

Fototechnic

DO NOT ATTEMPT TO REPAIR AN ATL PROCESSOR WITHOUT READING AND THOROUGHLY UNDERSTANDING THE ATL OPERATING INSTRUCTIONS AND THIS SERVICE MANUAL !!

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CHAPTER 1

Introduction and Cautions

Before proceeding to "troubleshoot" a unit utilizing this service manual, it is important to realize that many "problems" experienced with an ATL are actually the result of misunderstanding how the unit should work. We suggest you familiarize yourself with the instruction manual first to be sure the machine is actually malfunctioning.

This service manual contains data that is applicable to both the ATL-2 and ATL-3 (all versions) except where it has been obviously noted otherwise.

The units ATL-2 and ATL-3 are fully integrated microprocessor controlled film and paper processing machines. Servicing these two units is simplified due to modular construction. The circuit boards can all be removed from the front of the machine with a minimal amount of disassembly. Fuses are centrally located and accessible through a small front panel, and motors and other functional components are mounted with standard hardware eliminating the need for special tools.

Electronic diagnostic tests have been incorporated into the ATL's for easier troubleshooting.

Many other time-saving devices have been incorporated to make servicing simple and efficient.

CHAPTER 2

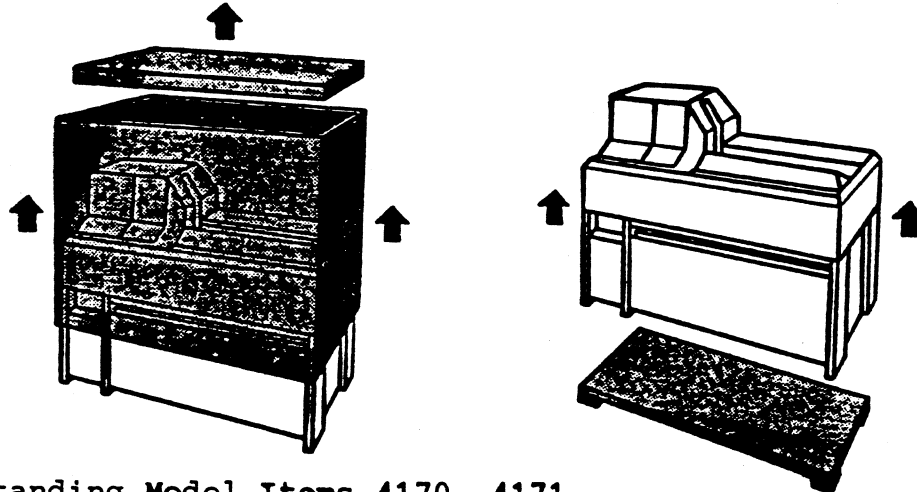
Packaging and Transport

- 2.1 ATL-3 Unpacking and Installation
- 2.2 ATL-3 Repacking and Transporting
- 2.3 ATL-2 Unpacking and Installation

2.1 ATL-3 Unpacking and Installation

Unpacking:

Remove shipping carton top and pull sleeve up and off of unit. Pull chemical cart out from underneath unit by lifting cart over the spanning board. Lift the unit up and off of the pallet.



Floor Standing Model Items 4170, 4171

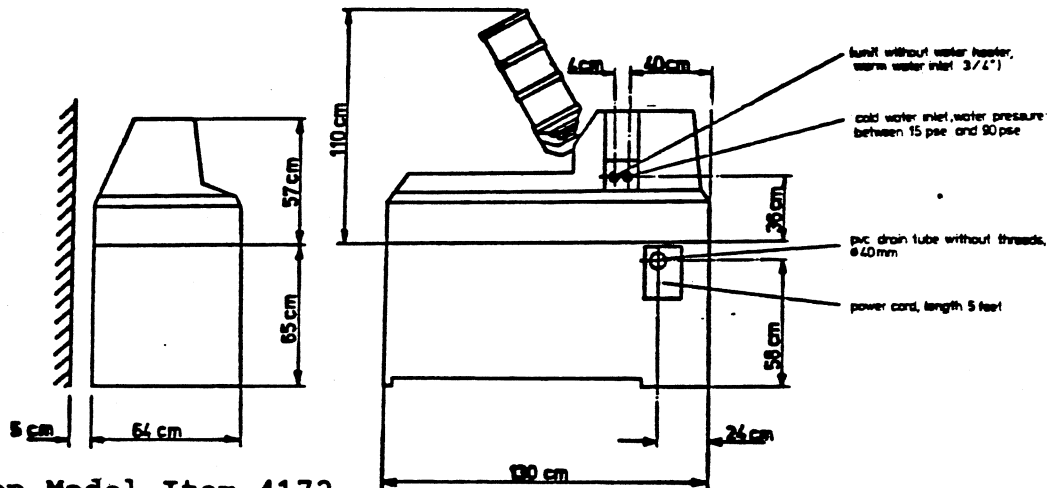
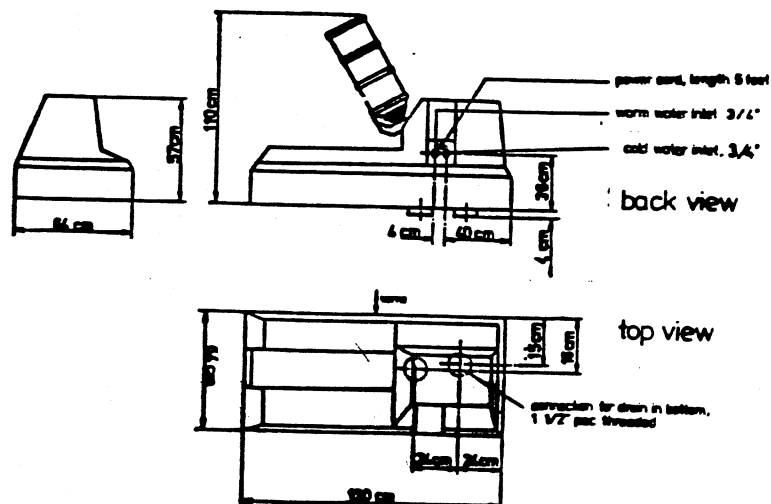
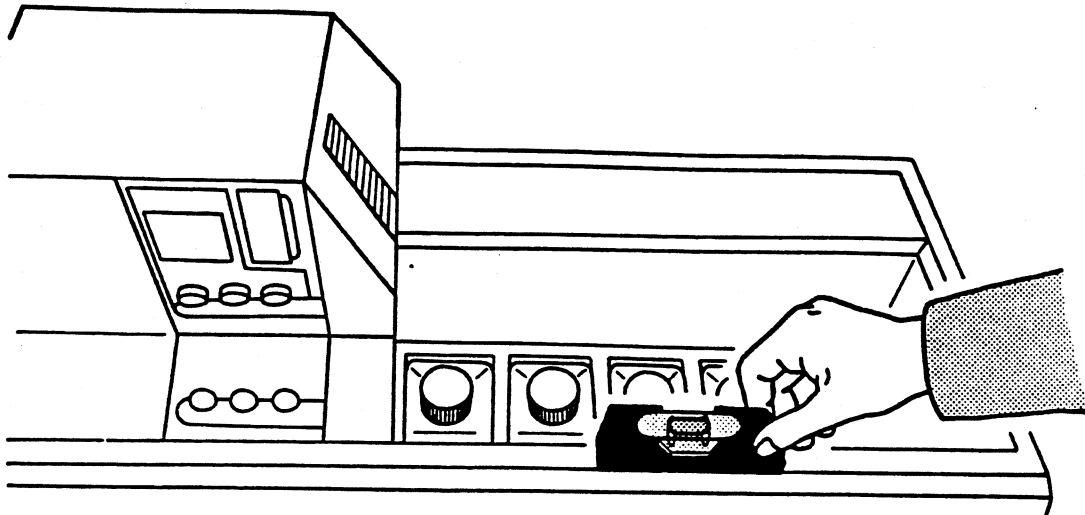


Table Top Model Item 4172



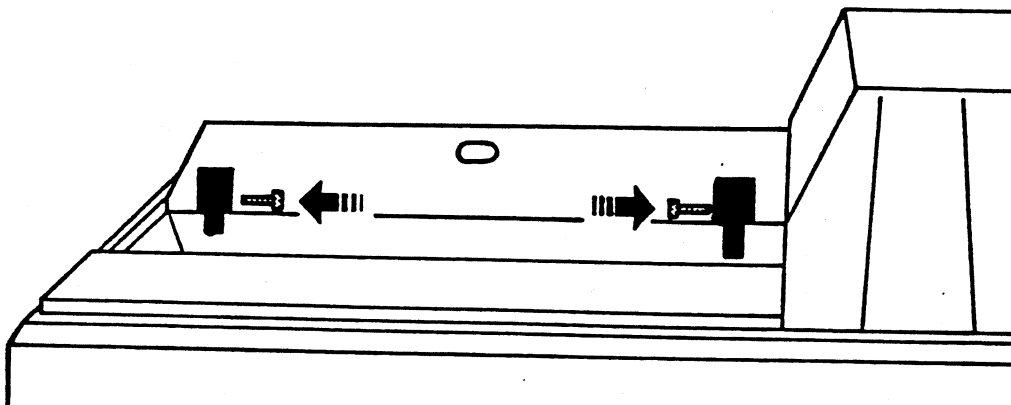
Place the unit in the desired location to begin installation.

Level the unit using Spirit Level provided.



Note: Use the front edge of the unit for proper levelling.

Bottle cover assembly



Place cover over bottle bank, insert guide pins into pin-holes.

Installation:

There are only three items that need to be connected, the power cord, water supply and the drain.

Power Cord

CAUTION!

IF YOU HAVE ANY QUESTIONS ON THIS SECTION CONSULT A LICENSED ELECTRICIAN BEFORE PROCEEDING

All three versions of the ATL-3 have a power cord permanently built-in. The cord should be plugged into a grounded, dedicated socket. The socket should match the pin configuration of the cord for the unit you are installing, see list below.

ATL-3 with boiler #4170 uses a 20 amp. 220 volt receptacle.
ATL-3 without boiler #4171 uses standard 20 amp. 115 volt receptacle.
ATL-3 Table Top #4172 uses standard 20 amp. 115 volt receptacle.

CAUTION!

BE SURE TO TURN OFF THE POWER SWITCH TO THE BOILER BEFORE PLUGGING UNIT IN. BOILER IS EMPTY.

Water supply

CAUTION!

IF YOU HAVE ANY QUESTIONS ON THE FOLLOWING SECTION CONSULT WITH A LICENSED PLUMBER BEFORE PROCEEDING.

All water supply fittings on the ATL-3 use standard 3/4 inch hose. The pressure at the hose should be between 15-90 psi. (1-6 bar). If the pressure is higher than 90 psi. (6 bar) a pressure reducer will be necessary, otherwise the pressure relief valve for the boiler will open discharging water into the reclamation area.

TURN WATER ON WHEN HOOKED UP PROPERLY TO FILL BOILER.

Drain4170/4171

On the back of the machine is a standard PVC 1 1/2 inch drain pipe. Connect this pipe to a waste line, the waste line must already have a trap as there is no trap on the ATL-3. Check with all local codes before hooking drain line up. Some areas have specific restrictions for Photo Chemical waste.

4172

The drain for this unit comes as a sub-assembly which must be assembled before hooking drain line up.

The ATL-3 water jacket will fill up automatically when the power is turned on

Remove the tape from the Thermostat on the boiler and set it to the capitol letter "E".

Draining the boiler

The boiler holds ten liters of water (2 1/2 gal.) which can be siphoned out using a small, self-priming pump and an electric hand drill.

1. Loosen and disconnect the cold water inlet line to the boiler at the 90 degree elbow which is easiest to reach from the Chemical Cart area.
2. Connect a 3-4 foot flexible tube to the inlet side of the drill and stick it into the boiler inlet until it reaches the bottom of the inside of the boiler. (you may reach a "false bottom" when the tube reaches the various fittings it needs to go beyond. Be sure the tube goes all the way down.)
3. Use the drill to siphon the water out of the boiler.
4. Reassemble elbow fitting and tighten securely.

NOTE: You will not be able to pressure test the water system until the unit is installed in its permanent location.

Sec. 2.2 ATL-3 REPACKING AND SHIPPING

NOTE: THE ATL-3 BOILER MUST BE DRAINED BEFORE TRANSPORTING THE UNIT BY TRUCK. (see sec. 2.1)

Repacking is the reverse of unpacking.

You should have:

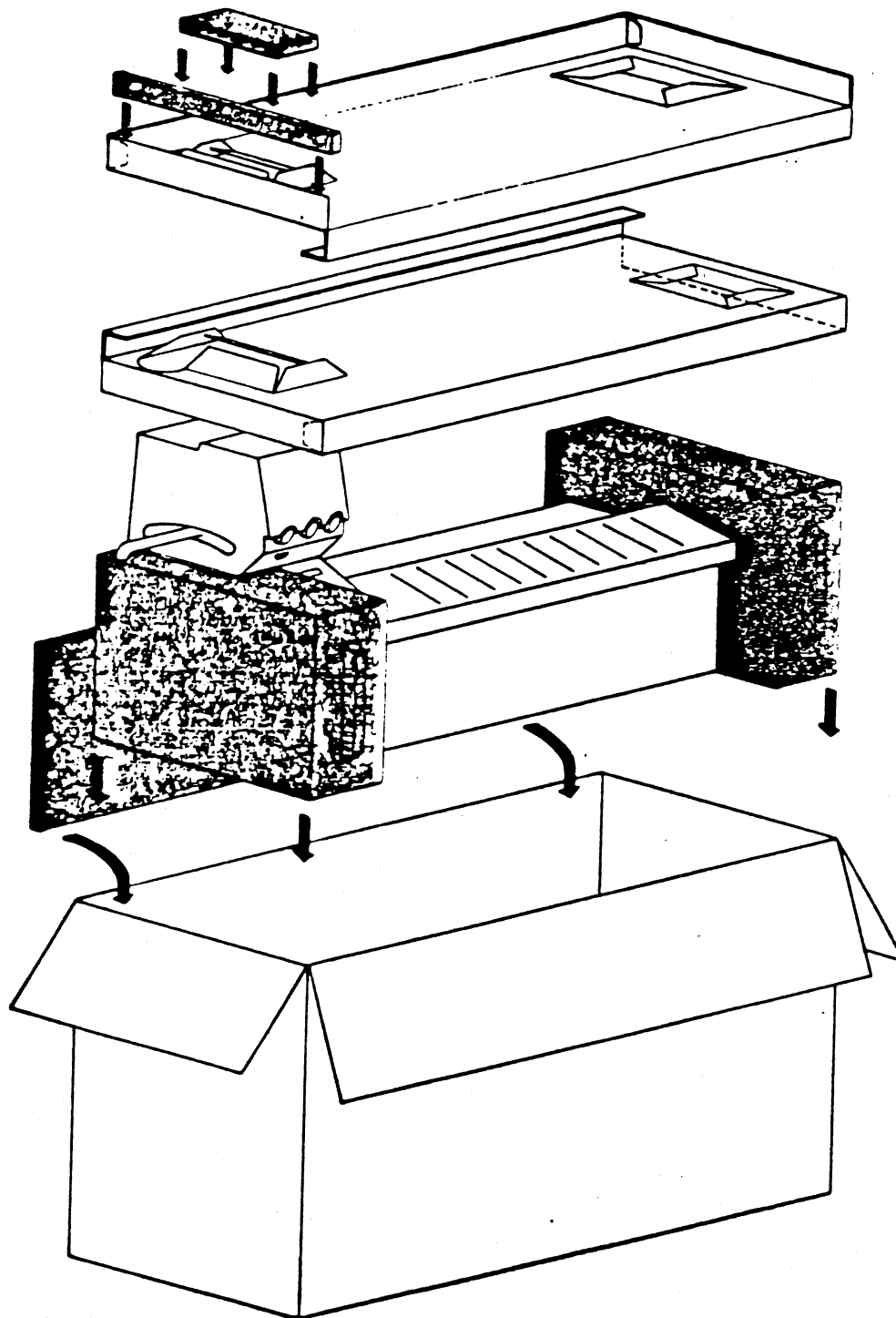
- 1 pallet
- 1 spanning board in front of cart
- 1 cardboard base cap
- 1 cardboard sleeve for entire unit
- 1 cardboard top cap
- 4 styrofoam corner pieces inside sleeve

You must strap the entire unit down to the pallet to avoid damage to the unit.

Caution: Use extreme care when transporting an ATL Processor. Only use lift truck on the side where the control head is, otherwise the unit may fall.

2.3 ATL-2 Unpacking and Installation

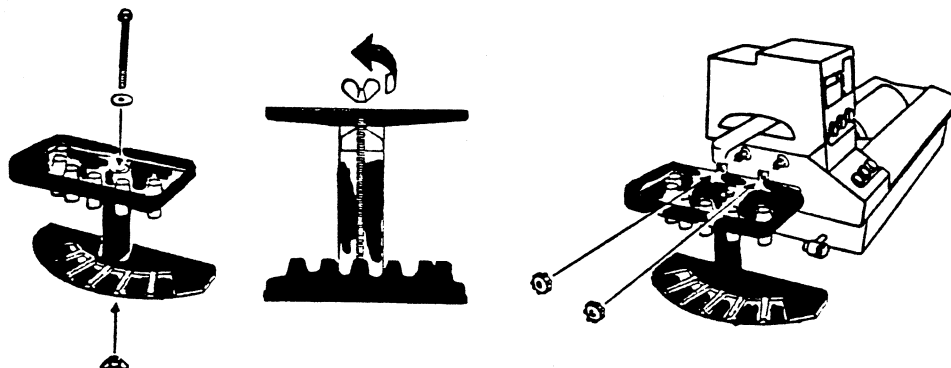
Unpacking



Reclamation unit

A reclamation unit is provided to aid in replenishment of chemistry, allow re-use of chemistry or reclaim chemistry for silver recovery. The unit must be assembled and attached to utilize these options, otherwise it need not be used at all.

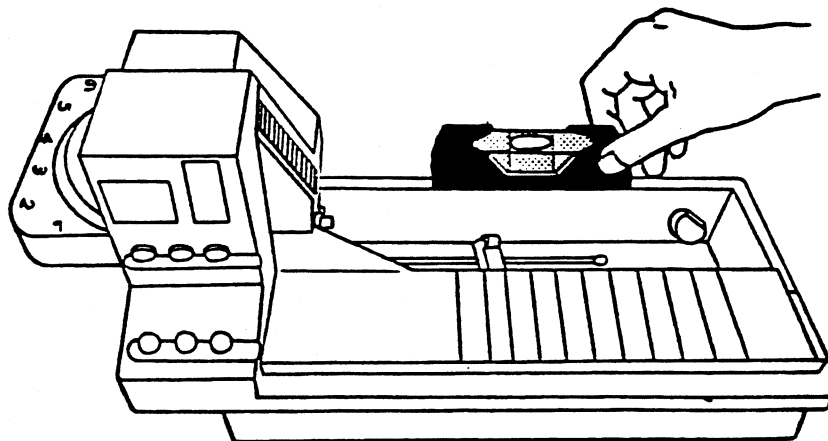
If the assembly is not to be used move the reclamation drain arm toward the back of the machine and latch it on the lip provided. A rubber band may be used if the lip were to get damaged.



Installation

The ATL-2 has three items needing to be hooked up, the power cord, water supply and drain.

The ATL-2 should be on a level surface. Use the Spirit Level provided with the machine.



Power Cord

CAUTION!

CONSULT WITH A LICENSED ELECTRICIAN BEFORE PLUGGING THIS UNIT IN TO BE SURE THE POWER SUPPLY HAS THE PROPER RATING.

The ATL-2 has a standard 115 volt power cord. It should be plugged into a grounded, dedicated, 20 amp. 115 volt power supply.

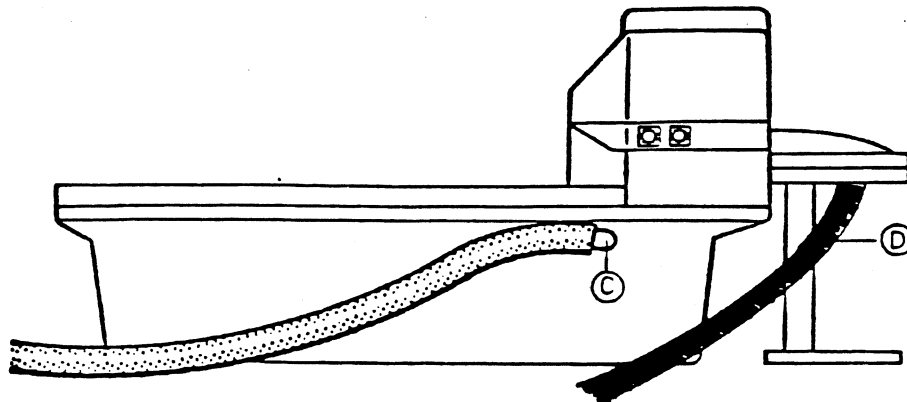
Water Supply

The ATL-2 has a standard 3/4 inch hose-type hook up. The pressure at the hoses should be between 15-90 psi.(1-6 bar). As shown in the drawing cold water only should be hooked up to the fixture marked "B" and tempered water within +/-5 degrees C. of the process temperature needed hooked up to "A".

The ATL-2 fills itself up automatically when the cold water is turned on and the power is switched on.

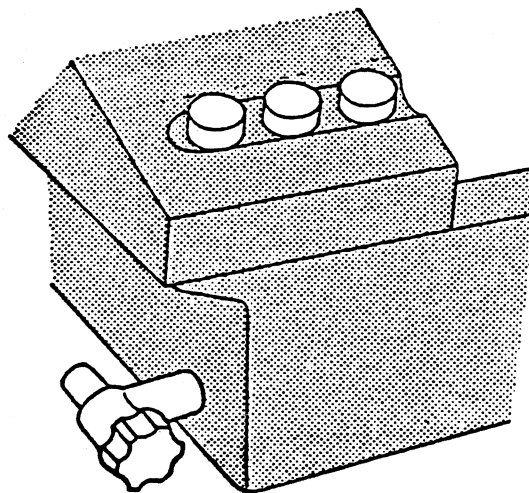
DRAIN

The ATL-2 has three water outlets. The reclamation unit (D) and the trough drain spigot are on the left side of the unit and overflow elbow (C) is on the back.



The reclamation unit drain purges rinse water used in processing. Excess tempering water runs out the overflow elbow. The trough drain spigot releases the water in the main bath. All three drains can be connected together and routed for disposal using kit #4161.

If the ATL-2 is in a sink, a short piece of hose should be attached to the overflow.



CHAPTER 3

Block Diagram and Explanation

- 3.1 P.C. Board Identification
- 3.2 Abbreviations
- 3.3 D.C. Voltage Distribution
- 3.4 Block Diagram

Block Circuit Diagram Explanation

3.1 P.C. Board Identification

The following item numbers correspond to the following printed circuit boards.

94015	Interface board, upper electronic head
94016	Transformer board
94017	Interface board, lower control unit
94018	Display board
94022	Control board ATL 2
94023	Control board ATL 3
29002	Foil Keyboard

3.2 Abbreviations (see chap. 15 for other abbreviations)

a) Assemblies:

FP	Filling pump
HM	Lift Motor
SMT	Stepping Motor (air distributor & drain arm)
MVK	Solenoid valve - cold
MVW	Solenoid valve - warm
TMT	Rotation motor
H 1	Heating element 1
H 2	Heating element 2
P	Water jacket recirculation pump
L	Cooling Fan
V & E	Voltage
I	Current
R	Resistance

b) Sensors:

FSN	Filling Sensor (chemical /water)
W	Temperature sensor - water jacket
CH	Temperature sensor - chemical bottle
SMT 0 sens.	Hall sensor stepping motor zero position
SMT 1 sens.	Hall sensor stepping motor single step
TRA sens.	Hall sensor drum lifted (swing sensor/ bottom sensor)
HMH-sens.	Hall sensor lifting arm up (upper sensor)
TMT Sens.	Rotation motor sensor
Level 1	Lower float switch
Level 2	Upper float switch

3.3 DC Voltage Distribution

Transformer board: 36 V 24 V 18 V 5 V
(supply voltages)

Name of board;Voltages used:

Transformer board, lower control
unit:

10 V 5 V
(power supply from
trans-former board)

Display board:

24 V 5 V
(power supply from inter-
face control board)

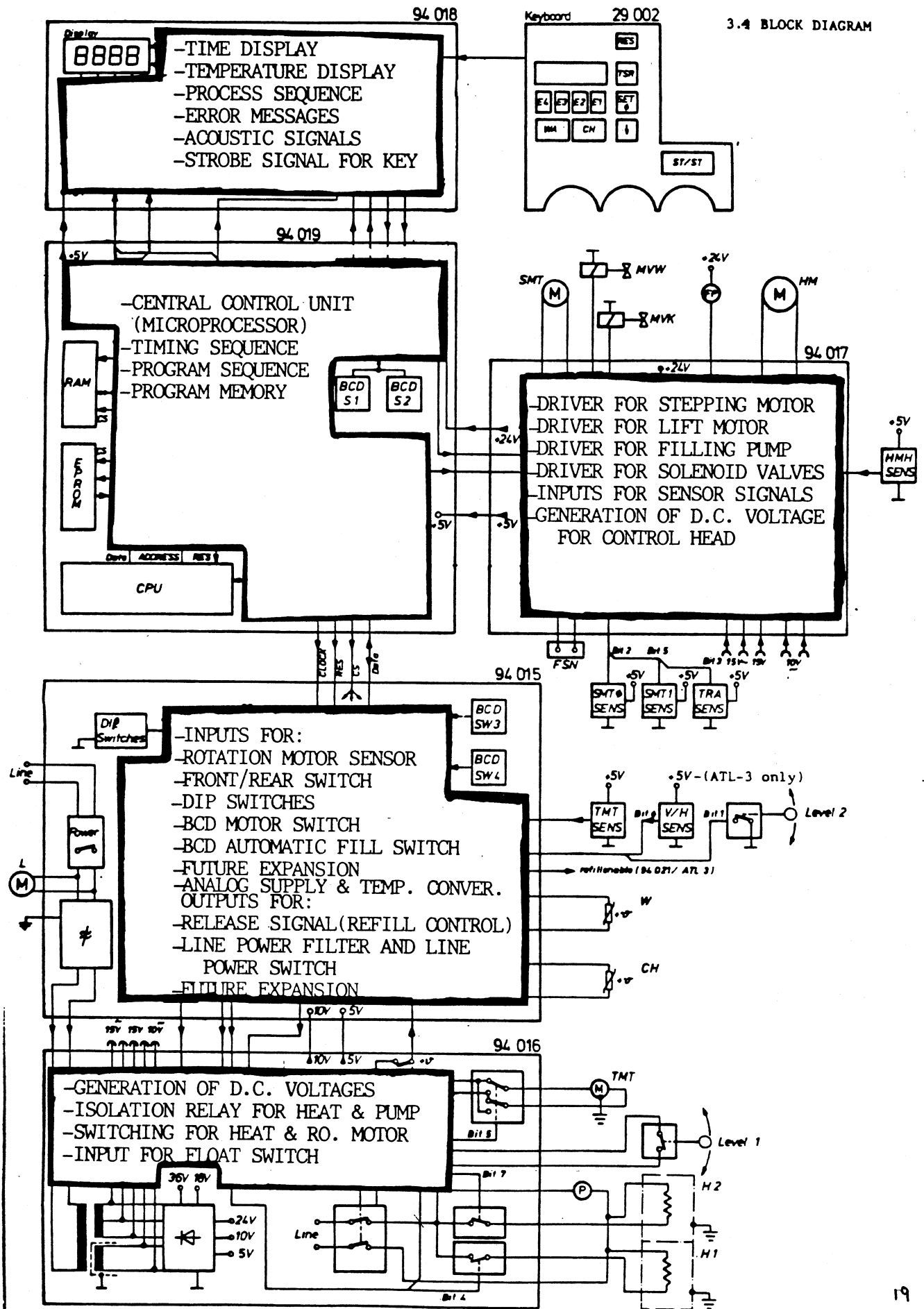
Control boards ATL 2/3:

5 V (power supply from
interface control board)

Interface board, upper electronic
head:

36 V 24 V 18 V 5 V

3.4 BLOCK DIAGRAM



CHAPTER 4

Functional Description of Electronic Circuitry

- 4.1 Overview
- 4.2 Control Board
- 4.3 Display Board
- 4.4 Control Head Interface Board
- 4.5 Transformer Board
- 4.6 Motor Unit Interface Board
- 4.7 Chemical Refill Circuit Board
(Floor Standing ATL-3 Only)

Functional Description - Electronic Circuitry

4.1 Overview

The ATL 2/3 electronic circuitry consists of 5/6 circuit boards (without automatic refilling-5, 4170-6).

Located in Control board
Control Head: Display board
 Interface board, control head

Located in Transformer board
Motor Unit: Interface board, motor unit

The following summary indicates the functions associated with the individual circuit boards.

Control board (94014/019)	<ul style="list-style-type: none">- central control unit (microprocessor)- timing sequence- program sequence- program memory
Display board (94018)	<ul style="list-style-type: none">- time display- temperature display- process sequence display- displays for operator
guidance	<ul style="list-style-type: none">- error messages- acoustic signals- strobe signal generation for key entries
Interface board, control head (94017)	<ul style="list-style-type: none">- driver for stepping motor- driver for lift motor- driver for filling pump- driver for solenoid valves- inputs for sensor signals- generation of DC voltages for control head
Transformer board (94016)	<ul style="list-style-type: none">- line power transformer- generation of DC voltages for motor head- line power isolation relay for heating elements and water bath pump

Interface board,
motor unit
(94015)

- switching stages for heating elements, rotation motor control
- input for float switch (minimum level)
- generation of + 5 V power supply for analog stage
- generation of control voltages for rotation motor
- A/D conversion for temperature values
- inputs for:
 - rotation motor sensor
 - front/rear switch
 - DIP switches
 - BCD motor switch
 - BCD automatic fill switch
 - future expansion
- Outputs for:
 - release signal, refill control
- future expansion
- Line power filter and line power switch

4.2 Control Board ATL 2 (94022) Control Board ATL 3 (94023)

The control board contains the microprocessor system which controls the timing and program sequence. It processes measured values and sensor signals and calculates and transmits the required control signals.

Processor System Components:

- a. CPU central processing unit;
 controls entire program sequence
- b. E-PROM Erasable programmable read-only memory;
 can be erased with ultraviolet light;
 contains machine program codes and data for
 CPU sequence control
- c. RAM Random access memory;
 stores the user program data and auxiliary
 data for the machine program
- d. Output Output signal memory;
 register stores control signals
- e. Input Input signal memory;
 register reads input signals on the data bus
- f. VIA Multi-function interface adapter;
 input/output module;
 parallel/serial converter;
 timer for time control
- g. PROM Mask programmable read-only memory;
 address decoder;
 allocates a chip select signal to each
 address block used (CS, CE OE).

Data bus:

A 6502 8 bit CPU is used as the central processor. The CPU (IC 1) is connected to all memory and input/output modules via an 8 bit data bus and can therefore read or write data. In addition to the control board, modules which are addressed via the data bus are also located on the motor unit interface board. For this reason the data bus is also connected to ST 4 (plug connector for motor unit interface board).

The data bus is buffered by the bi-directional driver IC 2 to assure perfect data signals. The driver direction can be switched by inverting the R/W signal.

When the CPU writes data to the data bus, a high level is present on pin 1 of IC 2 and IC 2 drives the data in the direction of the data bus. For read operations IC 2 drives the data in the direction of the CPU and a low level is present on IC 2/Pin 1.

To decrease interference sensitivity, pull-down resistor networks are used, which terminate the data bus and therefore suppress reflections and make the data bus less sensitive to external interference.

Address bus/address decoder:

One or more addresses are assigned to each module connected to the data bus. Whether one or more addresses are assigned to a module depends on the number of memory cells present in the module. A chip select signal must be generated from the address signals for each module in order to allow the CPU to address all modules with the proper address. This is accomplished by the address decoder, consisting of the decoder PROM IC 7 and the two de-multiplexers IC 5 and IC 6.

The address areas allocated to the PROM outputs are entered in the circuit diagram in hexadecimal form.

With the exception of the chip select signal 01 all PROM outputs in the active state are switched to low level.

The chip select signal 01 must be at high level in the active state, because this signal is not connected directly to the RAM; it is first ANDed with the reset signal. In the event of a power failure reset, this logic operation protects the RAM from uncontrolled access and therefore data loss.

There is a further subdivision of the chip select signals at the PROM outputs 02 and 03 for the input registers in the address area 0400-04FF and the output registers in the address area 0500-05FF in order to allow all registers to be addressed individually. This additional subdivision is accomplished by IC 5 and IC 6.

Connection to several address lines is required for the modules containing a number of addresses in order to be able to select each address within the allocated address block.

Control bus:

In addition to the data bus for data transfer and the address bus in combination with the chip select signals a number of various control signals are required for address and module selection, which are explained in this section:

- a. 1 MHz clock:
OSC (oscillator) The 1 MHz clock OSC is generated by the integrated quartz oscillator QOS and supplies the time base for all operations in the processor system. This clock is inverted and buffered by IC 13 and connected to the A/D converter on the motor head interface board via plug ST 4.
- b. System clock:
PHI 2 The system clock PHI 2 (IC 1/Pin 39) is derived from the 1 MHz clock OSC by the CPU. The frequency of the system clock is also 1 MHz. However the pulse/space timing is directly connected with internal CPU operations. For example PHI 2 - high level indicates that the signals on the address lines are stable and therefore read and write operations can be performed.
- c. R/W signal: High level on the read/write line indicates a read operation, low level a write operation.
- d. RAM R/W signal: The RAM R/W signal corresponds to the function of the R/W signal, however, it is also synchronized with PHI 2 in order to assure stable data signals for write operations to the RAM.
- e. RES signal: The reset signal initializes the CPU and VIA and thereby assures that a program starts at a defined point in the machine program with defined CPU and VIA register contents.

f. IRQ signal:

The IRQ signal requests a main program interrupt for execution of an IRQ subroutine. This signal is generated by IC 16 (VIA) under the control of the internal VIA timer. The signal appears every 50 ms in the form of low level for the duration of the IRQ subroutine and serves as the time control. The IRQ subroutine reads all sensor signals and measured values and sends control signals.

g. SYNC signal:

The SYNC signal indicates that an instruction code is being read into the CPU by output of a high voltage level for the duration of approx. 1 us.

This signal is not sent to the control bus, however, it can be measured during trouble-shooting to determine whether the CPU is operating.

VIA (IC 16):

The multi-function interface module IC 16 (VIA) contains in addition to the two I/O ports PA and PB, a shift register for parallel/serial conversion and two 16 bit counters. Port PB is used as an input port for the BCD switches S 1 and S 2. Port PA is programmed as an input port for the keyboard byte and stores the keyboard byte present at the strobe input (IC 16/Pin 40) via plug ST 1 with a negative pulse.

Timer 1, one of the two 16 bit counters, is used for time sequence control of the entire program. This counter is loaded with the hex. value C 350, which corresponds to a decimal value of 50000. The counter therefore generates an IRQ signal on IC 16/Pin 21 every 50 ms.

Output Registers:

74HC374 8 bit D-registers are used as output registers. The data byte present at the D-outputs is stored in the D-register by a positive edge at clock input Pin 11 and is then available at the Q-outputs. The clock input of an addressed output register is set to low level by the demultiplexer IC 5 (address coding). The clock input is reset to high level (positive edge) with the trailing edge of PHI 2 and the data stored.

Use of Registers:

- IC 8 - LED and buzzer control
- IC 9 - LED control and inhibit for manual lifting arm control
- IC 10 - Control of the unit lift motor, filling pump, stepping motor and solenoid valves.

Input registers:

An 74HC241 8 bit bus driver is used as the input register (IC 11). This circuit is organized into 2 groups of 4 drivers each. Each group is activated via its own control input (1 G/Pin 1 and 2 G/Pin 19), each of which requires a different level (active: 1 G=low; 2 G=high).

For this reason the associated chip select signal Y 0 (IC 6) is sub-divided into an inverted and non-inverted signal. When the module is activated inputs A are switched through to the corresponding outputs Y.

Use of Register:

- IC 11 - Examination of sensor signals, chemical keys, water temperature and SET/RUN switch.

Reset Circuit:

We differentiate between 4 types of reset:

- a. Power on reset: The reset signal generated as the supply voltage is built up by IC 15 switches off all I/O devices, initializes the CPU and VIA, protects the RAM from data loss and assures that the program is restarted at the point it was interrupted following a power failure.
- b. Power fail reset: This reset signal is generated by IC 15 in the event of a power supply failure. and protects the RAM from data loss. In addition it switches off all I/O devices.
- c. Key reset: The key reset interrupts the program, initializes the CPU and VIA and starts the air distributor on a zero point search (stepping motor).

- d. Watchdog reset: A watchdog reset is generated by the watchdog circuit if the program "crashes" and corresponds to the power-on reset in terms of function (see also section on watchdog circuit).

Function of Reset Circuit:

a. Power-on/power-fail reset

The reset circuit consists of IC 15 and the two NAND gates IC 13 a and b.

If the 5 V power supply exceeds the 4.75 V threshold at the sensing input of the voltage monitoring module TL 7705 (IC 15/Pin 7) the output (IC 15/Pin 5) goes to a low level. If this threshold is exceeded only for a short time, e.g. during build-up of the supply voltage, the output remains at low for approx. 90 ms after the voltage on the sensing input (IC 15/Pin 7) has exceeded the 4.75 V threshold.

The reset signal travels to the CPU (IC 1), VA (IC 16) and the output register IC 10 over the two NAND gates IC 13 a and b.

The CPU and VIA are thereby initialized and the outputs of register IC 10 are set to the high resistance state. Since the outputs are connected to ground via resistor network NW 5, all units are switched off.

The reset signal is available on plug ST 4 for deactivation of the output registers on the motor unit interface board.

b. Key reset

When the reset key is pressed C 14 is connected to ground via plug ST 1/Pin 19 generating a short low pulse at IC 13 a/Pin 2. This travels over IC 13 b to the CPU, VIA and registers.

Pressing the reset key causes a strobe signal to be released on the display board, whose negative edge is present at the strobe input of the VIA (IC 16/Pin 40), a short time after termination of the reset pulse to the CPU.

The strobe signal is buffered in the VIA and read out by the CPU. This allows a differentiation between key reset and power on/power-fail reset and the CPU can terminate the program and start the air distributor zero point search.

c. Watchdog Reset

The watchdog reset corresponds to the power-on/power-fail reset in terms of function with the difference that triggering of IC 15 is accomplished via reset input Pin 2 instead of via the voltage level at input Pin 7.

Watchdog Circuit:

The actual watchdog circuit consists of the re-triggered monoflop IC 17 a. The retention time of the monoflop is set to approximately 225 ms with R 12 and C 13. Pulses must be fed continuously to the trigger input Pin 4 in order to keep the output Pin 6 at high level. The IRQ signal, which supplies a pulse every 30 ms is used for triggering. If the pulses are not received for longer than 25 ms, the output Pin 6 goes to low. A low pulse is then generated to IC 15/Pin 2 via C 15, which results in a reset pulse with a duration of approx. 90 ms. The remaining sequence corresponds to that for power-on/power-fail reset.

In addition the monoflop IC 17b, wired as a bi-stable monoflop is triggered, switching on the green and red section of the power failure display. Reset: The warning triangle illuminates yellow.

Battery Backup Circuit:

The battery backup circuit supplies the C-mos-RAM IC 4 with power when the unit is switched off or during a power failure. Since the RAM is in the standby mode when the line power is not present and the power consumption is extremely low in this mode, the lithium battery has a life of approx. 10 years. However, this assumes that the control board is handled properly. A control board with battery soldered in should never be laid on a conductive surface, e.g. antistatic mat.

Function: When the + 5 V voltage is present the RAM is supplied with power via D 1 and the lithium battery is coupled via D 2. When the + 5 V voltage is not present the battery takes over the power supply via R 8 and "D 2.

General Information on Machine Program Sequence:

Following the positive edge of the reset signal the CPU takes the program standard address from the E-PROM via the reset vector. The CPU then starts running the program at this point.

During this operation the following functions are performed continuously.

- a. Fetch instruction code from E-PROM (and SYNC signal generating).
- b. Fetch any associated data from E-PROM.
- c. Execute instruction.

The entire program is a sequence of many different instructions. Execution of the instructions is accomplished taking into consideration the user data in the RAM.

A low level at the IRQ input of the CPU can interrupt the main program if the interrupt has been permitted by a corresponding instruction. This instruction sets the indent. bit in the CPU and thereby allows the main program to be interrupted for the purpose of executing an IRQ subroutine. After running the IRQ subroutine the CPU returns to the point of exit in the main program.

The IRQ program is called every 50 ms in the ATL program by the timer 1 IRQ signal of the VIA. This allows various instruction sequences in the main program, special subroutines and the IRQ routine to be run once, or a number of times, thereby forming the entire program sequence.

4.3 Functional Description - Display Board

The display board contains all optical displays, the buzzer and the interface with the foil keyboard. The display board is connected to the control board via the plug connectors ST 1 and SV 2.

Display Board Components:

- | | |
|------------------------------------|--------------------------------------|
| a. 4 bit binary decoder
(IC 2): | Control of the process step
LED's |
| b. Drivers
(IC 1, IC 5, IC 10): | LED and buzzer control |

- | | |
|---|--|
| c. Darlington Array
(IC 3): | Switching stages for 7 segment display multiplexer and LED's |
| d. 7 segment decoder/
driver (IC 6): | Serial/parallel conversion of the display data, multiplexing of the 7 segment display and generation of the display characters |
|
 | |
| e. NAND gate and mono-flop (IC 8, IC 9, IC 10): | Generation of the strobe signal for the key byte |
| f. Schmitt Trigger
(IC 4/Pin 8,9,10): | Switching of the display brightness |

Control of 7 Segment Display:

The display data is processed by the control board in serial and transferred every 15 ms in two groups of 8 bits each. In order to display the data it is first necessary for it to be converted to parallel data and then decoded. Serial/parallel conversion is accomplished by IC 6. For this purpose IC 6 receives the serial data signal at Pin 5 and the processed shift file at Pin 13 via the monoflop IC 7

Low level is applied to the enable input IC 7/Pin 12 for the duration of data transfer by the second monoflop in IC 7.

In addition, the serial/parallel converter IC 6 also contains the BCD to 7 segment decoder with segment drivers a-g and the multiplexer which allocates the segment data to the displays via switch outputs Pin 7, 8, 10 and 11. The switch outputs Pin 7, 8, 30 and 11 of IC 6 control the displays LD 1 through LD 4 via Darlington drivers.

Display Brightness Switching:

The brightness of the display and the LED's is adjusted by a photo-resistor R 34 and the OR gate IC 4 (Pins 8,9 and 10+ wired as a Schmitt-Trigger).

If the room is very bright the output of the Schmitt-Trigger (IC 4/Pin 10) is high causing the two transistors T 2 and T 1 to be connected through by IC 4/Pin 11 or IC 4/Pin 11 and IC 1/Pin 2, and activates the decoder IC 2 via the enable inputs pin 18 and 19. The transistor T 1 serves as a power supply for a portion of the LED's, while T 2 switches the common ground for all Darlington drivers in IC 3.

Since the two transistors are continuously switched on in a bright room, the controlled LED's are also continuously supplied with power and are therefore bright. If the light intensity in the room is low the output of the Schmitt-Trigger (IC 4/Pin 10) is at low level and transistors T 1 and T 2 as well as the enable inputs of decoder IC 2 are activated only by short pulses to IC 4/Pin 13. This causes all activated LED's and the 7 segment display to illuminate only at low intensity.

Since the control pulses to IC 4/Pin 13 must be synchronous with the multiplex signal for the 7 segment display, the pulses are generated directly from the multiplex signal via diodes D 38 through D 41 and shaped to a defined length by one of the two monoflops in IC 9.

Generation of the Strobe Signal:

A strobe signal is generated on the display board, which triggers acceptance of the key byte in the VIA (IC 16/control board) to avoid "bouncing" of the membrane keys. The strobe signal is generated by the second monoflop in IC 9 and is available in the form of a positive pulse with a duration of approximately 20 ms at output Q 1 (IC 9/Pin 13).

The monoflop is triggered by the NAND gate IC 10/Pin 3 and the low path filter consisting of R 29 and C 9 when a key is pressed.

During the program sequence only, the start key should be operable and in the set mode all keys except for the start key, the keys are subdivided into 2 groups:

Group 1: start key ST/ST

Group 2: keys E 1, E 2, E 3, E 4, TSR, SET0 and step key

In each case only one of the two groups is enabled for strobe signal generation under the control of the set/run switch on the control board via IC 8, IC 10 (Pins 8, 9, 10) and IC 10 (Pins 4, 5, 6). The reset key is always enabled. Since the negative edge of the strobe signal is the active edge, a chatter period of less than 20 ms is bridged.

Manual Lifting on Control Disable:

Short term errors can occur when the lift motor driver receives control signals to lift and lower simultaneously. For this reason manual control is disabled during processor control access to the lift motor driver.

Function: During process control access to the lifting motor driver the HM disable (ST 2/Pin 12) is set to high level. This high level disables the manual control signals E 3 and E 4 via the OR gate IC 4/Pin 2 and 5.

4.4 Control Head Interface Board (94017)

This board contains the interface for control and monitoring of all units and sensors for the assembly stage.

Control Head Interface Board Components:

- | | |
|-----------------------|---|
| a. Driver: | Control of solenoid valves, filling pump and stepping motor |
| b. Motor bridge: | Control of lift motor |
| c. Comparator: | Examination of fill sensor |
| d. Inputs: | Receiving sensor signals and sending to control board |
| e. Voltage regulator: | Generation of the supply voltages |

Rectifier/Voltage Regulator:

The rectifier circuits G1 1 AND G1 2 supply the unstabilized voltages 10 V, 18 V and 36 V for power supply to the control head and assemblies. The stabilized voltages +5 V and + 24 V are obtained via IC 5 and IC 6.

Filling Pump Driver:

The filling pump is connected to the + 24 V power supply via plug ST 4/Pin 5. If Pin 4 of plug ST 4 is connected through to ground via T 12, the filling pump is active.

Since the air distributor must be in the position corresponding to the process step when the filling pump is active, control can only be accomplished by the processor control.

Manual operation is accomplished under control of the processor systems just as manual control for the lift motor, and not directly via hardware control.

Control - Lift Arm:

The bridge circuit consisting of T 1 through T 9 is used for control of the lift arm.

Control is accomplished either by the processor control or directly, via manual operation (see also display board description/section: "Manual Lift Arm Control Disable").

"Lift" Mode:

If the lift mode is activated, IC 4/Pin 11 is at high level and IC 4/Pin 8 at low level.

The following situation results in the bridge circuit:

- T 6 is conductive blocking T 1
- T 2 becomes conductive; the circuit with C 6, D 6, R 11 and R 12 assures that it slowly becomes conductive rather than suddenly ("soft start")
- T 3 and T 9 are non-conductive
- T 4 is conductive
- T 5 is non-conductive

In this manner the lift motor is connected through to ground via T 2 and R 1 and to + 36 V via T 4.

When the sensor magnet then passes by the Hall switch IC 90, the output of the Hall switch (plug ST2/Pin 8) switches off the signal to the lifting arm control. This puts the bridge circuit back into the quiescent and transistors T 4, T 5 and T 1 are conductive.

Since the lift motor is now short-circuited by T 4 and T 5 it is stopped while T 1 is decoupled by D 2.

"Lowering" Mode:

In this mode IC 4/Pin 8 is at high level and IC 4/Pin 11 at low level.

This results in the following situation in the bridge circuit:

- T 9 is conductive blocking T 4
- T 3 is conductive
- T 2 and T 6 are non-conductive
- T 1 is conductive
- T 5 is non-conductive

The lift motor is connected to ground via T 3 and R 1 while the + 18 V supply reaches the lift motor via T 1 and D 2.

Current Limitation:

The voltage drop resulting from the lifting motor current flowing through R 1 controls the two current limitation transistors T 7 and V 8. If the current is too high T 7 or T 8 causes the active ground transistor for the bridge circuit to become less conductive.

The current value for lifting is approximately 3.4-3.8 A, the value for lowering 1.2 - 1.4 A.

Stepping Motor Control:

Two push/pull drivers in IC 1 are used for control of the stepping motor. The outputs Out 1 and Out 2 are connected to + 24 V or to ground depending on inputs IN 1 and IN 2 and in this manner control the direction of rotation of the stepping motor. Both outputs are at low level when the stepping motor is stopped.

The Hall switches IC 92 and IC 93 associated with the step motor serve for position control of the air distributor and generate a low level in the active state, which is fed to the input register of the control board (SMT 0, SMT 1).

Solenoid Valve Control:

The other two drivers in IC 1 are used for control of the solenoid valves MVK and MVW.

Fill Sensor:

The fill sensor consists of the two needle chains in the filling fitting of the lift arm and the comparator IC 2. During the filling operation a resistance of 1 M ohm is present between the needle chain, which results in an increase in the input voltage to the comparator (Pin 3). This results in a high level at the output (Pin 6), which is fed to the input register of the control board (signal FSN).

4.5 Transformer Board (94016)

The transformer board provides the AC voltage for the control head and the DC voltages for the motor unit. The switching circuits for heater 1, heater 2 and the circulation pump as well as the electronic control circuitry for the rotation motor are located on this board.

All control signals are provided by the motor unit interface board.

Components:

- | | |
|--|---|
| a. Line transformer, rectifier, voltage regulator: | Power supply for control head and motor unit |
| b. Relay: | Switching circuits for heater 2, "pump, line isolation, switching supply voltage for electronic control circuitry |
| c. OP amplifier: | Control of rotation motor speed |
| d. Zero voltage switch (IC 3), optocoupler: | Switching circuit for heater 2 |

Switching Circuits for Heaters 1 and 2:

The switching circuit for heater 1 consists of the optocoupler OK 1, the zero voltage switch IC 3 and Triac IC 1.

Heater 2 is switched by relay rel. 2.

Line Isolation Relay:

The line power for the heating elements and circulation pump can be switched off as required with relay rel. 1. Switching is accomplished by the processor control when the water bath overheats or by the float switch connected via plug ST 1 when the water level in the bath is too low. Also switching off by transistors T 2 and T 3 is possible; these transistors are controlled directly by the overheating protection monoflop IC 16 on the motor unit interface board.

Speed Control - Rotation Motor:

The control circuit consisting of T 7 and IC 2 is an E/I control.

This circuit is supplemented only by the pre-amplifier stage IC 1 for adaptation of the control voltage V sol1 (ST 2/Pin 3) to the input sensitivity of the control stage.

A switching circuit for the control voltage of the control stage is used, which limits the power loss of transistor P 7 at low speeds or in the event of a malfunction.

Switching is accomplished by relay rel. 4 controlled by the microprocessor.

The thermoswitch S 1 monitors the temperature of transistor T 7. If T 7 overheats the switch generates a low level at the monitor input TEMP.EX (ST 2/Pin 1).

4.6 Functional Description - Motor Unit Interface Board (94015)

In addition to further I/O registers, the motor unit interface board also contains the analog interface for collection of the analog readings (temperature) and output of the control voltage for the rotation motor.

Motor Unit Interface Board Components:

- a. Input register - Examination of:
- BCD switch for rotation motor speed (IC 13)
 - BCD switch for automatic filling quantity (IC 13)
 - transistor temperature monitor for rotation motor IC 13
 - Rotation motor stand still indicator IC 16 a (IC 13)
- IC 1
- DIP switches SW 1/1 through 5 (IC 1)
 - Front/rear switch on plug ST 3 (IC 1)
 - Top float switch on plug ST 2 (IC 1)
 - Floating input to EXTERN plug ST 4 (IC 1)
 - A/D converter data (IC 10)
- b. Output registers
- Output of:
- Control signal, nominal rotation motor speed (IC 8)
 - 15 V/30 V switching (IC 8)
 - Control voltage TEMP/ON (IC 8)
 - Test signals TS 1 - TS 3 (IC 2)
 - Expansion, EXTERN plug ST 4, (IC 2)
 - Floating outputs to plug ST 8 (IC 2)
 - Refill control enable (IC 2)
 - Control bit, heater 1 (IC 14)

- Control bit, heater 2
(IC 14)
- Control signals for A/D
converter (IC 14)
- c. D/A converter
Generation of control
voltage for rotation
motor
- d. A/D converter
Conversion of temperature
readings chemical/water
sensors
- e. Comparator and
monoflop
Overheating protection,
switches heating elements
off
- f. Operation Amplifier
Preamplifier for temp-
erature readings
(IC 5/IC 6)
Impedance converter for
control voltage (IC 3)
- g. Optocoupler
Isolation of chemical
refill control from
processor system
- h. Line filter and
power switch

Input registers:

The input registers IC 1, IC 10, and IC 13 correspond to the input registers on the control board in terms of function. The required chip select signals are provided by the control board.

Output registers:

The output registers IC 2, IC 8 and IC 14 correspond to the output registers on the control board in terms of function. The required chip select signals are provided by the control board.

Temperature Measurement:

Since the two preamplifiers for the chemical and water temperature are identical in terms of design, only the amplifier for the water temperature value is described here.

The bridge circuit consisting of resistors R 18, R 19, P 4, R 20 and the temperature sensor is supplied with power by the reference element IC 12 and delivers the differential input voltage for the op-amp IC 6. Adjustment of the zero point is accomplished with P 4. The amplifier circuit has two alignment points; P 3 for adjustment of the gain and P 7 for offset adjustment.

The amplifier output is connected to the A/D converter input via R 25 and BR 1.

The two preamplifiers differ only in the gain adjustment.

Overheating Protector:

Only a portion of the overheating protection circuit is located on the interface board. A total of three independent measures protect the unit from overheating.

- a. Temperature sensor check for short circuit or discontinuity, via software.
- b. When the water level drops below the minimum required level the heating elements and the line isolation relay are switched off via the bottom float switch.
- c. In the event of a processor control failure or output register IC 14 failure the line isolation relay is switched off by the protection circuit consisting of comparator IC 15, monoflop IC 16 b and transistor T 1.

If the temperature in the water bath exceeds the 55 degree limit a positive edge is generated by comparator IC 15 at the trigger input of monoflop IC 16 b.

This results in low level at the output (Pin 9) of the monoflop, which provides for an interruption to the line isolation relay power supply.

However, if the water bath is already overheated when the line power is switched on (e.g. overheated following a short power failure), the edge required to set the monoflop can no longer be generated. Transistor T 1 is also used to assure that the circuit still operates properly. This transistor pulls the overheating protection output to lower level.

A/D Converter:

A 4 channel converter with a resolution of 10 bits is used as the A/D converter (IC 11).

Of the 4 possible channels only channels CH 0 and CH 1 are used. Both channels are the same and can be selected via software.

An input register (IC 10) and an output register (IC 14) are assigned to the A/D converter for operations without address lines and R/W signal.

The output register assumes control of the converter, while the input register serves as a converter layout.

The precision reference diode ZN 458 (IC 12) with an output voltage of 2.45V +/- 1.5 % serves to provide the reference voltage.

D/A Converter:

The D/A converter (IC 7) generates an analog control signal for control of the rotation motor speed from the binary input signal. The maximum possible resolution of the converter is 6 bits, however only 5 bits are used. A parallel regulator with an output voltage of 2.5 V - 3 V is used for reference. An op-amp wired as a voltage follower is connected to relieve the load on the D/A converter output. Initial adjustment of the speed can be accomplished with P 5.

Rotation Motor Standstill Indicator:

A stand-still indicator was implemented for monitoring the rotation motor. This consists of the retriggerable monoflop IC 15 a, which is triggered by the rotation motor sensor on plug ST 9. The drum sensor is a hall switch, which is triggered at intervals by ring magnets located on the motor shaft.

If the pulses generated in this manner are not present the output of the monoflop(IC 16 a/Pin6) goes to low level after a short time and after a delay of 1.6 seconds the processor control starts reversing the drum motor direction of rotation continuously in order to eliminate any contact problems on the pole switching relay.

Simultaneously the supply voltage is switched over to 15 V to reduce the power loss of the drum motor control transistor. Also, the error message 2 is displayed.

The pole reversal function and output of error message 2 continue until the output of monoflop IC 16a is switched back to high level, i.e. pulses are again present from the rotation motor sensor.

4.7 Chemical Refill Circuit Board (94021)

(Models 4170 & 4171 only)

The chemical refill control board controls and monitors the six refilling pumps.

Chemical Refilling Circuit Board Components:

- a. Switching circuits: Relays RL 1 - RL 6; switch pumps 1 - 6.
- b. Enable circuit: T 2, IC 1, T 1; disables the refilling pumps when the filling pump in the control head is active.
- c. Timer: IC 1; switches off pumps when the maximum pumping time is exceeded (e.g. supply reservoir empty or filter clogged).
- d. Buzzer: Bz; gives warning when the maximum pumping time is exceeded (e.g. supply reservoir empty or filter clogged).

If at least one of the float switches SW 1-SW 6 is active (float down), the associated relay is connected to the + 12 V supply. Simultaneously + 12 V is fed to the enable transistor T 2 via the corresponding diode of diode network"DN 1. However since T 1 does not become conductive without an enable signal via plug ST 10, the relay cannot pull in. If an enable signal is then given by the processor control via the optocoupler to the motor unit interface board, Pin 2 of plug 10 is then connected to ground.

T 2 is therefore conductive and IC 1 receives power. High level is then present at the output IC 1/Pin 3, which activates T 1, after a delay of approximately 30 seconds (R 11, R 13, C 12). The relay pulls in.

IC 1 contains a timer, which keeps the output IC 1/Pin 3 at high level for approximately 6.5 minutes. If the refilling operation is not completed within this time (float switch closed for longer than 6.5 min.), pin 3 of IC 4 goes to low level switching off all relays.

Simultaneously high level is switched to IC 1/Pin 2 of the buzzer and the enable is maintained via T 3 in order to prevent resetting of the error message by switching off the enable signal (self-retaining circuit)." Before expiration of the 6.5 min. the timer can be reset at any time by interrupting the enable signal. This is always accomplished when the filling pump in the control head is activated.

To prevent resetting the timer when the reset key is pressed, C 9 is installed, which maintains the enable for a short time.

CHAPTER 5

Troubleshooting

Page

5.1	Introduction
5.2	Fault Code Chart 1
5.3	Fault Code Chart 2

5.1 Troubleshooting - Introduction

The circuitry used in the ATL-2,3 is capable of an assortment of self-diagnostic tests. These tests are simply programs which are written into the operating memory. The operating memory is stored on a small electronic device called an EPROM which stands for "Erasable Programmable Read-Only Memory". In order to perform these diagnostic tests it is essential for the unit to have a lighted numerical display which you are able to change using standard program entry functions. The fact that the display changes at all indicates that the program is running.

Troubleshooting - Program Running

Two versions of an eeprom were used when the ATL-2,3 were first introduced. You can determine which version you have by pressing the lateral agitation button and the program step button simultaneously. In the display will appear a 4 digit code, if the first two numbers are 86 or 87 you have the first version, if the first two numbers are in the twenties or thirties then you have the second version.

Note: Eeproms can easily be changed and are completely compatible. All improvements or updates will be made available to ATL owners.

Troubleshooting - First Version

With the first version of eeprom there is a limited amount of troubleshooting capability. While the machine is switched on the program in memory is constantly running and "looking" for any irregularities in several of the main components. If an irregularity is "spotted" the machine will display a flashing number in the left digit of the display and sound an audible alarm. The flashing digit will correspond to a table found in section 5.2. The table gives the cause and remedy for each flashing code number. For problems not found in the table consult the Functional Description of the area in the machine where you are experiencing the problem, there you will find a complete description of the operation of the electronics giving you test points to help pinpoint a problem.

Troubleshooting - Second Version

The second version of eprom has some additional diagnostic capacity. While the machine is switched on you can push the lateral agitation button and the "set 0" button simultaneously, this will cause the two left hand digits in the display window to light up showing a fault code. (See section 5.1 to determine whether the program is running.) The explanation of how to use this code is located in section 5.3. If the problem is not covered by this table refer to the functional description section for the area of the machine you are repairing. There you will find a complete operation sequence which will enable you to determine what the cause of the defect is.

5.2 Faults

Indication	Cause	Remedy
Water bath does not heat up	RESET was not pressed after programming the process.	Push RESET (13)
Water bath does not heat up	SET/RUN in set position SET	Turn switch (20) to RUN.
Program does not start	not enough remaining solution.	Refill bottles, enter new volume in display.
red triangle	Rinse water off? Bottles empty? Bottle caps tight?	Turn on. Refill bottles. Tighten caps.
red triangle/led(s) next to chemical step flashing.	In the step where the LED flashes the chemical quantity was too low.	Before starting refill chemistry.
red triangle blinking	Indicates a momentary loss of power to the machine.	Ignore. The process will not be affected if only for a few seconds. Triangle will be off at next process (Note: the ATL's will always do this when first turned on.)

Indication	Cause	Remedy
Yellow triangle	Unit finds internal problem w/processor	Corrects itself automatically.
Blinking "1"	Front back switch is in wrong position	Switch to correct position.
Drum motor stopped.		Service; see chapter 3 or 6. If for less than 5 sec. unit will reverse motor to free up any obstruction. If it doesn't free up see chapter 3 or 6.
Motor turns at 50 rpm w/out reversing & does respond to speed changes.	Motor is overburdened.	It should work normally after it cools for a not while. if problem occurs often see CHAPTER 6.
Air distributor defect.		See CHAPTER 6.
Lift arm cannot raise		Empty the drum manually, replace drum and press start. Remove any obstruction. If no obvious obstruction appears, stay with machine and see if problem recurs. If so, repeat the above step until process is done, then see chapter 6.

Water temperature
sensor defect.
(flashing 5)

See instructions
page -----.
See chapter 2.

Pumped solution
quantity is too
low.

Depress key (15)
& (5) together
to pump more
chemistry.
1 sec. = 100 ml
See compressor
calibration sec.
CHAPTER 7.

Chemistry temperature
sensor defect.
(flashing 7)

Take automatic
over-heat feature
out of program.
Unit can be
run w/temp/start
override.
Test sensor.
see chap. 3

Continuous
long beep.

Filters plugged on
automatic refill.

Change filters.

Continuous
long beep.

Refill Pump defect.

Check complete
delivery system
for blockage.
Replace pump if
necessary.

Continuous
beep.
refill switch off &

15 L container
empty.

Refill 15 L long
containers. Turn
then on again.

5.3 Explanation of Fault Code For Second Version Eprom

Programmed into the ATL memory is a code which may be helpful in quickly diagnosing a problem. This code is not intended to be an exclusive method of troubleshooting and will only be useful with a clear understanding of the operation of the ATL which can be found in the instruction manual.

CONSULT THE FOLLOWING PAGE FOR THE CHART CORRESPONDING TO THE INFORMATION BELOW!

Instructions:

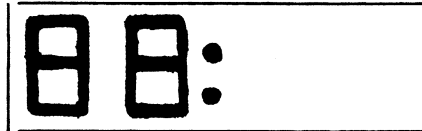
A two digit fault code will be displayed for a short period of time at the end of a program. It can be brought back to the display by changing the number 3 dip switch (behind access panel) to the up position and then depressing the lateral agitation key and the step down key simultaneously.

This code represents the error status of the unit at that time. The normal code displayed when everything is working properly is 0 0. If there is a problem with the machine a different code will be displayed, such as 4 0. If 4 0 is displayed this would indicate the Chemical Sensor is either unplugged or defective because a 4 in the left column means a defective Chemical Sensor and a 0 in the right column means OK.

5.3 Fault Code Chart #2

Depress lateral agitation key and step down key together.

- 1 = front back switch, wrong pos. (ATL-3)
- 2 = drum motor stopped
- 3 = air distributor defect
- 4 = lift arm cannot raise
- 5 = water temperature sensor defect
- 6 = pumped solution quantity low
- 7 = chemistry temperature sensor defect
- 8 = unassigned



<First Digit/Second Digit>

See Key Above
For this column

5
6
5 & 6
7
5 & 7
6 & 7
5 & 6 & 7
8
5 & 8
6 & 8
5 & 6 & 8
7 & 8
5 & 7 & 8
6 & 7 & 8
5 & 6 & 7 & 8

0 0
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9
A A
| |
|| ||
□ □
— —

See Key Above
For this column

1
2
1 & 2
3
1 & 3
2 & 3
1 & 2 & 3
4
1 & 4
2 & 4
1 & 2 & 4
3 & 4
1 & 3 & 4
2 & 3 & 4
1 & 2 & 3 & 6

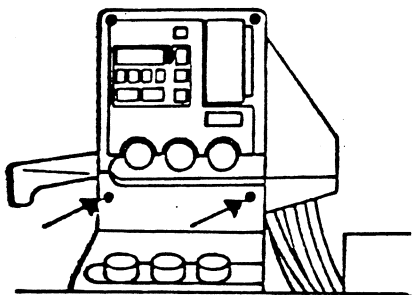
CHAPTER 6

Fuse Replacement

The ATL-2 and ATL-3 both have two fuses. The fuses are located just behind the small access panel which is mid-way between the upper head with the digital display and the lower head with the main power switch. The panel is held on with two Philipps head screws.

RATINGS ARE AS FOLLOWS:

ATL-2	2 X 1.6 amp. Time delay
ATL-3 w/hot water heater	1 - 800ma T.D. and 1 - 1.6 amp. T.D.
ATL-3 w/o hot water heater	2 X 1.6 amp. Time delay
ATL-3 Table top	2 X 1.6 amp. Time delay



CHAPTER 7

Test Points P.C.Boards

The following seven pages contain data needed to accurately test individual components on any of the 5 p.c. boards while in circuit.

CAUTION: Use extreme caution when testing this electrical device while power is on. Lethal voltages are present. Only qualified, experienced technicians should perform any of the tests found on the next seven pages.

- 7.1 Upper Interface Board (#94017)
- 7.2 Control Board (#94014/019)
- 7.3 Display Board (#94018)
- 7.4 Lower Interface Board (#94015)
- 7.5 Transformer Board (#94016)

7.1 Test Points

a) Upper Interface Board, Control Head (94017)

Signal	Nominal Value	Remarks
FSN	with resistor: + 5 V without resistor: 0 V	Replace filling sensor with 1 M ohm test resistor. (ST 2/Pin 1 + 11) FSN = ST 1/Pin 2
Current limita- tion IC 1	I = 500-580 mA	Replace MVW solenoid valve with ammeter. Actuate SET 0 and key E 1 (SET)
Current limita- tion, lift- motor (lifting)	I = 3.4-3.8 A	Replace lift motor with ammeter (+ to ST 2/Pin 10; - to ST 2/Pin 12) Press SET 0 and E 4 key (SET)
Current limita- ion, lift motor (lowering)	I = 1.2-1.4 A	Replace lift motor with ammeter (- to ST 2/Pin 10; + to ST 2/Pin 12) press SET 0 and E 3 (SET).
Lift motor supply voltage (lifting)	E = 28-30 V	Press SET 0 and E 4 key. Pos.to ST 2/Pin 10; ground ST 2/Pin 12.
Lift motor supply voltage (lowering)	E = 12-14 V	Press SET 0 and E 3 key. Pos.to ST 2/Pin 10; ground to ST 2/Pin 10.
+ 5 V	+ 5 V +/- 0.1 V	Ground to black stranded wire + 5 V to red stranded wire.
+ 24 V	+ 24 V +/- 0.8 V	Voltage regulator IC 6
+ 18 V	17 V	Measure across C 3 without load.

+ 18 V (with load)	15 V ripple 2.5 VPP	Measure across C 3 with load. Load by pressing SET 0 and E 3 key (= lower lifting arm). Allow lift arm to rest against lower stop.
+ 36 V (without load)	34 V	Measure across C 2 without load
+ 36 V (with load)	30 V ripple 4.5 VPP	Measure across C 2 with load. Load by pressing SET 0 and and E 4 key (= lift arm)
V out IC 7	+ 5 V +/- 3 %	IC 1/Pin 1. TO IC 1/Pin 4

7.2 ATL 2 Control Board (94022)/ATL 3 (94023)

Signal	Nominal Value	Remarks
+ 5 V	+ 5 V +/- 0.1 V	Measuring ground to IC 15/ Pin 4; and + 5 V to IC 15/ Pin 8.
V,C-mos	+ 3.6 V + 0.2 V - 0.0 V	Measure voltage across lithium battery with uni connected.
V Ref	+ 2.5 V	Measuring ground to IC 15/ Pin 4; 2.5 V to IC 15/Pin 1
OSC (oscillator)	1 MHz +/- 100 ppm Vpp min 3.5 V	IC 2/Pin 37 (CPU) Ground Pin 1/IC 1.
IRQ (interrupt request) (ground IC 1/Pin 1)	a. tL 1- 2 ms tH 48-49 ms b. tL 4- 5 ms tH 45-46 ms	IC 1 Pin 4 (CPU) a. idling (press reset button previously) b. while program is running
STRB (strobe)	tH 5-6 ms	IC 16/Pin 40 (can only be measured when a key is pressed. Reset key in RUN or SET mode, start key in RUN mode, SET keys, arrow key or TSR key in SET mode. (ground IC 16/Pin 1)
Sync	tH = 900 ns tL = 800 ns/5 us irregular sequence of H/L pulses	IC 1/Pin 7 (a "stable" oscillogram cannot be recognized because the pulse sequence is irregular depending on the program). (ground IC 1/Pin 1)
SEDA	a. pulse group 8 low pulses each with duration of 16 us. Repetition every 50 ms. b. low level	IC 16/Pin 19 (oscillo- scope setting: 2 V/div; 50 us/div; trig. neg. edge) (ground IC 16/Pin 1). a. measure with display 55:55 b. measure with display 00:00

Signal	Nominal Value	Remarks
Clock	<u>Pulse group</u> 16 low pulses with duration of 5 us each. Structure independent of display. Repetition every 50 ms.	IC 16/Pin 19 (oscillo- scope setting: see SEDA measurement)
PHI 2	Square pulse f = 1 MHz Vpp = 5 V	IC 16/Pin 25 (ground IC 16/Pin 1)

7.3 Display Board (94018)

Signal	Nominal Value	Remarks
+ 5 v	+ 5 V +/- 0.1 V	Ground to SL 1/Pin 12; 5 V to IC 6/Pin 18
+ 24 V	+ 24 V +/- 0.8 V	24 V to BZ 1/+
SEDA	<u>a. pulse group</u> 8 low pulses each with duration of 16 us. Repetition every 50 ms. <u>b. low level</u>	IC 6/Pin 5 (oscilloscope setting; 2 V/div; 50 us/div trig. neg. edge) a. measure with display 55:55 b. measure with display 00:00
Clock	<u>Pulse group</u> 16 low pulses each with duration of 5 us.	IC 7/Pin 2 (oscilloscope setting: see SEDA measurement)
MPX	<u>Pulse</u> tH = 1.5 - ms tL = 4.5-6 ms	IC 9/Pin u0
Enable IC 6	<u>Pulse</u> tH = 49.7 ms tL = 300 us	IC 6/Pin 12 (ground IC 6/Pin 9)
CLOCK	<u>Pulse group</u> 16 low pulses each with duration of 11 us.	IC 6/Pin 13 (oscilloscope setting: see SEDA measurement)
STRB	tH 5-6 ms	IC 9/Pin 13 (can only be measured when a key is pressed, reset key in RUN or SET mode, start key in RUN mode, SET keys, arrow key or TRS key in SET mode.
Dark/bright switching level	light = H-level dark = L-level	IC 4/Pin 10 Dim R 34 for L-level at IC 4/Pin 10
Dark/bright	light = H-level. dark = H-pulse 3-6 ns each.	IC 9/Pin 4

7.4 Lower Interface Board (94015)

Signal	Nominal Value	Remarks
+ 5 V; AN	+ 5 V +/- 3%	IC 5/Pin 7; ground = temperature sensor shield
+ 5 V; DIG	+ 5 V +/- 4%	IC 10/Pin 20
V ref: DAC	2.5 - 3 V	IC 7/Pin 5; ground = temperature shield
V ref; ADC	2.45 +/- 1.5 %	IC 11/Pin 8; ground = temperature shield
Lever switch (ST 2)	a. low b. high	IC 1/Pin 8 a. float up b. float down
V/H sens. (ST 3)	a. low b. high	IC 1/Pin 11 a. "front" position b. "rear" position
TMT - sens.	Square wave: f 5 HZ	IC 16/Pin 6 (motor switch on disc, start program, e.g. chemical 1 = 10 min.
TMT-monoflop	a. H-level b. L-level	IC 16/Pin 6 (motor switch, any position, start program, e.g. chemical number 1 = 10 min. a. ST 9 plugged in b. ST 9 pulled
Input voltage CH 0	0.73 V +/- 2% Temperature display = 29.8-30.2 degrees C.	IC 6/Pin 6; ground to C 11/ Pin 9 replace temperature sensor WA with 2.2 K ohm trimmer and set trimmer to 0.73 V +/- 2%
Input voltage CH 1	0.73 V +/- 2%	IC 5/Pin 6; ground to C 11/ Pin 9 replace temperature sensor CH with 2.2 k ohm trimmer and set trimmer to 0.73 V +/- 2%

Signal	Nominal Value	Remarks
Overheating protection	a. low b. high c. high d. low	a. IC 15/Pin 7 b. T 1/collector c. IC 15/Pin 7; pull ST 6 d. T 1/collector; pull ST 6 Collector T 1 remains at low MTLST 6 is plugged i again and the power switched off momentarily
ANALOG output	1.30-1.34 V	IC 7/Pin 4 (start program, e.g. chemical 1 = 10 min., motor switch on disc).

7.5 Transformer Board (94016)

Signal	Nominal Value	Remarks
+ 5 V	+ 5 V +/- 3%	Ground to C 3; + 5 V to IC 5/Pin: Out
+ 24 V	+ 24 V +/- 0.8 V	Ground to C 1; + 24 V to IC 4/Pin: Out
+ 18 V (w/o load)	17 V	Ground to C 1 (-); + 18 V to C 1 (+)
+ 36 V (w/o load)	34 V	Ground to C 1 (-); + 36 V to C 1 (+)
Power supply IC 2/IC 2	+ 28 V +/- 10%	IC 1/Pin 7
Test relay 1	a. Relay 1 pulled in b. Relay 1 dropped out	Actuate bottom float switch (float up), pull plug ST 2. a. Connect R 14 (ST 2/Pin 11) to + 5 V. b. Connect R 14 (ST 2/Pin 11) to ground and/or float down.
Test relay 2	a. Relay 2 pulled in b. Relay 2 dropped out	Actuate bottom float switch (float up), pull plug ST 2. a. Connect R 13 (ST 2/Pin 15) to + 5 V. b. Connect R 13 (ST 2/Pin 15) to ground and/or float down.
Test relay 3	a. Relay 3 pulled in. b. Relay 3 dropped out	Pull plug ST 2. a. Connect R 12 (ST 2/Pin 7 to + 5 V. b. Connect R 12 (ST 2/Pin 7 to ground.
Test relay 4	a. Relay 4 pulled in b. Relay 4 dropped out	Pull plug STS 2. a. Connect R 11 (ST 2/Pin 9 to + 5 V. b. Connect R 11 (ST 2/Pin 9 to ground.

Signal	Nominal Value	Remarks
Test - H1	a. H 1 = on b. H 2 = off	Pull plug ST 2, actuate bottom float switch (float up). a. R 21 (ST 2/Pin 18) and R 14 (ST 2/Pin 12) to + 5 V. b. R 21 (ST 2/Pin 18) and/or R 14 (ST 2/Pin 12) to ground and/or float down.
Test - H 2	a. H 2 = on b. H 2 = off	Pull plug ST 2, actuate bottom float switch (float up). a. R 13 (ST 2/Pin 16) and R 14 (ST 2/Pin 12) to + 5 V. b. R 23 (ST 2/Pin 16) and/or R 14 (ST 2/Pin 12) to ground and/or float down.
Test - Capacitors c 1/C 2		Start any program, pull ST 9 (TMT-sens.) on interface board, motor head. Wait for error message 2 and continue operating unit with error message for approx. 2 min. If a power failure or watch dog display appears during this time, C 1 or C 2 is defective.

CHAPTER 8

Servicing the Upper Electronic Control Head

Note: It is not necessary to remove the electronic control head if it is known which of the three circuit boards is defective or if you are simply replacing a known defective component or changing the Eprom to a different version. The three circuit boards can all be removed by taking the front plate with the membrane panel off.

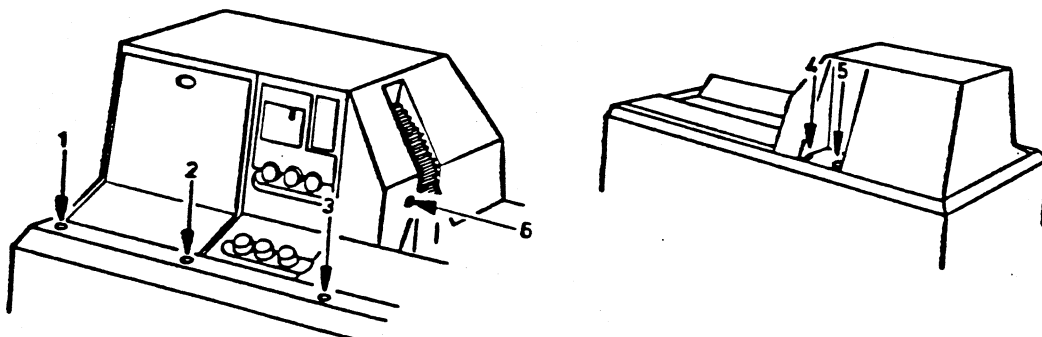
If you are unable to determine which of the three boards is defective it may be necessary to remove the entire electronic head. See section 8.1

- 8.1 ATL-3 Hood Removal
- 8.2 ATL-3 Hose Removal
- 8.3 ATL-2,3 Back Cover Removal
- 8.4 Control Head Removal
- 8.5 Wiring Harness Connections Top Head
- 8.5.1 Individual Wire Replacement
(Harness Connection)
- 8.6 Electronic Control Head
- 8.7 Replacing Membrane Switch Panel
- 8.8 Replacing Upper Head P.C. Boards

8.1 ATL-3 Head Removal
(ATL-2 Starts at section 8.3)

Remove ATL 3 hood (95294) - by unscrewing the six slotted screws shown in drawing.

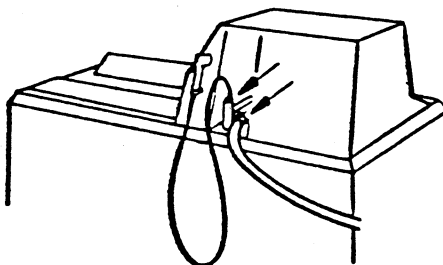
(diagram)



8.2 ATL-3 Hose Removal

Remove manual sprayer (95321) and cold water hose - use pliers if necessary.

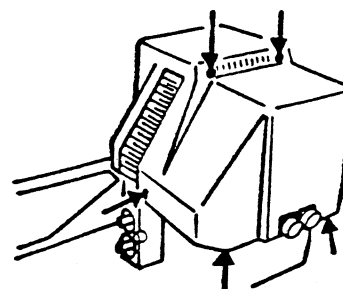
(diagram)



8.3 (ATL-2 begins here.)
Remove motor cover (92028)
by unscrewing the five screws
shown in drawing.

(diagram)

Note: The two lower screws are
finger tightened wing nuts or
similar.

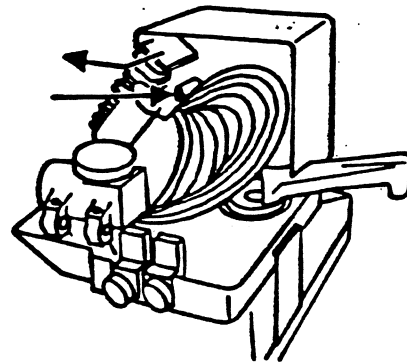


8.4 Control Head Removal

Back of machine

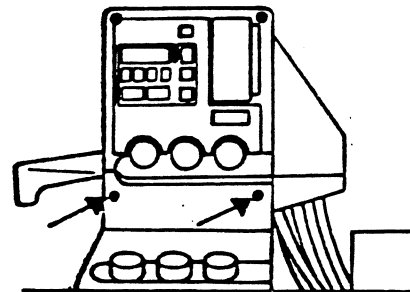
- Pull bellows out of upper guide
- Remove white plastic screw

(diagram)

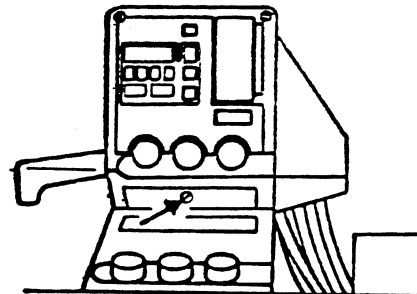


Front of machine

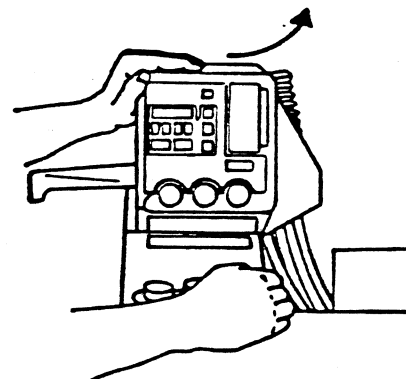
- Remove access panel (92026/07155) by removing the two Phillips screws shown in drawing.



- Remove center screw at bottom edge.



- Disconnect power and ribbon cables in front.
- Press head to right out of mount and lift.
- Disconnect the three cable plugs in the back of electronic head.



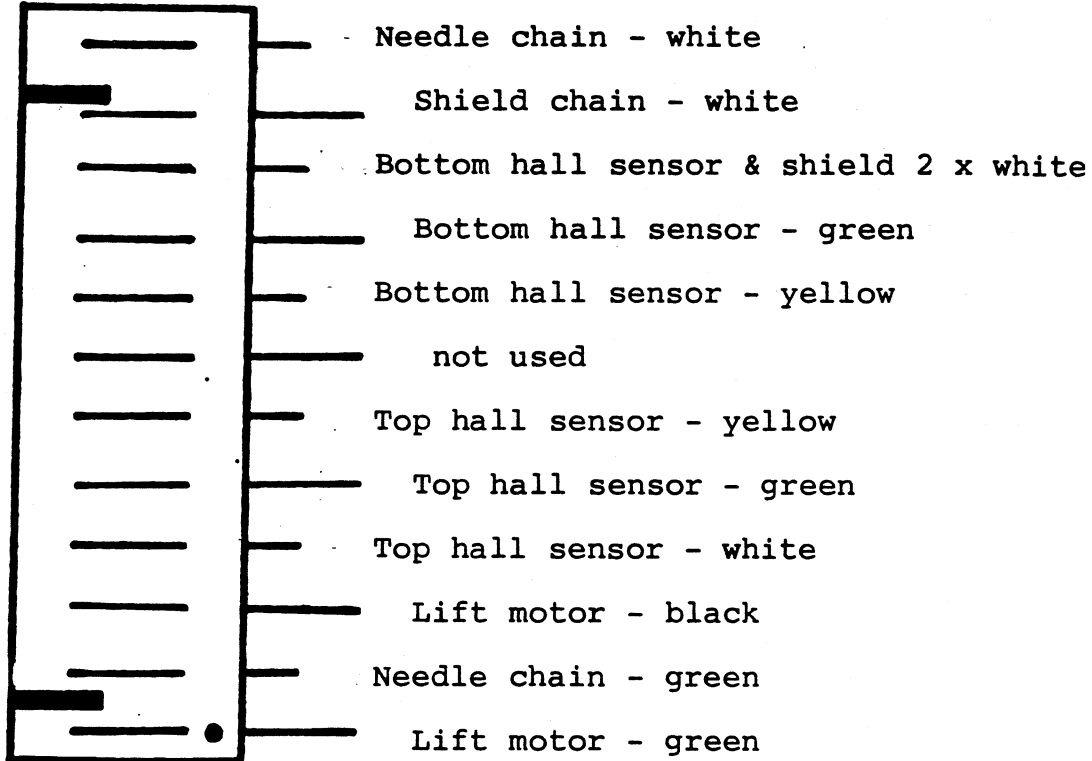
8.5 Wiring Harness Connections (for Upper I/O Devices)

a) Lift Arm Connector

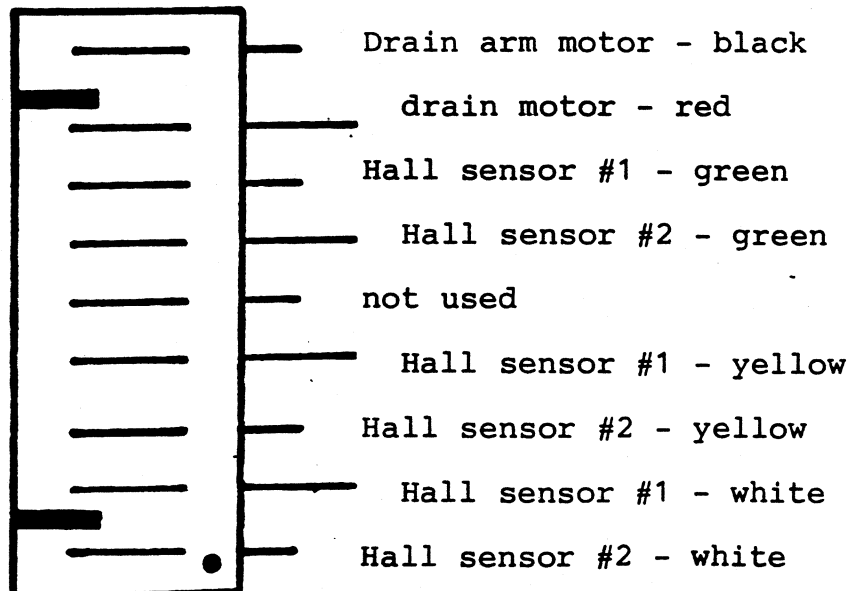
Note: All three of these connectors are plugged into the back of the electronic control head. The text to the right of each connector indicates which I/O device each wire goes to.

Needle chain
pivoting
point of arm.

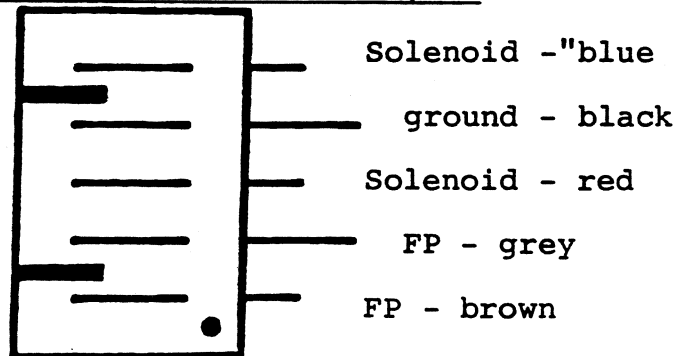
Shield &
ground HSTRA



b) Air Distributor & Drain Arm



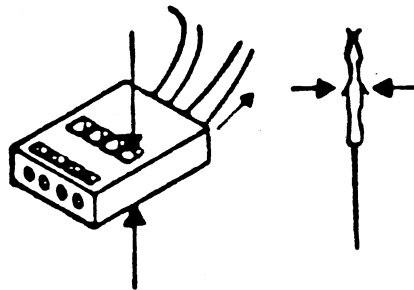
c) Solenoid warm, solenoid cold, FP



8.5.1 Individual wire Replacement

Removal:

- Pull cable connector off electronic control unit.
- Use a small screw driver or a similar tool and insert from both sides through the openings in the cable connector, pressing the barbed hooks inward.
- Pull out wire.



Assembly:

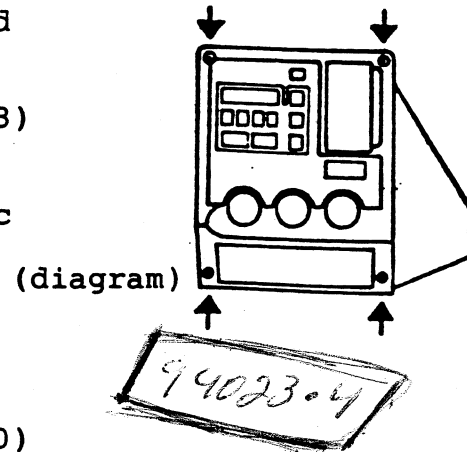
- Bend barbed hooks of wire connector slightly apart.
- Insert wire into cable connector.
- Check with a light pull for firm assembly.

8.6 Servicing The Upper Electronic Control Head

- Display board, control head (94018)
- Control board, control head (94022/94023)
- Interface board, control head (94017)

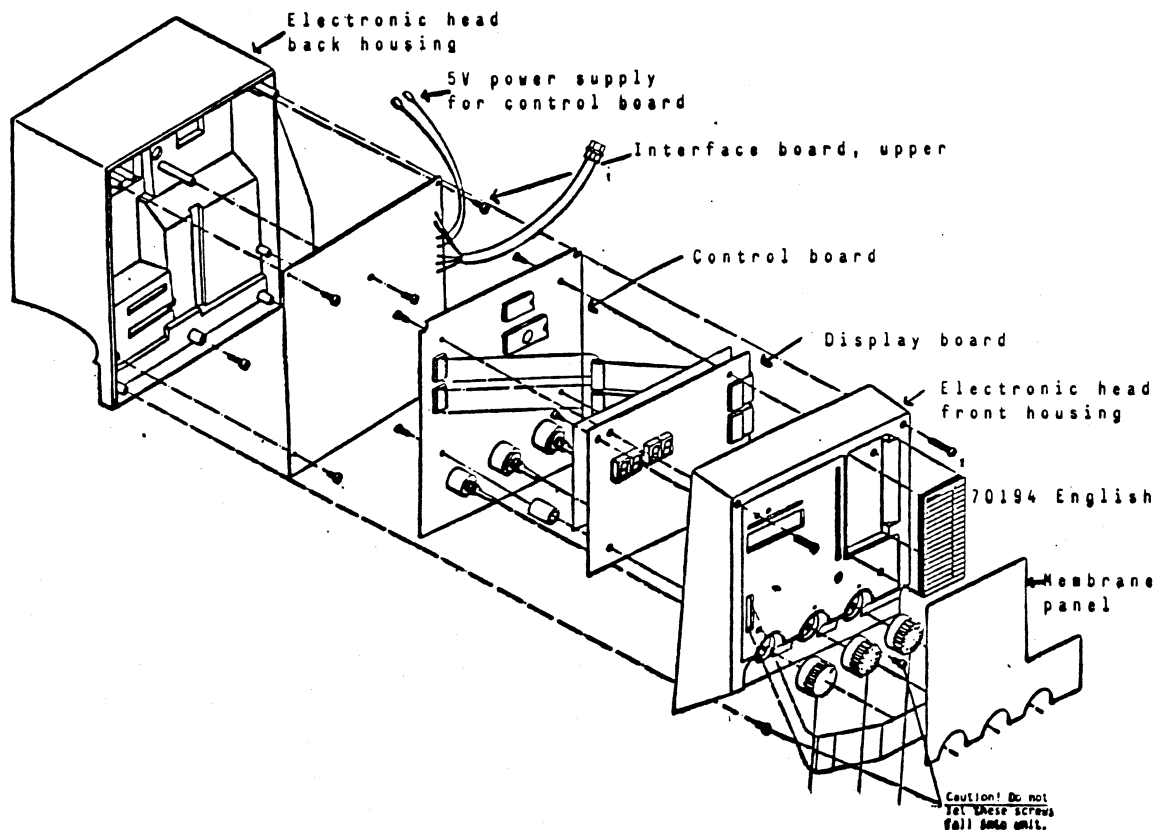
If work is required on the upper electronic control

- remove the four Phillips screws shown in drawing



Exploded Drawing, Control Head (95274/95290)

(illustration)



8.7 Replacing Membrane Switch Panel

- a) To remove the membrane switch panel, the control and display PC-boards must first be removed from the front housing section
- b) The defective membrane switch panel is lifted at one corner with a knife and pulled off.
- c) Remove remaining glue and any unevenness (use an adhesive solvent, not a plastic solvent)
- d) Remove protective backing from new membrane switch panel, guide cables through opening in housing, and align panel without pressure.
- e) When pressing membrane switch panel into place, avoid excessive pressure on touch buttons and display window.

Assembly:

Assembly takes place in reverse sequence.

8.8 Replacing upper electronic head P.C. Board

Display Board

- Connect the connector for the membrane switch panel
- Check positions of the LED's; if bent, correct position.

Insertion of control PC-board:

- Align SET/RUN knob properly with flattened shaft.

Assembling halves of housing:

- Avoid pinching of cables.

CHAPTER 9

Servicing Lower Motor Unit

Note: The upper control head and the lower motor unit are integrated on the ATL-2,3. In order to separate them you must first remove the access panel in front and disconnect the power cable and the data ribbon cable.

- 9.1 Removal
- 9.2 Pump Repair
- 9.3 Exploded Drawing
- 9.4 Rotation Motor Replacement
- 9.5 Heating Element Removal
- 9.6 Circuit Board Removal
- 9.7 Temperature Calibration
- 9.8 Hose Replacement
- 9.9 Sensor Replacement

9.1 Page 2

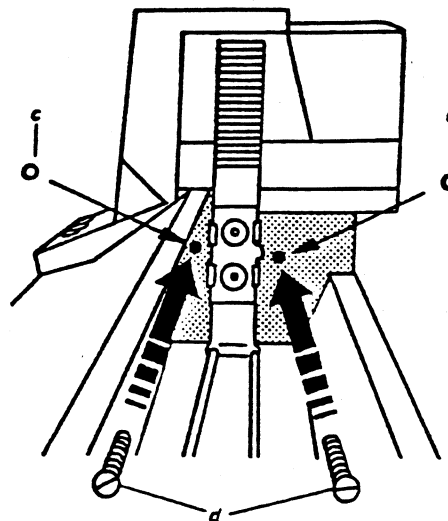
ATL-2

- Remove four thumb nuts
on underside of water trough
at four corners of motor unit
to release unit.

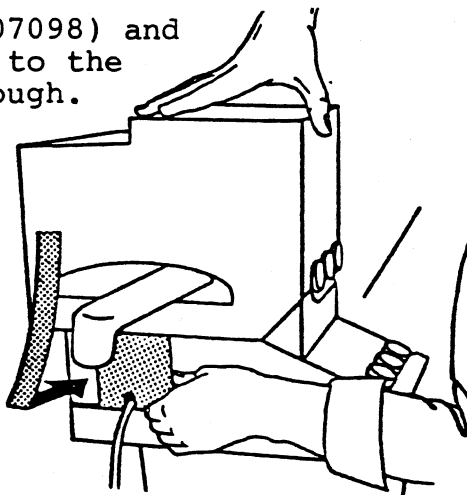
9.1 Removal

Removal of Motor Unit

- Raise lift arm to 45 degree position
- remove brass machine screws



- Bend away clamp (07098) and tilt top assembly to the right into the trough.



ATL-3

- loosen locking screw for ATL 3 bottom cabinet door.
- Open door, pull motor unit power cable out of terminal strip. On full size ATL only.
- Unscrew 6 Allen screws with special wrench (16153) (Provided)
- Remove motor unit

9.2 Page 1

PUMP REPAIR

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

A.C. current is applied to the pump motor through a relay controlled lower float switch. This switch also supplies power to the heating element.

The temperature probe 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.

Common Problems

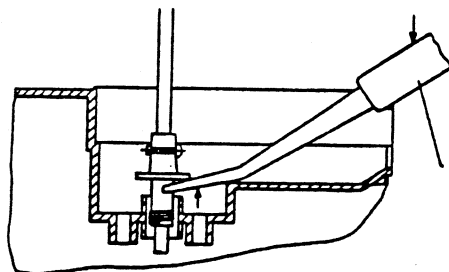
1. Dirt and / or lint on the pump impeller (picked up from tempering bath) will often slow down or stop the rotation of the impeller. It is important to periodically clean this assembly. Instructions for this process can be found in the Instruction Manual (See section of this manual with instructions.)
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

9.2 Page 2

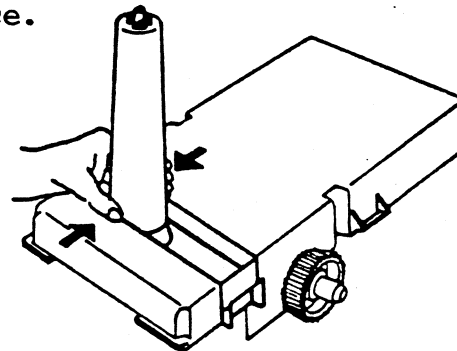
out of alignment. Symptoms will range from a "noisy" pump to failure of the impeller to rotate. The solution is simply pushing the housing back into it's opening until it snaps into place.

Servicing

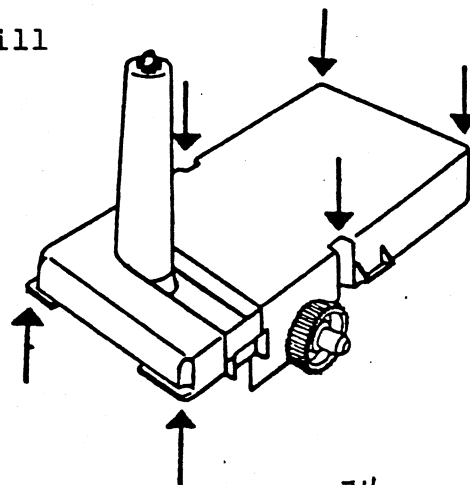
Pry off pump impeller with offset needle nose pliers to replace pump impeller (95081) or pump motor (32008)



Pry up with angular pliers.

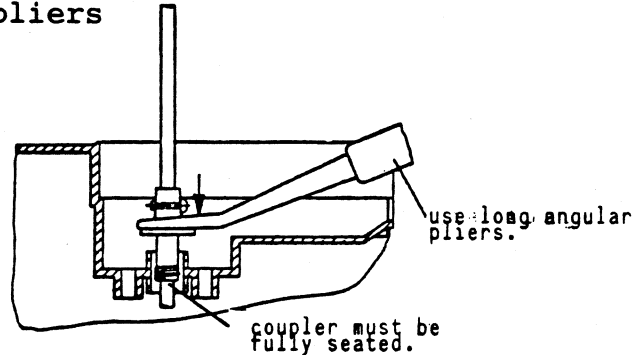


- To remove pump motor
- Remove the six Philipps screws shown in drawing
- Remove upper housing of motor unit
- Remove pump motor screws and remove motor
- Installation of pump motor
- Position felt disc on motor shaft and soak with non-detergent oil.
- Screw motor on so that it contacts the support on the bottom housing uniformly (if motor is installed at an angle pump impeller will run off center)



9.2 Page 3

- To install pump impeller (95081)
press down completely with off-
set needle nose pliers



- To install the pump housing (06017)
- All 4 lugs must engage correctly
and the shaft must be positioned
in the center hole Caution! If the
shaft is not pressed down completely
the pump vanes can hit against the
housing. Minimum distance between pump
vanes and housing 3mm

Technical data: Motor
FRG 220 V AC;
GB: 240 V AC;
USA: 120 V AC
P=10 Watts
Speed: 2750 rpm

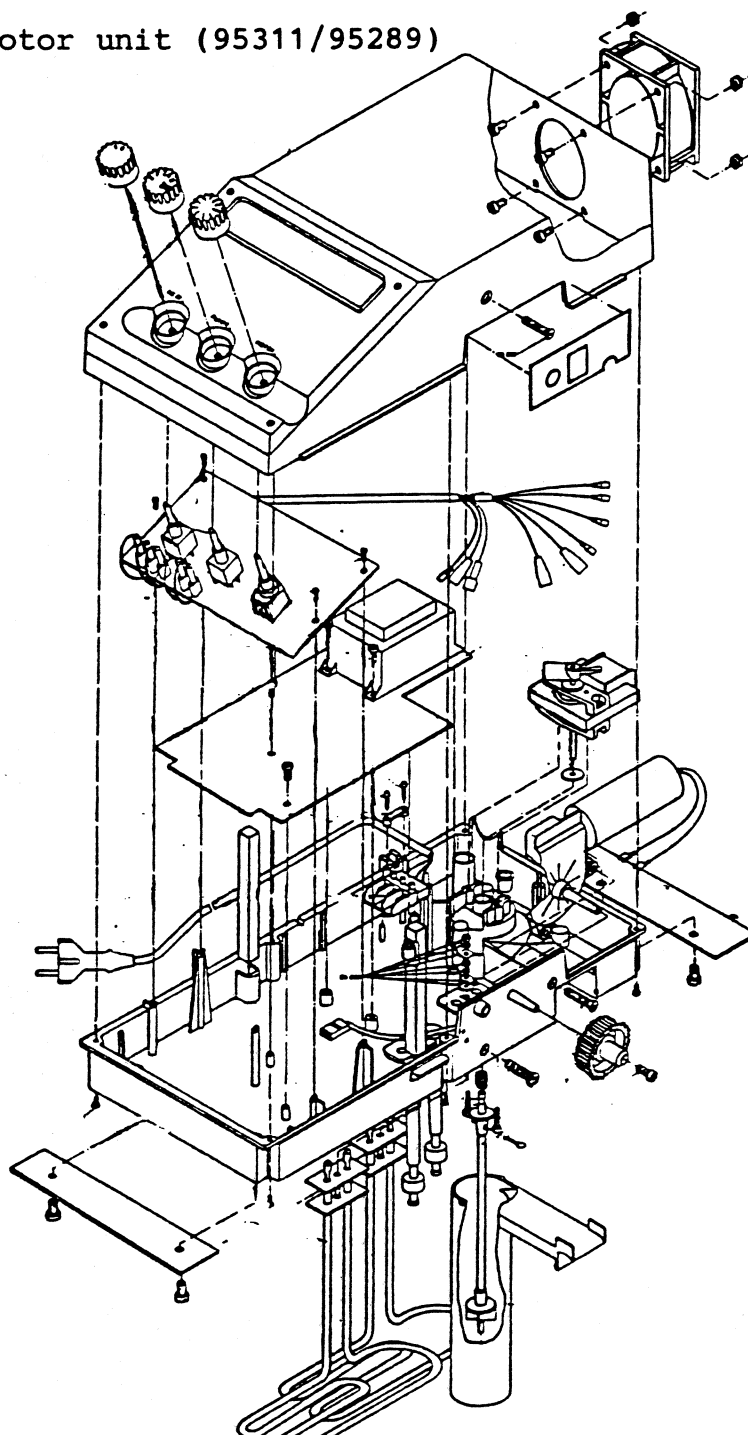
9.3 Servicing Lower Motor Unit

- Interface board, motor unit (94015)
- Transformer board, motor unit (94016)

If work is required on the lower motor control unit,

- remove the four Philipps screws shown in drawing
- remove 3 knobs by pulling straight off
- remove front panel

Exploded drawing, motor unit (95311/95289)



Refer to pump motor replacement section for instructions on getting into the motor unit.

The rotation motor is held in by one screw and is connected electrically by two different colored wires. (polarity of these wires is critical)

9.5 Heating element removal:

Refer to pump motor replacement section for instructions on getting into the motor control unit. There are two heating elements used in the ATL-2,3. They are each held in by one 7mm brass nut and have two non-polarized wires attached to the heating element terminals.

9.6 Circuit board removal:

See either the section on Motor unit which is the lower piece or the section on the electronic Control head, which is the upper piece.

9.7 Temperature Calibration:

Turn the ATL on and program the temperature for 32.0 C. Turn the unit to run and press reset. When the temperature in the display stabilizes (regardless of the actual temp) make these adjustments.

1. Chemical bottle sensor: The chemical bottle sensor should be adjusted so that the display is the actual temp. of the chemistry (or water) in the bottle (any bottle). Use a high quality mercury thermometer for calibration. The adjusting point is a black potentiometer in-line with one of the wires to the sensor located near the point of attachment to the circuit board.

2. Water bath sensor calibration: This procedure is the same as the chemical sensor calibration. Adjustments for the water bath calibration are made to the water bath sensor potentiometer which is in-line with one of the two sensor wires. The actual temp. of the water using a reliable mercury thermometer should be 0.4 degrees higher than the displayed value. (note: this is only true at 32.0 C. measured at the pump output.) This is to compensate for heat loss of the water jacket before tempering of the chemicals can take place.

9.8 Hose Replacement:

It is unlikely that any of the hoses used in the ATL will ever need replacing, in the event they do, consult the exploded diagrams for hose routing.

9.9 Temperature Sensor Replacement:

The temperature sensor is located inside the pump housing. It is a small tube running parallel to the pump shaft.

Replacement-

1. Remove motor unit top cover.
2. Disconnect temperature sensor at the Interface Board.
3. Unhook the green ground wire.
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 properly.
8. Reattach the green ground wire.
9. Reconnect the wires to the interface board. (Polarity is not a concern.)
10. Replace the pump housing.
11. Recalibrate the temperature. (See Calibration Section.)
12. Replace motor housing top cover.

CHAPTER 10

Servicing upper Control head

On the following pages you will find a detailed exploded drawing for disassembly and assembly of the upper control head.

This section is not exhaustive and assumes a general mechanical aptitude on the part of the technician. All components are easily accessible and are assembled with standard hardware for easy replacement.

- 10.1 Exploded drawing upperhead
- 10.2 Chemical distributor Arm
- 10.3 Air distributor
- 10.4 Air switching unit (ATL-3)
- 10.5 Exploded drawing, Lift arm
- 10.6 Sensing needle explanation
- 10.7 Lift arm removal
- 10.8 Lift motor removal
- 10.9 Solenoid removal
- 10.10 Fill quantity Calibration board

[illegible]

lift arm
complete

bottle 1

--bottle refill
sensor

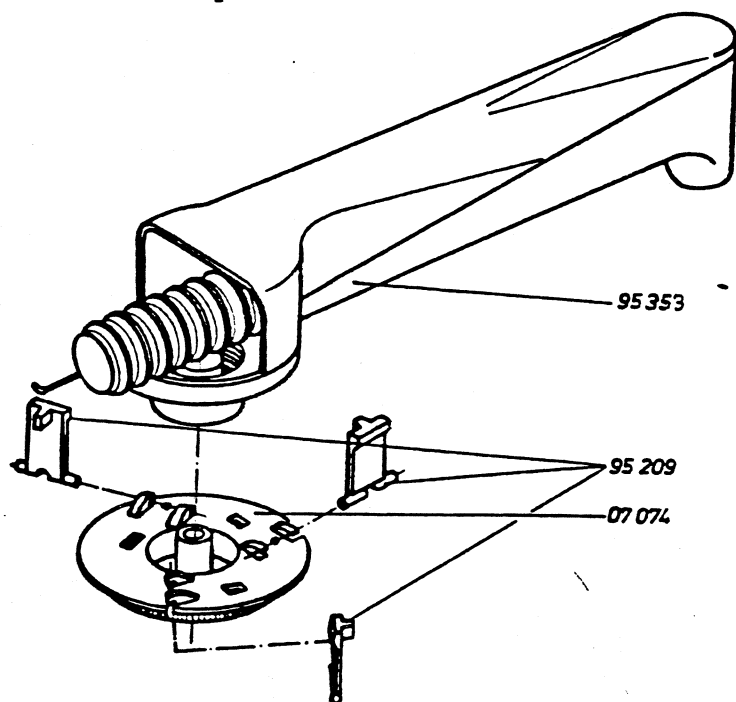
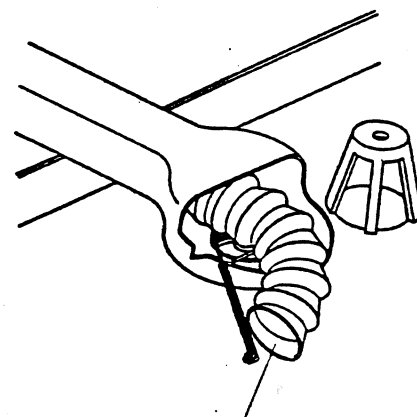
10.2 Chemistry Distributor Arm (95353)

Disassembly of the Chemical Distributor Arm:

- Move chemical distributor arm to position "1" by pressing reset button.
- Unscrew Philipps screw at pivoting point of arm and remove washer and retaining pin under screw.
- Release return spring by pulling up and away from air distributor motor.
- Hold down black plate #07074 to prevent motion and pull chemical distributor arm up and off.
- Remove drain hose from lift arm drain opening by pulling and twisting to break the glue seal.

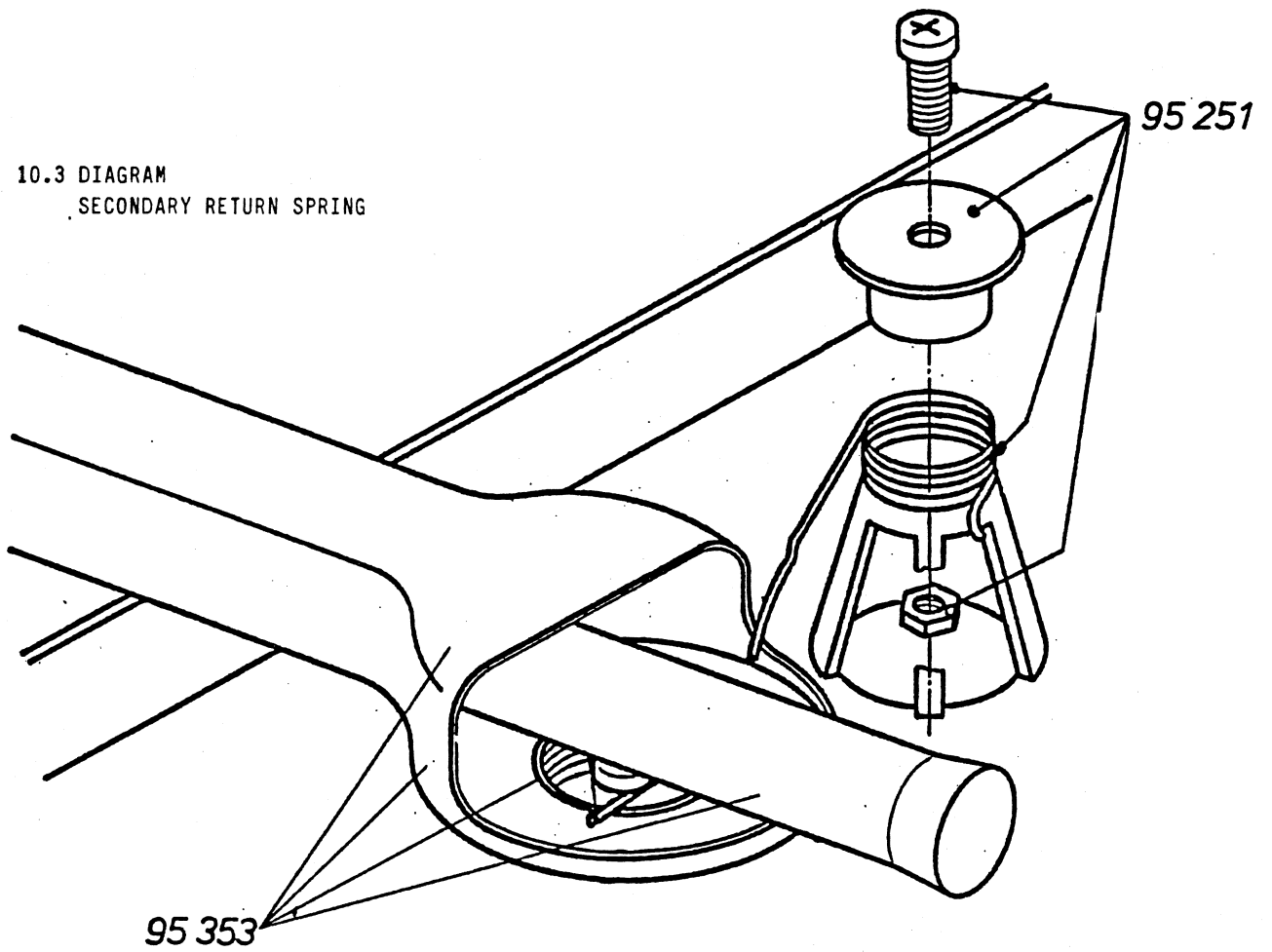
Installation of Chemical Distributor Arm:

- Attach hose to drain opening of lift arm with silicon glue, position chemical distributor arm on plate #07074.
- Position retaining pin in groove and install screw with washer.
- The retaining pin end must not drag on the edge of the chemical distributor arm bottom part!
- Clamp spring behind gear motor. It must not drag on edge of chemical distributor (bend if required).
- Check position of arm after assembly.



Widen before
mounting
apply thin coat
of glue to the
mounting spout.

10.3 DIAGRAM
SECONDARY RETURN SPRING



10.3 Air Distributor (95344)

Functional Description

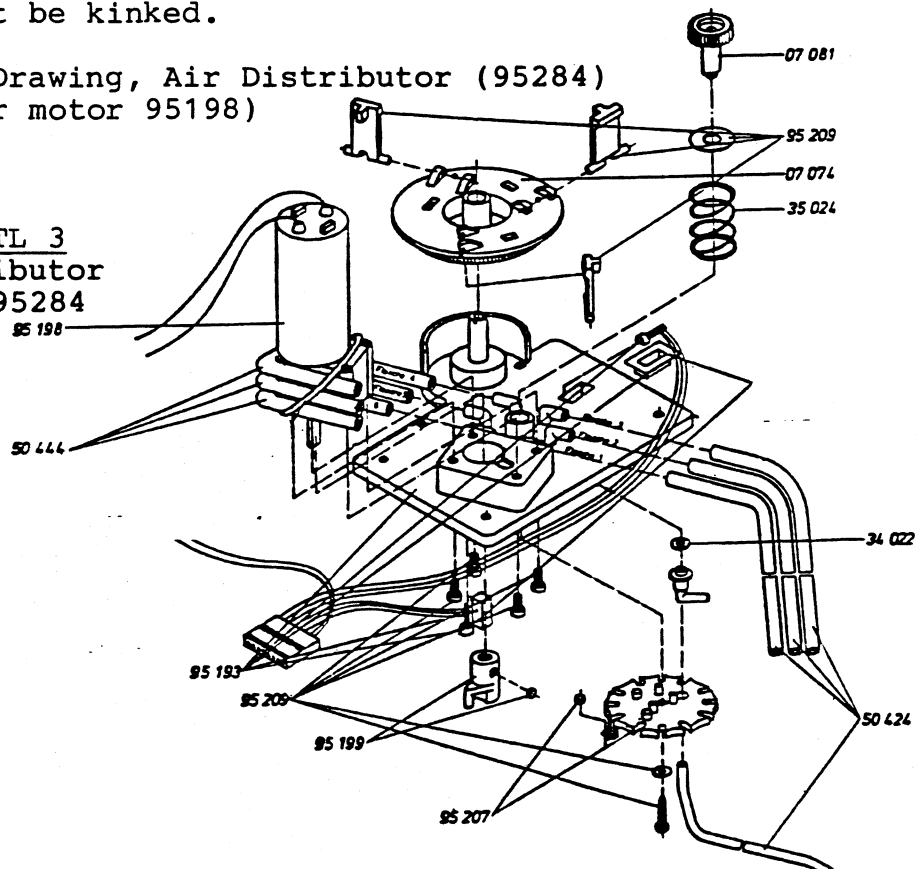
- The air coming from the pump is fed to the upper part of the air switch-over stage by the air distributor. The indexing wheel (95207) has 6 locking positions. An O-ring located in the indexing wheel is used as a seal. The indexing wheel is driven by the motor (95198) via an indexing finger (95199). The chemical distributor is moved to the proper position simultaneously by gear (07081).

Special assembly instructions

- The 6 holes in the air distributor plate must be deburred
- The O-ring (34022) must be coated with vaseline before installation
- The square shaft on gear (07081) must be correctly positioned in the opening of the indexing wheel when screwed on
- The indexing finger (95199) must be positioned against the stop on the motor shaft
The air hose to the pump must have a sufficient amount of play below the installation plate, and must not be kinked.

Exploded Drawing, Air Distributor (95284)
(with gear motor 95198)

Autolab ATL 3
Air distributor
assembly 95284



10.4 Air Switching Unit (ATL-3)

Functional description:

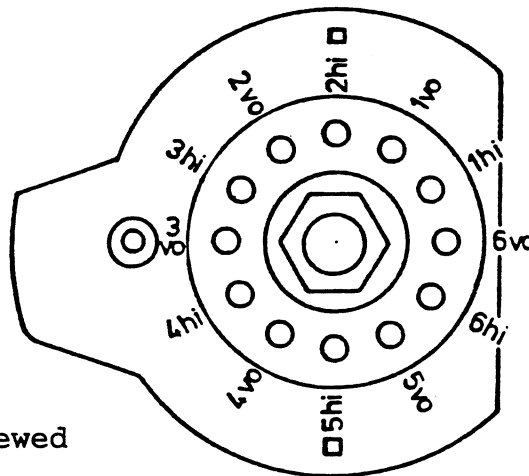
- The air switching-stage switches the compressed air to the front or rear bottles as desired.

Disassembly of the Air Switching Stage

- remove center plastic screw
- The hall sensor (95286) is fastened with a machine screw and 4mm brass nut (hall sensor serves for monitoring the position of the air switching stage)

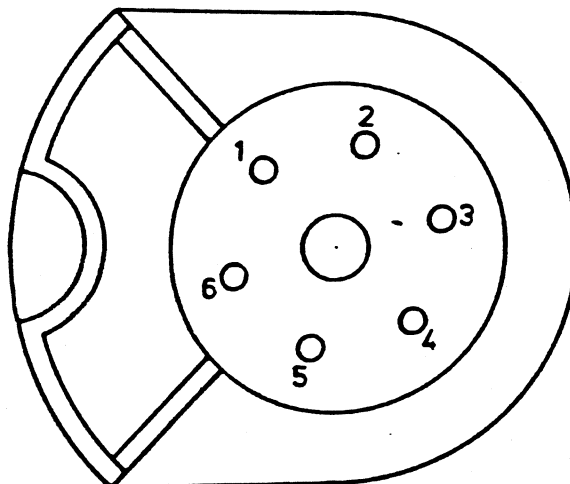
Connection of Air Hoses on Bottom part of Air Switching Stage

VO=FRONT
HI=BACK



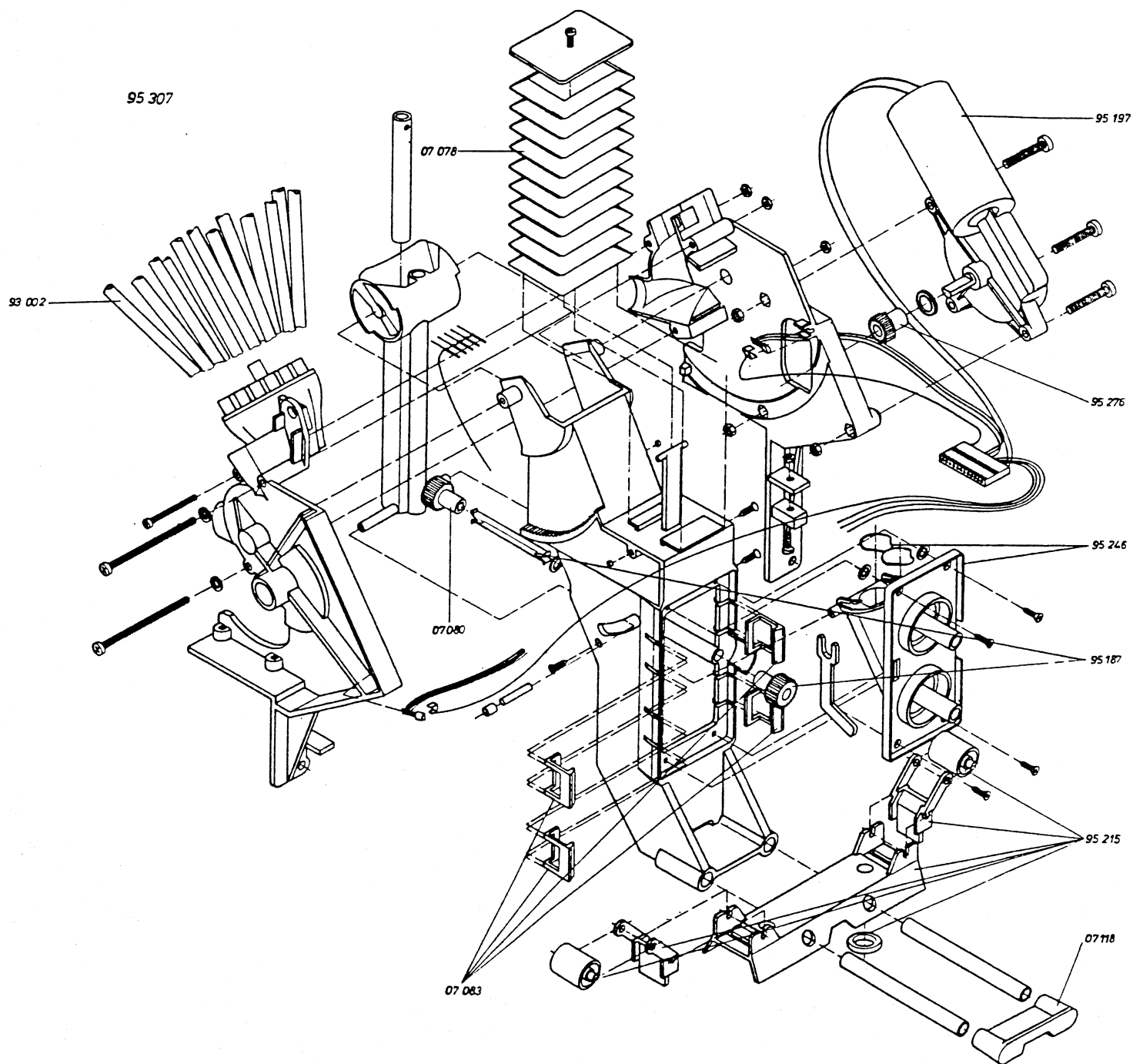
Bottom part of air switching stage viewed from below

Air Hose Connection on Upper Part of Air Switching Stage



Upper part of air switching stage viewed from top

10.5 Exploded Diagram of Lift Arm



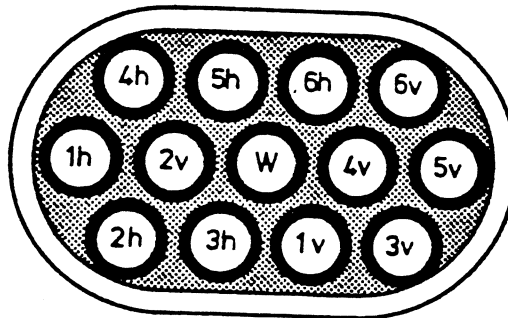
10.7 Removal of Lift Arm

The lift arm is available only as a complete unit tested for proper function and leakage. Replaceable parts are listed in the parts list.

- Pull bellows out of bottom clamp
- Pull hose package with hose manifold (95305) out of lifting arm
- Remove 4 screws for bearing block on bottom of mounting plate
- Pull off hose to chemical distributor arm
- The lift arm can be removed

Connection of Hose Package

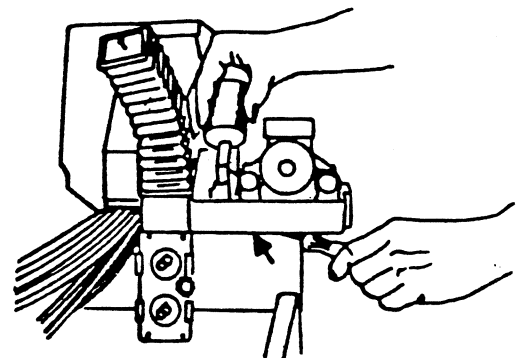
HOSE MANIFOLD ATL 3 (95305)
VIEWED FROM CHEMICAL DISTRIBUTOR



H = rear
V = front
W = water hose

10.8 Removal of Lift Motor

- Remove the back cover of the control head
- with the exception of the cover it is not necessary to remove any further parts for removal of the lift motor of lift gear.
- the lower screw of the 3 Philipp screws can be removed from below through the open side of the bearing block for the pump (see Illus.)
- remove all 3 screws without pressing the nuts on the inside of the bearing block out of their seat
- the wires must be removed from the connecting block to replace the motor. (see chapter 8).

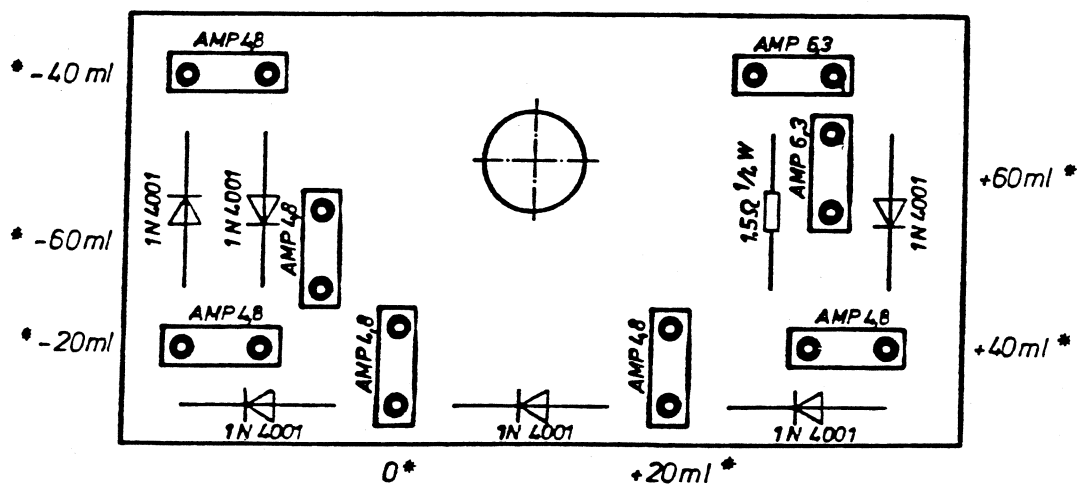


10.9 Replacing the Solenoid Valves (95218)

- cut off the metal clamps with a pair of pliers to pull off the hose
- to reinstall a new clamp must be used (included with solenoid valve)
- the solenoid valve (24 V) regulates the flow quantity and must not be replaced by any other type.

10.10 Fill Quantity Correction

If the Fill Quantity needs to be corrected, the AMP plug 4.8 can be switched to ± 60 ml proceeding from 0.



*Tested at 730ml fill quantity

Circuit board Nr.24032

94013

Diode-board ATL2,3

CHAPTER 11

ATL-3 LOWER UNIT

- 11.1 Removing Boiler (95309)
- 11.2 Exploded Drawing and Part Designation for
Heater (95309)
- 11.3 Chemical refill pumps
- 11.4 Removing chemical refill pump circuit board

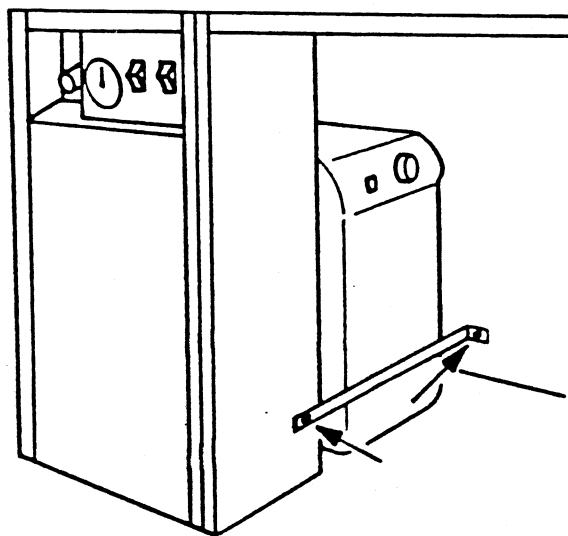
11.1 SERVICING HEATER (95309)

Removing the heater;

- remove chemical cart
- remove aluminum retaining strip in front of boiler
- unscrew right rear boiler mount
- unscrew water connections
- remove heater by lifting up slightly.

If the heater is operated without water, the cover for the safety temperature limiter must be pressed back in with a screwdriver after opening the cover.

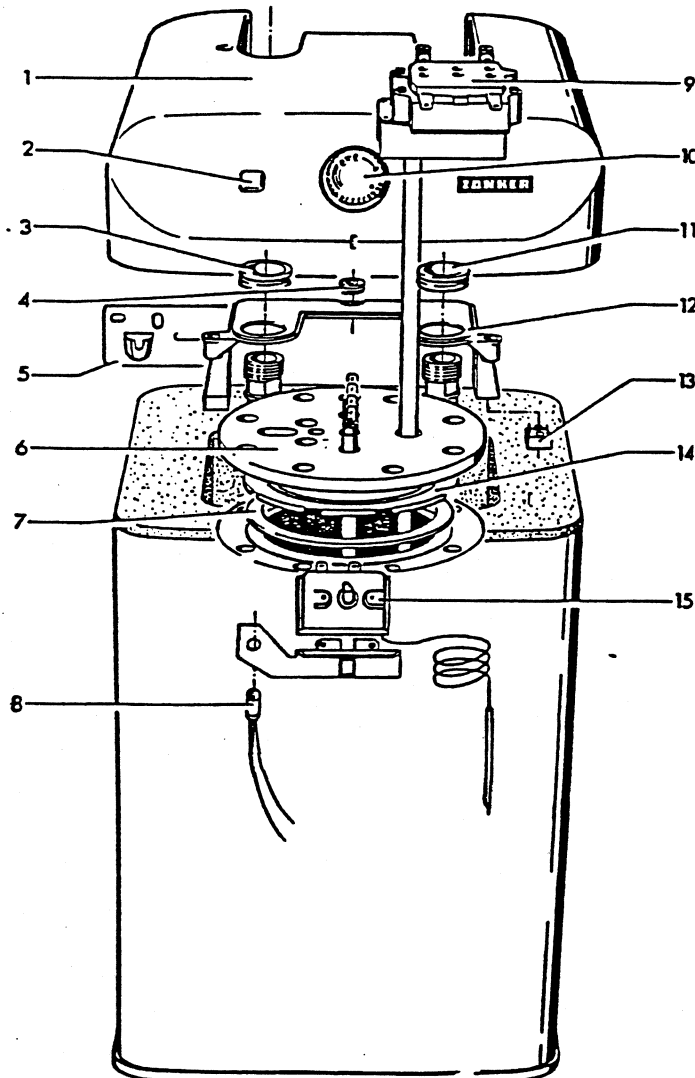
DIAGRAM



11.2 Part Designation

- 1 cover
- 2 lamp house
- 3 bushing, red
- 4 cable bushing 0 6/10/14
- 5 hanger
- 6 strengthening disc
- 7 gasket
- 8 pilot light
- 9 thermal cut-out
- 10 knob
- 11 bushing, blue
- 12 connection plate
- 13 insulating base
- 14 heating element 2 kw 220 V
- 15 thermostat

Exploded Drawing, Boiler (95309)



11.3 SERVICING CHEMICAL REFILLING PUMPS

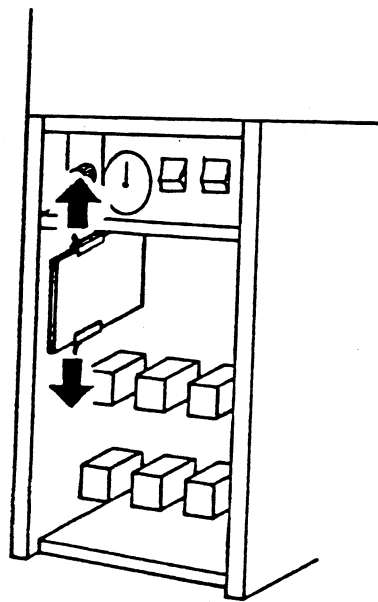
Removal of Chemical Refilling Pumps

- Unplug Unit
- Disconnect main power cord from terminal block.
- remove 4 Philipps screws on mounting plate for chemical refilling unit (10085)
- The assembly plate can then be pulled out
- Remove chemical refilling pump mounting screws
- Pull off hose with aid of hose puller (07162)
- Pull off cable
- Remove pump

11.4 Removal of Chemical Refilling Circuit Board (94021)

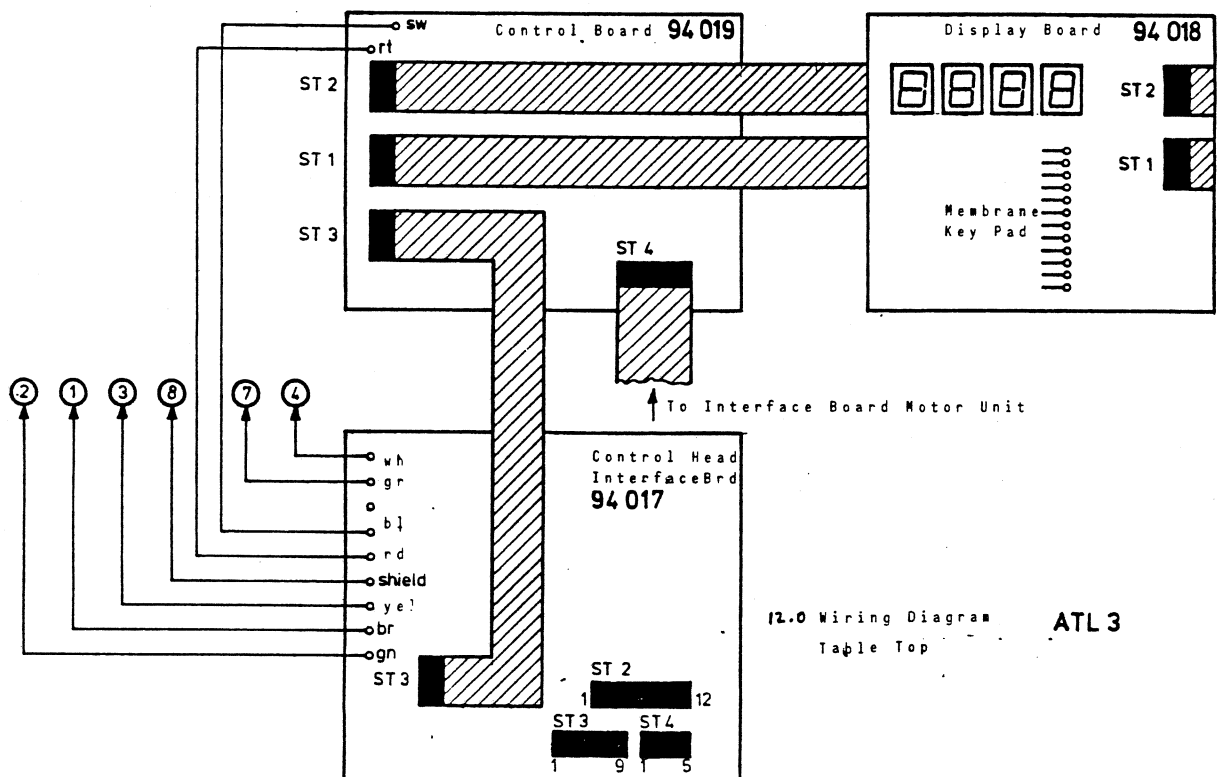
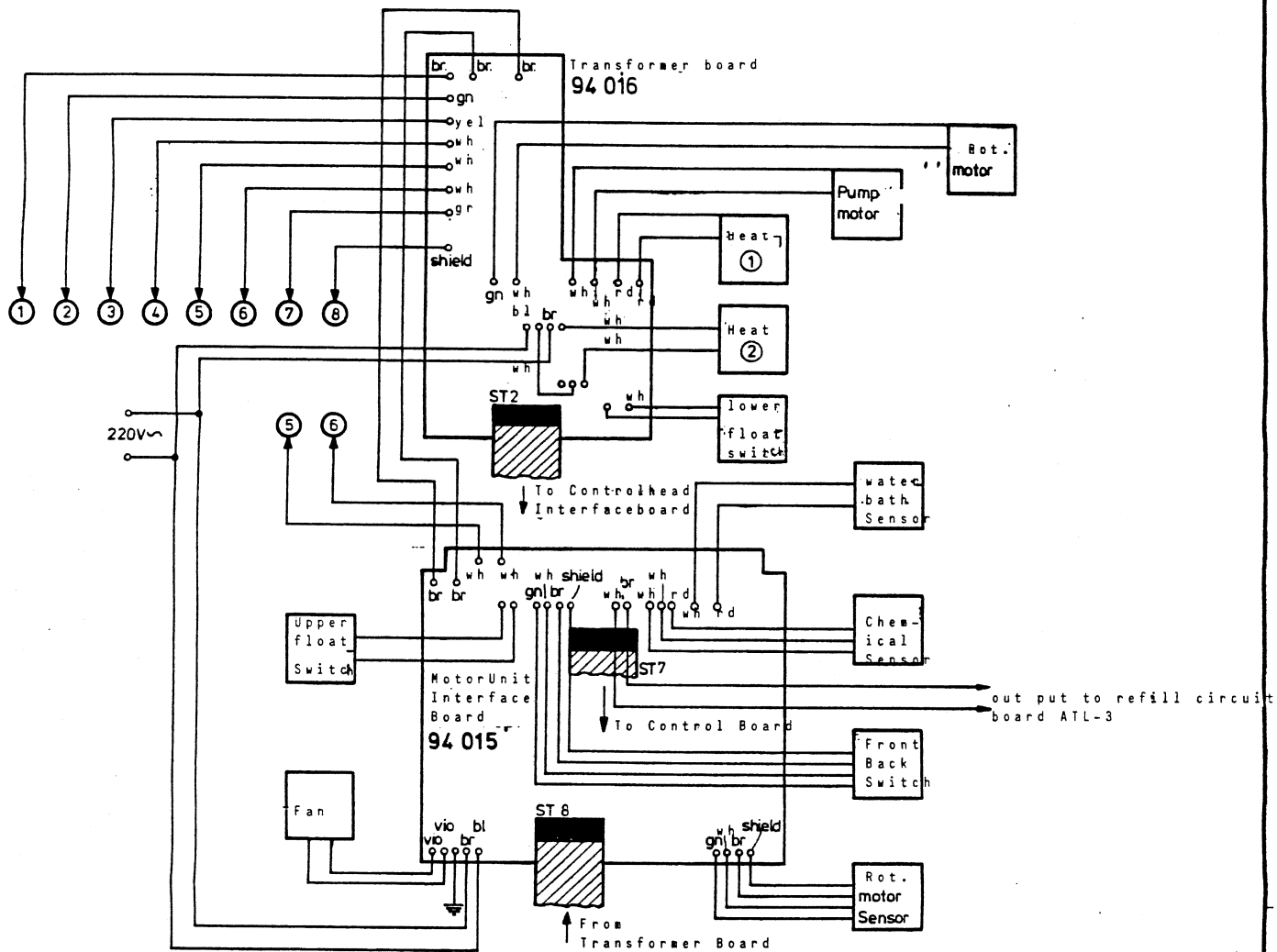
- Open hinged door on ATL 3 lower cabinet (95348) by loosening top screw
- release upper and lower catches (35064) on circuit board mounting (35063).
- the circuit board is then free and can be pulled toward the front

DIAGRAM



CHAPTER12
WIRING DIAGRAM

12.0 Wiring Diagram ATL 3 - Table Top



12.0 Wiring Diagram
Table Top

ATL 3

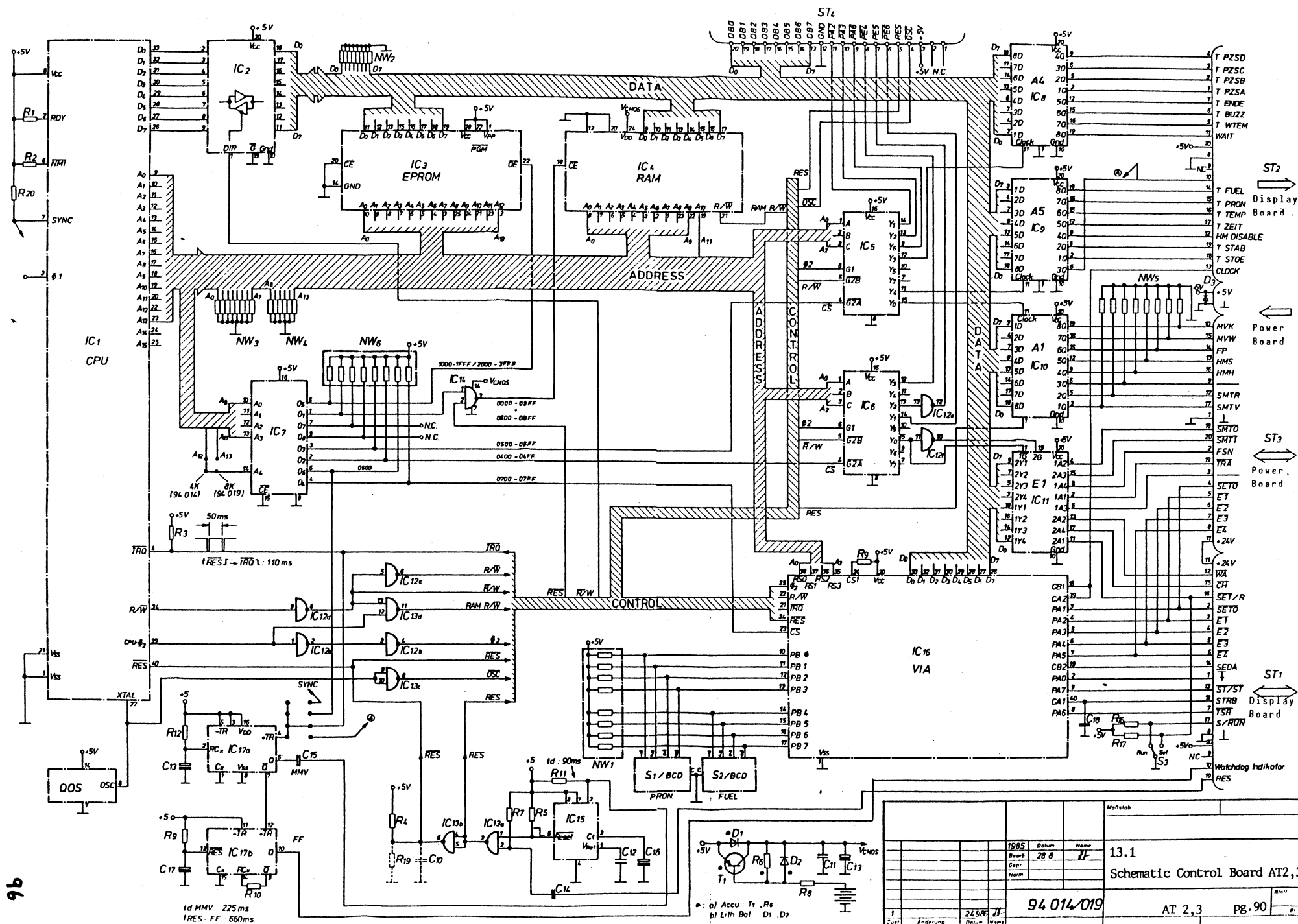
CHAPTER 13

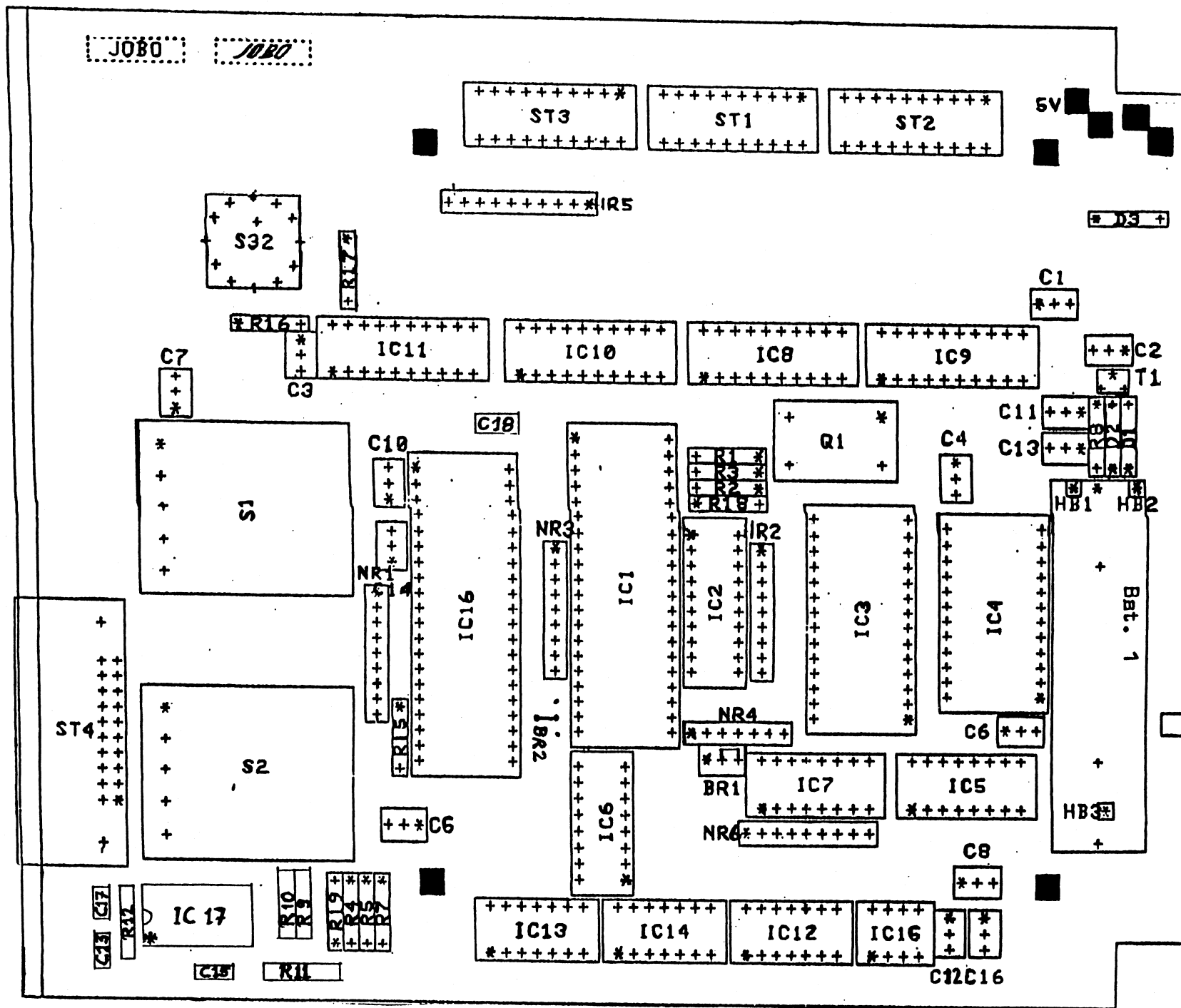
Schematics, Data Sheets, Parts Lists

On the following pages you will find schematics, data sheets and parts lists for all five of the printed circuit boards used in the ATL-2,3.

The parts lists show prices which are subject to change without notice.

- 13.1 Schematic, Control Board (94014/019)
- 13.2 Data Sheet, Control Board
- 13.3 Parts List, Control Board
- 13.4 Schematic Display Board (94018)
- 13.5 Data Sheet Display Board
- 13.6 Parts List Display Board
- 13.7 Schematic Interface Board Control Head (94017)
- 13.8 Data Sheet Interface Board Control Head
- 13.9 Parts List Interface Board Control Head
- 13.10 Schematic Transformer Board (94016)
- 13.11 Data Sheet Transformer Board
- 13.12 Parts List Transformer Board
- 13.13 Schematic Interface Board Motor Unit (94015)
- 13.14 Data Sheet Interface Board Motor Unit
- 13.15 Parts List Interface Board Motor Unit
- 13.16 Schematic Chemical Refill Board (94021)
- 13.17 Data Sheet Chemical Refill Board
- 13.18 Parts List Chemical Refill Board
- 13.19 I.C. Data Sheets





13.3 Parts Sheet

Item: Control Board ATL 2 (94019)

Page 1

Part No.	Ref.	Value	Description
Resistors			
40089	R 1	3.3K	Carbon Film 1/4 watt
40089	R 2	3.3K	Carbon Film 1/4 watt
40089	R 3	3.3K	Carbon Film 1/4 watt
40083	R 4	2.2K	Carbon Film 1/4 watt
40110	R 5	10 K	Carbon Film 1/4 watt
40110	R 7	10 K	Carbon Film 1/4 watt
40060	R 8	1 K	Carbon Film 1/4 watt
40089	R 15	3.3K	Carbon Film 1/4 watt
40089	R 16	3.3K	Carbon Film 1/4 watt
40089	R 17	3.3K	Carbon Film 1/4 watt
40080	R 19	1.8K	Carbon Film 1/4 watt
Diodes			
42001	D 1		1N4148
42001	D 2		1N4148
42002	D 3		1N4001
Resistor Network			
40503	NR 1		8 x 4.7K
40504	NR 2		8 x 15K
40504	NR 3		8 x 15K
40505	NR 4		6 x 15K
40506	NR 5		8 X 1K
Resistors			
40128	R 9	100K	Carbon Film 1/4 watt
40110	R 10	10K	Carbon Film 1/4 watt
40089	R 11	3.3K	Carbon Film 1/4 watt
40115	R 12	22K	Carbon Film 1/4 watt

13.3 Parts Sheet

Item: Control Board ATL 2 (94019)

Page 2

Part No.	Ref.	Value	Description
Capacitors			
41303	C 1	100n	Ceram.
41101	C 2	1 u	Tantal
41303	C 3	100n	Ceram.
41303	C 4	100n	Ceram.
41303	C 5	100n	Ceram.
41303	C 6	100n	Ceram.
41303	C 7	100n	Ceram.
41303	C 8	100n	Ceram.
41301	C 10	10n	Ceram.
41302	C 11	47n	Ceram.
41303	C 12	100n	Ceram.
41105	C 13	10 u	Tantalum RM 2.54
41303	C 14	100n	Ceram.
41303	C 15	100n	Ceram.
41105	C 16	10u	Tantal
41105	C 17	10u	Tantal
41297	C 18	1n	Ceram.
Switches			
20031	S 1		10 pos. BCD switch
20028	S 2		16 pos. BCD switch
20112	S 32		Set-Run Switch
25073	S 1		Connecting Pins /switch
25073	S 2		Connecting Pins /switch
25074	S 1		Spacer for switch
25074	S 2		Spacer for switch
25101	ST 4		Data bus connector for 90 degree

13.3 Parts Sheet

Item: Control Board ATL 2 (94019)

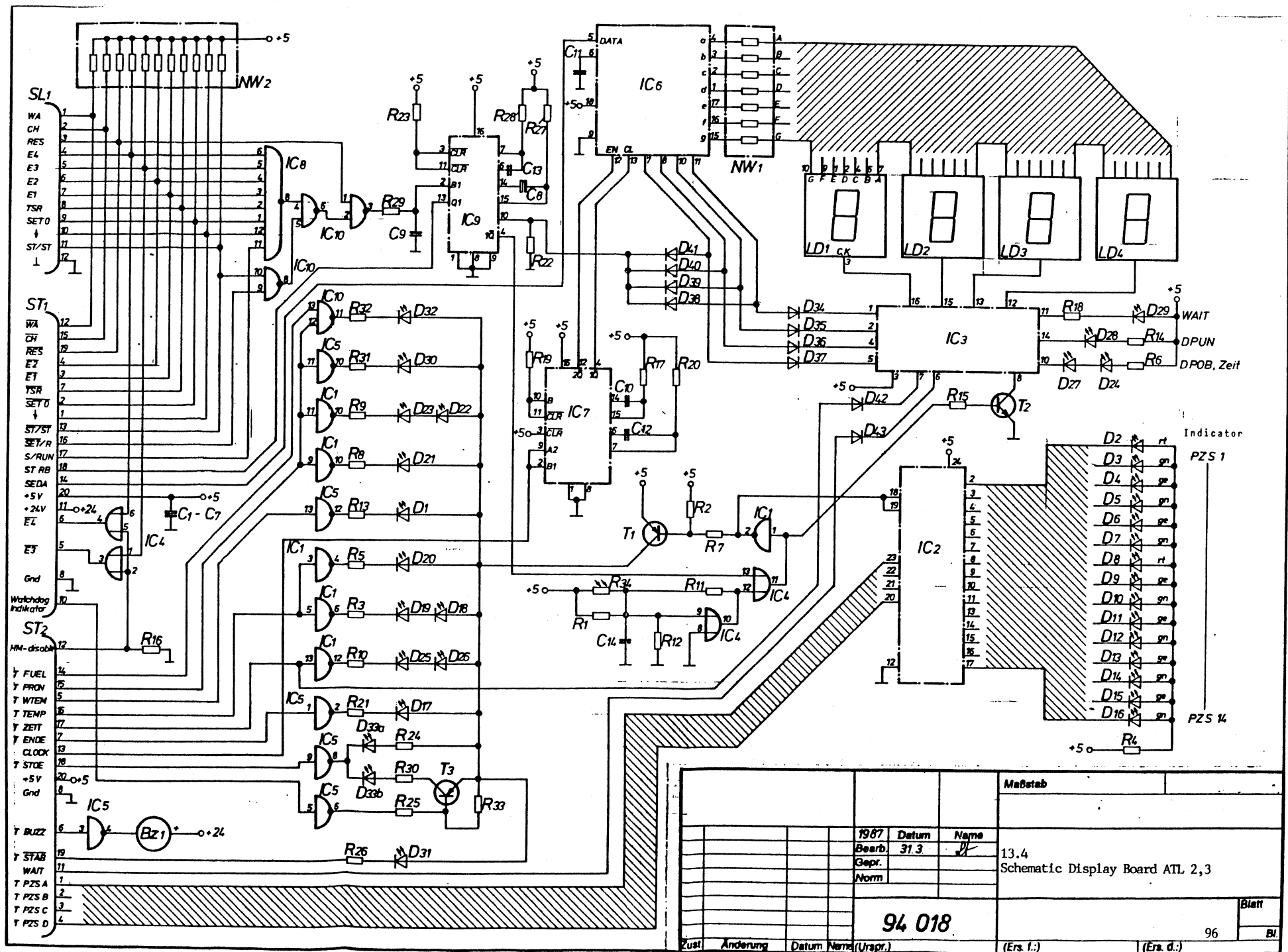
Page 3

Part No.	Ref.	Value	Description
Integrated Circuits			
46201	IC 1		65 C 02 CPU
46745	IC 2		74 245
46603	IC 3		27 C 64 EPROM
46612	IC 4		2 Kx 8 Bit RAM
46735	IC 5		74 HC 138
46735	IC 6		74 HC 138
46599	IC 7		TBP 18 S 03 DN
46750	IC 8		74HC374
46750	IC 9		74HC374
45750	IC 10		74HC374
46741	IC 11		74HC241
46714	IC 12		74HC04
46732	IC 13		74HC132
46102	IC 14		4011
46403	IC 15		TL 7705
46203	IC 16		65 C 22 VIA
46124	IC 17		4538
47101	Q 1	1 MHz	Quartz Oscillator
48105	Bat. 1		Lithium Bat. 3.4 V

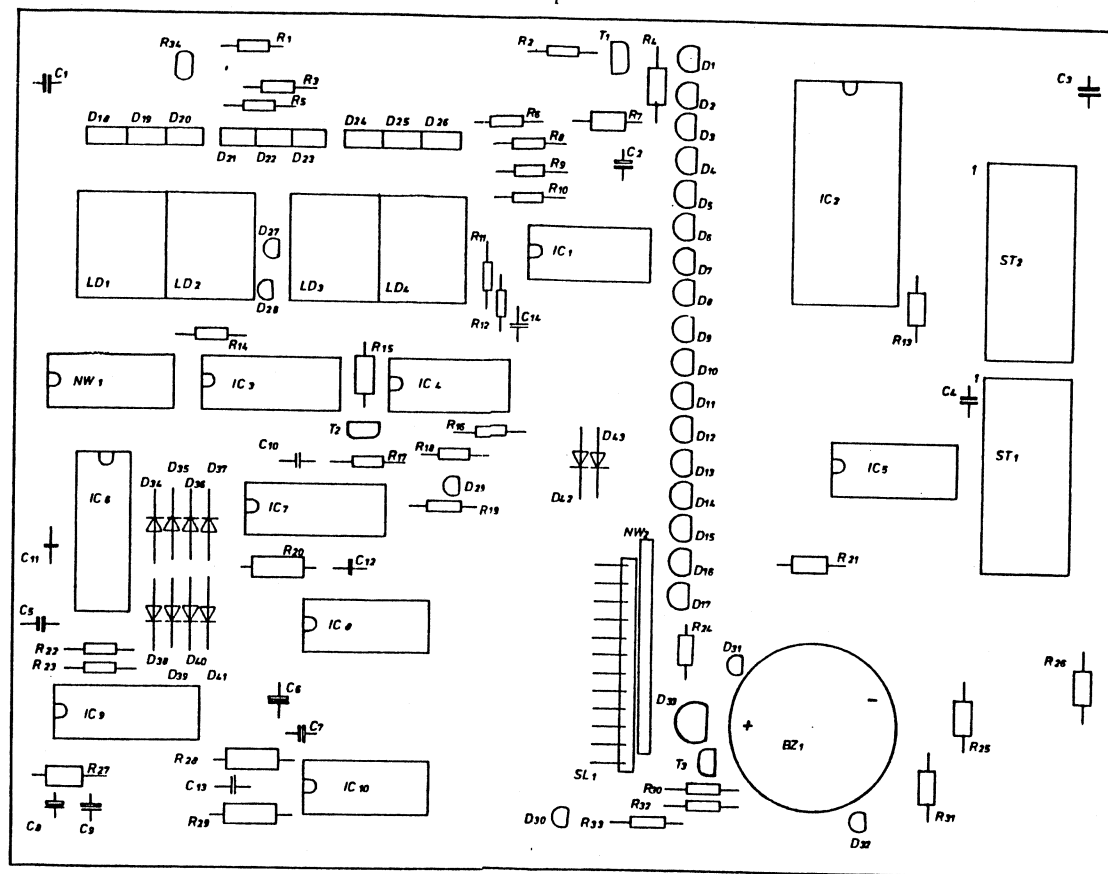
13.3 Parts Sheet

Item: Control Board ATL 2 (94019) Page 4

Part No.	Ref.	Value	Description
			Sockets
25090	ST 1		Precision I.C. Socket 20 pin
25090	ST 2		Precision I.C. Socket 20 pin
25090	ST 3		Precision I.C. Socket 20 pin
25088	IC 1		Precision I.C. Socket 40 pin
25088	IC 18		Precision I.C. Socket 40 pin
25089	IC 3		Precision I.C. Socket 28 pin
25087	IC 4		Precision I.C. Socket 24 pin
25085	IC 7		Precision I.C. Socket 16 pin
25085	IC 17		Precision I.C. Socket 16 pin



Maßstab				
1987	Datum	Name		
Bearb.	31.3			
Gepr.				
Norm				
94 018			13.4 Schematic Display Board ATL 2,3	
Zust.	Anderung	Datum	Name (Urspr.)	Blatt
(Ers. f.:)				96
(Ers. d.:)				Bl.



Right

[illegible]

13.6 Parts Sheet

Item: Display Board (94018)

Page 1

Part No.	Ref.	Value	Description
Resistors			
40131	R 1	180 kOhm	Carbon Film 1/4 watt
40115	R 2	22 kOhm	Carbon Film 1/4 watt
40014	R 3	39 Ohm	Carbon Film 1/4 watt
40020	R 4	150 Ohm	Carbon Film 1/4 watt
40020	R 5	150 Ohm	Carbon Film 1/4 watt
40014	R 6	39 Ohm	Carbon Film 1/4 watt
40070	R 7	1.2 kOhm	Carbon Film 1/4 watt
40020	R 8	150 Ohm	Carbon Film 1/4 watt
40014	R 9	39 Ohm	Carbon Film 1/4 watt
40014	R 10	39 Ohm	Carbon Film 1/4 watt
40136	R 11	470 kOhm	Carbon Film 1/4 watt
40130	R 12	150 kOhm	Carbon Film 1/4 watt
40023	R 13	220 Ohm	Carbon Film 1/4 watt
40020	R 14	150 Ohm	Carbon Film 1/4 watt
40089	R 15	3.3 kOhm	Carbon Film 1/4 watt
40110	R 16	10 kOhm	Carbon Film 1/4 watt
40080	R 17	1.8 kOhm	Carbon Film 1/4 watt
40020	R 18	150 Ohm	Carbon Film 1/4 watt
40060	R 19	1 kOhm	Carbon Film 1/4 watt
40125	R 20	56 kOhm	Carbon Film 1/4 watt
40020	R 21	150 Ohm	Carbon Film 1/4 watt
40101	R 22	5.1 kOhm	Carbon Film 1/4 watt
40060	R 23	1 kOhm	Carbon Film 1/4 watt
40030	R 24	390 Ohm	Carbon Film 1/4 watt
40070	R 25	1.2 kOhm	Carbon Film 1/4 watt
40020	R 26	150 Ohm	Carbon Film 1/4 watt
40128	R 27	100 k	Carbon Film 1/4 watt
40086	R 28	2.7 kOhm	Carbon Film 1/4 watt
40011	R 29	22 Ohm	Carbon Film 1/4 watt

13.6 Parts Sheet

Item: Display Board (94018)

Page 2

Part No.	Ref.	Value	Description
Resistors			
40016	R 30	75 Ohm	Carbon Film 1/4 watt
40020	R 31	150 Ohm	Carbon Film 1/4 watt
40020	R 32	150 Ohm	Carbon Film 1/4 watt
40115	R 33	22 kOhm	Carbon Film 1/4 watt
43006	R 34		Photo Resistor P 380-5r
Capacitors			
41101	C 1	1u/35V	Tantalum
41101	C 2	1u/35V	Tantalum
41101	C 3	1u/35V	Tantalum
41101	C 4	1u/35V	Tantalum
41101	C 5	1u/35V	Tantalum
41101	C 6	1u/35V	Tantalum
41101	C 7	1u/35V	Tantalum
41303	C 8	100nF	Ceram.
41105	C 9	10u/16V	Tantal
41242	C 10	10nF	MKS 2
41244	C 11	15nF	MKS 2
41242	C 12	10nF	MKS 2
41298	C 13	1.5 nF	
LED's			
26004	D 1		3 mm red
26004	D 2		3 mm red
26010	D 3		3 mm green
26011	D 4		3 mm yellow
26010	D 5		3 mm green

13.6 Parts Sheet

Item: Display Board

Page 3

Part No.	Ref.	Value	Description
Diodes			
26011	D 6		3 mm yellow
26010	D 7		3 mm green
26004	D 8		3 mm red
26011	D 9		3 mm yellow
26010	D 10		3 mm green
26011	D 11		3 mm yellow
26010	D 12		3 mm green
26011	D 13		3 mm yellow
26010	D 14		3 mm green
26011	D 15		3 mm yellow
26010	D 16		3 mm green
26004	D 17		3 mm red
26012	D 18		2.5 x 5 mm green
26012	D 19		2.5 x 5 mm green
26012	D 20		2.5 x 5 mm green
26012	D 21		2.5 x 5 mm green
26012	D 22		2.5 x 5 mm green
26012	D 23		2.5 x 5 mm green
26012	D 24		2.5 x 5 mm green
26012	D 25		2.5 x 5 mm green
26012	D 26		2.5 x 5 mm green
26010	D 27		3 mm green
26010	D 28		3 mm green
26004	D 29		3 mm red
26010	D 30		3 mm green
26010	D 31		3 mm green
26010	D 32		3 mm green
26017	D 33		Duo-LED

13.6 Parts Sheet

Item: Display Board (94018)

Page 4

Part No.	Ref.	Value	Description
LED's			
26054	LD 1		Display green
26054	LD 2		Display green
26054	LD 3		Display green
26054	LD 4		Display green
Diodes			
42001	D 34		Diode 1N4148
42001	D 35		Diode 1N4148
42001	D 36		Diode 1N4148
42001	D 37		Diode 1N4148
42001	D 38		Diode 1N4148
42001	D 39		Diode 1N4148
42001	D 40		Diode 1N4148
42001	D 41		Diode 1N4148
42001	D 42		Diode 1N4148
42001	D 43		Diode 1N4148
Transistors			
44008	T 1		Transistor BC 327
44009	T 2		Transistor BC 337
44008	T 3		Transistor BC 327
IC's			
46008	IC 1		IC SN 7406
46004	IC 2		IC SN 74159
46404	IC 3		IC ULN 2003
46123	IC 4		IC CD 4071 8
46008	IC 5		IC SN 7406
46122	IC 6		IC MC 14449
46739	IC 7		IC SN74HC 221
46720	IC 8		IC SN74HC 30
46739	IC 9		IC SN74HC 221
46710	IC 10		IC SN74HC 00
Resistor Networks			
40502	NW 1	7x680hm	DIL 7 x 68 OHM
40507	NW 2	11x4.7kO	SIL 11 x 4.7 k OHM

13.6 Parts Sheet

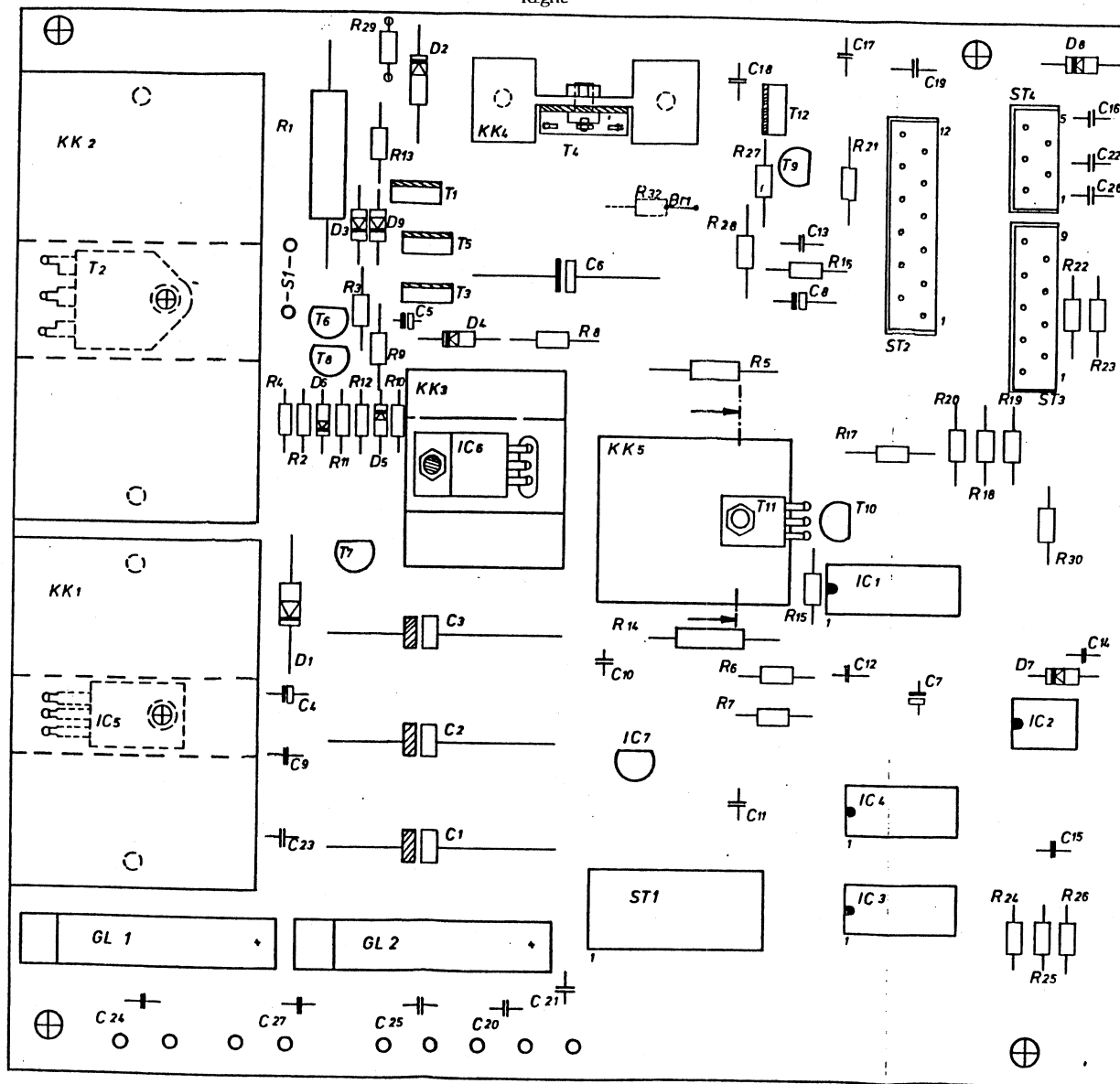
Item: Display Board (94018)

Page 5

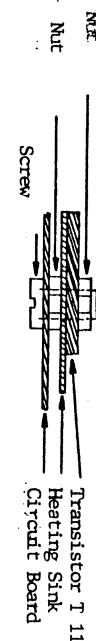
Part No.	Ref.	Value	Description
I.C's			
46008	IC 5		IC SN 7406
46122	IC 6		IC MC 14449
46739	IC 7		IC SN74HC 221
46720	IC 8		IC SN74HC 30
46739	IC 9		IC SN74HC 221
46710	IC 10		IC SN74HC 00
Resistor Networks			
40502	NW 1	7 x 68OHM	DIL 7 x 68 OHM
40507	NW 2	11 x 4.7kO	SIL 11 x 4.7 k OHM
Miscellaneous			
26100	BZ 1		SM 4 B
25091	ST 1		Cable Connector 20-pol.
25091	ST 2		Cable Connector 20-pol.
25109	SL 1		Connector 12-Pole
25108	zuLD1.2		Display Socket 20-pol.
25108	zuLD3.4		Display Socket 20-pol.
34059	zuLD1.2		Holder 1 x 4
34059	zuLD1.2		Holder 1 x 4
34059	zuLD1.2		Holder 1 x 4
34059	zuLD1.2		Holder 1 x 4
34059	zuLD2.3		Holder 1 x 4
34059	zuLD2.3		Holder 1 x 4
34059	zuLD2.3		Holder 1 x 4
34059	zuLD2.3		Holder 1 x 4
24052			Board 24 052

Top

Right



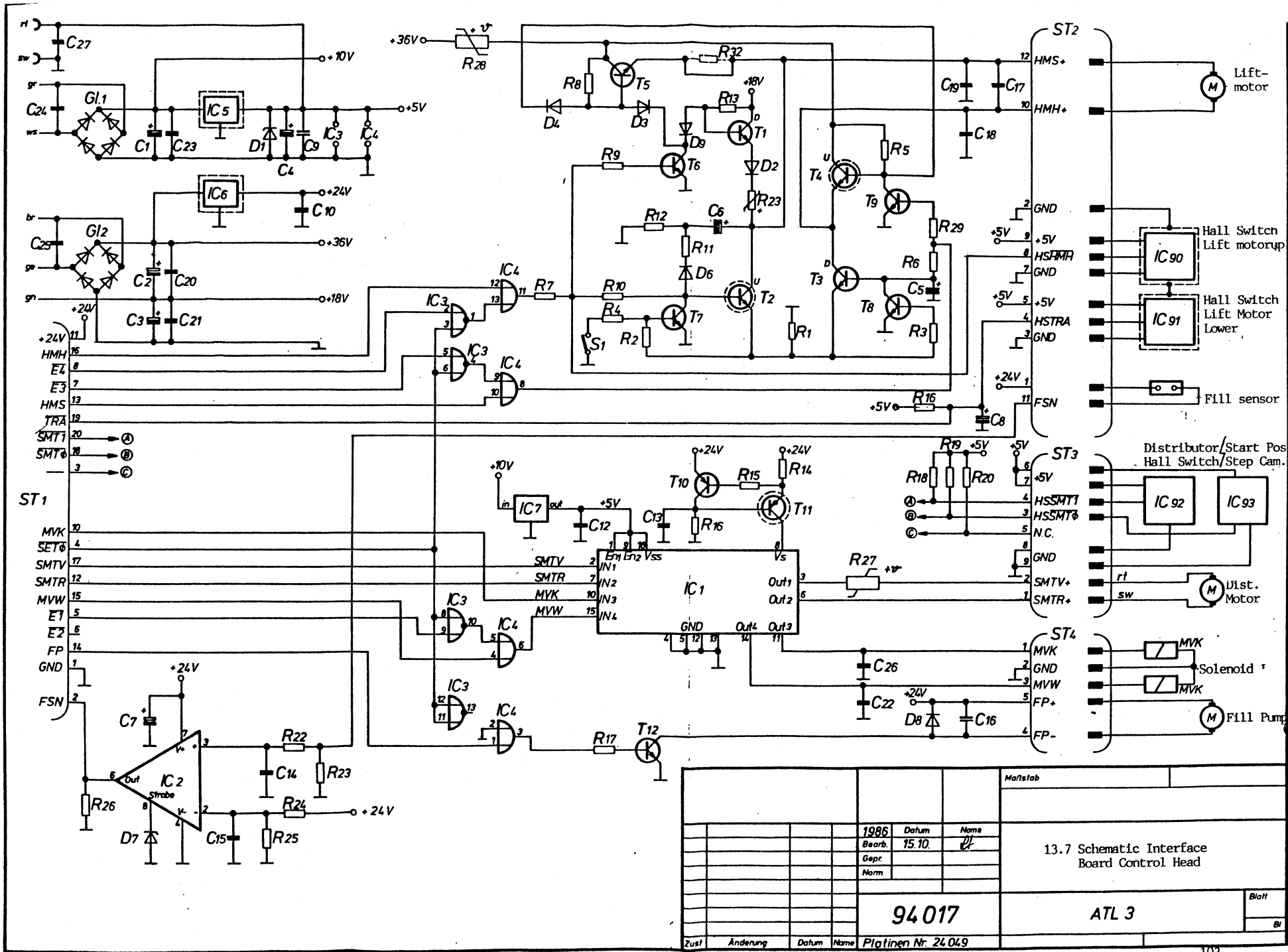
Mounting Direc.



		19.06.05.06.		Name: Valbert		Mettis	
		Bruch: 05.06.		Norm		13.8 Data Sheet Interface Board Control Head	
		Zust.		Änderung		Datum	
		94 017					

13.7

Diagram - schematic board control head atl-3



13.9 Parts Sheet

Item: Interface-Board Control Head (94017)

Part No.	Ref.	Value	Description
Capacitors			
41028	C 1	2200uF	Electolytic
41028	C 2	2200uF	Electolytic
41028	C 3	2200uF	Electolytic
41019	C 4	47 uF	Electolytic
41101	C 5	I uF	Tantal
41033	C 6	100 uF	Electolytic
41101	C 7	I uF	Tantalum
41101	C 8	I uF	Tantalum
41303	C 9	100 nF	Cer.
41303	C 10	100 nF	Cer.
41303	C 11	100 nF	Cer.
41303	C 12	100 nF	Cer.
41303	C 13	100 nF	Cer.
41303	C 14	100 nF	Cer.
41303	C 15	100 nF	Cer.
41303	C 16	100 nF	Cer.
41303	C 17	100 nF	Cer.
41303	C 18	100 nF	Cer.
41303	C 19	100 nF	Cer.
41303	C 20	100 nF	Cer.
41303	C 21	100 nF	Cer.
41303	C 22	100 nF	Cer.
41303	C 23	100 nF	Cer.
41303	C 24	100 nF	Cer.
41303	C 25	100 nF	Cer.
41303	C 26	100 nF	Cer.
41303	C 27	100 nF	Cer.

13.9 Parts Sheet

Item: Interface-Board Control Head (94017)

Part No.	Ref.	Value	Description
Resistors			
40025	R 1	0.47Ohm	Resistor 5 W
40080	R 2	1.8KOhm	Carbon Film 1/4 watt
40060	R 3	1 KOhm	Carbon Film 1/4 watt
40044	R 4	560 Ohm	Carbon Film 1/4 watt
40051	R 5	820 Ohm	Resistor 2 W
40060	R 6	1 KOhm	Carbon Film 1/4 watt
40026	R 7	270 Ohm	Carbon Film 1/4 watt
40110	R 8	10 KOhm	Carbon Film 1/4 watt
40110	R 9	1 KOhm	Carbon Film 1/4 watt
40060	R 10	1 KOhm	Carbon Film 1/4 watt
40011	R 11	22 Ohm	Carbon Film 1/4 watt
40102	R 12	5.6 KOhm	Carbon Film 1/4 watt
40101	R 13	5.1 KOhm	Carbon Film 1/4 watt
40004	R 14	1 Ohm	Resistor 1 W
40050	R 15	820 Ohm	Carbon Film 1/4 watt
40087	R 16	3 KOhm	Carbon Film 1/4 watt
40089	R 17	3.3 KOhm	Carbon Film 1/4 watt
40089	R 18	3.3 KOhm	Carbon Film 1/4 watt
40089	R 19	3.3 KOhm	Carbon Film 1/4 watt
40089	R 20	3.3 KOhm	Carbon Film 1/4 watt
40089	R 21	3.3 KOhm	Carbon Film 1/4 watt
40110	R 22	10 KOhm	Carbon Film 1/4 watt
40135	R 23	390KOhm	Carbon Film 1/4 watt
40122	R 24	39 KOhm	Carbon Film 1/4 watt
40112	R 25	13 KOhm	Carbon Film 1/4 watt
40060	R 26	1 KOhm	Carbon Film 1/4 watt
40101	R 27	5.1 KOhm	Carbon Film 1/4 watt

13.9 Parts Sheet

Item: Interface Board Control Head (94017)

Part No.	Ref.	Value	Description
Resistors			
40380	R 28	C 915	PTC
40374	R 29	C 975	PTC
40379	R 30	C 985	PTC
40089	R 31	3.3 k	Resistor
Diodes			
42120	D 1	BZW 70	Suppressor-Diode 5V6
42005	D 2	IN5406	Diode
42001	D 3	IN4148	Diode
42001	D 4	IN4148	Diode
42001	D 5	IN4148	Diode
42001	D 6	IN4148	Diode
42112	D 7	ZD 6V2	Zenerdiode
42001	D 8	IN4148	Diode
42311	GL 1	B80C3700	Bridge Rectifier B80C 3700/2200
42312	GL 2	B80C5000	Bridge Rectifier B80C 5000/3300
Transistors			
44010	T 1	TIP 120	Darlington Transistor
44011	T 2	TIP 140	Darlington Transistor
44010	T 3	TIP 120	Darlington Transistor
44011	T 4	TIP 140	Darlington Transistor
44010	T 5	TIP 120	Darlington Transistor
44009	T 6	BC337-40	Transistor
44009	T 7	BC337-40	Transistor
44009	T 8	BC337-40	Transistor
44004	T 9	BC 517	Darlington Transistor
44008	T 10	BC327-16	Transistor
44012	T 11	BD 680	Darlington Transistor
44010	T 12	TIP 120	Darlington Transistor

13.9 Parts Sheet

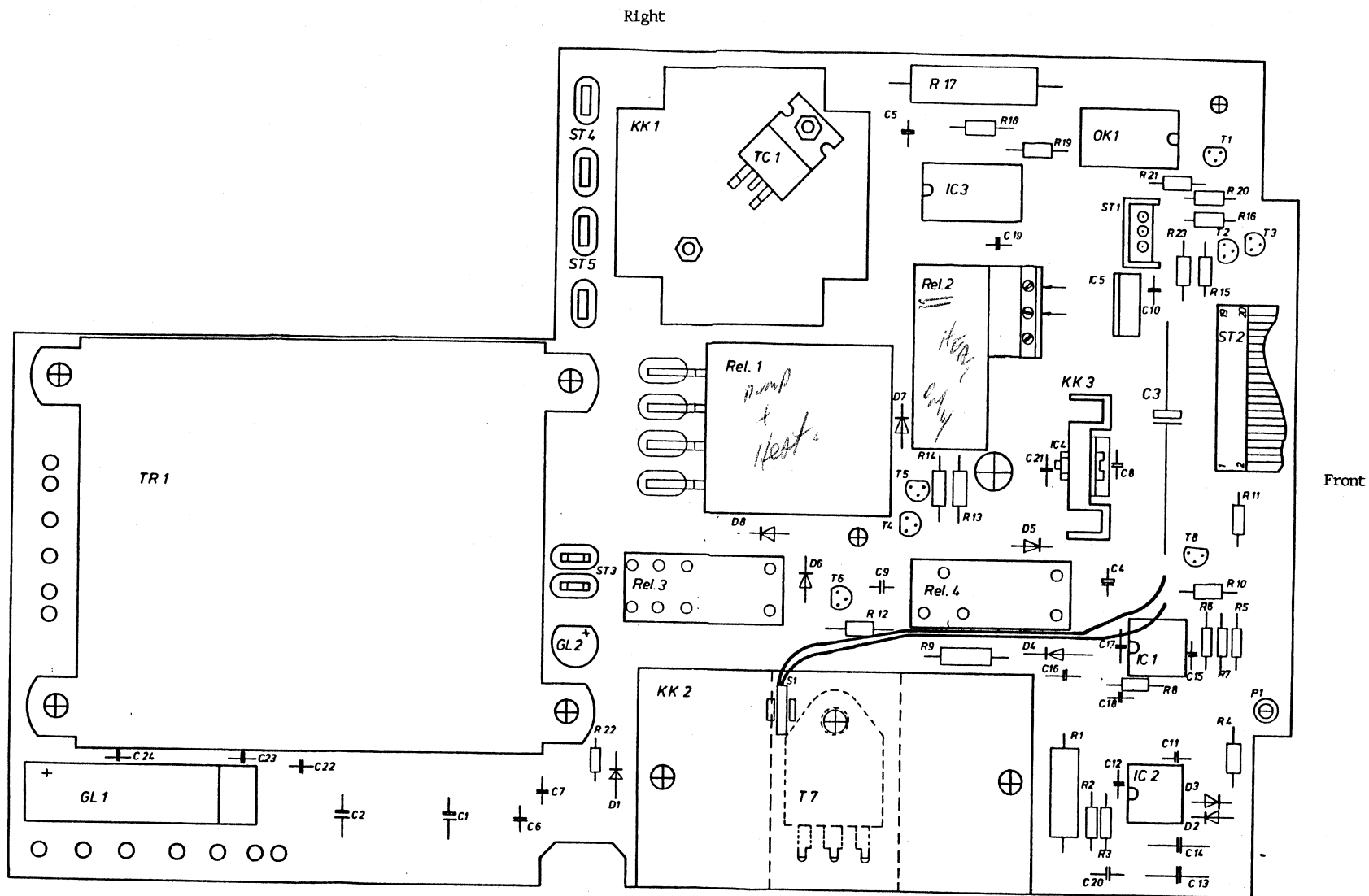
Item: Interface Board Control Head (94017)

Part No.	Ref.	Value	Description
I.C.s			
45012	IC 1	L293	Motor-Bridge
45005	IC 2	CA3140	OP AMP
46712	IC 3	74HC02	IC digital
46722	IC 4	74HC32	IC digital
45207	IC 5	780-05	V.Reg 1%
45209	IC 6	7824	V. Reg
45204	IC 7	78L05	V. Reg
Heat Sinks			
44047	KK 1	SK 65	Heat Sink
44044	KK 2	SK 64	Heat Sink
44048	KK 3	SK 75	Heat Sink
44045	KK 4	6098B	Heat Sink
44046	KK 5	KL 163	Heat Sink

13.9 Parts Sheet

Item: Interface Board Control Head (94017)

Part No.	Ref.	Value	Description
Misc.			
25092	ST 1		Socket 20=Pole
25036	ST 2		Socket 12=Pole
25096	ST 3		Socket 0-Pole
25097	ST 4		Socket 5-Pole



				Herfotab			
				1986		Datum	
				26.6.		Vabert	
				Revis			
				Gepr			
				Norm			
				94 016			
				1311 Transformer Board			
				Data Sheet			
						110	
						Blatt 2	

13.12 Parts Sheet

Item: Transformer Board ATL 2/3 (94016)

Part No.	Ref.	Value	Description
Resistors			
40005	R 1	0.33 Ohm	Resistors 2 W
40018	R 2	100 Ohm	Carbon Film 1/4 watt
40124	R 3	47 kOhm	Carbon Film 1/4 watt
40128	R 4	100 kOhm	Carbon Film 1/4 watt
40322	R 5	75 kOhm	MF 1%
40308	R 6	100 kOhm	MF 1%
40310	R 7	5.1 kOhm	MF 1%
40128	R 8	100 kOhm	Carbon Film 1/4 watt
40027	R 9	270 Ohm	Resistors 0.5 W
40083	R 10	2.2 kOhm	Carbon Film 1/4 watt
40060	R 11	1 kOhm	Carbon Film 1/4 watt
40060	R 12	1 kOhm	Carbon Film 1/4 watt
40060	R 13	1 kOhm	Carbon Film 1/4 watt
40060	R 14	1 kOhm	Carbon Film 1/4 watt
40060	R 15	1 kOhm	Carbon Film 1/4 watt
40110	R 16	10 kOhm	Carbon Film 1/4 watt
40116	R 17	22 kOhm	Resistors 4 W
40110	R 18	10 kOhm	Carbon Film 1/4 watt
40100	R 19	4.7 kOhm	Carbon Film 1/4 watt
40026	R 20	270 Ohm	Carbon Film 1/4 watt
40060	R 21	1 kOhm	Carbon Film 1/4 watt
40380	R 22	C 915	PTC - C 915
Trimmer Pot.			
40421	P 1	25 k	Trimmer

13.12 Parts Sheet

Item: Transformer Board ATL 2/3 (94016)

Part No.	Ref.	Value	Description
----------	------	-------	-------------

Capacitors

41029	C 1	2200 u	Electolytic
41029	C 2	2200 u	Electolytic
41030	C 3	1000 u	Electolytic
41031	C 4	100 u	Electolytic
41013	C 5	100 u	Electolytic
41303	C 6	100 n	Cer.
41303	C 7	100 n	Cer.
41303	C 8	100 n	Cer.
41303	C 9	100 n	Cer.
41303	C 10	100 n	Cer.
41301	C 11	10 n	Cer.
41301	C 12	10 n	Cer.
41257	C 13	0.22 u	Cer.
41257	C 14	0.22 u	Cer.
41301	C 15	10 n	Cer.
41303	C 16	100 n	Cer.
41301	C 17	10 n	Cer.
41303	C 18	100 n	Cer.
41301	C 19	10 n	Cer.
41303	C 20	100 n	Cer.
41303	C 21	100 n	Cer.
41303	C 22	100 n	Cer.
41303	C 23	100 n	Cer.
41303	C 24	100 n	Cer.

Diodes

42002	D 1	1N4001
42001	D 2	1N4148
42001	D 3	1N4148
42113	D 4	ZD27V
42001	D 5	1N4148
42001	D 6	1N4148
42001	D 7	1N4148
42001	D 8	1N4148

Zener diode 27 V, 1.3, W

13.12 Parts Sheet

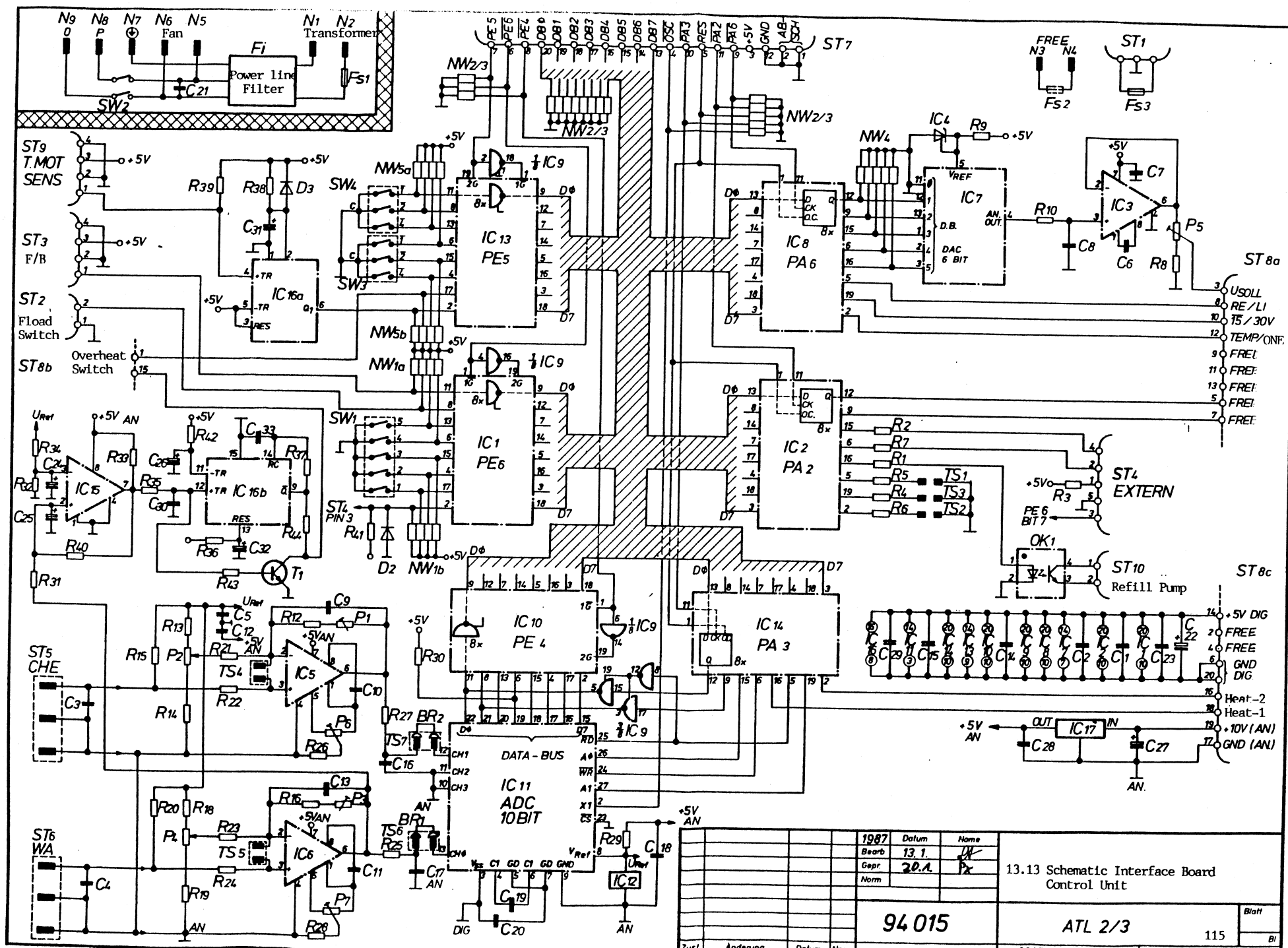
Item: Transformer Board - ATL 2/3 (94016)

Part No.	Ref.	Value	Description
Transistors			
44007	T 1	BC 546	
44008	T 2	BC 327	
44007	T 3	BC 546	
44009	T 4	BC 337	
44007	T 5	BC 546	
44007	T 6	BC 546	
44011	T 7	TIP 140	
44007	T 8	BC 546	
Bridge Rectifier			
42312	GL 1		8 80 C 5000
42310	GL 2		8 80 C 1500
Triac			
44101	TC 1	TIC246M	Triac 600 V / 12 A
IC's			
45005	IC 1	3140	OP Amp
45005	IC 2	3140	OP Amp
45004	IC 3	CA3079	0 Voltage Switch
45209	IC 4	7824	Voltage regulator 24 V
45201	IC 5	7805	5 V
43004	OK 1	CNY 85	Opto Coupler
Relay			
21010	Rel 1	2 S	Power Relay
21012	Rel 2	1 S	
21009	Rel 3	2 W	
21011	Rel 4	1 W	
Misc.			
25095	zuRel 2	RFK 5	Relay Socket
25100	zuRel 2	HF 83	Holder
44041	KK 1	FK 201	Heat Sink
44044	KK 2	SK 64	
44043	KK 3	KL 105	

13.12 Parts Sheet

Item: Transformer Board - ATL 2/3 (94016)

Part No.	Ref.	Value	Description
34139	zu KK 1	M 3 x 8	Screw
34139	zu KK 1	M 3 x 8	Screw
34061	zu KK 1	M 3	Nut
34061	zu KK 1	M 3	Nut
34047	zu KK 1		Washer
34047	zu KK 1		Washer
34139	zu KK 2	M 3 x 8	Screw
34139	zu KK 2	M 3 x 8	Screw
34139	zu KK 2	M 3 x 8	Screw
34139	zu KK 3	M 3 x 8	Screw
34061	zu KK 3	M 3	Nut
25047	ST 1		Connector 3-Pole
25093	ST 2		
25016	ST 3	4.8 x 0.8	
25016	ST 3	4.8 x 0.8	
25005	ST 4	6.3	
25005	ST 4	6.3	
25005	ST 5	6.3	
25005	ST 5	6.3	
22007	S 1	100 C	Overheat Switch
11039	zu S 1		Clamp
24051			Board 24 051
48039	TR 1		Transformer 110 VA
25004	N 1		Soldering Stud





13.14

INTERFACE MOTOR UNIT ST 8
(pin designations)

1	PE 5/D5 (FREE)
2	TEMP-OVERHEAT
3	PE 5/D4 (FREE)
4	TMT - NOMINAL (0-2.75)
5	<u>1</u> digital
6	PA2/D0 (FREE)
7	TMT re./li.
8	PA2/D1 (FREE)
9	15/30V
10	FREE
11	Heating-all
12	FREE
13	+5Vd
14	FREE
15	Heating 2
16	Overheat Switch
17	Heating 1
18	<u>1</u> a
19	<u>1</u> d
20	+10V a

13.15 Parts Sheet

Item: Interface Board Motor unit (94015)

Page 1

Part no.	Ref.	Value	Description
Resistors			
40026	R 1	270	Carbon Film 1/4 watt
40026	R 2	270	Carbon Film 1/4 watt
40015	R 3	47	Carbon Film 1/4 watt
40026	R 4	270	Carbon Film 1/4 watt
40026	R 5	270	Carbon Film 1/4 watt
40026	R 6	270	Carbon Film 1/4 watt
40026	R 7	270	Carbon Film 1/4 watt
40312	R 8	715	Carbon Film 1/4 watt
40023	R 9	220	Carbon Film 1/4 watt
40128	R 10	100 k	Carbon Film 1/4 watt
40316	R 12	182 k	Carbon Film 1/4 watt
40310	R 13	5.1 k	Carbon Film 1/4 watt
40324	R 14	2 k	Carbon Film 1/4 watt
40303	R 15	2.43 k	Carbon Film 1/4 watt
40316	R 16	182 k	Carbon Film 1/4 watt
40310	R 18	5.1 k	Carbon Film 1/4 watt
40324	R 19	2 k	Carbon Film 1/4 watt
40303	R 20	2.43 k	Carbon Film 1/4 watt
40309	R 21	47 k	Carbon Film 1/4 watt
40309	R 22	47 k	Carbon Film 1/4 watt
40309	R 23	47 k	Carbon Film 1/4 watt
40309	R 24	47 k	Carbon Film 1/4 watt
40128	R 25	100 k	Carbon Film 1/4 watt
40304	R 26	4.7 k	Carbon Film 1/4 watt
40128	R 27	100 k	Carbon Film 1/4 watt
40304	R 28	4.7 k	Carbon Film 1/4 watt
40040	R 29	470	Carbon Film 1/4 watt
40110	R 30	10 k	Carbon Film 1/4 watt

13.15 Parts Sheet

Item: Interface Board Motor Unit (94015) Page 2

Part No.	Ref.	Value	Description	Tolerance %
Resistors				
40110	R 31	10 k	Carbon Film 1/4 watt	10
40310	R 32	5.1 k	Carbon Film 1/4 watt	1
40110	R 33	10 k	Carbon Film 1/4 watt	10
40304	R 34	4.7 k	Carbon Film 1/4 watt	1
40060	R 35	1 k	Carbon Film 1/4 watt	10
40128	R 36	100 k	Carbon Film 1/4 watt	10
40110	R 37	10 k	Carbon Film 1/4 watt	10
40132	R 38	220 k	Carbon Film 1/4 watt	10
40100	R 39	4.7 k	Carbon Film 1/4 watt	10
40128	R 40	100 k	Carbon Film 1/4 watt	10
40060	R 41	1 k	Carbon Film 1/4 watt	10
40060	R 42	1 k	Carbon Film 1/4 watt	10
40124	R 43	47 k	Carbon Film 1/4 watt	1
40100	R 44	4k7	Carbon Film 1/4 watt	1
Carbon Film 1/4 watt Network				
40504	NW 1	15 k	x 8,SIL	
40503	NW 2	4k7	x 8,SIL	
40503	NW 3	4k7	x 8,SIL	
40508	NW 4	1 k	x 5,SIL	
40504	NW 5	15 k	x 8,SIL	
Potentiometers				
40422	P 1	100 k	Cermet-25-Gang	
40423	P 2	1 k	Cermet-25-Gang	
40422	P 3	100 k	Cermet-25-Gang	
40423	P 4	1 k	Cermet-25-Gang	
40424	P 5	500	Cermet-Mini	
40425	P 6	10 k	Cermet-Mini	
40425	P 7	10 k	Cermet-Mini	

13.15 Parts Sheet

Item: Interface Board Motor Unit (94015)

Page 3

Part No.	Ref.	Value	Description
Capacitors			
41303	C 1	100 n	Cer Capacitor
41303	C 2	100 n	Cer Capacitor
41303	C 3	100 n	Cer Capacitor
41303	C 4	100 n	Cer Capacitor
41303	C 5	100 n	Cer Capacitor
41301	C 6	100 n	Cer Capacitor
41303	C 7	100 n	Cer Capacitor
41303	C 8	100 n	Cer Capacitor
41303	C 9	100 n	Cer Capacitor
41301	C 10	10 n	Cer Capacitor
41301	C 11	10 n	Cer Capacitor
41303	C 12	100 n	Cer Capacitor
41303	C 13	100 n	Cer Capacitor
41303	C 14	100 n	Cer Capacitor
41303	C 15	100 n	Cer Capacitor
41303	C 16	100 n	Cer Capacitor
41303	C 17	100 n	Cer Capacitor
41303	C 18	100 n	Cer Capacitor
41246	C 19	33 n	Foil Capacitor
41301	C 20	10 n	Cer Capacitor
41212	C 21	0.1 u	X, 250 V Capacitor
41105	C 22	10 u	Tantal Capacitor
41301	C 23	10 n	Cer Capacitor
41100	C 24	1 u	Tantal Capacitor
41100	C 25	1 u	Tantal Capacitor
41100	C 26	1 u	Tantal Capacitor
41105	C 27	10 u	Tantal Capacitor
41303	C 28	100 n	Cer Capacitor
41303	C 29	100 n	Cer Capacitor
41303	C 30	100 n	Cer Capacitor

13.15 Parts Sheet

Item: Interface Board Motor Unit (94015) Page 4

Part No.	Ref.	Value	Description
I.C.s			
46741	IC 1		74HC241 I.C.
46750	IC 2		74HC374 I.C.
45005	IC 3		CA 3140 E I.C.
45205	IC 4		TL 430 CLP I.C.
45005	IC 5		CA 3140 E I.C.
45005	IC 6		CA 3140 E I.C.
46304	IC 7		ZN 436 E I.C.
46750	IC 8		74HC374 I.C.
46740	IC 9		74HC240 I.C.
46741	IC 10		74HC241 I.C.
46305	IC 11		u PD 7002 C-1 I.C.
45210	IC 12		ZN 458 B I.C.
46741	IC 13		74HC241 I.C.
46750	IC 14		74HC374 I.C.
45013	IC 15		IC CA 311 E I.C.
46124	IC 16		IC 4538 B I.C.
45204	IC 17		78 L 05 I.C.
Diodes			
42001	D 2		1N914
42001	D 3		1N914
Transistors			
44001	T 1		BC 238 C
Capacitors			
41105	C 31	10 u	Tantal Capacitor
41105	C 32	10 u	Tantal Capacitor
41301	C 33	10 u	Cer Capacitor
43007	OK 1		Optocoupler

13.15 Parts Sheet

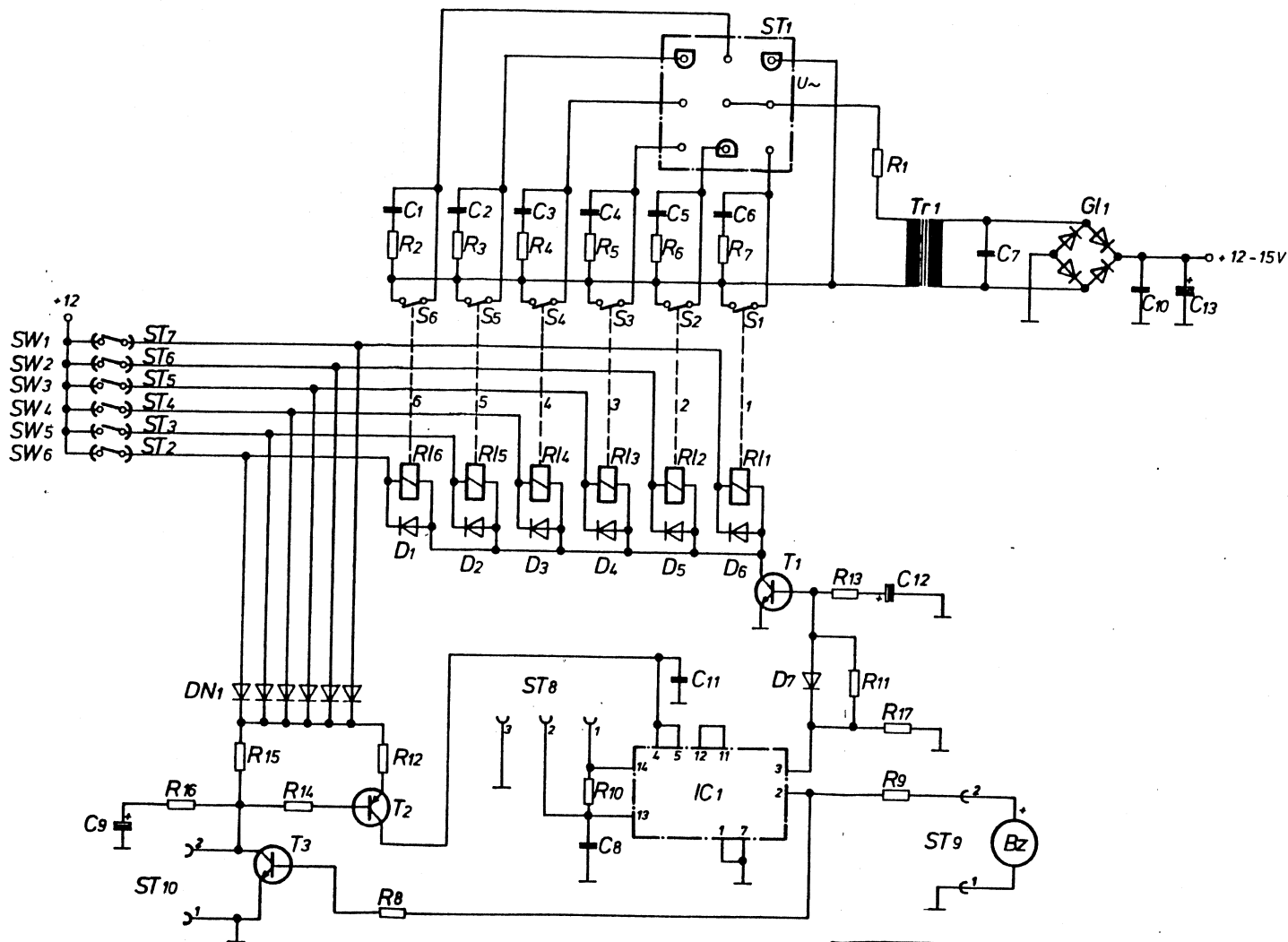
Item: Interface Board Motor Unit (94015) Page 5

Part No.	Ref.	Value	Description
Switches			
20111	SW 1		DIP-Switches 5-pole
20027	SW 2		Power Switch
20036	SW 3		Motor Speed Switch 0-5 BCD
20035	SW 4		Auto. Chem. fill quan. Switch 0-7 BCD
Connectors and Sockets			
25040	ST 1		Connector 3 Pin
25110	ST 2		Connector 2 Pin
25060	ST 3		Connector 4 Pin
	ST 4		Open
25131	ST 5		Connector 3 Pin
25131	ST 6		Connector 3 Pin
25094	ST 7		Ribbon Cable
25102	ST 8		Connector 20 Pin
25060	ST 9		Connector 4 Pin
25110	ST 10		Connector 2 Pin
25113	TS 1		Connector 2 Pin
25113	TS 2		Connector 2 Pin
25113	TS 3		Connector 2 Pin
25113	TS 4		Connector 2 Pin
25113	TS 5		Connector 2 Pin
25113	TS 6		Connector 2 Pin
25113	TS 7		Connector 2 Pin
25112	BR 1		Short Circuit Bridge
25112	BR 2		Short Circuit Bridge

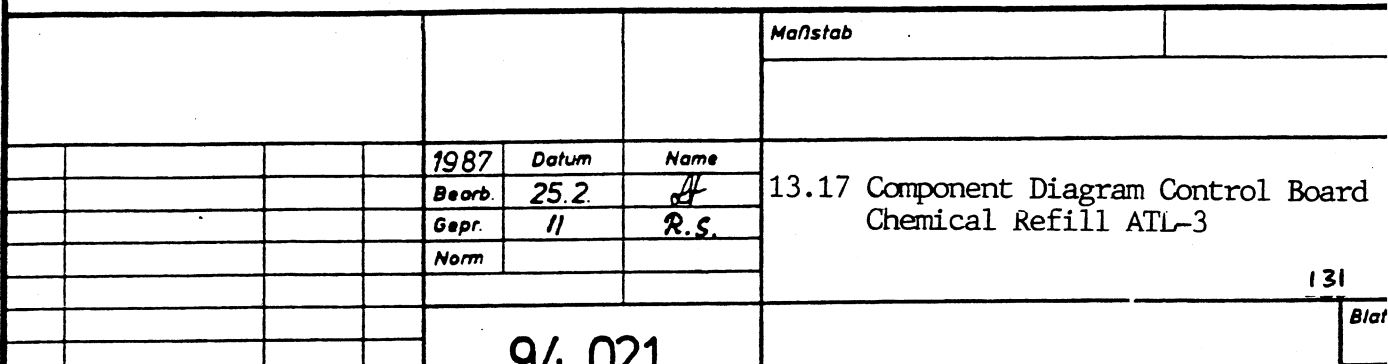
13.15 Parts Sheet

Item: Interface Board Motor Unit (94015) Page 6

Part No.	Ref.	Value	Description
			Misc.
25005	N 1		Spade Terminal
25005	N 2		Spade Terminal
25005	N 3		Spade Terminal
25005	N 4		Spade Terminal
25005	N 5		Spade Terminal
25005	N 6		Spade Terminal
25005	N 7		Spade Terminal
25005	N 8		Spade Terminal
25005	N 9		Spade Terminal
25073	N 10		Switch Connector 5 Pin
25073	N 11		Switch Connector 5 Pin
25089	SO 1		IC-Socket
33100	Fi	1 A	Power Filter
27014	FH 1		Fuse Holder
27014	FH 2		Fuse Holder
27014	FH 3		Fuse Holder
27008	FS 1	T 0.8 A	Fuse
27009	FS 2	T 1.6 A	Fuse
27015			Fuse Holder Cap
27015			Fuse Holder Cap
25074			Spacer
25074			Spacer
34059			Spacer



				Maßstab	
1986	Datum	30.9	Name	13.16 Schematic Control Board Chemical Refill ATL-3	
Bearb.		"	R.S.		
Gepr.					
Norm					
94 021				ATL 3	Blatt
1	25.2.87			124	B/
Zust.	Änderung	Datum	Abm.		



13.18 Parts Sheet

Item: Chemical Refill Circuit Board (94021) Page 1

Part No.	Ref.	Value	Description
Carbon Film 1/4 watts			
40021	R 1	180 Ohm	Carbon Film 1/4 watt
40018	R 2	100 Ohm	Carbon Film 1/4 watt
40018	R 3	100 Ohm	Carbon Film 1/4 watt
40018	R 4	100 Ohm	Carbon Film 1/4 watt
40018	R 5	100 Ohm	Carbon Film 1/4 watt
40018	R 6	100 Ohm	Carbon Film 1/4 watt
40018	R 7	100 Ohm	Carbon Film 1/4 watt
40083	R 8	2.2 K Ohm	Carbon Film 1/4 watt
40023	R 9	220 Ohm	Carbon Film 1/4 watt
40318	R 10	1 M Ohm	MF 1%
40115	R 11	22 k Ohm	Carbon Film 1/4 watt
40040	R 12	470 Ohm	Carbon Film 1/4 watt
40018	R 13	100 Ohm	Carbon Film 1/4 watt
40110	R 14	10 K Ohm	Carbon Film 1/4 watt
40128	R 15	100 k Ohm	Carbon Film 1/4 watt
40060	R 16	1 k Ohm	Carbon Film 1/4 watt
40040	R 17	470 Ohm	Carbon Film 1/4 watt
Capacitors			
41249	C 1	47 nF	MKT / 250 V
41249	C 2	47 nF	MKT / 250 V
41249	C 3	47 nF	MKT / 250 V
41249	C 4	47 nF	MKT / 250 V
41249	C 5	47 nF	MKT / 250 V
41249	C 6	47 nF	MKT / 250 V
41303	C 7	100 nF	Cer
41254	C 8	0.15 uF	MKC
41101	C 9	1.0 uF	Tantal
41303	C 10	100 nF	Cer

13.18 Parts Sheet

Item: Chemical Refill Circuit Board (94021) Page 2

Part No.	Ref.	Value	Description
Capacitors			
41301	C 11	10 nF	Cer Capacitor
41012	C 12	470 uF	Electolytic Capacitor
41012	C 13	470 uF	Electolytic Capacitor
Diodes			
42001	D 1	1N4148	Diode
42001	D 2	1N4148	Diode
42001	D 3	1N4148	Diode
42001	D 4	1N4148	Diode
42001	D 5	1N4148	Diode
42001	D 6	1N4148	Diode
42001	D 7	1N4148	Diode
42310	GL 1	380C1500	Bridge Rectifier

13.18 Parts Sheet

Item: Chemical Refill Circuit Board (94021) Page 3

Part No.	Ref.	Value	Description
42010	DN 1	DAN601	Diode Nerwork
			Transistors
44004	T 1	BC517	NPN-Transistors
44008	T 2	BC327	PNP-Transistors
44007	T 3	BC546	NPN-Transistors
46401	IC 1	ZN1034	Timer-IC
			Misc.
26101	BZ 1		Buzzer
21013	Rel.1	1xE	Relay E 3207
21013	Rel.2	1xE	Relay E 3207
21013	Rel.3	1xE	Relay E 3207
21013	Rel.4	1xE	Relay E 3207
21013	Rel.5	1xE	Relay E 3207
21013	Rel.6	1xE	Relay E 3207
48013	Tr.1	10V1.5VA	Transformer
24053			Board

13.18 Parts Sheet

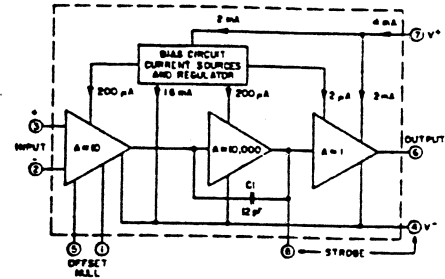
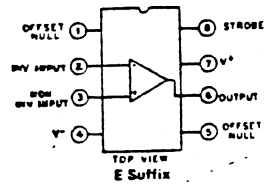
Item: Chemical Refill Circuit Board (94021) Page 4

Part No.	Ref.	Value	Description
25117	ST 1	9pol.	Connector
25110	ST 2	2pol.	Connector
25110	ST 3	2pol.	Connector
25110	ST 4	2pol.	Connector
25110	ST 5	2pol.	Connector
25110	ST 6	2pol.	Connector
25110	ST 7	2pol.	Connector
25110	ST	2pol.	Connector
25110	ST	2pol.	Connector
25047	ST 8	3pol.	Connector

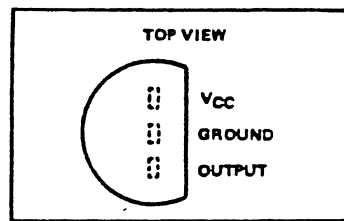
13.19 I.C. Data Sheet

CA 3140

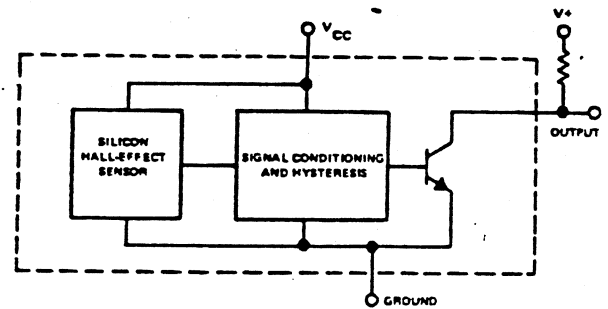
CA 3079



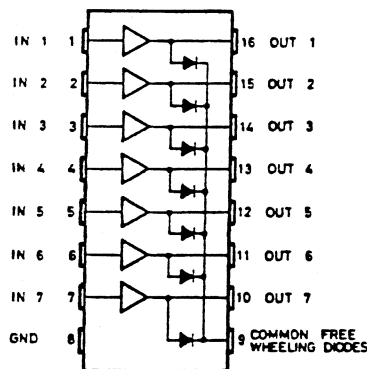
TL 172



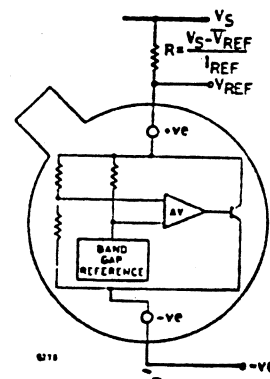
TL172C FUNCTIONAL BLOCK DIAGRAM



ULN 2003

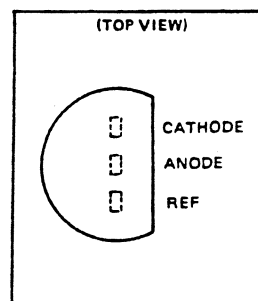


ZN 458 b



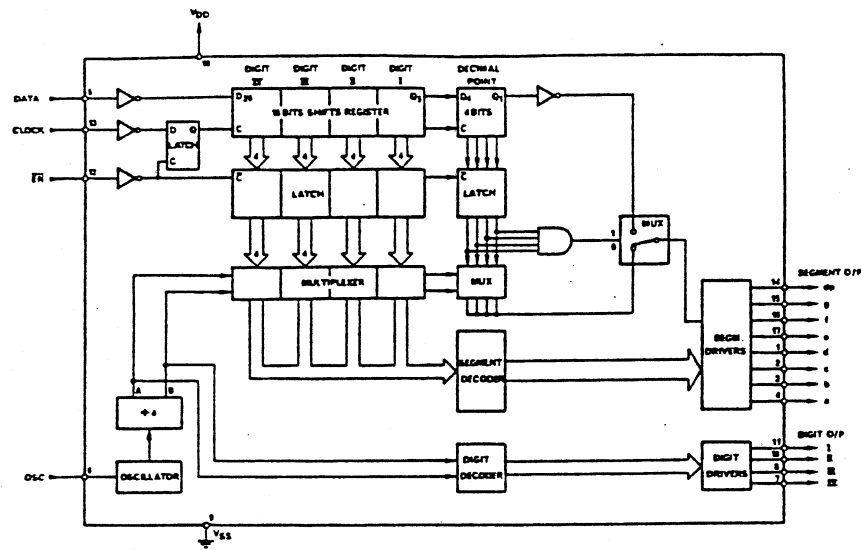
Circuit Diagram

TL 430 C

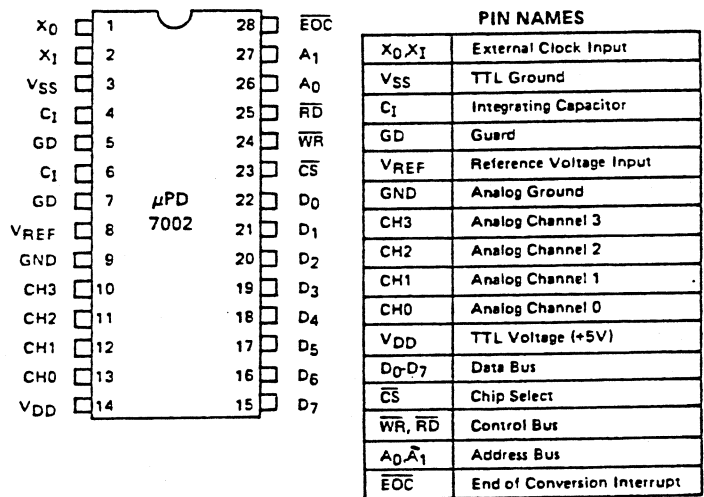


13.19 I.C. Data Sheet

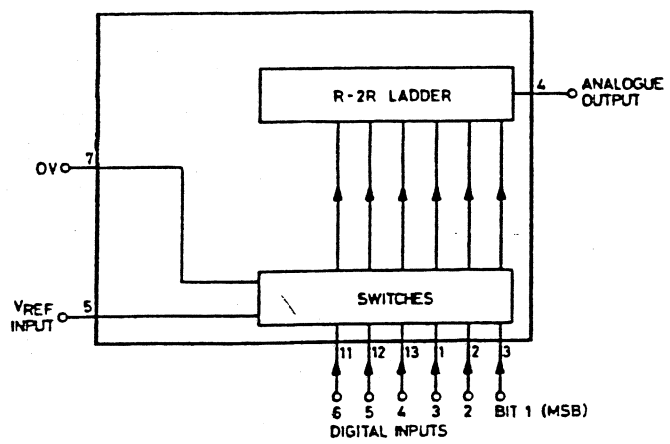
MC 14499



μPD 7002-1

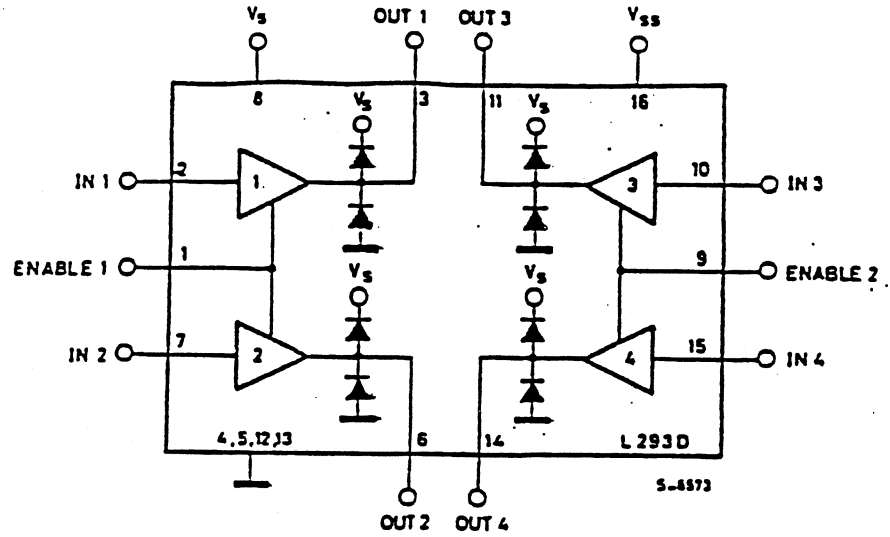


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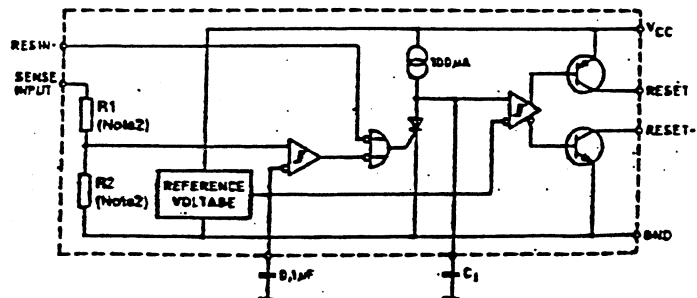
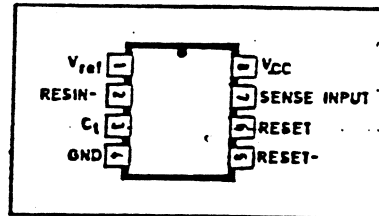
L 293 D

13.19 I.C. Data Sheet



TL 7705

(TOP VIEW)



Functional Diagram

CHAPTER 14

Supplementary parts list

The following parts lists are intended to cover most of the parts that you may need to order to service and ATL processor.

All parts listed come as complete assemblies when necessary so that you're certain to get what you need.

Prices are current at the date of printing but may change without notice.

Please call Jobo if you have any questions regarding parts, prices or availability.

14.1 ATL-2

14.2 ATL-3

14.1 Parts Sheet

Item: 4160 Autolab -2 pg. 1

Part #	Description	Price
05066	bottle lid with hole	
05071	bottle cover number 1	
05072	" " number 2	
05073	" " number 3	
05074	" " number 4	
05075	" " number 5	
05076	" " number 6	
06017	pump housing	
07007	roller for rollerblock	
07067	rollerblock extensions	
07074	drive gear dist. arm	
07075	positioning stop	
07080	transfer gear for lift arm	
07081	secondary drive gear	
07083	tank gripping clamp	
07095	cog lid gasket	
07098	mounting plate	
07134	curved hose connector	
07135	roller with notch	
07137	air hose elbow	
07162	hose removing tool	
10049	bottle cover	
12098	reclamation unit bracket	
15057	rubber band for hoses	
15071	air filter	
23096	wiring harness ATL-2,3	
27008	800 ma fuse	
27009	1.6 amp fuse	
32008	pump motor	
32013	compressor	
32018	rotation motor	
34022	o-ring for air distributor	
34056	o-ring for roller	
50424	air distributor hose 1 meter 3 mm	
50444	air distributor hose 1 meter 4 mm	
70194	magnetic cards	
70201	white magnetic cards	
81114	shipping carton	
83015	cardboard insert	
88011	styrofoam end pieces	
88016	styrofoam plate	
92027	red trough	
92028	motor housing cover ATL-2,3	

cont. from pg. 1

Part No.	Description
93000	heating element 1
93001	heating element 2
93003	overflow complete
93004	chemistry hose set
94013	compressor calibration board
94502	interface pc board motor unit
94501	transformer pc board
94017	interface pc board control head
94018	display board
94022	control board
95062	main housing bottom
95081	pump shaft complete
95187	transfer gear w/shaft
95189	sensing needle set
95197	lift motor
95198	motor for air distributor
95199	drive cam w/magnet
95207	distributor gear w/magnet and hose
95215	roller block plain
95218	solenoid valve warm/cold
95251	external spring kit
95256	reclamation unit
95274	control unit ATL-2
95276	brass motor gear for lift
95281	temp. sensor water bath
95287	float switch 40 mm
95288	motor unit top housing
95299	cog gear, main motor drive
95311	motor unit ATL-2
95322	drain valve
95342	cooling fan
95333	bottle temp. sensor
95340	1 liter bottle w/o cover
95341	float switch 90 mm
95344	air distributor
95350	eprom
95352	lift arm complete
95353	chemical drain arm
95528	coupler

14.2 4170/4171/4172 Parts list pg. 1

Part #	Description	Price
05071	bottle cover 1	
05072	" " 2	
05073	" " 3	
05074	" " 4	
05075	" " 5	
05076	" " 6	
06017	pump housing	
07007	roller for rollerblock	
07067	rollerblock extentions	
07074	drive gear dist. arm	
07075	positioning stop	
07080	transfer gear for lift arm	
07081	secondary drive gear	
07083	tank gripping clamp	
07095	cog lid gasket	
07098	mounting plate	
07135	roller with notch	
07137	air hose elbow	
07155	fuse cover, grey	
07162	hose removing tool	
10067	bottle cover, front ATL-3	
10068	bottle cover, back ATL-3	
15053	rubber band, red, for chem.hoses	
15057	rubber band, bla, for chem.hoses	
15071	air filter	
15078	protective cover, power switch	
16134	in-line chemistry filter	
16153	ball point allen screwdriver	
16800	water heater see 95309	
23096	wiring harness ATL-2,3	
27008	800 ma fuse	
27009	1.6 amp fuse	
32008	pump motor 115v see 95059	
32013	compressor	
32018	rotation motor	
32019	liquid chemical pump 220v	
32022	liquid chemical pump 115v	
34022	o-ring for air distributor	
34056	o-ring for roller	
50424	air distributor hose 1 meter 3 mm	
50444	air distributor hose 1 meter 4 mm	
70194	magnetic cards	
70201	white magnetic card	

cont. from pg. 1

Part No.	Description
92028	motor housing cover ATL-2,3
93001	heating element number1
93002	heating element number 2
94013	compressor calibration board
94015	interface pc board motor unit 220v
94017	interface board control head
94018	display board
94021	chemical refill pc board
94023	control board
94500	transformer pc board 240v
94501	transformer pc board 115v
94502	interface pc board motor unit 115v
95059	pump motor 220v
95081	pump shaft
95187	transfer gear w/shaft
95197	lift motor
95198	motor for air distributor
95199	drive cam w/magnet
95207	distributor gear w/magnet and hose
95215	roller block
95218	solenoid valve
95251	external spring kit
95276	brass gear for lift motor
95281	temp. sensor water bath
95287	float switch 40 mm
95288	motor unit top housing
95289	motor unit ATL-3
95290	control head ATL-3
95292	water trough complete
95293	upper water trough
95294	main housing
95295	housing door ATL-3 complete
95299	cog gear, main motor drive
95303	bottle float switch w/lid
95304	hose set for chemistry refilling
95306	sensing needle set
95309	water heater complete w/pipes
95313	bottle, 2 holes
95314	bottle, 3 holes
95315	bottle, 4 holes
95324	cooling fan 220v
95329	water trough table top version
95332	water bath stopper
95335	hose set upper trough
95339	air changing switch w/magnet
95341	float switch 90 mm

cont. from pg. 2

Part No.	Description
95342	cooling fan 115v
95343	lift arm complete
95344	air distributor
95345	warm water regulation pipe
95346	warm water pipe
95347	cold water pipe
95351	eprom
95353	chemical drain arm
95528	coupler

CHAPTER 15 ABBREVIATIONS

The following is a list of abbreviations used in the schematic diagrams.

DPOB	led colon, top
DPUN	led colon, bottom
E1	hundredths digit key
E2	tenths digit key
E3	ones digit key
E4	tens digit key
FP	compressor
FP-	low potential w/compressor on
FSN	fill sensor signal (modified)
FSNI	fill sensor signal input
FUEL	fill volume sel. switch and l.e.d.
ge	yellow
gn	green
HMH	lift motor raise
HMH-	low potential at lift motor raise
HMS	lift motor lower
HMS-	low potential at lift motor lower
HSHMH	hall-sw. low signal, lift arm up
HSSMT	hall-sw. low signal after each rot. of step motor
HSSMTO	hall-sw. low signal at step motor zero position
HSTRA	hall-sw. low sig. lift raised w/rocking motion
IHMS	lift motor current, lowering
MV	solenoid valve
MV-	low potential solenoid valve on
NW	Resistor Network
PRUN	process step selector switch
RES	reset button
rt	red
RUN	program run
SET	enter program
SET 0	program button zero position
SMT	stepping motor
SMTO	see HSSMTO
SMT 1	see HSSMT
SEDA	serial data of VIA
SET/R	low potential at set
S/RUN	low potential at run
SMT-	low potential stepping motor on
STOE	red warning triangle
STRB	strobe signal for key debouncing
ST/ST	start stop button

cont. from page 1

Abbrev.	Explanation
TBUZZ	TTL signal for controlling buzzer
TENDE	" " end led
TFUEL	" " fill amt led
TPRON	" " program led
TRA	see HSTRA
TSR	button for lateral agitation
ZW.B.	red led "intermediate exposure"
CLOCK	timing signal for decoder/driver

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
squeegee.

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

Problem:

Solution:

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 JOB0 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
JOB 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 H₂SO₄.
(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

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.

Processing Faults- Black and White Film

Problems:Solutions:

Negative too light.

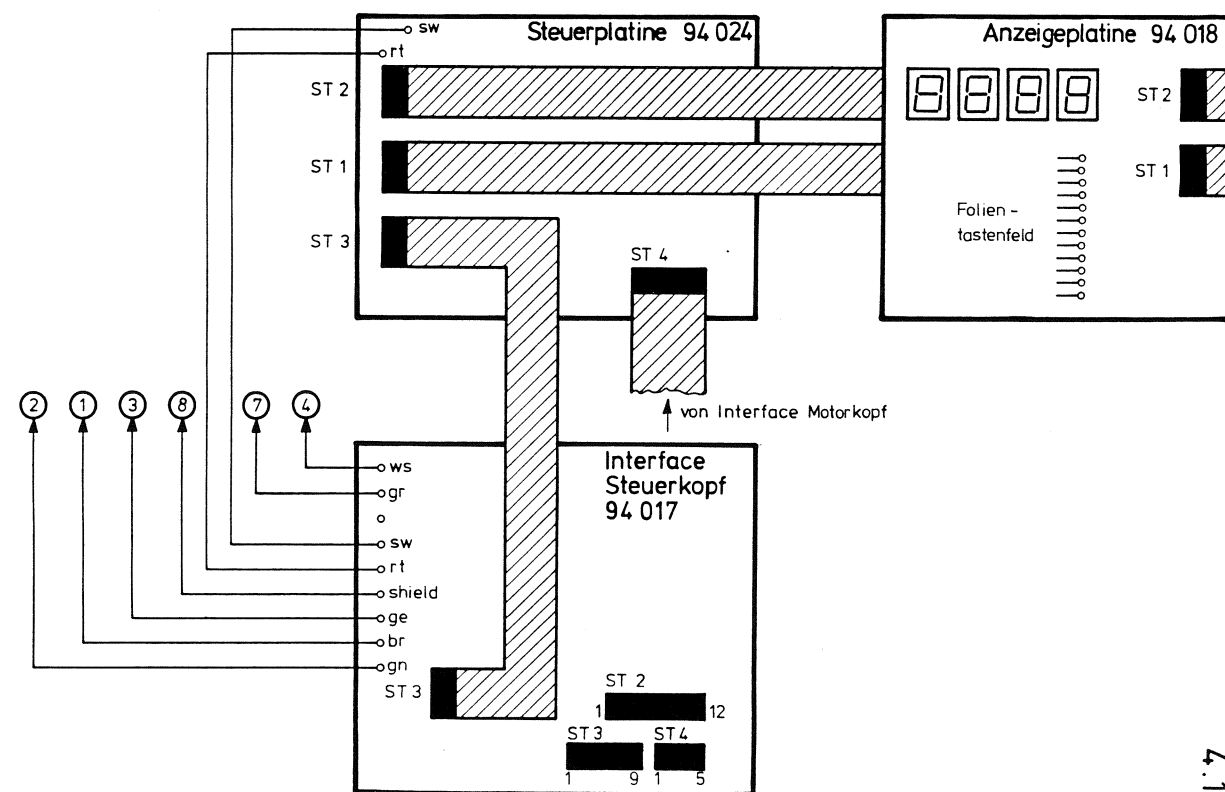
Increase time of first developer.

Negative too dark.

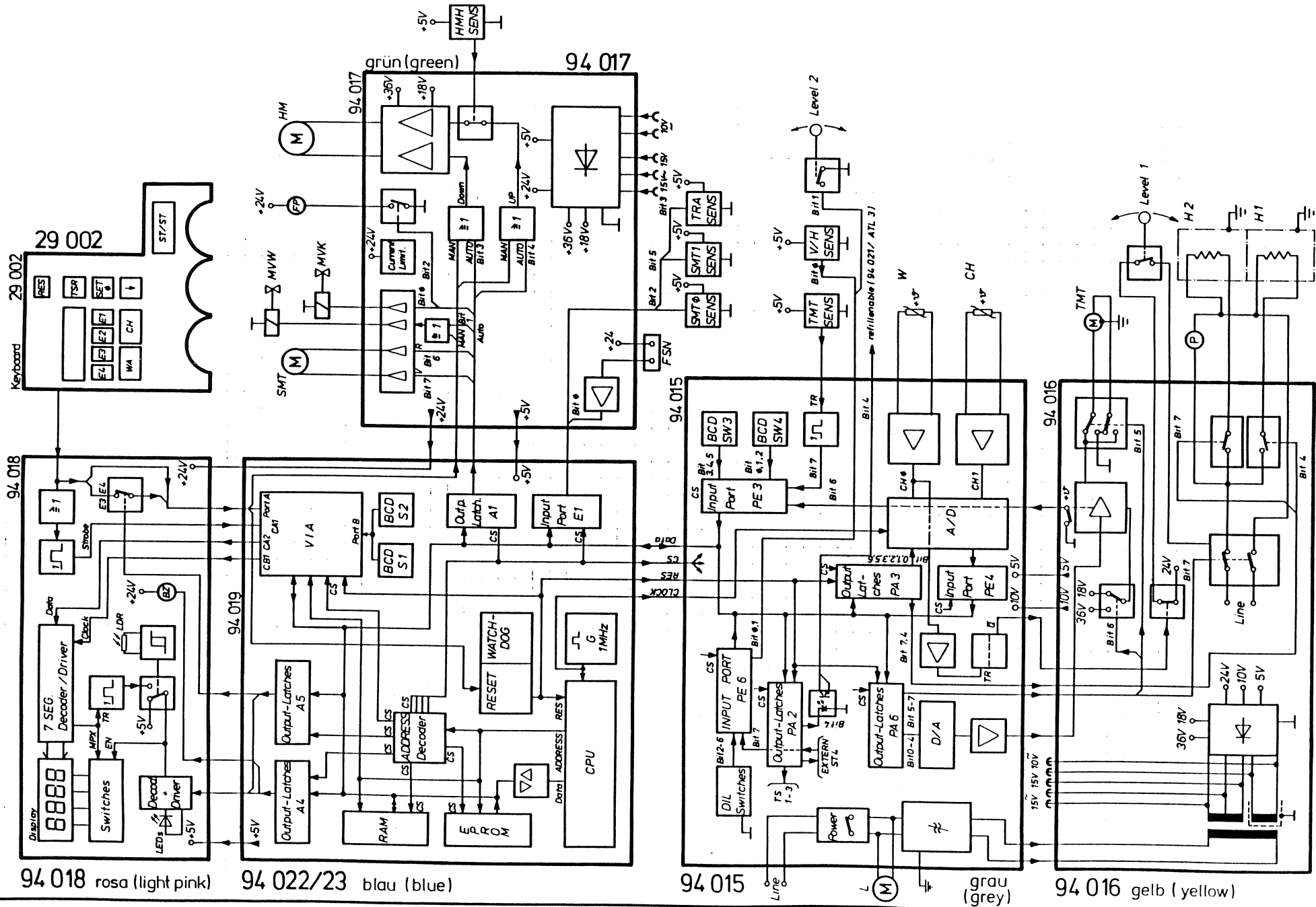
Decrease time of first developer.

Density streaks or clouds.

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

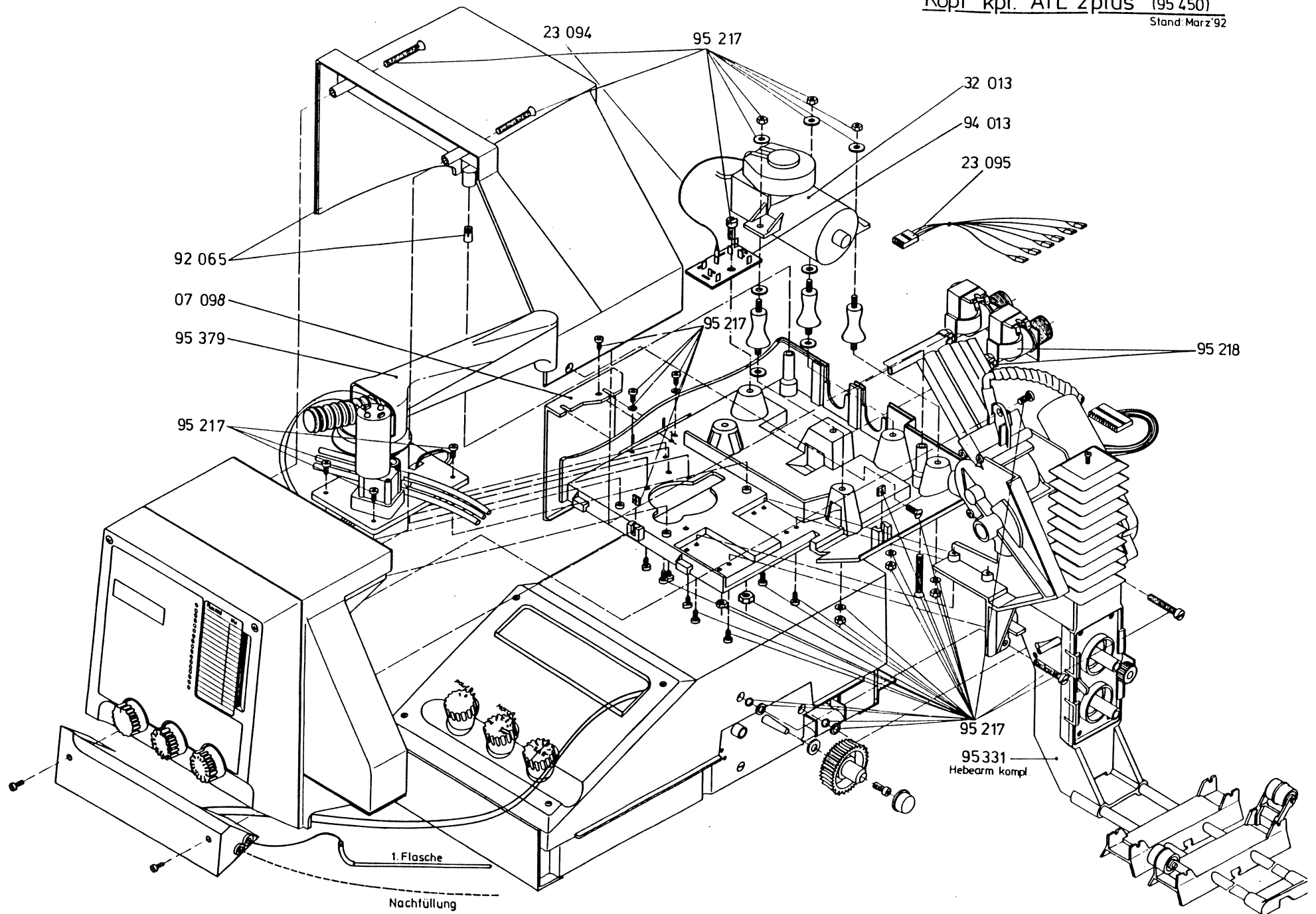


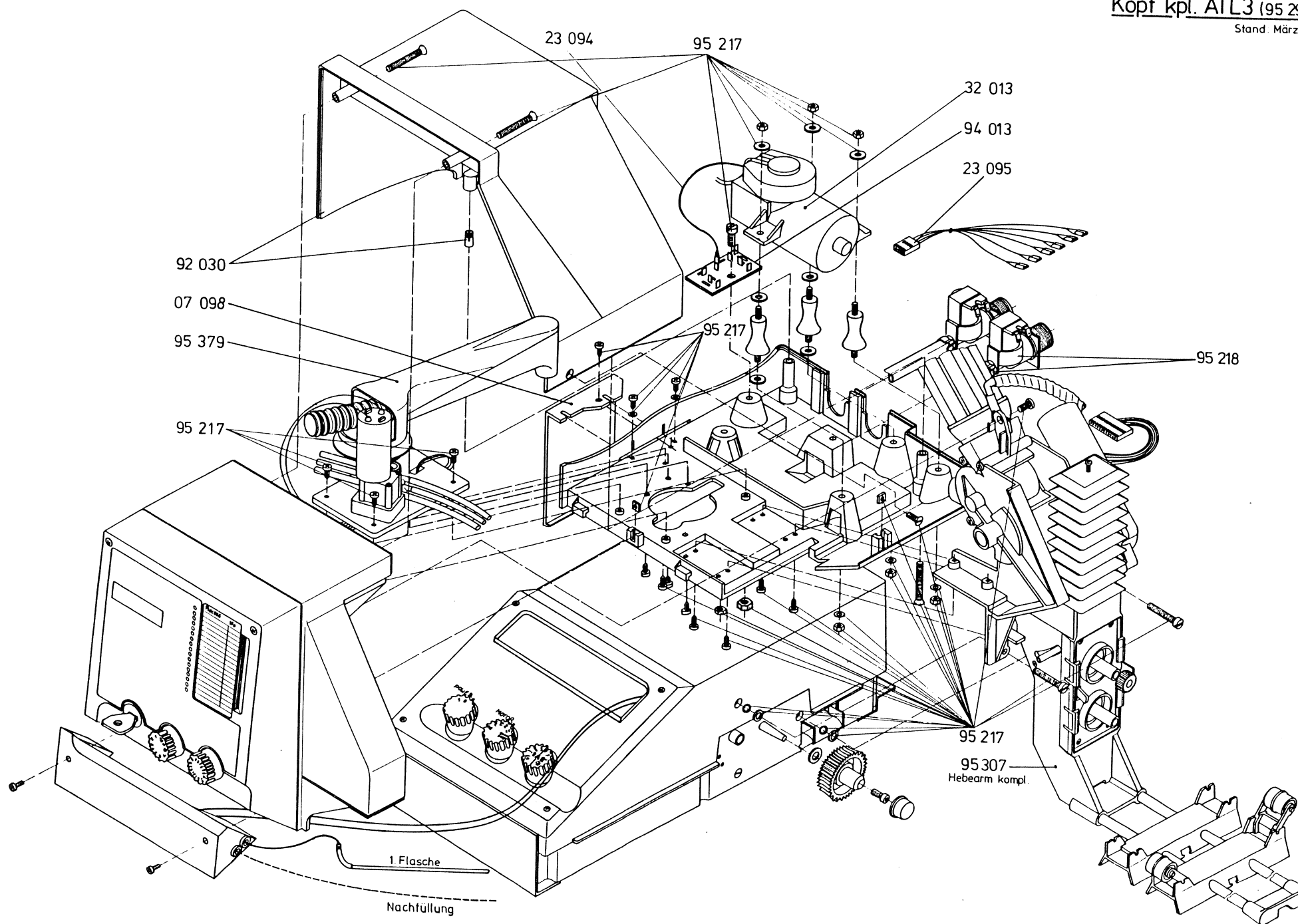
4.1



Kopf kpl. ATL 2plus (95 450)

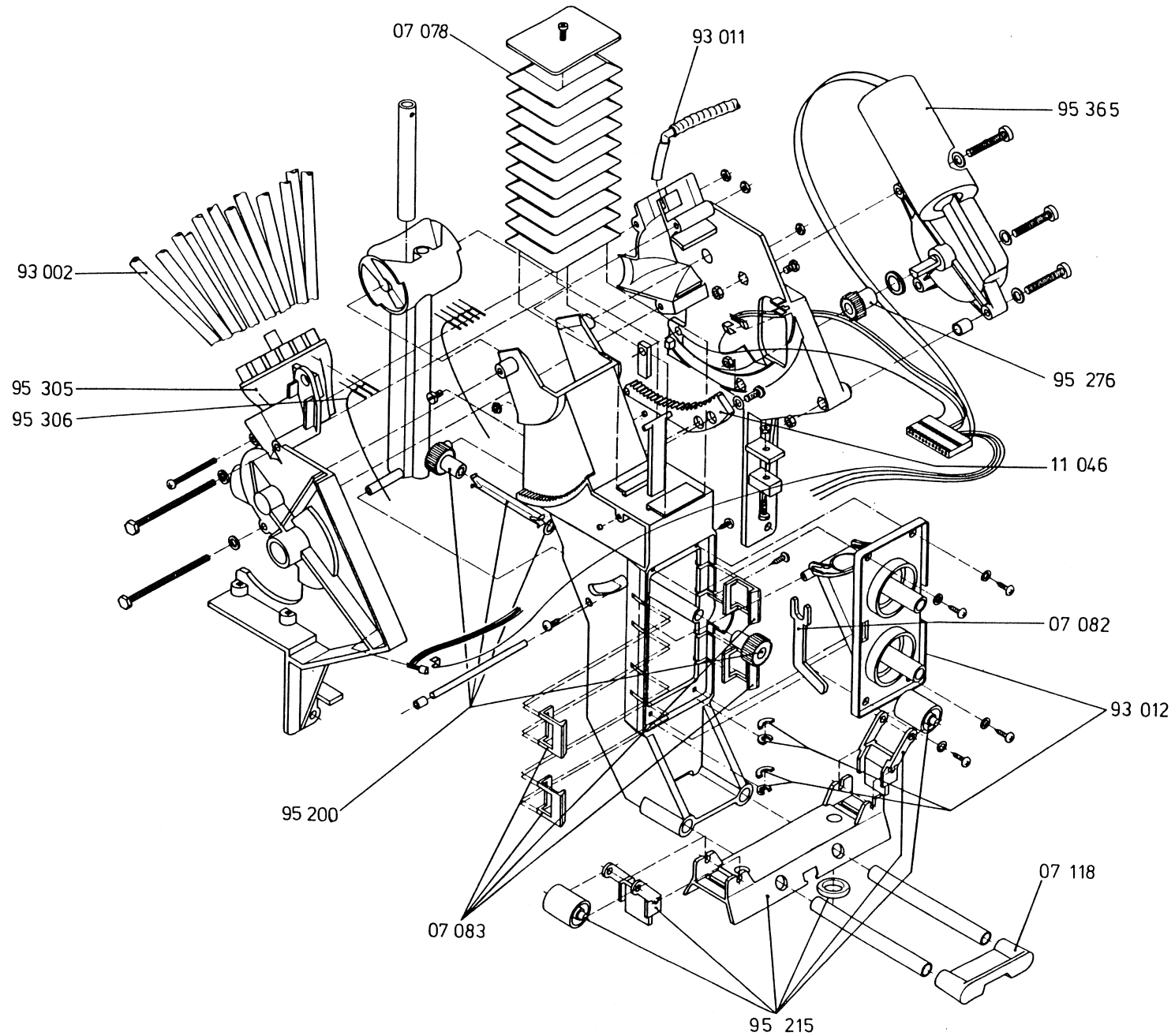
Stand März 92





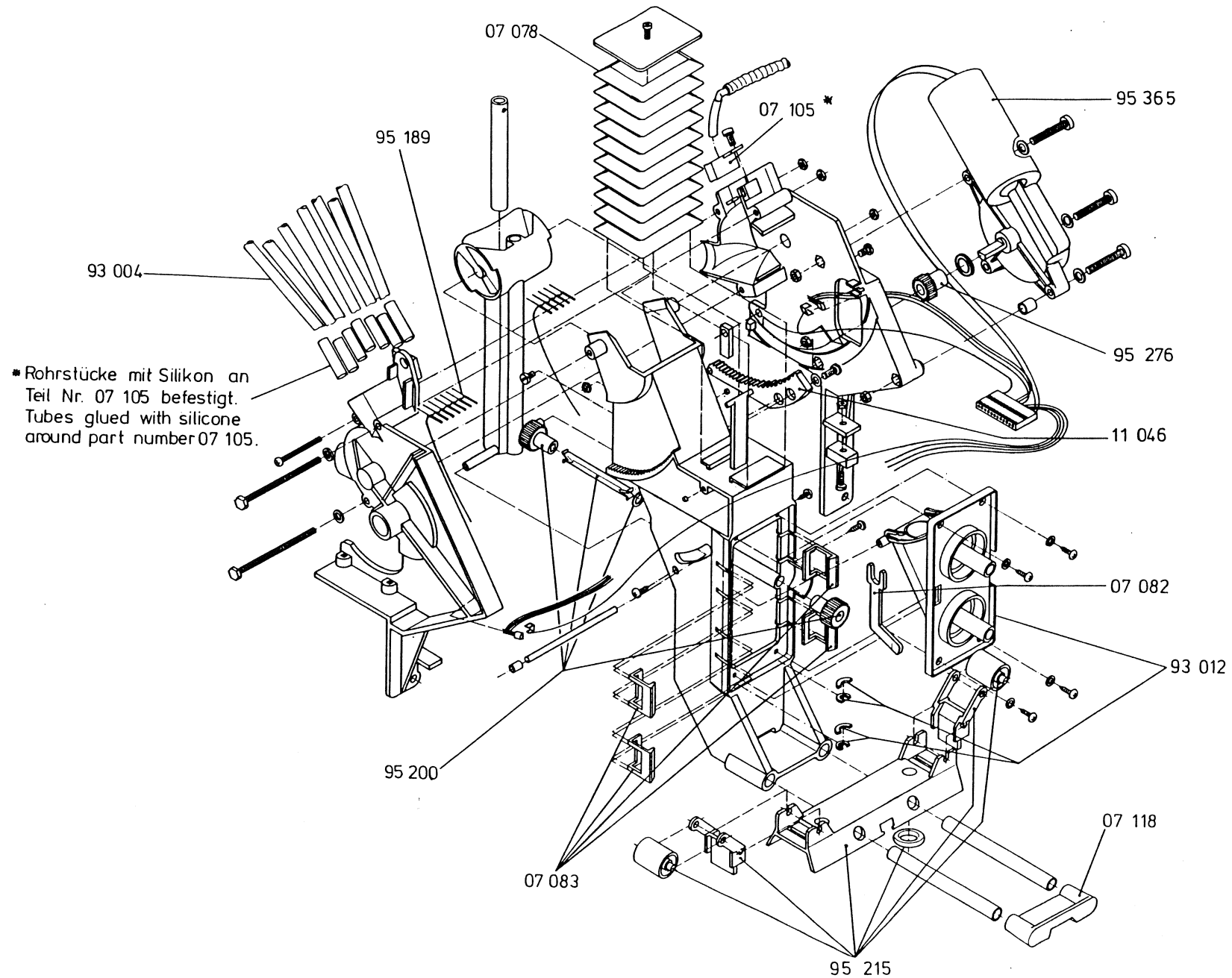
Hebeam mit Getriebemotor ATL 3 (95 307)

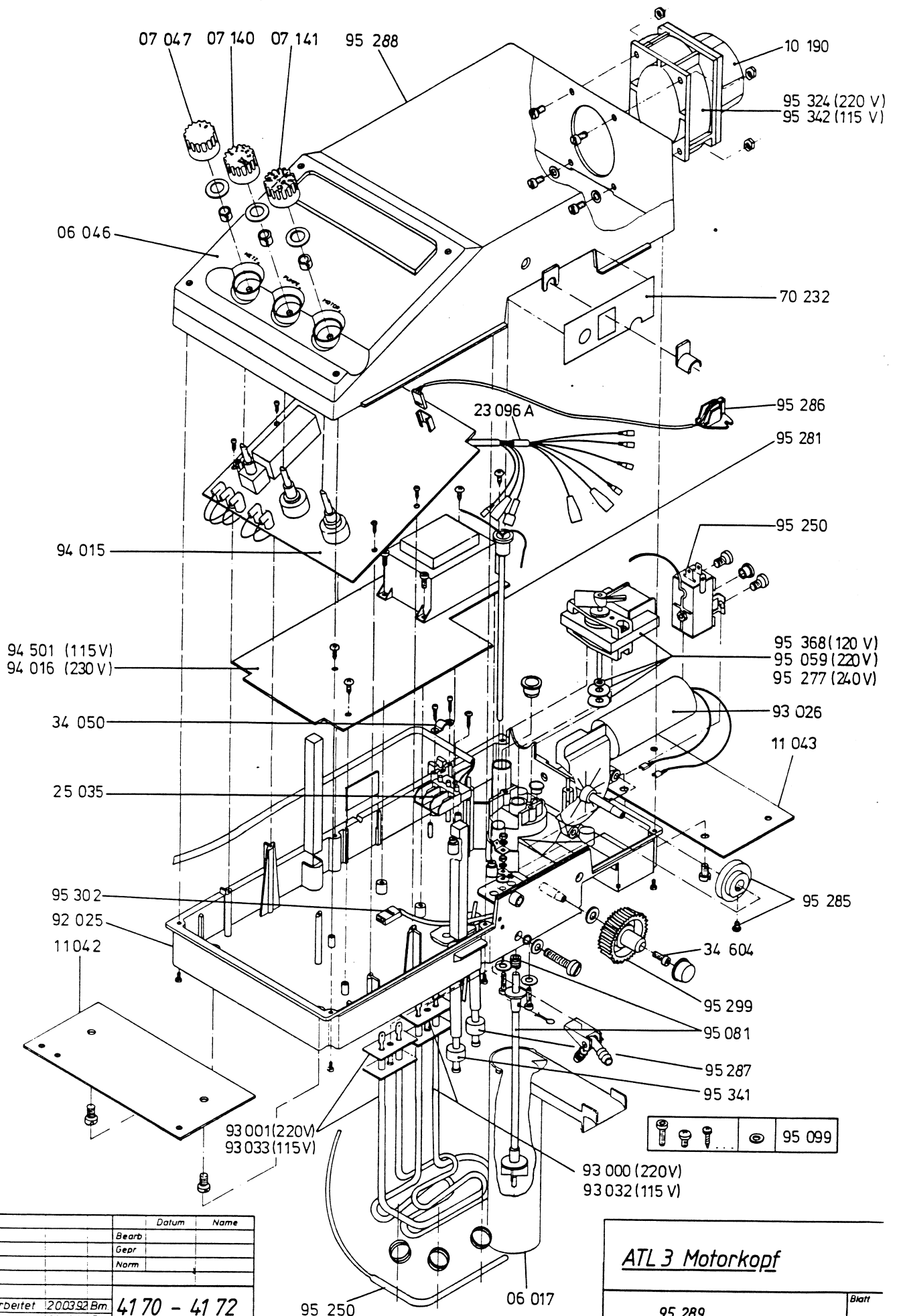
Stand: März '92



Hebearm mit Getriebemotor ATL2 plus (95 311)

Stand: März'92





		Datum	Name
	Bearb.		
	Gepr.		
	Norm		
2	überarbeitet	12.03.93 Bm	4170 - 4172
	Aktualisiert	10.10.91 Fr	
	Änderung	Datum Name	

ATL 3 Motorkopf

95 289

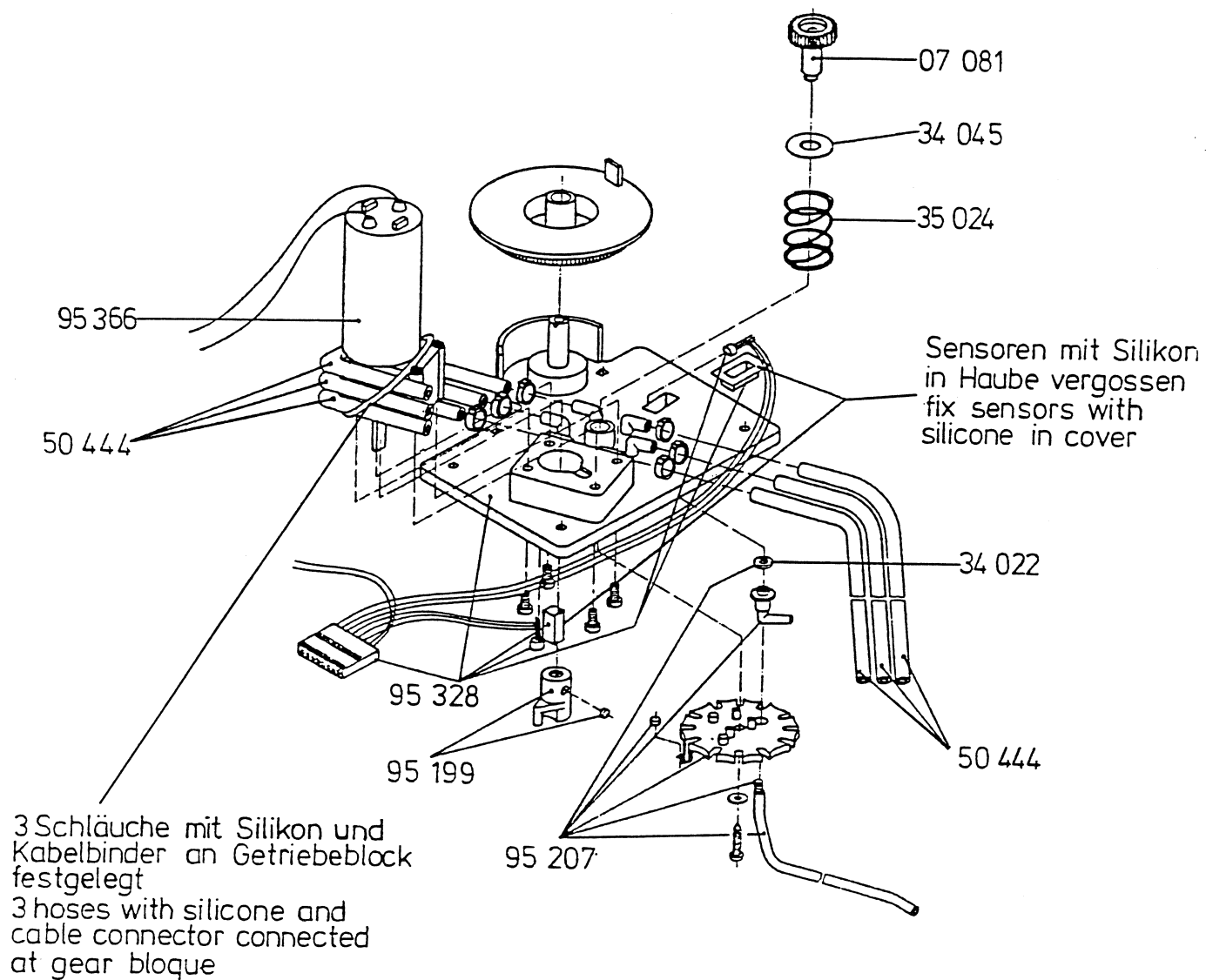
Blatt
B

Luftverteiler

ATL 3 (95 284)

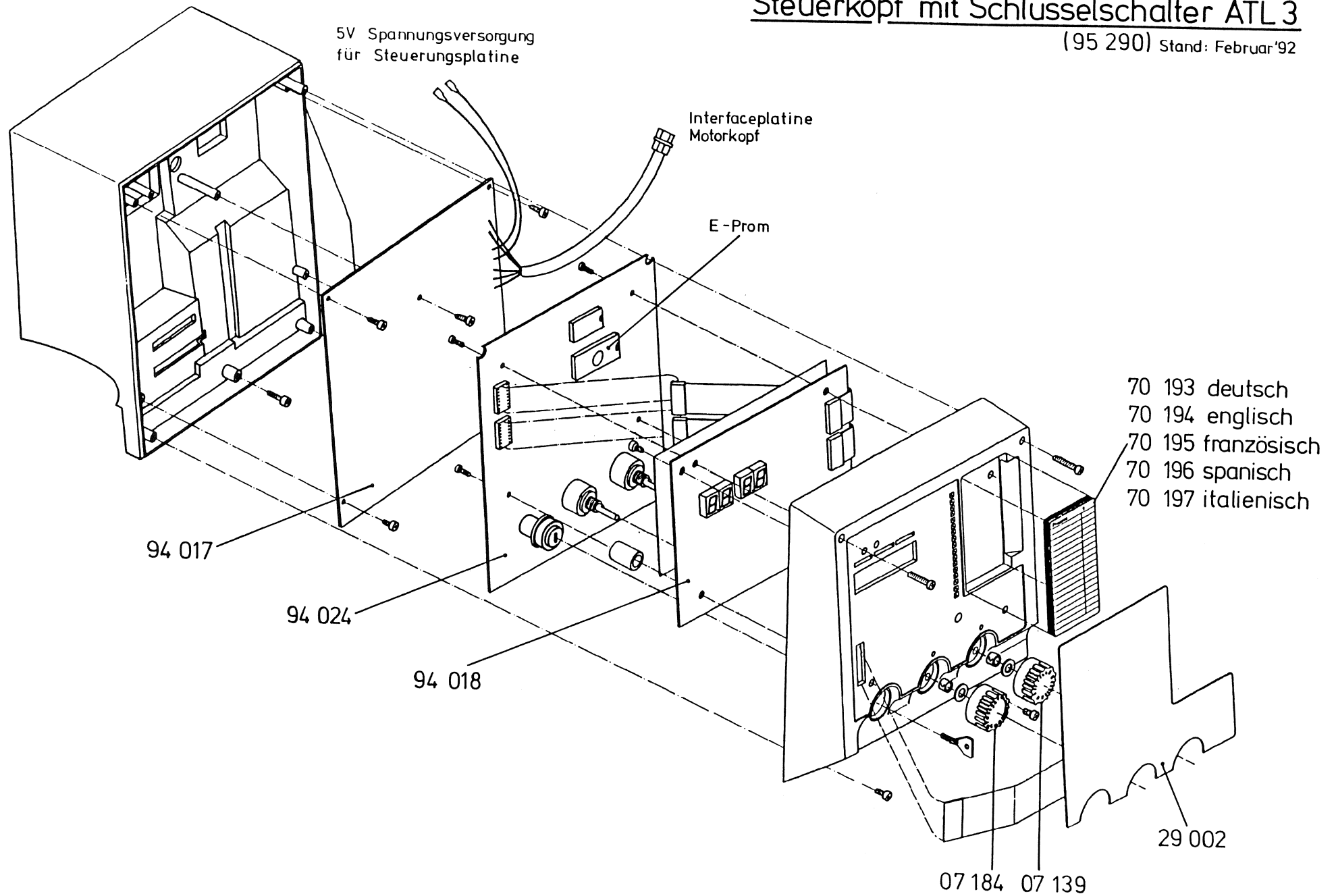
ATL 2 plus (95 461)

Stand: März '92



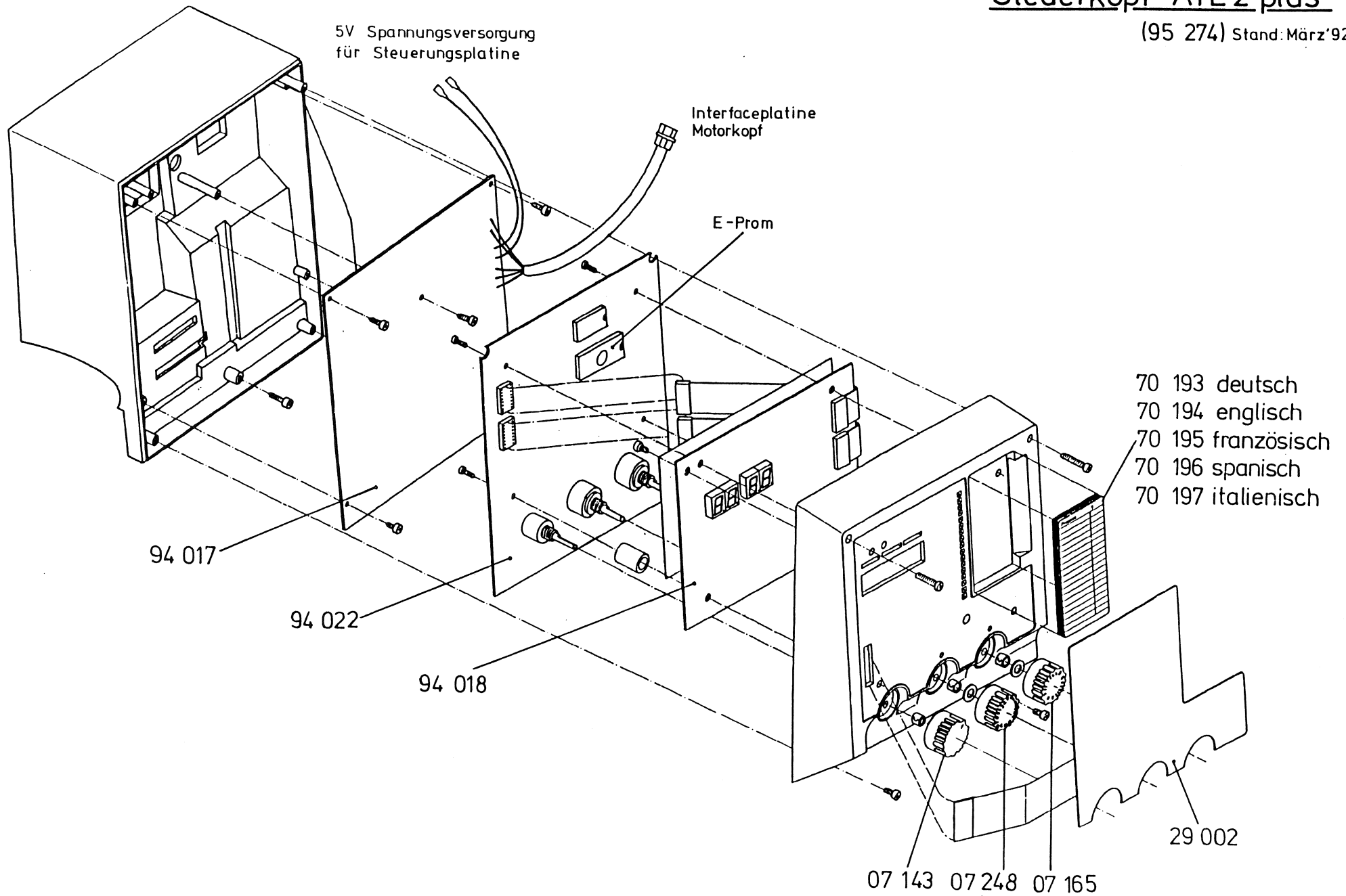
Steuerkopf mit Schlüsselschalter ATL 3

(95 290) Stand: Februar'92



Steuerkopf ATL 2 plus

(95 274) Stand: März'92



1.0 M O D I F I C A T I O N S

1.1 NOTES ON MODIFICATION REPORTS

The service folder is supplemented at intervals by modification reports, so that it is possible to use the service folder Autolab ATL 2/ATL 3, irrespective of the state of production, and to supplement this with modifications if necessary.

The modification report is made up as follows:

- a. Running no.: This number is important to ensure that the particular modification can be found quickly and reliably. This is related to column b.:
- b. * Marking : In this column we specify under which sections in the service folder the modifications are to be marked by the service technician. This marking must be made in the appropriately indicated part of the folder, together with entry of the running number. Thus when working with the folder it is always possible to recognise where a modification has been carried out. Using the running number the type of modification can then be looked up in the modification report.
- c. Reason for : In this column the reason for carrying modification out the modification is given.
- d. Type of : In this column the type of modification is described, which components are affected etc.
- e. Modification introduced: The modifications are entered as from in order of the manufactured Serial no. (ATL 2/ATL 3) equipment (serial no.). If the modification only applies to one type of equipment (ATL 2 or ATL 3), the serial numbers are only entered in that particular column. Thus if a repair has been carried out, the technical state of the equipment can be ascertained from the serial number. Modifications which may be made in the future can be seen from the following serial numbers for that particular equipment.

1.1

Example:

<i>Modification report</i>					
		Article 4 1 6 0		AUTOLAB ATL 2	
		4 1 7 0 / 7 1 / 7 2		AUTOLAB ATL 3	
Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
19	5.6.4.3 5.6.4.5	Assembly of geared motor lifting arm is facilitated considerably	The M5 screws previously used are replaced by socket head cap screws with nuts. Assembly and dismantling are possible with commercially available angle-shaped spanners for socket head cap screws. The work is facilitated considerably using a ball end screwdriver (parts list no. 16158) and a spanner for socket head cap screws (parts list no. 16159): - Eliminated parts: 3 34066 3 34143 - New parts: 3 34406 hexagonal nut M5 3 34459 washer 5,3 3 34602 socket head cap screw M5 x 25	STA 10156 GB 10025 US 10204	10291
				15.10.87	15.10.87

- Marking under indicated sections:

5.6.4.3 Dismantling of geared motor
5.6.4.5 Exploded drawing of lifting arm

- Modification introduced from serial no. 10156 (ATL 2) and 10291 (ATL 3). This modification does not exist before this serial no.

In order to ensure easy handling of the service folder, it is essential that items a. to e. are observed and these procedures carried out.

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
1	5.7.4	Moisture and corrosion protection of motor head	Means of sealing motor head: - Sealing of crack between top and bottom part on drive side with silicone - Felt washer brushed with Vaseline and fitted on motor shaft	STA 10001 GB 10001 US 10007	10001
2	5.7.2.4 5.7.4	Moisture and corrosion protection of pump motor shaft	Pump hole is closed: - Thick felt washer eliminated and replaced by thinner felt washer and cover with small drill hole - Eliminated parts: 1 34005 - New parts: 1 12167 cover 16 x 16 x 1 1 34029 felt washer 18 x 4,0 x 1,0	23.03.87 STA 10016 GB 10001 US 10027	02.04.87 10059
3	5.7.4	Moisture and corrosion protection of motor head	Means of sealing motor head: - Fixing screw head of geared motor coated with protective layer of silicone after tightening	16.04.87 STA 10014 GB 10001 US 10025	30.03.87 10065
4	5.6.2.2 5.6.2.3	Distance of magnet on switch wheel too great through shrink-fit hose	Distance magnet/sensor is reduced: - Shrink-fit hose piece eliminated. Magnet is now inserted with IS-adhesive - Eliminated parts: 50407 shrink-fit hose dia 5 mm	15.04.87 STA 10075 GB 10010 US 10080	09.04.87 10144
				22.06.87	06.05.87

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

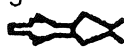
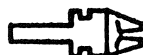
Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
5	5.6.4.5	Elimination of distortion or destruction of swing-pipe adjusting pins	Swing-pipe adjusting pins reinforced: - A pin is inserted right through both operating pins - New parts: 1 12170 pin 3,5 x 76 2 34011 distance rollers 6 x 3,4 x 8	STA 10066 GB 10010 US 10071	10150
6		Reliable positioning of air distributor ensured, thus giving reliable sealing of first bottle	Change of programme - applicable EPROM-version 3723 (ATL 3): - During reverse travel from rest position, the stepping motor is not switched off immediately when the 0-sensor is reached, but after 0,1 second delay	04.06.87	04.06.87 10200 subse- quently fitted: * 10131 * 10156 - 10160 * 10172 - 10177 * 10181 * 10186 - 10188 * 10195 - 10196 24.07.87
7		Moisture and corrosion protection of sensor plugs on control unit	Means of sealing against water splashes on sensor plugs on control unit: - PVC foil stuck over sensor plugs - New parts: 1 12175 PVC foil 40 x 70 x 0,2	STA 10114 GB 10015 US 10110 21.07.87	10203 15.07.87

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
8	3.6	Sporadic fault alarm not possible to obtain previously	Change of programme - applicable EPROM-versions 2729 (ATL 2) / 3729 (ATL 3): - In service position (DIP-switch 3) using switch combination TSR-NE all faults which have occurred since the last PGM start can be indicated (in coded digit form)	STA 10112 GB 10015 US 10110	10208
9	5.6.6	Moisture and corrosion protection of diode P.C. Board	Higher positioning of diode P.C. Board: - Mounting on distance bolt - New parts: 1 34077 nut M 6 MS 1 34126 cylindrical screw M6 x 40	21.07.87	22.07.87
10	5.6.6	Moisture and corrosion protection of control unit	Means of sealing against water splashes on control unit: - Sealing strips stuck over parting lin - New parts: 1 70238 sealing strip for control unit	STA 10115 GB 10015 US 10110	22.07.87
11		Inlet nozzle over canister not correct	Inlet nozzle improved; now fitted as closed deflector part on outlet hose. Outlet hose base plate refinished. - Eliminated parts: 6 95337 - New parts: 6 95363 outlet hose nozzles 'B'	29.06.87	10209 02.09.87

	4. 1 6 0	AUTOLAB ATL 2
Article	4. 1 7 0 / 7 1 / 7 2	AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
12		Bottles could not be removed easily before	Hose guide replaced by bottle rotators and new hose holding device: - Eliminated parts: 1 10048 1 34095 1 50447 - New parts: 5 07151 bottle rotators 1 10073 hose holding device 10 34033 washers 4,3 MS 5 34112 self-tapping screws BZ 4,2 x 13 2 34313 Slotted pan-head screws M4 x 12 2 34400 Nuts M 4	STA 10121 GB 10134 US 10117 12.08.87	
13	5.6.2.3 5.6.4.5 5.6.6	Greater reliability of contact of groups of leads	Stock plugs replaced by Lumberg plugs - Eliminated parts: 25076 stop plug  - New parts: 25132 Crimp connection spring 	STA 10152 GB 10021 US 10201 15.10.87	10275 05.10.87
14	3.9.2	Pumping output of diaphragm pump cannot be adjusted finely enough	Assembly of diode P.C. Board altered: - 1st diode replaced by a resistor, 2nd flat-pin plug replaced by a soldered pin AMP 6,3 - Eliminated parts: 1 25016 1 42002 - New parts: 1 25005 soldered pin AMP 6,3 1 40002 resistor 1,5 ohm 174 W	STA 10151 GB 10015 US 10189 09.10.87	10275 09.10.87

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
15	4.8.3 4.8.4 4.8.6	Adjustability of zero setting for both temperature sensors improved	Adjustability of cramped zero setting range guaranteed by new resistors and trimmers: - Modified components: R 14, R 19: old 2 k ohm 1 % new 715 ohm 1 % (no. 40312) R 13, R 18: old 5,1 k ohm 1 % new 1,74 ohm 1 % (no. 40327) P 2, P 4: old 1 k ohm 25 G new 100 ohm 25 G (no. 40427)	STA 10152 GB 10025 US 10193	10275
16		Prevention of chemical residues in hoses	The opening for passage of chemical hoses on hood, upper tank and bottle cover are enlarged as wide as possible. The standpipes and chemical hoses have been improved. In addition the hoses are held together with clips. - New parts: 1 12185 hose clip 3 1 12186 hose clip 5	15.10.87	09.10.87 10279 12.10.87

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
17	5.6.4.4	Pinion shaft is subjected to considerable wear. Fitting this component by the customer himself prevents a long break-down time	Complete pinion shaft with assembly instructions is included with each machine: - New part: 1 95200 pinion shaft ATL 2/3	STA 10156 GB 10025 US 10207	10288 subse- quently fitted: * 10204 * 10206 * 10219 * 10228 * 10232 * 10243 * 10250 * 10252 - 10253 * 10255 - 10258 * 10263 * 10266 - 10271 * 10273 * 10275 - 10280 * 10286 29.10.87 13.11.87

A P P E N D I X to Modification report no. 18

ATL 2

6.3 Couple the cog of the tank/drum with the drive cog on the lift. Verify that the rollers are set properly. Check the water bath level to ensure coverage without floating the tank. See section 4.3 for details.

Push reset.

The display indicates the remaining contents of the bottles.

Press "Start" button (19).

The tank-quantity you have selected is now shown.

Press "Start" button (19) once again.

(Should the tank quantity be greater than the contents of the bottle, the remaining contents will again be indicated.)

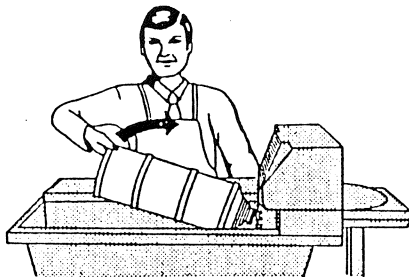
The programme you have selected is now displayed.

Press "Start" button (19) once again.

The process temperature is displayed. If the water bath and chemistry are at the programmed temperature, the process will start with a beep.

When either the temperatures of the water bath or chemistry are not the same as the programmed temperature, the red LED (16) will illuminate and the process is delayed until both temperatures are correct. As soon as the temperatures are both equal, the process will start. To override this failsafe feature see section 7.7.

Note: Once the process has started, turning the program selector switch (21) will not change to another program.



Once the "Start" button has been pressed, the Autolab will run the process automatically. During the process an LED will illuminate next to the current step. The remaining time of each step counts down on the digital display. At the end of the process, a beep will continue to sound until the reset button (12) is pressed, and then the remaining chemistry amount is displayed.

When the process is finished, remove the tank/drum from the processor. To do this, grasp the tank at its bottom and tilt it upwards and towards you. It is normal for the tank to make a snapping sound when the cog disengages from the lift. The processed print(s) or film(s) may now be removed from the tank/drum.

Note: When a wetting agent or stabilizer is used at the end of a process, JOBO recommends removing the film from the reel, or print from the drum, before placing it in the bath. This optional step should be done outside of the processor. If either agent is used in a tank/drum on the processor, the solution will foam vigorously and reduce its effectiveness. Both chemicals are very tenacious, and will be difficult to wash off from the tanks or reels. If they are not thoroughly cleaned, the chances of "carry over" to the next process are great. Even a small buildup of these agents will hinder the loading of film reels.

Note: When the processor is not in use, both the warm water and cold water supplies should be shut off to relieve pressure in the system.

AB

ATL 3

6.4 STARTING THE PROCESS

Push reset.

The display indicates the remaining contents of the bottles press start-button (19).

The tank-quantity you have selected is now shown.

Press start-button (19) once again.

(Should the tank quantity be greater than the contents of the bottle, the remaining contents will again be indicated.)

The programme you have selected is now displayed.

Press start-button (19) once again.

The process temperature is displayed

At this time the processor will beep and then begin the process, provided the temp of the water jacket and the chemistry bottles corresponds with the temp selected for that process.

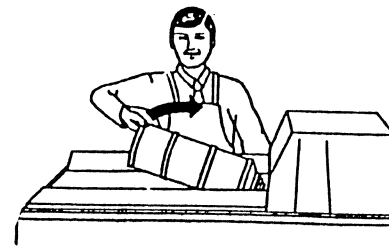
If the temp of the water jacket is not yet up to (or down to) the correct level, an orange LED (16) will light up and stay lit until the temp is right. When the temp is right the process will begin automatically. (To override this feature see 8.7) . All processes run automatically until the end, then the machine beeps to signal the process has finished.

NOTE: Once started you cannot change the SELECTOR SWITCH (21) and the filling amount except as outlined in section 8.4.

Once started the display will show the step and display the time remaining for each step in the process. At the end of a process run push "reset" (13). To remove the tank/drum from the arm pull it up and towards you simultaneously. Do not bend back the white clips with your fingers. Remove the film from the tank and the reel and, if desired, put film in wetting agent.

NOTE: Do not put reels directly into wetting agent.

The ATL is now ready for another process run. The remaining available stock solution is displayed.



Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
18	3.2.3 3.8.2.1 10.6.3 11.6.4 Appendix (Extract from new operating instructions)	Faulty filling level and A-switches cannot be tested under production conditions	Alteration to programme, applicable EPROM-versions 2744 (ATL 2) / 3744 (ATL 3): - Before programme start (after RESET) the DIP-switch 3 is set to position 'on' (top), and the SET/RUN switch to position 'RUN'. The adjusted filling level is indicated. For change in operational procedure see appendix.	STA 10156 GB 10025 US 10207	10288 Subse- quently fitted: * 10204 * 10206 * 10219 * 10228 * 10232 * 10243 * 10250 * 10252 - 10253 * 10257 - 10258 * 10263 * 10266 - 10271 * 10273 * 10275 - 10280 * 10286
				29.10.87	13.11.87

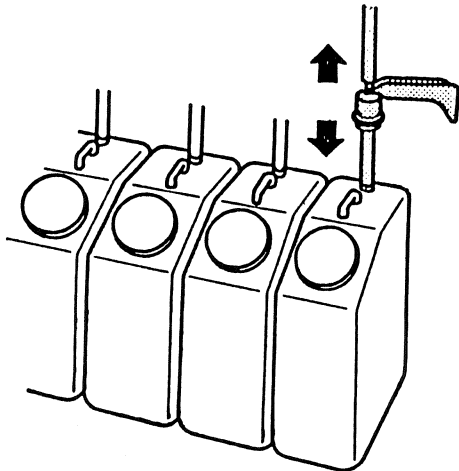
Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
19	5.6.4.3 5.6.4.5	Assembly of geared motor lifting arm is facilitated considerably	The MS screws previously used are replaced by socket head cap screws with nuts. Assembly and dismantling are possible with commercially available angle-shaped spanners for socket head cap screws. The work is facilitated considerably using a ball end screwdriver (parts list no. 16158) and a spanner for socket head cap screws (parts list no. 16159): - Eliminated parts: 3 34066 3 34143 - New parts: 3 34406 hexagonal nut M5 3 34459 washer 5,3 3 34602 socket head cap screw M5 x 25	STA 10156 GB 10025 US 10204	10291
20	5.6.2.2 5.6.2.3	Switch wheel bends under the load of the spring	The previous washer (dia. 7) is replaced by a larger washer (dia. 12). At the same time a countersunk head screw is used instead of the round head screw, so that the elbow cannot become jammed on this: - Eliminated parts: 1 34049 1 34102 - New parts: 1 34308 self-tapping screw B 2,9 x 19 V2A 1 34452 washer 4,3 V2A	15.10.87 STA 10190 GB 10030 US 10213 16.11.87	15.10.87 10299 03.11.87

[illegible]

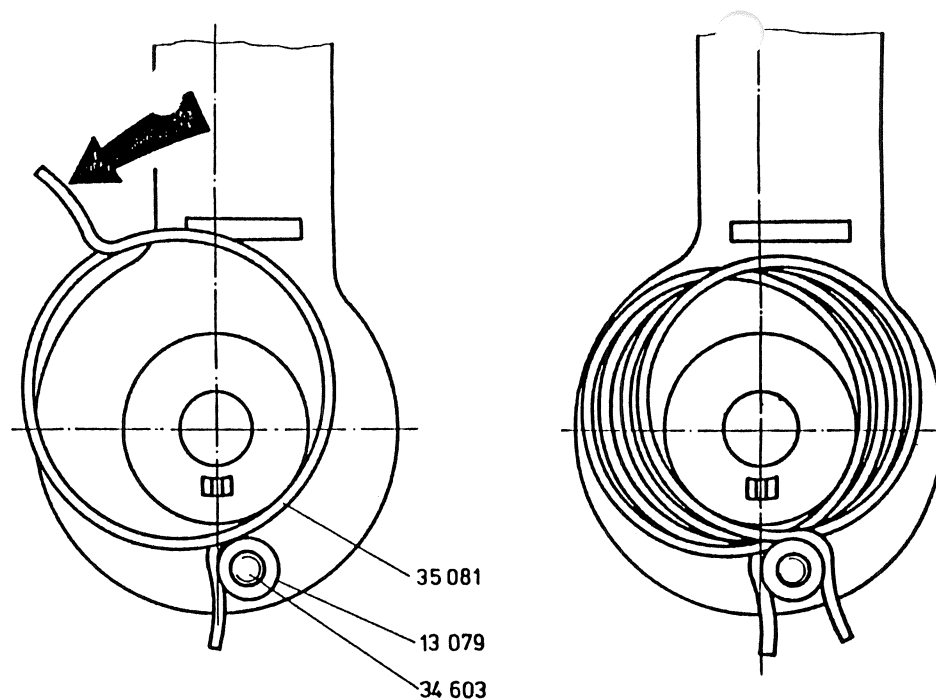
	4	1	6	0						AUTOLAB	ATL	2	
Article	4	1	7	0	/	7	1	/	7	2	AUTOLAB	ATL	3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
21	6.2	Risk of pollution through running out chemicals when changing filters	<p>The chemical filter is no longer mounted in front of the pump but directly on suction tube. The bending of suction tube will be corrected. PVC-hosepiece will be mounted to suction side of filter. Hoses, which branch off from pump to bottle will be marked additionally with 'C'.</p> <p>- New parts: 6 15092 hose distinguishing mark 'C'</p> 		10343
					15.12.87

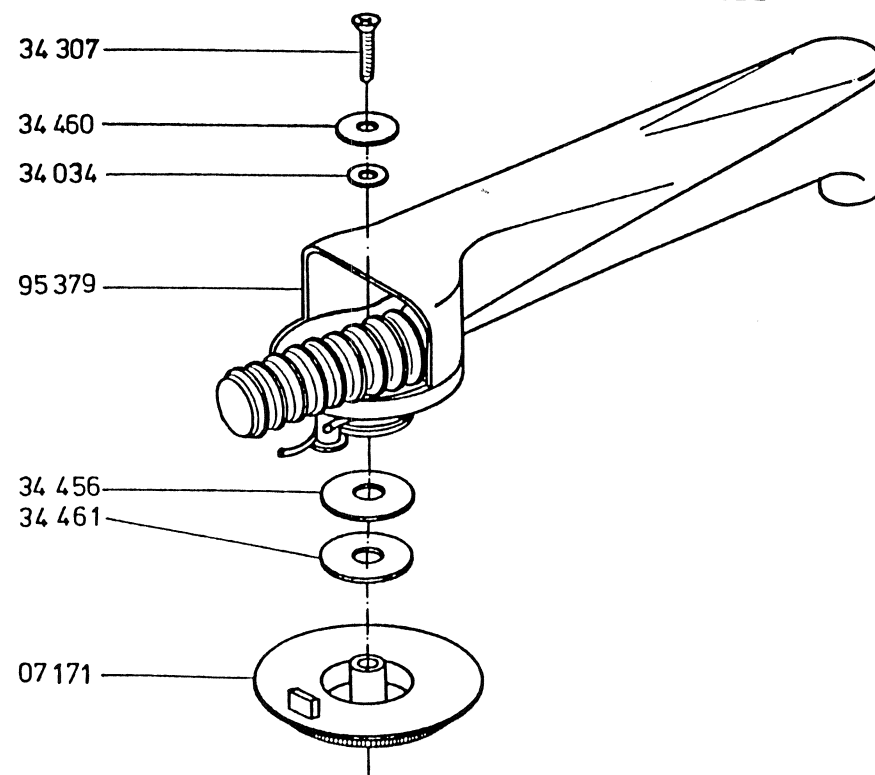
A P P E N D I X for modification report No. 22

Assembling of chemistry distributor with double spring

- a. Boring \varnothing 11,8 in chemistry distributor arm and grease cog (13079).
- b. Put in double spring (35081) according to draft.
- c. Put hard paper washer (34456) (1 mm thick) and 34461 (1,5 mm thick)) in the cog washer (07171).
- d. The chemistry distributor arm should be placed that way, that the ends of the double spring clasps the cog of the cog washer.
- e. Place cog washer with chemistry distributor arm in the right position and bolt according to draft, grease the lower part of the washer (34460).
- f. Check if chemistry distributor can be operated easy concerning direction of rotation, as well as, if it sits well concerning wobble and tilt.



Exploded Drawing, Chemistry distributor



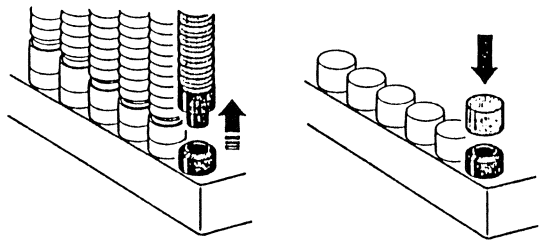
Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

[illegible]

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
23		If hose coupling is not set in, solution could get into the collecting cans	<p>Closing caps for pipe are fitted over ends of unused collecting hoses.</p> <p>- new parts: 6 15152 closing cap for pipe</p> 		10373 11.02.88

Modification report

	4 1 6 0	AUTOLAB ATL 2
Article	4 1 7 0 / 7 1 / 7 2	AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
24		Soiling in jacket bath could lack the pump	<p>A filter plate made out of high-grade steel is fixed into the upper tub immediately in front of the level controller in a guide groove of the upper tub:</p> <ul style="list-style-type: none"> - modified part: 10064 upper tub - new part: 11045 filter plate 		<p>10385</p> <p>19.02.88</p>

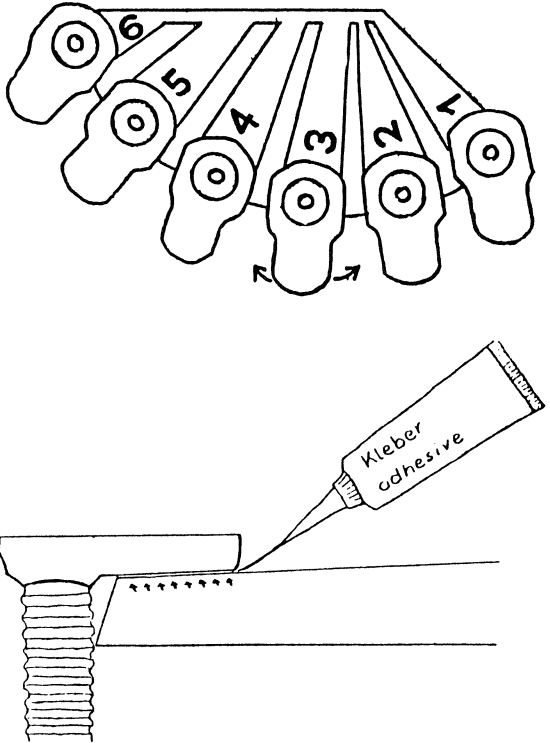
Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no	
				ATL 2	ATL 3
25	5.6.4.5	Failures of units caused by broken plastic teeth at the lifting arm	Up to now only the teeth, which were extremely loaded, were made out of brass. In future the whole toothed segment will be made out of brass. - modified part: 07079 lifting arm - part discontinued: 1x 11040 - new parts: 1x 11046 toothed segment Ms (22 teeth) 1x 34116 cyl. screw M3 x 6 Ms	STA 10280 GB 10073 US 10278	10398
26	5.6.4.5	Preventing gear shaft in lifting arm from quick wear	An opening in the side of the lifting arm is intended for greasing the gear shaft. It is bored in and closed with a stopper. - modified part: 07079 lifting arm - new part: 1x 15153 parallel stopper Ø 5	24.03.88 STA 10280 GB 10073 US 10278	03.03.88 10398
27	6.2	Preventing connection hose from breaking between suction pipe and filter	A thick silicon tube is fitted between suction pipe and filter. - new part: 50494 silicon tube 4 x 2 mm	24.03.88	03.03.88 10401
28	5.6.2.3	Air tubes can be removed too easy from air distributor and are partly not air-tight	Hose clamp are fitted at all 6 tubes. - new part: 6x 35062 hose clamp 7,5	STA 10287 GB 10081 US 10292 31.03.88	07.03.88 10419 30.03.88

Modification report

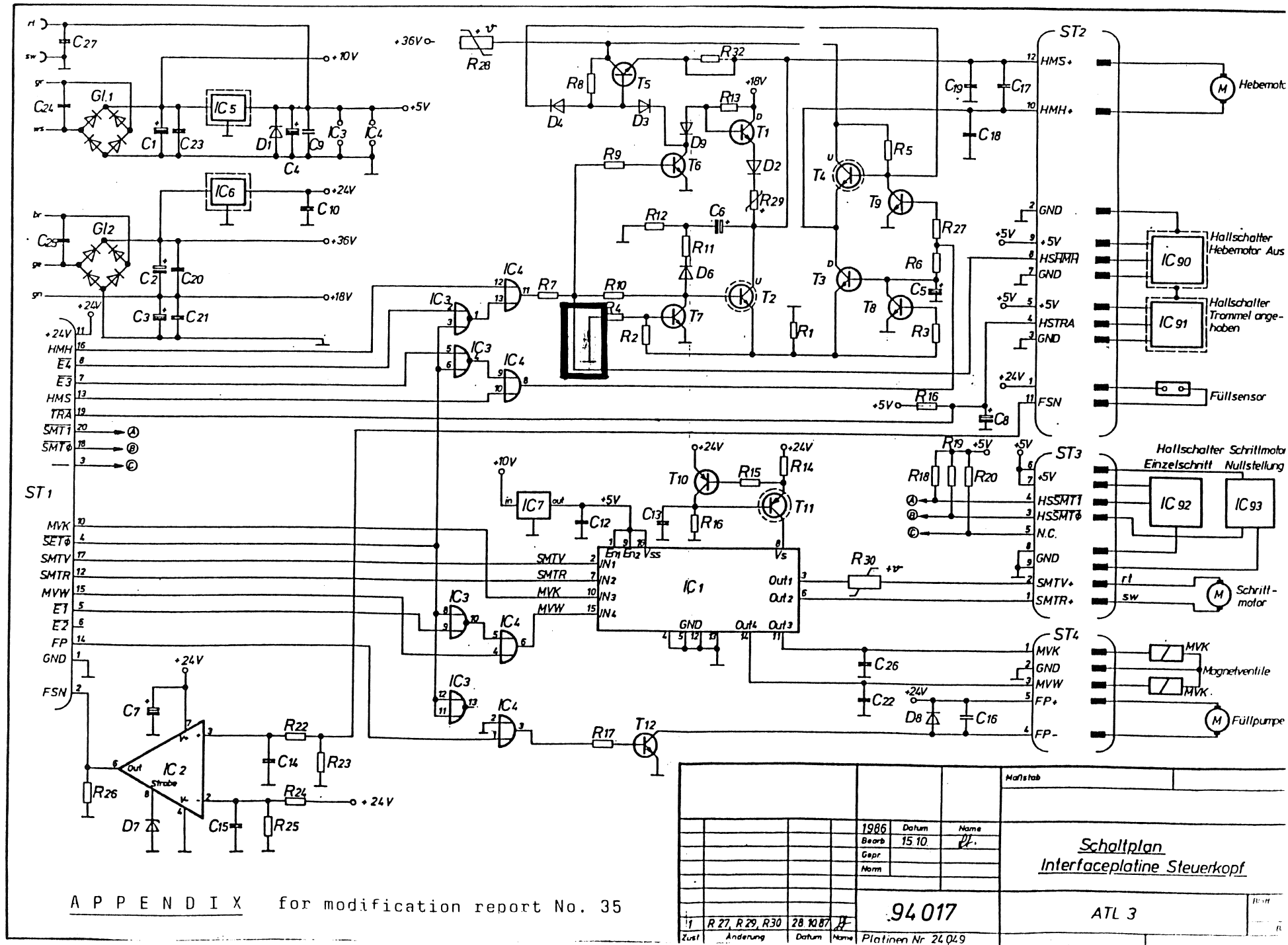
Article 4 1 6 0 AUTOLAB ATL 2
 4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
31		Present solution showed sometimes inaccurate positioning, later and individual correction was nearly impossible	<p>At the new hose retaining plate the hoses can be adjusted individually and than be glued.</p> <p>- Modified component: 95323 position cup with hoses</p> 		10521 13.06.88

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

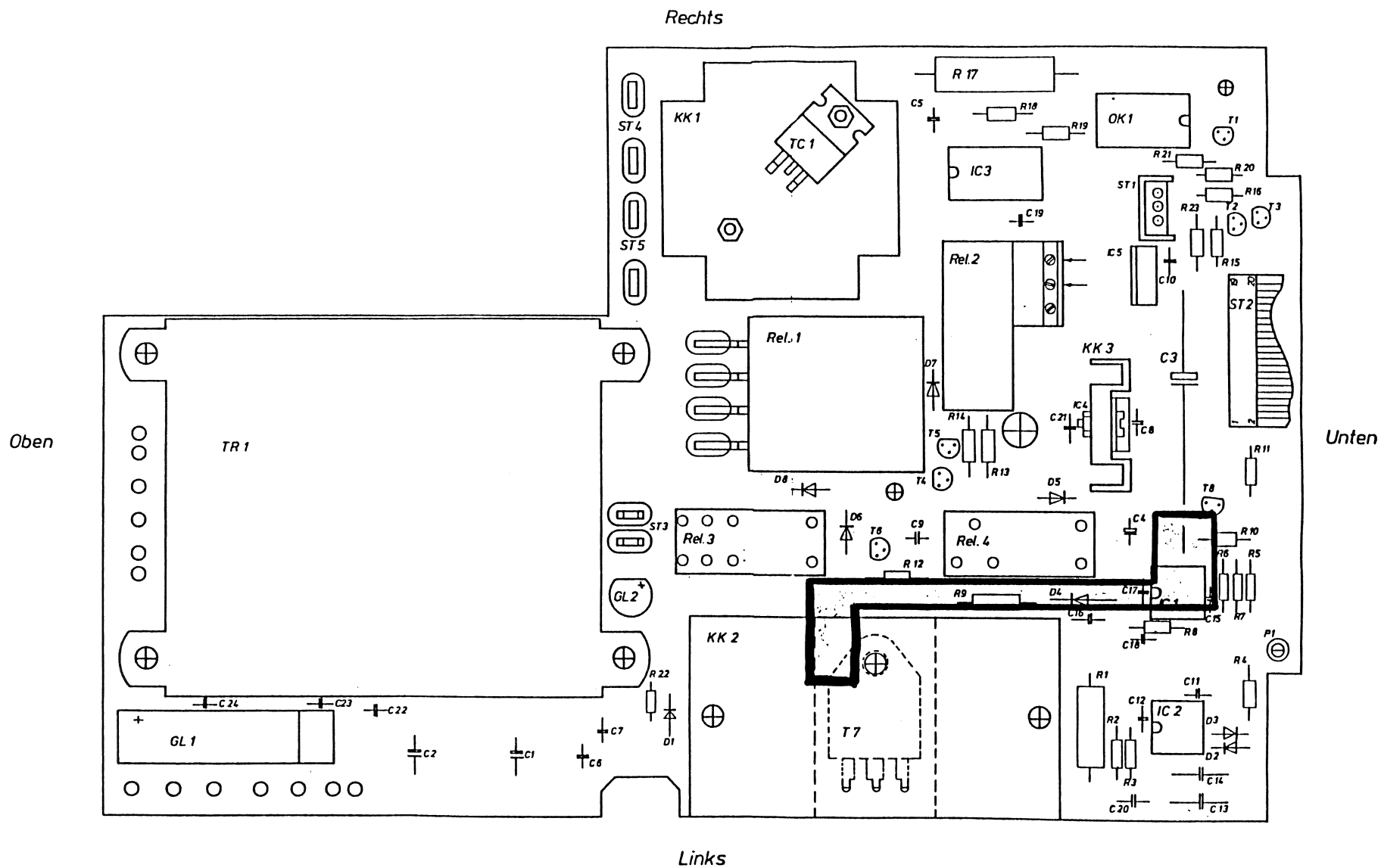
Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
32	5.7.2.4	The pump motor loosens after a short time. This is due to the plastic underneath the washer of the fastening screw	A bigger washer is fixed between the screw head and the motor head housing bottom part. - discontinued parts: 2x 34457 washer 4,3 V2A DIN 125 - new parts: 2x 34452 washer 4,3 V2A DIN 9021	STA 10362 GB 10094 US 10323 15.06.88	10528 16.06.88
33	5.6.2.3	Protection against breaking of air tubes	A spring, which protects the air tubes to break, is fixed at every air tube; an additional protecting spring for tube 1 and 3 in the area of the bearing block. - new parts: 8x 35071 protecting spring	STA 10372 GB 10094 US 10323 23.06.88	
34		After a short operating period the connection cable of the sensor needles becomes fragile. The consequence for this: Machine stops working at the beginning of a rinsing or chemistry stop (at a filling quantity of more than 170 ml). The same appears, as if no chemicals or water could be refilled. When switching over the DIL switch 3 at the interface P.C.Board motor control and starting programme again, the machine continues operating.	The needles are no longer soldered, but clamped. - modified component: 95189 sequence sensors green ATL 2 95190 sequence sensors white ATL 2/3 95306 sequence sensors green ATL 3	STA 10391 GB 10094 US 10334 05.07.88	10582 13.07.88



Modification report

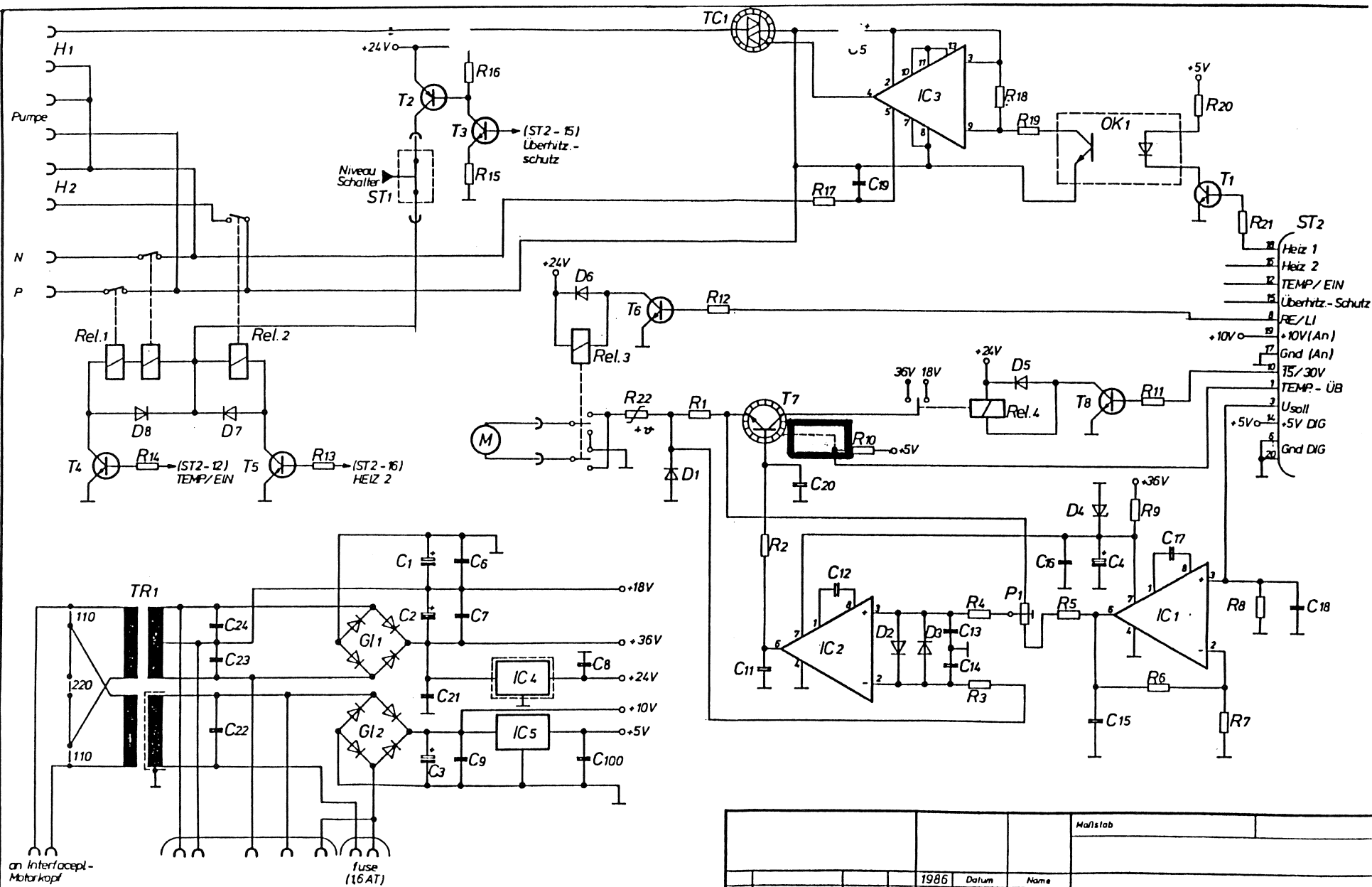
	4	1	6	0					AUTOLAB	ATL	2
Article	4	1	7	0	/	7	1	/	7	2	AUTOLAB ATL 3

[illegible]



A P P E N D I X for modification report No. 36

				Mar 1966
	1986	Design	Drawn	Trafoplatine ATL 213
	26.6.	Yoder		
94 016				



A P P E N D I X for modification report No. 36

						Maßstab			
				1986	Datum	Name			
				Bearb.	20.10.	H			
				Gepr.					
				Norm					
						<u>Schaltplan Trafoplatine ATL 2/3</u>			
				94 016					
Zust.	Änderung	Datum	Ursache			Beif.			

Modification report

Article

[illegible]

Modification report

Article

4 1 6 0

AUTOLAB ATL 2

4 1 7 0 / 7 1 / 7 2

AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no	
				ATL 2	ATL 3
37	5.6.2.3	Hose at air distributor elbow is too rigid, caused leakages	Change of material. The new hose is softer, but kinking-resistant. Spiral coil inserted as an additional protection against kinking. - Omitted part: 0,29 m 50424 Soft-PVC-hose 3x1 - new parts: 1 piece 35085 spring for air hose 0,29 m 50496 Silicone hose 4x1	STA 10452 GB 10099 US 10352 23.08.88	10625 23.08.88
38	5.6.4.5	Flushed-out residual chemicals come into contact with the air distributor	Instead of the short piece of hose used so far, a hose is connected to a kinking-resistant spiral hose by means of an elbow. The spiral hose is conducted through a boring in the mounting plate and ends above the water jacket bath. The endpiece is fastened with a cable binder.	STA 10463 GB 10099 US 10371 13.09.88	10636 13.09.88
39		High degree of production requirements in mounting the transformer on the transformer plate, as well as problems with dismantling for servicing	Adhesive connection replaced by screw connection. The new transformer is supplied with integral cast threaded sleeves. - Omitted parts: 48039 Transformer 110/220 V 48040 Transformer 120/240 V - New parts: 48041 Transformer 110/220 V 48042 Transformer 120/240 V	STA 10539 GB 10099 US 10413 02.11.88	10690 28.10.88

E-PROM MODIFICATION 2848/3848

1===== OPERATION

1.1----- SETFULL-switch

The SETFULL-switch enables one to set the residual amount at maximum value in the 'RUN' mode (formerly rocking switch). On pushing this switch to the home position (between 'RESET' and 'START') the maximum cylinder filling capacity is indicated by flashing for two seconds and adopted as current residual amount after a buzzer signal. If the switch is released before the sounding of the buzzer signal, the change will not take place !

The SETFULL-switch may also be used in the SET mode; the response will then take place without any time delay ! (This function is not mentioned in the manual !)

1.2----- Cleaning Programs (ATL 3 only)

The cleaning programs can be selected by adjusting the program selector switch to the positions 11 to 16 and are marked on the knob by corresponding symbols. They run just like normal programs, with the chemical steps programmed only for the programs to be cleaned and for the final irrigation.

The following functions are different from the 'normal' process:

1. No digits will appear on the indicator; only the flashing symbols --- are indicated.
(In the 'SET' mode continuous indication of ---)
2. The programmed times cannot be changed by the user.
3. The positions of the FILLING CAPACITY and A-switches are disregarded; fixed times are used for filling and emptying.
4. Process is started immediately after pushing the start switch !
(Operator does not have to acknowledge whether process number and filling capacity are ok; no checking whether jacket bath level, water and temperature of chemicals are ok !)
5. The jacket bath is not tempered !
6. The filling sensor is not checked during the chemical steps.
7. The drum is emptied immediately after switching off the filling pump.
8. The correct position of the front/back switch is monitored during the cleaning programs as well.
9. If 'U' (overheating) is programmed, the Temp.-LED will not flash.

1.3----- Fixed Programs

The customer no longer has to start programming his ATL during start up; all processes are programmed with the process data in accordance with the ATL manual !
(The US equipment is supplied with special process data adapted to the chemicals sold in the USA.)

1.4----- Miscellaneous

- 1.4.1 The Equipment version (state of mechanical modification) is indicated on pushing 'NE' (step) and 'SET 0' simultaneously.
- 1.4.2 If the position of the program switch is changed in the 'SET' mode with the residual amount set to 0.00, no other residual amounts will be deleted !
- 1.4.3 If the value of the status indicator 'quick tempering' is invalid ('U'), (e.g. after RAM replacement), the initialisation will take place even if the corresponding 'SET'-switch is not operated (without quick tempering).

2===== EXTENDED START-UP FUNCTIONS

- 2.1 If the DIP-switch '3' is ON (up), the indicator will be switched back on during cleaning programs.

2.2----- Fixed Programs

At the initial start-up and after changing RAM/battery, it is possible to fill the data storage with process data in accordance with the ATL manual.

First, it is necessary to switch to 'Temperature input' with the step switch in the 'SET' mode and while the 'DIP' switch '3' is ON (Start-up). After that, all process data can be programmed by simply pushing the SETFULL-switch.

In addition, all residual amounts are set to maximum cylinder filling capacity and 'U' (Quick tempering) as well as '-' (calculation of residual amount in spite of refilling) are programmed out. (Any data previously fed in will be irrevocably deleted).

To load the special process data for US equipment, it is necessary to push the Water temp. switch while operating the SETFULL' switch.

2.3----- Production Programs

In addition to the convenient fixed program input, it is possible to enter 10 test programs for use during production.

The operation is the same as for entering the fixed programs; in addition, the Chemical-temp.-switch must be pushed while operating the 'SETFULL' switch.

2.4----- Miscellaneous

With the DIP-switch '3' ON (up), the triangular warning indicator will be activated during the search for the zero position on switch reset.

Reason: Otherwise triggering of the watchdog might not be detected under certain circumstances owing to the omission of the drum-rocking routine.

In addition, the serves to warn the user that the normal program cannot be processed.

3.-----SERVICE FUNCTIONS

New: Program for the output of statistical data and for performing service routines.
The program is run after switching the DIP-switch '2' ON; to return to the main program the DIP-switch must be switched back with subsequent switch reset !

3.1-----Running-time meters

The running-timer meters can be set to indicate the position 'RUN' after 'RESET'. Which meter is indicated depends on the position of the program selector switch. The following table applies:

Prog.No.	I	Indicator	I	Unit	I
1	I	Total ED	I	Hour	I
2	I	Drum motor ED	I	Hour	I
3	I	Heater 1 ED	I	Hour	I
4	I	Heater 2 ED	I	Hour	I
5	I	Filling pump ED	I	0,1 hours	I
6	I	Upward/downward motion	I	*100	I
7	I	Not in use	I		I
8	I	Not in use	I		I
9	I	Not in use	I		I
10	I	Service program	I		I

(ED = Power-on time)

This program is also used to clear the running-time meters. This is done by switching to 'SET' during output and then pushing the 'SET 0' switch.

3.2-----SERVICE Routines

When the program selector switch is in position 10, a service program is run, whereby the desired function is selected with the filling capacity switch.

The following functions are available:

(Position '1'): The stepping motor is operated manually;

Forward: Push 'SETFULL' ('TSR')

Backward: Push 'STEP' ('NE')

The stepping motor is switched on directly as long as the corresponding switch is held down. (Thus, the motor can be operated with defective sensors and despite the 0-sensor).

(Position '2'): Measure drum RPM (60/40 ml)

For this function the TMT sensor cable must be connected to the V/H sensor input; the drum will run at the selected RPM, but without any polarity reversal. The RPM can be read directly after a testing time of 7,5 sec.

(Position '3'): The current actual temperatur (water/chemical) is continuously indicated, depending on the temperature switch last pushed. If the chemical temperature is indicated, the WAIT-LED will be activated as an additional indication.

3.3-----Miscellaneous

There is no automatic stepping motor calibration after a switch reset !

At position 'SET' after a switch reset (initial state), it is possible to enter the equipment version (mechanical modification state) as a 4-digit number (up to 9999) instead of the residual amount. After switching back the DIP-switch, the program will remain in a closed loop ! ('RESET' required !)

4.-----GENERAL MODIFICATION

4.1-----Date Code

ATL 2: Date code changed to '2848'

ATL 3: Date code changed to '3848'

4.2-----Stepping Motor Zero Sensor Check

Up to now, after a failure of the zero sensor the stepping motor ran backward as long as desired. With the modified program version, the following sequence of events will occur:

If no sensor signal is detected at the expected moment (internal step counter = 0), two more backward steps will be carried out. Then the direction of rotation will be reversed, and four forward steps will be taken. If during this search no sensor signal is detected, the error message '3' will be indicated. The error message can only be cleared by a switch reset.

4.3 Invalid motor switch positions (>5) are corrected to 75 RPM as the universal RPM.

4.4 The float switch is provided with a switch hysteresis of 0,8 sec. to eliminate short-term line disturbances.

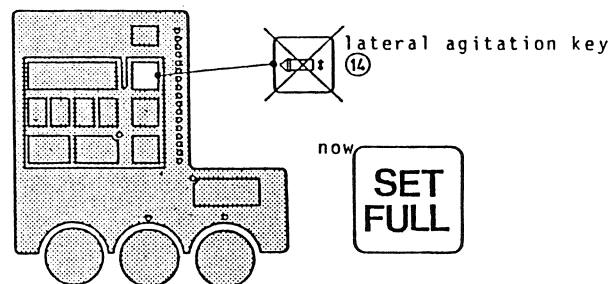
4.5 The input port PE5/B6 (temperatur check motor-trans.) is no longer queried, i.e. it is free; the corresponding emergency routines have been removed from the motor control program !

4.6 In the event of error message '2' (drum motor stands) the 15/30 V relay is switched as well as the polarity reversal relay (also at an 1 sec. interval, but with an offset of 0,5 sec. as compared to the polarity reversal relay.

4.7 Time delay after 'Starting condition ok.' reduced from 3 to 1,5 sec.

4.8 A fixed entry address has been defined for the use of program parts by the FLUKE-tester. (OFFF7H)

SUPPLEMENT TO THE OPERATING INSTRUCTIONS



This button simplifies the entry of filling quantities. After filling the storage bottles (1.0 ltrs), press the Set/Full button 14 for 2 secs. The change of the LED-display to 1.0 ltrs and a buzzing signal acknowledge the entry of the filling quantity. For bottle fillings below 1.0 ltrs - see operating instructions 5.3 page 16.

THE FOLLOWING PROCESSING STEPS ARE ALREADY INSTALLED

which you can certainly (see operating instructions no. 5, page 14) modify to meet your individual requirements.

Program 1+6

Process: E-6 No.	
temp.	30.2
prewarm	5.00
1st. rinse	2.30
chemistry 1	6.30
rinse	2.30
chemistry 2	2.00
rinse	2.30
re-exposure	-
chemistry 3	6.00
rinse	2.30
chemistry 4	2.00
rinse	2.30
chemistry 5	6.00
rinse	2.30
chemistry 6	6.00
rinse	6.00
end	

AP 44 .UK 6
First developer
Reversal bath
Color developer
Conditioner bath
Bleach bath
Fixing bath

Program 4+9

Process: SW No.	
temp.	20.0
prewarm	-
1st. rinse	5.00
chemistry 1	-
rinse	2.30
chemistry 2	-
rinse	2.30
re-exposure	-
chemistry 3	-
rinse	2.30
chemistry 4	1.00
rinse	2.30
chemistry 5	1.00
rinse	2.30
chemistry 6	1.00
rinse	2.30
end	

Developer
Stop bath
Fixing bath

Program 2+7

Process: No.	
temp.	30.2
prewarm	5.00
1st. rinse	2.30
chemistry 1	6.30
rinse	2.30
chemistry 2	6.30
rinse	2.30
re-exposure	-
chemistry 3	6.30
rinse	2.30
chemistry 4	-
rinse	2.30
chemistry 5	-
rinse	2.30
chemistry 6	6.00
rinse	2.30
end	

(3-bath)UK 3
First developer
Color developer
Bleach/fixing bath

Program 5

Process: P-3 No.	
temp.	30.0
prewarm	1.00
1st. rinse	1.00
chemistry 1	-
rinse	1.00
chemistry 2	-
rinse	1.00
re-exposure	-
chemistry 3	-
rinse	1.00
chemistry 4	3.00
rinse	0.30
chemistry 5	3.00
rinse	0.30
chemistry 6	3.00
rinse	3.00
end	

First developer
Bleach bath
Fixing bath

Program 3+8

Process: C-41 No.	
temp.	30.2
prewarm	5.00
1st. rinse	2.30
chemistry 1	-
rinse	2.30
chemistry 2	-
rinse	2.30
re-exposure	-
chemistry 3	-
rinse	2.30
chemistry 4	3.15
rinse	2.30
chemistry 5	6.00
rinse	2.30
chemistry 6	6.00
rinse	2.30
end	

AP 70 .NK 2
Color developer
Bleach bath
Fixing bath

Program 10

Process: EP-3 No.	
temp.	30.2
prewarm	1.00
1st. rinse	1.00
chemistry 1	3.00
rinse	0.30
chemistry 2	0.30
rinse	0.30
re-exposure	-
chemistry 3	2.30
rinse	0.30
chemistry 4	-
rinse	0.30
chemistry 5	-
rinse	0.30
chemistry 6	-
rinse	2.30
end	

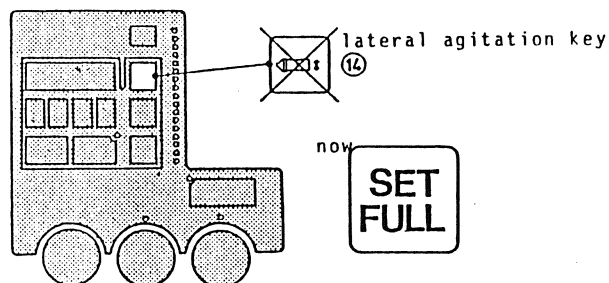
Color developer
Stop bath
Bleach/fixing bath

ROTATIONAL SPEEDS

System	1500	50 rpm
System	2500/2800	75 rpm
System	3000	50 rpm

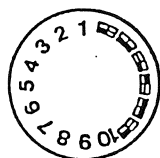
JOB Labor Technik GmbH & CO. KG, Kölner Str. 58,
D-5270 Gummersbach
Made in Federal Republic of Germany 9/88

SUPPLEMENT TO THE OPERATING INSTRUCTIONS

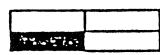


This button simplifies the entry of filling quantities. After filling the storage bottles (1.8 ltrs), press the Set/Full button 14 for 2 secs. The change of the LED-display to 1.80 ltrs and a buzzing signal acknowledge the entry of the filling quantity. For bottle fillings below 1.8 ltrs - see operating instructions 5.2.1., page 16/17.

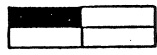
PROGRAM SELECTOR SWITCH NOW WITH CLEANING PROGRAMS



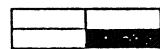
lock the distributing arm



bottles 1-3 front



bottles 1-3 rear



bottles 4-6 front



bottles 4-6 rear



bottles 1-6 front



bottles 1-6 rear

The complete cleaning programs are already installed. Fill the selected bottles with water, connect the tank (2553/63), 2830/40) and press the Start button. Repeat this procedure twice.

THE FOLLOWING PROCESSING STEPS ARE ALREADY INSTALLED

which you can certainly (see operating instructions no. 5, page 14) modify to meet your individual requirements.

Program 1+6

Process: E-8 No.	AP 44, UK 6
temp.	30.2
prewash	5.00
pre-rinse	-
chemistry 1	6.30
rinse	2.30
chemistry 2	2.00
rinse	-
re-exposure	-
chemistry 3	6.00
rinse	-
chemistry 4	2.00
rinse	-
chemistry 5	6.00
rinse	-
chemistry 6	4.00
rinse	6.00
end	-

Program 4+9

Process: SW No.	
temp.	20.0
prewash	5.00
pre-rinse	-
chemistry 1	-
rinse	-
chemistry 2	-
rinse	-
re-exposure	-
chemistry 3	-
rinse	-
chemistry 4	-
rinse	-
chemistry 5	1.00
rinse	-
chemistry 6	-
rinse	0.00
end	-

Developer
Stop bath
Fixing bath

Program 2+7

Process: No.	(3-bath) UK 3
temp.	30.2
prewash	5.00
pre-rinse	-
chemistry 1	6.30
rinse	2.30
chemistry 2	6.30
rinse	2.30
re-exposure	-
chemistry 3	6.30
rinse	-
chemistry 4	-
rinse	-
chemistry 5	-
rinse	-
chemistry 6	6.00
rinse	-
end	-

First developer
Color developer
Bleach/fixing bath

Program 5

Process: P-3 No.	
temp.	30.0
prewash	1.00
pre-rinse	-
chemistry 1	-
rinse	-
chemistry 2	-
rinse	-
re-exposure	-
chemistry 3	-
rinse	-
chemistry 4	3.00
rinse	0.30
chemistry 5	3.00
rinse	0.30
chemistry 6	3.00
rinse	3.00
end	-

First developer
Bleach bath
Fixing bath

Program 3+8

Process: C-41 No.	AP 70, NK 2
temp.	30.2
prewash	5.00
pre-rinse	-
chemistry 1	-
rinse	-
chemistry 2	-
rinse	25.00
re-exposure	-
chemistry 3	-
rinse	25.00
chemistry 4	3.15
rinse	1.15
chemistry 5	6.00
rinse	3.15
chemistry 6	6.00
rinse	3.00
end	-

Color developer
Bleach bath
Fixing bath

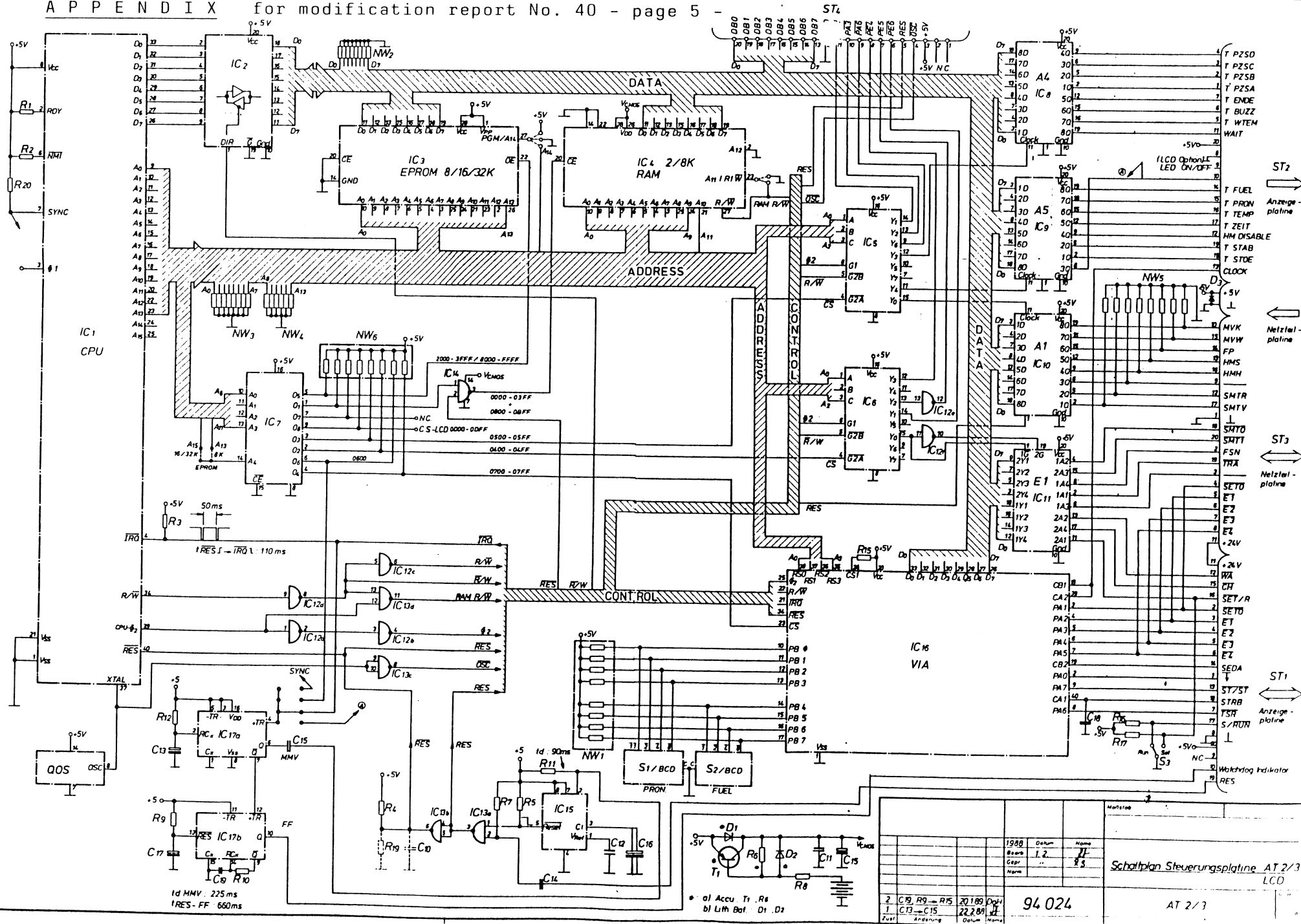
Program 10

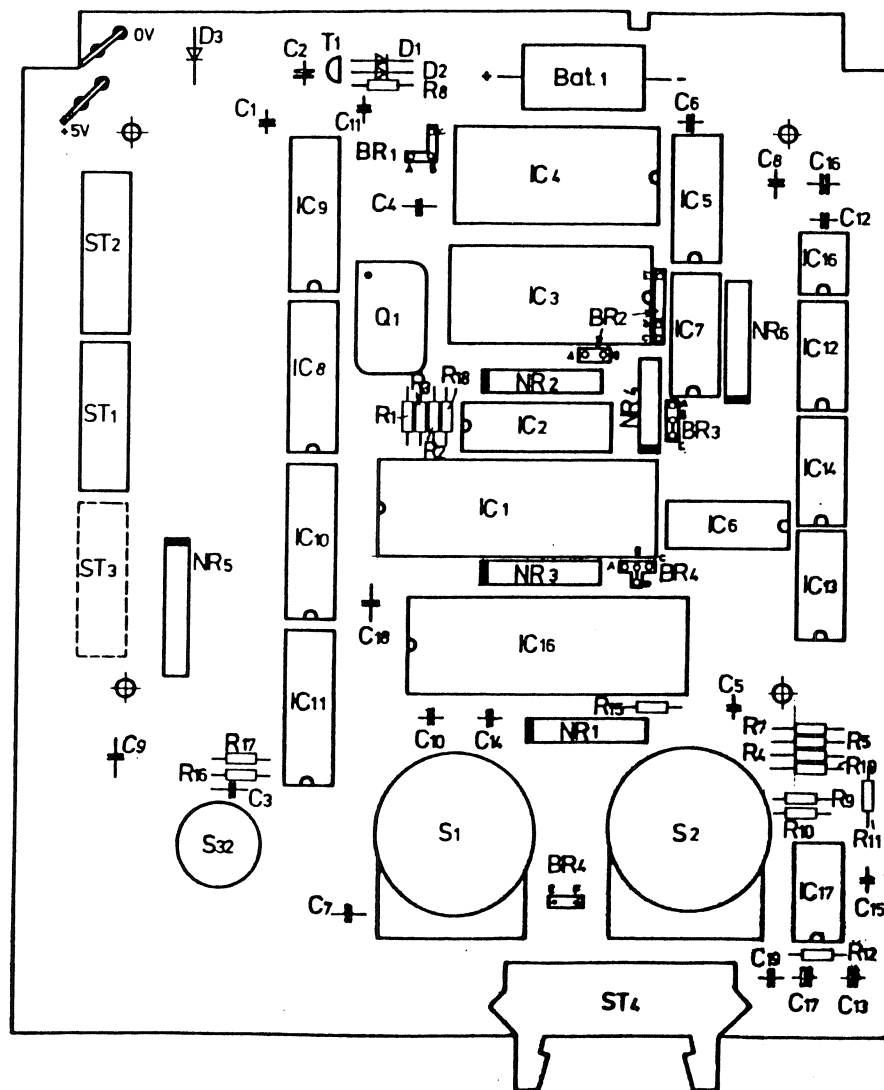
Process: EP-2 No.	
temp.	30.2
prewash	1.00
pre-rinse	-
chemistry 1	3.00
rinse	-
chemistry 2	0.30
rinse	-
re-exposure	-
chemistry 3	3.30
rinse	-
chemistry 4	-
rinse	-
chemistry 5	-
rinse	-
chemistry 6	-
rinse	3.30
end	-

Color developer
Stop bath
Bleach/fixing bath

ROTATIONAL SPEEDS

System	1500	50 rpm
System	2500/2800	75 rpm
System	3000	50 rpm





			Maßstab	
19.08	Datum	Norm		
Beurh	6.6			
Gepr.	"	P.S.	Steuerplatine ATL 2/3	
Norm				
94 019 (24 054)				Blatt
(Urspr.)			(Ers. f.)	(Ers. d.)

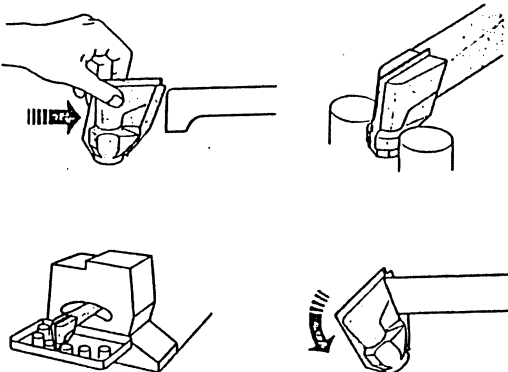
Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7 1 / 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no	
				ATL 2	ATL 3
40	See Annex	<ul style="list-style-type: none"> - rocking routine is omitted instead the SETFULL-Switch - additional cleaning programs (only ATL 3) - Fixed Programs - Running-time meters - Service Routinen - a key lock is used instead of the SET/RUN-switch <p>More modifications see Annex</p>	<p>Program change:</p> <p>ATL 2 -> new E-PROM with more memory capacity and new version 2848</p> <p>ATL 3 -> new control P.C. Board, new E-PROM with more memory capacity and new version 3848</p> <ul style="list-style-type: none"> - SETFULL-switch instead of rocking function. This enables one to set the residual amount at maximum value - There are 16 programs in all, 6 of them are pre-programmed cleaning programs (only ATL 3) - The processing programs (10 programs) are also pre-programmed, but can be modified in accordance with individual needs. - With the Running-time meters you can ask about the power-on time of each aggregate - The service-technican can work with a service-program: stepping motor operated manually measure drum RPM the current actual temperature is indicated - The key lock, which replaces the SET/RUN-switch, helps prevent operation by unauthorized persons - new parts (ATL 2): 94027 E-PROM 27 C 256 ATL 2 - new parts (ATL 3): 94026 E-PROM 27 C 256 ATL 3 95535 Front control operating device ATL 3 with key lock 	<p>STA 10581</p> <p>GB</p> <p>US 10413</p>	<p>10760</p>
				06.01.89	08.12.88

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 7.1 / 7.2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
41		A handy and reliable locking of the chemistry distributor at the wash program	<p>The locking cap is enclosed to each unit. The cap is pushed on the end of the chemistry distributor and locks it between two openings in a rising position.</p> <p>- New part: 1x 95397 locking cap</p> 	STA 10644 GB 10099 US 10482	10880
				09.03.89	09.03.89

Modification report

Article 4 1 6 0 AUTOLAB ATL 2
4 1 7 0 / 4 1 7 1 / 4 1 7 2 AUTOLAB ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
42	6.1 6.2 6.3 6.5 6.6 6.7 7.1 7.2 7.5 7.6 7.7	<ul style="list-style-type: none"> - A hose pump, serving as chemistry refilling pumps, is inserted instead of a membrane liquid pump. This one is more service-friendly, in addition, transit filters are not necessary any longer. - the new boiler is more service-friendly. - new wooden parts are necessary, as <ul style="list-style-type: none"> - a new suspension for the boiler, - the hose pumps are not installed on a panel any more but in a drawer, - the new wooden parts dispose of a water-proofed plastic cover. 	<ul style="list-style-type: none"> - Units, subsequently equipped with hose pumps, are reconstructed as shown on page 1. All necessary parts for this reconstruction are delivered with the spare part No. 93009 hose pump w.accessories 220V 93010 hose pump w.accessories 115V. A worn out hose pump is exchanged as shown in point 6.6 SP-No. 93008 pump hose - new spare parts: <ul style="list-style-type: none"> 93009 hose pump w.accessories 220V 93010 hose pump w.accessories 115V 93008 pump hose 32026 pump hose 220 V 32027 pump hose 115 V 95413 chemistry replenishing pipe, short 16188 boiler (new version) 95399 boiler access. (new version) 95408 hand shower with connecting hose for version with boiler 92042 upper cabinet for complete version (new version) 92043 upper cabinet for table-top version (new version) 		Intermediate version: hose pumps on panel 10987 10991 11003 11005 11017 11019 Complete modification: hose pumps in drawer from: 11028 14.09.89

[illegible]

4 1 6 0

AUTOLAB ATL 2

4 1 7 0 / 4 1 7 1 / 4 1 7 2

AUTOLAB ATL 3

Seq.
no.

* Marking under section

Reason for modification

Type of modification

Modific. introduced from serial no.

ATL 2

ATI 3

43

Security in case of an error
of the bottle temperature
sensor.
Internal security checking
of ATL because of EWG certi-
ficate.

Modification of programme:
Valid E-Prom-Version now
2932 (ATL 2) / 3932 (ATL 3)

STA 10784

11051

GB 10099

US 10596

- In case of an invalid or too high value of the bottle temperature sensor, the tempering is switched off and the error is indicated. In addition, the highest temperature, not indicated as a fault was reduced from 55°C to 51°C.

06.10.89

04.10.89

Modification report

Article 4170 / 4171

ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
44		easier adjustment to level the ATL 3 unit in its location	To adjust the level of ATL3 unit, a open ended spanner and a maunting instruction is added.		11181 15.01.90
45		note the keynumber at the unit	The keynumber of key look is noted on a yellow adhessiv point on the back of the fuse cover.		11236 08.03.90

Modification report

Article 4170/4171

ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
46		Transport security for pump drawer	For securing the pump drawer a clamp is installed (art.no. 11072)		11328
47		Drain hose mounting	The connection for the outlet connecting peace will be drilled soon and the connecting peace protected with a binder for cables (art.no. 35042)		11393
48		automatic control of water level	Setting a new Eprom version		We will inform you later from which serial no. it starts
49		Fault of floating switch	To avoid that the floating switch did not switch off, the guide way is now 5mm longer than before. the floater comes now deeper in the bottle than befor. This guarantees that the floater floats better than befor and switches off in time. The bend of chemistry replenshing hose is formed different so that no sprinkle water can pull the floating switch down.		s.a.

List of all revisions of the ATL-2/3 program versions
2035/3035 compared to the previous versions 2932/3932

1. Modifications for both versions

- 1.1 Rinse water automatically drains in the rinsing position of the chemical distributor arm during rinse programs. It is no longer necessary to mechanically lock the arm. During a rinse program, the stepper motor must advance two additional steps after the filling pump has shut off. After emptying the drum, the stepper motor no longer advances. There is no rinse position past the "Bottle 6" position, therefore the arm remains in the rinse position after bottle 5.
- 1.2 Increased safety in case of defective lower float switch. When the water level is below the upper float switch, the two heating elements are automatically turned off. If this occurs during a process, the heaters will stay on until the process is completed, at which time they will be turned off.
- 1.3 Error indicator "8"
This error is indicated if the water bath is not filled up after ten minutes. The cold water solenoid, heater, and water circulating pump are all turned off. The process can be started even with this indicator, however, the unit will not heat up. A new filling attempt occurs only after the RESET button is pushed.
- 1.4 When the water level is too low, the cold water solenoid is turned on 3 seconds after pushing the RESET button (formerly a 1 minute delay).
- 1.5 Preceding zeroes are no longer displayed in the RUN mode (i.e., display of 1.45 instead of 01:45)

2. Special modifications for ATL-2 plus

- 2.1 16 programs (13 programmable and 3 cleaning programs)
The operation is identical with ATL-3.
Programs 1-10 are programmed at the factory. For programs 11-13 all times are set at 00:00 min. and all temperatures are at 20,0 C.
The U.S. version has 10 modified programs according to the fax of JOBO Fototechnic Inc. of 22.08.90

3. In general

Version "3035" has no changes in the hardware. The ATL-2 plus requires only a 16 position switch as a modification.

Modification report

Article

4170/4171

ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
50		Waterdrops at the lifting arm	If the lifting arm works for a long time, it can happen that there are small water drops in the area of swivel pipe and support console. That's why a dripping security is installed to save the air distributor and the aggregate part.		28.09.90

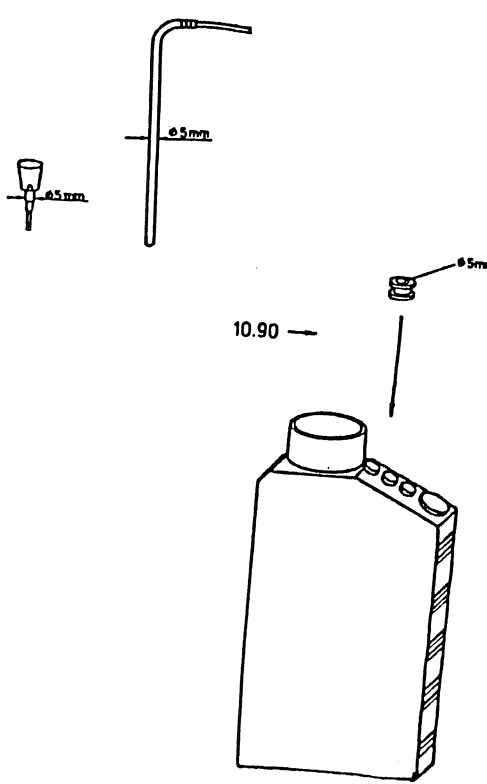
Modification report

Article 4160 Autolab ATL 2 4170/4171/4172 Autolab ATL 3.....

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
51		Higher security when starting the hose pump	Pumps will be equipped with with more powerful gears. At the same time there will be a modification regarding the refilling PC board (Capacitor C 8) as the pumps equipped with new gears are running more slowly which causes a prolongation of the filling time.		11560
52		Possible over-filling of the bottles during automatical filling	The floating switch's part to screw in will be extended by 5mm and equiped with an O-ring for protection. The new type of floating switch with 2 reedcontacts guarantees more security.		STA 11477 US 11540

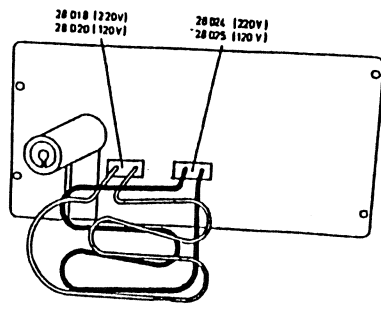
Modification report

Article 4160 Autolab ATL 2 4170/4171/4172 Autolab ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
53		Quality improvement of the chemical temperature sensor	<p>The chemical temperature sensors are covered with a high quality steel tube. The bottles for temperature control should be equipped with bigger bushing sleeves (15182). The closing pin will get a thicker section in addition. The screw-in assembly's spare part code-number for ATL 2 is 93014. For ATL 3 it's 93015.</p> 		11485

Modification report

Article 416Q...Autolab...ATL...2.....417Q/417.1/417.2.....Autolab...ATL...3.....

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
54		Untight connections of the water pressure hose because its sealing does not exactly fits into the thread.	The hole in the thread (13089) will be extended so that the sealing will fit exactly. Ø of the hole 16 mm.		11594
55		Insertion of the heaters with different measurements through the housing of ATL-2 Plus.	The new heaters have been modified what the measurements are concerned but do still fit in all Autolabs both ATL 2 and 3. The installation has to be effected as in the depiction below. 		11489

Modification report

Article 4160 Autolab ATL 2 4170/4171/4172 Autolab ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
56		To convert old units with the EPROM 27C64 version.	<p>This programme corresponds to the programme-version 2035/3035 according to the modification report 48. (Error indicator 8 and operation period meter)</p> <p>! Exception: The Service programmes "Fixes program- mes into RAM" could not have been taken on for space rea- sons</p> <p>Assembly 95350 for ATL-2 95351 for ATL-3</p> <p>These Eproms can be ordered at the technical Service- departement.</p>		

Modification report

Article 4160 Autolab ATL 2 4170/4171/4172

Autolab ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
57		Problems to heat up the 38°C by using the chemical temperature sensor of high quality steel.	The regulation of the water's temberature will be effected as in point 3.6.1.2 -see Service files. To raise the temperature of the bottle the printed circuit board has been re-adjusted so that you'll get a temperature of 0,6 ° instead of 0,4° when chosing 38 °C. The sandard value in point c. has chenged. It is 20°C and 37,7°C		11597

Änderungsbericht

Artikel.....4170/71/72.....Autolab ATL 3.....

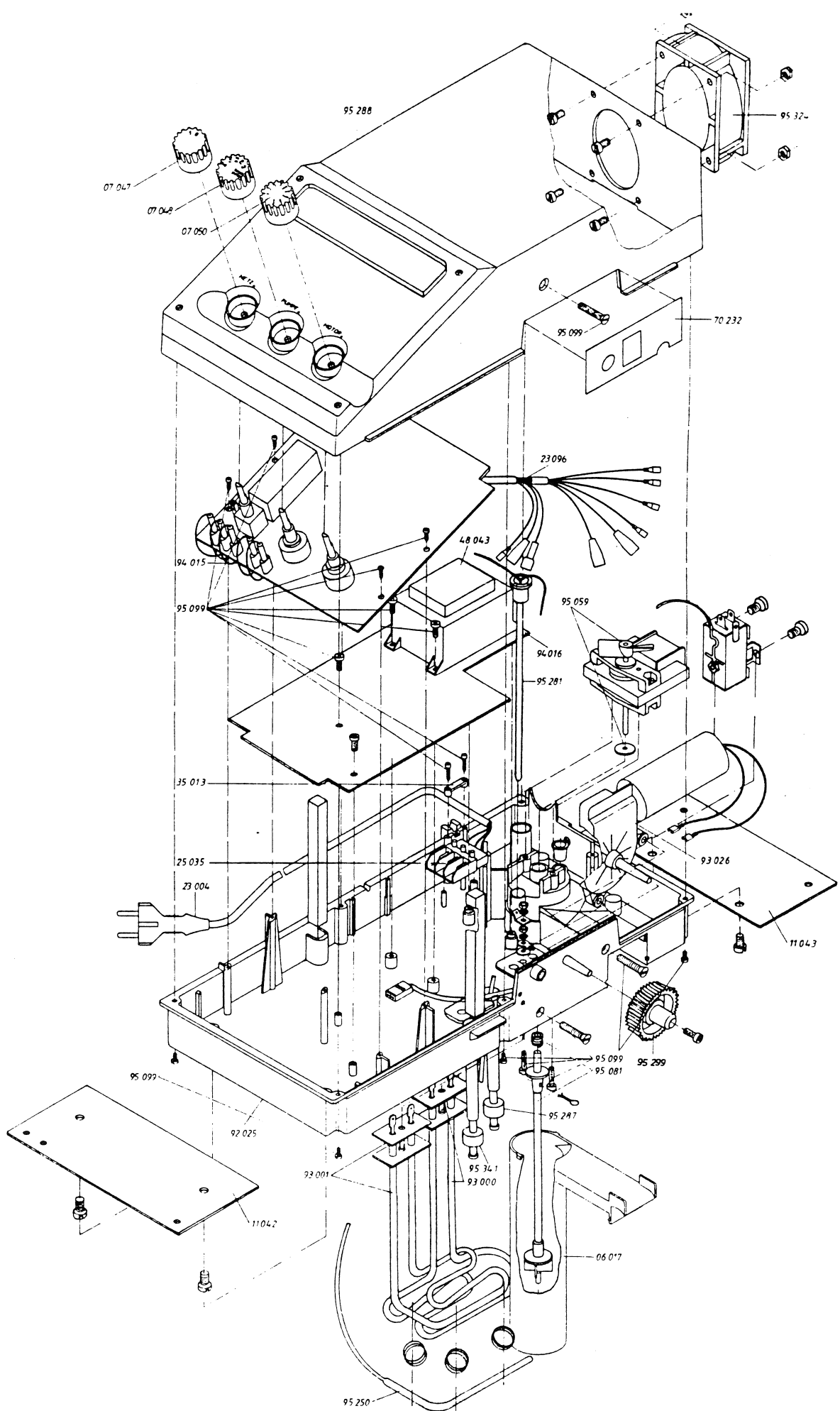
Lfd. Nr.	* Kennzeichnung unter Punkt	Änderungsgrund	Änderungsart	Änderung eingeführt ab Serien-Nr. ATL 212+	ATL 3

!!!!!! attention: Please keep the floating switches (95303 and 95378)
away from concussion. Extremely sensitive of shock.

Modification report

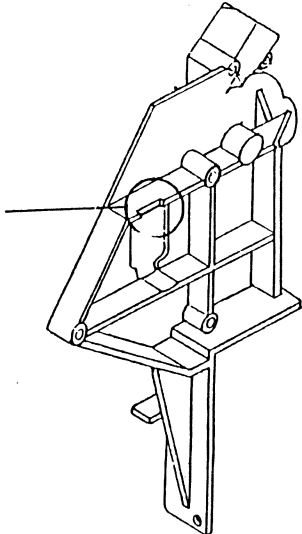
Article 4260 Autolab ATL 2plus / 4170/71/72 Autolab ATL 3

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
58		Overheating of the heaters, if the floating switch might be defective.	The control head of ATL 2+ and ATL 3 is now equipped with a thermal cut out (95290), so that a overheating is im- possible.(see drawing of motor control)	10284	11677
59		New material of spiral-hose	To safe the bended hose to the first 15l container of the lower cabinet, a 10cm peace of vacuflex-tube (50404) is pull- ed over.		11700
60		Advanced Process-start (1,0°C befor process tem- perature is reached); Lengthing of emptying-time	With new EPROM Version 2132/3132 the fault of star- ting to early is removed. At the same time the emptying time has been raised.	10421	11807
61		Adjustment of mixer	The mixer generally will be adjusted at the adjusting- screw (This will be done by us). How to adjust it if is is necessary: 4170: 4 rotation - near 38°C 4167: 3,5 rot. - little more than 38°C		11800 06.11.91



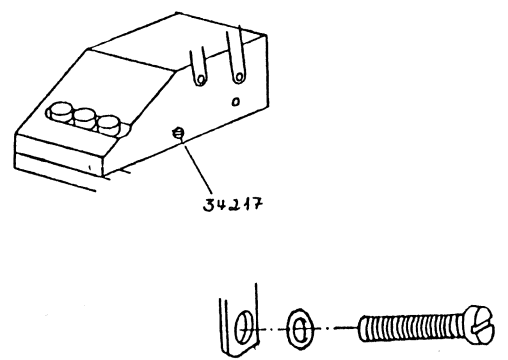
Modification report

Article Autalab ATL 2plus / 3 4260 / 4170/71/72

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
62		Collision of gear-housing and the right support console. This collision leads to bracings.	<p>Cut the edge as shown in the drawing. Also in service cases.</p> 		11892
63		<p>The water-level is equal to the hight of the over-flow at the present floating switch (95287). If the unit is not installed in balance it might happen that</p> <ol style="list-style-type: none"> 1. the floating switch has not jet turned off but the water is pouring out of the overflow 2. the water spills over the upper tub if the lift arm comes down and is running out through the overflow. 	<p>The connecting piece of the floating switch (95287) has been made 10mm longer.</p>	10595	11892

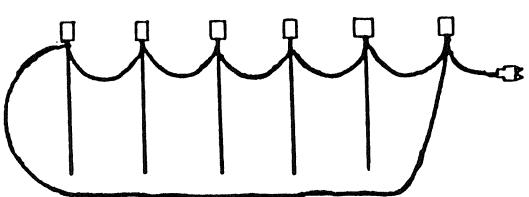
Modification report

Article Autolab ATL 2plus / 3 4260 / 4170/71/72.....

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no	
				ATL 2	ATL 3
		If the lift arm goes up again, the water level is to low so that the waterbath will be tilled up. This happens if the drum 3063 is used.			
64		In case of service it's not possible to adjust the outlet funnel (07205 B).	Instead of glue now a screw and washer (34458) is used to fix the outlet tunnel.	US 10667	
65		Corrosion at the motor head	<p>Between screw (34217) and washer (15186) respectively between the mounting screw a washer (15220) is placed, to avoid that humity can come into the motor head.</p> 	10594	11987

Modification report

Article AutoLab ATL 2plus / 3 4260 / 4170 / 71 / 72

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no	
				ATL 2	ATL 3
66		Avoidance of cable breaking at the sensor needle chain (95190).	<p>As an avoidance we now use a sensor needle chain which cable beginning and cable end are connected at the lumberg plug (dubble line = dubble security)</p> 	10691	12033
					13.4.92

Modification report

Article 4620 Autolab ATL 2plus / 4170/71/72 Autolab ATL 3.....

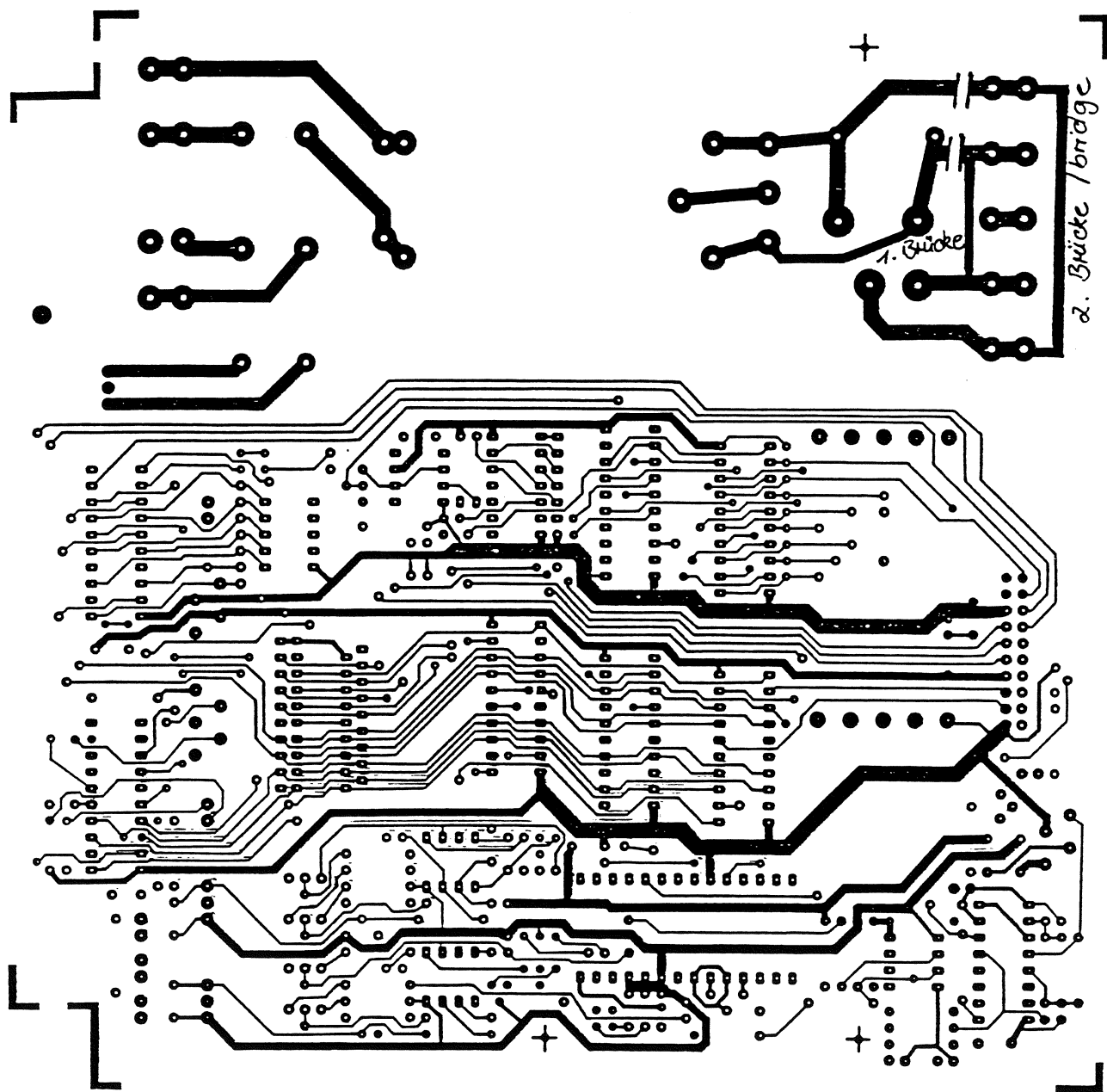
Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
67		Prevention of recycling of washwater into freshwater-system	From underneath the motor-head (95287/95311/95451) comes a curved hose (15080) which needs to be replaced by a new curved hose (15226) with a drilled hole. This prevents recycling into freshwater-system	STA 10847	STA 12144
68		Corrosion in electronic head through chemical and water evaporation.	<p>To prevent corrosion at the electronic elements, we have placed on the top of the fan a cover. So condensed water cannot be taken in. Additional the fan is activated as soon as the processor is hooked up to electricity.</p> <p>Older units in market need the following attention:</p> <p>1.) The electric lead needs cut-offs at the points marked in the attached drawing.</p> <p>2.) Reduce length of bridges</p> <p>bridge 1: 30 mm bridge 2: 50 mm</p>	STA 10907 US 10822	STA 12193

Anlage / Annex :

Änderungsbericht Nr. / Modification report no.: 68

94015 Interface PCB

Ansicht Lötseite / View of solder points



Modification report

Article 4260 Autolab ATL 2plus / 4170/71/72 Autolab ATL 3.....

Seq. no.	* Marking under section	Reason for modification	Type of modification	Modific. introduced from serial no.	
				ATL 2	ATL 3
68			3.) all bride-wire-endings need isolation 4.) Solder by attached "plan"		
69		Waterhoses bend too sharp in the areas of heatechange.	The PVC-hose (50432) has been changed against a new hose (15180) that doesnot bend and reduce diameter	STA 10966 US 10966 GB 10970	STA 12202