complete adjustment of the temperature control includes two related adjustments. One adjusts the range (spread) of the unit. The other adjusts the actual readout and temperature at an individual temperature. The range adjustment (P 40) insures that temperatures are accurate at all points in the range of the unit. Adjustment of the range (P 40) is seldom necessary unless IC 45 has been replaced. Because of this, two procedures are listed below. The first only adjusts the readout and temperature and assumes the range is correct. This procedure should be used unless IC 45 or an associated component has been replaced or if it is known the range is incorrect. If a complete calibration is required, follow the procedure in the second section.

#### 7.1 Partial Calibration

This procedure calibrates the readout and temperature at a single point and assumes it will be correct at all other temperatures. See above explanation for details.

##### 7.1.1 Equipment Needed

1. Thermometer with a range of 25 - 35 degrees centigrade and a +/- 0.05 degree accuracy.
2. Water bath for processor. (The bottom trough of the actual processor is recommended.)

3. Small straight-slot screwdriver for adjustment of calibration potentiometer.
4. Nail polish.

#### 7.1.2 Calibration Procedure

1. Place motor unit without top cover into water bath.
2. Turn on main power switch and pump switch.
3. Set temperature knobs to 32.0
4. Allow unit to heat until LED display reads 32.0.
5. Measure temperature at the output spout of the motor unit.
6. Utilizing Chart# 1 adjust P 41 until the LED display reads the value corresponding to the actual temperature read on the thermometer. (ie; If actual temp. on thermometer reads 31.7 adjust P 41 until display reads 31.3)
7. Wait for LED display to again read 32.0 and then measure the water temperature at the output spout again.
8. If the actual temperature at the output spout is 32.4 when the display reads 32.0 the unit is calibrated properly and you may proceed to the next step. If the actual temperature is not 32.0 go to step X and repeat the subsequent steps.
9. Apply a small drop of nail polish to the adjustment screw of P 41 to lock it into place.
10. Proceed with reassembly of the unit.

7.1.3 Chart # 1

<u>ACTUAL</u> <u>TEMPERATURE</u>	<u>DISPLAYED</u> <u>TEMPERATURE</u>
31.5	31.1
31.6	31.2
31.7	31.3
31.8	31.4
31.9	31.5
32.0	31.6
32.1	31.7
32.2	31.8
32.3	31.9
32.4	32.0
32.5	32.1
32.6	32.2
32.7	32.3
32.4	32.3

7.2 Complete Calibration

This procedure performs a complete calibration of the temperature control circuit. This procedure may not be necessary. See the explanation at the beginning of this chapter to determine whether a "Partial Calibration" or a "Complete Calibration" is necessary.

7.2.1 Equipment Needed

1. Container with stirred water at a temperature between 19 -21 degrees centigrade.
2. Container with water bath at a constant temperature of 40.7 degrees centigrade +/- 0.05 degrees centigrade

3. Small straight-slot screwdriver for adjusting calibration potentiometer.
4. Two thermometers two measure two water bathes (Accuracy +/- 0.05 degrees Centigrade)
5. Nail polish.

#### 7.2.2 Procedure

1. Remove top cover from motor unit.
2. Adjust P 40 to a center position.
3. Place motor unit into water bath at 19-21 degrees C.
4. Turn on main power switch and pump switch and allow a few minutes for unit to stabilize.
5. Adjust P 41 until LED reads the actual bath temperature. (If the bath temperature is not in 19-21 degree range see Chart #2 for correction factor.)
6. Place the motor unit into the 40.7 degree bath.
7. Note the value shown in the LED display.
8. Utilizing Chart #3 find the value noted in the above step. Adjust P40 until the LED display shows the value corresponding to the value noted in the previous step.
9. Adjust P 41 until the display reads 40.0
10. Place motor unit into 19-21 degree bath. After allowing a few minutes for stabilization the LED display should read the temperature of the water bath +/- 0.1 degree centigrade. If it does not repeat steps 3 through 10 again.
11. After calibration is complete place a drop of nail



polish on the adjustment screw to secure it's position.

7.2.3 Chart #2

CORRECTION TABLE FOR BATH#1 TEMPERATURES OTHER  
THAN 20 DEGREES CENTIGRADE

FOR BATH 17 - 18.9 DEGREES ADD ONE/TENTH TO DISPLAY  
FOR BATH 19 - 21.5 DEGREES ADJUST DISPLAY TO TEMPERATURE  
FOR BATH 21.6 - 24 DEGREES SUBTRACT ONE/TENTH FROM DISPLAY

7.2.4. Chart #3

CPP-2 Final Adjustment Chart

If Display Reads:	Adjust P41 until display reads:	If Display Reads:	Adjust P41 until display reads:
36.5	44.2	40.0	40.0
36.6	44.1	40.1	39.9
36.7	44.0	40.2	39.8
36.8	43.8	40.3	39.7
36.9	43.7	40.4	39.6
37.0	43.5	40.5	39.5
37.1	43.4	40.6	39.4
37.2	43.3	40.7	39.3
37.3	43.1	40.8	39.2
37.4	43.0	40.9	39.1
37.5	42.9	41.0	39.0
37.6	42.7	41.1	39.0
37.7	42.6	41.2	38.9
37.8	42.5	41.3	38.8
37.9	42.3	41.4	38.7
38.0	42.2	41.5	38.6
38.1	42.1	41.6	38.5
38.2	42.0	41.7	38.4
38.3	41.9	41.8	38.3
38.4	41.7	41.9	38.3
38.5	41.6	42.0	38.2
38.6	41.5	42.1	38.1
38.7	41.4	42.2	38.0
38.8	41.3	42.3	37.9
38.9	41.2	42.4	37.9
39.0	41.1	42.5	37.8
39.1	40.9	42.6	37.7
39.2	40.8	42.7	37.6
39.3	40.7	42.8	37.5
39.4	40.6	42.9	37.5
39.5	40.5	43.0	37.4
39.6	40.4	43.1	37.3
39.7	40.3	43.2	37.2
39.8	40.2	43.3	37.2

## Chapter 8

### TEMPERATURE SENSOR

The temperature sensor (Part# 95067) is located inside the pump housing. It is a small tube running parallel to the pump shaft.

#### 8.1 Symptoms of failure

1. If the temperature LED display starts to jump around erratically and/or very quickly it is often a sign the sensor is faulty.
2. If the temperature display suddenly is very inaccurate and/or reads a very low temperature it is often a faulty sensor.

#### 8.2 Replacement

1. Remove motor unit top cover. (See Chapter 6)
2. Unsolder leads from the temperature sensor at the temperature display board. (#94008)

3. Unhook the green ground wire from the terminal block.
4. Remove the pump housing.
5. Using a screwdriver push the old sensor from the pump housing side until it comes loose.
6. Scrape old glue and sealant away from the opening.
7. Place a bead of Isarplast glue (Part# 16019) around the opening for the sensor and place the sensor into the hole. Make sure to push the sensor down firmly so it seats and there will be no leakage.
8. Reattach the green ground wire to the terminal block.
9. Resolder the wires to the temperature display board. (Polarity is not a concern.)
10. Replace the pump housing.
11. Recalibrate the temperature control board. (See Partial Calibration Section 7.1)
12. Replace motor housing top cover. (See section 6.2)

## Chapter 9

### WATER RECIRCULATION PUMP

The Pump consists of three major sections, an A.C. motor, an impeller shaft, and a hollow "pump housing".

A.C. current is applied to the pump motor through the "PUMP" switch. This switch also supplies power to the heating element.

The temperature probe for the CPP-2 temperature is located inside the pump housing next to and parallel to the impeller shaft. It is important to treat this probe with care while working on the pump.

#### 9.1 Common Problems

1. Dirt and/or lint on the pump impeller (picked up from tempering bath) will often slow down or stop the rotation of the impeller. It is important to periodically clean this assembly. Instructions for this process can be found in the "Instruction Manual" which comes with the CPP-2. (See section of this manual with instructions.)
2. The bottom part of the impeller is a pin which rotates in a hole in the "pump housing" (Part# 06017 ).

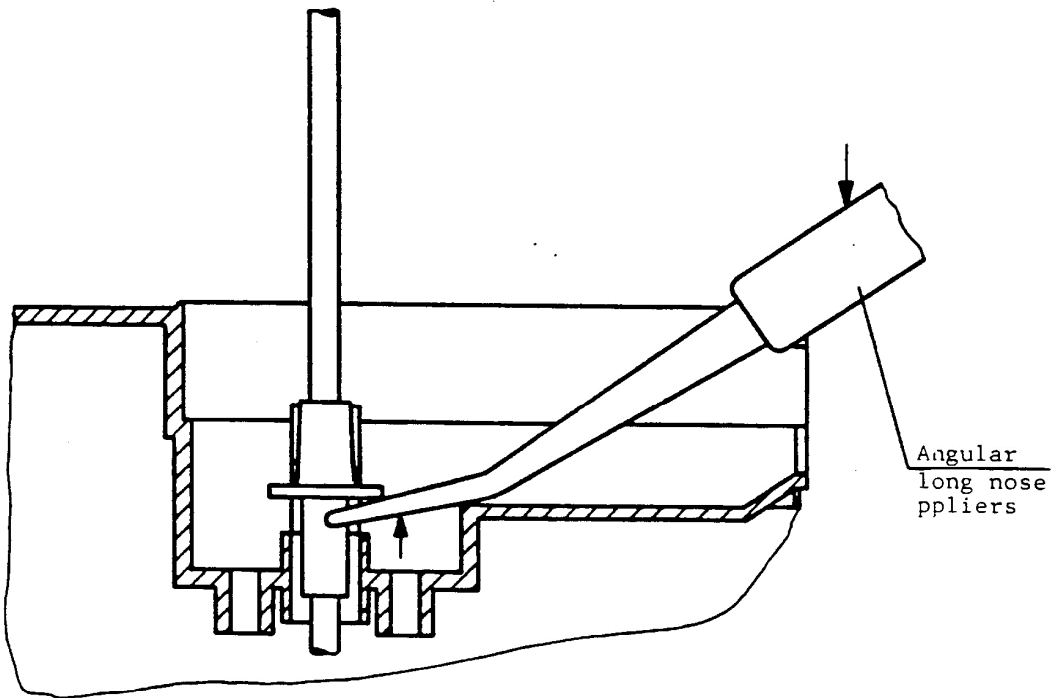
Occasionally, "flashing" from the plastic molding process can remain in the hole of the "pump housing" causing it to slow or stop rotation of the impeller. The hole should be cleared with a 4.5mm drill bit to remove any resistance to rotation.

3. The "pump housing" snaps into the bottom of the motor unit housing. It is possible, particularly during transit or reassembly after cleaning, to knock this housing out of alignment. Symptoms will range from a "noisy" pump to failure of the impeller to rotate. The solution is simply pushing the housing back into it's opening until it snaps into place.
4. Pump impeller shafts are lubricated before they are fit onto the pump motor shaft. Occasionally, due to excess lubrication, the pump impeller shaft will slip down slightly on the motor shaft. This slippage will cause the impeller to hit the bottom of the pump housing causing the pump to become noisy. This problem can be remedied by removing the "pump housing" and pump shaft (see sections below), cleaning the motor shaft with alcohol and a cotton swab and reassembling the pump.

#### 9.2 Pump Disassembly

1. Remove pump housing by rocking back and forth and pulling away from motor unit bottom.
2. Remove pump impeller shaft with long nose pliers. (See Illustration # 9.2.1)
3. Disconnect pump wires from bottom circuit board.
4. Unscrew pump motor and remove from motor.

9.2.1 Illustration: Disassembling the Pump Assembly

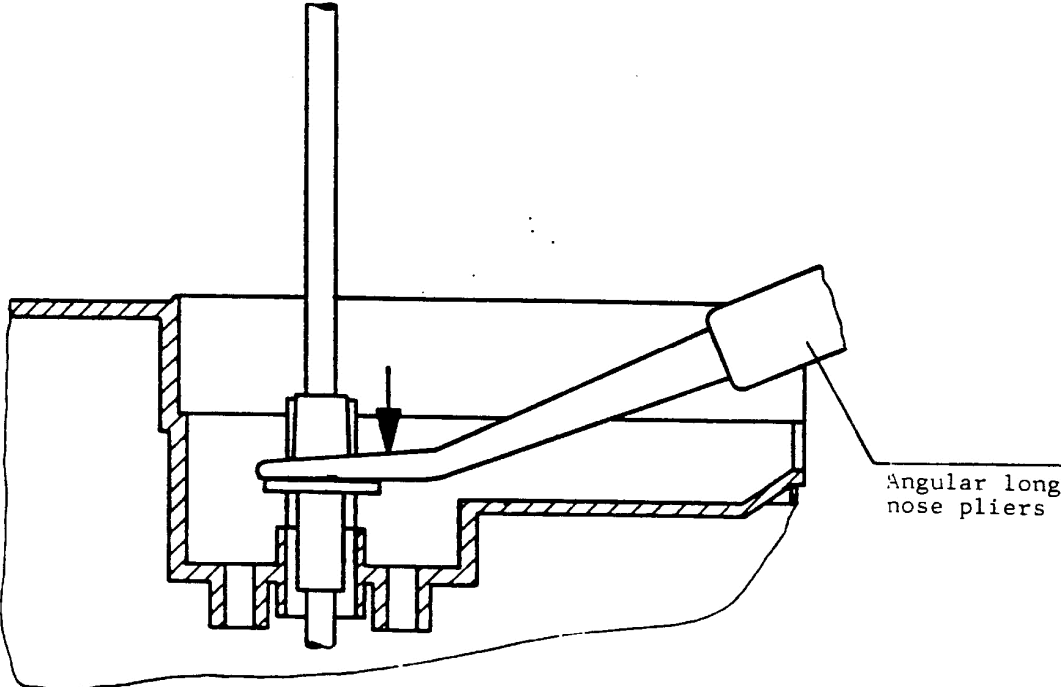


9.3 Pump Reassembly

1. Scrape glue away from pump motor screw holes. (Glue is used in the assembly process to seal the screw from water leaks.)
2. Place felt disc (Part# 34029 ) onto the motor shaft and lubricate with a high quality machine oil.
3. Fasten motor to motor unit bottom with brass screws and hardware. Tighten until no wobble is evident and then place a dab of glue (we recommend Part# 16019 ) on the screw heads inside the pump housing. The glue both locks the hardware in place and also makes it watertight.
4. Attach pump impeller shaft with long nose pliers. (See illustration# 9.3.1) It is important that the impeller shaft be seated properly. If pump noise appears subsequent to this operation check that the impeller shaft has been seated properly. (The impeller shaft must not touch the pump housing at any point except the pin rotating in the center hole of the bottom of the pump housing. )



9.3.1 Illustration: Reassembling Pump Assembly



## Chapter 10

### ROTATION MOTOR

#### 10.1 Common Problems

1. If the rotation motor stops working completely it is often a blown motor fuse. The motor fuse is the front fuse of two located next to the transformer on the Power Supply/Control Board. A blown motor fuse is often an indication of other problems so it is advisable to check other items in this section also.
2. CPP-2's prior to Serial Number 10695 had a single bearing rotation motor (Part# 32006) These units required the addition of an external bearing when used with a Jobo-Lift or AT-1 head. The bearing could either be a white nylon bearing screwed to the lower motor unit housing cover or a black plastic bearing glued to the lower motor housing cover. Units that did not have this bearing installed before addition of a Jobo-Lift will often develop a jerky rotation or will simply start blowing the motor fuse regularly. The solution to this problem is replacement of the rotation motor. (See following section)
3. Occasionally a CPP-2 will have a problem with the magnet or Cog rotating in an eccentric pattern instead of a pure circle. While a small amount of runout is allowable large variations can cause problems. The most common source of this problem is a faulty magnet or Cog assembly and not the motor itself. When correcting this problem it necessary to first

determine whether the motor itself is faulty or the magnet or cog and then replace the faulty component.

4. The reversal circuit of the CPP-2 will sometimes fail to operate. The first thing to check is that the 3 fingered switch actuator next to the motor shaft is being moved. If it is, the next most likely cause of a reversal problem will be IC 21 (CD 4001) on the Switch/Motor Board (# 95114). After the above two possibilities have been checked then it is advised to check the motor relay and the reversal microswitch.

#### 10.2 Replacement of Rotation Motor

1. Remove motor housing top cover (See Chapter 6)
2. Remove wires from heating element.
3. Remove fastening hardware from heating element and pull down out of the bottom of the motor housing.
4. Pull off rotation motor wires from Power Supply/Control Board. **IMPORTANT: Note location of green and black wire. Polarity is important.**
5. Remove two screws holding motor to motor housing bottom.
6. To replace the motor reverse the above operation. It is advisable to replace the motor with a double-bearing model (Part# 32016) If the single bearing motor (Part# 32006) is used install the external bearing. (Part# 13034)

### 10.3 Motor Circuit Adjustment

On "OLD STYLE" Switch/Motor boards two adjustments are possible, rotation speed and "reversal dwell time." On "NEW STYLE" boards "reversal dwell time" is fixed and only rotation speed can be adjusted.

#### 10.3.1 Rotation Speed Adjustment

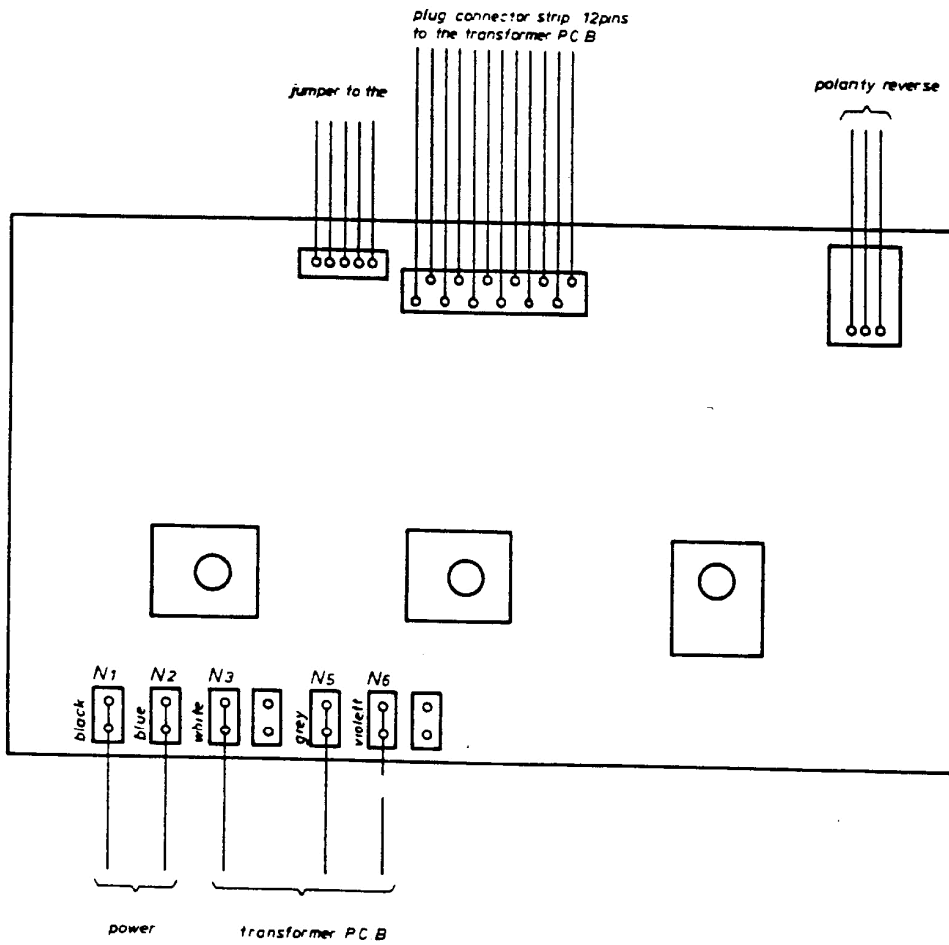
1. Set motor speed control (P23) to minimum position. (Not off!!)
2. Flip reversal switch "fingers" out for uni-directional rotation.
3. Adjust P21 until motor speed is 25 R.P.M.

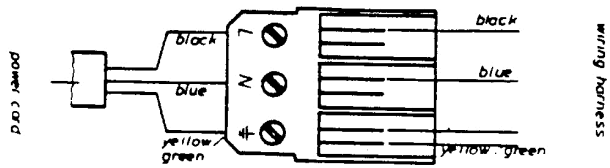
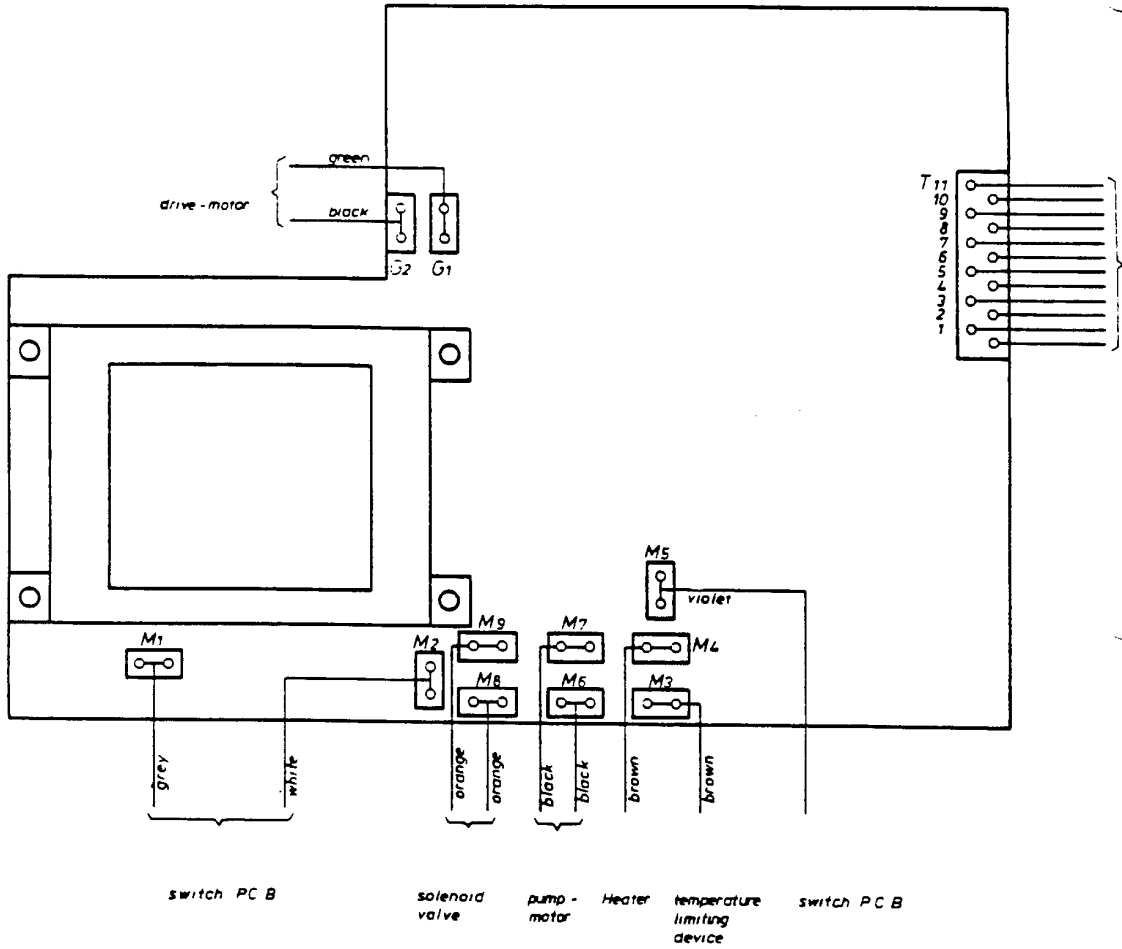
#### 10.3.2 Reversal Dwell Time Adjustment

1. Flip reversal switch "fingers" out so rotation is uni-directional.
2. Measure voltage between Pin 6 of IC 22 and motor circuit ground with an oscilloscope or rapid response analog voltmeter.
3. Adjust Motor speed control (P23) until voltage is 20 volts. (Approximately the "P" setting on the speed knob.)
4. Flip reversal switch "fingers" in so rotation is bi-directional.
5. Adjust trimmer P22 until voltage drops to 5-7 volts at change of direction of motor.

**Chapter 11**  
**SCHEMATICS, DRAWINGS, and PARTS LISTS**

11.1 Inter-board Wiring and Connector Diagram.





CPP-2 Service Data

Nov. 1, 1984

Connectors and socket CPP2

CPP2 Board	CPA/CPP2	CPP 2	Function
94004	95114	95 068	
	N1		Mains P
	N2		Mains O
M2	N3		Mainswitch O
	N4		Mainswitch O/NC
M1	N5		Mainswitch P
M5	N6		heater-pump-switch P
	N7		heater-pump-switch
T1	S1		heater(0 -off/1,3V on delaytime on 1,5s
T2	S2		cooling(0 -off/1,3V on) delaytime on 30 s
T3	S3		ground digital
T4	S4		+5 V
T5	S5		ground analog
T6	S6		24-32 V unregulated
T7	S7		out put OP/base power/transistor
T8	S8		positive feedback +
T9	S9		ground
T10	S10		positive feedback -
T11	S11		relay reverse
	U1		reverse micro-switch 15V / 0V
	U2		0V
	U3		0V / 15V
	J1	J1	ground digital
	J2	J2	heater on/off
	J3	J3	cooling on/off
	J4	J4	+ 5 V
	J5	J5	ground analog
M3			heater
M4			
M6			pumpmotor
M7			
M8			Magnetic solenoid
M9			cooling
G1			rotation motor
G2			/



11.2 Component Data Sheets

TIC236, TIC246  
SILICON TRIACS  
REVISED JAN 1977

PRELIMINARY DATA

HIGH CURRENT TRIACS WITH GLASS-PASSIVATED WAFER

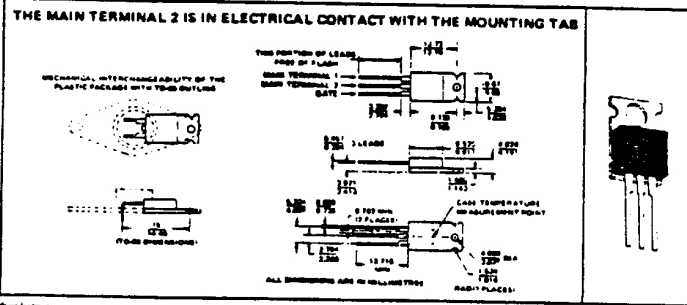
- 100 V to 800 V
- 12 A and 16 A RMS, 100 A and 125 A Peak
- MAX  $I_{GT}$  of 50 mA (Quadrants 1:3)

description

This device is a bidirectional triode thyristor (triac) which may be triggered from the off-state to the on-state by either polarity of gate signal with Main Terminal 2 at either polarity.

mechanical data

TRIAC 600 V / 12 A  
Nr. 44 101



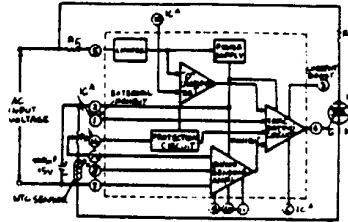
Absolute maximum ratings over operating case temperature range (unless otherwise noted)

	SERIES		UNIT
	TIC236	TIC246	
Repetitive Peak Off-State Voltage, $V_{DRM}$ (See Note 1)	A Surplus	100	100
	B Surplus	200	200
	C Surplus	300	300
	D Surplus	400	400
	E Surplus	600	600
	S Surplus	700	700
Full-Cycle RMS On-State Current at 100 percent 70°C Case Temperature, $I_T(RMS)$ (See Note 2)	12	16	A
Peak On-State Surge Current, Full-Sine-Wave, $I_{TSM}$ (See Note 2)	100	125	A
Peak Gate Current, $I_{GM}$	10	10	A
Operating Case Temperature Range	-40 to 110		°C
Storage Temperature Range	-40 to 125		°C
Terminal Temperature 1.6 mm from Case for 10 Seconds	230		°C

CA3079

Zero-Voltage Switches

IC CA 3079  
Nr 45 004 IC 1



RELATIVE TEMPERATURE COEFFICIENT

AC Input Voltage (50 60 or 400 Hz) V AC	Input Series Resistor (R <sub>S</sub> ) Ω	Dissipation Rating for R <sub>S</sub> W
24	2	0.5
120	10	2
208/230	20	4
277	25	5

NOTE:  
Circuitry within shaded areas not included in CA3079.  
\* See chart  
\* IC - Internal Connection DO NOT USE  
† Terminal Restriction applies only to CA3079.

Fig 1 - Functional block diagram of CA3068, CA3069, and CA3079.

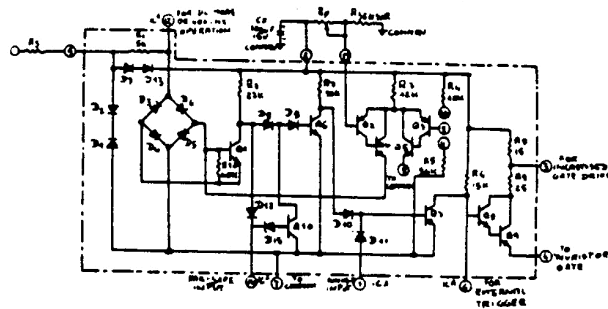
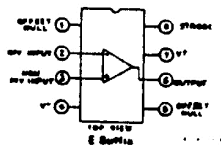


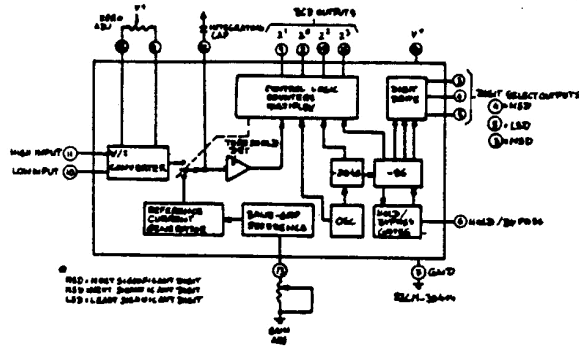
Fig 2 - Schematic diagram of CA3068, CA3069, and CA3079.

IC CA 3140  
Nr 45 005 IC 22, 46



**A/D Converter for 3-Digit  
Digital Readout System**

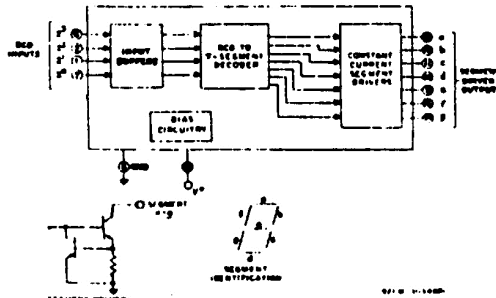
IC CA 3162 E  
Nr 46 302 IC 45



**BCD-to-Seven-Segment  
Decoder/Driver**

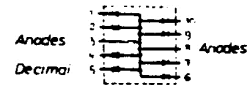
CA3161E

IC CA 3161 E  
Nr 46 402 IC 44



LED DISPLAY TIL 701 (DL 507)  
Nr 26 052

TIL701, TIL700, TIL700,  
TIL712, TIL717

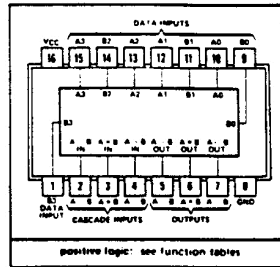


TTL  
MSI

**TYPES SN5485, SN54L85, SN54LS85, SN54S85,  
SN7485, SN74L85, SN74LS85, SN74S85**  
**4-BIT MAGNITUDE COMPARATORS**

BULLETIN NO. DLS 7611810, MARCH 1974 - REVISED OCTOBER 1978

SN5485, SN54LS85, SN54S85 ... J OR W PACKAGE  
SN7485, SN74LS85, SN74S85 ... J OR N PACKAGE  
(TOP VIEW)



TYPE	TYPICAL POWER DISSIPATION	TYPICAL DELAY	14 BIT WORDS
LS	275 mW	23 ns	
S	20 mW	90 ns	
SN	52 mW	74 ns	
LS	365 mW	11 ns	

FUNCTION TABLES

COMPARING INPUTS				CASCADING INPUTS			OUTPUTS		
A3 B3	A2 B2	A1 B1	A0 B0	A > B	A < B	A = B	A > B	A < B	A = B
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L

LS85, S85

A3 B3	A2 B2	A1 B1	A0 B0	A > B	A < B	A = B	A > B	A < B	A = B
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L

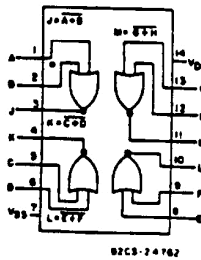
LS85, S85

A3 B3	A2 B2	A1 B1	A0 B0	A > B	A < B	A = B	A > B	A < B	A = B
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L
X X	X X	X X	X X	X	X	X	H	L	L
X X	X X	X X	X X	X	X	X	L	H	L

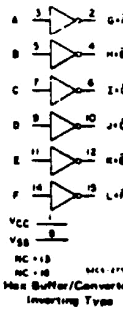
Description

These four-bit magnitude comparators perform comparison of straight binary and straight BCD (8-4-2-1) codes. Three fully decoded decisions about two 4-bit words (A, B) are made and are externally available at three outputs. These devices are fully expandable to any number of bits without external gates. Words of greater length may be compared by connecting comparators in cascade. The A > B, A < B, and A = B outputs of a stage handling less-significant bits are connected to the corresponding A > B, A < B, and A = B inputs of the next stage handling more-significant bits. The stage handling the least-significant bits must have a high-level voltage applied to the A = B input and in addition for the 'LS85, low-level voltages applied to the A > B and A < B inputs. The cascading paths of the 'B5, 'LS85, and 'S85 are implemented with only a two-gate level delay to reduce overall comparison times for long words. An alternate method of cascading which further reduces the comparison time is shown in the typical application data.

IC 4001  
Nr. 46 111 IC 21



Quad 2-Input NOR Gate  
CD4001A (Page 442)  
CD4001B (Page 50)  
CD4001UB (Page 54)



CD4049A (Page 364)  
CD4049UB (Page 184)

IC 4049  
Nr. 46 117 IC 41

TTL  
MSI

**TYPES SN5475, SN5477, SN54L75, SN54L77, SN54LS75, SN54LS77,  
SN7475, SN74L75, SN74L77, SN74LS75**  
**4-BIT BISTABLE LATCHES**

BULLETIN NO. DL 5 7611851, MARCH 1974—REVISED OCTOBER 1974

opc

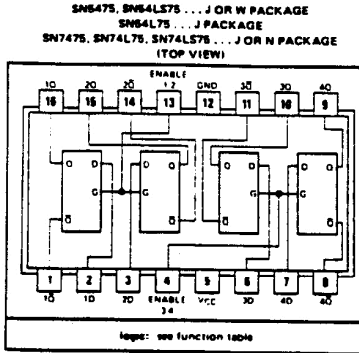
FUNCTION TABLE  
(Each Latch)

INPUTS		OUTPUTS	
D	G	Q	$\bar{Q}$
L	H	L	H
H	H	H	L
X	L	$Q_0$	$\bar{Q}_0$

X = irrelevant  
L = low level, H = high level  
Q<sub>0</sub> = the level of Q before the high-to-low transition of G

Description

These latches are ideally suited for use as temporary storage for binary information between processing and input/output or indicator units. Information present at a data (D) input is transferred to the Q output when the enable (G) is high and the Q output will follow the data input as long as the enable remains high. When the enable goes low, the information that was present at the data input at the time the transition occurred is retained at the Q output until the enable is permitted to go high.



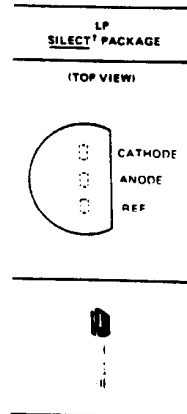
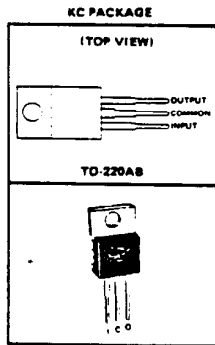
absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

supply voltage, VCC (see Note 1)	7 V
output voltage, '75, 'L75, '77, 'L77	5.5 V
'LS75, 'LS77	7 V
emitter voltage (see Note 2)	5.5 V
operating free-air temperature range: SN54', SN54L', SN54LS' Circuits	-55°C to 125°C
SN74', SN74L', SN74LS' Circuits	0°C to 70°C
storage temperature range	-65°C to 150°C

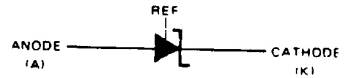
Note 1: See values except emitter voltage, are with respect to network ground terminal.  
Note 2: This is the voltage between two emitters of a multiple-emitter input transistor and is not applicable to the 'LS75 and 'LS77.

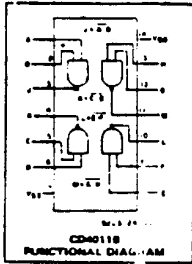
**TYPE TL7805AC**  
**3-PERCENT 5-VOLT REGULATOR**

BULLETIN NO. DL 5 12504, MARCH 1977—REVISED SEPTEMBER 1977

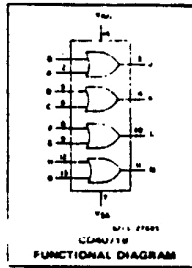


functional block diagram





IC 4011 B CMOS  
Nr. 46 102 IC 43



IC 4071 B  
Nr. 46 123 IC 42

**TIP3055**  
**NPN SINGLE-DIFFUSED MESA SILICON POWER TRANSISTOR**

THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB

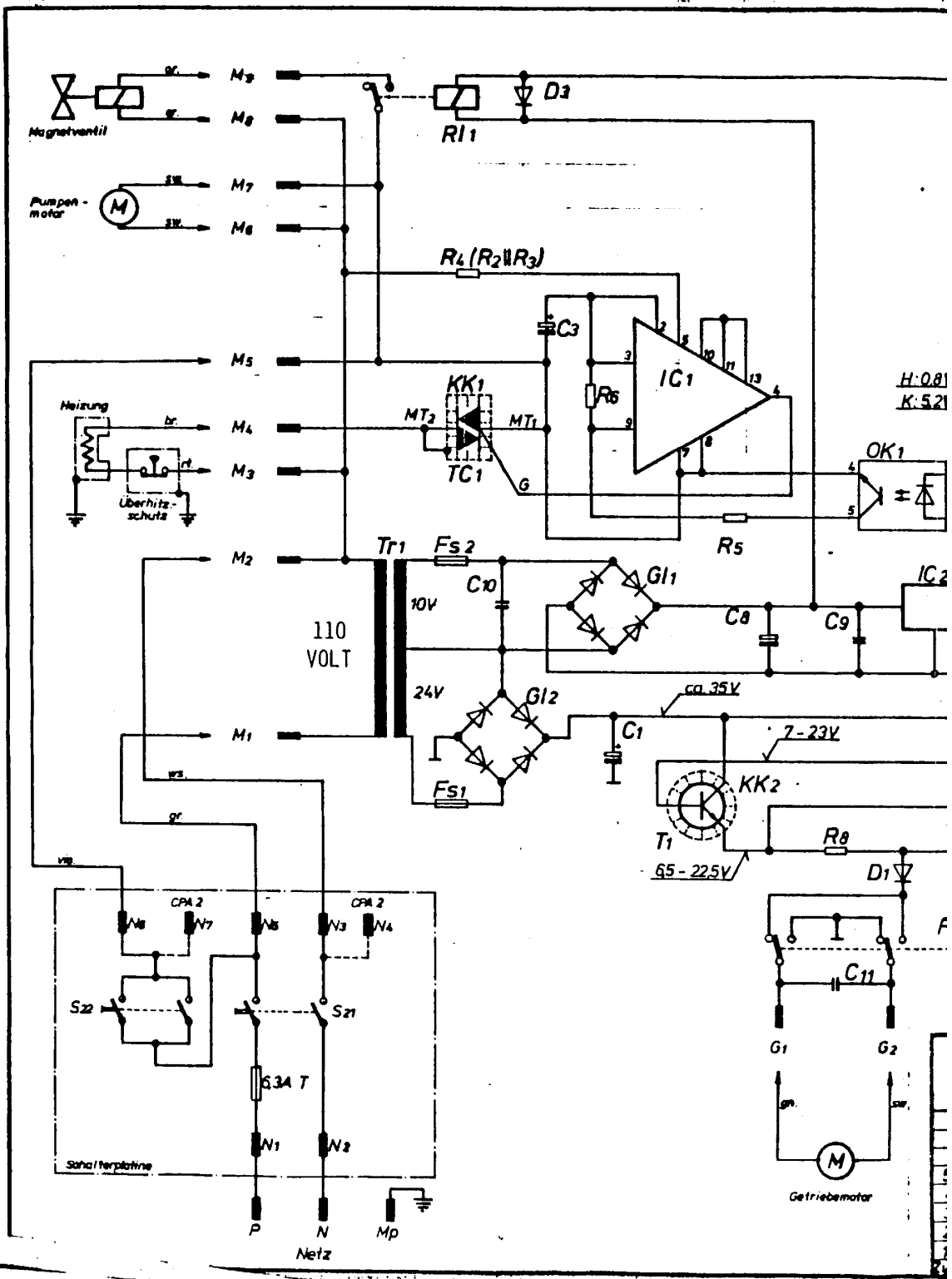
TRANSISTOR TIP 3055  
Nr. 44 005 T1 (OLD STYLE BOARD)



11.3 Power Supply/Control Board (#94004)

This section deals with the 110 volt version of the Power Supply/Control Board. A 220 volt version is available also. The part number for the 220 volt version is #94009. (Please note, conversion of a unit from 110 volt to 220 volt also requires replacement of the heating element, pump motor, and main power fuse.)

The Power Supply/Control Board has been manufactured in two different versions. Drawings and schematics are included for the "NEW STYLE" and "OLD STYLE" versions. The parts list is for the "NEW STYLE" version. Refer to the schematic diagrams for the "OLD STYLE" boards for part numbers for "OLD STYLE" boards.



H: 0.81  
K: 5.21

110 VOLT

10V

24V

ca. 35V

7-23V

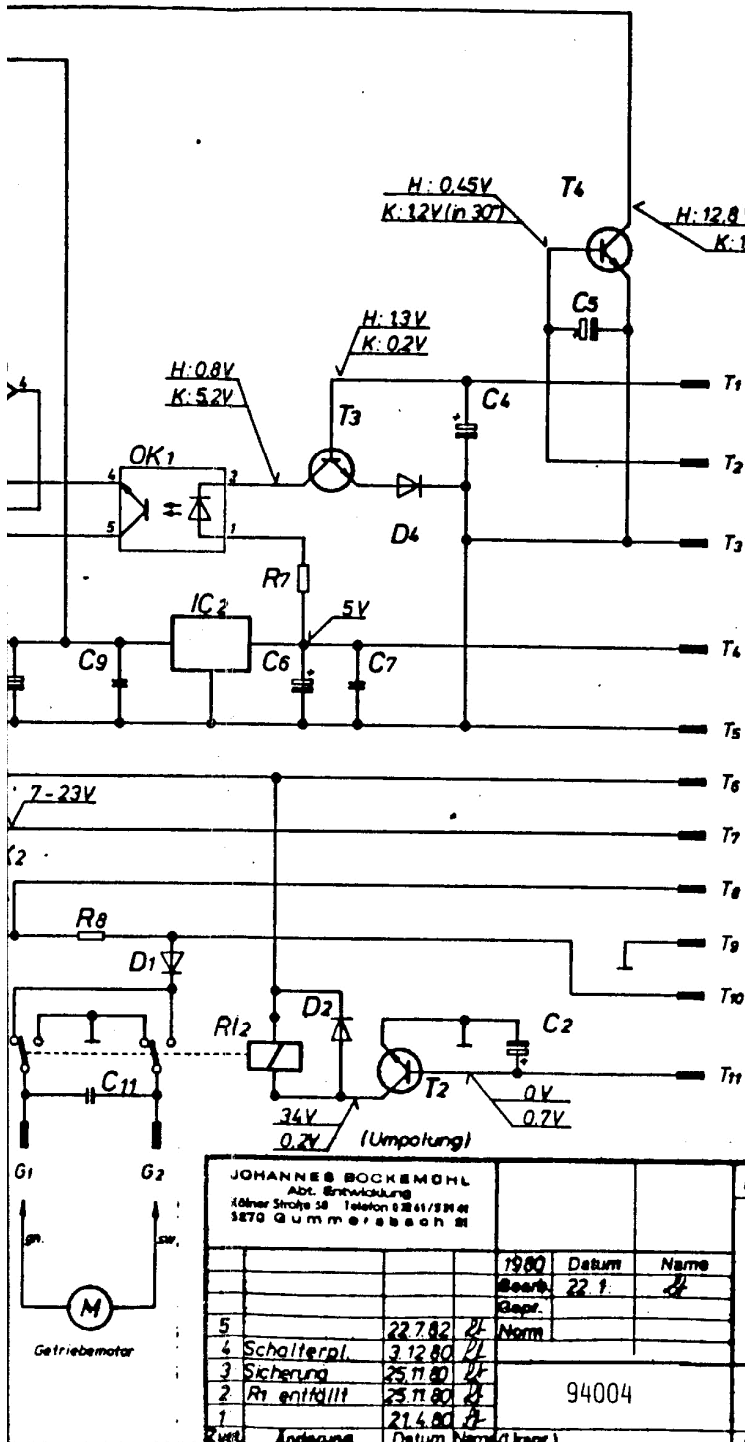
65-225V

Schalttafel

Netz

Getriebemotor





Spannung gegen T<sub>5</sub> gemessen

Spannung gegen T<sub>5</sub> gemessen

JOHANNES BOCKEMOHL Abt. Entwicklung 10liner Straße 58 · Telefon 03261/51141 5870 Gummersbach BR		1980	Datum	Name
		Bohr.	22.1	J
		Bohr.		
		Norm		
5	22.7.80	Zf		
4	3.12.80	Zf		
3	25.11.80	Zf		
2	25.11.80	Zf		
1	21.4.80	Zf		
KW	Auswertung	Datum	Name	(Unger)

Maßstab

NEW STYLE  
CPP-2 POWER / CONTROL BOARD  
SCHEMATIC DRAWING

94004

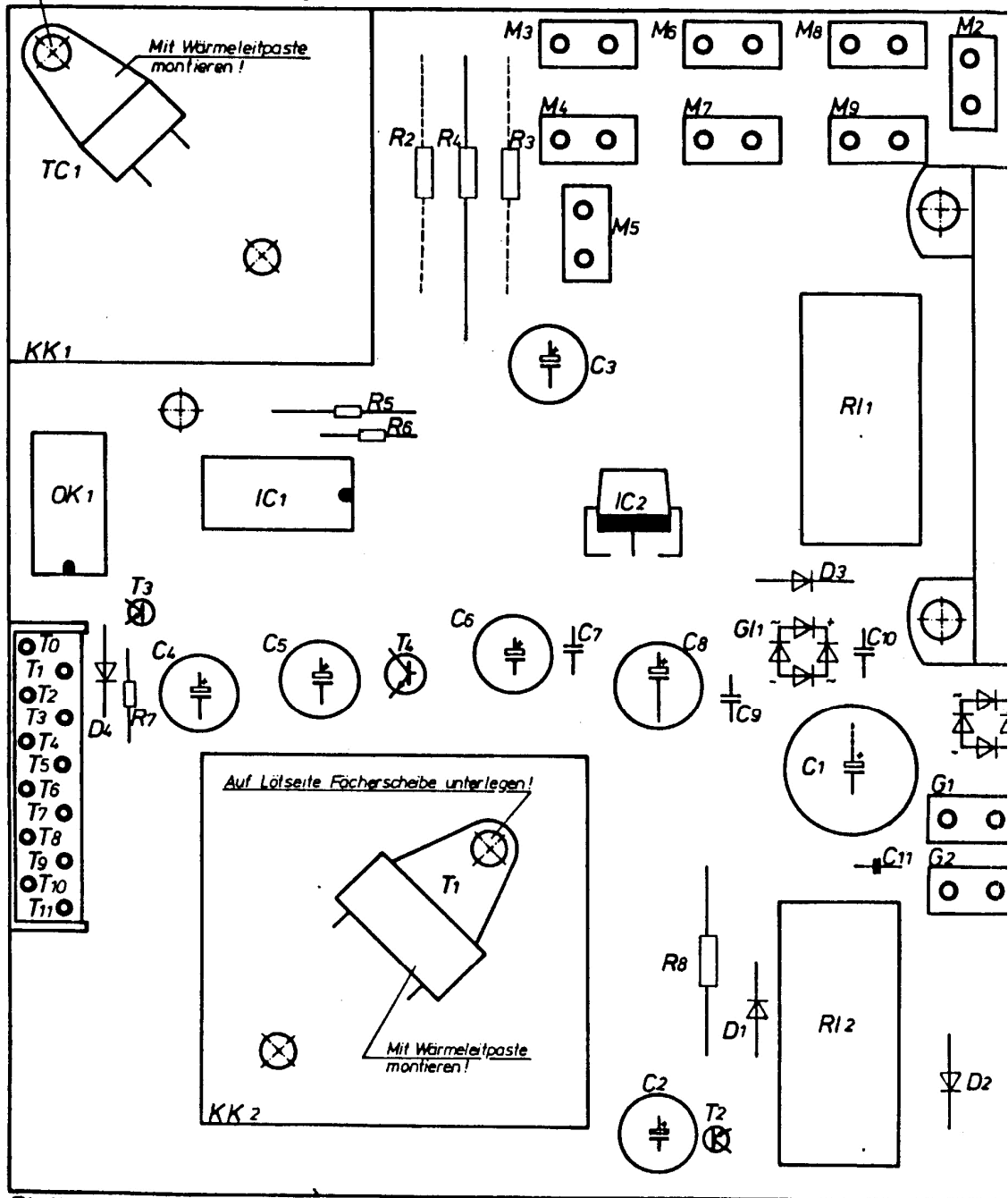
CPP 2

Blatt

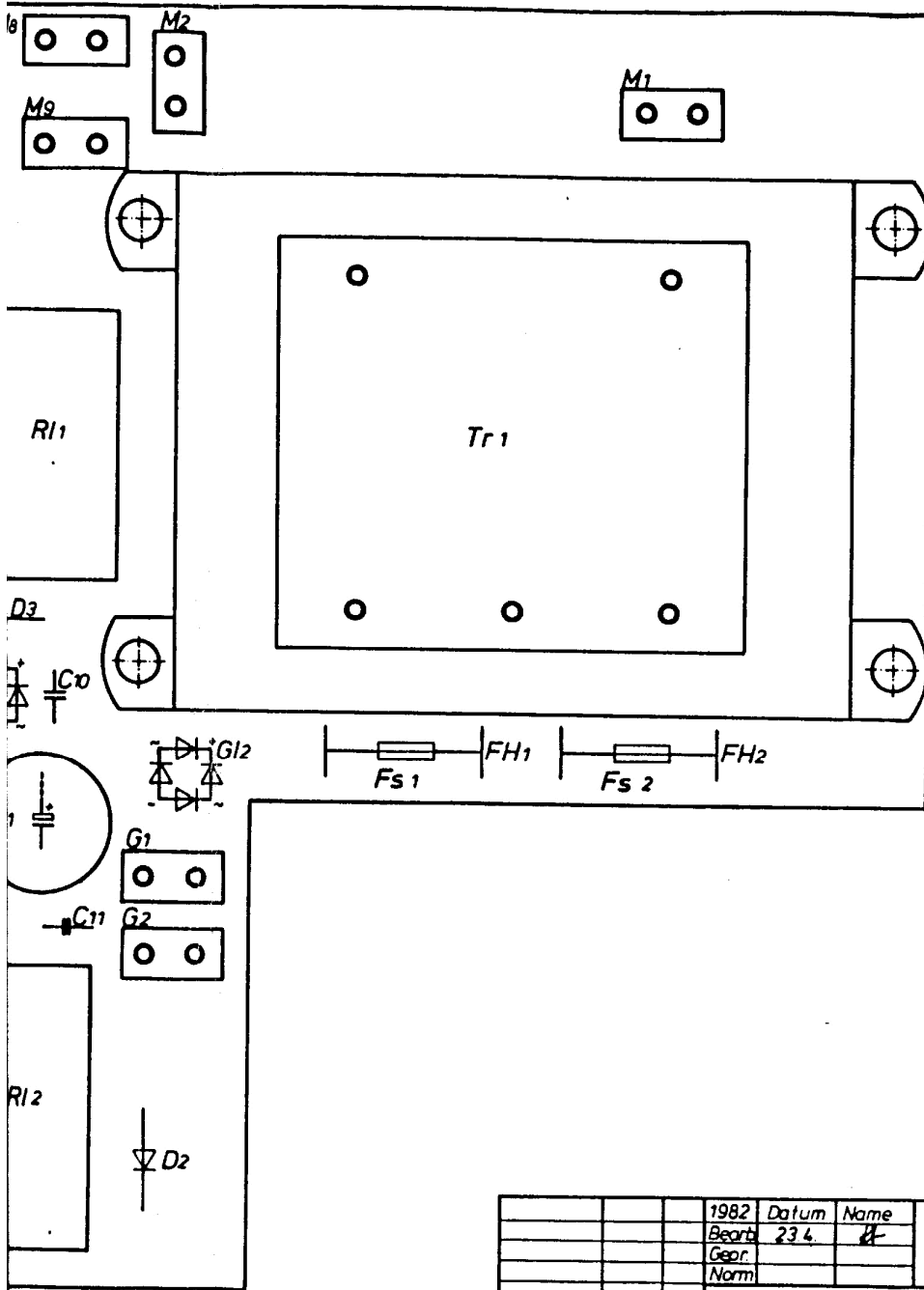
Bl.

52

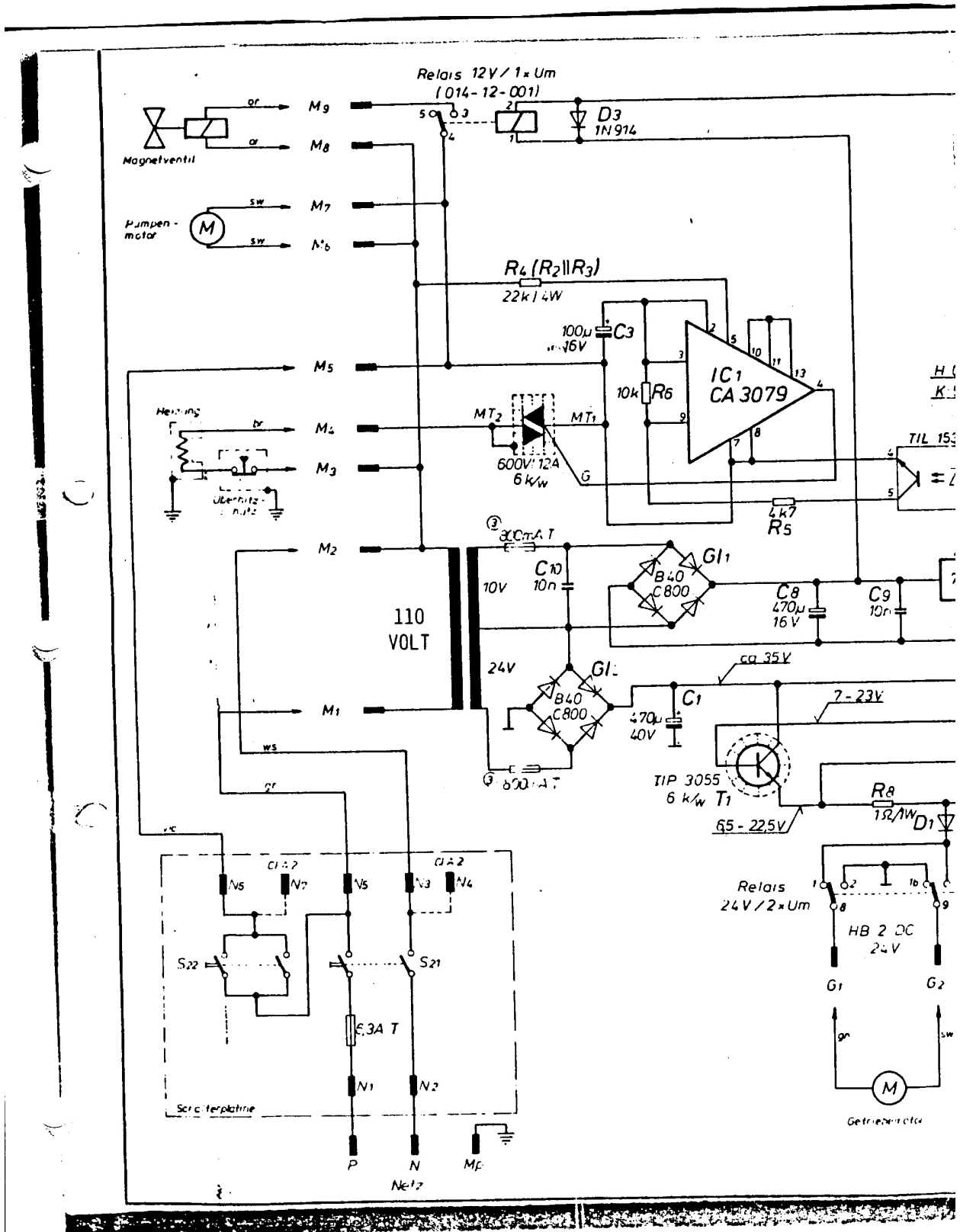
Auf Lötseite Fächerscheibe unterlegen!

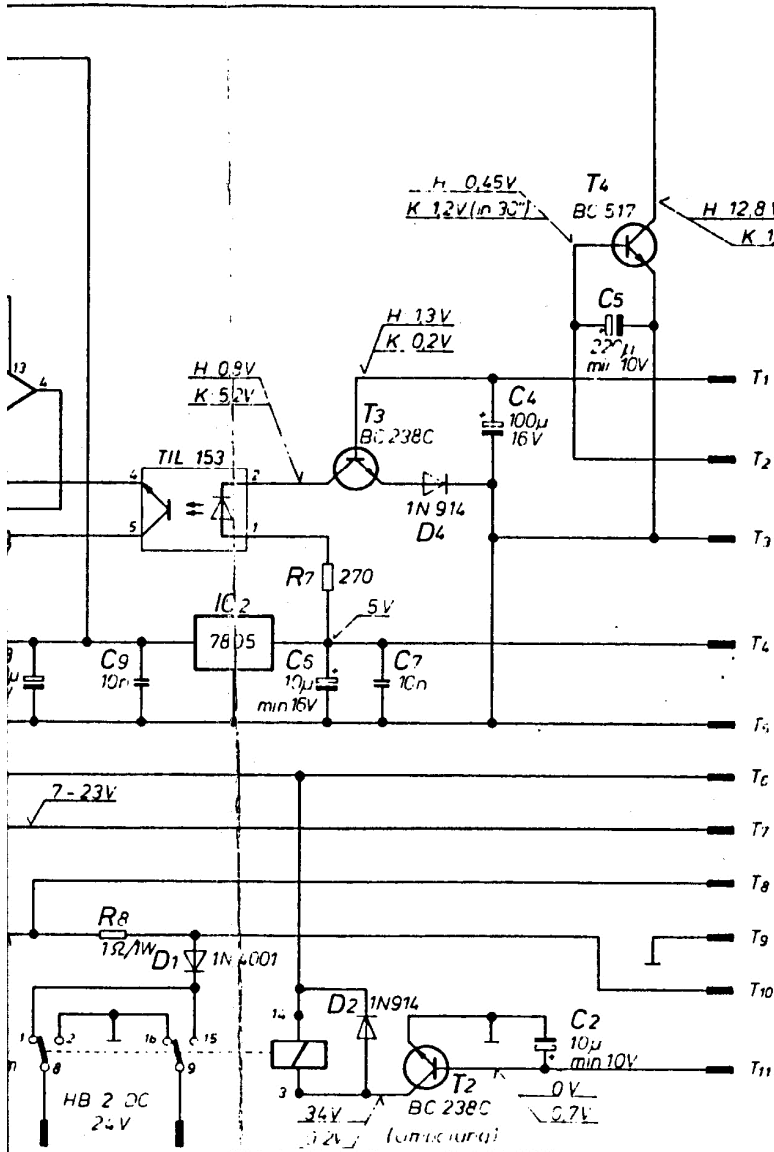


Platinen-Nr. 24 024  
ab 8243



			1982	Datum	Name	<b>JOBO-Labortechnik</b> GmbH u. Co. KG Postfach 810-18 D - 5270 Gummersbach 21
			Bearb.	23.4.	H	
			Gepr.			
			Norm			
						NEW STYLE CPP-2 POWER/CONTROL BOARD PARTS DRAWING
	2	12.83	H			
	1	22.82	H			
	Aenderung	Datum	Name			
94004						





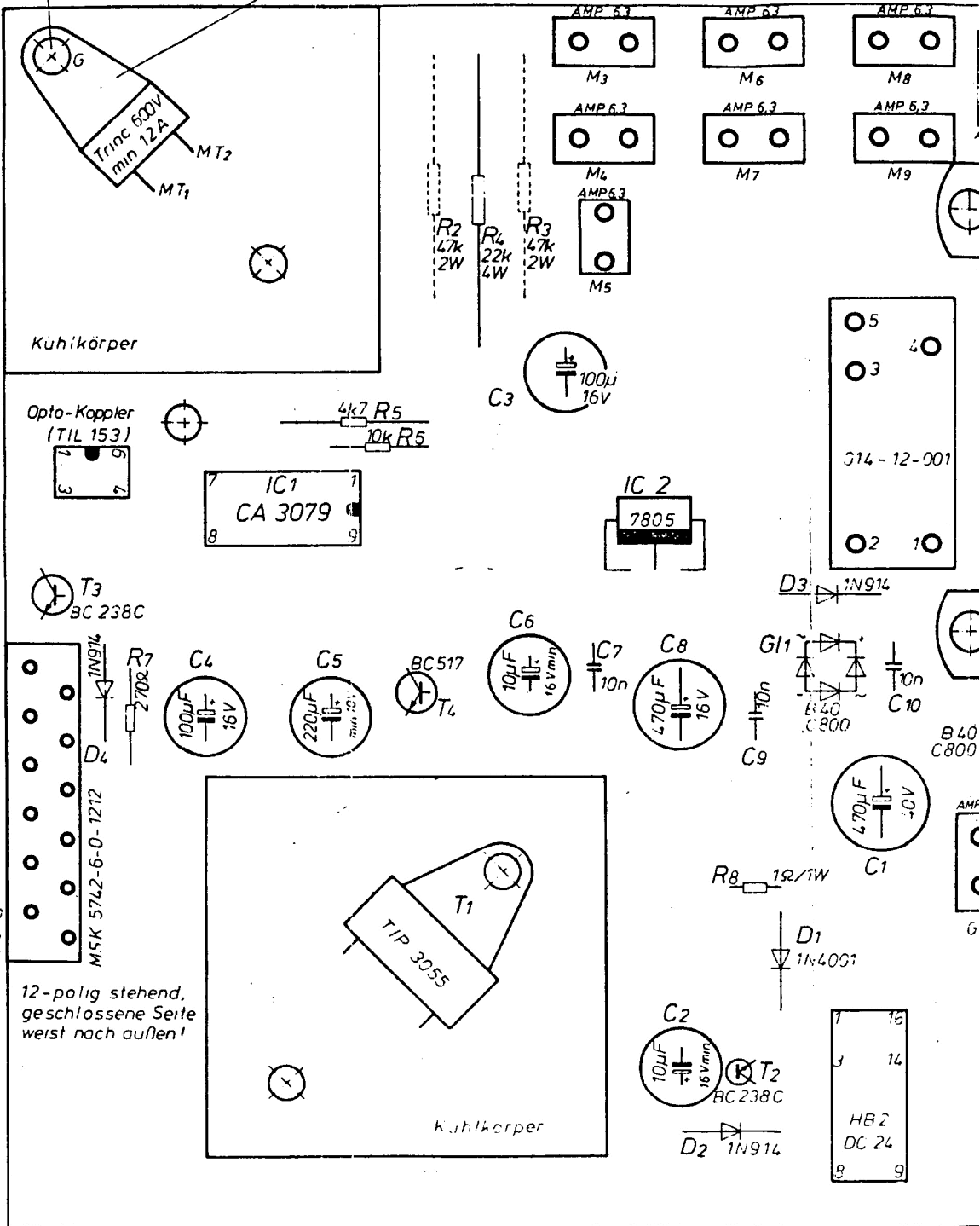
Spannung gegen T5 gemessen

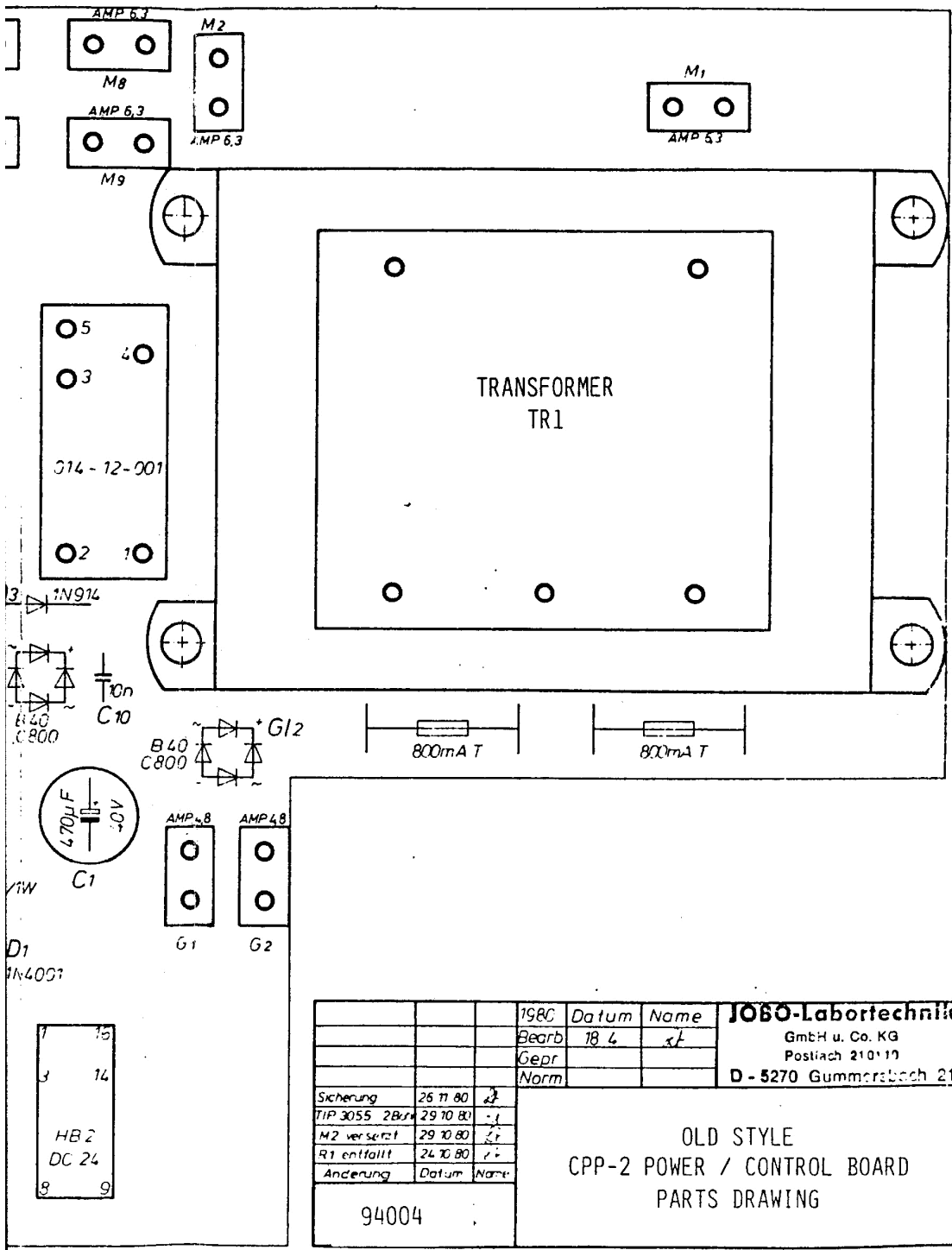
Spannung gegen T9 gemessen

<b>JOBO-Labortechnik</b> GmbH u. Co. KG Postfach 210110 D - 5270 Gummersbach 21		Maßstab	
1980 Datum Bearb. 22.1 Gepr. Norm		Name 94004	
S. T. G. 10.12.80 S. T. G. 10.12.80 S. T. G. 10.12.80 S. T. G. 10.12.80 S. T. G. 10.12.80		OLD STYLE CPP-2 POWER / CONTROL BOARD SCHEMATIC DRAWING	
Änderung Datum Name (Urspr.)		Blatt CPP 2 B	

Auf Lotseite  
Facherscheibe  
unterlegen!

Mit Wärmepaste montieren!





BOARD #94004  
PARTS LIST

INVENTORY NUMBER	REF	DESCRIPTION
40123	R3	47K, 8 WATT
40116	R4	560K, 7 WATT RESISTOR
40100	R5	4.7K, 1/4 WATT RESISTOR
40110	R6	10K, 1/4 WATT RESISTOR
40026	R7	270 OHM, 1/4 WATT
40032	R8	1 OHM POWER RESISTOR
41012	C1	470 $\mu$ F, 40 VOLT ELECTROLYTIC
41001	C2	10 $\mu$ F ELECTROLYTIC CAPACITOR
41013	C3	100 $\mu$ F, 16 VOLT CAPACITOR
41013	C4	100 $\mu$ F, 16 VOLT CAPACITOR
41014	C5	220 $\mu$ F 16 VOLT CAPACITOR
41001	C6	10 $\mu$ F ELECTROLYTIC CAPACITOR
41301	C7	10 $\mu$ F, 63 VOLT CAPACITOR
41011	C8	470 $\mu$ F 16 VOLT ELECTROLYTIC
41301	C9	10 $\mu$ F, 63 VOLT CAPACITOR



CPP-2 Service Data

October 1, 1991

BOARD #94004  
PARTS LIST

INVENTORY NUMBER	REF	DESCRIPTION
41301	C10	10 $\mu$ F, 63 VOLT CAPACITOR
41303	C11	100PF, DISC CAPACITOR
42002	D1	IN4001 DIODE
42001	D2	IN914 DIODE
42001	D3	IN914 DIODE
42001	D4	IN914 DIODE
42301	GL1	BRIDGE RECTIFIER
42310	GL2	BRIDGE RECTIFIER B 40 C 1500
44011	T1	TIP 140 TRANSISTOR
44009	T2	TRANSISTOR BC 337 -40
44001	T3	BC238CP TRANSISTOR
44004	T4	BC517 TRANSISTOR
45004	ICI	CA 3079 I.C.
45201	IC2	7805 VOLTAGE REGULATOR
44101	TC1	TIC 246 TRIAC

CPP-2 Service Data

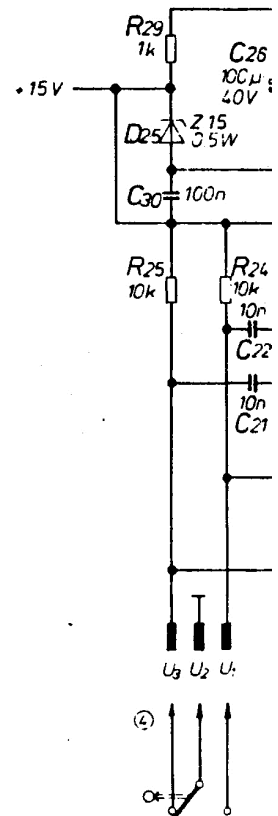
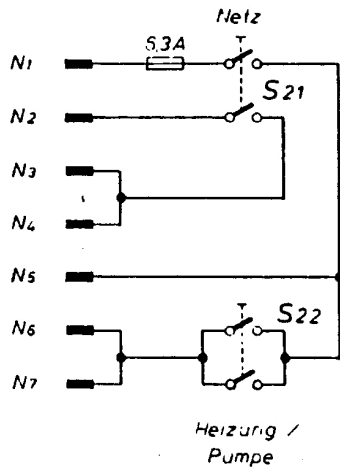
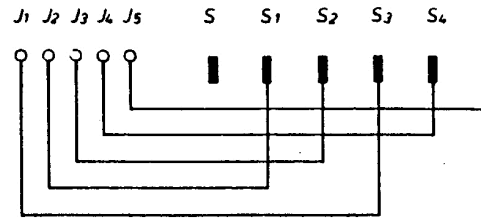
October 1, 1991

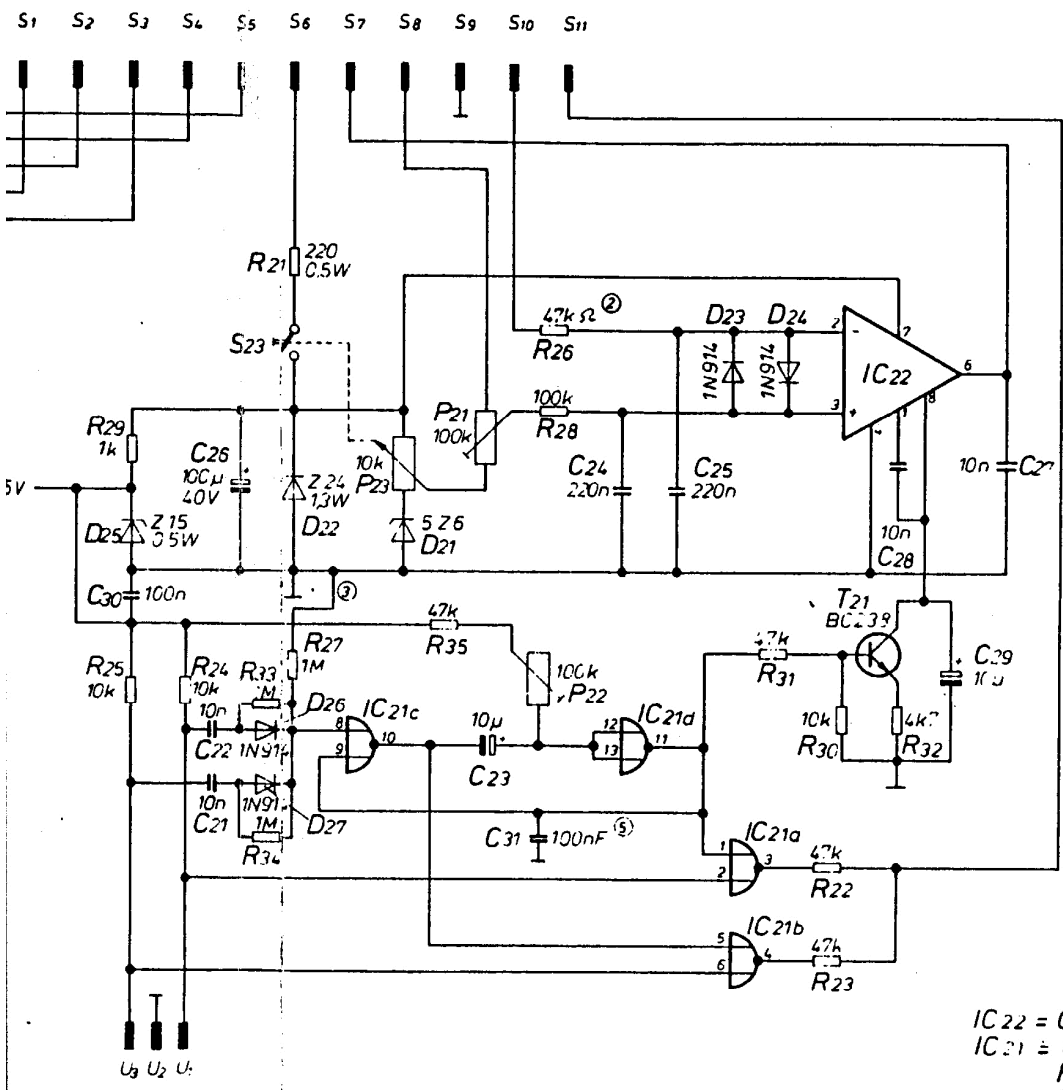
BOARD #94004  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
44041	KK1	HEAT SINK
44041	KK2	HEAT SINK
25036	T0-11	CONNECTOR
43004	OK1	OPTO COUPLER FOR NEW CPP/A
21008	RL1	CPP SOLENOID RELAY FOR NEW STYLE BOARD
21009	R12	CPP/A MOTOR RELAY FOR NEW STYLE BOARD
48030	TR1	CPP-2 NEW STYLE TRANSFORMER
27017	FS1	1.25 AMP TYPE T FUSE
27008	FS2	800 MA TYPE T FUSE
27001	FH1	FUSE HOLDER
27001	FH2	FUSE HOLDER
25016	G1	MALE STAKON
25016	G2	MALE STAKON
25005	M1-M9	MALE STAKON TERMINAL
40123	R2	47K, 8 WATT

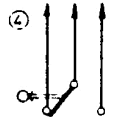
11.4 Switch/Motor Board (# 95114)

The Switch/Motor Board has been manufactured in two different versions. Drawings and schematics are included for the "NEW STYLE" and "OLD STYLE" versions. The parts list is for the "NEW STYLE" version. Refer to the schematic diagrams for the "OLD STYLE" boards for part numbers for "OLD STYLE" boards.

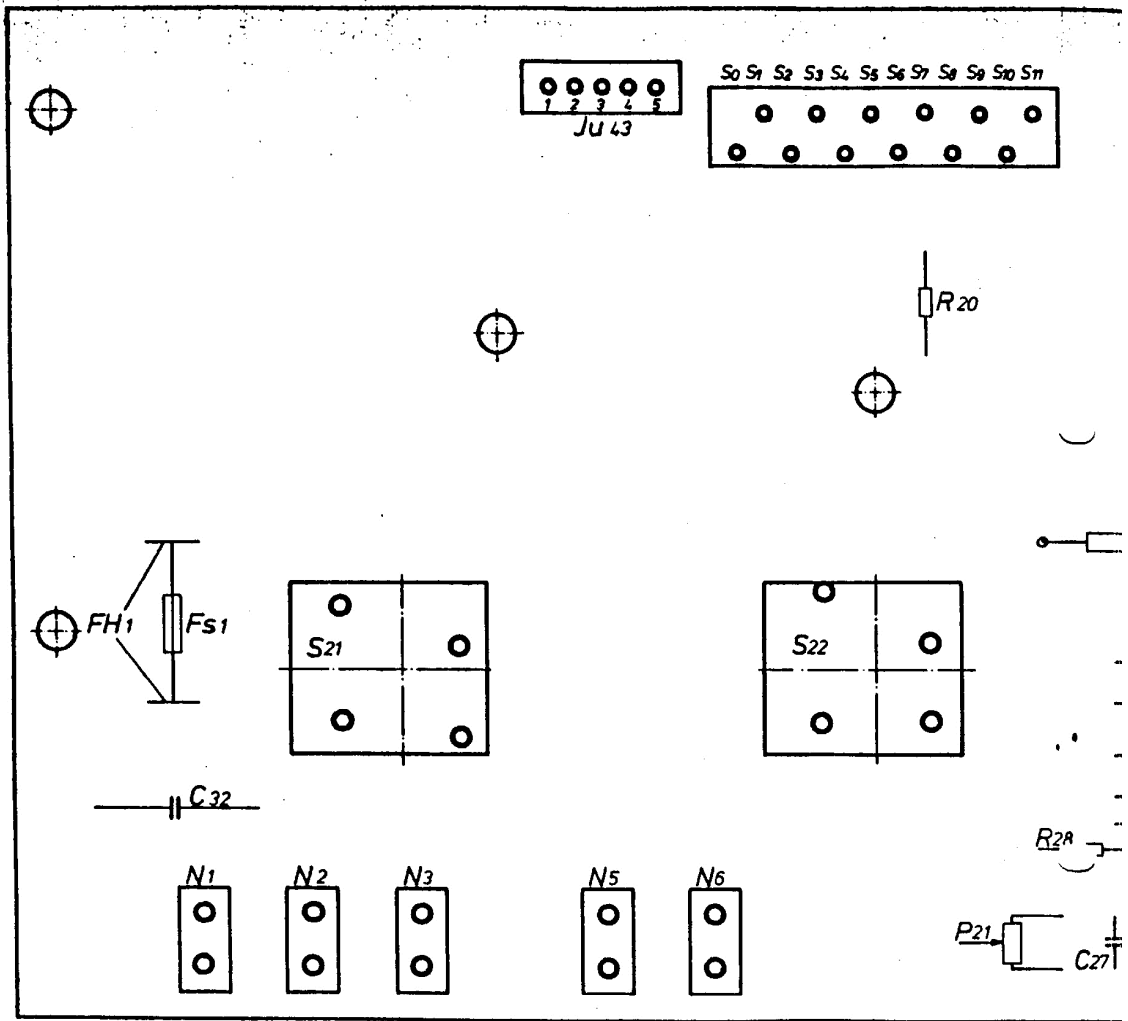




IC22 = CA 3140 E  
 IC21 = 4001  
 PIN 7 = Vs.  
 PIN 14 = VdL

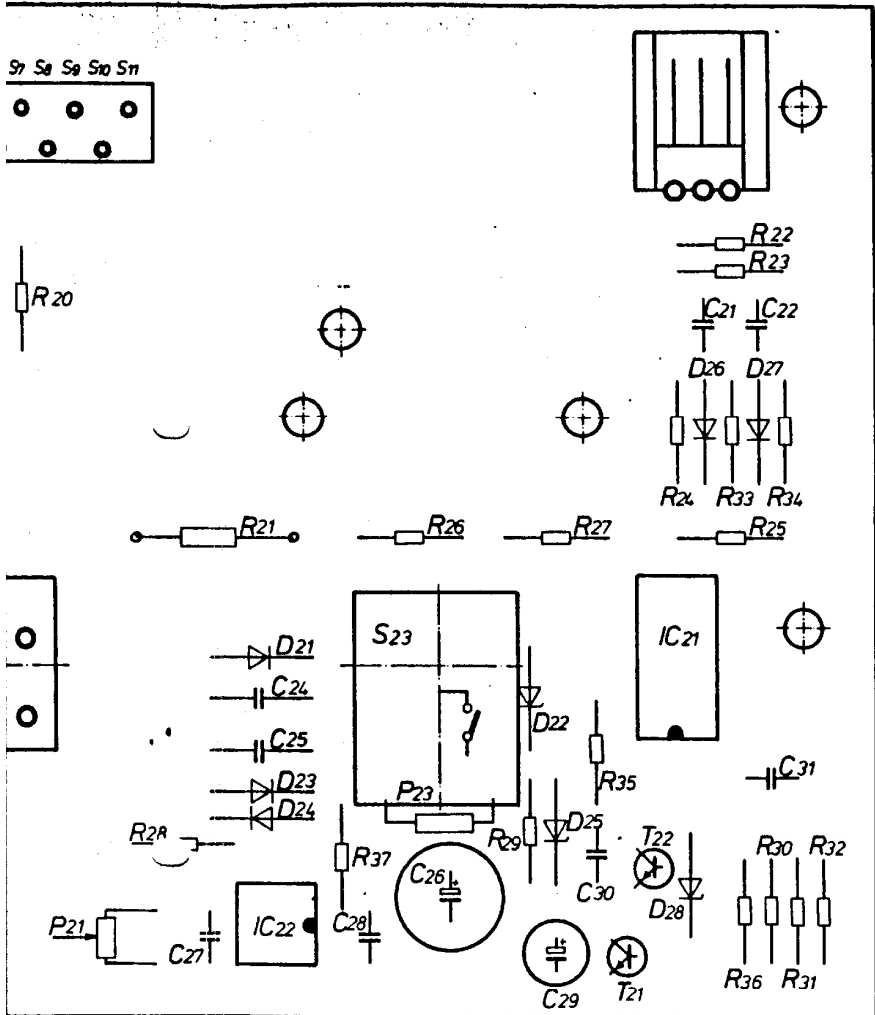


<b>JOBO-Labortechnik</b> GmbH u. Co. KG Postfach 210110 D - 5270 Gummersbach 21			Maßstab		
1980 Bearb. Gepr. Norm	Datum 21.1	Name [Signature]	OLD STYLE CPP-2 SWITCH / MOTOR BOARD SCHEMATIC DRAWING		
5 Cn 100 stück 20 4 3 Anschluss 122 2 100-4k 1	5.2.81 3.12.80 3.12.80 20.8.80 21.4.81	95114			
Änderung Datum Name (Urspr.)			(Ers. l.)		(Ers. d.)



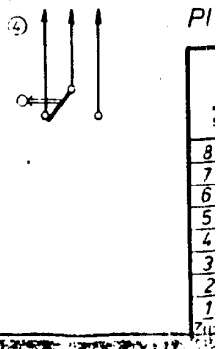
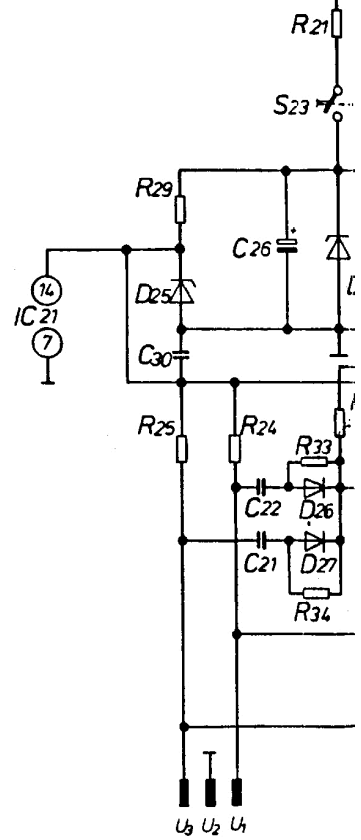
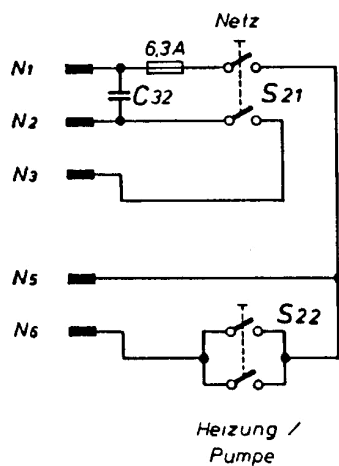
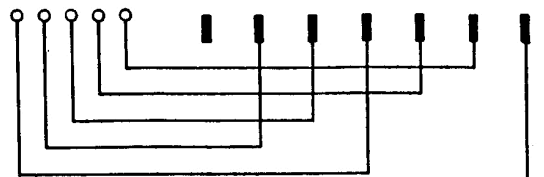
Platinen -Nr.: 24 025  
 ab 8332

H<sub>2</sub>



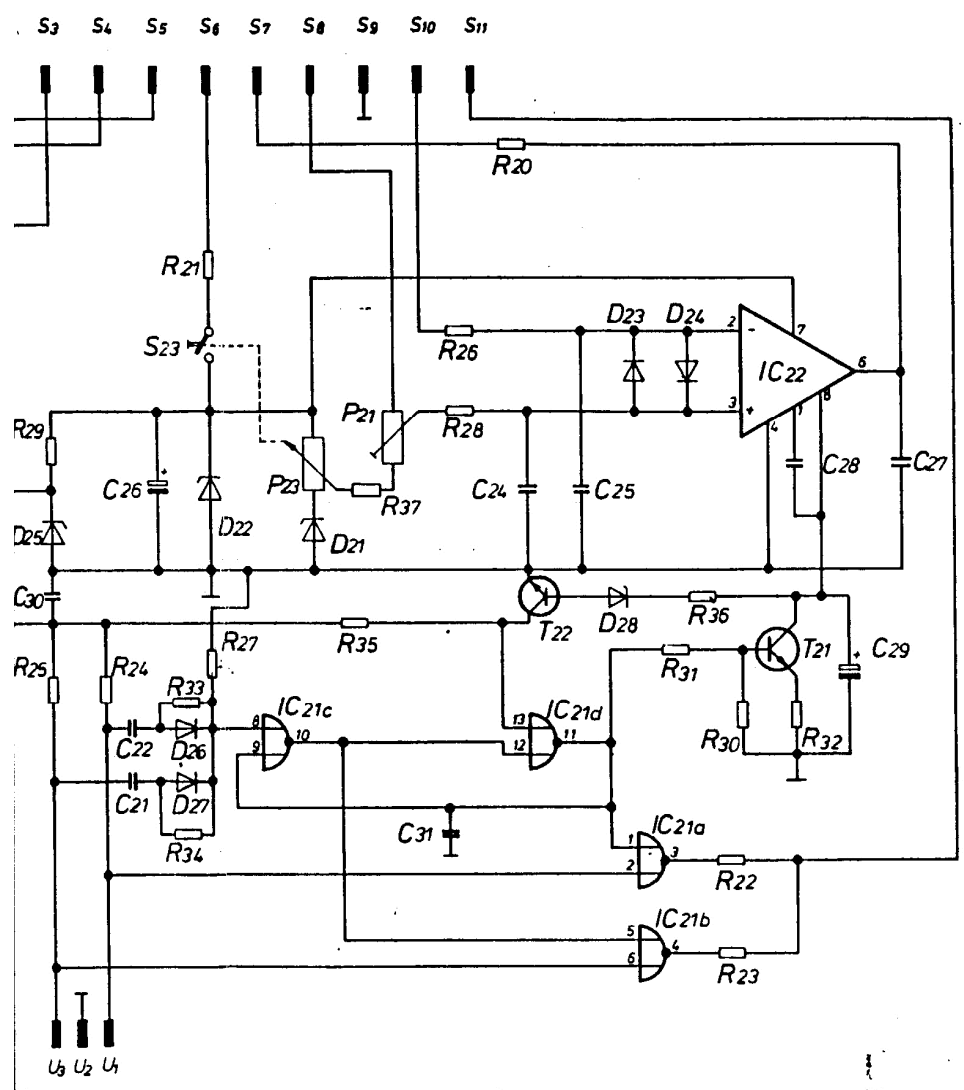
			1983	Datum	Name
			Beart	1.2.	Pf
			Gepr	1.2.	Pz
			Norm		
R37	16	1283			
Anderung			Datum		Name
95 114			NEW STYLE CPP -2 SWITCH / MOTOR BOARD PARTS DIAGRAM		

J1 J2 J3 J4 J5 S S1 S2 S3 S4 S5 S6





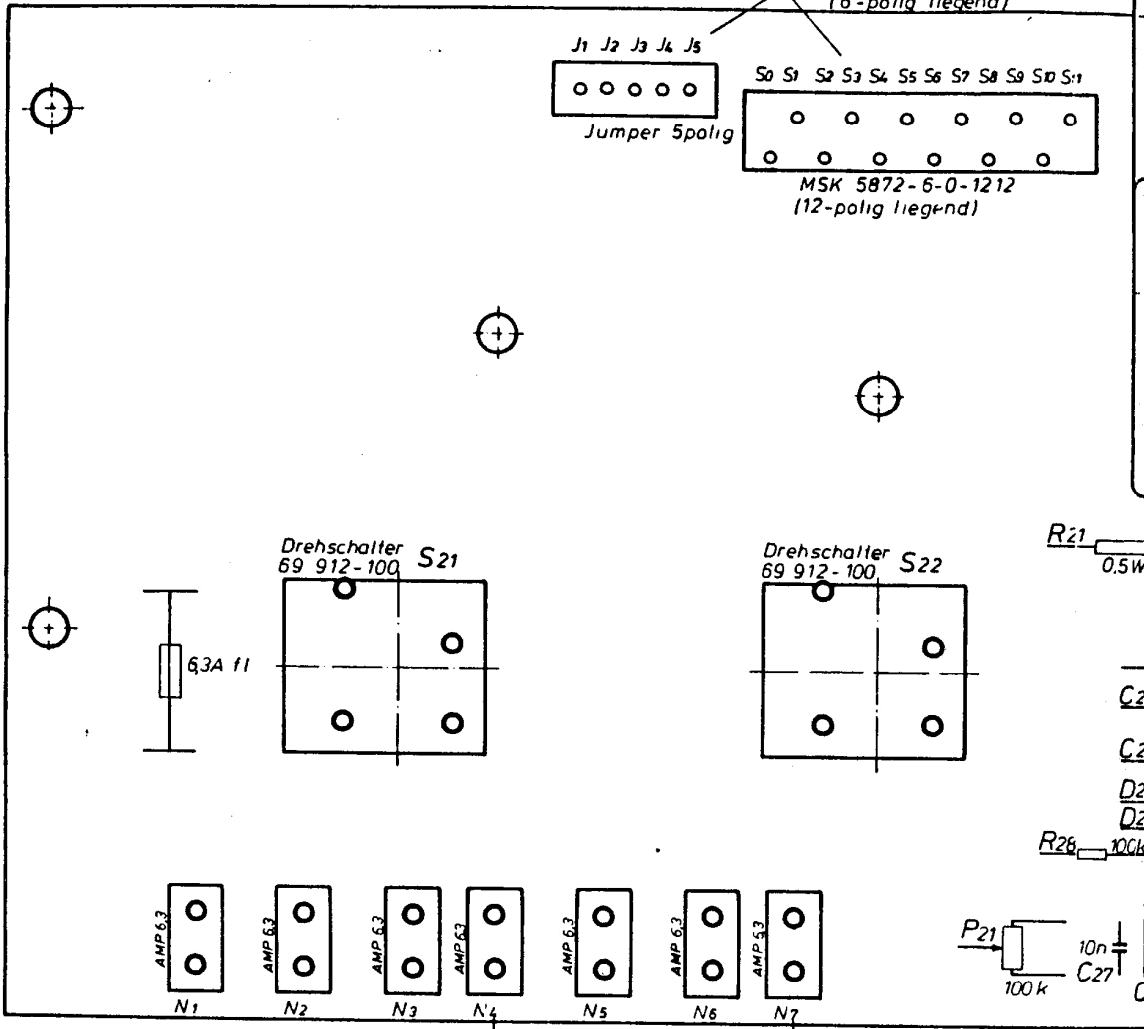
(H)



Platinen - Nr.: 24.025 / ab 8332

JOHANNES KEIMMEL				Maßstab		
8	R37	16.12.83	J	1980	Datum	Name
7	C32	20.4.83	J	Bearb.	21.1	JF
6		15.6.82	JF	Gepr.		
5	C31 100 statt 220	6.2.81	JF	Norm		
4		3.12.80	JF			
3	Anschluß R27	3.12.80	JF			
2	R26 100-47k	20.8.80	JF			
1		21.4.80	JF			
Zust. Änderung Datum Name (Uj/scr)				95 114		Blatt
						CPP 2
				(Ers f.)		(Ers d.)

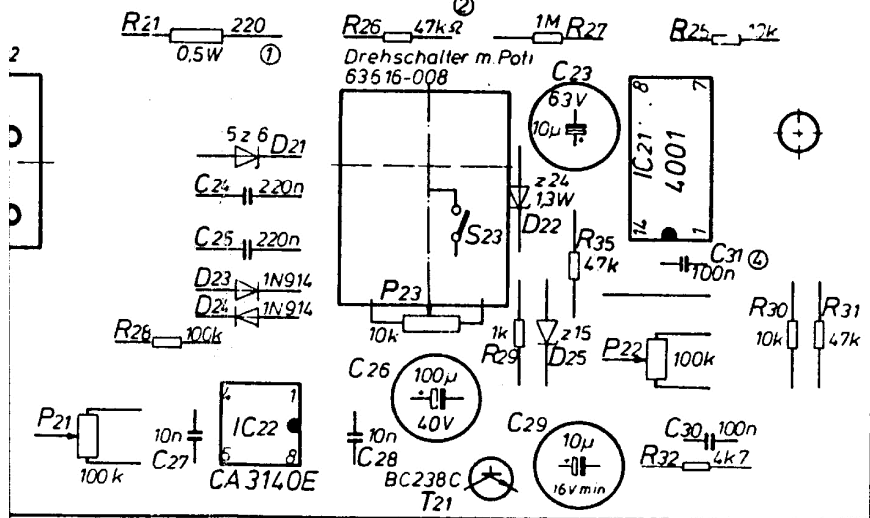
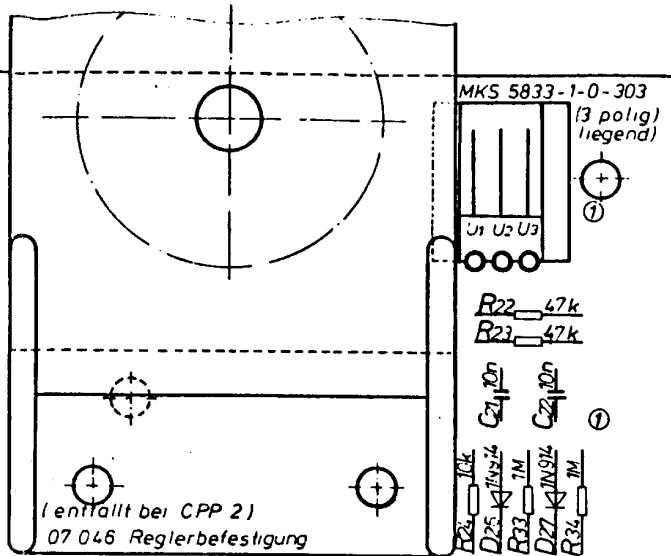
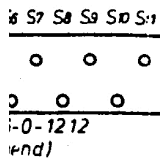
Bei Ausführung CPA 2 entfallen  
 J1 - J5 und S0 - S5. S6 - S11 werden  
 mit MKS 5856-6-0-606 bestückt  
 (6-polig liegend)



Bei Ausführung CPP 2  
 entfallen N1 und N7

fallen  
werden  
gesteckt  
(liegend)

(H) 2



			1980	Datum	Name	<b>JOBO-Labortechnik</b> GmbH u. Co. KG Postfach 210110 D - 5270 Gummersbach
			Bearb	21.6	J	
			Gepr			
			Norm			
C31 220-100n	5 2 81	J				OLD STYLE CPP-2 SWITCH / MOTOR BOARD PARTS DIAGRAM
R26 100-47k	20 8 80	J				
1	30 7 80	J				
Anderung	Datum	Name				
95114						

BOARD #95114  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
40018	R20	100 OHM, 1/4 WATT RESISTOR
40024	R21	220 OHM, 1/4 WATT RESISTOR
40124	R22	47K, 1/4 WATT RESISTOR
40124	R23	47K, 1/4 WATT RESISTOR
40110	R24	10K, 1/4 WATT RESISTOR
40110	R25	10K, 1/4 WATT RESISTOR
40124	R26	47K, 1/4 WATT RESISTOR
40142	R27	1 MEG, 1/4 WATT RESISTOR
40128	R28	100K, 1/4 WATT RESISTOR
40060	R29	1K, 1/4 WATT RESISTOR
40110	R30	10K, 1/4 WATT RESISTOR
40124	R31	47K, 1/4 WATT RESISTOR
40100	R32	4.7K, 1/4 WATT RESISTOR
40142	R33	1 MEG, 1/4 WATT RESISTOR
40142	R34	1 MEG, 1/4 WATT RESISTOR

BOARD #95114  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
40124	R35	47K, 1/4 WATT RESISTOR
40142	R36	1 MEG, 1/4 WATT RESISTOR
40126	R37	75K, 1/4 WATT RESISTOR
40420	P21	22K CARBON POTENTIOMETER
40416	P23	100K POTENTIOMETER
41301	C21	10 $\mu$ F, 63 VOLT CAPACITOR
41301	C22	10 $\mu$ F, 63 VOLT CAPACITOR
41258	C24	.22 $\mu$ F, 63 VOLT
41258	C25	.22 $\mu$ F, 63 VOLT
41010	C26	100 $\mu$ F, 40 VOLT
41301	C27	10 $\mu$ F, 63 VOLT CAPACITOR
41301	C28	10 $\mu$ F, 63 VOLT CAPACITOR
41020	C29	10 $\mu$ F ELECTROLYTIC
41303	C30	100PF, DISC CAPACITOR
41303	C31	100PF, DISC CAPACITOR

BOARD #95114  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
41212	C32	
42102	D21	5.6 VOLT ZENER DIODE
42108	D22	24 VOLT ZENER DIODE
42001	D23	IN914 DIODE
42001	D24	IN914 DIODE
42107	D25	15 VOLT ZENER DIODE
42001	D26	IN914 DIODE
42001	D27	IN914 DIODE
42103	D28	6.8 VOLT ZENER DIODE
44001	T21	BC238CP TRANSISTOR
44001	T22	BC238CP TRANSISTOR
46111	IC21	4001 I.C.
45005	IC22	CA 3240E I.C.
20020	S21	CPP/A ON/OFF SWITCH NEW STYLE
20020	S22	CPP/A ON/OFF SWITCH OLD STYLE

CPP-2 Service Data

October 1, 1991

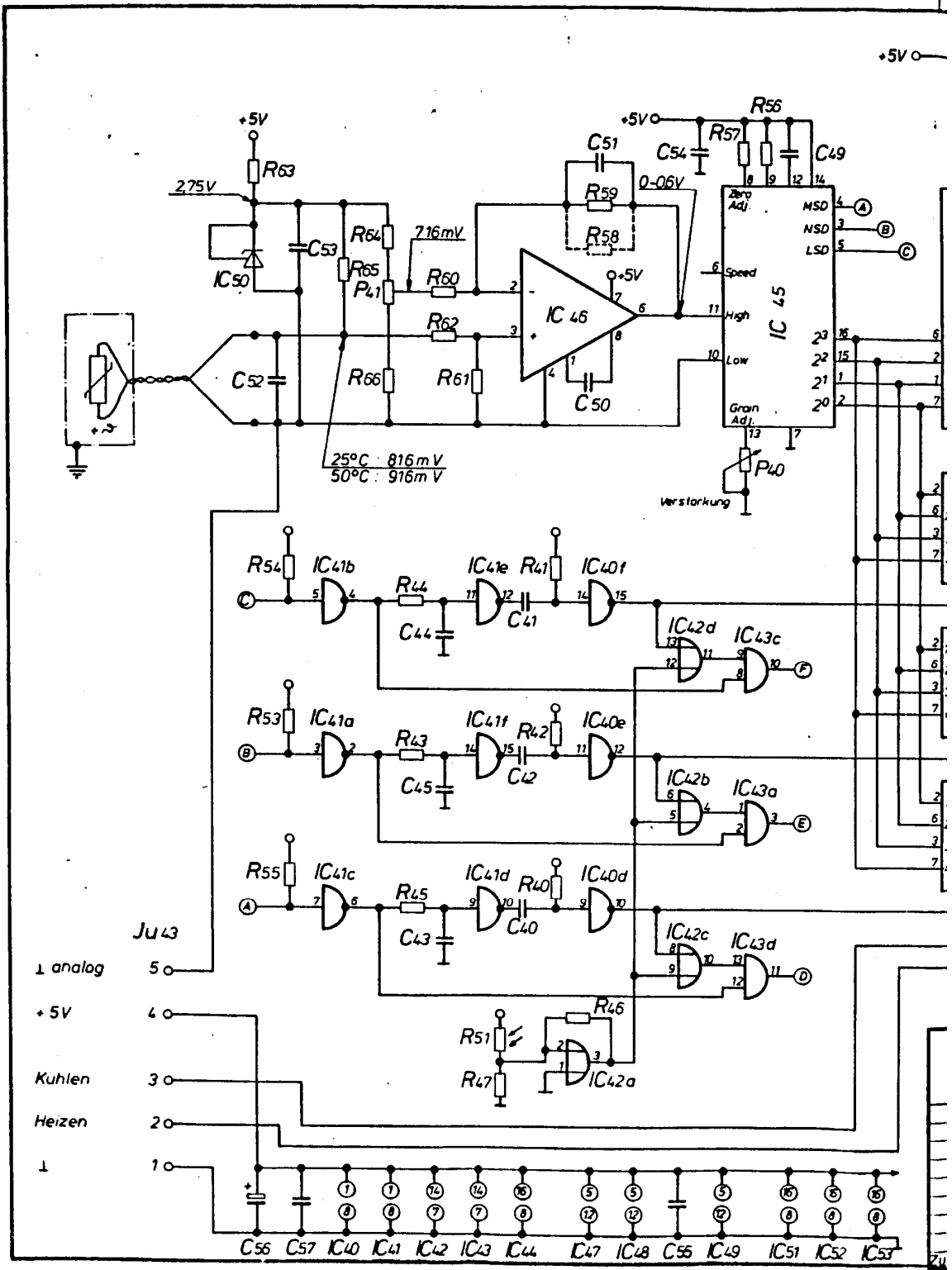
BOARD #95114  
PARTS LIST

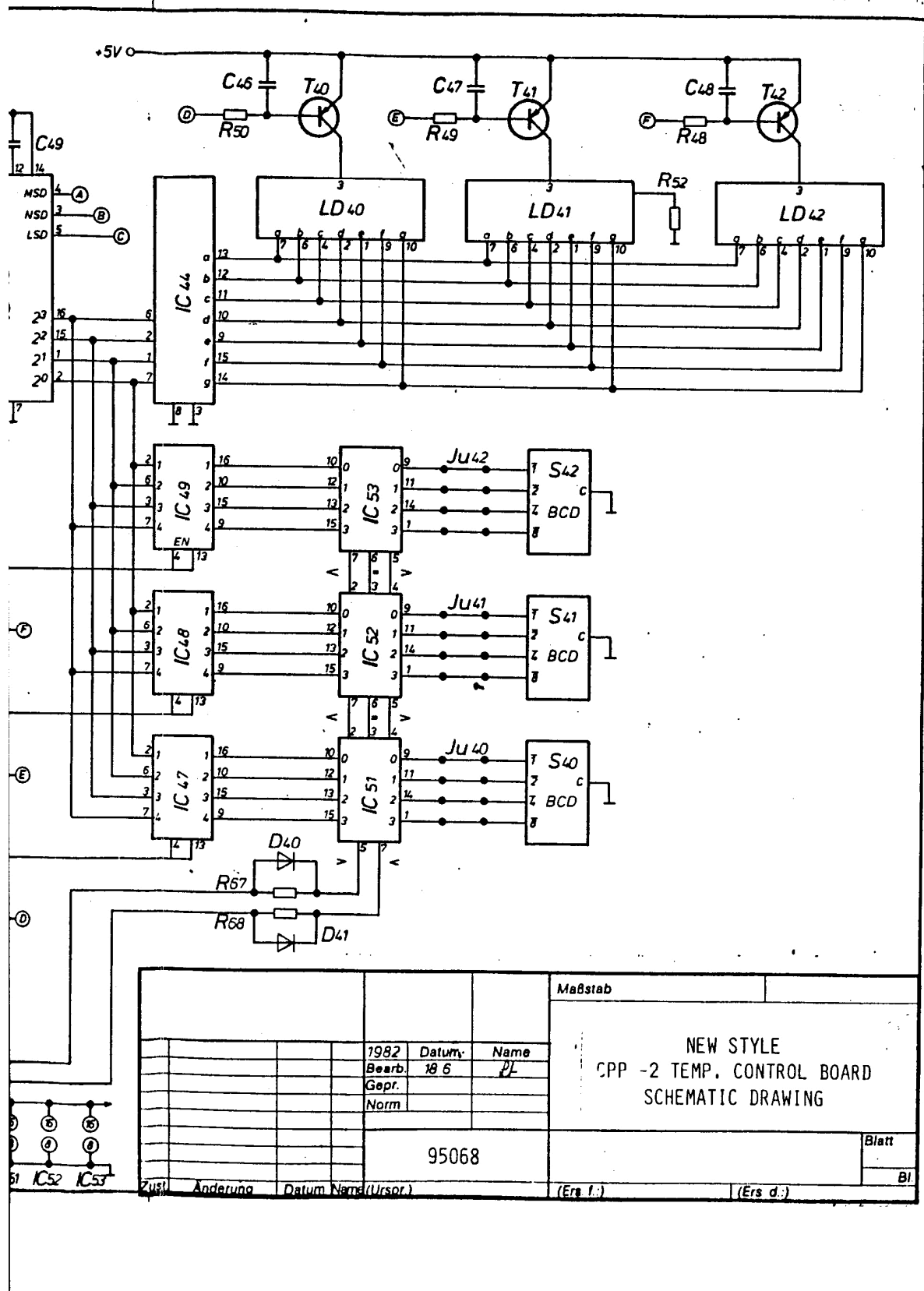
INVENTORY NUMBER	REF.	DESCRIPTION
20019	S23	CPP-2 MOTOR SPEED POT.
25037	S0-11	CONNECTOR
27005	FS1	6.3 AMP TYPE T FUSE
27001	FH1	FUSE HOLDER
25040	$\mu$ 1-3	CONNECTOR
25005	N1	MALE STAKON TERMINAL
25005	N2	MALE STAKON TERMINAL
25005	N3	MALE STAKON TERMINAL
25005	N5	MALE STAKON TERMINAL
25005	N6	MALE STAKON TERMINAL

11.5 Temperature Control Board (# 94008)

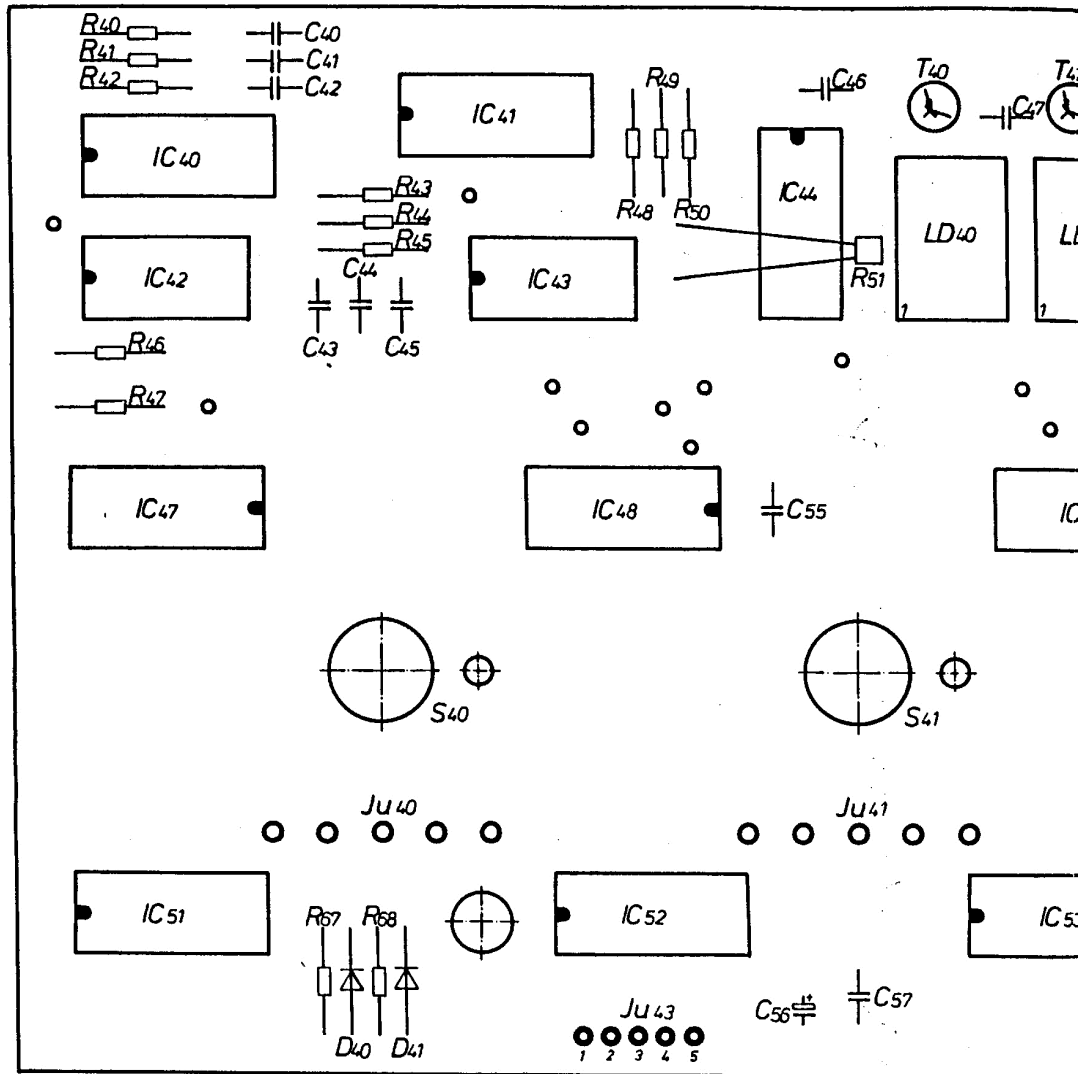
The Temperature Control Board has been manufactured in two different versions. Drawings and schematics are included for the "NEW STYLE" and "OLD STYLE" versions. The parts list is for the "NEW STYLE" version. Refer to the schematic diagrams for the "OLD STYLE" boards for part numbers for "OLD STYLE" boards.



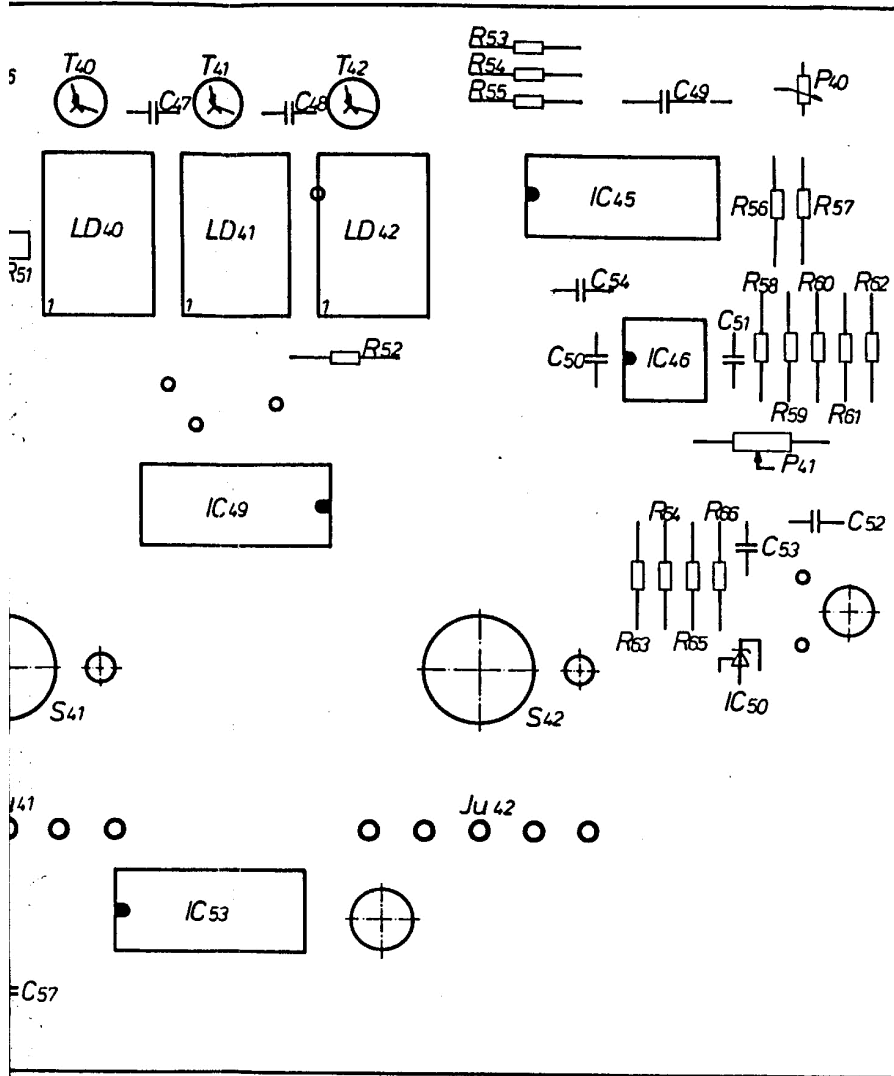




			Maßstab		
			NEW STYLE CPP -2 TEMP. CONTROL BOARD SCHEMATIC DRAWING		
1982	Datum	Name			
Bearb.	18 6	PL			
Gepr.					
			Blatt		
95068			Bl		
Zust.	Änderung	Datum	Name (Urspr.)	(Ers f.)	(Ers d.)

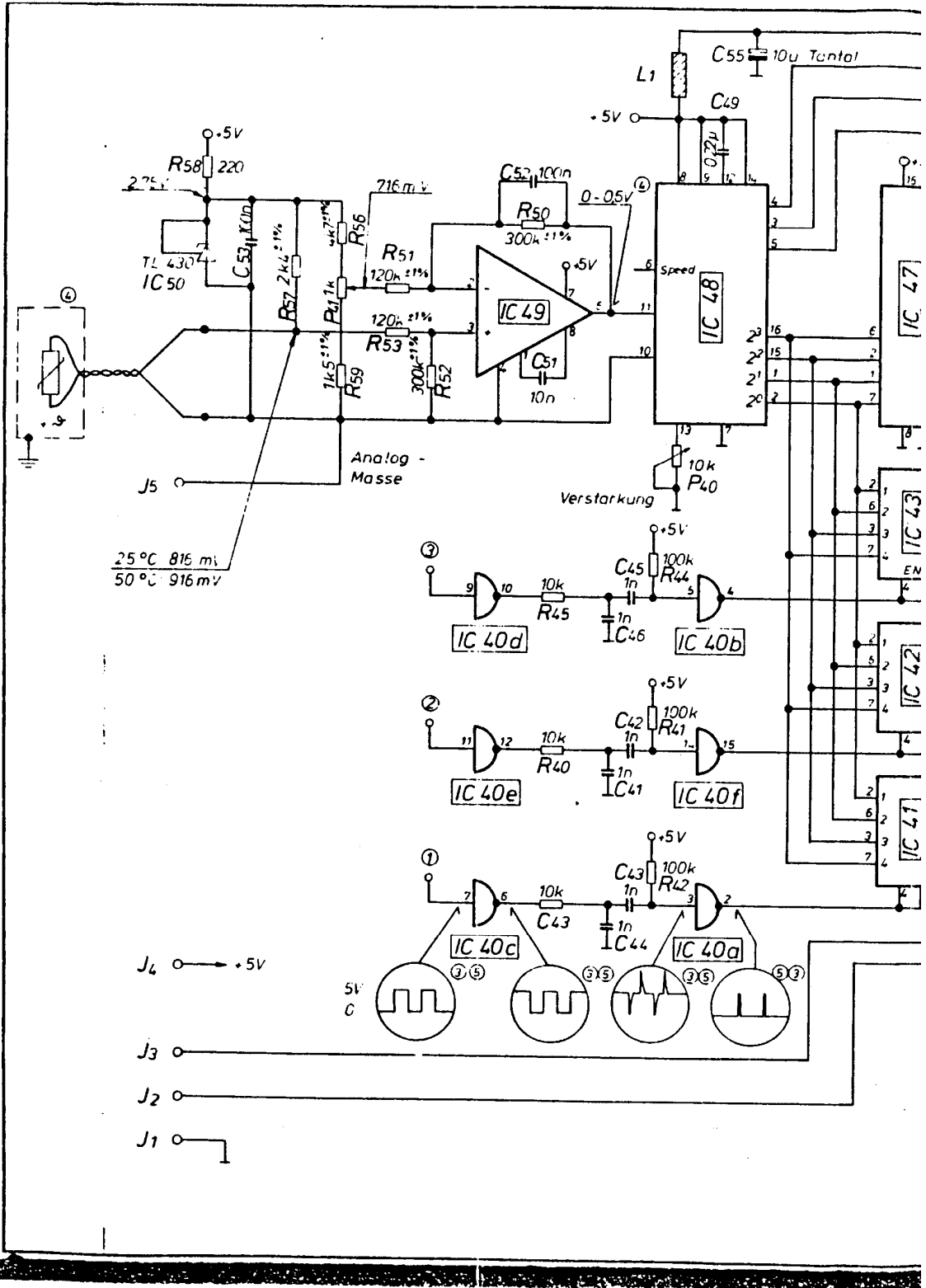


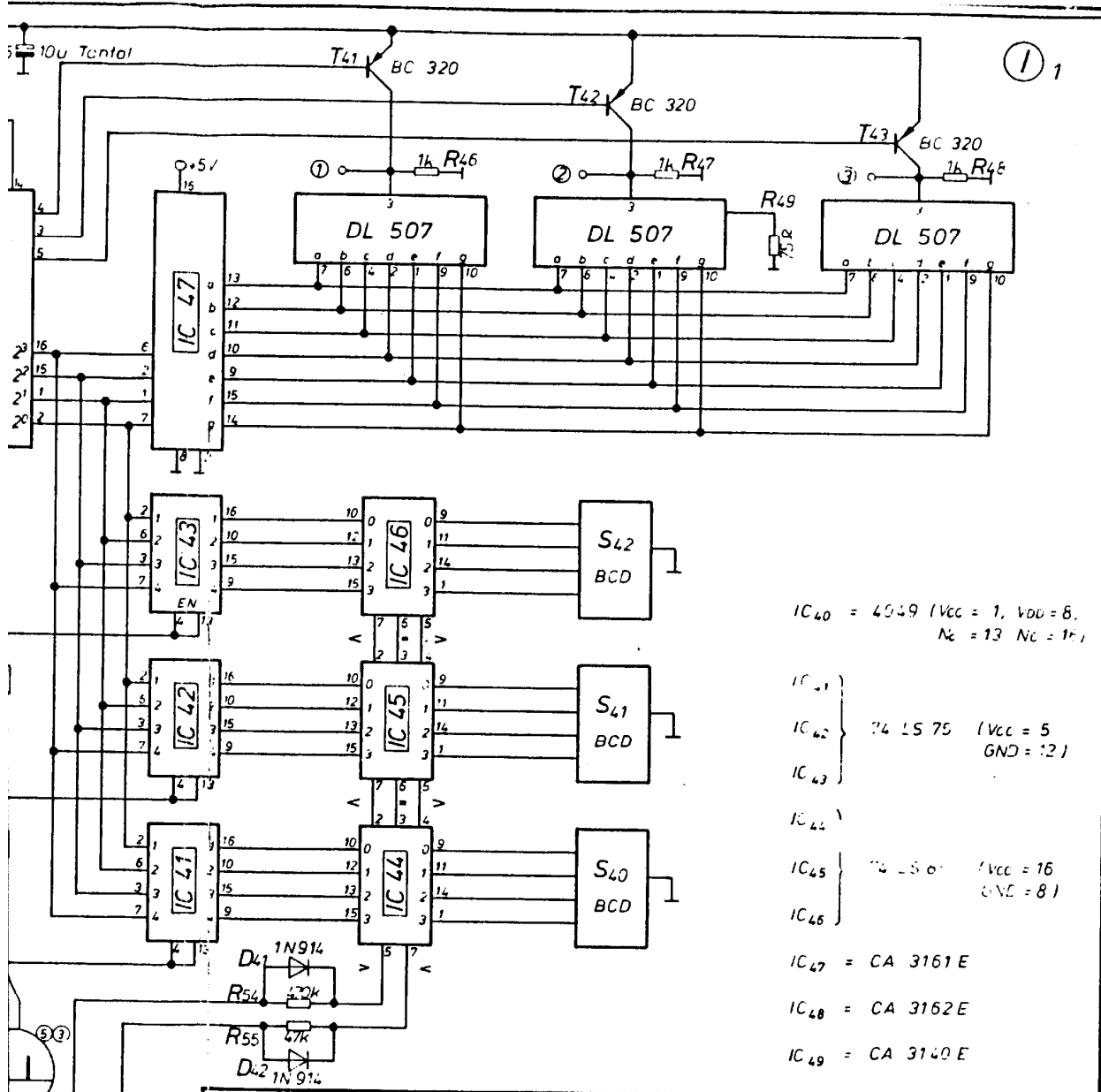
Platinen-Nr.: 24 026  
 ab 8216



Platinenmaß: 100 x 160

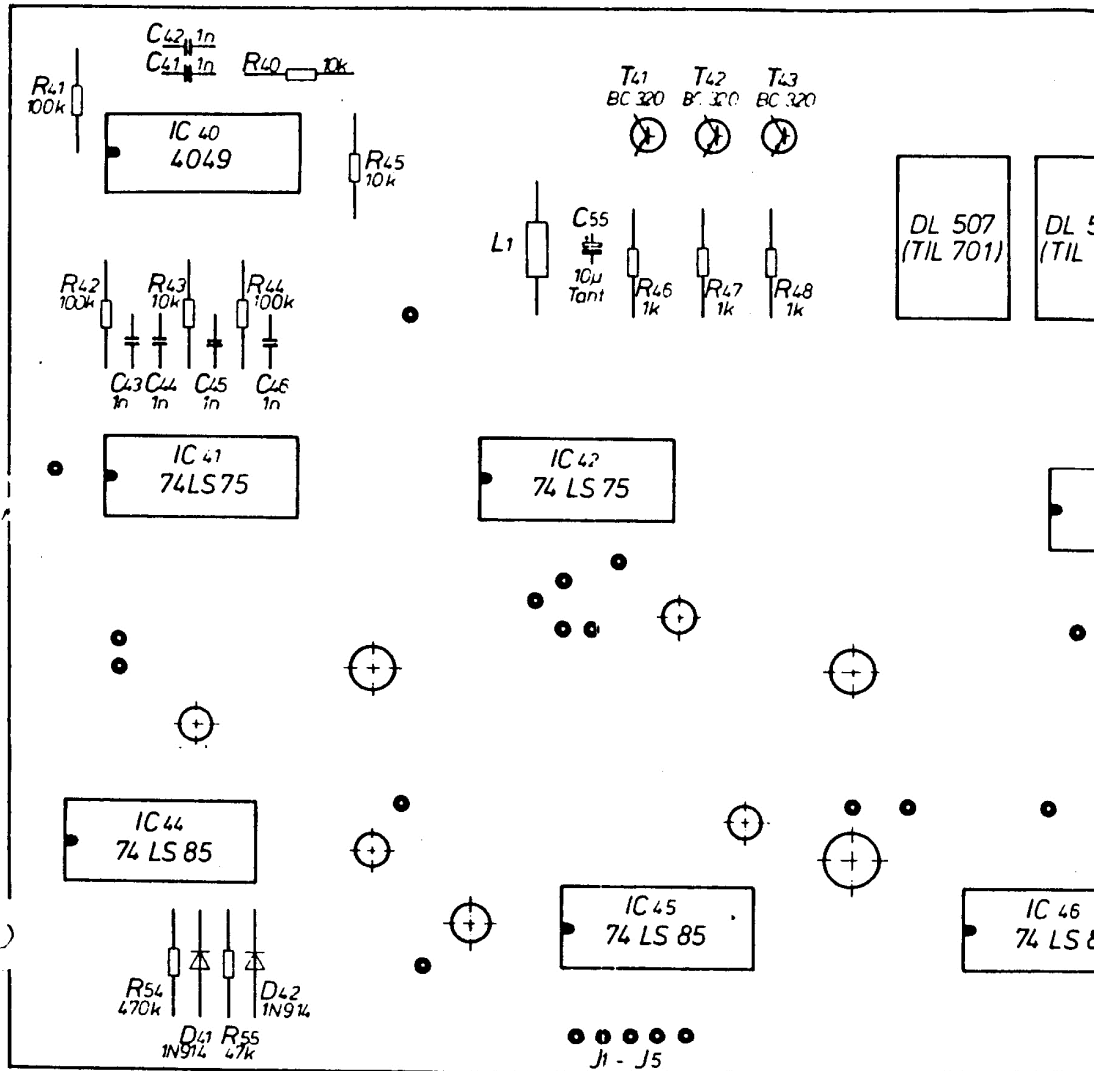
		1982	Datum	Name	Druck
		Bearb.	22.4.	JF	
		Gepr.			
		Norm			
NEW STYLE CPP-2 TEMP. CONTROL BOARD PARTS DRAWING					
Änderung		Datum	Name		
95 068					

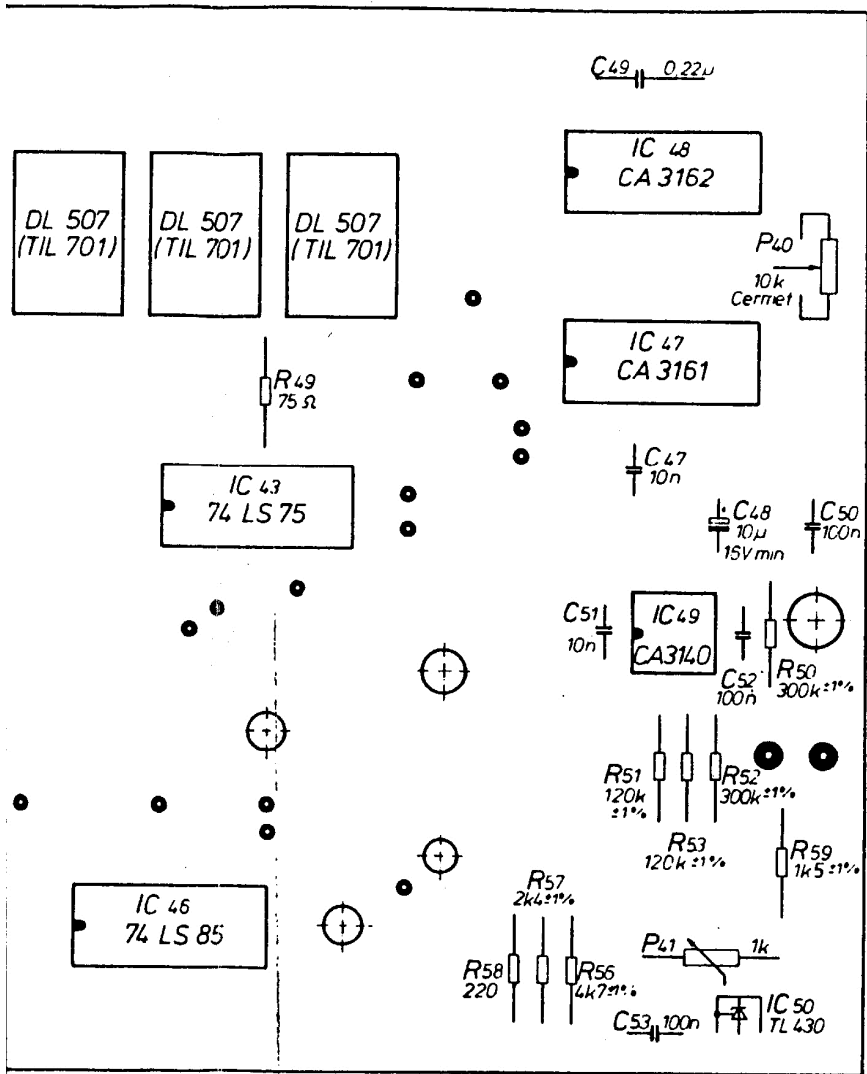




- IC 40 = 4049 (Vcc = 1, VDD = 8, Nc = 13, Nc = 14)
- IC 41 } 74 LS 75 (Vcc = 5, GND = 12)
- IC 42 }
- IC 43 }
- IC 44 }
- IC 45 } 74 LS 01 (Vcc = 16, GND = 8)
- IC 46 }
- IC 47 = CA 3161 E
- IC 48 = CA 3162 E
- IC 49 = CA 3140 E

<b>IOBO-Labortechnik</b> GmbH u. Co. KG Postfach 210110 D - 5270 Gummersbach 21			Maßstab	
1980 Datum Name Bearb. 22.1. JJ Gepr. Norm.			OLD STYLE CPP-2 TEMP. CONTROL BOARD SCHEMATIC DRAWING	
5 Diagramme 18.2.81 4 Beschriftung 31.2.80 3 Diagramme 5.12.80 2 1.1.85 1 21.4.80				
Änderung Datum Name (Urspr.)			CPP 2	
(Ers 1)			Blatt BI (Ers d)	





<b>JOBO-Labortechnik</b> GmbH u. Co. KG Postfach 210-10 D-5270 Gummersbach 21			Maßstab 2 1			
			<p>OLD STYLE CPP-2 TEMP. CONTROL BOARD PARTS DRAWING</p>			
			95068			
			CPP 2			
Zust	Anderung	Datum	Name	(Urspr)	(Ers f)	(Ers d)



BOARD #94008  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
40128	R40	100K, 1/4 WATT RESISTOR
40128	R41	100K, 1/4 WATT RESISTOR
40128	R42	100K, 1/4 WATT RESISTOR
40110	R43	10K, 1/4 WATT RESISTOR
40110	R44	10K, 1/4 WATT RESISTOR
40110	R45	10K, 1/4 WATT RESISTOR
40133	R46	270K, 1/4 WATT RESISTOR
40115	R47	22K, OHM, 1/4 WATT RESISTOR
40083	R48	2.2K OHM 1/4 WATT RESISTOR
40083	R49	2.2K OHM 1/4 WATT RESISTOR
40083	R50	2.2K OHM 1/4 WATT RESISTOR
43003	R51	PHOTO RESISTOR
40016	R52	75 OHM, 1/4 WATT RESISTOR
40128	R53	100K, 1/4 WATT RESISTOR
40128	R54	100K, 1/4 WATT RESISTOR

BOARD #94008  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
40128	R55	100K, 1/4 WATT RESISTOR
40315	R56	22.1K OHM, 1/4 WATT RESISTOR
40315	R57	22.1K OHM, 1/4 WATT RESISTOR
40318	R58	1 MEG, 1/4 WATT RESISTOR
40306	R59	301K OHM, 1/4 WATT RESISTOR
40305	R60	13.1K OHM, 1/4 WATT RESISTOR
40306	R61	301K OHM, 1/4 WATT RESISTOR
40305	R62	13.1K OHM, 1/4 WATT RESISTOR
40023	R63	220 OHM, 1/4 WATT RESISTOR
40304	R64	4.7K OHM, 1/4 WATT RESISTOR
40303	R65	2.4K OHM, 1/4 WATT RESISTOR
40302	R66	1.5K OHM, 1%, 1/4 WATT RESISTOR
40136	R67	47K, 1/4 WATT RESISTOR
40124	R68	47K, 1/4 WATT RESISTOR
40417	P40	10K POTENTIOMETER

BOARD #94008  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
40413	P41	1K TRIMMER
41297	C40	1 $\mu$ F CAPACITOR
41297	C41	1 $\mu$ F CAPACITOR
41297	C41	1 $\mu$ F CAPACITOR
41297	C42	1 $\mu$ F CAPACITOR
41297	C43	1 $\mu$ F CAPACITOR
41297	C44	1 $\mu$ F CAPACITOR
41297	C45	1 $\mu$ F CAPACITOR
41302	C46	47 PF CAPACITOR
41302	C47	47 PF CAPACITOR
41302	C48	47 PF CAPACITOR
41257	C49	22 $\mu$ F, 100 VOLT
41301	C50	10 $\mu$ F, 63 VOLT CAPACITOR
41303	C51	100PF, DISC CAPACITOR
41301	C52	10 $\mu$ F, 63 VOLT CAPACITOR

BOARD #94008  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
41303	C53	100PF, DISC CAPACITOR
41303	C54	100PF, DISC CAPACITOR
41302	C55	47 PF CAPACITOR
41016	C56	10 $\mu$ F, 6.3V TANTALUM CAPACITOR
41301	C57	10 $\mu$ F, 63 VOLT CAPACITOR
42001	D40	IN914 DIODE
42001	D41	IN914 DIODE
44006	T40	BC516 TRANSISTOR
44006	T41	BC516 TRANSISTOR
44006	T42	BC516 TRANSISTOR
46117	IC40	CD4049 I.C.
46117	IC41	CD4049 I.C.
46123	IC42	CE 4071BE I.C.
46102	IC43	IC 4011
46402	IC44	CA3161 I.C.

October 1, 1991

BOARD #94008  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
46302	IC45	CA3162 I.C.
45005	IC46	CA 3140E I.C.
46029	IC47	74LS75N IC
46029	IC48	74LS75N IC
46029	IC49	74LS75N IC
45205	IC50	TL 430C CURRENT REGULATOR
46032	IC51	74LS85N IC
46032	IC52	74LS85N IC
46032	IC53	74LS85N IC
20033	S40	CPP TEMP SELECTOR (1-4)
20032	S41	CPP TEMP SELECTOR (1-9)
20032	S42	CPP TEMP SELECTOR (1-9)
26052	LD40	TIL 701 7-SEGMENT LED
26052	LD41	TIL 701 7-SEGMENT LED
26052	LD42	TIL 701 7-SEGMENT LED
95067		SENSOR, WATERBATH TEMPERATURE

CPP-2 PROCESSOR  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
06017		PUMP HOUSING
07019		CAM FOR REVERSAL
07021		3-FINGER GEAR FOR REVERSAL
07024		CPP/A WATER LEVEL DEAL
07047		ON/OFF KNOB
07048		PUMP KNOB
07050		MOTOR CONTROL KNOB
07051		KNOB 1-4 (OLD STYLE)
07052		KNOB 1-9 (OLD STYLE)
07114		KNOB 1-4 (NEW STYLE)
07115		KNOB 1-9 (NEW STYLE)
10029		BOTTLE SPACER
11007		BRASS INSERT FOR CPP/A MOTOR UNIT COVER
12043		SOLENOID VALVE HOSE
13013		MOTOR HEAD NUT
15005		CPP/A OVERLOAD GROMMET (SPLIT)
15018		CERAMIC SPACERS

CPP-2 Service Data

October 1, 1991

CPP-2 PROCESSOR  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
15020		CPP-2 OVERFLOW ELBOW O-RING
15026		KNOB SEALS
20019		CPP-2 MOTOR SPEED POT.
20027		CPP/A ON/OFF SWITCH NEW STYLE
20032		CPP TEMP SELECTOR (1-9)
20033		CPP TEMP SELECTOR (1-4)
21001		CPP SOLENOID RELAY FOR OLD STYLE BOARD
21003		CPP/A MOTOR RELAY FOR OLD STYLE BOARD
21008		CPP SOLENOID RELAY FOR NEW STYLE BOARD
21009		CPP/A MOTOR RELAY FOR NEW STYLE BOARD
23041		CP-2 INTERBOARD JUMPER
23075		WIRE HARNESS, PUMP/VALVE
27008		800 MA TYPE T FUSE

CPP-2 PROCESSOR  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
27009		1.6 AMP FUSE
27017		1.25 AMP TYPE T FUSE
32016		CPP/A ROT. MOTOR-TWO BEARING
34022		10 PIECES, O-RING 4.2X 1.9
34027		KNOB FELTS
34176		PLASTIC MOTOR SCREW-CPP/A
34177		BRASS MOTOR SCREW-CPP/A
35016		OVERLOAD SENSOR RETAINER
66002		CPP-2 INSTRUCTION MANUAL NEW STYLE
94004		CPP-2 TRANSFORMER BD 110 VOLT
94008		CPP-2 DISPLAY BOARD W/SENSOR INCLUDES KNOBS
95066		CPP/A TEMP. OVERLOAD SENSOR
95081		PUMP SHAFT PUMP SHAFT FOR PROCESSOR



CPP-2 PROCESSOR  
PARTS LIST

INVENTORY NUMBER	REF.	DESCRIPTION
95114		CPP-2 SWITCH BOARD
95181		CPP-2 MOTOR UNIT (U.S. VERSION)
95183		COMPLETE ROLLER BLOCK ASSEMBLY ROLLER BLOCK, ROLLERS, SUPPORTS
95233		CPP BOTTOM TROUGH W/ELBOW W/O SPACER OR DRAIN
95234		CPP/A HEATING ELEMENT (110 V) W/HARDWARE
95227		CPP/A MICRO-SWITCH W/WIRE HARN
95236		CPP RO TROUGH W/WATER DIAL
95322		TROUGH DRAIN ASSEMBLY
95520		SET LEVELING WEDGES 2 PIECES
95523		ATL JOBO-LIFT COG

Processing Faults-Cibachrome

Problem:

Solution:

Spots, light to completely white.

Paper has been exposed to light.

Grey or black spots on print.  
Spots are negative.

Processor is not level or drum is floating. Check if processor is level. Lower level of upper water bath if drum is floating.

Chemistry amount is insufficient. Use amount recommended by Ilford.

Print has reverse image and too dark and orange.

Paper was exposed on backing. Expose on emulsion side.

Faint, dark print.

Increase developing time.

Brown spots on back side of print and/or red stains on exposed side of print.

Decrease rinse time after after developer.

Black areas lack density and color shift.

Wrong safelight or exposure to light.

## Processing Faults-Cibachrome

Yellow spots on print.

Developer contaminated by  
fixing bath. Rinse and  
clean drums carefully.

---

Gradual diminishing of color  
and density on print from end  
nearest processor to end farthest  
from processor.

Level processor and/or increase  
chemistry amounts.

Check temperature and processing  
times.

Drum is floating in upper  
water trough. Lower water  
level.

---

Blue streaks on print.

Emulsion has been scratched.  
Remove from drum carefully.  
Use less pressure on print  
squeeze.

---



Process Faults- Print from Negative (ie, Kodak EP 2)

<u>Problem:</u>	<u>Solution:</u>
Print too dark.	Use shorter exposure time.
Print is too light.	Use shorter exposure time.
Black areas of print are blue.	Increase developer time and/or temperature. First developer is old or exhausted. Mix fresh chemistry.
Dark blotches in print.	Paper has been exposed to light.
Print has light colored stripes.	Processor is not level and/or drum is floating in upper trough. Check processor with level. If drum is floating lower water level in upper trough. Insufficient chemistry amount. Use either amount recommended by JOBBO or by chemical manufacturer, whichever is highest.
Print is light or off color on end away from processor.	Chemistry volume insufficient or drum not level. Check if processor is level. Make sure drum is not floating.
Print has stripes from end	Use 1 minute prewash. Place

Process Faults- Print from Negative (ie, Kodak EP 2)

nearest processor to end  
farthest from processor.

Drum on processor more rapidly  
after turning horizontal.

Light spots in print.

Bleach/Fix contamination.  
Clean drum and cap assembly  
carefully.

Color shift when switching from  
test drum (#2820) to larger  
drums.

Increase amount of fresh  
chemistry used in processing.

White in the print is impure.

Wrong safelight in use. Darkroom  
is not light tight.

Processing Faults -Prints From Slides (ie;Kodak RC 14)

**Problems:**

**Solutions:**

Print is too dark.

Increase exposure time.

Print is too light.

Decrease exposure time.

Contrast is excessive and/or  
black areas are green.

Reduce time and/or temperature  
of first developer.

Dark areas and colors are uneven.

Processor is not level and/or  
drum is floating. Level processor  
and/or lower water level  
in upper water trough.

Insufficient chemistry. Use  
amount recommended by JOBO  
or chemical manufacturer,  
whichever is higher.

Print is too dark and has  
low contrast or impure black  
areas.

Increase time and/or temperature  
of first developer.

Colors tend to be black and  
print has low contrast and  
impure black areas.

Residue of first developer  
in color developer. Use  
clean bottles and mixing  
containers when preparing  
solutions.

Processing Faults -Prints From Slides (ie;Kodak RC 14)

Stripes in print from end  
nearest processor to end  
farthest from processor.

Use 1 minute prewash and rotate  
drum immediately after turning  
horizontal.

Print with undeveloped areas.  
(White areas.)

Processor is not level and/or  
drum is floating in upper  
water trough. Level processor  
and or lower water level  
in upper trough.

Chemistry amount insufficient.  
Use amount recommended by  
JOBO or chemical manufacturer  
whichever is highest.

Print has light to white spots.

Paper has been exposed to  
light.

Black areas of print lack  
density. Print has color shift.

Incorrect safelight or over-  
exposure to safelight.

## Processing Faults- E-6 Process

Problems:Solutions:

Transparency too dark.

Increase time and/or temperature of first developer.

Transparency too light.

Decrease time and/or temperature of first developer.

Transparency too light and color shift toward blue.

First developer contaminated with fixing bath. Mix fresh developer with clean equipment.

Color shift toward blue.

Ektachrome film only.  
Dilute reversal bath to 60% solution.  
Adjust alkalinity of color developer by adding "Starter" solution.

NOTE: For more information see Kodak Bulletin Z-119A, "Special Instructions for using Rotary-Tube Processors with process E-6."

Strong color shift toward green with insufficient black density.

Reversal bath exhausted. Use fresh reversal bath.  
Agfachrome and Fugichrome films only use higher concentration reversal bath.

Yellow spots & high minimum density.

Developer contaminated with stabilizer. Clean reels and do not put reels in stabilizer bath in future.



## Processing Faults- E-6 Process

High minimum density  
(Silver residue.)

Increase bleach - fix time.

Color shift toward magenta.

Increase color developer  
concentration by 10%.

Color shift toward yellow.

Ektachrome  
Reduce alkalinity of color  
developer by adding H<sub>2</sub>S<sub>04</sub>.  
(Hydrosulfuric acid.)

Agfachrome & Fugichrome  
Increase alkalinity of color  
developer by adding "Starter"

Maximum black density is  
insufficient or uneven.

If using light reversal, increase  
time and/or intensity of second  
exposure.

Film end closest to center  
core of reel is undeveloped.

Increase amount of chemistry  
used.

Processing Faults -C 41 Process

Problems:

Solutions:

Negative too light.

Increase time and/or temperature of developer.

Negative too dark. (Dense)

Decrease time and/or temperature of developer.

Low contrast. Color balance okay.

Increase agitation speed. (Use motor speed control.)

Too much contrast.

Decrease agitation speed. (Use motor speed control.)

No image on film.

Check sequence of processing steps.  
Developer is old or exhausted

Film end closest to reel  
center core is undeveloped.

Increase amount of solutions used in processing.

Density clouds or streaks.

Use 30 degree C processing temperature. Increase developer, bleach, & fix times to 8 minutes each.

## Processing Faults -C 41 Process

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Negatives more dense toward  
edges, gradually getting less  
dense toward center.

Reels contaminated with  
stablizer solution. Clean  
reels with brush. Do  
not put reels in stabilizer.

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Processing Faults- Black and White Film

Problems:

Solutions:

Negative too light.

Increase time of first developer.

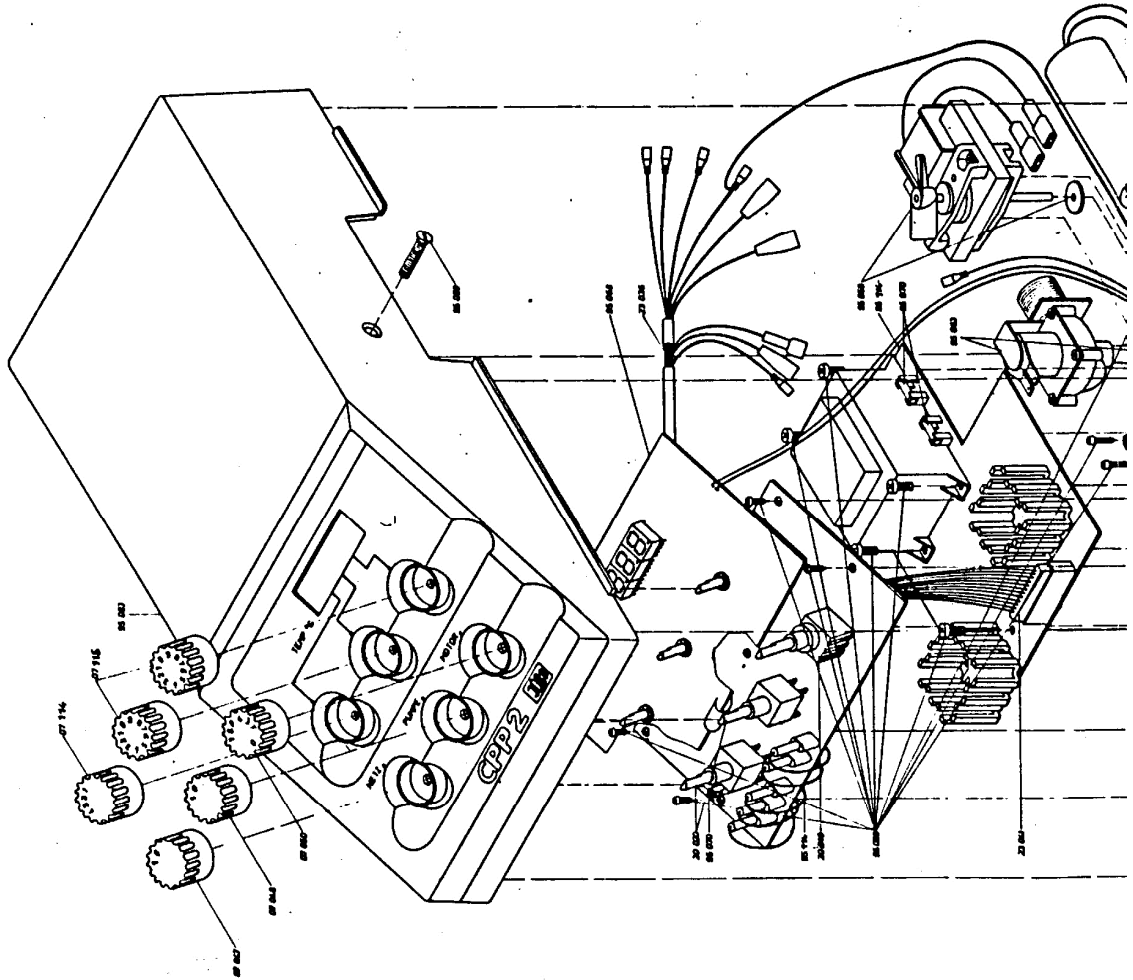
Negative too dark.

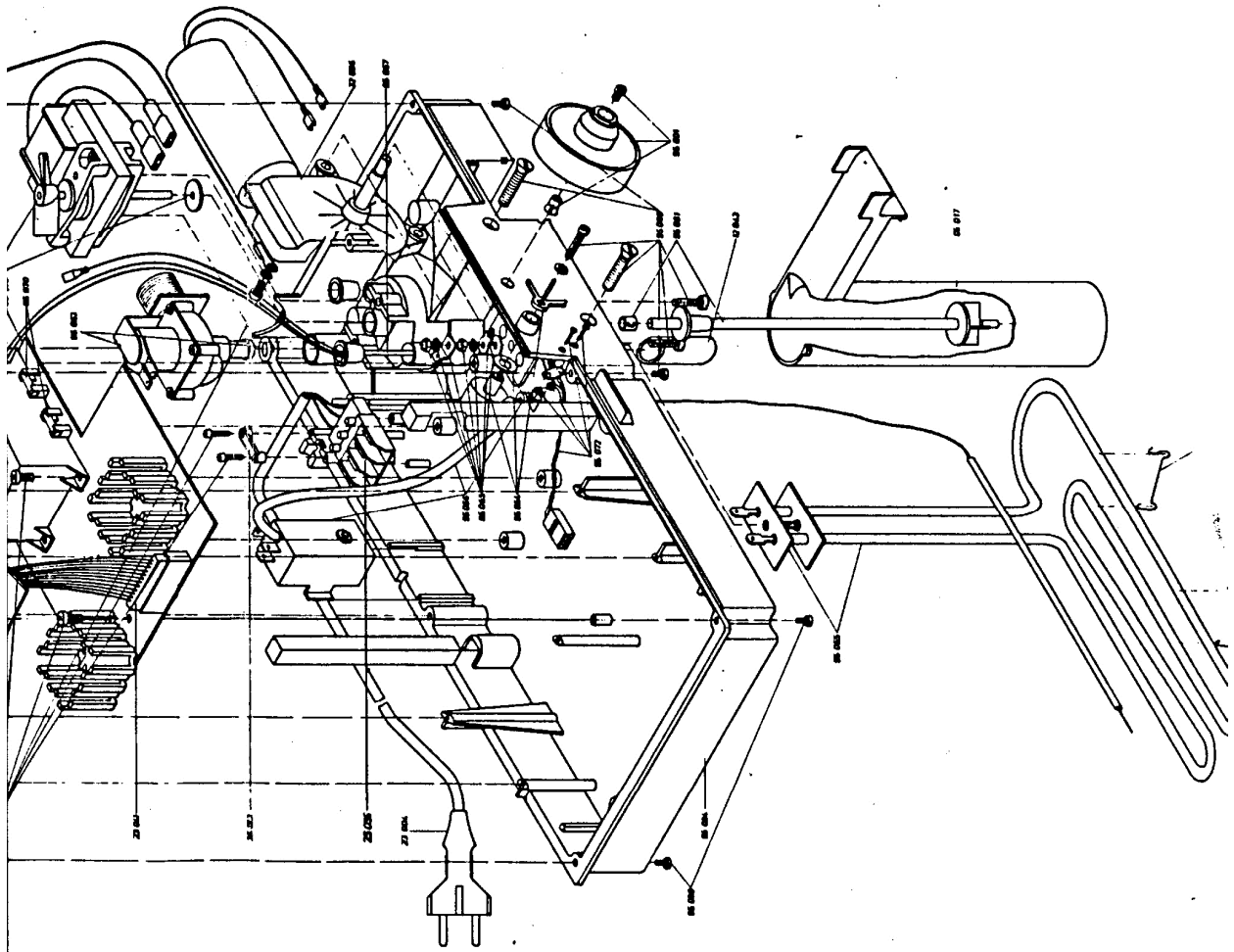
Decrease time of first developer.

Density streaks or clouds.

Developing time too short.  
Dilute developer to concentration requiring 5 minutes or more developing time.

CPP 2





MECHANICAL ASSEMBLY  
DRAWING