AutoLab
ATL-2000
ATL-3000

JOBO

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INDEX

AutoLab
ATL-2000

Automatic Processor
Instruction Manual

JOBO

For Your
Best Image

Introducing
The JOBO ATL-2000

Serial Number: _____

Featuring:

Quality

- Fully automatic, microprocessor controlled system.
- Constant, repeatable results from one process to another.
- Each process step accurate to the second.
- Chemical temperature maintained to within ± 0.1° C.

Economy

- Thorough utilization of chemistry.
- Integrated chemical collection system.

Versatility

- Switch from process to process quickly and easily.
- Processes: C-41, E-6, Ilfochrome©, B & W, R-3, RA-4, Lithographic, and X-Ray.
- Standard film formats include: 110, 135, 120, 220, 4x5", 5x7", 8x10", 8.5x11", 9x12". We can also custom build sheet film drums for any film size up to 16x20". Our long roll system includes 8mm, 16mm, 35mm, 60mm, 70mm, 126mm, and 127mm.
- Print formats include 4x5", 5x7", 8x10", 16x20", and 20x24".

Operating Instructions

For Serial Number 20000 and up - Current Revision 1.1

Table Of Contents

Introduction to your new ATL-2000

Congratulations on your purchase of the JOBO ATL-2000 film and print processor. Please take a moment to complete and return the enclosed warranty card. The warranty card will register you as a processor owner. This registration will allow us to notify you of product updates and **promotions**.

The ATL-2000 is the smallest, fully programmable, automatic processing machine in the JOBO product line. With your new processor, you will be able to take advantage of a variety of tank and drum combinations to process virtually any film or print format. Your new processor is able to quickly switch back and forth between E-6, RA-4, Ilfochrome©, C-41, Black and White, etc...

Your processor will maintain up to twelve different programs depending on your needs. Its lithium battery protects your programs even if the power is disconnected for months. All the functions of processing your film and prints, except stabilizing and drying, are fully automatic.

The ATL-2000 uses a recirculating water bath to maintain the temperature of all 12 liters of chemistry, and the tanks, reels, and film or paper to within ± 0.1° C. The rotation of the tank can be set to 25, 50, or 75 R.P.M, depending on the chemical process you are running.

After your chemistry has been pumped, the microprocessor deducts the amount used from the total volume you started with, and will not allow you to start a process with insufficient chemistry. Also, the processor will not start until the chemistry is within ± 0.3°C of the process temperature (unless you decide to override it).

Your ATL-2000 will even allow you to reclaim spent chemistry in six separate containers. The recovery and reprocessing of your spent chemistry makes processing more profitable.

If you have any questions or comments regarding the setup or use of your new processor call us at 800-525-2821 and ask for Customer Service at extension 160.

TECHNICAL INFORMATION

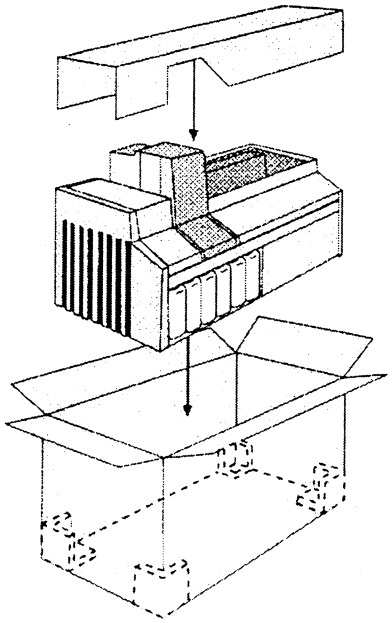
Height	24" (61cm)
Height with largest drum in highest position	45½" (116cm)
Length	46" (117cm)
Width	20" (51cm)
Weight (empty)	66 lbs. (30 kgs)
Voltage	110V 60hz or 240V 50hz
Power Consumption	1300 Watts 11 Amps at 115 volts 5.5 Amps at 240 volts
Minimum Water Pressure	15 psi (1 bar)
Maximum Water Pressure	90 psi (6 bar)
Water Jacket Capacity	4¼ gallons (16 liters)
Temperature Range	64.4°-121.8° F (18°-49.9° C)

1. Unpacking the unit

1.1 Removing the processor from the shipping box

The unit is packaged in a corrugated cardboard box. The total weight is approximately 82 lbs. Two people are required to lift the processor from the box.

- ☐ Cut the shipping tape on the top and open the lids.
- ☐ Remove the upper support made of corrugated cardboard, and the two foam end pieces.
- ☐ With one person at each end of the box, lift the processor straight up.
- ☐ Place the processor where you intend to install it.



1.2 Shipping damage

Check the processor for any damage caused in shipping. Immediately report any shipping damage to the shipping company or the dealer from which you purchased the processor.

1.3 Packaging

To protect against any damage to the processor, use the original packaging material if the unit is to be transported. We do not accept responsibility for damage due to incorrect packaging.

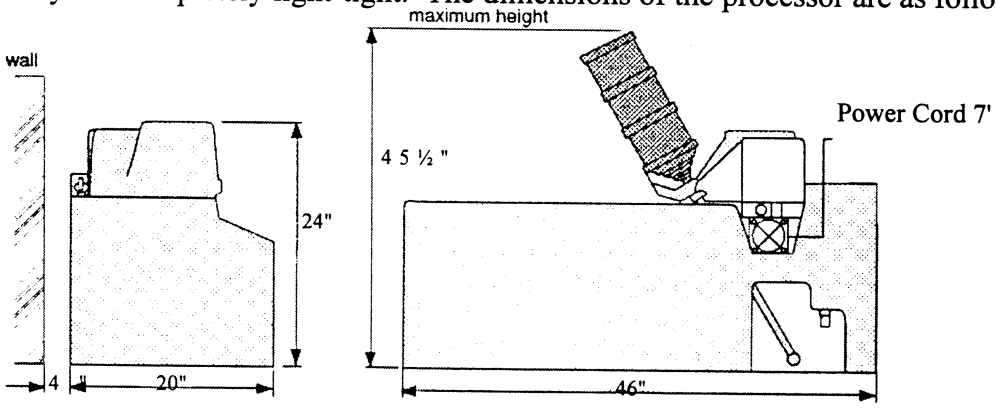
2. Items supplied with your processor

Article Name	Quantity
Allen key 4mm (#16159)	1
Bottle, black 1 liter (#3372)	2
Bottle, in-line front (#3391)	6
Bottle, white 1 liter (#3373)	10
Bottle Cap #1 (#05071)	1
Brass Adaptor for 3/4" NPT hose (#61003)	2
Cap For Coupler (#92158)	1
Cog lid washers (#07095)	3
Drain Hose Assembly (#93017)	1
Filter, for fan	1
Journal of Rotary Processing Compendium (#66032)	1
Rear bottle cover (#10152)	1
Reclamation Cover (#10154)	1
Retention Clip Set (#92157)	1
Roller supports (#07067)	2
Rollers (#07007)	2
Screwdriver, Jeweler's Phillips (#16229)	1
Spirit level (#4502)	1
Transfer gears (#95200)	2
Warranty card (#60015)	1
Washer, 3/4" (#61002)	2
Wrench, 10mm (#16244)	1

3. Site specifications

3.1 Installation site

The ATL-2000 does not need to be installed in a darkroom. Once the tanks have been sealed, they are completely light-tight. The dimensions of the processor are as follows:



Rear View

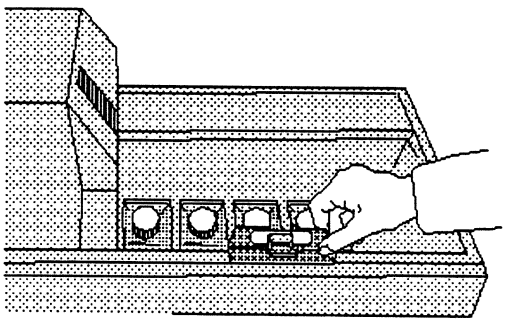
The ATL-2000 should be installed near a drain (check your local codes regarding disposal of photo chemistry), a water supply (the rinse steps require tempered water), and a **dedicated, grounded, GFCI protected** 110V electrical outlet. Please read section 4.2 about water connection before you determine the final location of the processor.

The ATL-2000 should be installed on a stable, level surface capable of supporting at least 150 lbs. The surface should be waterproof, and higher than the drain.

The installation location should have enough vertical clearance for the processor to empty the largest drum - at least 45½" (from the base of the processor).

The ATL-2000 can be installed on our special support table #4221, in a sink, or on any generic work table. Jobo's support table provides a convenient, comfortable working height for the processor, and has storage space for your tanks and drums. This support table can be combined with our collecting tray (#4225) which provides additional storage for used chemistry.

Please use the level (#4502) included with the processor. It is *extremely* important the processor be absolutely level to develop your film and prints properly. Level the processor on the trough casing as indicated in the following graphic.



Then, check that the drums attached to the processor are level.

3.2 Electrical connection

A dedicated, grounded, UL-approved electrical outlet is required. At least a 15 amp circuit breaker is needed to run the processor. The ATL-2000 draws a maximum of 11 amps, so consider the amperage of any other appliances if you must connect them to the same circuit. It is strongly recommended that you consult an electrician when deciding what rating of circuit you need.

A ground fault interrupter (GFCI) is strongly recommended!!!

DO NOT OPERATE THE AUTOLAB WITHOUT ELECTRICAL GROUNDING!

3.3 Water pressure

The water pressure should be between 15 and 90 p.s.i. (1-6 bar). Pressure less than 15 p.s.i. will result in an unusually long filling time for the water bath in addition to inadequate rinsing. Water pressure of over 90 p.s.i. may cause damage to the processor. If the water pressure exceeds 90 p.s.i., we recommend you purchase a pressure reducer (#61004). The two hoses required to operate the processor are included.

The shut-off valves for your water supply should remain accessible.

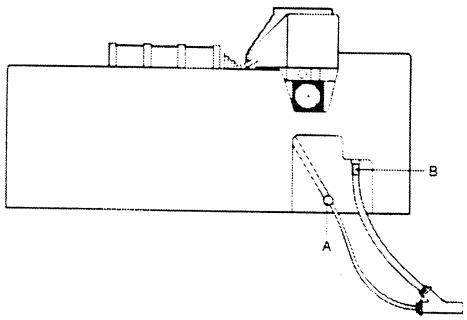
3.4 Rinse water temperature

The ATL-2000 uses two water supply lines, one cold and the other tempered. The tempered water line should be adjusted to within ± 0.5°C of the process temperature. To deliver the tempered water JOBO recommends our water mixing panel (#4189). It has a low-flow mixing valve and a trickle line; both are needed for optimum results.

If processes are run at temperatures below ambient room temperature, the temperature of the supplied water must be lower than the processing temperature. A water chiller should be used if the supplied water is warmer than that required by the process you intend to run.

3.5 Waste water

The ATL-2000 has two drains: one water bath drain, and one drain for the rinse and chemical steps and water bath overflow. Included with the processor is a drain assembly kit (#93017). Attach the drain lines in the following manner.



If the processor is installed on a work table, you must run the drain hose for the processor to your drain. Consult your local government code regarding the disposal of photographic chemistry.

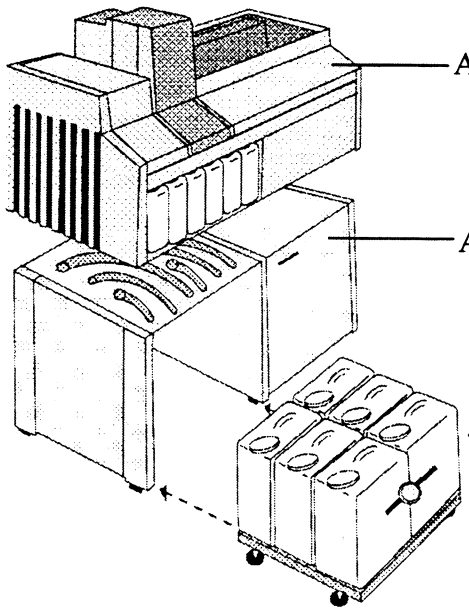
3.6 Room temperature

The processor continually circulates the water bath to maintain the processing temperature. Normal fluctuations in room temperature will have no impact on the processor's ability to maintain the correct temperature (except when running processes below room temperature, see sec. 3.4). Do not install the processor directly in the path of a heating or cooling duct.

4. Installation instructions

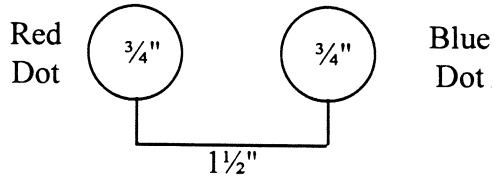
4.1 Chemical reclamation

The ATL-2000 collects the used chemistry in six 1 liter bottles. If you use our support table (#4221), it is possible to purchase the 15 liter chemical collection cart (#4225). It includes six 15 liter bottles designed specifically for the support table.



4.2 Water connection

The ATL-2000 uses two water connections with European hose thread. Two washers and two brass adaptors are included. The two water connections are located in the rear of the processor above the fan and power cord. Connect white hose (with the red stripe) to the solenoids, the hose to the brass adaptors, and the adaptors to your cutoff valve. Make SURE you use the washers at every connection.



The tempered water connects to the solenoid coded with a red dot. The cold water supply connects to the solenoid with the blue dot. The tempered water supply should always be set to within ± 0.5°C of the processing temperature. Screw the hoses on tightly, but do not strip the threads.

Depending on the condition of your tap water, you may want to install a water filtering system to prevent any contamination caused by particulate matter.

4.3 Electrical Connection

Observe your local electrical code!!!

Plug the processor into a grounded 110-120V UL approved outlet. It is extremely important that the outlet be grounded. JOBO strongly recommends the use of a **ground fault circuit interrupter (GFCI).**

The correct electrical connection AND grounding of the processor are necessary to avoid the risk of fire, electrical shock, or personal injury. The owner of the processor bears the personal responsibility for ensuring that the electrical connection is safe.

The processor is equipped with a grounded, three-prong plug. Insert the plug into grounded outlets only. Do not alter the plug. If you do not have a proper outlet, consult your local electrician to have one installed.

To prevent condensation in the microprocessor, the fan runs continuously when the unit is plugged in to a live outlet.

4.3.1 Emergency Power Supply

If you purchased an ATL-2000 with automatic battery backup, the additional plug must be connected to the emergency power supply (see additional instructions with unit).

4.4 Installation Check List

- √ Processor leveled correctly (sec. 3.1).
- √ Drain line connected (sec. 3.5).
- √ Water supply hoses connected and valves open with no leaks (sec. 4.2).
- √ Processor connected to a grounded outlet (sec. 4.3).

5. Operation

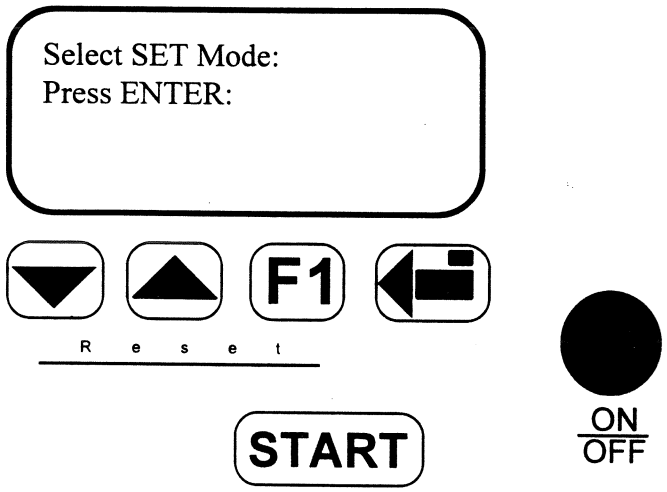
Perform a trial run with test film before processing any "real" film or chemistry.

5.1 Water supply

Open the cold and tempered water supply valves feeding the machine.

5.2 Turning on the processor

Switch the processor ON using the ON/OFF button. The display will read the following:



The unit starts filling with water within a few seconds, and automatically maintains the correct water bath level.

5.3 Setting the tempered water supply

The temperature of the incoming tempered water must be maintained at the temperature of the process. The ATL-2000 has a built-in heat exchanger that will smooth out fluctuations in temperatures of the rinse water within ± 0.5°C.

Refer to your water panel instructions to set the temperature of the rinse water. JOBO recommends the use of water panel #4189 which was specifically designed for the operation of JOBO products.

5.4 Filling the chemical bottles

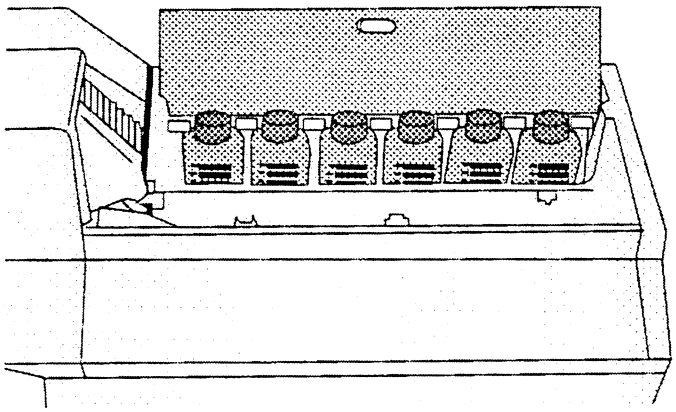
Lift the front lid to access the six in-line bottles. Unscrew the bottle caps and pour in your chemistry. The maximum capacity of the bottles is 1 liter each. Do not fill above the air pressure line grommets.

The quantity in the bottles must be entered into the processor's memory as explained in section 7.4. Screw the caps back on to the bottles tightly. If the bottle caps are not tight or cross-threaded too little or no chemistry will be pumped and the film or paper will be improperly developed. (The processor will warn you if no chemicals are pumped on any volume over 140ml.) Make sure the air distribution lines fit snugly into the rubber grommets and the chemical lines are completely on the grey tube coming out of the bottle.

Do not overfill the bottles. If the bottles are over-filled, the chemistry may siphon into the unit. Do not use the top of the Autolab as a resting place for coffee, chemistry, or any other liquids. If they were to spill, the moisture could damage the electronics.

5.5 Filling the rear storage bottles

The ATL-2000 includes six additional 1 liter bottles for to pre-tempering chemistry. Lift off the back bottle cover and remove the bottles. Fill the bottles with the chemistry you want to preheat, place them back in the processor, and reposition the bottle cover.



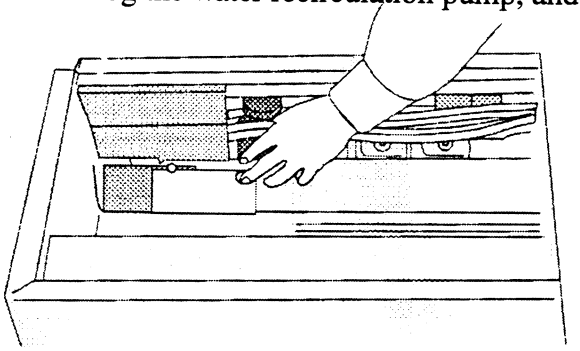
Hint: Write the name of the chemical, who mixed them, and the date they were mixed on the bottles. A grease pencil works well for this.

5.6 Adjusting the water level

On the front, right-hand side of the water trough, there is a sliding panel with a stainless steel screen. Sliding the panel to the left (open) will increase the water drainage and lower the upper trough water level. Sliding it to the right (close) will raise the rotation bath water level. Set the water level so the bottom of the drum being used is covered with approximately 1/4" of water.

The water level needs to be changed every time a different tank or drum system is used. If the water level is set too high the tank floats off the rollers, uneven development will occur because the chemistry will pool at one end. If the level is set too low, the tank will not be heated properly.

Clean the stainless steel screen filter as needed. Operating the processor with a clogged filter may cause the water level to be too high. Operating the processor without the filter screen will cause debris to clog the water recirculation pump, and may damage the processor.

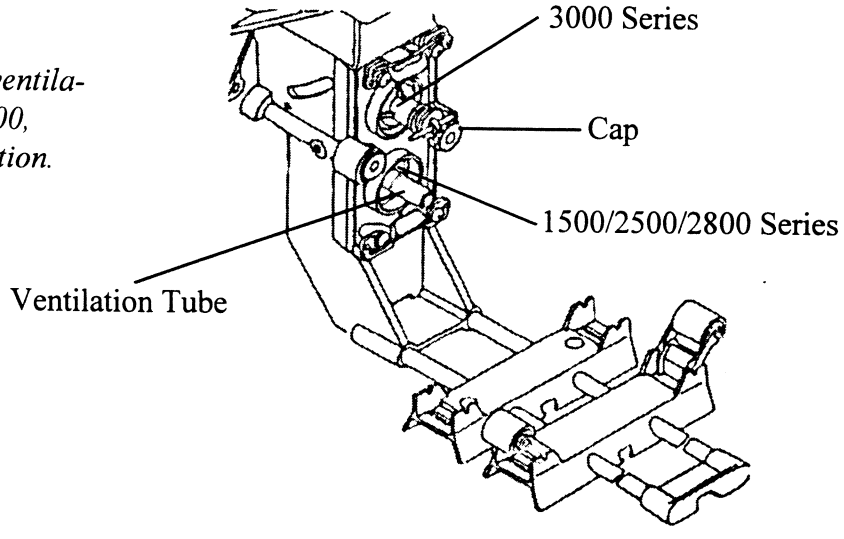


View from the back of the processor

5.7 Tank and drum systems

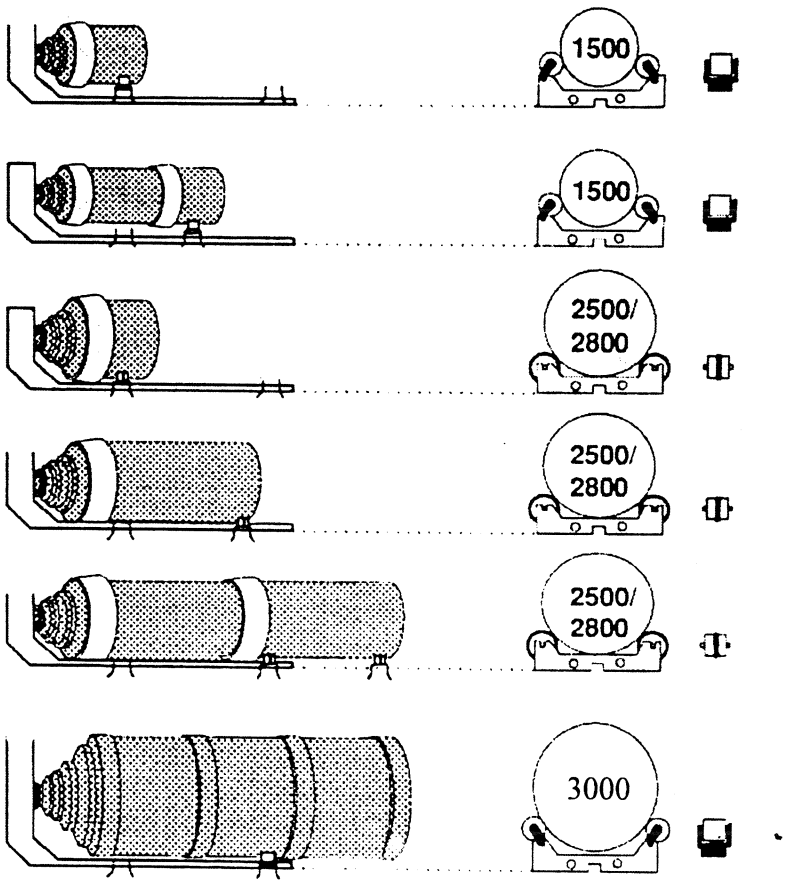
JOBO produces a variety of tanks and drums you can use, depending on the format sizes of your film and paper. JOBO tanks and drums are attached to the processor with a coupler on one side of the rotation trough. The coupler uses a ventilation tube, and a cap. If you are using 1500, 2500, or 2800 series tanks, the cap goes on the top tube and the ventilation piece fits in the lower tube. If you are using the 3000 series drums the cap goes on the bottom tube, and the ventilation tube on the top tube.

Illustration show cap and ventilation tube positioned for 1500, 2500, or 2800 series operation.



5.8 Setting the roller supports

The positions of the rollers, roller extensions, and bases are illustrated here. Note that the roller with the black O-ring is only used with the 2500 and 2800 series tanks.



5.9 Automatic cooling

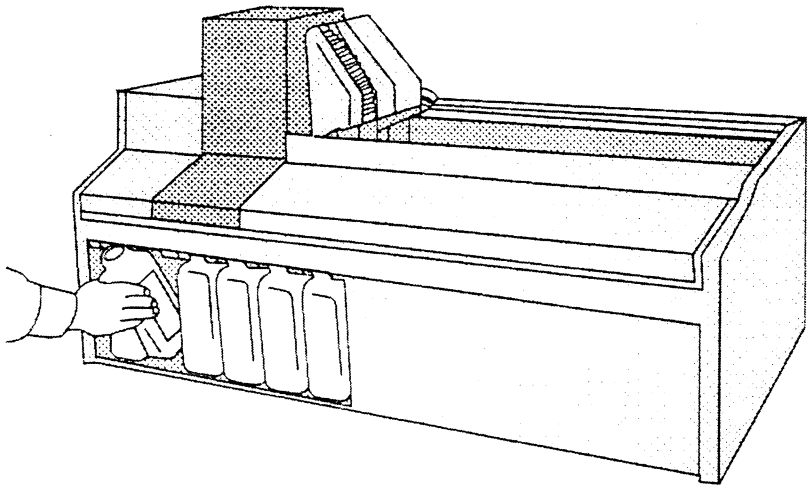
The water bath is cooled automatically until the correct developing temperature is reached. When the water bath temperature rises higher than the selected process temperature the cold water solenoid opens to let in cold water. The cold water solenoid opens approximately 30 seconds after the water bath temperature has exceeded the processing temperature.

If your cold water supply is warmer than the selected process temperature, you will have to purchase a water chiller. Contact your local photographic dealer.

Hint: If you want to cool the processing temperature from a high level to a low level you should turn off the machine, drain the water bath, turn on the machine, and select the new process. This procedure will save time and water.

5.10 Collection of used chemistry

The ATL-2000 is designed so all chemistry can be individually collected in 1 liter bottles.



If the support table (#4221) is used with the collecting cart (#4225), the chemistry can be routed to 15 liter containers below the unit. Many options used in the reclamation process are explained starting on page 18.

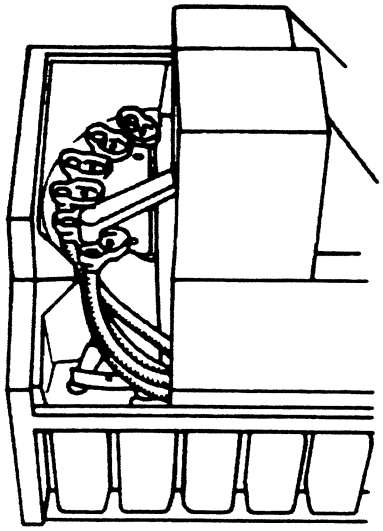


Illustration #1

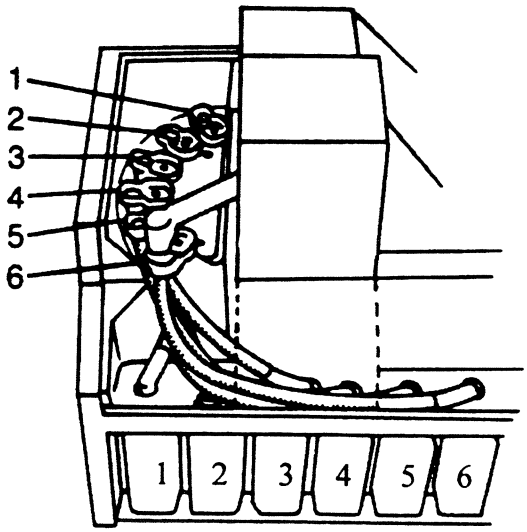


Illustration #2

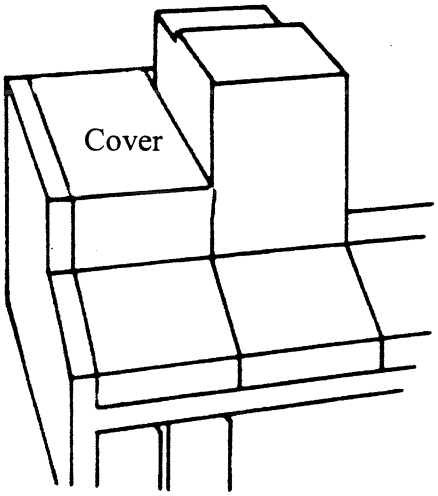


Illustration #3

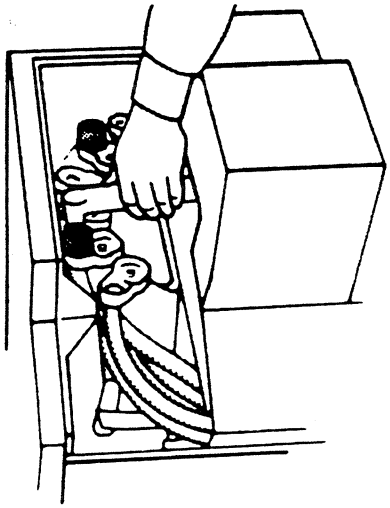


Illustration #4

The ATL-2000 can be configured to reclaim certain chemical steps, and route others to the drain. This setting is accomplished by limiting the movement of the internal drain arm. Two black, mushroom shaped caps (#16247) are included with the processor. As shown in illustration #4, the caps can be placed over the holes. The caps are designed to limit the movement of the drain arm, not to prevent chemistry from going into the holes. Refer to page #17 to determine the correct placement of the caps.

When the cover is removed from the drain area (it is shipped with the cover removed), the processor will look like illustration #1. The six holes in the drain area connect to openings over the six bottles recessed in the front of the processor (see illustration #2). The drain arm (black spigot) moves in conjunction with the process steps from back to front. The rinse steps are drained between the holes.

The following table illustrates the different cap formations you can specify:

Which bottle(s) to claim	Which hole to cap	Position of drain arm
None	One cap on 6	In front of cap
All	No caps	N/A
1	One cap on 2	Behind cap
1-2	One cap on 3	Behind cap
1-3	One cap on 4	Behind cap
1-4	One cap on 5	Behind cap
1-5	One cap on 6	Behind cap
2	Caps on 1 and 3	Between caps
2-3	Caps on 1 and 4	Between caps
2-4	Caps on 1 and 5	Between caps
2-5	Caps on 1 and 6	Between caps
2-6	One cap on 1	In front of cap
3	Caps on 2 and 4	Between caps
3-4	Caps on 2 and 5	Between caps
3-5	Caps on 2 and 6	Between caps
3-6	One cap on 2	In front of cap
4	Caps on 3 and 5	Between caps
4-5	Caps on 3 and 6	Between caps
4-6	One cap on 3	In front of cap
5	Caps on 4 and 6	Between caps
5-6	One cap on 4	In front of cap
6	One cap on 5	In front of cap

Note: Government regulations can affect your right to put photo chemistry into your drains. Consult the proper authorities for any regulations before draining your chemistry.

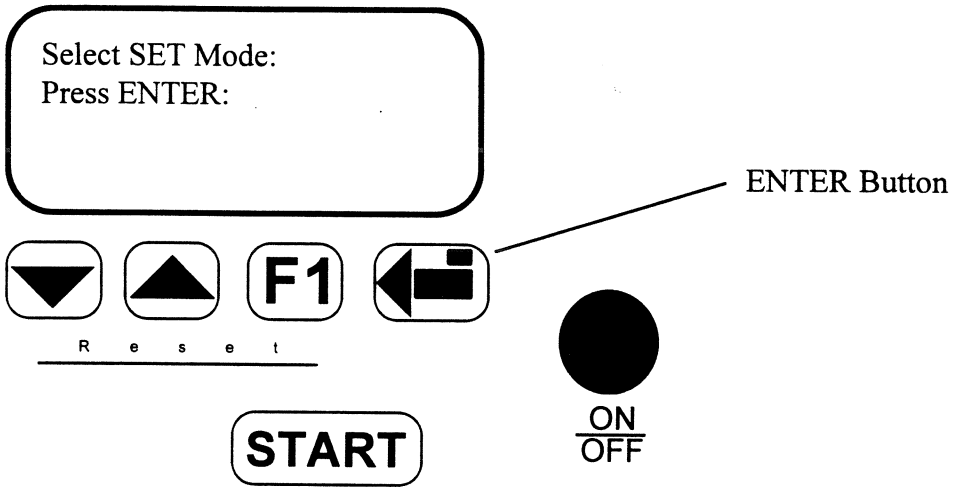
6. Programming in SET mode

6.1 General information on programming

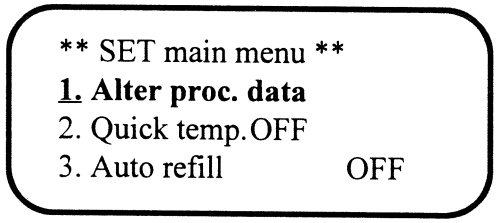
Each ATL-2000 has been pre-programmed with standard processing times and temperatures for all the traditional processes. The pre-programmed processes are specified in Section 10.10. The ATL-2000 is fully programmable, so you can change any of the preset processing parameters at any time.

6.1.1 Altering a process (SET mode)

Items specific to a process (temperature, chemical and rinse times, etc.) can be changed in SET mode. Access SET mode by RESETing the processor (press down arrow, up arrow, and F1 simultaneously). When the following message is displayed, press ENTER.



The display will change to the following:



Press the down arrow key to scroll through the options. The remaining options are:

4. Rinsing Opt.	OFF	9. Alter code no.	
5. Vol. leftovr.	SEP	10. Language	**GB**
6. Vol Transp.	MAN	11. LCD Lighting	100%
7. Temp. sens.	F1 B:0	12. Cursor	
8. Heat exch.	W/O	13. List of Errors	

All 13 options are explained in the following program sections 6.2.1 - 6.2.13.

6.2.1 Altering process information

Select option 1 while in the SET main menu (Alter Process Data) and press the ENTER key. The display will change as follows:

```
** Alter process data **
1. Process no:      1
2. Pr. name         C-41 PHO
3. Bottle batt:     FR.
```

Pressing ENTER here will move the cursor as follows:

```
** Alter process data **
1. Process no. 1
2. Pr. name         C-41 PHO
3. Bottle batt.     FR.
```

You can now use the up and down arrows to choose which program (1-12) to modify. After choosing the program you want to modify, press ENTER again to return to the numbered options at the left.

Press the down arrow one time to move to the process name, and the display will change to the following:

```
1. Process no.      1
2. Pr. name:        C-41 PHO
3. Bottle batt:     FR.
4. Pr. temp.        38,0°C
```

"Pr. name" refers to the process name. The name can be changed to whatever you would like to call it up to eight characters long. All upper and lower case letters, as well as punctuation marks can be used.

To change the name press ENTER while at position 2. Using the up and down arrows will change the character, and pressing the ENTER key will advance you through the eight characters. While positioned at option number 2 press the down arrow to move to option 3.

```
2. Pr. name:        C-41 PHO
3. Bottle batt:     FR.
4. Pr. temp.        38,0°C
5. Preheat.         5:00
```

"Bottle batt." refers to whether the chemistry will be pumped from the front set (battery) of bottles or the rear set. **This option is available on the ATL-3000 only.** Press the down arrow to advance to option 4. The display will change as follows:

3. Bottle batt:	FR.
4. Pr. temp.	**38,0°C**
5. Preheat	5:00
6. Pre-rinse	0:00

"Pr. Temp." refers to the process temperature. Press the ENTER key to change the temperature. You can specify any temperature between 20.0 and 49.9 degrees centigrade. Pressing the ENTER key will advance you through the digits of the temperature. Use the up and down arrows to change the values of each individual digit (while you are positioned on the digit). While positioned on option 4, press the down arrow to move to option 5. The display will change to the following:

4. Pr. temp.	38,0°C
5. Preheat	**5:00**
6. Pre-rinse	0:00
7. Chemical 1	6:30

Use the ENTER key to position the cursor under the first digit of the time. You can then use the up and down arrows to change the values, and use the ENTER key to move to the next digit. Any time can be programmed from 00:00 to 99:59. If you specify 00:00 as the time, the step sill be skipped. **Refer to section 9 for processing times.**

The rest of the values from "6. Pre-Rinse" to "18. Rinse 6" can be set the same way you set the "5. Preheat" time. In determining the process times you want to use, remember that if a chemical manufacturer specifies "*3-30 second rinses*" you should set the time for the total (*01:30*). The ATL-2000 accounts for the time needed to drain the chemistry, you should not add any extra time to a process step to try to account for the draining times.

After the final rinse (rinse 6), press ENTER at "19. Interrupt" to return to SET main menu.

6.2.2 Quick tempering

While in SET main menu (sec.6.1.1), move the cursor to option "2. Quick Temp: OFF" and press the ENTER key. The display will change to the following:

1. Alter process data	
2. Quick temp:	**ON**
3. Auto refill:	OFF
4. Rinsing opt.	OFF

When the quick tempering feature is on a "U" will appear in front of the temperature in the operational display. This feature reduces the amount of time it takes to heat the chemistry by about 80%. However, using the quick tempering feature reduces the accuracy of the chemistry temperature from 0.1°C to 0.3°C. You should not use the quick tempering feature if there is less than 800ml of chemistry in the bottles due to a "layering" effect it can have (uneven heating of the chemistry).

You should never process film or paper with the feature engaged. Use it to warm up the chemistry, then turn it off.

6.2.3 Auto refill

This function is available on the ATL-3000 Auto-refill models only.

6.2.4 Rinsing option

While in SET main mode (sec. 6.1.1), move the cursor to option "4. Rinsing opt." and press the ENTER key. The display will change to the following:

3. Auto refill:	OFF
4. Rinsing opt.	**ON**
5. Vol. leftovr.	SEP
6. Vol. transp.	AUTO

When the rinsing option is engaged, the water from the last rinse cycle of the final rinse step will not be drained from the tank. Uncouple the tak and manually pour the water down the drain. The function is designed to prevent partial drying of films or prints in the event you are unable to remove the material within ten minutes after the process has finished.

6.2.5 Remaining chemical volume

While in main SET mode (sec. 6.1.1), move the cursor to option "5. Vol. leftovr: SEP" and press the ENTER key. The display changes to the following:

4. Rinsing opt.	OFF
5. Vol. leftovr:	**JOIN**
6. Vol. transp:	AUTO
7. Temp sens.	F1 B:0

Press ENTER again to change the setting back to SEP.

SEPARATE: This is the standard setting. When the processor pumps chemistry, it tracks the remaining chemical volume in the bottles for *each specific process*.

JOINED: With this setting, the processor will deduct the chemical volume used from all the processes *regardless of the process chosen.* It is primarily useful in the following scenario: You have processes 1-3 set up with an E-6, E-6 push 1, and an E-6 push 2. Regardless of the program you choose to run (1-12), the processor will deduct the chemistry used from every process. You won't have to reset the remaining chemical volume every time you switch processes.

6.2.6 Chemical quantity to pump

While in main SET mode (sec. 6.1.1), move the cursor to option "6. Vol Transp" and press ENTER. The display will change to the following:

5. Vol. leftovr.	JOIN
6. Vol. transp.	**AUTO**
7. Temp sens.	F1 B:0
8. Heat exch.	W/O

When the MANUAL setting is activated, you can select the chemical volumes to use based on several predetermined quantities in the operational display.

When the AUTOMATIC setting is active, you select which tank you have loaded the film into and whether or not the reels are loaded externally only or both internally and externally. The AUTO function can only be used with the 2500 series tanks. The rotation speed will be set at 75rpm (in the operation display). See section 8.5 for more information.

6.2.7 Temperature sensors

While in SET mode (sec. 6.1.1) move the cursor to option "7. Temp Sens F:1 B:0". This function is for display only. The two possible displays are:

F:1 B:0	1 sensor in front, no sensors in back (back sensors on ATL-3000 models only)
F:2 B:0	2 sensors in front, none in back.

The unit automatically detects whether 1 or 2 sensors are installed. When only 1 sensor is installed, it can be used in any of the six bottles. If two sensors are installed, the first sensor must be in bottle 1 and the second in any other bottle. If there is a chemical step programmed in bottle 1, the first sensor will be the one used. If there is no chemical step programmed in bottle 1, the second sensor will be the one in use.

6.2.8 Heat exchanger

This function is only available in the ATL-3000.

6.2.9 Code number

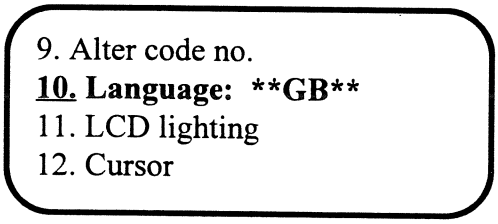
While in SET main mode (sec 6.1.1), move the cursor to option "9. Alter Code no." and press ENTER. You can now select a code number to prevent access to the programming menus. The code number can be set using the up and down arrows to any number from 1-9.

When you have chosen a code number, the processor will prompt you for the number whenever you attempt to enter SET mode.

You do not have to set a code number! If you don't want a code number, set the code to "0".

6.2.10 Language

While in SET main mode (sec. 6.1.1), move the cursor to option "10. Language" and press ENTER. The display will change to the following:



Press the ENTER key to toggle through the five possible languages. The processor can be operated in English (GB), Spanish (E), French (F), Italian (I), or German (D).

6.2.11 LCD lighting

While in SET main mode (sec. 6.1.1), move the cursor to option "11. LCD Lighting" and use the ENTER key to choose how bright you want the panel to be illuminated. You can choose from OFF (if processor is installed in your darkroom), 10%, 90%, or 100% illumination.

6.2.12 Cursor display

While in SET main mode (sec. 6.1.1), and press the ENTER key. Move the cursor to option "12. Cursor" and press ENTER. You can specify the cursor to be displayed as a solid underline, or a blinking square.

6.2.13 Errors

While in SET main mode (sec. 6.1.1), move the cursor to option "13. List of Errors" and press ENTER. The ATL-2000 will display the errors it has encountered during the last process run. The errors are self-explanatory.

6.2.14 Interrupt

Option 14 of SET main menu is used to end the editing session and proceed to RUN mode.

Tank Number	Disc	110	135	120	220	Chemical Volume
1510	-	4	1		-	140ml
1520	-	**8**	**2**	**2**	**1**	**240ml**
1530 (Module)	-	12	3	4	2	330ml
1540 (1510 & 1530)	-	**16**	**4**	**4**	**2**	**470ml**
1520 & 1530	-	20	5	6	3	570ml
1510 & 1530 & 1530	-	**26**	**7**	**8**	**4**	**800ml**
1520 & 1530 & 1530	-	32	8	10	5	900ml
1517 (Disc tank)	**17**	-	-	-	-	**400ml**

2500 System - Film Quantity / Chemical Volume Chart

Tank Number	35mm/36exp	1x 120	2x 120	220	70mm / 5'	4x5"
2523 or 2521	2 / 270ml	1 / 170ml	2 / 270ml	1 / 270ml	1 / 330ml	6 / 270ml
2553	5 / 640ml	3 / 330ml	6 / 640ml	3 / 640ml	2 / 730ml	12 / 560ml
2560 Module	6 / 850ml	4 / 400ml	8 / 850ml	4 / 850ml	3 / 1000ml	12 / 730ml
2563	6 / 850ml	4 / 400ml	8 / 850ml	4 / 850ml	3 / 1000ml	12 / 730ml
2583	8 / 1250ml	5 / 620ml	10 / 1250ml	5 / 1250ml	N/A	18 / 1000ml
2593	12 / 1500ml	N/A	14 / 1500ml	7 / 1500ml	N/A	24 / 1250ml

Use the autofill option, see Sec 6.2.6

2800 System Print Drum Chart

Drum Number	4x5"	5x7"	8x10"	11x14"	16x20"	20x24"	Minimum Chemical Volume
2820	2	-	-	-	-	-	40ml
1526	-	-	1	-	-	-	50ml
2830	-	4	2	-	-	-	100ml
2840	-	4	2	1	-	-	120ml
2850	-	8	4	1	1	-	200ml
2870	-	4	2	-	-	-	100ml
3062	-	6	3	2	-	-	210ml
3063	-	12	6	2	1	1	300ml

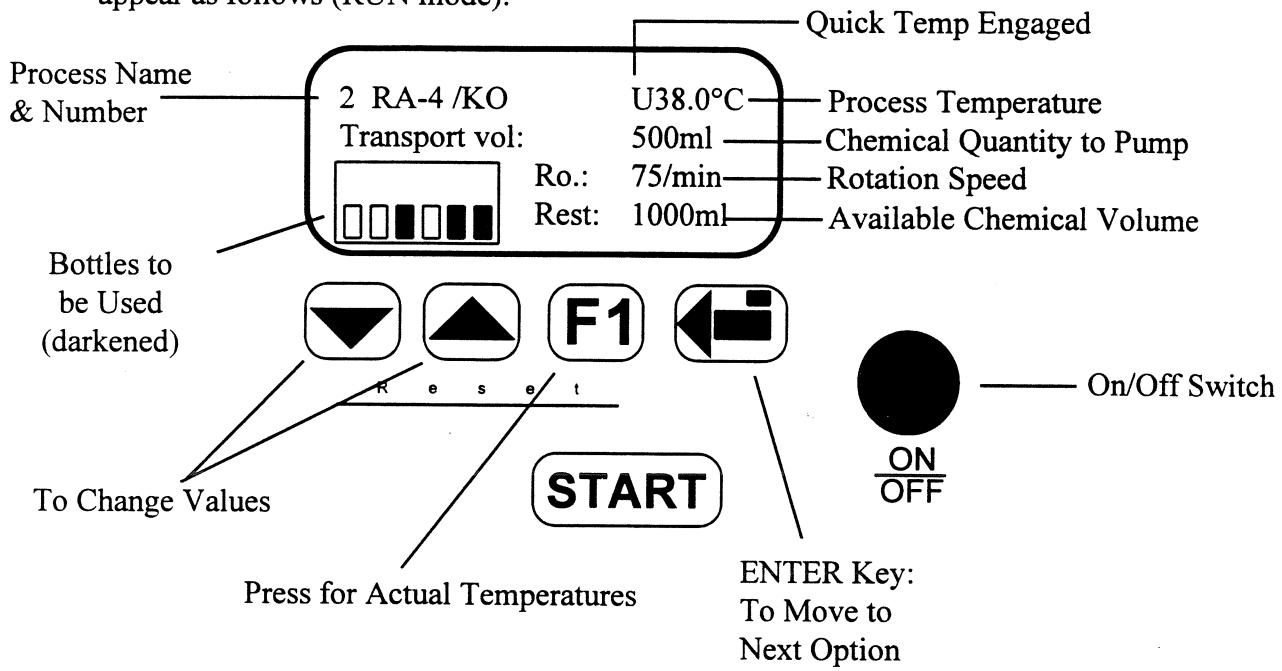
Expert Drums

Drum Number	Film & Print Capacities	Chemical Volume
3004	Four 8½x12", 8x10", 5x7"	270ml to 1500ml
3005	Five 8x10" or 5x7"	270ml to 1500ml
3006	Six 4x5" or 5x7"	210ml to 1000ml
3010	Ten 4x5"	210ml to 1000ml
3360	Accessory Footpump	N/A

7. Running a process

7.1 Selecting the correct process

Turn the ATL-2000 on and wait for the processor to complete its self-diagnostic testing. When it has completed the tests, it will end in the operational display. The display will appear as follows (RUN mode):



7.2 Selecting the chemical quantity to use

Read the label on the tank or drum to determine the correct amount of chemistry needed to develop the film or paper. When using multiple tank modules, add the quantities for the correct chemical amount. If the chemical amount required does not appear as an option, use the next highest chemical volume.

Note: The quantities listed on the tank and drum labels are the minimum needed. Some processes may require higher volumes for proper results.

Move the cursor to "Rest" by pressing the ENTER key and adjust the level with the up and down arrows. When using the 2500 series tanks, you can select "Automatic Supply Quantities" (see sec. 6.2.6). To help you choose the correct tank or drum system to use, please refer to the diagrams on the proceeding page.

7.3 Rotation speed

While in RUN mode, move the cursor to "Ro." by pressing the ENTER key. You can adjust the rotation speed to 25, 50, or 75 R.P.M.. Use the following information to determine the rotation speed:

25rpm	Special Processes
50rpm	Expert Drums, 3000 series.
75rpm	1500/2500/2800 series tanks and drums.

The R.P.M. settings for the motor are calculated as if the drum were moving continuously in one direction. The processor slows the motor before reversing direction so the net rotation speed will actually be lower than the setting, which is normal.

7.4 Remaining chemical volume

While in RUN mode, move the cursor to "Rest" by pressing the ENTER key. You must reset this number every time you refill the chemical bottles. The volume can be changed by pressing the up and down arrows. All bottles must have the identical amount of chemistry in them. If the bottles are full, you can press the up arrow for two seconds to set the "Rest" volume to 1 liter automatically.

7.5 Final check list

After attaching the tank to the processor, please go through this final check list before starting a process:

1) Have you selected the correct program?
2) Have you set the proper chemical volume to be used?
3) Is the rotation speed correct?
4) Is the chemical volume listed under "Rest" correct?
5) Is the unused spout on the lift arm capped, and the ventilation tube on the used spout in place?
6) Are the bottle caps screwed on correctly?
7) Are the rollers and roller extensions set correctly?
8) Is the water bath level set correctly? (It should cover the bottom 1/4 inch of tank.)
9) Are the cold and tempered water supply lines open?
10) Are the reclamation bottles empty enough to collect the chemistry from this process?
11) Are the bottle covers on the processor?

7.6 Starting the process

The process can be started from anywhere in the Operation Menu by pressing the START button. The processor will automatically check the following conditions before starting the process to ensure they are correct:

Sufficient chemistry to run the process (based on the amount displayed in REST).
Drum motor is functioning normally.
Level of the recirculating water bath is correct.
Temperature of chemistry and water bath are within tolerance.

When you press START, the processor will automatically start when all the parameters are correct. Once the process has started, it is not possible to change any of the processing parameters. Should a problem arise in the middle of a process the processor can be RESET by simultaneously pressing down arrow, up arrow, and F1 keys.

IMPORTANT!

The lift arm is raised and lowered during the course of any process. Do not allow anything to impede the raising or lowering of the lift arm. Failure to comply may cause serious damage or injury. Should something become trapped under the lift arm as it is lowering, do the following:

1) Activate RESET (down arrow, up arrow, and F1 keys simultaneously).
2) Press ENTER to manually raise the lift arm using the up and down arrows.

If necessary, the processor can be turned off when the lift arm is raised.

In the event of a power interruption, the processor will automatically return to the exact time and step displayed when the power failure occured. It will then continue with the rest of the process.

7.7 After the process

At the end of a process, an audible beep will sound until the processor is RESET. If any errors have occurred the message "F1 for error list" will appear on the display. Press the F1 key to display the errors recorded during the process run.

You can also access the error list from the SET main menu (sec. 6.2.13).

8. Special Functions

8.1 Reading the actual temperatures

When in the Operational Menu, you can press the F1 key to display the current water bath and chemical temperatures. The chemical temperature displayed always reflects the sensor in use for the currently selected program.

8.2 Overriding the temperature setting

If you decide to run a process without the water and/or chemical temperatures being correct, you can override the sensors. Pressing START while the processor is waiting to heat up will cause the following message to be displayed:

> Process temperature
> not yet reached:
> Forced start:
> Press START

Pressing START with this message displayed starts the process regardless of the actual temperatures.

Note: Running a photographic process out of the recommended process temperature can ruin paper or film.

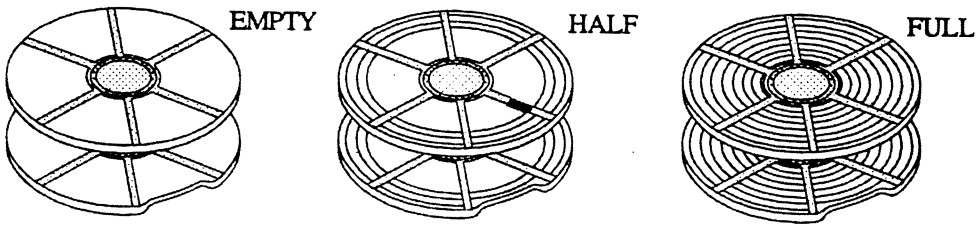
8.3 Quick tempering

After the chemical bottles are refilled, the processor will not start a new process until the temperature of the chemistry is within ± 0.3°C of the process temperature. In order to speed the process of heating the chemistry you can cause the processor to heat the water bath beyond the process temperature temporarily. Enter main SET mode (sec. 6.1.1.) and choose option 2 (see sec. 6.2.2), press ENTER to turn Quick Tempering ON. When Quick Tempering is ON the tolerance for starting the process is lowered to ± 0.3°C.

The Quick Tempering feature is designed to speed the process of heating the photo chemistry. **Disengage the feature before running any process.**

8.4 Automatic chemical quantity use

For the 2500 series tank system, the AUTO function is an option for selecting the required filling quantity and rotation speed by using the tank number, and the length of the film loaded in the reels. For example: If the reels are loaded with one roll of 120mm film on the outer spirals of the reel, they are loaded to "half". If there are two rolls of 120mm film per reel they are loaded to "full."



Any film that loads past the red clip on a 2502 reel needs the "full" setting to provide adequate rinsing.

For more information regarding the AUTO function please refer to section 6.2.6.

8.5 Raising the lift arm

RESET the processor. The message "Lift arm manually" will appear. Press ENTER. You can now use the up and down arrows to manually raise and lower the lift arm.

9. Specific processing instructions

To minimize the risk of cross contamination when changing from process to process, use the following bottles (1-6) to hold your chemistry:

E-6:	Bottle 1 - FD, bottle 2 - Rev, bottle 3 - CD. bottle 4 - Con, bottle 5 - Bl, bottle 6 - Fx.
C-41:	Bottle 3 - CD, bottle 5 - Bl, bottle 6 - Fx.
B&W:	Bottle 1 - FD, bottle 4 - ST, bottle 6 - Fx.
RA-4:	Bottle 3 - CD, bottle 4 - ST, bottle 5 - BFx.
R-3000:	Bottle 1 - FD, bottle 3 - CD, bottle 5 - BFx.
Ilfochrome©:	Bottle 1 - FD, bottle 5 - BL, bottle 6 - Fx.

9.1 Color Transparency Film Process E-6

(Kodak E-6 and Photo Technology MasterClass Chrome-Six Chemicals)

Recommended Process Times for Kodak E-6 and Master Class E-6: Temp. 38.0°C.

Prewarm	5:00
First Developer	6:30
Rinse	2:00
Reversal	2:00
Color Developer	5:00
Conditioner (Pre-Bleach)	2:00
Bleach	6:00
Fixer	4:00
Rinse	4:00
Stabilizer (Final Rinse)	1:00 (Off processor at room temperature, see below.)

Dry as needed.

If you are using the six step E-6 Chemistry, we suggest you get JOBO's E-6 Handbook (#4192) or Kodak's Manual Z-119.

Reversal solution should be mixed to a 60% solution.

Color Developer is used for a reduced time of five minutes because of the constant agitation.

Stabilizer (or Final Rinse) should be used off the processor and with the film out of the tanks and reels at room temperature. Do not agitate.

Note: Stabilizer contains formaldehyde, a known carcinogen. Use only with good ventilation. It is suggested that you use rubber or neoprene gloves, an apron, and eye goggles.

Kodak E-6 Conditioner was changed to 'Pre-Bleach' and contains the formalin treatment that stabilizes the film. The Stabilizer was changed to 'Final Rinse.' The Final Rinse in the Kodak chemistry does not contain formaldehyde. It is a rinse that contains a surfactant. It acts much like Kodak Photo-Flo, helping to prevent water spots on the film while drying. Do not use Final Rinse as a substitute for Stabilizer in other (non Kodak E-6) processes.

Caution: Stabilizer (or Kodak Final Rinse, or any Photo-Flo type surfactant) should always be used in the following way: Use a dedicated container for the solution. The solution should be stored and used off the processor (at room temperature). Remove the film from the reels before immersing the film in the solution.

Note: If reels or tanks are immersed in these solutions, they will eventually cause processing contamination effects. The reels will become difficult to load. Rinsing or cleaning the reels or tanks after processing will not eliminate this problem.

9.2 Color Transparency Film Process 3-Bath E-6

Photo Technology Chrome-Six 3 Bath

Recommended Process Times for Chrome-Six Three Bath: Temperature 38.0°C

Prewarm	5:00
First Developer	6:30
Rinse	3:00
Color Developer	5:00
Rinse	1:30
Bleach-Fix	10:00
Rinse	4:00
Stabilizer	1:00 (Off processor at room temperature.)

Dry as needed.

Everything that takes place in the full six step E-6 Process also takes place with this three bath process. However, some of the actions of the chemicals are combined in one chemical step. This process has the advantage of fewer items to mix and handle. The disadvantage is fine tuning individual steps is not possible due to combining steps. For most serious amateurs and small volume professional photo processors, the 3-bath chemical is acceptable.

For the action taking place in each of the baths, refer to the Process E-6 six step sequence (section 9.5).

The First Developer is the same for both. The work of the Reversal, Color Developer, and Conditioner is all done in the Color Developer in the 3-bath Chemistry. The work of the Bleach and the Fixer is done in the single bath Bleach-Fix in the 3 bath chemistry.

Note: Stabilizer contains formaldehyde, a known carcinogen. Use only with good ventilation. JOBO suggests you also use rubber or neoprene gloves and apron, and eye goggles.

Chrome-Six (3 bath) Kits do not contain stabilizer. However, we strongly suggest that a stabilizer be used. Failure to use stabilizer will result in rapid fading of the image. A formaldehyde based stabilizer solution should be used. This chemical is manufactured by several chemical manufacturers, or you may purchase the stabilizer from JOBO, part #303627 MasterClass E-6 Stabilizer.

Caution: Stabilizer (or Kodak Final Rinse, or any Photo-Flo type surfactant) should always be used in the following way: Use a dedicated container for the solution. The solution should be stored and used off the processor (at room temperature). Remove the film from the reels before immersing the film in the solution.

Note: If reels or tanks are immersed in these solutions, they will eventually cause processing contamination effects. The reels will become difficult to load. Rinsing or cleaning the reels or tanks after processing will not eliminate this problem.

9.3 E-6 Process Control

Each type of slide film has its own color characteristics. Colors can change from one emulsion batch to another within certain film types. Using test exposures and test developing, it is possible to optimize processing control for a specific emulsion batch. For critical applications, buy a large batch of a specific emulsion number. Fine tune your process for this emulsion. Another method of correcting color balance of films is to use correcting filters on the camera lens. JOBO recommends the use of the E-6 handbook (#4192) when processing E-6 film.

9.4 Push-Pull Processing for six or three step E-6 processes

Changing the first developing time causes a change in the following way:

A 'Push' of one F-stop (2 x ASA) is obtained by a 30% increase in first developer time.

A 'Push' of two F-stops (4 x ASA) is obtained by an 80% increase in first developer time.

A 'Pull' of one F-stop can be compensated for by reducing the first developing time by 30%.

Since using different developing times can cause color shifts, JOBO recommends determining proper 'control' by test developments.

Note: The above push/pull processing information should not be used with Kodak Ektachrome P800/1600 professional film, or Fujichrome 1600. ('Normal' use of these films requires push processing.) We suggest you get specific processing information from the manufacturers, or refer to Kodak Manual Z-119, or Fuji Processing Manual for Process CR-56/E-6.

9.5 E-6 Process description

There are two families of E-6 processing chemistries. The original and standard is a six chemical step process. The other family of 'rapid' or 'hobby' type chemistries use three chemical steps. Both families of chemistry will process E-6 type films. The choice of which chemistry type to use revolves around the issues of convenience and control of the process. The three step chemistries are easier to use. You can 'fine tune' a six step process with

adjustments not available in the three step processes. Stabilizer, the final step of the process is not counted in the quantity of steps described above. Hence, a 'six' step process really requires seven chemical steps, and a 'three' step process really requires four chemical steps.

Process Sequence:

Prewarm: Allows the dry film to rise to the process temperature by heating the tank and reels.

First Developer: In the first developer, the exposed silver halides of the film coating are reduced to metallic silver. The first developer represents the most critical phase of the process. Time, temperature, and agitation, as well as storage of the working solutions affects density, contrast, maximum density, and fog.

First Rinse: The first rinse quickly interrupts the development and prevents first developer contaminating the reversal bath (or color developer in three bath chemistry). Insufficient first rinse can lead to changes in density as well as color.

Reversal: The reversal contains a chemical fogging agent that prepares the film for the color developer. Faults in this step can lead to incomplete reversal and a general loss of density. There should be no rinse between the reversal bath and the color developer. The emulsion enters the color developer soaked with the reversal bath.

Color Developer: In this processing step, the remaining silver salts are converted to metallic silver. The oxidized color developing substances react with the film's color couplers and dyes. Changes in the color developer step affect color balance, contrast, minimum and maximum density, and evenness of the development.

Conditioner: In the conditioner, the metallic silver is prepared for the bleach stage. The conditioner maintains the pH value of the bleach by avoiding a carry-over of color developer into the bleach bath.

Note: Kodak has changed some of the chemistry in their E-6 process. The step we are calling conditioner is now called 'Pre-bleach.' The same conditioner actions take place. The work previously done by the formaldehyde in the Stabilizer step (the last step of the process) now takes place in the Pre-bleach step. (As of this writing, only Kodak and L.B. Russell have made this change in the E-6 process.)

Bleach: In the bleach, the metallic silver is transformed to silver halides that are removed by the fixing bath. Changes in the bleach produce the following problems: Silver residue, low maximum density in reds, fogging in yellows, and high maximum density in blues.

Fixer: In the fixer, the silver halides in the emulsion are removed. Insufficient fixer times or incorrect dilution may lead to the following problems: Excessive blue density, and yellow fog, with spots caused by silver halide residues that become visible in low density areas.

Final Rinse: The last rinse removes the remaining chemistry and should be continued for at least 4 to 5 minutes.

Stabilizer: The stabilizer increases dye stability and contains a wetting agent. To avoid drying spots or damage on film surfaces, the stabilizer should be replaced at regular intervals.

Note: Repeated use of stabilizer on plastic reels and tanks can lead to the buildup of a sticky residue. This makes the reels difficult to load and increases the possibility of back contamination (stabilizer contamination of first developer). Rinsing alone will not remove all stabilizer from a reel or tank. Stabilize your film off the reel in a tray or tank used only for stabilizer. Failure to use stabilizer will result in rapid fading of images. (In Kodak six step E-6, Pre-bleach and Final Rinse meet the chemical need for image stability.)

9.6 Color negative film process C-41

Kodak Flexicolor, Photocolor II, Photocolor FP

Recommended Process Times for Kodak C-41 and Photocolor II: Temperature 38.0°C. (100.4°F):

Process Step	Kodak	Photocolor II
Prewarm	5:00	5:00
Developer	3:15	3:15
Bleach	6:30	Do Not Use
Rinse	3:00	Do Not Use
Fixer	6:30	Do Not Use
Bleach-Fix	Not Used	10:00
Rinse	4:00	4:00
Stabilizer	1:00	1:00
Dry	As Needed	As Needed

Recommended Process Times for Photocolor FP: Temperature 38°C (100.0°F)

Process Step	All Except Fuji film	Fuji film only
Prewarm	5:00	5:00
Developer	3:15	3:15
Conditioner	Do Not Use	5:00
Rinse	Do Not Use	5:00
Bleach-Fix	6:00	6:00
Rinse	4:00	5:00
Dry	As needed	As needed

Process Sequence for Kodak Flexicolor and Photocolor II:

Prewarm: The tank and film are warmed to the process temperature.
Color Developer: Contrast and density are determined by color development.
Bleach: In the bleach, the metallic silver is converted to silver salts to be removed by the fixing bath.
Rinse: The bleach is removed from the film.

Fixer: In the fixer, the silver converted by the bleach, and all remaining silver salts are removed from the film.
Rinse: The rinse washes out the remaining chemistry and should be at least four minutes long.
Stabilizer: The stabilizer serves as a wetting agent, preserves the dyes, inhibits bacteria, and hardens the film.
Dry: As needed.

The above description of the process is for Kodak Flexicolor (C-41) chemicals. However, in the time chart we have included Photocolor II, a C-41 and EP-2 type chemistry sold by JOBO. In this the Bleach and Fix are combined in a single step called 'Bleach-Fix.'
Process Sequence for Photo Technology FP:

Prewarm: The tank and film are brought to the process temperature.
Color Developer: Contrast and density are determined by color development.
Conditioner: For Fuji film only, a conditioner step removes the developer and prepares the film for the bleach-fix. For Kodak, and other C-41 compatible films this step is not necessary or desirable.
Rinse: This is used only with Fuji Film, to remove the Conditioner.
Bleach-Fix: In this step the silver and silver salts are removed from the film.
Rinse: The rinse washes out the remaining chemistry. Rinse for at least five minutes.
Stabilizer: The stabilizer serves as a wetting agent, preserves the dyes, inhibits bacteria, and hardens the film.

Note: Stabilizer contains formaldehyde, a known carcinogen. Use it only with good ventilation. It is suggested that you use rubber or neoprene gloves and apron, and eye goggles.

The Photocolor II and FP Kits do not contain a stabilizer. However, We strongly suggest that a stabilizer be used. A formaldehyde based stabilizer solution should be used. This is manufactured by several different chemical manufacturers, or you may purchase from JOBO, part #303627 Master Class E-6 Stabilizer. Stabilizer should be used outside the processor and at room temperature. Do not agitate.

Photocolor FP is a chemistry that will process both C-41 Films and RA-4 Paper. For simplicity we are treating only the film process in this section. You will find the details about RA-4 in the paper processing section.

9.7 Black and white film process

Black and white film processing is easily done in the ATL-2000. Because there are many film and developer combinations, *you* must determine the times with black and white film processing.

Starting point for black and white processing: Temperature 68°F (20°C) or the temp. recommended by the developer manufacturer:

Pre-rinse	5:00
Developer	X:XX Use your normal time for hand inversion processing, or the film manufacturer's recommended time.
Stop Bath	1:00
Fixer (rapid type)	5:00 Some film and fixer combinations require a longer fix time.
Final Rinse	5:00
Wetting Agent	1:00
Dry	As needed

Process Sequence for Black and white Film:

Pre-rinse: The tank and film are brought to process temperature. The emulsion is completely soaked with water.
Developer: Exposed silver salts are converted to metallic silver. Density and contrast are determined in the developer.
Stop Bath: The stop bath quickly and evenly ceases development. The emulsion is made acidic for the fixer.
Fixer: The fixer removes the unconverted silver salts.
Final Rinse: This rinse removes the fixer from the emulsion. Removal of the fixer is necessary for image permanence.
Wetting Agent: Wetting agent is an optional step that helps film dry spot free.
Dry: As needed.

9.8 Black & White processing in-depth discussion

The type of negative desired in black and white varies with the film, your enlarger (condenser or diffusion type), the developer, and the desired print appearance.

For a condenser enlarger, you would normally want a negative that is a little lower in contrast and density than one for a diffusion enlarger. This factor will affect your developer choice and time.

A five minute pre-rinse of any black and white film works with the developer to produce a negative with manageable contrast and good tonal range. Pre-rinse times shorter than five minutes may produce irregular development, and should be avoided.

With all this in mind, let's set up a typical starting point for your favorite film and developer combination. If you have a developer time that has worked well for you with hand (inversion) processing, start with that time. If you do not have that time, look in the film or chemical manufacturer's information. Get the time they suggest for inversion (hand) processing. Program your processor to work at 20-24°C (68-75°F).

Process Step	Condenser Enlarger	Diffusion Enlarger
Pre-rinse	5:00	5:00
Developer	Hand time or up to 20% less	Hand time or up to 15% less
Stop Bath (2% Acetic Acid)	1:00	1:00
Fixer	5:00 (approx.)	5:00 (approx.)

Final Rinse	5:00	5:00
Wetting Agent	1:00	1:00

Some notes on the process:
You may have to experiment to get the best negatives. To test, expose a roll of film. Use segments of that roll to process at various developing times. This procedure will help to determine the developer time you want without great expenditures of film and time. Often, the hand inversion time is very acceptable, and is an excellent starting point.

Adjust the incoming water temperature so that your pre-rinse and rinse water are at the same temperature as your water bath and chemistry.

Use the fixer time given by the chemical manufacturer for the type of film you have chosen.

If you can't find a recommended fixing time for your fixer and film combination, use this procedure. Place a short length of film in a small container of fixer. Gently agitate the container. Time how long it takes for the film to turn clear. Use twice the time it took to clear as your fixing time.
Hypo-clearing or hypo-eliminator products (such as Speedwash from Photo Technology) may be used to reduce the rinse time required. Use the times and rinses recommended by the chemical manufacturer when using hypo-removing products.

Some important comments on tanks and developers:
All JOBO tanks are labeled with the quantity of solution required to completely cover the film level in that tank. If you process only one roll of film in a two-reel tank, you still have to use the solution quantity specified for that tank. Any lower quantity will be too low to cover the film at the center of the reel. The solution quantity marked on the tank is the minimum quantity - the tank will hold more.

There are numerous black and white film developers on the market. Many different dilutions of these developers can be used. You must pay attention to the developer concentration and quantity of the specific dilution you plan to use. A specific area of film (square inches) will require a specific quantity of developer to process the film properly. If using a more highly diluted developer, test to ensure the quantity of diluted developer used will properly develop your film. Inadequate developer could cause under development. This type of under development cannot be compensated for by extending the developer time.

An Example:
According to Kodak's instructions, 100 ml of Kodak D-76 stock solution will process one roll of 35 mm, 36 exposure film. A popular dilution of D-76 is to mix the stock solution 1:1 with water, and extend the development time. If you use the same quantity for the diluted developer as the original stock developer, the film will be underdeveloped. There is not enough active developer agent in the 1:1 solution to develop the film to the same density as the stock solution. When using a diluted developer, increase the quantity of the developer solution by at least 30%. The correct development time will be different with each dilution. Be sure to refer to the correct time (from the chemistry manufacturer) for the dilution you are using.

You may find that extreme dilutions will require a reduced quantity of film in the tank. This provides enough active developer to finish the development of the film. (An example is one roll of 35 mm film in a two reel tank.)

The 'inversion' quantity of chemistry marked on the tank label is approximately the maximum amount of chemistry the tank will hold. Excess chemistry pumped into the tank will immediately flow out the drain arm.

9.9 Black and white print process

The ATL-2000 can be used for papers and chemistry manufactured by Kodak, Ilford, Agfa, Oriental, etc. JOBO also has a line of black and white chemistry made by Photo Technology.

Process sequence and recommended process times, Temperature 20°C (68°F):

Pre-rinse	0:30
Developer	1:30 (Time will vary with choice of developer)
Stop Bath	0:30
Fix	1:00 (Time will vary with choice of fixer)
Rinse	2:00 (see note below)
Dry	As needed.

Process sequence for Black and White Prints:

Pre-rinse: The drum and paper are brought to process temperature. The emulsion is completely soaked with water.
Developer: Exposed silver salts are converted to metallic silver. Density and contrast are determined in the developer.
Stop Bath: The stop bath quickly and evenly ceases development. The emulsion is made acidic for the fixer.
Fixer: The fixer removes the unconverted silver salts.
Final Rinse: This rinse removes the fixer from the emulsion. Removal of the fixer is necessary for image permanence.
Dry: As needed.

Both the developer and the fix times will vary with the manufacturer's directions for the use of their product.

JOBO paper drums have a chemistry quantity printed on the side stating the minimum amount required to cover the paper during processing.

With black and white paper, there is no chemistry (at recommended dilutions) that would require more solution quantity than printed on the drum. You are safe to use the quantity printed on your JOBO Drum.

JOBO does not recommend processing fiber based print paper in our print drums. The raised ridges on the inside the drums may mark the paper, and rinsing in the drum may not be sufficient.

9.10 Print from color negative process RA-4

(Photocolor FP, Kodak RA-4, and Master Class RA-4)

Recommended processing times and temperatures:

	FP	RA-4
Temp:	38.0°C	35.0°C
Pre-wet:	0:30	0:30
Developer:	2:00	1:00
Stop Bath:	None	0:30
Rinse:	None	0:30
Bleach-Fix:	1:00	1:00
Rinse:	2:00	1:30

Process sequence for RA-4 type paper:

Pre-rinse: The drum and paper are brought to the process temperature. The emulsion is completely soaked with water.
Developer: Contrast and density are determined by development.
Stop Bath: The stop bath ceases the development and prepares the paper for the bleach-fix. For some EP-2 and RA-4 type processes, this step is not necessary. It will not harm the process if used.
Rinse: The rinse removes the stop bath (or developer, if used without stop bath). For some EP-2 and RA-4 type process this step is not necessary. It will not harm the process if used.
Bleach-Fix: In this step the silver and silver salts are removed from the paper.
Rinse: The rinse washes out the remaining chemistry. Rinse for at least one and a half minutes.
Dry: As needed.

Stop bath is not supplied with most color print chemistry kits. You may use Phototechnology Indicol, Kodak Indicator Stop Bath, or any common black and white process stop bath. You may mix your own by diluting acetic acid to about a 2% solution. Stop baths with indicators in them (yellow color) will not stain the print. Acetic acid (28%) diluted at a ratio of 1 part acid to 20 parts water will make a 2% solution.

Note: The FP print process differs from the Kodak and Master Class RA-4. There is no stop bath or rinse after the stop bath. With Photocolor FP, there is no problem with this processing sequence. You may add a stop step and rinse step to this process. It will not harm the processing.

Note: As with all color prints, do not attempt to make any judgment of the colors while the print is wet. Color can only be judged correctly when the print is dry.

If you are now using EP-2 type chemistry and paper, we recommend that you change to RA-4 type materials. The EP-2 process has been phased out of production by Kodak. The RA-4 materials are replacing the older process. For more information on the EP-2 process, call JOBO customer service or read Kodak's manual.

9.11 Color transparency print process R-3000

(Kodak R-3000, and Photo Technology Chrome-R Chemicals)

Making prints from transparencies (slides) using papers manufactured by Kodak, Fuji, Ilford, and others.

Recommended Process Times:

	Chrome-R	Kodak R-3000
Temperature	38.0°C (100.0°F)	34.0°C (93°F)
Pre-rinse	1:00	1:00
First Developer	1:10	1:50
Rinse	2:00	2:00
Color Developer	2:15	3:15
Rinse	1:00	1:00
Bleach-Fix	2:00	2:30
Rinse	2:00	2:30
Dry	As needed	As needed

Process Sequence:

Pre-rinse: The drum and paper are brought to the process temperature. The emulsion is completely soaked with water.
First Developer: In the first developer the exposed silver halides of the paper coating are reduced to metallic silver. The first developer represents the most critical phase of the process. Time, temperature, and agitation, as well as storage of the working solutions affects density, contrast, maximum density, and fog.
Rinse: This rinse quickly interrupts the development and prevents the first developer from contaminating the color developer. Insufficient first rinse can lead to changes in density as well as color.
Color Developer: In this processing step the remaining silver salts are converted to metallic silver. The oxidized color developing substances react with the film's color couplers and dyes. Changes in the color developer step affect color balance, contrast, minimum and maximum density, and evenness of the development. A reversal agent is contained in the color developer.
Rinse: This rinse removes the color developer and should be continued for at least 1 minute.
Bleach-Fix: In the bleach-fix, the metallic silver is transformed to silver halide and is removed.
Last Rinse: The last rinse removes the remaining chemistry and should be continued for at least 2 minutes.

Dry: As needed.

As with all color prints, do not attempt to make any judgment of the colors while the print is wet. Color can only be judged correctly when the print is dry.

With R-3000 type processes, no chemicals are used that would require more solution quantity than that printed on the drum. You can safely use the quantity printed on your JOBO Drum.

9.12 Color transparency print process Ilfochrome© P-30 and P-30P

Color prints from transparencies (slides) used with paper manufactured by Ilford.

Recommended Process Times:

Temperature 24.0°C (75°F)	
Pre-rinse	0:30
Developer	3:00
Rinse	0:30 (Maximum)
Bleach	3:00
Fixer	3:00
Final Rinse	3:00
Dry	As needed

Process sequence:

Developer: The developer is a black and white type developer that contains special additives enabling the formation of a positive silver mask.
First rinse: This rinse interrupts development and avoids the spreading of undiluted developer into the bleach bath. **Do not extend the time of this rinse.**
Bleach: In the bleach, pigment and silver bleaching are completed. The bleach is a highly acidic solution. Handle with care.
Fixer: The fixer, an almost neutral pH, is well buffered to keep the pH value constant. In this bath any remaining silver is removed from the print.
Final rinse: In the final rinse, all chemistry and soluble reaction products are removed.
Dry: As needed.

Note: With Ilfochrome, pay attention to their solution quantity requirements. They are greater than the quantity that the JOBO drum indicates. In all cases you should use the Ilfochrome© recommendations as a minimum amount.

8 x 10" print = 75 ml each; 11 x 14" print = 150 ml each.

10. Technical Troubleshooting

10.1 Troubleshooting, Introduction

You may find that your processing results do not meet your expectations. This section deals with troubleshooting the problems that can occur.

Please note that many errors other than actual processing may appear to be a processing fault. A partial list of these are: Out of date or improperly stored film or paper; over- or underexposure; camera, drum or tank, or darkroom light leaks; exposure of the film or paper to X-rays, microwaves, or some chemical fumes; and incorrect identification of the process required for the material you have exposed.

If it is likely that the problem is in the processing, use this section to determine the most likely source. Only test runs should be made until the problem is resolved.

If you are at a loss trying to solve a processing problem, it may be the local water supply. **Buy bottled, distilled water to mix your chemistry, and try again. This minimal expense can yield great benefits in quality and consistency of the process.**

10.2 Review non-processing errors or faults

Is the film or paper past its expiration date?
Was it properly stored?
Was it properly exposed, or exposed at all, or fogged?
Was the film or paper loaded in the tank or drum correctly?

Was the correct chemistry used for this film or paper?
Is the chemistry past its expiration date?
Was it properly stored?
Was the chemistry mixed correctly?

- Dilution?
- All components mixed in proper order?
- Stirred after each component added?
- All components used for each solution?
- Mixed at the proper temperature?
- Used at the proper temperature?

Was there a chance for contamination in the mixing?

- The graduates or mixing vessels thoroughly washed between the mixing of each step?
- The bottles used for storage thoroughly cleaned before using?
- Drum or tank rinsed after the last process?

Was the mixed chemistry impaired?

Stored properly? (There should be a minimal amount of air over the developer in the storage bottle. It is best if the bottle is full to the rim with no air space.)
Stored too long? (Date the bottle of chemical when mixed, to know how old it is when used.)
Used in the correct order?

Many problems are solved by using the edge markings printed on 35 mm and 120/220 roll film. The marks generally tell the frame or negative number, type of film, and sometimes the emulsion number. This information is pre-exposed on the film during manufacture, and its exposure is correct.

If edge markings appear properly developed on your film, the problem is generally not with processing. Look for difficulties in exposure (camera or light meter problems).

If the edge markings are dull, appear underexposed, or are not fully visible for the length of the film, the problem can be:

Loading or unloading of film in camera.
Loading of film on reel.
Improper storage of the film (excess heat, radiation, or chemical fumes).
Age of film (old film develops a high fog level).
Chemical mixing, dilution, or contamination problems.
Processing errors in time or temperature.

10.3 Processing faults - Color transparency film E-6

Transparency too dark: Increase time or temperature of the first developer. This effect also could be caused by underexposure of the film.

Transparency too light: Decrease time or temperature of the first developer. This effect also could be caused by overexposure of the film.

Transparency too light with a color shift toward blue: First developer contaminated with fixing bath. Clean equipment and mix fresh developer.

Color shift toward blue: Be sure to adjust the reversal bath to a 60% solution. For further adjustments, see the JOBO E-6 Handbook, part #4192, or the E-6 Manuals from the major chemical manufacturers.

Color shift toward yellow: See the JOBO E-6 Handbook, part #4192, or the E-6 Manuals from the major chemical manufacturers.

Strong color shift toward green with insufficient black density: Reversal bath is exhausted. Use fresh reversal. With three step chemistry, replace the color developer, as the reversal agent is incorporated in the color developer.
Yellow spots, high minimum density: Developer contaminated with stabilizer. Clean reels and tanks. See comments on stabilizer in the E-6 Process section.

High minimum density: Sometimes a gray, muddy appearance to the whole slide (silver residue). Silver has been retained in the film emulsion due to inadequate action of the bleach or bleach-fix. Aerate the bleach, and re-bleach and fix to remove the retained silver. Weak conditioner in six bath E-6.

Color shift toward magenta: Increase the time of the rinse after first developer to a maximum of four minutes. Be sure that the temperature of the rinse water is at the processing temperature (adjust the incoming water temperature). Overly cold or hot rinse water can cause color shifts. Aerate the bleach or bleach-fix before starting the process. Increase the color developer concentration by 10%.

Film end closest to center core of the reel is undeveloped, or streaked: Increase the amount of chemistry being used.

10.4 Processing faults - Color negative film C-41

Negative too light: (Not dense enough) Developer old or exhausted. This effect could be from underexposure of the film.

Negative too dark: (Too dense) Developer mixed wrong. This result could also be from overexposure of the film.

No image on film - no edge markings: Check sequence of processing steps. Developer must come before the bleach step. Or developer may be old or exhausted.

No image on film - edge markings are present: Chemical steps of the process are OK, film unexposed.

Film end closest to the center core of the reel is undeveloped or streaked: Increase the amount of chemistry being used.

Negatives more dense toward edges, gradually getting less dense toward center: Reels contaminated with stabilizer. Replace reels. See comments on stabilizer in the sections on E-6 and C-41 film processing.

Film image appears dense, base color of film is very reddish. Long exposure time required for prints, which may have red shadows and cyan colored highlights. Fault is with the bleach or bleach-fix step of the process. Silver residues remain in the film, which creates the high density. It is also possible that a colorless leuco-cyan dye has formed in the image. This results in the red shadows or cyan highlights in a print. Both problems, the retained silver, and the leuco-cyan dye, can be corrected by aerating the bleach (bleach-fix). Then re-bleach, fix, and rinse the film.

10.5 Processing faults - Black and white film

Negative too light: Check camera or light meter for possible exposure problems. Increase the time of developer. Increase the amount of developer.

Negative too dark (dense): Check camera or light meter for possible exposure problems. Decrease the time of developer.

Density streaks or clouds: Developing time is too short. Dilute the developer to a concentration requiring five minutes or more developing time, or change to a different developer.

10.6 Processing faults - Black and white prints

Print too dark: Use a shorter exposure time.

Print too light: Use longer exposure time.

Dark blotches or dark edges on print: Paper has been exposed to light.

Print has light stripes: Processor not level or drum is floating in the water bath. Check the processor with a level. If drum is floating, reduce the amount of water in the bath until the drum rests on the rollers. Also possible insufficient amount of chemical being used. As a minimum, use either the amount recommended by JOBO, or the amount recommended by the chemical manufacturer, whichever is greater.

Print has light stripes running the length of the drum towards the end away from the processor motor: Use a 1 minute pre-rinse.

Print has light stripes that may run lengthwise of the drum, or run around the circumference of the drum: Be sure that the drum and the lid are dry before starting a print. Remove the beaker (light trap) from the lid and dry that as well. This type of mark is almost always caused by droplets of water that get on the paper before the pre-rinse.

Overall gray appearance, lacking contrast and highlight detail: Check safelight. This problem is most often a safelight fog.

10.7 Processing faults - Print from color negative RA-4

The drum and lid must be dry before placing any paper in the drum.

Print is too dark: Use shorter exposure time.

Print is too light: Use longer exposure time.

Black areas of the print are dark blue: Increase developer time or temperature. 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, or drum is floating in the water bath. Check the processor with level. If drum is floating, lower the water level. Insufficient chemistry amount. As a minimum, use either the amount recommended by JOBO or by the chemical manufacturer, whichever is greater.

Print is light or off-color on the end away from the processor motor: Chemistry volume insufficient or drum not level. Check that processor is level. Be sure drum is not floating.

Print has stripes from end nearest processor to end farthest from processor motor: Use 1 minute pre-rinse.

Light spots in print: Bleach-fix contamination. Clean drum and cap assembly carefully.

Color shift when switching from larger to smaller drums: Increase amount of fresh chemistry being used. If practical, be sure that the diameter of the test drum and the print drum are the same.

White in print is impure (often Cyan): Wrong, or too bright safelight is in use. Darkroom is not light-tight. Contamination of the developer with bleach-fix. Rinse drum and lid thoroughly between runs.

Magenta-purple swirls in random pattern across the face of the print: Most often from a carry-forward of the developer into the bleach-fix. Increase the concentration or time of the stop-bath. Use a 30 second rinse after the stop bath step.

10.8 Processing faults - Prints from transparencies R-3000

Print is too dark: Increase exposure time.

Print is too light: Decrease exposure time.

Contrast is excessive, or black areas are green: Reduce time or temperature of the first developer.

Dark areas and colors are uneven: Processor is not level, or drum is floating. Level the processor (See the section on Installing the Processor). If the drum is floating, lower the water level. Insufficient chemistry. As a minimum use the amount recommended by JOBO, or by the chemical manufacturer, whichever is higher.

Print is too dark, and has low contrast and impure blacks: Increase time or temperature of the first developer.

Stripes in print from end nearest to end farthest from the processor motor head: Use a 1 minute pre-rinse.

Print with undeveloped areas (white areas): Processor is not level or drum is floating. Level the processor. Lower the water level if the drum is floating. Chemistry amount is insufficient. As a minimum, use the amount recommended by JOBO or by the chemical manufacturer, whichever is higher.

Print has light to white spots: Paper has been exposed to light.

Black areas of print lack density: The print has a color shift. Exposure to safelight.

Very light print with strong magenta-purple color shift: Contamination of color developer with first developer. Insufficient rinse after first developer. Increase the time in the rinse after the developer.

10.9 Processing faults - Prints from transparencies Ilfochrome©

You must be cautious about the rinse after the developer in the Ilfochrome© process. Do not extend the time of this rinse past 30 seconds.

Brown or yellow spots on back side of print, or red stains on the exposed side of the print: Decrease rinse time after developer.

Spots or streaks - light or completely white: Paper has been exposed to light.

Gray or black spots on print: Processor is not level or drum is floating. Check if processor is level (See section on 'Installing The Processor'). Lower the level of the water bath, if the drum is floating. Chemistry amount is insufficient. As a minimum use the amount recommended by Ilford.

Print has reverse image - too dark, and orange: Paper was exposed through the back side. Expose paper with emulsion side up.

Faint, dark print: Increase developing time.

Black areas lack density, and a color shift: Safelight exposure, or exposure to light. Yellow spots on the print. Developer contaminated by fixer. Rinse and clean drums carefully. You may need to discard developer and mix fresh.

Gradual diminishing of color and density on the print from end nearest processor to end farthest from the processor motor: Level processor, or increase chemical amounts. Check temperatures and process times. Drum is floating in the water bath. Lower the water level until drum no longer floats.

Blue streaks on print: Emulsion has been scratched. Remove from drum carefully. Use less pressure on the print squeegee.

10.10 Factory settings for the programs

1)	Process no.:		1
2)	Process name:		C-41 PHO
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		5:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	3:15
12)	Rinse	3:	0:00
13)	Chemical	4:	1:00
14)	Rinse	4:	0:00
15)	Chemical	5:	10:00
16)	Rinse	5:	5:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		2
2)	Process name:		RA-4 /KO
3)	Bottle Battery:		Front
4)	Process temperature:		35°C
5)	Preheat:		0:00
6)	Pre-Rinse:		0:30
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	1:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:30
14)	Rinse	4:	0:30
15)	Chemical	5:	1:00
16)	Rinse	5:	1:30
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		3
2)	Process name:		C-41 KOD
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		5:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	3:15
12)	Rinse	3:	0:00
13)	Chemical	4:	1:00
14)	Rinse	4:	0:00
15)	Chemical	5:	6:30
16)	Rinse	5:	3:00
17)	Chemical	6:	6:30
18)	Rinse	6:	3:00

1)	Process no.:		4
2)	Process name:		B/W FILM
3)	Bottle Battery:		Front
4)	Process temperature:		20°C
5)	Preheat:		0:00
6)	Pre-Rinse:		5:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	1:00
10)	Rinse	2:	0:00
11)	Chemical	3:	0:00
12)	Rinse	3:	5:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	0:00
16)	Rinse	5:	0:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		5
2)	Process name:		P30/CIBA
3)	Bottle Battery:		Front
4)	Process temperature:		24°C
5)	Preheat:		0:00
6)	Pre-Rinse:		1:00
7)	Chemical	1:	3:00
8)	Rinse	1:	0:30
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	0:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	3:00
16)	Rinse	5:	0:30
17)	Chemical	6:	3:00
18)	Rinse	6:	3:00

1)	Process no.:		6
2)	Process name:		E-6 KOD
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		05:00
6)	Pre-Rinse:		00:00
7)	Chemical	1:	6:30
8)	Rinse	1:	2:30
9)	Chemical	2:	2:00
10)	Rinse	2:	0:00
11)	Chemical	3:	4:00
12)	Rinse	3:	0:00
13)	Chemical	4:	2:00
14)	Rinse	4:	0:00
15)	Chemical	5:	6:00
16)	Rinse	5:	0:00
17)	Chemical	6:	3:00
18)	Rinse	6:	5:00

1)	Process no.:		7
2)	Process name:		E-6 3B
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		5:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	6:30
8)	Rinse	1:	3:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	4:00
12)	Rinse	3:	1:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	10:00
16)	Rinse	5:	5:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		8
2)	Process name:		CHROME-R
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		0:00
6)	Pre-Rinse:		1:00
7)	Chemical	1:	1:10
8)	Rinse	1:	2:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	2:15
12)	Rinse	3:	1:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	2:30
16)	Rinse	5:	2:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		9
2)	Process name:		EP-2 KOD
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		0:00
6)	Pre-Rinse:		1:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	2:30
12)	Rinse	3:	0:00
13)	Chemical	4:	0:30
14)	Rinse	4:	0:00
15)	Chemical	5:	1:30
16)	Rinse	5:	2:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		10
2)	Process name:		EP-2 PM
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		0:00
6)	Pre-Rinse:		0:30
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	1:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:30
14)	Rinse	4:	0:00
15)	Chemical	5:	1:30
16)	Rinse	5:	1:30
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		11
2)	Process name:		US #11
3)	Bottle Battery:		Front
4)	Process temperature:		20°C
5)	Preheat:		0:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	0:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	0:00
16)	Rinse	5:	0:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		12
2)	Process name:		US #12
3)	Bottle Battery:		Front
4)	Process temperature:		20°C
5)	Preheat:		0:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	0:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	0:00
16)	Rinse	5:	0:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

11. Cleaning and Maintenance

11.1 Cleaning at the end of the process

The ATL-2000 carries out a thorough cleaning of the internal chemical supply system automatically.

The chemical bottles require cleaning only when you intend to use different chemistry in the same bottles, or when the unit will be unused for a prolonged period of time. Please read the instructions in the following section to correctly clean the bottles and chemical lines.

11.2 Cleaning programs

The ATL-2000 has three cleaning programs built into the microprocessor. You should run the cleaning programs every time you switch to a different process chemistry, or when the unit has not been or will not be operated for a prolonged period of time.

Program 13 cleans bottles 1, 2, and 3.
Program 14 cleans bottles 4, 5, and 6.
Program 15 cleans all six front bottles.

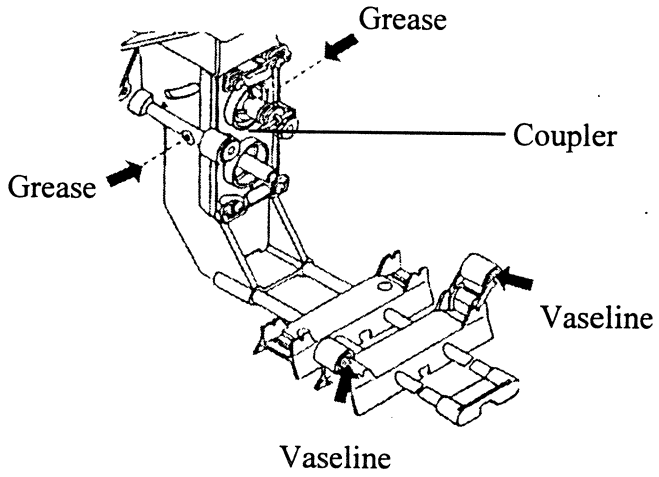
To run a cleaning program, attach an empty film tank capable of holding 1 liter of liquid to the processor. In RUN mode, select which cleaning program you wish to run (13, 14, or 15), fill the corresponding bottles with water, and press start. No fluids pumped during a cleaning program are reclaimed. The cleaning programs take 9 minutes and 30 seconds to run.

Note: While the cleaning program times and temperature can be changed, the changes will not be stored in memory. Do not attempt to run a photographic process in the cleaning programs.

11.3 Lubrication

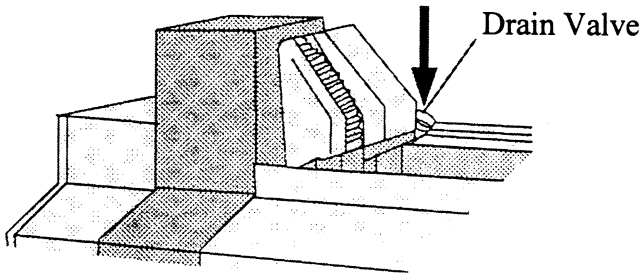
The two white transfer gears on the lift arm require occasional lubrication. A processor used on a daily basis should be greased every three months. Apply the grease with JOBO's syringe (item #95465) at the points marked in the diagram below.

Never apply grease on the coupler.
If a squeaking sound occurs, apply a little vaseline to the connection points of the tanks and drums.



11.4 Cleaning the unit

DAILY! Drain the water bath at the end of the day to reduce algae buildup and possible corrosion from water contaminated with chemistry.



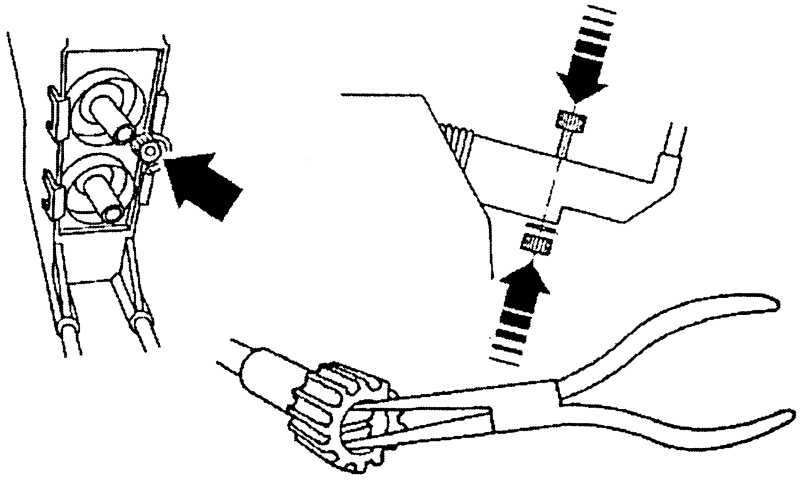
Rinse off the stainless steel screen in front of the water level panel. Do not remove the screen permanently, it protects the water recirculation components from damage.

MONTHLY! Regular cleaning with a damp cloth and a mild detergent is recommended. To help clean the processor use JOBO Processor Clean II (#4135). Processor Clean II is a non-chlorinated powder. At the end of the day, pour in the desired amount of cleaner (after mixing with a little water) as specified on the packet, let run overnight (6 hours minimum). The next morning flush out the processor with water.

Do not use any cleaners containing solvents or chlorine since these will cause the plastic of the trough to become brittle and eventually crack. They may also corrode the heating elements and pump impeller shaft.

11.5 Transfer gears

The gears (#95200) are subject to wear and should be replaced every 6 months or after 500 hours of operation. Two extra gears are included with the processor accessories. If the gears are not replaced on a regular basis, they may break in the middle of a process, causing the loss of your film or paper.



11.6 Preventing algae growth

Do not use any chlorine-based cleaners to control algae growth in the processor. The best way to prevent the growth of algae is to drain the processor water bath every evening. You can also control algae by using Processor Clean II (#4135) or any non-chlorinated algaecide.

11.7 Prolonged periods of inoperation

When you don't intend to use the processor for longer than one month, you should run a cleaning program to wash the bottles out. You should then drain the processor water bath.

11.8 Storage at temperatures below freezing

If the ATL-2000 will be stored in a location below freezing, the following steps should be taken to ensure the processor is not damaged:

1) Drain the water bath.
2) Remove and drain the water supply hoses.
3) Remove and empty the drain hoses.
4) Drain the internal rinse hose and heat exchange coil (contact JOBO for details).

12. After-Sales Service

12.1 Before contacting the service department

Please ascertain the following:

1) Does the actual temperature correspond to the displayed temperature (press F1)?
2) Does the drum motor rotate?
3) Is there enough chemistry to be pumped?
4) Is the processor draining the tank at the end of each process step?

If the answer to all these questions is "yes" and the film or prints are still not developed properly you should contact your chemical supplier to establish the cause of the problem.

5) Does the "F1 for error list" appear at the end of the process?

Write down the messages that appear when you press the F1 key. If possible, correct the errors yourself. If you are unable to correct the processor, contact your dealer or JOBO Fototechnic for service at 800-525-2821. Have your serial number ready, it can be found printed on a silver sticker located on the rear of the processor above the water connections.

We recommend having the processor serviced yearly or at the completion of 1,000 operating hours. To remind you of this suggestion, a message will appear at the completion of 1,000 operating hours to prompt you to call for service.

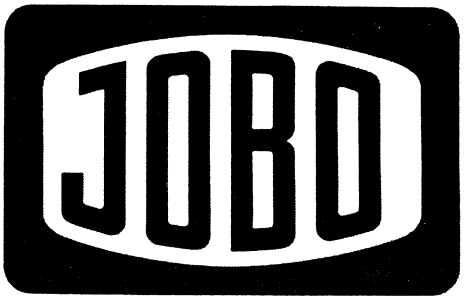
Index

V

W

AutoLab
ATL-3000

Automatic Processor
Instruction Manual



For Your
Best Image

Introducing
The JOBO ATL-3000

Serial Number: _____

Featuring:

Quality

- Fully automatic, microprocessor controlled system.
- Constant, repeatable results from one process to another.
- Each process step accurate to the second.
- Chemical temperature maintained to within ± 0.1° C.

Economy

- Thorough utilization of chemistry.
- Integrated chemical collection system.

Versatility

- Switch from process to process quickly and easily.
- Processes: C-41, E-6, Ilfochrome©, B & W, R-3, RA-4, Lithographic, and X-Ray.
- Standard film formats include: 110, 135, 120, 220, 4x5", 5x7", 8x10", 8.5x11", 9x12". We can also custom build sheet film drums for any film size up to 16x20". Our long roll system includes 8mm, 16mm, 35mm, 60mm, 70mm, 126mm, and 127mm.
- Print formats include 4x5", 5x7", 8x10", 11x14", 16x20", and 20x24".

Operating Instructions

For Serial Number 20000 and up - Current Revision 1.1
Item Number 60120

Table Of Contents

Introduction to your new ATL-3000

Congratulations on your purchase of the JOBO ATL-3000 film and print processor. Please take a moment to complete and return the enclosed warranty sheet. The warranty sheet will register you as a processor owner. This registration will allow us to notify you of product updates and **promotions**.

With your new processor, you will be able to take advantage of a variety of tank and drum combinations to process virtually any film or print format. Your new processor is able to quickly switch back and forth between E-6, RA-4, Ilfochrome©, C-41, Black and White, etc...

Your processor will maintain up to twelve different programs depending on your needs. Its lithium battery protects your programs even if the power is disconnected for months. All the functions of processing your film and prints, except stabilizing and drying, are fully automatic.

The ATL-3000 uses a recirculating water bath to maintain the temperature of all 21½ liters of chemistry, and the tanks, reels, and film or paper to within ± 0.1° C. The rotation of the tank can be set to 25, 50, or 75 R.P.M, depending on the chemical process you are running.

After your chemistry has been pumped, the microprocessor deducts the amount used from the total volume you started with, and will not allow you to start a process with insufficient chemistry. Also, the processor will not start until the chemistry is within ± 0.3°C of the process temperature (unless you decide to override it).

Your ATL-3000 allows you to reclaim spent chemistry in six separate 2 liter containers, or in 15 liter containers with the auto-refill models. The recovery and reprocessing of your spent chemistry makes processing more profitable.

If you have any questions or comments regarding the setup or use of your new processor call us at 800-525-2821 and ask for Customer Service at extension 160.

Technical Information

	ATL-3000 Complete With Water Heater (#4270)	ATL-3000 Complete W/O Water Heater (#4271)	ATL-3000 Table Top (#4272)
Height	48" (122cm)	48" (122cm)	27½" (70cm)
Height with largest drum in highest position	69" (177cm)	69" (177cm)	48½" (123cm)
Length	25" (64cm)	25" (64cm)	25" (64cm)
Width	52" (130cm)	52" (130cm)	52" (130cm)
Weight (empty)	325 lbs. (148 kgs.)	310 lbs. (140 kgs.)	170 lbs. (77 kgs.)
Voltage	220 Volt 50-60 Hz	110 Volt (220V) 60 Hz (50-60 Hz)	110 Volt (220V) 60 Hz (50-60 Hz)
Power Consumption - After warm up.	3500 Watts 800 Watts	1500 Watts 500 Watts	1500 Watts 500 Watts
Amps	16	13 (7)	13 (7)

For All Models:

Minimum Water Pressure: 15 psi (1 bar)

Maximum Water Pressure: 90 psi (6 bar)

Flow Rate: 1.8 - 2.0 gallons per minute

Water Jacket Capacity: 9 gallons (34 Liters)

Temperature Range: 64.4°F-121.8°F (18°C-49.9°C)

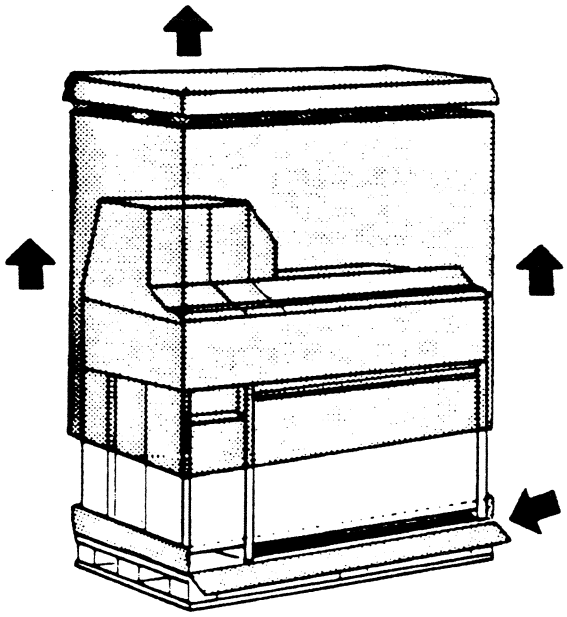
1. Unpacking the unit

1.1 ATL-3000 Auto-refill models (#4270 & #4271)

Note: Move the processor as close to the installation site as possible.

The processors will arrive as illustrated in figure 1. The shipping weight of the unit is approximately 325 pounds (148 kgs). *Use a forklift or pallet jack to move the unit from the end marked "FRONT" while it is in the* ***original packaging***. Lifting from the rear of the pallet can cause serious damage to the processor.

Remove the lid and outer casing as shown in figure 1. Remove the box of accessories resting inside the box on top of the processor and set it aside.



Cut the cardboard floor piece the ATL is resting on at the front two corners (see figure 1), completely exposing the chemical collection cart. Pull the cart out.

You are now ready to lift the ATL-3000 off the pallet. Using the hand holds on the ends of the processor, lift the unit straight up, and set it down where it will be installed. Do not drag the processor across the floor.

Note: It takes at least two people to lift the ATL-3000. The end with the control panel is significantly heavier than the other end.

1.2 ATL-3000 Table Top (#4272)

The ATL-3000 Table Top will arrive at your location as shown in figure 2. The shipping weight of the processor is 170 pounds (77.1 kgs). Remove the lid and outer casing as shown in figure 2. Remove the box of accessories resting inside the box on top of the processor and set it aside.

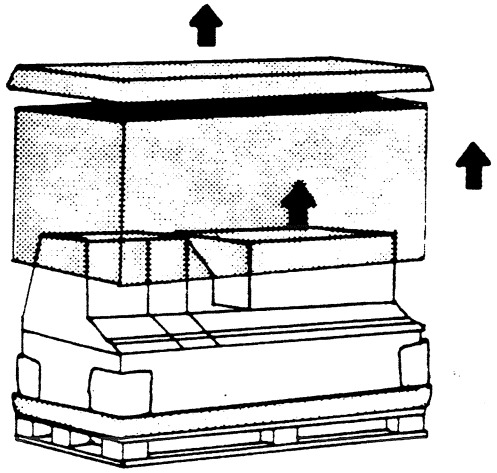


Figure 2

1.3 ATL-3000 Cover assembly

The front and back bottle covers are packaged separately to protect them from getting damaged. The back bottle cover is placed directly over the bottles. There is no latching mechanism for this cover. The front bottle cover can be semi-permanently installed using the two white pins included with the processor as shown in figure 3.

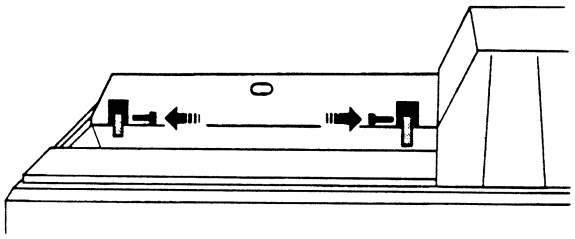


Figure 3

1.4 Shipping damage

Check the processor for any damage caused in shipping. Immediately report any shipping damage to the shipping company or the dealer from which you purchased the processor.

1.5 Packaging

To protect against damage to the processor, use the original packaging material if the unit is to be transported. We do not accept responsibility for damage due to incorrect packaging.

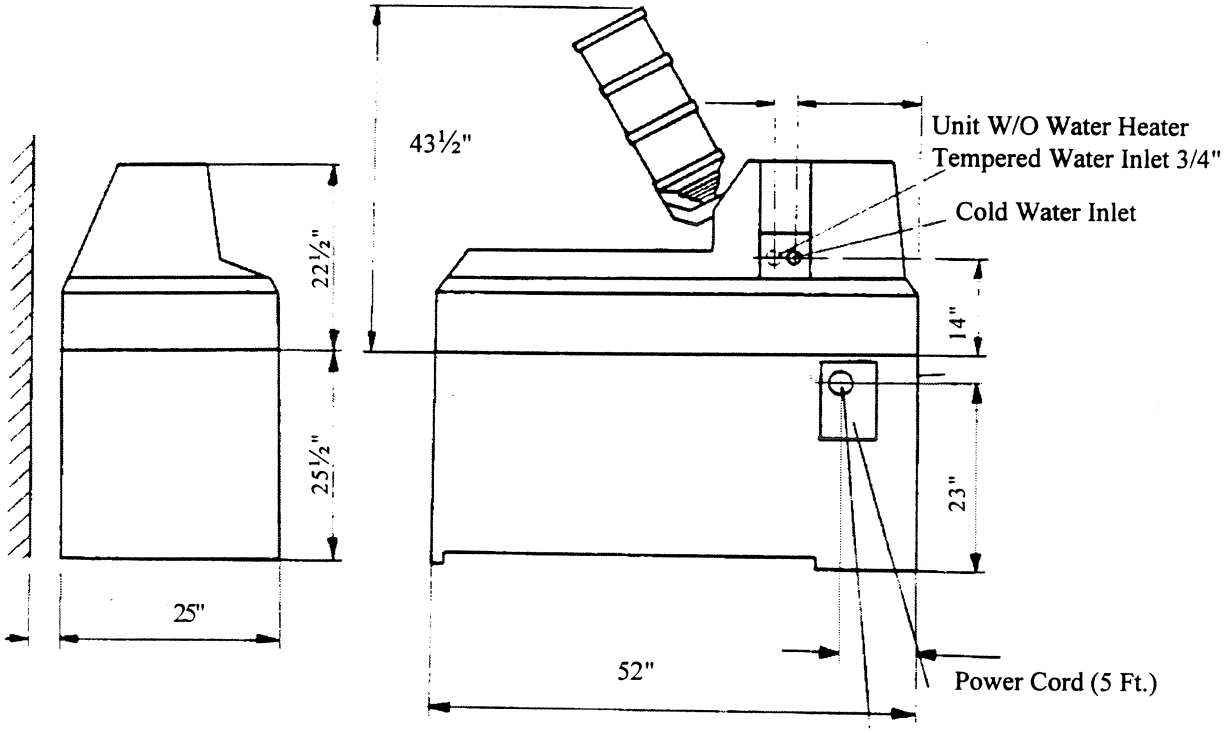
2. Items supplied with your processor

Article Name	#4272	#4270	#4271
Bottle, White 2 liter (#3375)	6	6	6
Bottle Stopper (#07163)	1	1	1
Brass Adaptor for 3/4" NPT hose (#61003)	2	1	2
Cap For Coupler (#92158)	2	2	2
Cap For Reclaim Area (#15152)	N/A	6	6
Cog lid washers (#07095)	3	3	3
Cover, Back Bottle (#10068)	1	1	1
Cover, Front Bottle (#10067)	1	1	1
Drain Adaptor, PVC (#95354)	1	1	1
Hex Driver, 3mm Ball Point (#16153)	1	1	1
Hose, High Pressure Water (#16171)	2	1	2
Hose, Replacement Refill Lines (#93008)	N/A	1	1
Instruction Manual, ATL-3000 (#60120)	1	1	1
Instruction Sheet For Boiler (#86164)	N/A	1	N/A
Journal of Rotary Processing Compendium (#66032)	1	1	1
Leveling Wedge (#15083)	1	N/A	N/A
Pin, Hinge (#35052)	2	2	2
Retention Clip Set (#92157)	1	1	1
Roller supports (#07067)	4	4	4
Roller Block (#07069)	1	1	1
Rollers (#07007)	4	4	4
Spirit level (#4502)	1	1	1
Transfer gears (#95200)	1	1	1
Warranty sheet (#60015)	1	1	1
Washer, 3/4" (#61002)	2	1	2
Wrench, 8mm (#16204)	N/A	1	1

3. Site specifications

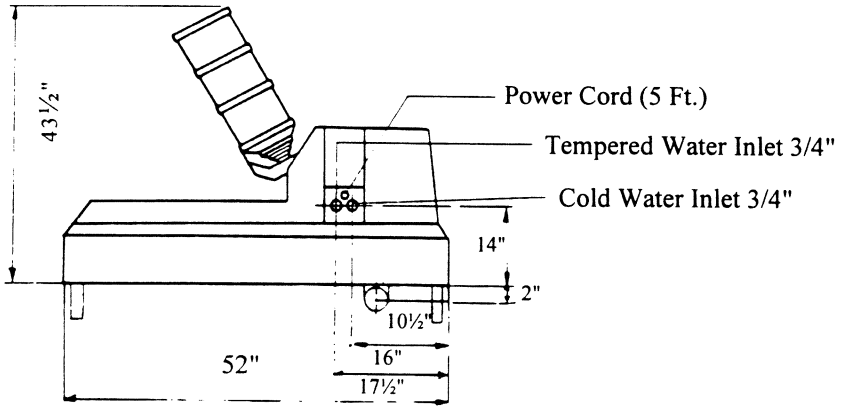
3.1 ATL-3000 Auto-refill (#4270 & #4271) site specifications

The ATL-3000 Auto-refill does not need to be installed in a darkroom. Once the tanks have been sealed, they are completely light-tight. The dimensions of the processors are as follows:



1½" PVC Drain Pipe

3.2 ATL-3000 Table Top (#4272) site specifications



3.3 Other site specifications

The ATL-3000 should be installed near a drain (check your local codes regarding disposal of photo chemistry), a water supply (the rinse steps require tempered water), and a **dedicated, grounded, GFCI protected** 110V (or 220V for #4270) electrical outlet. Please read section 4.2 about water connection before you determine the final location of the processor.

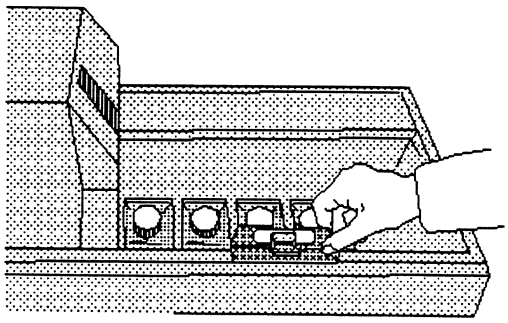
The ATL-3000 Table Top (#4272) should be installed on a stable, level surface capable of supporting at least 300 lbs. The surface should be waterproof, and higher than the drain.

The installation location should have enough vertical clearance for the processor to empty the largest drum - at least 45½" (from the base of the processor).

The ATL-3000 Table Top can be installed on our special support table (#4183), or on any water proof generic work table. JOBO's support table provides a convenient, comfortable working height for the processor, and has storage space for your tanks and drums.

Please use the level (#4502) included with the processor. It is *extremely* important the processor be absolutely level to develop your film and prints properly. Level the processor on the trough casing as indicated in the graphic.

After leveling the processor, place a drum on the lift arm and check to make sure the drum is level.



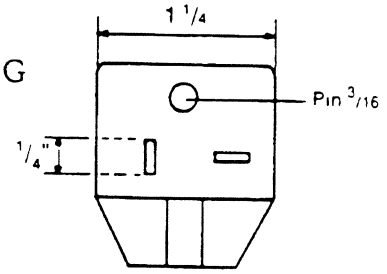
3.4 Electrical connection

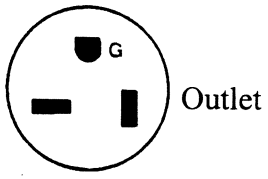
A dedicated, grounded, UL-approved electrical outlet is required. At least a 20 amp circuit breaker is needed to run the ATL-3000 #4270 processor. A 15 amp circuit is required for the #4271 and #4272 models. Consider the amperage of any other appliances if you must connect them to the same circuit. We strongly recommend that you consult an electrician when deciding what rating of circuit you need.

A ground fault circuit interrupter (GFCI) is strongly recommended!

DO NOT OPERATE THE AUTOLAB WITHOUT ELECTRICAL GROUNDING!

220 Volt PLUG





Outlet

*Plug on ATL-3000 (**#4270 ONLY**) will be NEMA 6-20P.*
Install NEMA 6-20R type outlet.

3.5 Water pressure

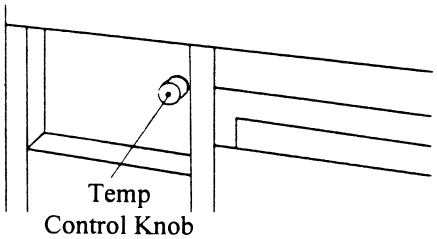
The water pressure should be between 15 and 90 p.s.i. (1-6 bar). Pressure less than 15 p.s.i. will result in an unusually long filling time for the water bath in addition to inadequate rinsing. Water pressure of over 90 p.s.i. may cause damage to the processor's solenoid valves. If the water pressure exceeds 90 p.s.i., we recommend you purchase a pressure reducer (#61004). Hoses are included with the processor (#4270 only one hose needed).

The shut-off valves for your water supply should remain accessible.

3.6 Rinse water temperature

Two of the ATL-3000s (#4271 & #4272) use two water supply lines, one cold and the other tempered. The tempered water line should be adjusted to within ± 0.5°C of the process temperature. To deliver the tempered water JOBO recommends our water mixing panel (#4189).

The ATL-3000 Complete (#4270) has a built in water heater for the rinse steps. The water heater temperature is adjusted by turning the knob illustrated in the following diagram.



Use the spray wand to run the rinse water. You may need to increase the internal hot water heater temperature.

If processes are run at temperatures below ambient room temperature, the temperature of the supplied water must be lower than the processing temperature. A water chiller should be used if the supplied water is warmer than that required by the process you intend to run.

3.7 Waste water

Refer to section 3.1 to determine the exact drain measurements. The connection is made with standard 1½" PVC drain pipe.

Consult your local government code regarding the disposal of photographic chemistry.

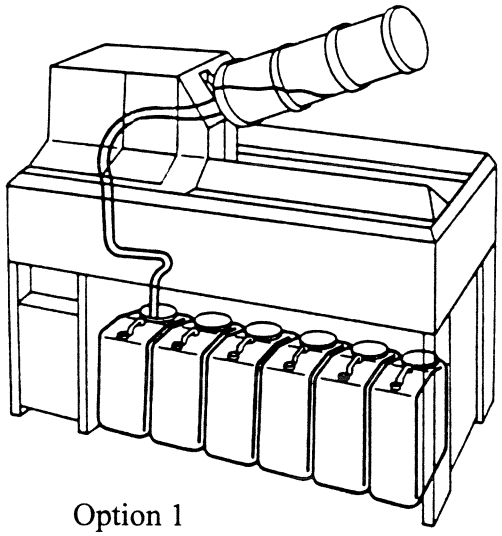
3.8 Room temperature

The processor continually circulates the water bath to maintain the processing temperature. Normal fluctuations in room temperature will have no impact on the processor's ability to maintain the correct temperature (except when running processes below room temperature, see sec. 3.4). Do not install the processor directly in the path of a heating or cooling duct.

4. Installation instructions

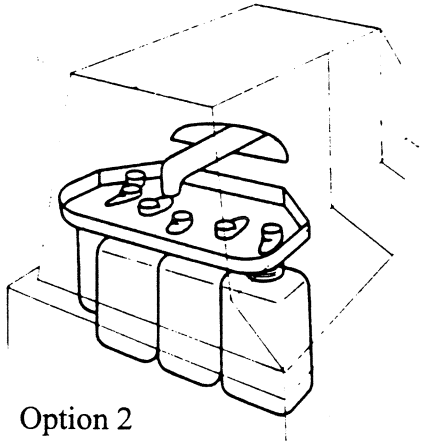
4.1 Chemical reclamation

There are two ways to configure chemical reclamation on the ATL-3000 Auto-refill models. Chemicals can be collected in the front set of six 15 liter bottles on the lower chemical cart (option 1), or in six 2 liter bottles in the top reclamation trough (option 2).



Option 1

Figure 6



Option 2

To use the six 15 liter containers located on the front cart, position the plastic hose positioning plate as indicated in figure 7. Attach the six hoses to the six openings on the right hand side of the reclamation chamber.

Make sure the front set of 15 liter bottles are in the cart with the lids removed and their mouths facing the rear as illustrated in figure 6, option 1. The lower cart must be pushed all the way in and not moved while a process is running. If the cart and bottles are not positioned correctly the dumped chemistry will not end up in the bottle.

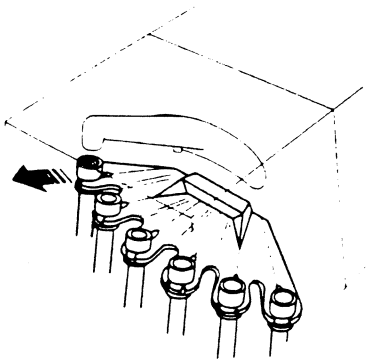


Figure 7

To use the six 2 liter bottles for reclamation, remove the plastic hose positioning plate (if installed), place the six bottles in the reclamation chamber (there are indents in the floor), and lower the hinged reclamation plate. The funnels of the hinged plate should enter each of the bottles.

A third option is to remove all the reclamation apparatus from the trough so the used chemistry pours down the drain. If you choose this option, use the plugs included with the processor to cover the holes leading to the 15 liter bottles. These caps will prevent dumped chemistry and rinse water from accidentally spilling into the holes and possibly contaminating the reclaimed chemistry stored below.

Note: Consult your local government restrictions regarding the disposal of photographic chemicals.

With the ATL-3000 Table Top, only options two and three are possible.

4.2 Water connection

The ATL-3000 #4272 and #4271 use two water connections with European hose size thread; the ATL-3000 #4270 only has a single cold water hookup. Washers and brass adaptors (to convert to American threads) are included. The water connections are located in the rear of the processor above the fan and power cord. Connect the white hose(s) (with the red stripe) to the solenoids, the hoses to the brass adaptors, and the adaptors to your cutoff valve. Make SURE you use the washers at every connection.

The tempered water line connects to the solenoid coded with a red dot. The cold water supply connects to the solenoid with the blue dot. The tempered water supply should always be set to within ± 0.5°C of the process temperature. Screw the hoses on tightly, but do not strip the threads.

Depending on the condition of your tap water, you may want to install a water filtering system to prevent any contamination caused by particulate matter.

4.3 Electrical connection

Observe your local electrical code!!!

Plug the processor into a grounded 110-120V (220-240V for #4270) UL approved outlet. It is extremely important that the outlet be grounded. JOBO strongly recommends the use of a **ground fault circuit interrupter (GFCI).**

The correct electrical connection AND grounding of the processor are necessary to avoid the risk of fire, electrical shock, or personal injury. The owner of the processor bears the personal responsibility for ensuring that the electrical connection is safe.

Note: The ATL-3000 operates at 220V. Depending on where you are located in the United States, the power supplied will be either 208V or 240V. The processor will function normally at 240V. If your supplied voltage is 208V, the processor will heat up more slowly than if the supplied voltage was 240V. Having an electrician install a "buck/boost" transformer will reduce the heat up time.

The processor is equipped with a grounded, three-prong plug. Insert the plug into grounded outlets only. Do not alter the plug. If you do not have a proper outlet, consult your local electrician to have one installed.

To prevent condensation in the microprocessor, the fan runs continuously when the unit is plugged in to a powered outlet.

4.3.1 Emergency power supply

If you purchased an ATL-3000 with automatic battery backup, the additional plug must be connected to the emergency power supply (see additional instructions with unit).

4.4 Installation checklist

- √ Processor leveled correctly (sec. 3.3).
- √ Drain line connected (sec. 3.1).
- √ Water supply hoses connected and valves open with no leaks (sec. 4.2).
- √ Processor connected to a grounded outlet (sec. 4.3).

5. Operation

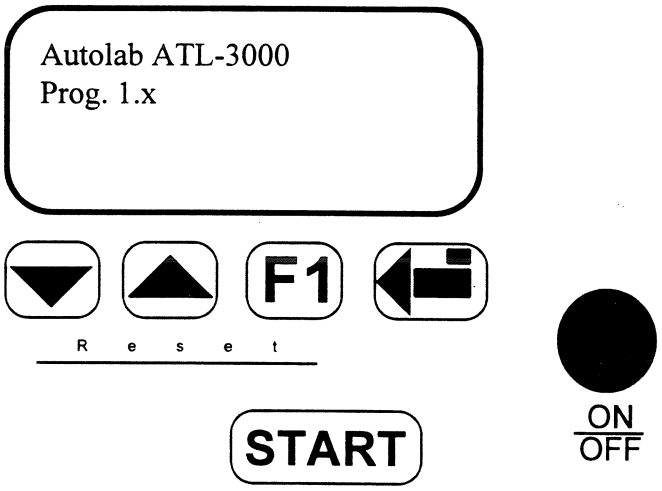
Perform a trial run with test film before committing any "real" film to the processor.

5.1 Water supply

Open the cold and tempered water supply valves feeding the machine.

5.2 Turning on the processor

Switch the processor ON using the ON/OFF button. The display will read the following:



The unit starts filling with water within a few seconds, and automatically maintains the correct water bath level.

5.3 Setting the tempered water supply

The temperature of the incoming tempered water must be maintained at the temperature of the process. The ATL-3000 has a built-in heat exchanger that will smooth out fluctuations in temperatures of the rinse water within ± 0.5°C.

Refer to your water panel instructions to set the temperature of the rinse water. JOBO recommends the use of a water panel (#4189) which was specifically designed for the operation of JOBO products.

5.4 Filling the chemical bottles

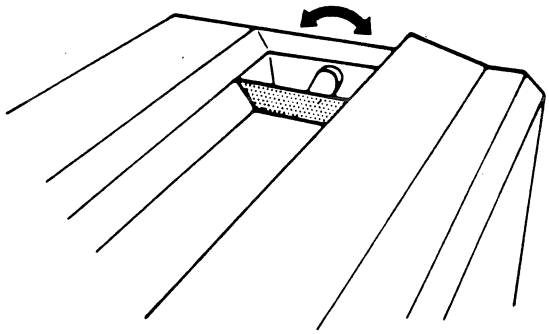
Lift the front lid to access the six in-line bottles. Unscrew the bottle caps and pour in your chemistry. The maximum capacity of the bottles is 1.8 liters each. Do not fill the bottles past the grommets used to connect the air lines (the smaller clear plastic tube going to the bottle).

The quantity in the bottles must be entered into the processor's memory as explained in section 7.4. Screw the caps back on to the bottles tightly. If the bottle caps are cross threaded or not tight, too little or no chemistry will be pumped and the film or paper will be improperly developed. (The processor will warn you if no chemicals are pumped on any volume over 270ml.) Make sure the air distribution lines fit snugly into the rubber grommets and the chemical lines are completely on the grey tube coming out of the bottle.

Do not overfill the bottles. If the bottles are overfilled, the chemistry may siphon into the unit. Do not use the top of the Autolab as a resting place for coffee, chemistry, or any other liquids. If they were to spill, the moisture could damage the electronics.

5.6 Adjusting the water level

On the front right-hand side of the water trough is a circular plastic water diverter. Turning this diverter will raise or lower the upper trough water level (see following illustration):



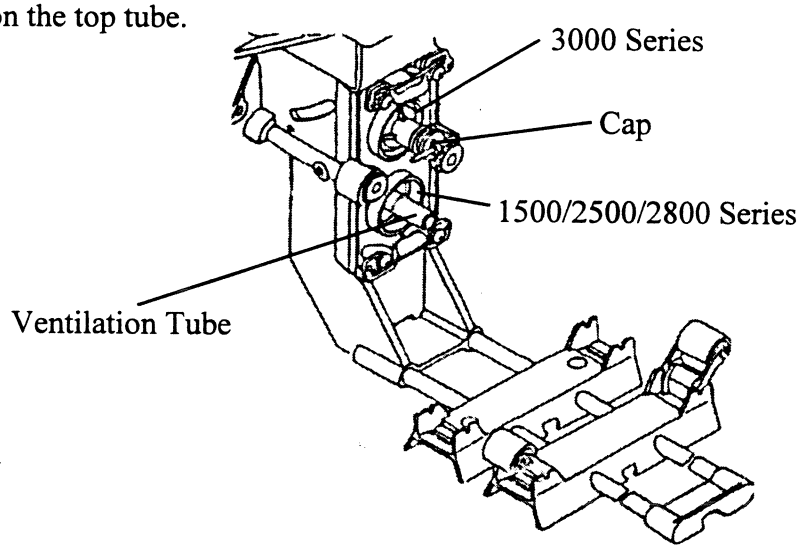
Set the water level so the bottom edge of the drum being used is covered with approximately 1/4" of water (when in the horizontal position).

The water level needs to be changed every time a different tank or drum system is used. If the level is set too high the tank floats off the rollers and uneven development will occur because the chemistry will pool at one end. If the level is set too low, the tank will not be heated properly.

Clean the stainless steel screen filter as needed. Operating the processor with a clogged filter may cause the water level to be too high. Operating the processor without the filter screen will cause debris to clog the water recirculation pump, and may damage the processor.

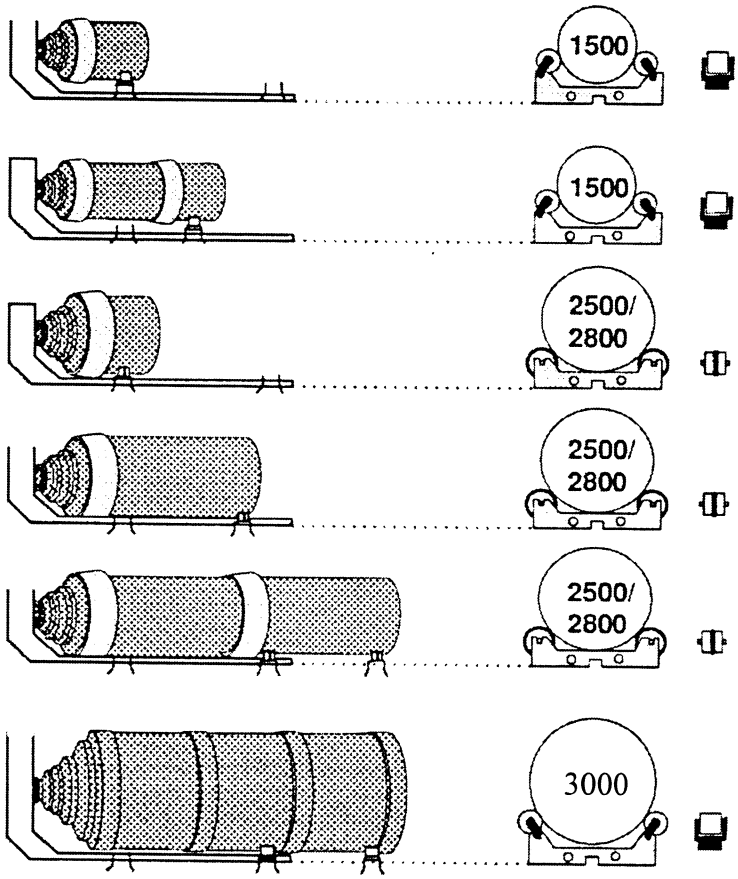
5.7 Tank and drum systems

JOBO produces a variety of tanks and drums you can use, depending on the format sizes of your film and paper. JOBO tanks and drums are attached to the processor with a coupler on one side of the rotation trough. The coupler uses a ventilation tube, and a cap. If you are using 1500, 2500, or 2800 series tanks, the cap goes on the top tube and the ventilation piece fits in the lower tube. If you are using the 3000 Expert drums the cap goes on the bottom tube, and the ventilation tube on the top tube.



5.8 Setting the roller supports

The positions of the rollers, roller extensions, and bases are illustrated here. Note that the roller with the black O-ring is only used with the 2500 and 2800 series tanks.



5.9 Automatic cooling

The water bath is cooled automatically until the correct developing temperature is reached. When the water bath temperature rises higher than the selected process temperature the cold water solenoid opens to let in cold water. The cold water solenoid opens approximately 30 seconds after the water bath temperature has exceeded the processing temperature.

If your cold water supply is warmer than the selected process temperature, you will have to purchase a water chiller. Contact your local photographic dealer.

Hint: If you want to cool the processing temperature from a high level to a low level you should turn off the machine, drain the water bath, turn on the machine, and select the new process. This procedure will save time and water.

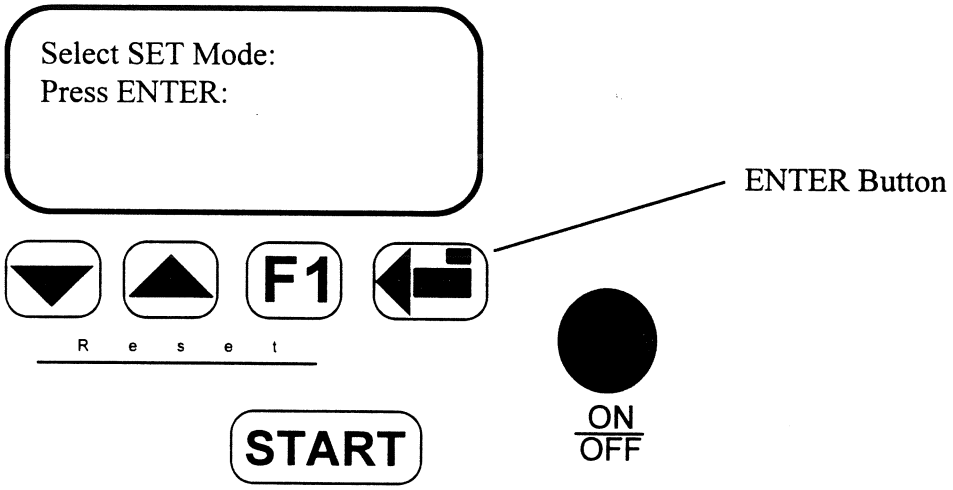
6. Programming in SET mode

6.1 General information on programming

Each ATL-3000 has been pre-programmed with standard processing times and temperatures for most of the traditional processes. The pre-programmed processes are specified in Section 10.10. The ATL-3000 is fully programmable, so you can change any of the preset processing parameters at any time.

6.1.1 Altering a process (SET mode)

Items specific to a process (temperature, chemical and rinse times, etc.) can be changed in SET mode. Access SET mode by RESETing the processor (press down arrow, up arrow, and F1 simultaneously). When the following message is displayed, press ENTER.



The display will change to the following:

```
** SET main menu **
1. Alter proc. data
2. Quick temp.        OFF
3. Auto refill        OFF
```

Press the down arrow key to scroll through the options. The remaining options are:

4. Rinsing Opt.	OFF	9. Alter code no.	
5. Vol. leftovr.	SEP	10. Language	**GB**
6. Vol Transp.	MAN	11. LCD Lighting	90%
7. Temp. sens.	F1 B:0	12. Cursor	
8. Heat exch.	W/O	13. List of Errors	
		14. Return	

All 14 options are explained in the following program sections 6.2.1 - 6.2.13.

6.2.1 Altering process information

Select option 1 while in the SET main menu (Alter Process Data) and press the ENTER key. The display will change as follows:

```
** Alter process data **
1. Process no:      1
2. Pr. name         C-41 PHO
3. Bottle batt:     FR.
```

Pressing ENTER here will move the cursor as follows:

```
** Alter process data **
1. Process no. 1
2. Pr. name         C-41 PHO
3. Bottle batt.     FR.
```

You can now use the up and down arrows to choose which program (1-12) to modify. After choosing the program you want to modify, press ENTER again to return to the numbered options at the left.

Press the down arrow one time to move to the process name, and the display will change to the following:

```
1. Process no.      1
2. Pr. name:        C-41 PHO
3. Bottle batt:     FR.
4. Pr. temp.        38,0°C
```

"Pr. name" refers to the process name. The name can be changed to whatever you would like to call it up to eight characters long. All upper and lower case letters, as well as punctuation marks can be used.

To change the name press ENTER while at position 2. Using the up and down arrows will change the character, and pressing the ENTER key will advance you through the eight characters. While positioned at option number 2 press the down arrow to move to option 3.

```
2. Pr. name:        C-41 PHO
3. Bottle batt:     FR.
4. Pr. temp.        38,0°C
5. Preheat.         5:00
```

"Bottle batt." refers to whether the chemistry will be pumped from the front set (battery) of bottles or the rear set. Press the down arrow to advance to option 4. The display will change as follows:

3. Bottle batt:	FR.
4. Pr. temp.	**38,0°C**
5. Preheat	5:00
6. Pre-rinse	0:00

"Pr. Temp." refers to the process temperature. Press the ENTER key to change the temperature. You can specify any temperature between 18.0 and 49.9 degrees centigrade. Pressing the ENTER key will advance you through the digits of the temperature. Use the up and down arrows to change the values of each individual digit (while you are positioned on the digit). While positioned on option 4, press the down arrow to move to option 5. The display will change to the following:

4. Pr. temp.	38,0°C
5. Preheat	**5:00**
6. Pre-rinse	0:00
7. Chemical 1	6:30

Use the ENTER key to position the cursor under the first digit of the time. You can then use the up and down arrows to change the values, and use the ENTER key to move to the next digit. Any time can be programmed from 00:00 to 99:59. If you specify 00:00 as the time, the step will be skipped. **Refer to section 9 for processing times.**

The rest of the values from "6. Pre-Rinse" to "18. Rinse 6" can be set the same way you set the "5. Preheat" time. In determining the process times you want to use, remember that if a chemical manufacturer specifies "*3-30 second rinses*" you should set the time for the total (*01:30*). The ATL-3000 accounts for the time needed to drain the chemistry, you should not add any extra time to a process step to try to account for the draining times.

After the final rinse (rinse 6), press ENTER at "19. Interrupt" to return to SET main menu.

6.2.2 Quick tempering

While in SET main menu (sec.6.1.1), move the cursor to option "2. Quick Temp: OFF" and press the ENTER key. The display will change to the following:

1. Alter process data	
2. Quick temp:	**ON**
3. Auto refill:	OFF
4. Rinsing opt.	OFF

When the quick tempering feature is ON, a "U" will appear in front of the temperature in the operational display. This feature reduces the amount of time it takes to heat the chemistry by about 80%. However, using the quick tempering feature reduces the accuracy of the chemistry temperature from 0.1°C to 0.3°C. You should not use the quick tempering feature if there is less than 800ml of chemistry in the bottles due to a "layering" effect it can have (uneven heating of the chemistry).

You should never process film or paper with the feature engaged. Use it to warm up the chemistry, then turn it off.

6.2.3 Auto refill

This function, "3. Auto refill", enables or disables the refill system on models #4270 and #4271, it does not apply for ATL-3000 Table Top (#4272).

6.2.4 Rinsing option

While in SET main mode (sec. 6.1.1), move the cursor to option "4. Rinsing opt." and press the ENTER key. The display will change to the following:

3. Auto refill:	OFF
4. Rinsing opt.	**ON**
5. Vol. leftovr.	SEP
6. Vol. transp.	AUTO

When the rinsing option is engaged, the water from the last rinse cycle of the final rinse step will not be drained from the tank. The function is designed to prevent partial drying of films or prints in the event you are unable to remove the material within ten minutes after the process has finished.

6.2.5 Remaining chemical volume

While in main SET mode (sec. 6.1.1), move the cursor to option "5. Vol. leftovr: SEP" and press the ENTER key. The display changes to the following:

4. Rinsing opt.	OFF
5. Vol. leftovr:	**JOIN**
6. Vol. transp:	AUTO
7. Temp sens.	F1 B:0

Press ENTER again to change the setting back to SEP.

SEPARATE: This choice is the standard setting. When the processor pumps chemistry, it tracks the remaining chemical volume in the bottles for *each specific program.*

JOINED: With this setting, the processor will deduct the chemical volume used from all the processes *regardless of the program chosen.* It is primarily useful in the following scenario: You have processes 1-3 set up with an E-6, E-6 push 1, and an E-6 push 2. Regardless of the program you choose to run (1-12), the processor will deduct the chemistry used from every process. You won't have to reset the REST volume every time you switch processes.

6.2.6 Chemical quantity to pump

While in main SET mode (sec. 6.1.1), move the cursor to option "6. Vol Transp" and press ENTER. The display will change to the following:

5. Vol. leftovr.	JOIN
6. Vol. transp.	**AUTO**
7. Temp sens.	F1 B:0
8. Heat exch.	W/O

When the MANUAL setting is activated, you can select the chemical volumes to use based on several predetermined quantities in the operational display.

When the AUTOMATIC setting is active, you select which tank you have loaded the film into and whether or not the reels are loaded externally only or both internally and externally. The AUTO function can only be used with the 2500 series tanks. The rotation speed will be set at 75rpm (in the operation display). See section 8.4 for more information.

6.2.7 Temperature sensors

While in SET mode (sec. 6.1.1) move the cursor to option "7. Temp Sens F:1 B:0". This function is for display only. The possible displays are:

F:1 B:1	1 sensor in front, 1 sensor in back
F:1 B:2	1 sensor in front, 2 sensors in back.

The unit automatically detects whether 1 or 2 sensors are installed. When only 1 sensor is installed, it can be used in any of the six bottles. If two sensors are installed, the first sensor must be in bottle 1 and the second in any other bottle. If there is a chemical step programmed in bottle 1, the first sensor will be the one used. If there is no chemical step programmed in bottle 1, the second sensor will be the one in use.

6.2.8 Heat exchanger

The Auto-refill models (#4270 & 4271) are capable of refilling the back six bottles with chemistry drawn from six 15 liter bottles underneath the processor. With the "heat exchanger" modification the front six bottles are removed and replaced with stainless steel coils. The refill chemistry passes through the coils, heating it to the process temperature.

This option is very useful for back-to-back process runs.

6.2.9 Code number

While in SET main mode (sec 6.1.1), move the cursor to option "9. Alter Code no." and press ENTER. You can now select a code number to prevent access to the programming menus. The code number can be set using the up and down arrows to any number from 1-9.

When you have chosen a code number, the processor will prompt you for the number whenever you attempt to enter SET mode.

You do not have to set a code number! If you don't want a code number, set the code to "0".

6.2.10 Language

While in SET main mode (sec. 6.1.1), move the cursor to option "10. Language" and press ENTER. The display will change to the following:

9. Alter code no.
10. Language: **GB**
11. LCD lighting
12. Cursor

Press the ENTER key to toggle through the five possible languages. The processor can be operated in English (GB), Spanish (E), French (F), Italian (I), or German (D).

6.2.11 LCD lighting

While in SET main mode (sec. 6.1.1), move the cursor to option "11. LCD Lighting" and use the ENTER key to choose how bright you want the panel to be illuminated. You can choose from OFF (if processor is installed in your darkroom), 10%, 90%, or 100% illumination.

6.2.12 Cursor display

While in SET main mode (sec. 6.1.1), and press the ENTER key. Move the cursor to option "12. Cursor" and press ENTER. You can specify the cursor to be displayed as a solid underline, or a blinking square.

6.2.13 Errors

While in SET main mode (sec. 6.1.1), move the cursor to option "13. List of Errors" and press ENTER. The ATL-3000 will display the errors it has encountered during the last process run. The errors are self-explanatory.

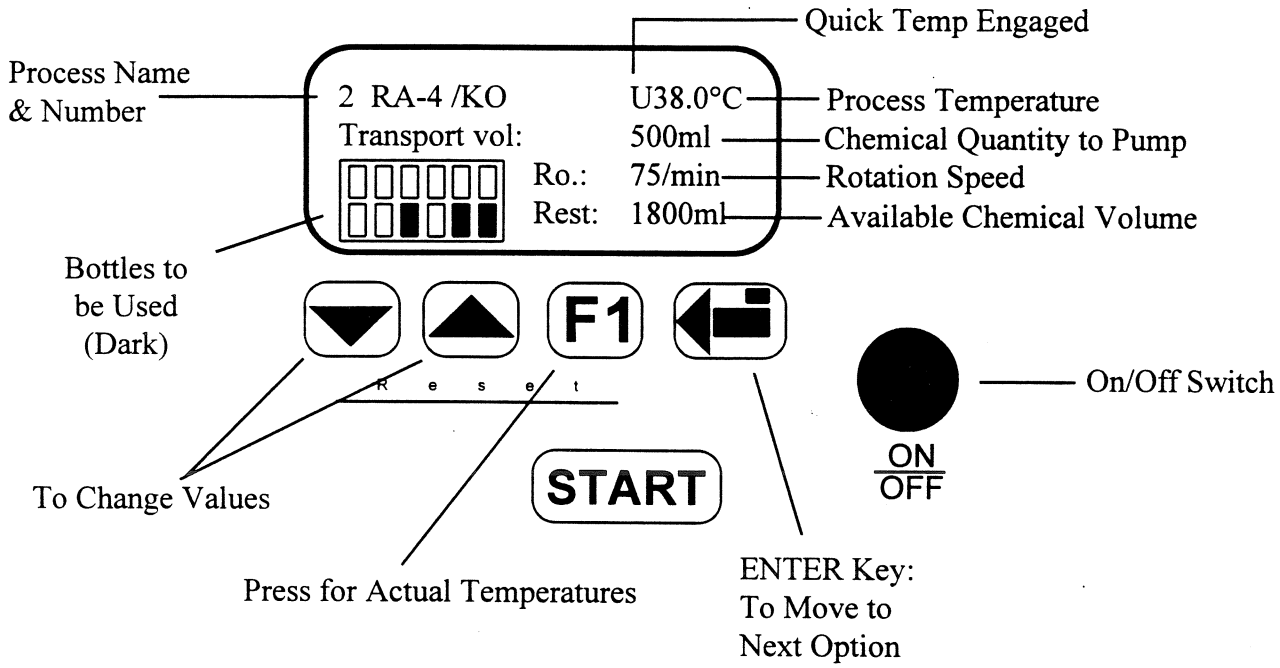
6.2.14 Return

Option 14 of SET main menu is used to end the editing session and proceed to RUN mode.

7. Running a process

7.1 Selecting the correct process

Turn the ATL-3000 on and wait for the processor to complete its self-diagnostic testing. When it has completed the tests, it will end in the operational display. The display will appear as follows (RUN mode):



7.2 Selecting the chemical quantity to use

Read the label on the tank or drum to determine the correct amount of chemistry needed to develop the film or paper. When using multiple tank modules, add the quantities for the correct chemical amount. If the chemical amount required does not appear as an option, use the next highest chemical volume.

Note: The chemical quantities listed on the labels of the tanks and drums show the minimum amount of chemistry needed. Some processes may require a higher chemical volume for proper results.

Move the cursor to "Transport Volume" by pressing the ENTER key and adjust the level with the up and down arrows. When using the 2500 series tanks, you should select "Automatic Supply Quantities" (see sec. 6.2.6).

To help you choose the correct tank or drum system to use, please refer to the diagrams on the following page.

Tank Number	Disc	110	135	120	220	Chemical Volume
1510	-	4	1		-	140ml
1520	**-**	**8**	**2**	**2**	**1**	**240ml**
1530 (Module)	-	12	3	4	2	330ml
1540 (1510 & 1530)	**-**	**16**	**4**	**4**	**2**	**470ml**
1520 & 1530	-	20	5	6	3	570ml
1510 & 1530 & 1530	**-**	**26**	**7**	**8**	**4**	**800ml**
1520 & 1530 & 1530	-	32	8	10	5	900ml
1517 (Disc tank)	**17**	**-**	**-**	**-**	**-**	**400ml**

2500 System - Film Quantity / Chemical Volume Chart						
Tank Number	**35mm/36exp**	**1x 120**	**2x 120**	**220**	**70mm / 5'**	**4x5"**
2523 or 2521	2 / 270ml	1 / 170ml	2 / 270ml	1 / 270ml	1 / 330ml	6 / 270ml
2553	5 / 640ml	3 / 330ml	6 / 640ml	3 / 640ml	2 / 730ml	12 / 560ml
2560 Module	6 / 850ml	4 / 400ml	8 / 850ml	4 / 850ml	3 / 1000ml	12 / 730ml
2563	6 / 850ml	4 / 400ml	8 / 850ml	4 / 850ml	3 / 1000ml	12 / 730ml
2583	8 / 1250ml	5 / 620ml	10 / 1250ml	5 / 1250ml	N/A	18 / 1000ml
2593	12 / 1500ml	N/A	14 / 1500ml	7 / 1500ml	N/A	24 / 1250ml

Use the "Auto-Fill" Option See Sec 6.2.6

2800 System Print Drum Chart							
Drum Number	**4x5"**	**5x7"**	**8x10"**	**11x14"**	**16x20"**	**20x24"**	**Minimum Chemical Volume**
2820	2	-	-	-	-	-	40ml
1526	-	-	1	-	-	-	50ml
2830	-	4	2	-	-	-	100ml
2840	-	4	2	1	-	-	120ml
2850	-	8	4	1	1	-	200ml
2870	-	4	2	-	-	-	100ml
3062	-	6	3	2	-	-	210ml
3063	-	12	6	2	1	1	300ml

Expert Drums		
Drum Number	**Film & Print Capacities**	**Chemical Volume**
3004	Four 8½x12", 8x10", 5x7"	270ml to 1500ml
3005	Five 8x10" or 5x7"	270ml to 1500ml
3006	Six 4x5" or 5x7"	210ml to 1000ml
3010	Ten 4x5"	210ml to 1000ml
3360	Accessory Footpump	N/A

7.3 Rotation speed

While in RUN mode, move the cursor to "Ro." by pressing the ENTER key. You can adjust the rotation speed to 25, 50, or 75 R.P.M. Use the following information to determine the rotation speed:

25 R.P.M. Special Processes
50 R.P.M. Expert Drums, 3000 series.
75 R.P.M. 1500/2500/2800 series tanks and drums.

The R.P.M. settings for the motor are calculated as if the drum were moving continuously in one direction. The processor slows the motor before reversing direction so the net rotation speed will actually be lower than the setting, which is normal.

7.4 Remaining chemical volume

While in RUN mode, move the cursor to "Rest" by pressing the ENTER key. You must reset this number every time you refill the chemical bottles. The volume can be changed by pressing the up and down arrows. All bottles must have the identical amount of chemistry in them. If the bottles are full, you can press the up arrow for two seconds to set the "Rest" volume to 1.8 liters automatically.

7.5 Final checklist

After attaching the tank to the processor, please go through this final checklist before starting a process:

1) Have you selected the correct program?
2) Have you set the proper chemical volume to be used?
3) Is the rotation speed correct?
4) Is the chemical volume listed under "Rest" correct?
5) Is the unused spout on the lift arm capped, and the ventilation tube on the used spout in place?
6) Are the bottle caps screwed on correctly?
7) Are the rollers and roller extensions set correctly?
8) Is the water bath level set correctly? (It should cover the bottom 1/4 inch of tank.)
9) Are the cold and tempered water supply lines open?
10) Are the reclamation bottles empty enough to collect the chemistry from this process?
11) Are the bottle covers on the processor?

7.6 Starting the process

The process can be started from anywhere in the Operation Menu by pressing the START button. The processor will automatically check the following conditions before starting the process to ensure they are correct:

- √ Sufficient chemistry to run the process (based on the amount displayed in REST).
- √ Drum motor is functioning normally.
- √ Level of the recirculating water bath is sufficient.
- √ The temperature of the water bath and chemicals are within tolerance.
- √ Air switch is in the correct position.
- √ Front/Rear switch is in the correct position.

After you press START, the processor will automatically start when all the parameters are correct. Once the process has started, it is not possible to change any of the processing parameters. Should a problem arise in the middle of a process, the processor can be RESET by simultaneously pressing down arrow, up arrow, and F1 keys.

IMPORTANT!

The lift arm is raised and lowered during the course of any process. Do not allow anything to impede the raising or lowering of the lift arm. Failure to comply may cause serious damage or injury. Should something become trapped under the lift arm as it is lowering, do the following:

1) Activate RESET (down arrow, up arrow, and F1 keys simultaneously).
2) Press ENTER to manually raise the lift arm using the up and down arrows.

If necessary, the processor can be turned off when the lift arm is raised.

In the event of a power interruption, the processor will automatically return to the exact time and step displayed when the power failure occurred. It will then continue with the rest of the process.

7.7 After the process

At the end of a process, an audible beep will sound until the processor is RESET. If any errors have occurred, the message "F1 for error list" will appear on the display. Press the F1 key to display the errors recorded during the process run.

You can also access the error list from the SET main menu (sec. 6.2.13).

8. Special Functions

8.1 Reading the actual temperatures

When in the Operational Menu, you can press the F1 key to display the current water bath and chemical temperatures. The chemical temperature displayed always reflects the sensor in use for the currently selected program.

8.2 Overriding the temperature setting

If you decide to run a process without the water and/or chemical temperatures being correct, you can override the sensors. Pressing F1 while the processor is waiting to heat up will cause the following message to be displayed:

> Process temperature
> not yet reached:
> Forced start:
> Press START

Pressing START with this message displayed starts the process regardless of the actual temperatures.

Note: Running a photographic process out of the recommended process temperature can ruin paper or film.

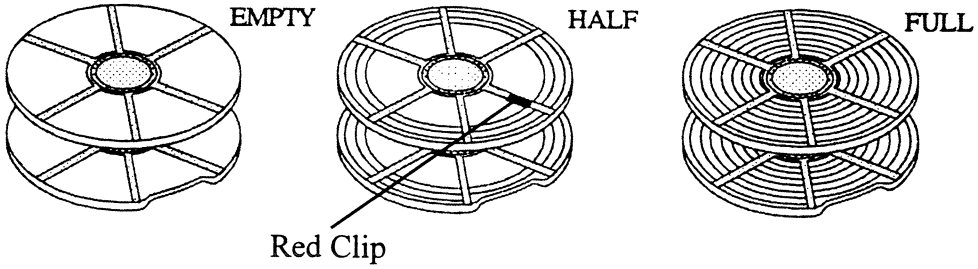
8.3 Quick tempering

After the chemical bottles are refilled, the processor will not start a new process until the temperature of the chemistry is within ± 0.3°C of the process temperature. In order to speed the process of heating the chemistry, you can cause the processor to heat the water bath beyond the process temperature temporarily. Enter main SET mode (sec. 6.1.1.) and choose option 2 (see sec. 6.2.2), press ENTER to turn Quick Tempering ON. When Quick Tempering is ON the tolerance for starting the process is lowered to ± 0.3°C.

The Quick Tempering feature is designed to speed the process of heating the photo chemistry. **Disengage the feature before running any process.**

8.4 Automatic chemical quantity use

For the 2500 series tank system, the AUTO function is an option for selecting the required filling quantity and rotation speed by using the tank number, and the length of the film loaded in the reels. For example: If the reels are loaded with one roll of 120mm film, they are loaded to "half". If there are two rolls of 120mm film per reel they are loaded to "full."



Any film that is loaded on a reel past the red clip is considered a "full" reel. For more information regarding the AUTO function please refer to section 6.2.6.

8.5 Raising the lift arm

RESET the processor. The message "Lift arm manually" will appear. Press ENTER. You can now use the up and down arrows to manually raise and lower the lift arm.

9. Specific processing instructions

To minimize the risk of cross-contamination when changing from process to process, use the following bottles (1-6) to hold your chemistry:

E-6:	Bottle 1 - FD, bottle 2 - Rev, bottle 3 - CD bottle 4 - Con, bottle 5 - Bl, bottle 6 - Fx.
C-41:	Bottle 3 - CD, bottle 5 - Bl, bottle 6 - Fx.
B&W:	Bottle 1 - FD, bottle 4 - ST, bottle 6 - Fx.
RA-4:	Bottle 3 - CD, bottle 4 - ST, bottle 5 - BFx.
R-3000:	Bottle 1 - FD, bottle 3 - CD, bottle 5 - BFx.
Ilfochrome©:	Bottle 1 - FD, bottle 5 - BL, bottle 6 - Fx.

9.1 Color transparency film process E-6

(Kodak E-6 and Photo Technology MasterClass Chrome-Six Chemicals)

Recommended Process Times for Kodak E-6 and Master Class E-6: Temp. 38.0°C.

Prewarm	5:00
First Developer	6:30
Rinse	2:00
Reversal	2:00
Color Developer	5:00
Conditioner (Pre-Bleach)	2:00
Bleach	6:00
Fixer	4:00
Rinse	4:00
Stabilizer (Final Rinse)	1:00 (Off processor at room temperature, see below.)

Dry as needed.

If you are using the six step E-6 Chemistry, we suggest you purchase JOBO's E-6 Handbook (#4192) or Kodak's Manual Z-119.

Reversal solution should be mixed to a 60% solution.

Color Developer is used for a reduced time of five minutes because of the constant agitation.

Stabilizer (or Final Rinse) should be used off the processor and reels at room temperature. Do not agitate.

Note: Stabilizer contains formaldehyde, a known carcinogen. Use only with good ventilation. We suggest you use rubber or neoprene gloves, an apron, and eye goggles.

Kodak E-6 Conditioner was changed to 'Pre-Bleach' and contains the formalin treatment that stabilizes the film. The Stabilizer was changed to 'Final Rinse.' The Final Rinse in the Kodak chemistry does not contain formaldehyde. It is a rinse that contains a surfactant. It acts much like Kodak Photo-Flo, helping to prevent water spots on the film while drying.

Do not use Final Rinse as a substitute for Stabilizer in other (non-Kodak E-6) processes.

Caution: Stabilizer (or Kodak Final Rinse, or any Photo-Flo type surfactant) should always be used in the following way: Use a dedicated container for the solution. The solution should be stored and used off the processor (at room temperature). Remove the film from the reels before immersing the film in the solution.

Note: If reels or tanks are immersed in these solutions, they will eventually cause processing contamination effects. The reels will become difficult to load. Rinsing or cleaning the reels or tanks after processing will not eliminate this problem.

9.2 Color transparency film process 3-bath E-6

Photo Technology Chrome-Six 3 Bath

Recommended Process Times for Chrome-Six Three Bath: Temperature 38.0°C

Prewarm	5:00
First Developer	6:30
Rinse	3:00
Color Developer	5:00
Rinse	1:30
Bleach-Fix	10:00
Rinse	4:00
Stabilizer	1:00 (Off processor at room temperature.)

Dry as needed.

Everything that takes place in the full six step E-6 Process also takes place with this three bath process. However, some of the actions of the chemicals are combined in one chemical step. This process has the advantage of fewer items to mix and handle. The disadvantage is fine tuning individual steps is not possible due to combining steps. For most serious amateurs and small volume professional photo processors, the 3-bath chemical is acceptable.

For the action taking place in each of the baths, refer to the Process E-6 six step sequence (section 9.5).

The First Developer is the same for both. The work of the Reversal, Color Developer, and Conditioner is all done in the Color Developer in the 3-bath Chemistry. The work of the Bleach and the Fixer is done in the single bath Bleach-Fix in the 3 bath chemistry.

Note: Stabilizer contains formaldehyde, a known carcinogen. Use only with good ventilation. JOBO suggests you also use rubber or neoprene gloves and apron, and eye goggles.

Chrome-Six (3 bath) Kits do not contain stabilizer. However, we strongly suggest that a stabilizer be used. Failure to use stabilizer will result in rapid fading of the image. A formaldehyde based stabilizer solution should be used. This chemical is manufactured by several chemical manufacturers, or you may purchase the stabilizer from JOBO, part #303627 MasterClass E-6 Stabilizer.

Caution: Stabilizer (or Kodak Final Rinse, or any Photo-Flo type surfactant) should always be used in the following way: Use a dedicated container for the solution. The solution should be stored and used off the processor (at room temperature). Remove the film from the reels before immersing the film in the solution.

Note: If reels or tanks are immersed in these solutions, they will eventually cause processing contamination effects. The reels will become difficult to load. Rinsing or cleaning the reels or tanks after processing will not eliminate this problem.

9.3 E-6 process control

Each type of slide film has its own color characteristics. Colors can change from one emulsion batch to another within certain film types. Using test exposures and test developing, it is possible to optimize processing control for a specific emulsion batch. For critical applications, buy a large batch of a specific emulsion number. Fine tune your process for this emulsion. Another method of correcting color balance of films is to use correcting filters on the camera lens. JOBO recommends the use of the E-6 handbook (#4192) when processing E-6 film.

9.4 Push-pull processing for six or three step E-6 processes

Changing the first developing time causes a change in the following way:

A 'Push' of one F-stop (2 x ASA) is obtained by a 30% increase in first developer time.

A 'Push' of two F-stops (4 x ASA) is obtained by an 80% increase in first developer time.

A 'Pull' of one F-stop can be compensated for by reducing the first developing time by 30%.

Since using different developing times can cause color shifts, JOBO recommends determining proper 'control' by test developments.

Note: The above push/pull processing information should not be used with Kodak Ektachrome P800/1600 professional film, or Fujichrome 1600. ('Normal' use of these films requires push processing.) We suggest you get specific processing information from the manufacturers, or refer to Kodak Manual Z-119, or Fuji Processing Manual for Process CR-56/E-6.

9.5 E-6 process description

There are two families of E-6 processing chemistries. The original and standard is a six chemical step process. The other family of 'rapid' or 'hobby' type chemistries use three chemical steps. Both families of chemistry will process E-6 type films. The choice of which chemistry type to use revolves around the issues of convenience and control of the process. The three step chemistries are easier to use. You can 'fine-tune' a six step process with adjustments not available in the three step processes. Stabilizer, the final step of the process

is not counted in the quantity of steps described above. Hence, a 'six' step process really requires seven chemical steps, and a 'three' step process really requires four chemical steps.

Process Sequence:

Prewarm: Allows the dry film to rise to the process temperature by heating the tank and reels.

First Developer: In the first developer, the exposed silver halides of the film coating are reduced to metallic silver. The first developer represents the most critical phase of the process. Time, temperature, and agitation, as well as storage of the working solutions affects density, contrast, maximum density, and fog.

First Rinse: The first rinse quickly interrupts the development and prevents first developer contaminating the reversal bath (or color developer in three bath chemistry). Insufficient first rinse can lead to changes in density as well as color.

Reversal: The reversal contains a chemical fogging agent that prepares the film for the color developer. Faults in this step can lead to incomplete reversal and a general loss of density. There should be no rinse between the reversal bath and the color developer. The emulsion enters the color developer soaked with the reversal bath.

Color Developer: In this processing step, the remaining silver salts are converted to metallic silver. The oxidized color developing substances react with the film's color couplers and dyes. Changes in the color developer step affect color balance, contrast, minimum and maximum density, and evenness of the development.

Conditioner: In the conditioner, the metallic silver is prepared for the bleach stage. The conditioner maintains the pH value of the bleach by avoiding a carry-over of color developer into the bleach bath.

Note: Kodak has changed some of the chemistry in their E-6 process. The step we are calling conditioner is now called 'Pre-bleach.' The same conditioner actions take place. The work previously done by the formaldehyde in the Stabilizer step (the last step of the process) now takes place in the Pre-bleach step. (As of this writing, only Kodak & L B Russell have made this change in the E-6 process.)

Bleach: In the bleach, the metallic silver is transformed to silver halides that are removed by the fixing bath. Changes in the bleach produce the following problems: Silver residue, low maximum density in reds, fogging in yellows, and high maximum density in blues.

Fixer: In the fixer, the silver halides in the emulsion are removed. Insufficient fixer times or incorrect dilution may lead to the following problems: Excessive blue density, and yellow fog, with spots caused by silver halide residues that become visible in low density areas.

Final Rinse: The last rinse removes the remaining chemistry and should be continued for at least 4 to 5 minutes.

Stabilizer: The stabilizer increases dye stability and contains a wetting agent. To avoid drying spots or damage on film surfaces, the stabilizer should be replaced at regular intervals.

Note: Repeated use of stabilizer on plastic reels and tanks can lead to the buildup of a sticky residue. This makes the reels difficult to load and increases the possibility of back contamination (stabilizer contamination of first developer). Rinsing alone will not remove all stabilizer from a reel or tank. Stabilize your film off the reel in a tray or tank used only for stabilizer. Failure to use stabilizer will result in rapid fading of images. (In Kodak six step E-6, Pre-bleach and Final Rinse meet the chemical need for image stability.)

9.6 Color negative film process C-41

Kodak Flexicolor, Photocolor II, Photocolor FP

Recommended Process Times for Kodak C-41 and Photocolor II: Temperature 38.0°C. (100.0°F):

Process Step	Kodak	Photocolor II
Prewarm	5:00	5:00
Developer	3:15	3:15
Bleach	6:30	Do Not Use
Rinse	3:00	Do Not Use
Fixer	6:30	Do Not Use
Bleach-Fix	Not Used	10:00
Rinse	4:00	4:00
Stabilizer	1:00	1:00
Dry	As Needed	As Needed

Recommended Process Times for Photocolor FP: Temperature 38°C (100.0°F)

Process Step	All Except Fuji film	Fuji film only
Prewarm	5:00	5:00
Developer	3:15	3:15
Conditioner	Do Not Use	5:00
Rinse	Do Not Use	5:00
Bleach-Fix	6:00	6:00
Rinse	4:00	5:00
Dry	As needed	As needed

Process Sequence for Kodak Flexicolor and Photocolor II:

Prewarm: The tank and film are warmed to the process temperature.
Color Developer: Contrast and density are determined by color development.
Bleach: In the bleach, the metallic silver is converted to silver salts to be removed by the fixing bath.
Rinse: The bleach is removed from the film.
Fixer: In the fixer, the silver converted by the bleach, and all remaining silver salts are removed from the film.

Rinse: The rinse washes out the remaining chemistry and should be at least four minutes long.
Stabilizer: The stabilizer serves as a wetting agent, preserves the dyes, inhibits bacteria, and hardens the film.
Dry: As needed.

The above description of the process is for Kodak Flexicolor (C-41) chemicals. However, in the time chart we have included Photocolor II, a C-41 and EP-2 type chemistry sold by JOBO. In this the Bleach and Fix are combined in a single step called 'Bleach-Fix.'

Process Sequence for Photo Technology FP:

Prewarm: The tank and film are brought to the process temperature.
Color Developer: Contrast and density are determined by color development.
Conditioner: For Fuji film only, a conditioner step removes the developer and prepares the film for the bleach-fix. For Kodak, and other C-41 compatible films this step is not necessary or desirable.
Rinse: This is used only with Fuji Film, to remove the Conditioner.
Bleach-Fix: In this step the silver and silver salts are removed from the film.
Rinse: The rinse washes out the remaining chemistry. Rinse for at least five minutes.
Stabilizer: The stabilizer serves as a wetting agent, preserves the dyes, inhibits bacteria, and hardens the film.

Note: Stabilizer contains formaldehyde, a known carcinogen. Use it only with good ventilation. We suggest you use rubber or neoprene gloves and apron, and eye goggles.

The Photocolor II and FP Kits do not contain a stabilizer. However, we strongly suggest that a stabilizer be used. A formaldehyde-based stabilizer solution should be used. This is manufactured by several different chemical manufacturers, or you may purchase from JOBO, part #303627 Master Class E-6 Stabilizer. Stabilizer should be used outside the processor and at room temperature. Do not agitate.

Photocolor FP is a chemistry that will process both C-41 Films and RA-4 Paper. For simplicity we are treating only the film process in this section. You will find the details about RA-4 in the paper processing section.

9.7 Black and white film process

Black and white film processing is easily done in the ATL-3000. Because there are many film and developer combinations, *you* must determine the times with black and white film processing.

Starting point for black and white processing: Temperature 68°F (20°C) or what is recommended by the manufacturer:

Pre-rinse	5:00
Developer	X:XX Use your normal time for hand inversion processing, or the film manufacturer's recommended time.
Stop Bath	1:00
Fixer (rapid type)	5:00 Some film and fixer combinations require a longer fix time.
Final Rinse	5:00
Wetting Agent	1:00
Dry	As needed

Process Sequence for Black and white Film:

Pre-rinse: The tank and film are brought to process temperature. The emulsion is completely soaked with water.
Developer: Exposed silver salts are converted to metallic silver. Density and contrast are determined in the developer.
Stop Bath: The stop bath quickly and evenly ceases development. The emulsion is made acidic for the fixer.
Fixer: The fixer removes the unconverted silver salts.
Final Rinse: This rinse removes the fixer from the emulsion. Removal of the fixer is necessary for image permanence.
Wetting Agent: Wetting agent is an optional step that helps film dry spot free.
Dry: As needed.

9.8 Black and white processing in-depth discussion

The type of negative desired in black and white varies with the film, your enlarger (condenser or diffusion type), the developer, and the desired print appearance.

For a condenser enlarger, you would normally want a negative that is a little lower in contrast and density than one for a diffusion enlarger. This factor will affect your developer choice and time.

A five minute pre-rinse of any black and white film works with the developer to produce a negative with manageable contrast and good tonal range. Pre-rinse times shorter than five minutes may produce irregular development, and should be avoided.

With all this in mind, let's set up a typical starting point for your favorite film and developer combination. If you have a developer time that has worked well for you with hand (inversion) processing, start with that time. If you do not have that time, look in the film or chemical manufacturer's information. Get the time they suggest for inversion (hand) processing. Program your processor to work at 20-24°C (68-75°F).

Process Step	Condenser Enlarger	Diffusion Enlarger
Pre-rinse	5:00	5:00
Developer	Hand time or up to 20% less	Hand time or up to 15% less
Stop Bath (2% Acetic Acid)	1:00	1:00
Fixer	5:00 (approx.)	5:00 (approx.)
Final Rinse	5:00	5:00
Wetting Agent	1:00	1:00

Some notes on the process:
You may have to experiment to get the best negatives. To test, expose a roll of film. Use segments of that roll to process at various developing times. This procedure will help to determine the developer time you want without great expenditures of film and time. Often, the hand inversion time is acceptable, and is an excellent starting point.

Adjust the incoming water temperature so your pre-rinse and rinse water are within ±2°C of your water bath and chemistry.

Use the fixer time given by the chemical manufacturer for the type of film you have chosen.

If you can't find a recommended fixing time for your fixer and film combination, use this procedure. Place a short length of film in a small container of fixer. Gently agitate the container. Time how long it takes for the film to turn clear. Use twice the time it took to clear as your fixing time.

Hypo-clearing or hypo-eliminator products (such as Speedwash from Photo Technology) may be used to reduce the rinse time required. Use the times and rinses recommended by the chemical manufacturer when using hypo-removing products.

Some important comments on tanks and developers:
All JOBO tanks are labeled with the quantity of solution required to completely cover the film level in that tank. If you process only one roll of film in a two-reel tank, you still have to use the solution quantity specified for that tank. Any lower quantity will be too low to cover the film at the center of the reel. The solution quantity marked on the tank is the minimum quantity - the tank will hold more.

There are numerous black and white film developers on the market. Many different dilutions of these developers can be used. You must pay attention to the developer concentration and quantity of the specific dilution you plan to use. A specific area of film (square inches) will require a specific quantity of developer to process the film properly. If using a more highly diluted developer, test to ensure the quantity of diluted developer used will properly develop your film. Inadequate developer could cause under-development. This type of under-development cannot be compensated for by extending the developer time.

An Example:
According to Kodak's instructions, 100 ml of Kodak D-76 stock solution will process one roll of 35 mm, 36 exposure film. A popular dilution of D-76 is to mix the stock solution 1:1 with water, and extend the development time. If you use the same quantity for the diluted

developer as the original stock developer, the film will be under-developed. There is not enough active developer agent in the 1:1 solution to develop the film to the same density as the stock solution. When using a diluted developer, increase the quantity of the developer solution by at least 30%. The correct development time will be different with each dilution. Be sure to refer to the correct time (from the chemistry manufacturer) for the dilution you are using.

You may find that extreme dilutions will require a reduced quantity of film in the tank. This reduction provides enough active developer to finish the development of the film. (An example is one roll of 35 mm film in a two reel tank.)

The 'inversion' quantity of chemistry marked on the tank label is approximately the maximum amount of chemistry the tank will hold. Excess chemistry pumped into the tank will immediately flow out the drain arm.

9.9 Black and white print process

The ATL-3000 can be used for papers and chemistry manufactured by Kodak, Ilford, Agfa, Oriental, etc. JOBO also has a line of black and white chemistry made by Photo Technology.

Process sequence and recommended process times, Temperature 20°C (68°F):

Pre-rinse	0:30
Developer	1:30 (Time will vary with choice of developer)
Stop Bath	0:30
Fix	1:00 (Time will vary with choice of fixer)
Rinse	2:00 (see note below)
Dry	As needed.

Process sequence for Black and White Prints:

Pre-rinse: The drum and paper are brought to process temperature. The emulsion is completely soaked with water.
Developer: Exposed silver salts are converted to metallic silver. Density and contrast are determined in the developer.
Stop Bath: The stop bath quickly and evenly ceases development. The emulsion is made acidic for the fixer.
Fixer: The fixer removes the unconverted silver salts.
Final Rinse: This rinse removes the fixer from the emulsion. Removal of the fixer is necessary for image permanence.
Dry: As needed.

Both the developer and the fix times will vary with the manufacturer's directions for the use of their product.

JOBO paper drums have a chemistry quantity printed on the side stating the minimum amount required to cover the paper during processing.

With black and white paper, there is no chemistry (at recommended dilutions) that would require more solution quantity than printed on the drum. You are safe to use the quantity printed on your JOBO Drum.

JOBO does not recommend processing fiber based print paper in our print drums. The raised ridges on the inside the drums may mark the paper, and rinsing in the drum may not be sufficient.

9.10 Print from color negative process RA-4

(Photocolor FP, Kodak RA-4, and Master Class RA-4)

Recommended processing times and temperatures:

	FP	RA-4
Temp:	38.0°C	35.0°C
Pre-wet:	0:30	0:30
Developer:	2:00	1:00
Stop Bath:	None	0:30
Rinse:	None	0:30
Bleach-Fix:	1:00	1:00
Rinse:	2:00	1:30

Process sequence for RA-4 type paper:

Pre-rinse: The drum and paper are brought to the process temperature. The emulsion is completely soaked with water.
Developer: Contrast and density are determined by development.
Stop Bath: The stop bath ceases the development and prepares the paper for the bleach-fix. For some EP-2 and RA-4 type processes, this step is not necessary. It will not harm the process if used.
Rinse: The rinse removes the stop bath (or developer, if used without stop bath). For some EP-2 and RA-4 type process this step is not necessary. It will not harm the process if used.
Bleach-Fix: In this step the silver and silver salts are removed from the paper.
Rinse: The rinse washes out the remaining chemistry. Rinse for at least one and a half minutes.
Dry: As needed.

Stop bath is not supplied with most color print chemistry kits. You may use Phototechnology Indicol, Kodak Indicator Stop Bath, or any common black and white process stop bath. You may mix your own by diluting acetic acid to about a 2% solution. Stop baths with indicators in them (yellow color) will not stain the print. Acetic acid (28%) diluted at a ratio of 1 part acid to 20 parts water will make a 2% solution.

Note: The FP print process differs from the Kodak and Master Class RA-4. There is no stop bath

or rinse after the stop bath. With Photocolor FP, there is no problem with this processing sequence. You may add a stop step and rinse step to this process. It will not harm the processing.

Note: As with all color prints, do not attempt to make any judgment of the colors while the print is wet. Color can only be judged correctly when the print is dry.

If you are now using EP-2 type chemistry and paper, we recommend that you change to RA-4 type materials. The EP-2 process has been phased out of production by Kodak. The RA-4 materials are replacing the older process. For more information on the EP-2 process, call JOBO customer service or read Kodak's manual.

9.11 Color transparency print process R-3000

(Kodak R-3000, and Photo Technology Chrome-R Chemicals)

Making prints from transparencies (slides) using papers manufactured by Kodak, Fuji, Ilford, and others.

Recommended Process Times:

	Chrome-R	Kodak R-3000
Temperature	38.0°C (100.0°F)	34.0°C (93°F)
Pre-rinse	1:00	1:00
First Developer	1:10	1:50
Rinse	2:00	2:00
Color Developer	2:15	3:15
Rinse	1:00	1:00
Bleach-Fix	2:00	2:30
Rinse	2:00	2:30
Dry	As needed	As needed

Process Sequence:

Pre-rinse: The drum and paper are brought to the process temperature. The emulsion is completely soaked with water.
First Developer: In the first developer the exposed silver halides of the paper coating are reduced to metallic silver. The first developer represents the most critical phase of the process. Time, temperature, and agitation, as well as storage of the working solutions affects density, contrast, maximum density, and fog.
Rinse: This rinse quickly interrupts the development and prevents the first developer from contaminating the color developer. Insufficient first rinse can lead to changes in density as well as color.
Color Developer: In this processing step the remaining silver salts are converted to metallic

silver. The oxidized color developing substances react with the film's color couplers and dyes. Changes in the color developer step affect color balance, contrast, minimum and maximum density, and evenness of the development. A reversal agent is contained in the color developer.
Rinse: This rinse removes the color developer and should be continued for at least 1 minute.
Bleach-Fix: In the bleach-fix, the metallic silver is transformed to silver halide and is removed.
Last Rinse: The last rinse removes the remaining chemistry and should be continued for at least 2 minutes.
Dry: As needed.

As with all color prints, do not attempt to make any judgment of the colors while the print is wet. Color can only be judged correctly when the print is dry.

With R-3000 type processes, no chemicals are used that would require more solution quantity than that printed on the drum. You can safely use the quantity printed on your JOBO Drum.

9.12 Color transparency print process Ilfochrome© P-30 and P-30P

Color prints from transparencies (slides) used with paper manufactured by Ilford.

Recommended Process Times:

Temperature 24.0°C (75°F)	
Pre-rinse	0:30
Developer	3:00
Rinse	0:30 (Maximum)
Bleach	3:00
Fixer	3:00
Final Rinse	3:00
Dry	As needed

Process sequence:

Developer: The developer is a black and white type developer that contains special additives enabling the formation of a positive silver mask.
First rinse: This rinse interrupts development and avoids the spreading of undiluted developer into the bleach bath. **Do not extend the time of this rinse.**
Bleach: In the bleach, pigment and silver bleaching are completed. The bleach is a highly acidic solution. Handle with care.
Fixer: The fixer, an almost neutral pH, is well buffered to keep the pH value constant. In this bath any remaining silver is removed from the print.
Final rinse: In the final rinse, all chemistry and soluble reaction products are removed.
Dry: As needed.

Note: With Ilfochrome^{C}, pay attention to their solution quantity requirements. They are greater than the quantity that the JOBO drum indicates. In all cases you should use the Ilfochrome^{C} recommendations as a minimum amount.

8 x 10" print = 75 ml each; 11 x 14" print = 150 ml each.

10. Technical Troubleshooting

10.1 Troubleshooting, Introduction

You may find that your processing results do not meet your expectations. This section works with troubleshooting the problems that can occur.

Please note that many errors other than actual processing may appear to be a processing fault. A partial list of these are: Out of date or improperly stored film or paper; over- or underexposure; camera, drum or tank, or darkroom light leaks; exposure of the film or paper to X-rays, microwaves, or some chemical fumes; and incorrect identification of the process required for the material you have exposed.

If it is likely that the problem is in the processing, use this section to determine the most likely source. Only test runs should be made until the problem is resolved.

If you are at a loss trying to solve a processing problem, it may be the local water supply. **Buy bottled, distilled water to mix your chemistry, and try again. This minimal expense can yield great benefits in quality and consistency of the process.**

10.2 Review non-processing errors or faults

Is the film or paper past its expiration date?
Was it properly stored (according to the manufacturers instructions)?
Was it properly exposed, or exposed at all, or fogged?
Was the film or paper loaded in the tank or drum correctly (lid properly sealed)?

Was the correct chemistry used for this film or paper?
Is the chemistry past its expiration date?
Was it properly stored?
Was the chemistry mixed correctly?

- Dilution?
- All components mixed in proper order?
- Stirred after each component added?
- All components used for each solution?
- Mixed at the proper temperature?
- Used at the proper temperature?

Was there a chance for contamination in the mixing?

The graduates or mixing vessels thoroughly washed between the mixing of each step?
The bottles used for storage thoroughly cleaned before using?
Drum or tank rinsed after the last process?

Was the mixed chemistry impaired?

Stored properly? (There should be a minimal amount of air over the developer in the storage bottle. It is best if the bottle is full to the rim with no air space.)
Stored too long? (Date the bottle of chemical when mixed, to know how old it is when used.)
Used in the correct order?

Many problems are solved by using the edge markings printed on 35 mm and 120/220 roll film. The marks generally tell the frame or negative number, type of film, and sometimes the emulsion number. This information is pre-exposed on the film during manufacture, and its exposure is correct.

If edge markings appear properly developed on your film, the problem is generally not with processing. Look for difficulties in exposure (camera or light meter problems).

If the edge markings are dull, appear underexposed, or are not fully visible for the length of the film, the problem can be:

Loading or unloading of film in camera.
Loading of film on reel.
Improper storage of the film (excess heat, radiation, or chemical fumes).
Age of film (old film develops a high fog level).
Chemical mixing, dilution, or contamination problems.
Processing errors in time or temperature.

10.3 Processing faults - Color transparency film E-6

Transparency too dark: Increase time or temperature of the first developer. This effect also could be caused by underexposure of the film.

Transparency too light: Decrease time or temperature of the first developer. This effect also could be caused by overexposure of the film.

Transparency too light with a color shift toward blue: First developer contaminated with fixing bath. Clean equipment and mix fresh developer.

Color shift toward blue: Be sure to adjust the reversal bath to a 60% solution. For further adjustments, see the JOBO E-6 Handbook, part #4192, or the E-6 Manuals from the major chemical manufacturers.

Color shift toward yellow: See the JOBO E-6 Handbook, part #4192, or the E-6 Manuals from the major chemical manufacturers.

Strong color shift toward green with insufficient black density: Reversal bath is exhausted. Use fresh reversal. With three step chemistry, replace the color developer, as the reversal agent is incorporated in the color developer.

Yellow spots, high minimum density: Developer contaminated with stabilizer. Clean reels and tanks. See comments on stabilizer in the E-6 Process section.

High minimum density: Sometimes a gray, muddy appearance of the whole slide (silver residue). Silver has been retained in the film emulsion due to inadequate action of the bleach or bleach-fix. Aerate the bleach, and re-bleach and fix to remove the retained silver. Weak conditioner in six bath E-6.

Color shift toward magenta: Increase the time of the rinse after first developer to a maximum of four minutes. Be sure that the temperature of the rinse water is at the processing temperature (adjust the incoming water temperature). Overly cold or hot rinse water can cause color shifts. Aerate the bleach or bleach-fix before starting the process. Increase the color developer concentration by 10%.

Film end closest to center core of the reel is undeveloped, or streaked: Increase the amount of chemistry being used.

10.4 Processing faults - Color negative film C-41

Negative too light: (Not dense enough) Developer old or exhausted. This effect could be from underexposure of the film.

Negative too dark: (Too dense) Developer mixed wrong. This result could also be from overexposure of the film.

No image on film - no edge markings: Check sequence of processing steps. Developer must come before the bleach step. Or developer may be old or exhausted.

No image on film - edge markings are present: Chemical steps of the process are OK, film unexposed.

Film end closest to the center core of the reel is undeveloped or streaked: Increase the amount of chemistry being used.

Negatives more dense toward edges, gradually getting less dense toward center: Reels contaminated with stabilizer. Replace reels. See comments on stabilizer in the sections on E-6 and C-41 film processing.

Film image appears dense, base color of film is very reddish. Long exposure time required for prints, which may have red shadows and cyan colored highlights. Fault is with the bleach or bleach-fix step of the process. Silver residues remain in the film, which

creates the high density. It is also possible that a colorless leuco-cyan dye has formed in the image. This results in the red shadows or cyan highlights in a print. Both problems, the retained silver, and the leuco-cyan dye, can be corrected by aerating the bleach (bleach-fix). Then re-bleach, fix, and rinse the film.

10.5 Processing faults - Black and white film

Negative too light: Check camera or light meter for possible exposure problems. Increase the time of developer. Increase the amount of developer.

Negative too dark (dense): Check camera or light meter for possible exposure problems. Decrease the time of developer.

Density streaks or clouds: Developing time is too short. Dilute the developer to a concentration requiring five minutes or more developing time, or change to a different developer.

10.6 Processing faults - Black and white prints

Print too dark: Use a shorter exposure time.

Print too light: Use longer exposure time.

Dark blotches or dark edges on print: Paper has been exposed to light.

Print has light stripes: Processor not level or drum is floating in the water bath. Check the processor with a level. If drum is floating, reduce the amount of water in the bath until the drum rests on the rollers. Also possible insufficient amount of chemical being used. As a minimum, use either the amount recommended by JOBO, or the amount recommended by the chemical manufacturer, whichever is greater.

Print has light stripes running the length of the drum towards the end away from the processor motor: Use a 1 minute pre-rinse.

Print has light stripes that may run lengthwise of the drum, or run around the circumference of the drum: Be sure that the drum and the lid are dry before starting a print. Remove the beaker (light trap) from the lid and dry that as well. This type of mark is almost always caused by droplets of water that get on the paper before the pre-rinse.

Overall gray appearance, lacking contrast and highlight detail: Check safelight. This problem is most often a safelight fog.

10.7 Processing faults - Print from color negative RA-4

The drum and lid must be dry before placing any paper in the drum.

Print is too dark: Use shorter exposure time.

Print is too light: Use longer exposure time.

Black areas of the print are dark blue: Increase developer time or temperature. 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, or drum is floating in the water bath. Check the processor with level. If drum is floating, lower the water level. Insufficient chemistry amount. As a minimum, use either the amount recommended by JOBO or by the chemical manufacturer, whichever is greater.

Print is light or off-color on the end away from the processor motor: Chemistry volume insufficient or drum not level. Check that processor is level. Be sure drum is not floating.

Print has stripes from end nearest processor to end farthest from processor motor: Use 1 minute pre-rinse.

Light spots in print: Bleach-fix contamination. Clean drum and cap assembly carefully.

Color shift when switching from larger to smaller drums: Increase amount of fresh chemistry being used. If practical, be sure that the diameter of the test drum and the print drum are the same.

White in print is impure (often Cyan): Wrong, or too bright a safelight is in use. Dark-room is not light tight. Contamination of the developer with bleach-fix. Rinse drum and lid thoroughly between runs.

Magenta-purple swirls in random pattern across the face of the print: Most often from a carry-forward of the developer into the bleach-fix. Increase the concentration or time of the stop-bath. Use a 30 second rinse after the stop bath step.

10.8 Processing faults - Prints from transparencies R-3000

Print is too dark: Increase exposure time.

Print is too light: Decrease exposure time.

Contrast is excessive, or black areas are green: Reduce time or temperature of the first developer.

Dark areas and colors are uneven: Processor is not level, or drum is floating. Level the processor (See the section on Installing the Processor). If the drum is floating, lower the water level. Insufficient chemistry. As a minimum use the amount recommended by JOBO, or by the chemical manufacturer, whichever is higher.

Print is too dark, and has low contrast and impure blacks: Increase time or temperature

of the first developer.
Stripes in print from end nearest to end farthest from the processor motor head: Use a 1 minute pre-rinse.

Print with undeveloped areas (white areas): Processor is not level or drum is floating. Level the processor. Lower the water level if the drum is floating. Chemistry amount is insufficient. As a minimum, use the amount recommended by JOBO or by the chemical manufacturer, whichever is higher.

Print has light to white spots: Paper has been exposed to light.

Black areas of print lack density: The print has a color shift. Exposure to safelight.

Very light print with strong magenta-purple color shift: Contamination of color developer with first developer. Insufficient rinse after first developer. Increase the time in the rinse after the developer.

10.9 Processing faults - Prints from transparencies Ilfochrome©

You must be cautious about the rinse after the developer in the Ilfochrome© process. Do not extend the time of this rinse past 30 seconds.

Brown or yellow spots on back side of print, or red stains on the exposed side of the print: Decrease rinse time after developer.

Spots or streaks - light or completely white: Paper has been exposed to light.

Gray or black spots on print: Processor is not level or drum is floating. Check if processor is level (See section on 'Installing The Processor'.) Lower the level of the water bath, if the drum is floating. Chemistry amount is insufficient. As a minimum use the amount recommended by Ilford.

Print has reverse image - too dark, and orange: Paper was exposed through the back side. Expose paper with emulsion side up.

Faint, dark print: Increase developing time.

Black areas lack density, and a color shift: Safelight exposure, or exposure to light. Yellow spots on the print. Developer contaminated by fixer. Rinse and clean drums carefully. You may need to discard developer and mix fresh.

Gradual diminishing of color and density on the print from end nearest processor to end farthest from the processor motor: Level processor, or increase chemical amounts. Check temperatures and process times. Drum is floating in the water bath. Lower the water level until drum no longer floats.

Blue streaks on print: Emulsion has been scratched. Remove from drum carefully. Use less pressure on the print squeegee.

10.10 Factory settings for the programs

1)	Process no.:		1
2)	Process name:		C-41 PHO
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		5:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	3:15
12)	Rinse	3:	0:00
13)	Chemical	4:	1:00
14)	Rinse	4:	0:00
15)	Chemical	5:	10:00
16)	Rinse	5:	5:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		2
2)	Process name:		RA-4 /KO
3)	Bottle Battery:		Front
4)	Process temperature:		35°C
5)	Preheat:		0:00
6)	Pre-Rinse:		0:30
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	1:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:30
14)	Rinse	4:	0:30
15)	Chemical	5:	1:00
16)	Rinse	5:	1:30
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		3
2)	Process name:		C-41 KOD
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		5:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	3:15
12)	Rinse	3:	0:00
13)	Chemical	4:	1:00
14)	Rinse	4:	0:00
15)	Chemical	5:	6:30
16)	Rinse	5:	3:00
17)	Chemical	6:	6:30
18)	Rinse	6:	3:00

1)	Process no.:		4
2)	Process name:		B/W FILM
3)	Bottle Battery:		Front
4)	Process temperature:		20°C
5)	Preheat:		0:00
6)	Pre-Rinse:		5:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	1:00
10)	Rinse	2:	0:00
11)	Chemical	3:	0:00
12)	Rinse	3:	5:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	0:00
16)	Rinse	5:	0:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		5
2)	Process name:		P30/CIBA
3)	Bottle Battery:		Front
4)	Process temperature:		24°C
5)	Preheat:		0:00
6)	Pre-Rinse:		1:00
7)	Chemical	1:	3:00
8)	Rinse	1:	0:30
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	0:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	3:00
16)	Rinse	5:	0:30
17)	Chemical	6:	3:00
18)	Rinse	6:	3:00

1)	Process no.:		6
2)	Process name:		E-6 KOD
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		05:00
6)	Pre-Rinse:		00:00
7)	Chemical	1:	6:30
8)	Rinse	1:	2:30
9)	Chemical	2:	2:00
10)	Rinse	2:	0:00
11)	Chemical	3:	4:00
12)	Rinse	3:	0:00
13)	Chemical	4:	2:00
14)	Rinse	4:	0:00
15)	Chemical	5:	6:00
16)	Rinse	5:	0:00
17)	Chemical	6:	3:00
18)	Rinse	6:	5:00

1)	Process no.:		7
2)	Process name:		E-6 3B
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		5:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	6:30
8)	Rinse	1:	3:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	4:00
12)	Rinse	3:	1:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	10:00
16)	Rinse	5:	5:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		8
2)	Process name:		CHROME-R
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		0:00
6)	Pre-Rinse:		1:00
7)	Chemical	1:	1:10
8)	Rinse	1:	2:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	2:15
12)	Rinse	3:	1:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	2:30
16)	Rinse	5:	2:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		9
2)	Process name:		EP-2 KOD
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		0:00
6)	Pre-Rinse:		1:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	2:30
12)	Rinse	3:	0:00
13)	Chemical	4:	0:30
14)	Rinse	4:	0:00
15)	Chemical	5:	1:30
16)	Rinse	5:	2:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		10
2)	Process name:		EP-2 PM
3)	Bottle Battery:		Front
4)	Process temperature:		38°C
5)	Preheat:		0:00
6)	Pre-Rinse:		0:30
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	1:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:30
14)	Rinse	4:	0:00
15)	Chemical	5:	1:30
16)	Rinse	5:	1:30
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		11
2)	Process name:		US #11
3)	Bottle Battery:		Front
4)	Process temperature:		20°C
5)	Preheat:		0:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	0:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	0:00
16)	Rinse	5:	0:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

1)	Process no.:		12
2)	Process name:		US #12
3)	Bottle Battery:		Front
4)	Process temperature:		20°C
5)	Preheat:		0:00
6)	Pre-Rinse:		0:00
7)	Chemical	1:	0:00
8)	Rinse	1:	0:00
9)	Chemical	2:	0:00
10)	Rinse	2:	0:00
11)	Chemical	3:	0:00
12)	Rinse	3:	0:00
13)	Chemical	4:	0:00
14)	Rinse	4:	0:00
15)	Chemical	5:	0:00
16)	Rinse	5:	0:00
17)	Chemical	6:	0:00
18)	Rinse	6:	0:00

11. Cleaning and Maintenance

11.1 Cleaning at the end of the process

The ATL-3000 carries out a thorough cleaning of the internal chemical supply system automatically.

The chemical bottles require cleaning only when you intend to use different chemistry in the same bottles, or when the unit will be unused for a prolonged period of time. Please read the instructions in the following section to correctly clean the bottles and chemical lines.

11.2 Cleaning programs

The ATL-3000 has six cleaning programs built into the microprocessor. You should run the cleaning programs every time you switch to a different process chemistry, or when the unit has not been or will not be operated for a prolonged period of time.

Program 13 cleans **front** bottles 1, 2, and 3. Program 16 cleans **rear** bottles 1, 2, and 3.
Program 14 cleans **front** bottles 4, 5, and 6. Program 17 cleans **rear** bottles 4, 5, and 6.
Program 15 cleans all six **front** bottles. Program 18 cleans all six **rear** bottles.

To run a cleaning program, attach an empty film tank capable of holding 1 liter of liquid to the processor. In RUN mode, select which cleaning program you wish to run (13-18), fill the corresponding bottles with water, and press start. No fluids pumped during a cleaning program are reclaimed. The cleaning programs take 9 minutes and 30 seconds to run.

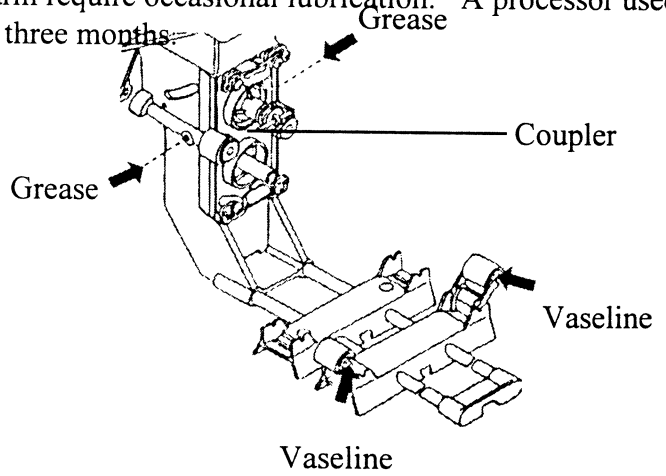
Note: While the cleaning program times and temperature can be changed, the changes will not be stored in memory. Do not attempt to run a photographic process in the cleaning programs.

Note: You must disable the refill option in SET mode to run a cleaning program in the rear set of bottles.

11.3 Lubrication

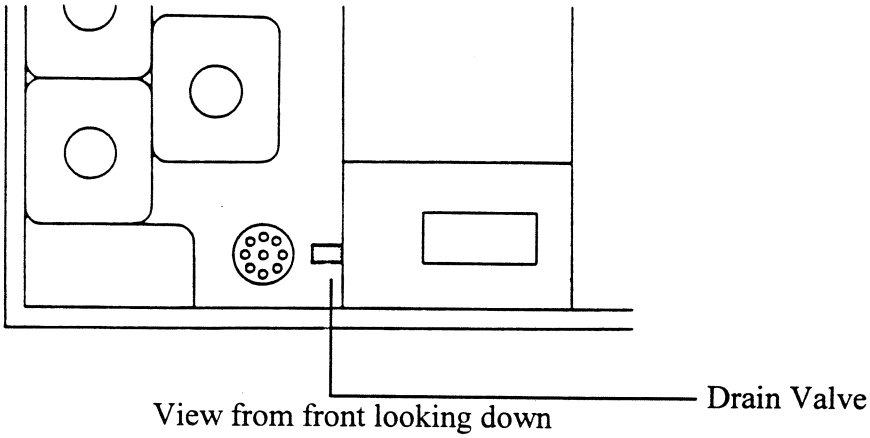
The two white transfer gears on the lift arm require occasional lubrication. A processor used on a daily basis should be greased every three months. Apply the grease with JOBO's syringe (item #95465) at the points marked in the diagram to the right.

Never apply grease on the coupler. If a squeaking sound occurs, apply a little vaseline to the connection points of the tanks and drums.



11.4 Cleaning the unit

DAILY! Drain the water bath at the end of the day to reduce algae buildup and possible corrosion from water contaminated with chemistry.



View from front looking down

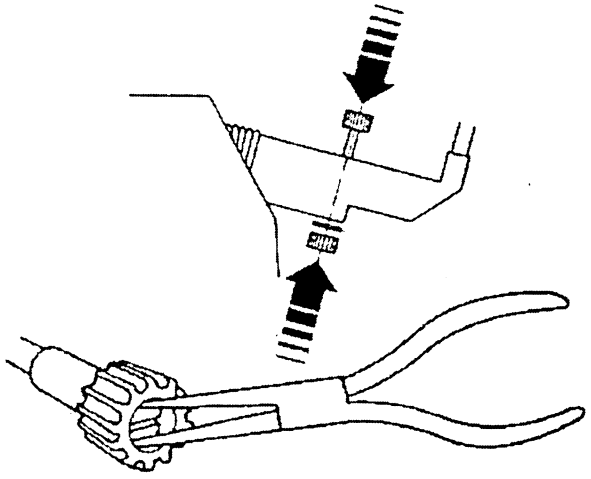
Rinse off the stainless steel screen in front of the water level panel. Do not remove the screen permanently, it protects the water recirculation components from damage.

MONTHLY! Regular cleaning with a damp cloth and a mild detergent is recommended. To help clean the processor use JOBO Processor Clean II (#4136 4oz. package, #4135 4.7lb jug). Processor Clean II is a non-chlorinated powder. At the end of the day, pour in the desired amount of cleaner (after mixing with a little water) as specified on the package, let run for 6 hours (or overnight). When finished, flush out the processor with two changes of water.

Do not use any cleaners containing solvents or chlorine since these will cause the plastic of the trough to become brittle and eventually crack. They may also corrode the heating elements and pump impeller shaft.

11.5 Transfer gears

The gears (#95200) are subject to wear and should be replaced every 6 months or after 500 hours of operation. Two extra gears are included with the processor accessories. If the gears are not replaced on a regular basis, they may break in the middle of a process, causing the loss of your film or paper.



11.6 Preventing algae growth

Do not use any chlorine-based cleaners to control algae growth in the processor. The best way to prevent the growth of algae is to drain the processor water bath every evening. You can also control algae by using Processor Clean II (#4135) or any non-chlorinated algaecide.

11.7 Prolonged periods of inoperation

When you don't intend to use the processor for longer than one month, you should run a cleaning program to wash all the bottles out. You should then drain the processor water bath.

11.8 Storage at temperatures below freezing

If the ATL-3000 will be stored in a location below freezing, the following steps should be taken to ensure the processor is not damaged:

1) Drain the water bath.
2) Remove and drain the water supply hoses.
3) Remove and empty the drain hoses.
4) Drain the internal rinse hose and heat exchange coil (contact JOBO for details).
5) Drain the water heater (model #4270 only).

12. After-Sales Service

12.1 Before contacting the after-sales service department

Please ascertain the following:

1) Does the actual temperature correspond to the displayed temperature (press F1)?
2) Does the drum motor rotate?
3) Is there enough chemistry to be pumped?
4) Is the processor draining the tank at the end of each process step?

If the answer to all these questions is "yes" and the film or prints are still not developed properly, you should contact your chemical supplier to establish the cause of the problem.

5) Does the "F1 for error list" appear at the end of the process?

Write down the messages that appear when you press the F1 key. If possible, correct the errors yourself. If you are unable to correct the processor, contact your dealer or JOBO Fototechnic for service at 800-525-2821, extension 159. Have your serial number ready. It can be found printed on a silver sticker located on the left side of the processor head inside the sink area.

We recommend having the processor serviced yearly or at the completion of 1,000 operating hours. To remind you of this recommendation, a message will appear at the completion of 1,000 operating hours to prompt you to call for service.

Index

3. MODIFICATIONS

Remarks concerning the modification reports

From time to time, the service manual is supplemented with modification reports; thus it is possible to utilize the ATL 2000 / ATL 3000 Service Manual regardless of production-version and update the manual as necessary.

The modifiction report is arranged as follows:

a. Consecutive No.: This number is important to assure quick and accurate locating of the modification in question. This number relates to column b.:

b. Designation of section: In this column we determine under which section of the service manual the modifications must be noted by the service technician. The designation must include the notoation of the consecutive number in the corresponding section. Thus, when working with the Service manual, it can easily be recognized where a modification took place. The type of modification can than be looked up under the consecutive number in the modification report.

c. Reason for modification: At this point a reason for the modification is given.

d. Type of modification: In this column the nature of the modification is explained and the components that are affected, ect.

e. Modification introduced since Serial-Number: The notation of the modification follows the sequence of the units produced. (Serial-No.). In case of repair the technical version of the unit can be determined. Modifications that may still be necessary become obvious through the subsequent 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.

4. DIAGNOSIS AND ADJUSTMENT WORK

4.1 Fault classification table

The listed measurement of the sensor signals must be tested during a test prgramme run.

Required measuring equipment:
a. Digital multimeter
b. Oscilloscope

If only one pin is given as measuring point, this measurement ist related to GND. If two pins are given, the measured value at the 1st pin is related to the 2nd pin.

Agreement: Under "measurements" first the measurement location (printed circuit board) and the measuring point (pin) with setpoint is given. If the measurement result is faulty, the printed circuit board to be replaced can be reasd off in the column "Faulty P.C.B". If the measured value is correct, the next measurement should be carried out. If several printed circuit boards ar indicated as " Faulty P.C.B's), these boards must be replaced, or further trouble shooting is necessary using curcuit diagrams and function description.

All replaced printed circuit boards should be sent to JOBO, indicating the serial number, the customer's name and a description of the fault.

Before working with the table, the following points should be checked:

a. Are fuses o.k.?
b. Is voltage supply o.k.?

4.2 Equipment faults (Measuring equipment: Digital multimeter)

Fault:	Measurements:	Faulty P.C.Board
Filling pump	Interface P.C.B. IC 4/Pin 1: 3,5-5V ST 4/Pins 5 u. 4: 24V	Control P.C.B. Interface P.C.B.
solenoid valve cold no function	Interface P.C.B. IC 1/Pin 10: 3,5-5 V ST 4/Pin 1: 24V	Control P.C.B. Interface P.C.B.
solenoid valve cold no function	Interface P.C.B. IC 1/Pin 15: 3,5-5V ST 4/Pin 3: 24V	Control P.C.B. Interface P.C.B.
raise lifting arm no function	Interface P.C.B. IC 4/Pin 12: 3,5-5V u. IC 4/Pin 10: 0-0,7V u. IC 3/Pin 6: 3,5-5V ST 2/Pins 10 u. 12 36V	Control P.C.B. Interface P.C.B.

Fault:	Measurements:	Faulty P.C.Board
lower lifting arm no function	InterfaceP.C.B. IC 4/Pin 12: 0-0,7V u. IC 4/Pin 10: 3,5-5V u. IC 3/Pin 3: 3,5-5V ST 2/Pins 12 u.10 36V	Control P.C.B. Interface P.C.B.
stepping motor forward no fuction	Interface P.C.B. IC 1/Pin 2: 3,5-5V u. IC 1/Pin 2: 0V ST 3/Pins 2 u. 1 24V	Control P.C.B. Interface P.C.B.
Drum motor no fuction	Transformer P.C.B. IC 1/Pin 3: > 0V ST 3/Pin 1 u. 2: > 3V	Main P.C.B. Transformer P.C.B.
Heater 1 no fuction	Transformer P.C.B. ST 2/Pin 18 (R21) 5 V u. St 2/Pin 12 R14): 5V Heater 1:≈ 220V	Main P.C.B. Transformer P.C.B. level switch on ST1
Heater 2 no function	Transformer P.C.B. ST 2/Pin 16 (R 13): 5 V u. ST 2/pin 12 (R 14): 5 V Heater 2:≈ 220V	Main P.C.B. Transformer P.C.B. level switch on ST1
Water jacket bath pump no fuction	Transfomer P.C.B. ST 2/Pin 12 (R 14): 5V Pump terminal lug≈ 220V	Main P.C.B. Transformer P.C.B.

4.3 Sensor faults (Measuring equipment : Oscilloscope)

Fault:	Measurements:	Faulty P.C.Board
Drum motor sensor	Main P.C.B. ST 3/Pin 4 square signal with drum motor runnig Signal o.k. ->	Drum motor sensor Main P.C.B.
stepping motor single stepp motor	Main P.C.B. ST 8/Pin 1 low pulse measurable when chemical distributror moving otherwise low level Signal o.k. ->	Singele step sensor Control P.C.B.
stepping motor zero sensor	Main P.C.B., ST 18/Pin 3 low level when chemical distributor in zero position (not rest position) otherwise high level Signal o.k. ->	zero sensor Main P.C.B.

Fault:	Measurements:	Faulty P.C.Board
lifting arm sensor - down	Main P.C.B. ST.18 /Pin 2 low pulse when lifting arm is raised and passes the upper rocking position otherwise high level	lower lifting arm sensor
	Signal o.k. ->	Main P.C.B.
lifting arm sensor up	lifting arm travels beyond upper "stop"	upper lifting arm sensor

4.4 Memory fault (Measuring equipment: Digital multimeter)

Fault:	Measurements:	Faulty P.C.Board
Memory loses data after breakdown in power supply	Control P.C.B. + pole battery: > 3.65 V	replace battery
	voltage o.k. ->	Control P.C.B.

4.5 Logic fault

Fault:	Measurements:	Faulty P.C.Board
Time sequence to fast or to slow	----	Control P.C.B.
Time sequence control complete-ly out of control	Main P. C. B. leads red/black: + 5 V/tolerance 0,1 V	Interface P.C.B.
	voltage o.k. ->	Control P.C.B.

4.6 Electronic fault

Problem:	Frequent occurrence of power failure display
Cause:	Capacity loss on C 1 or C 2 of transformer P.C.B. or C 1 or C 2 connection in assembly housnig interrupted
Trouble-shooting:	See measuring points, transformer P.C.B., Test C 1 or C 2

4.7 Service menue

The Service menue of ATL 2000 / 3000 is devided into 16 program steps. It is possible to change settings, to test sequences of operations manually, to do electronic tests and interrogate the service hour.

4.7.1 Exploded drawing assembly

- Switch of the unit.
- Push the ENTER, START and ON/OFF keys, simultaneously.
- The first programme steps are now shown at the display.
- To go to the next programme step use the ▼ arrow key, to go back use the ▲ arrow key.
- To call up the programme steps push the ENTER key.
- To leave the Service menue push RESET.

The Service menue only should be called up in a definable condition (that means not in case that the chemistry or air distributor is going to zero position).
A programme can be interrupted to make changes (for example: change volume of filling pump)

4.7.2 Work on pump

1. Filling pump

Here you can see, which kind of pump is installed and the filling volume in percent.

Adjustment variable:	12 V	68% - 126%
	24 V	64% - 100%

2. Stepper motor

The steppes motor can be moved with help of the arrow keys.

3. Mag. valves man.

- ▼ water jacket
- ▲ Rinse 1 - Drum

4. Lifting arm

ENTER-key has to be pushed twice

▲ Raise ▼ Lower

5. Service hours

1. Total
2. Drum motor
3. 1 Heater
4. 2 Heater
5. Filling pump
6. Lift arm
7. Inspection - After a running time of 1000 h is reached a signal for Inspection is shown in the display. To stop this message the service hours of inspection has to be reseted.

To reset the service hours, bridge BR 3 on main P. C. Board pulled of. Call up the step you would like to reset with the arrow buttons. Push F1 for 2 sec. minimum. To continue put on BR 3.

6. Equipment version

Shows a code of international modifications.

7. Load test program

The JOBO test programmes will be loaded. The programme are not shown in the service menue. The programme is verytied by a beepe signal. If you now push RESET the test program can be started.

ATTENTION: **After test program is finished don't forget to load the Std. programme or customers programme.**

8. Load std.

Programmes at our ATL 2000/3000 with our recommended developing times for various, common processes.

9. Load us

10. Customer programmes

Befor running a test program it is absolutly necessary to safe the customers dates. After the test program is ready the customer programmes can be loaded.

11. Fill sensor

Fill sensor: WITH / WITHOUT

- WITH = Sensors checks if chemistry is foaing up to a filling volume of 240 ml.

- WITHOUT = no check

12. Drum motor test

Selftest of drum motor function calibration about 50 rpm.

13. Hardeware Set-up

Adjustments of the unit

1. auto refill: WITH / WITHOUT (only 4270 and 4271 should be adjusted to - WITH)
2. Filling pump: 12 V or 24 V
3. Heat exchange:
   Generally it is adjusted to WITHOUT only if the unit has 6 pcs. of heat exchange instead of the front bottles it is with a pump capacity of 25% or 50%.
4. Exit

14. Set. default

DO NOT CALL UP THIS PROGRAMME!!!

15. Unref. / AD converter

Automatic temperature control with automatic calibration.

16. Output ADC

JOBO ATL-2000 / 3000

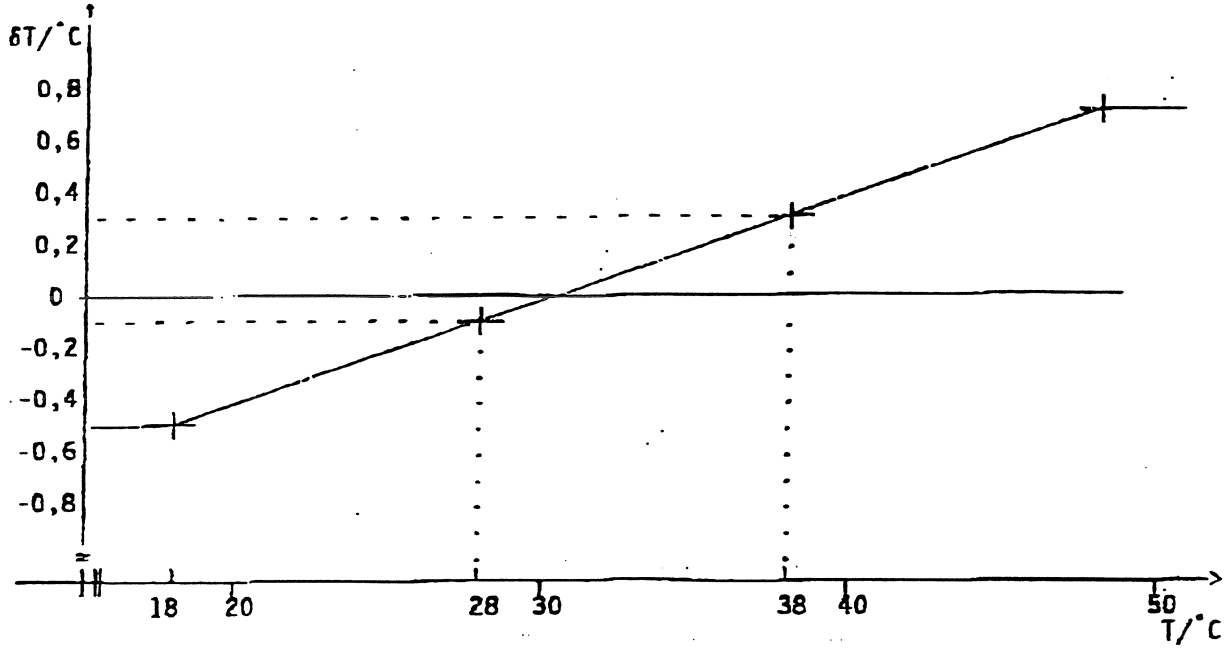
Program-Version 0.9

Service Menu

New: Point # 17 Temperature Sensor
This function makes it possible to enter individual correction values for each temperature sensor. The correction values can be progammed for 2 temperature values: for 28 degress C and 38 degrees C with +/- 0.5 degrees C tolerance. The machine will calculate a correction graph out of these values which will be considered after each following mesurements.

Exsample: Correction value: 28 degr.C: -0.1 degr.C
Correction value: 38 degr.C: +0.3 degr.C

Result: see the following graph.



Out of this diagram you can get the values of +0.5degr.C at 18degr.C and +0.7degr.C at 48degr.C.

Enter the correction value:
1. # 17 in the service menu
2. confirm with enter
You will see the following chart:

CH1:	28:+0.0	38:+0.0
CH2:	28:+0.0	38:+0.0
CH3:	28:+0.0	38:+0.0
CH4:	28:+0.0	38:+0.0

CH1 = Kanal 1 = water
CH2 = Kanal 2 = Chemie - sensor front
CH3 = Kanal 3 = 1. Che. - sensor rear
CH4 = Kanal 4 = 2. Che. - sensor rear

3. The cursor is blinking on the first value. Enter the value with „up" and „down" keys.
4. By pressing enter you can scroll through all the different values.
5. Only if you step back into the main menu of the Service menu the machine will recalculate the correction value. (You will step back into the main Service menu by pressing enter at the last value)

Attention: By selecting point #14 „set default" the correction values will be set to 0. (also by exchanging RAM).

ATTENTION SERVICE DEPARTMENT

Please note, in the instruction manuals for the ATL-2000 (Page 37) and ATL-3000 (Page 39) under point "after sales service".

The Autolabs have build-in "after sales service" check which will be activated after 1 year operation or 1000 hours of usage. After 1000 hours usage of the rotation motor the Autolab will show a message in the LCD. This message will be "Inspection". Please confirm this message by pressing the "ENTER" button. (This message should help to inform customers to schedule the next service check-up). Please look under point "5" of the service manual how rest the counter for the hours of usage.

Our suggestion:

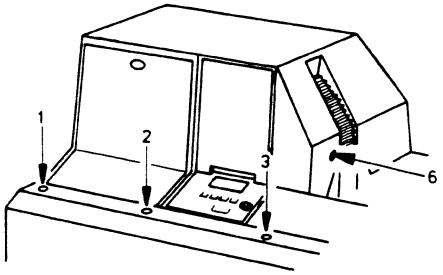
mechanical check - replacing bad parts - adjustments - grease parts - function in general

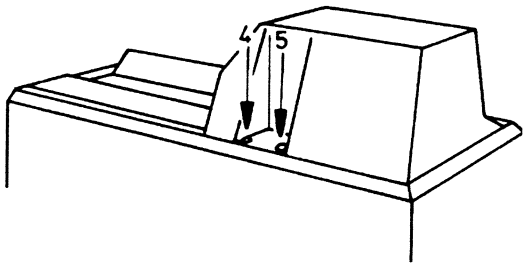
Gear in lift arm (Item # 95200)
Liftarm (check if it is water and chemical tight)
Water circulation pump (check the pump volume)
Drain of water bath (water tight, function)
Hoses (check all hoses in the machine, chemical hoses etc.)
Pressure hoses of the water supply
Sealing of the Chemical bottles (check if sealing are tight)
Lids of the chemical bottles
Filling test (check the delivered chemical volumes)
Temperature test
Water mixing valve (function)
Filter of fan (check for dust)
Sieve of water back (check for dust)
Chemical distribution plate behind the motor head (clean,adjustments)
Hot water accumulator (function, water tight, heater)
Automatic chemical refill (chemical tight, function etc.)
Switches in lids of chemical bottles (only ATL-3 second bank)

5. MECHANICAL WORK ON THE ELEKTRONIC CONTROL

5.1 Remove ATL 3000 hood

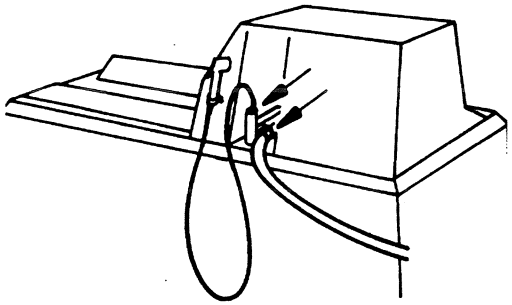
- by screwing out the six screws shown in drawing





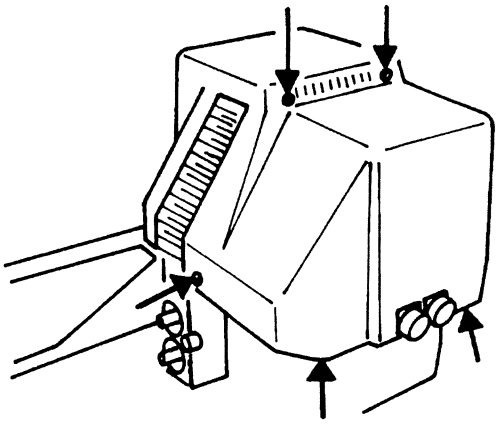
5.2. Remove manual sprayer and cold water connection

- with aid of a water pump pliers



5.3 Remove motor cover

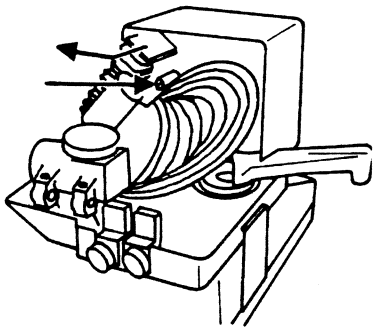
- by screwing out the five screws shown in drawing



5.4. Remove control unit

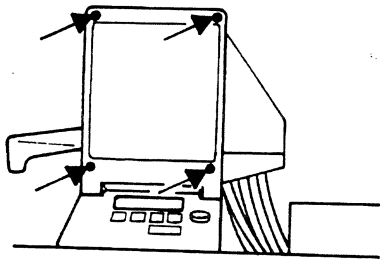
Rear

- pull bellows out of upper guide
- screw out plastic screw

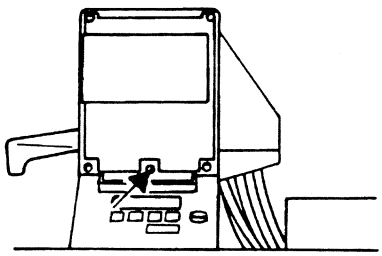


Front

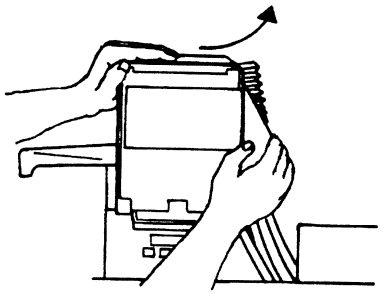
- remove control housing bottom part by screwing out the four screws shown in drawing



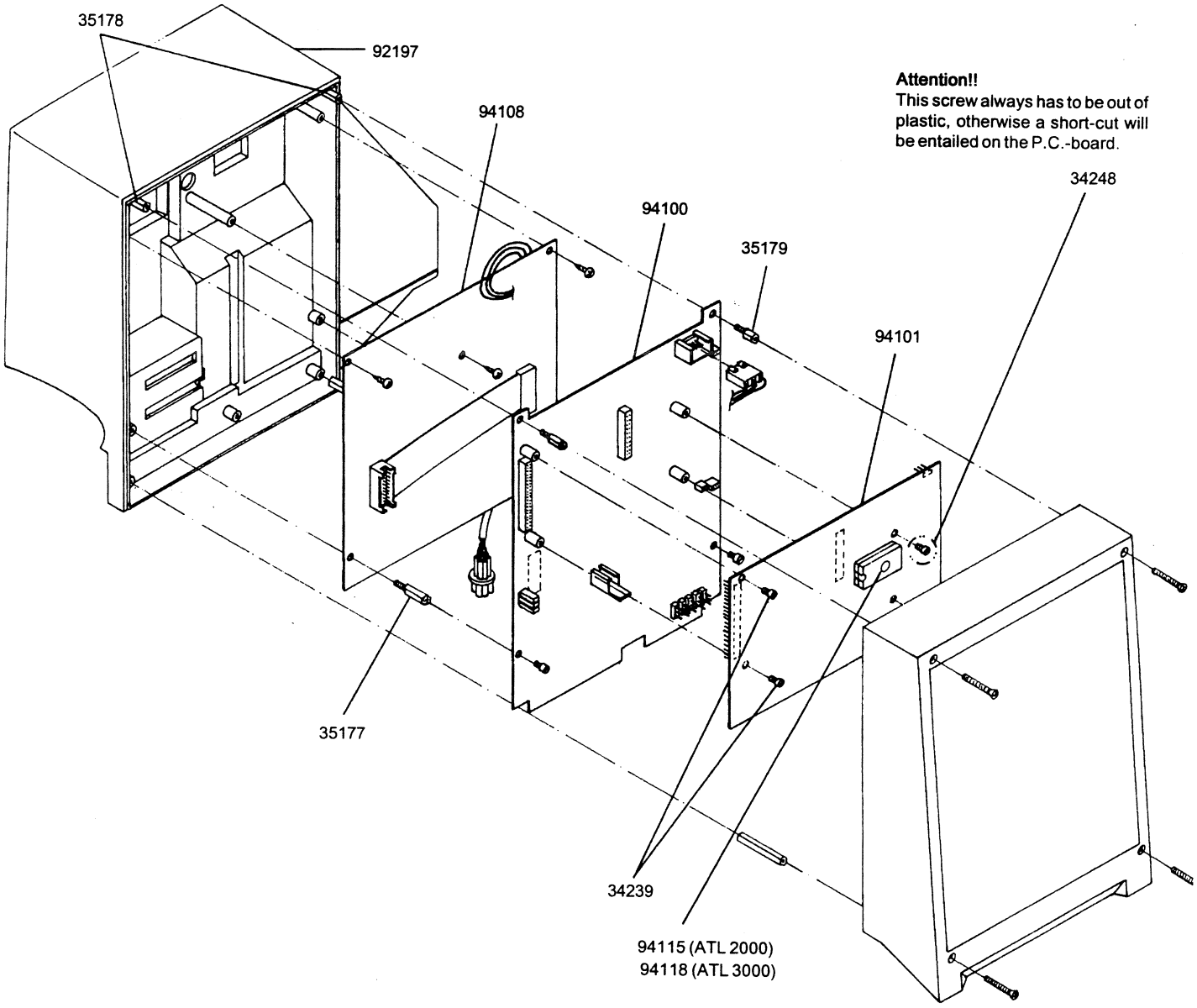
- screw out center screw at bottom edge



- press unit to right out of mount and lift it
- disconnect the three cable plugs on the rear and the cable plugs on the front



5.5 Control unit



5.6 Assembly

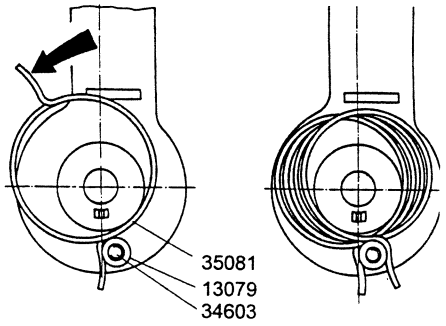
5.6.1 Work on chemical distributor

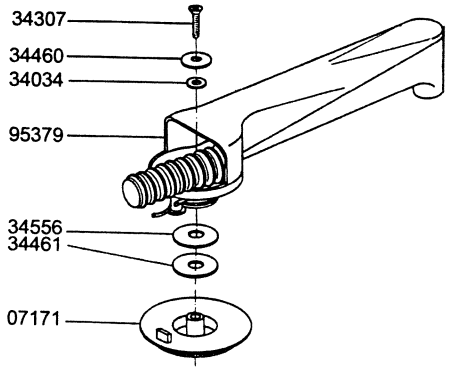
Disassembly of the chemical distributor

- move chemical distributor to position **'1'** by pressing Reset (F1 and the two arrow-push buttons)
- screw out philipps screw
- hold drain hose and pull chemical distributor off of bearing block drain opening by pulling hard

Installation of the chemical distributor

- put grease to the boring in chemistry distributor arm and cog
- put in double spring according to draft
- put hard paper washer (34456 / 34461) into the cog washer
- the chemical distributor arm should be placed that way, that the ends of the double spring claps the cog of the cog washer.
- attach hose to drain opening of bearing block with silicon glue, position chemical distributor on locking disc
- place cog washer with chemical distributor arm in the right position an bolt according to draft, grease the lower part of the washer
- check if chemical distributor can be operated easy concerning direction of rotation, as well as if it sits well concerning wobble an tilt





5.6.2 Work on air distributor

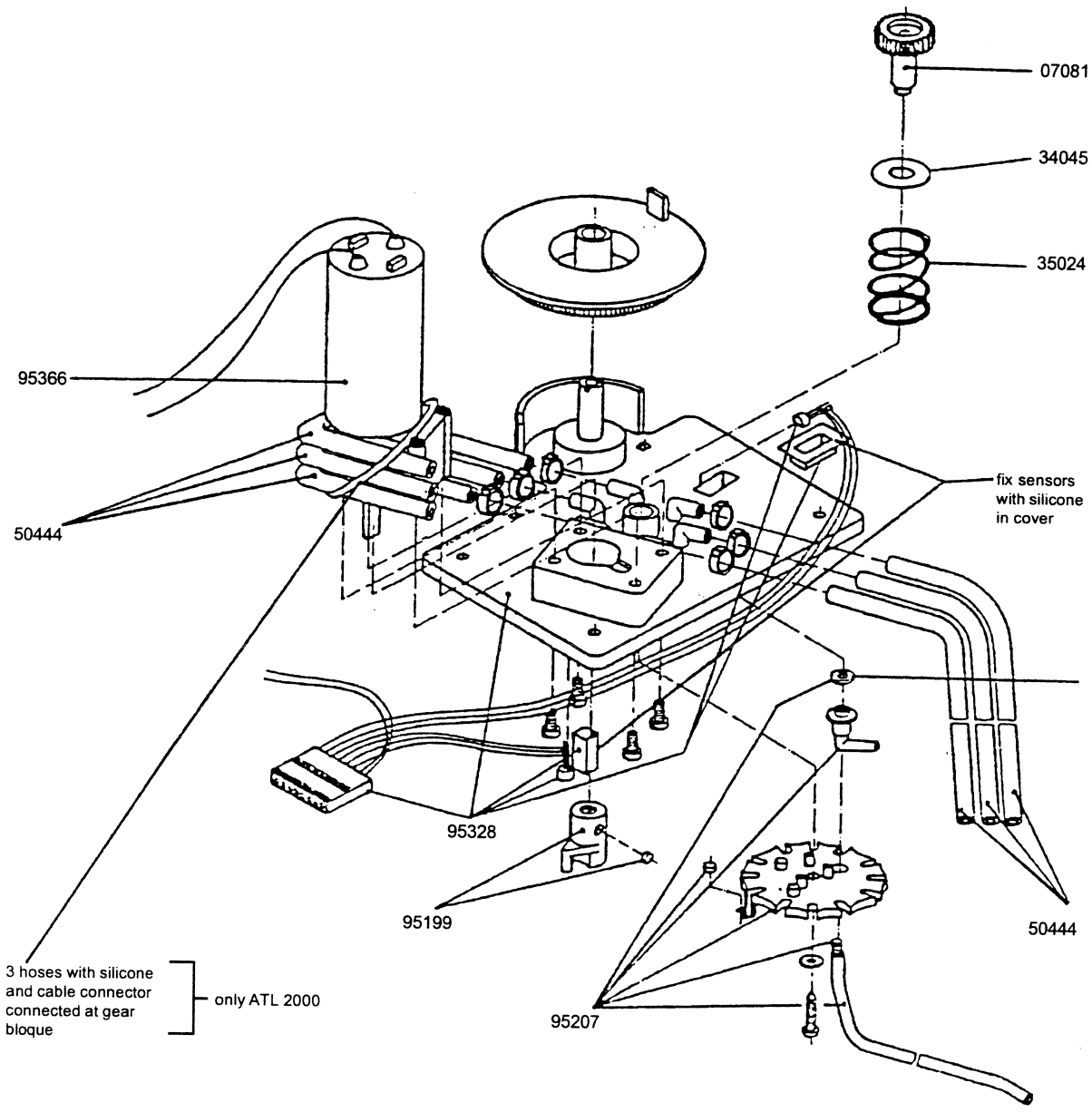
Function description

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 has 6 locking positions. In each position the manifold with O-ring located in the opening oir-tight. The indexing wheel is driven by the gear motor via an indexing finger. The chemical distributor is moved to the proper position simultaneously by gear.

Assembly and installation of the air distributor

- the 6 holes in air distributor plate must be deburred
- the O-ring must be coated with Vaseline before installation
- the square shaft on gear must be correctly screwed on
- the indexing finger must be positioned against the stop on the motor shaft
- the air hose to the pump must have a sufficient amont of play below the installation plate, and **must not be kinked**

Exploded drawing, air distributor



5.6.3 Work on air switching stage

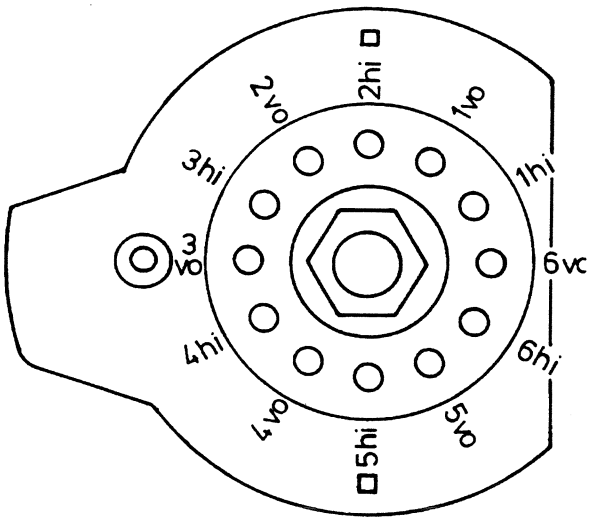
Function description

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

Removel and assembly of the air switching stage

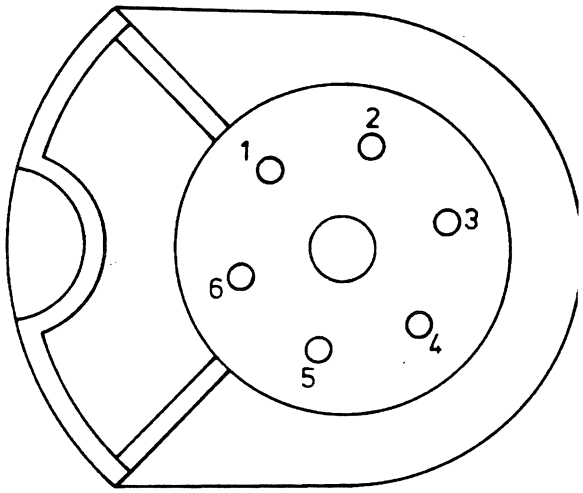
- screw out center plastic screw
- the hall sensor is fastened with a machine screw and 4 mm brass nut (hall sensor serves for monitoring the adjustment of the program selection switch air-switching stage)

Air hose connection on bottom part of air-switching stage



air switching bottom part view from below

Air hose connection on upper part of air-switching stage



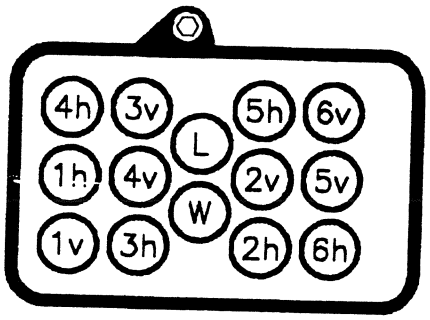
air switching upper part view from top

5.6.4 Work on lifting arm

Removal of lifting arm

The lifting arm is available only as a complete unit tested for proper function and leakage. Individual parts capable of being replaced or listed in the parts list.
- pull bellows out of bottom clamp
- pull off hoses from the hose connector
- remove 4 screws for bearing block on bottom of mounting plate
- pull off hose to chemical distributor
- the lifting arm can be removed

Connection of chemistry hose set



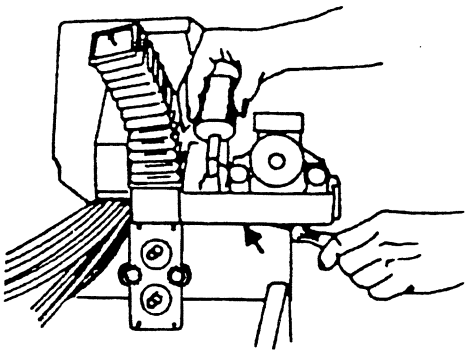
hose connector viewed from chemical distributor

h = rear v = front W = water hose L = air ventilation hose

For ATL 2000 only the inner connectors are used. The outer connectors are locked by a stopper.

Removel of gear motor lifting arm

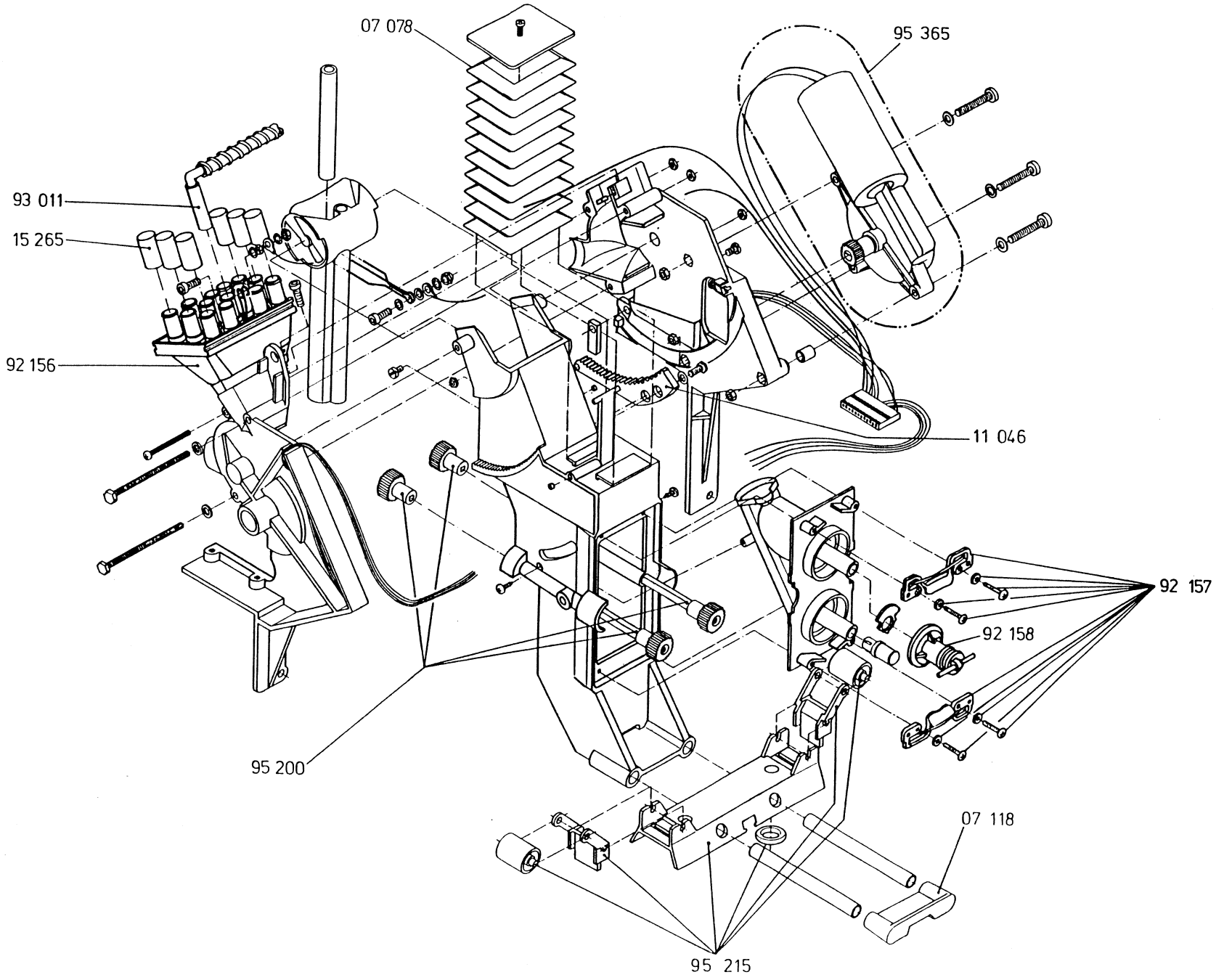
- with the exeption of the cover it is not necessary to remove any further parts for removel of the lifting motor off lifting pinion
- the lower screw of the 3 screws can be screwed out from the side from below through the open side of the bearing block for the pump



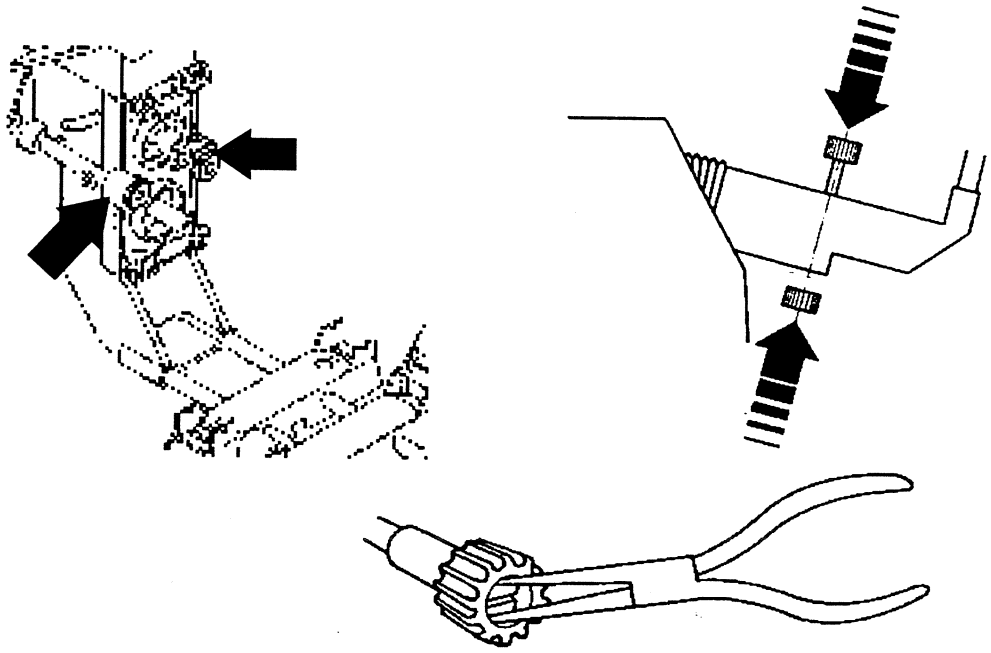
- screw out all 3 screws without pressing the nuts on the inside of the bearing block out of their seat
- the cables must be removed from the flat plugs to replace the motor

Hebearm ATL (ET) (95 540)

Stand: Juli 94



Changing the drive gear

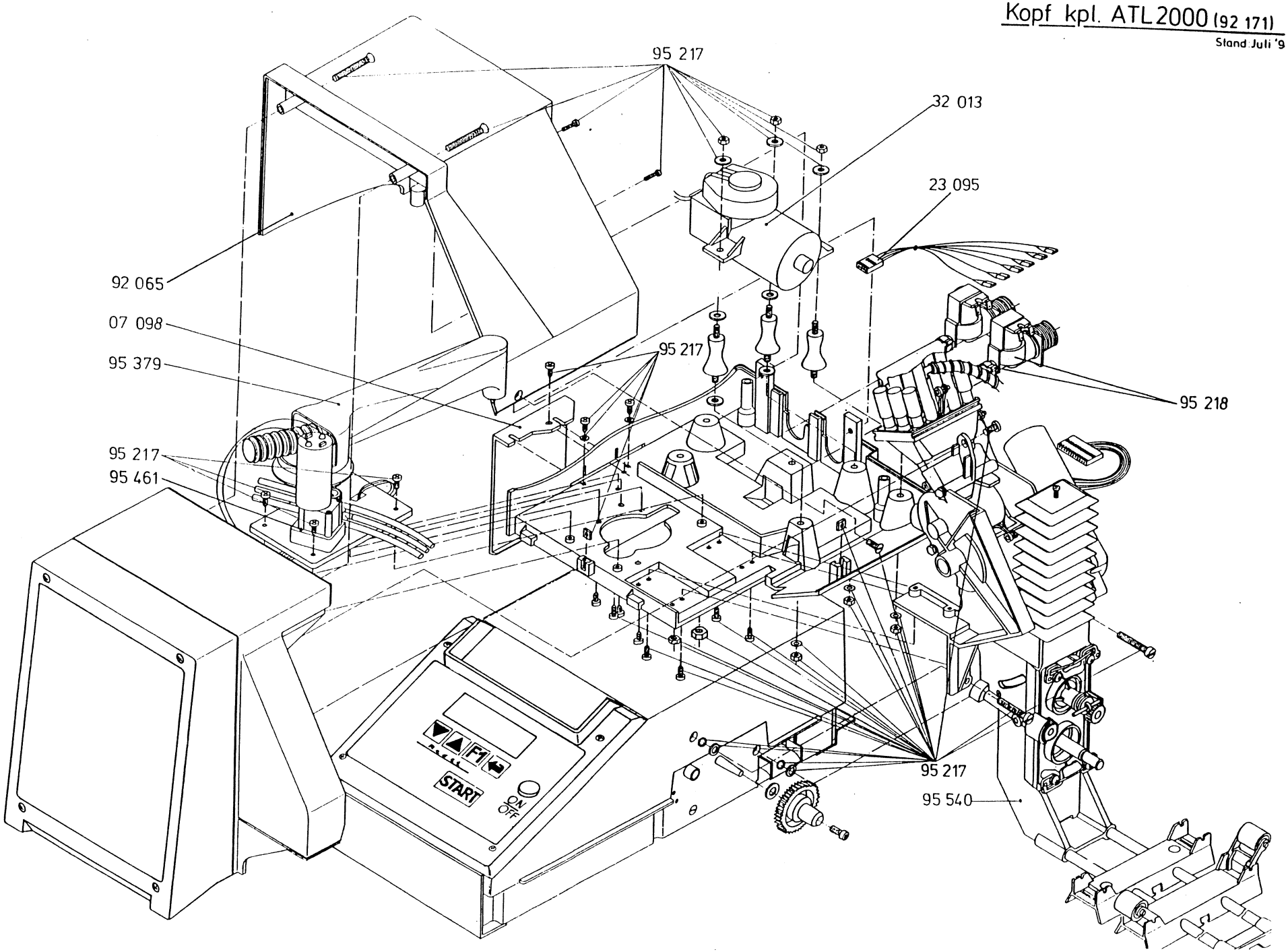


5.6.5 Replacing the solenoid valves

- 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 other types for this reason

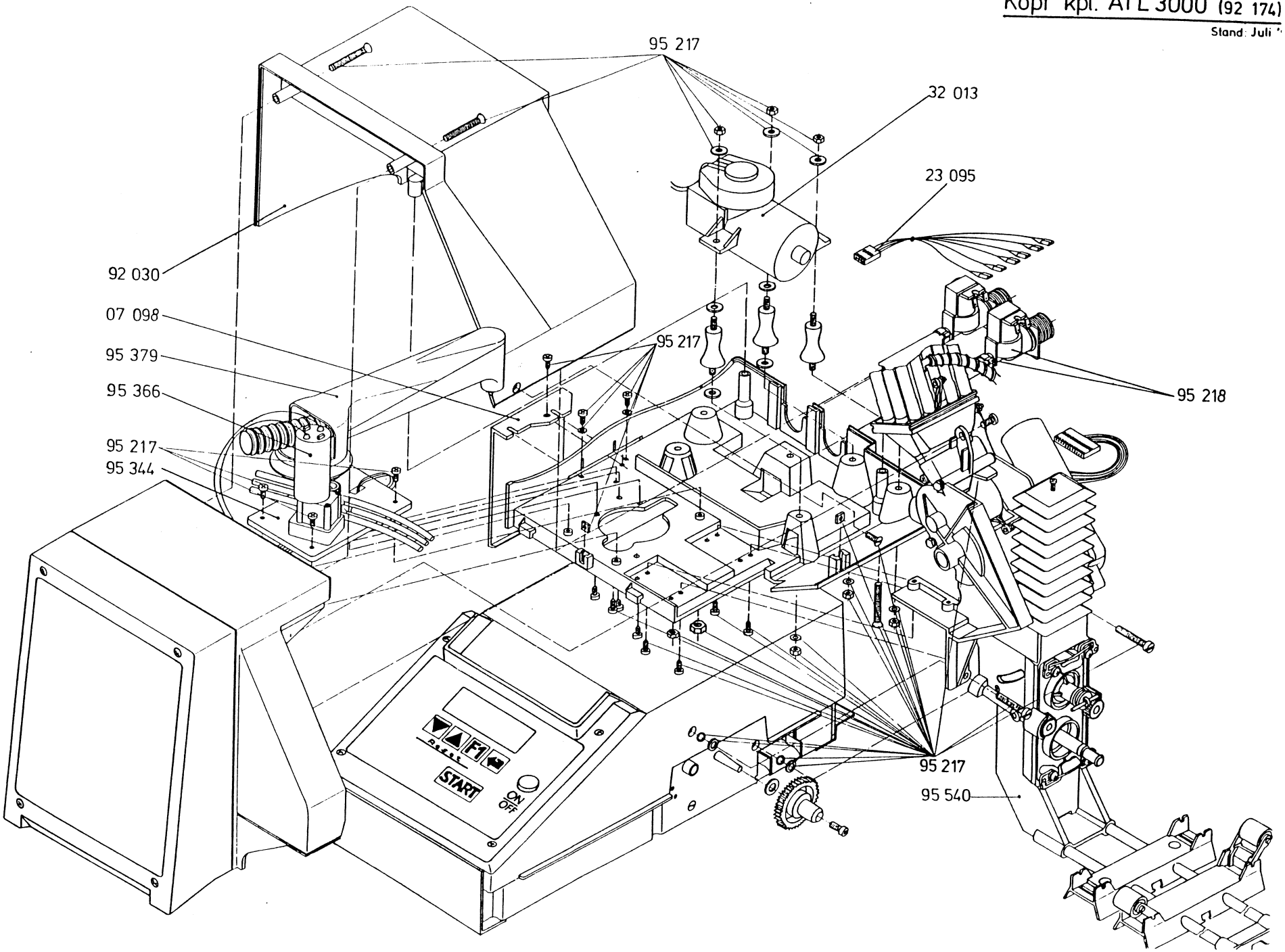
Kopf kpl. ATL 2000 (92 171)

Stand Juli '9



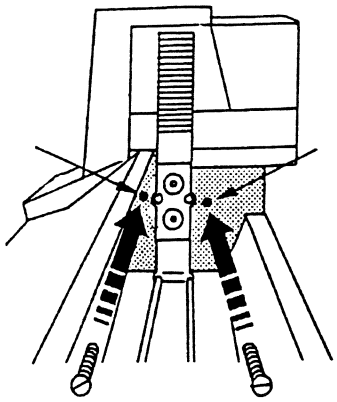
Kopf kpl. ATL 3000 (92 174)

Stand: Juli

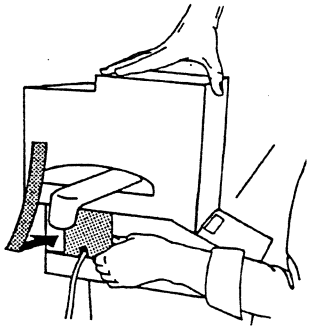


5.7 Remove motor control unit

- mowe lifting arm to 45° position
- screw out brass machine screws
- remove control housing bottom part by screwing out the four screws
- disconnect the cable plugs on the front



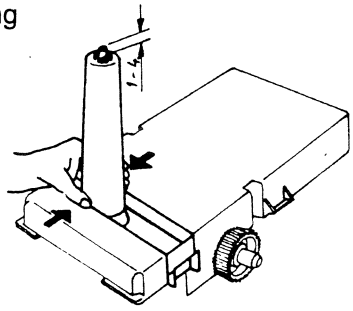
- bend away clamp and tilt assembly part to the right into the tub



5.7.1 Work on pump

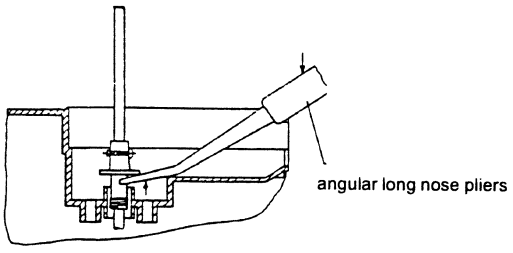
Remove pump housing

- pull off pump housing



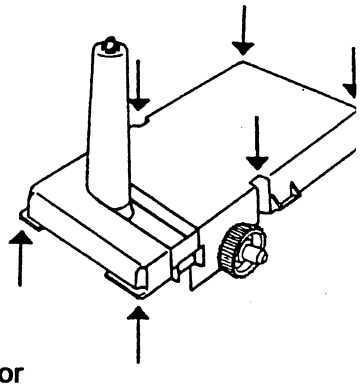
Remove pump shaft

- press off pump shaft with offsett needle nose pliers



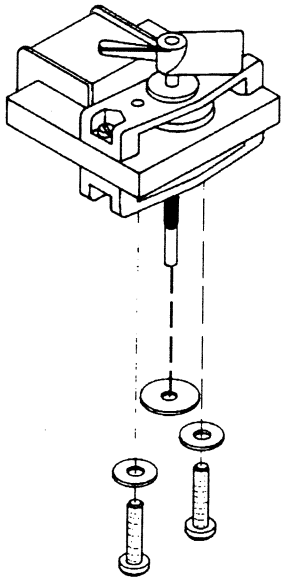
Remove pump motor

- screw out the six screws shown in drawing
- loosen the allen screw of the drive gear, pull the drive gear off
- remove the sealing foil
- remove pump motor screws and motor



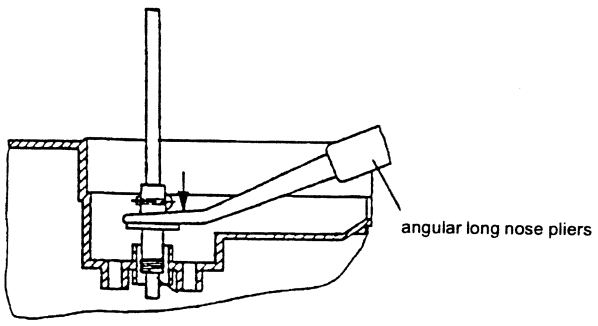
Installation of pump motor

- position feld disc on motor shaft and soak with resign-free oil (Tellus 68)
- screw motor on so that it contacts the support on the bottom part uniformly (if motor is installed at angle pump shaft runs off center)



Installation of pump shaft

- press on down to stop with offset needle nose pliers



Installation of pump housing

- position pump housing
- all 4 lugs must engage correctly and the shaft must be positioned in the center bore

CAUTION!!

- if the shaft is not pressed on down to the stop the pump vanes can hit against the housing web
- minimum distance between pump vanes and housing 3 mm

Technical data of pump motor:

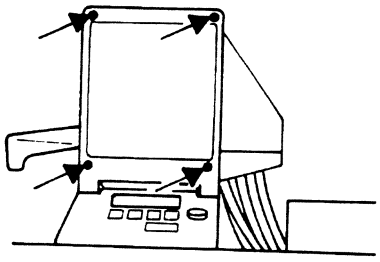
Motor V STA - > 220 V AC
GB - > 240 V AC
US - > 120 V AC
P - > 10 W

Idle speed - > 2750 rpm

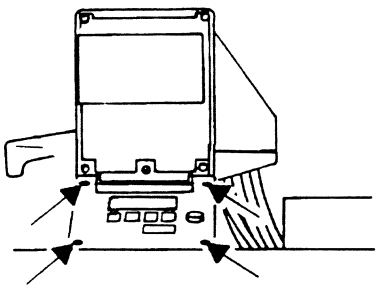
5.7.2 <u>Remove and assembly of the transformer P.C. Board</u>

If it is necessary to remove the motor control unit transformer P.C.Board,

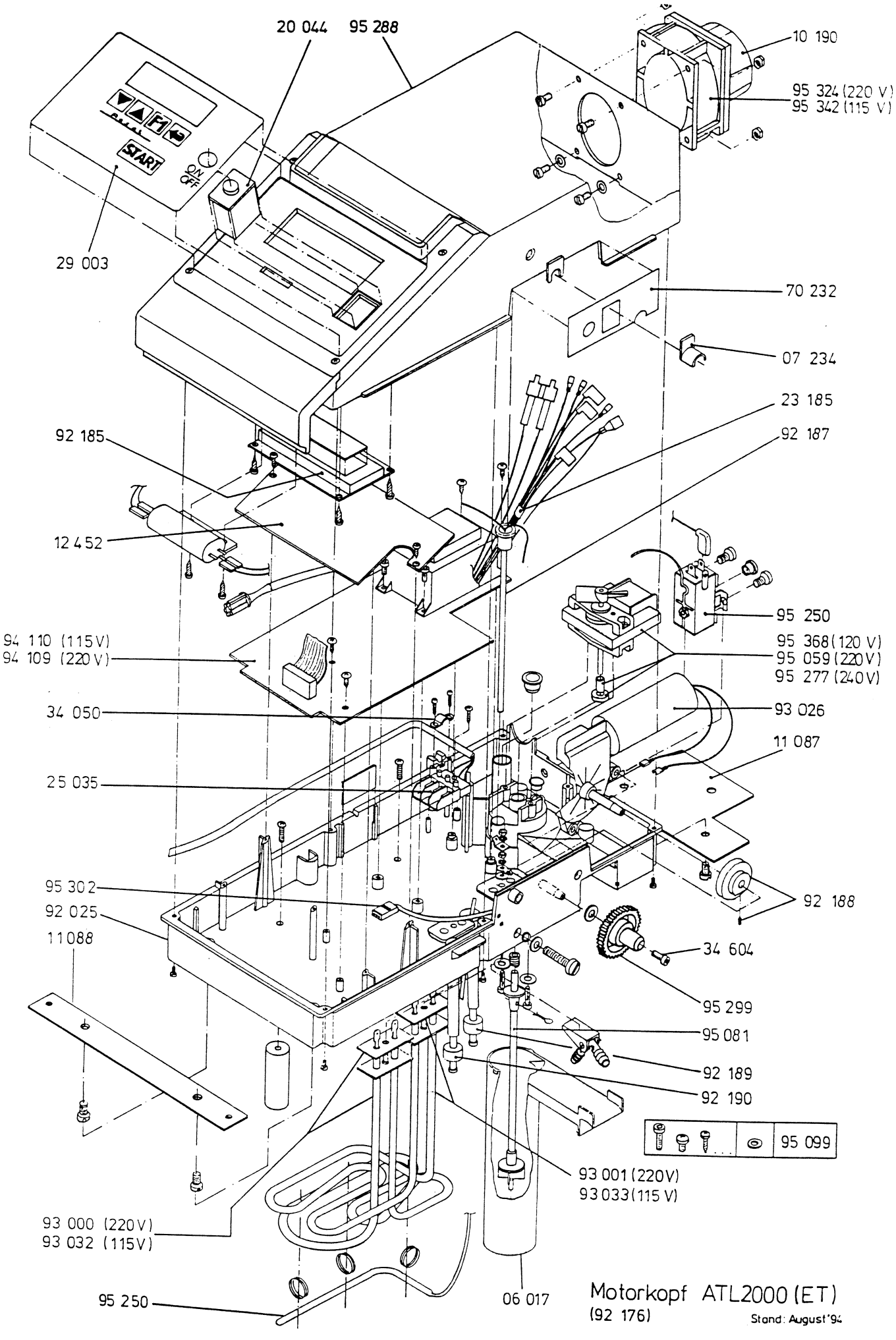
- screw out the four screws shown in drawing



- screw out the four screws of the front cover. The front cover with LC-display can now be put to the side. It is not necessary to pull off the cable plugs



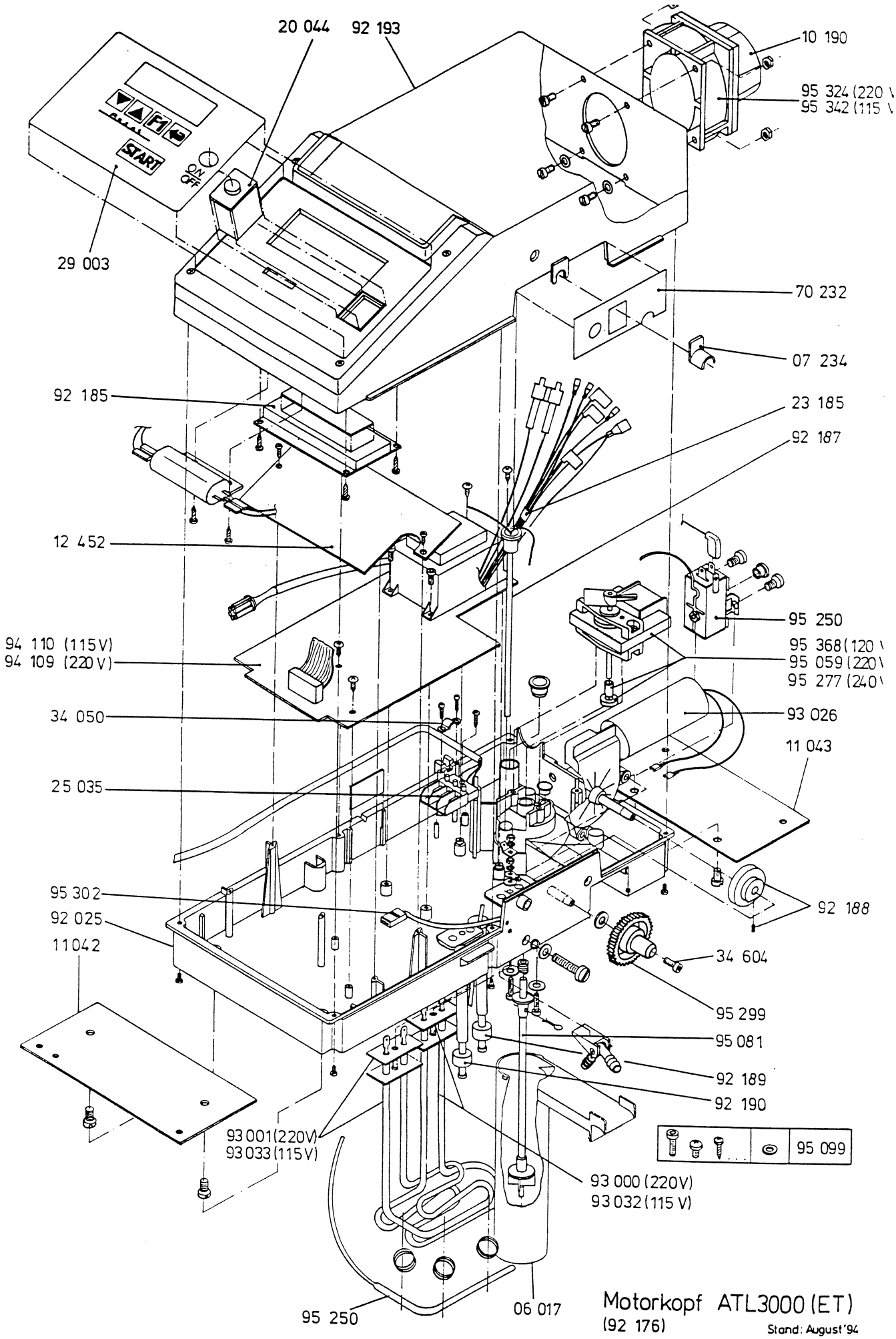
- screw out the two screws of the P.C.Board-cover
- screw out the two screws that fixes the transformer board



Motorkopf ATL2000 (ET)

(92 176)

Stand: August '94


20 044
92 193
10 190
95 324 (220 V
95 342 (115 V
29 003
70 232
07 234
92 185
23 185
92 187
12 452
95 250
94 110 (115 V)
94 109 (220 V)
95 368 (120 V
95 059 (220 V
95 277 (240 V
34 050
93 026
11 043
25 035
95 302
92 025
11042
92 188
34 604
95 299
95 081
92 189
92 190
93 001 (220 V)
93 033 (115 V)
95 099
93 000 (220 V)
93 032 (115 V)
95 250
06 017
Motorkopf ATL3000 (ET)
(92 176)
Stand: August '94

Baugruppe : 94108 Interfacepl. Steuerkopf ATL2/3000 INDEX A
Leiterplatte : 24049-9418

WIDERSTANDE

R1	0.47R	40025	WIDERSTAND 0,47 OHM /5W-5%
R2	1K8	40080	WIDERSTAND 1,8 KOHM 1/4 W
R3	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R4	560R	40044	WIDERSTAND 560 OHM 1/4 W
R5	820R	40051	WIDERSTAND 820 OHM / 2W
R6	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R7	270R	40026	WIDERSTAND 270 OHM 1/4 W
R8	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R9	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R10	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R11	22R	40011	WIDERSTAND 22 OHM 1/4 W
R12	5K6	40102	WIDERSTAND 5,6 KOHM 1/4 W
R13	5K1	40101	WIDERSTAND 5,1 KOHM 1/4 W
R14	1R	40004	WIDERSTAND 1 OHM 1 W
R15	820R	40050	WIDERSTAND 820 OHM 1/4 W
R16	3K	40087	WIDERSTAND 3 K OHM 1/4 W
R17	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R18	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R19	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R20	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R21	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R22	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R23	390K	40135	WIDERSTAND 390 KOHM 1/4 W
R24	39K	40122	WIDERSTAND 39 KOHM 1/4 W
R25	13K	40112	WIDERSTAND 13 K OHM 1/4 W
R26	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R27	5K1	40101	WIDERSTAND 5,1 KOHM 1/4 W
R28		40380	PTC SIEMENS C 915/30 V
R29		40374	PTC SIEMENS C 975 / 30 V
R30		40379	PTC C 985
R31	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W

KONDENSATOREN

C1	2200uF/25V	41028	ELKO 2200uF /25 V LIEGEND
C2	2200uF/25V	41028	ELKO 2200uF /25 V LIEGEND
C3	2200uF/25V	41028	ELKO 2200uF /25 V LIEGEND
C4	47uF/63V	41019	ELKO 47 UF 63 V STEH. RM 5
C5	1uF/35V	41101	ELKO 1 MIKROF.35 V TANTAL-PERLE
C6	100uF/63V	41033	ELKO 100 uF 63 V RM 30
C7	1uF/35V	41101	ELKO 1 MIKROF.35 V TANTAL-PERLE
C8	1uF/35V	41101	ELKO 1 MIKROF.35 V TANTAL-PERLE
C9	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C10	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C11	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C12	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C13	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V

Baugruppe : 94108 Interfacepl. Steuerkopf ATL2/3000 INDEX A
Leiterplatte : 24049-9418

C14	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C15	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C16	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C17	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C18	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C19	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C20	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C21	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C22	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C23	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C24	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C25	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C26	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C27	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V

DISKRETE HALBLEITER

D1	6V8	42120	TRANSILDIODE P6KE 6V8
D2	1N5406	42005	DIODE 3A 1N 5406
D3	1N4148	42001	DIODE 1 N 4148
D4	1N4148	42001	DIODE 1 N 4148
D5	1N4148	42001	DIODE 1 N 4148
D6	1N4148	42001	DIODE 1 N 4148
D7	6V2	42112	DIODE ZPD 6,2 V
D8	1N5817	42007	DIODE 1N 5817
D9	1N4148	42001	DIODE 1 N 4148
T1	TIP120	44010	TRANSISTOR TIP 120
T2	TIP140	44011	TRANSISTOR TIP 140
T3	TIP120	44010	TRANSISTOR TIP 120
T4	TIP140	44011	TRANSISTOR TIP 140
T5	TIP120	44010	TRANSISTOR TIP 120
T6	BC337-40	44009	TRANSISTOR BC 337-40
T7	BC337-40	44009	TRANSISTOR BC 337-40
T8	BC337-40	44009	TRANSISTOR BC 337-40
T9	BC517	44004	DARLINGTON-TRANSISTOR BC 517
T10	BC327-16	44008	TRANSISTOR BC 327-16
T11	BD680	44012	TRANSISTOR BD 680 MOT.
T12	TIP120	44010	TRANSISTOR TIP 120

INTEGRIERTE SCHALTKREISE

IC1	L293D	45012	IC L 293 D/IP 293 DN
IC2	3140E	45005	IC CA 3140 E
IC3	74HC02	46712	IC 74 HC 02
IC4	74HC32	46722	IC 74 HC 32
IC5	780-05	45207	FESTSPANNUNGSREGLER 5V 1%
IC6	24V	45213	Festspannungsregler 78S24 24V-2A
IC7	78L05	45204	FESTSPANNUNGSREGLER uA 78 L05

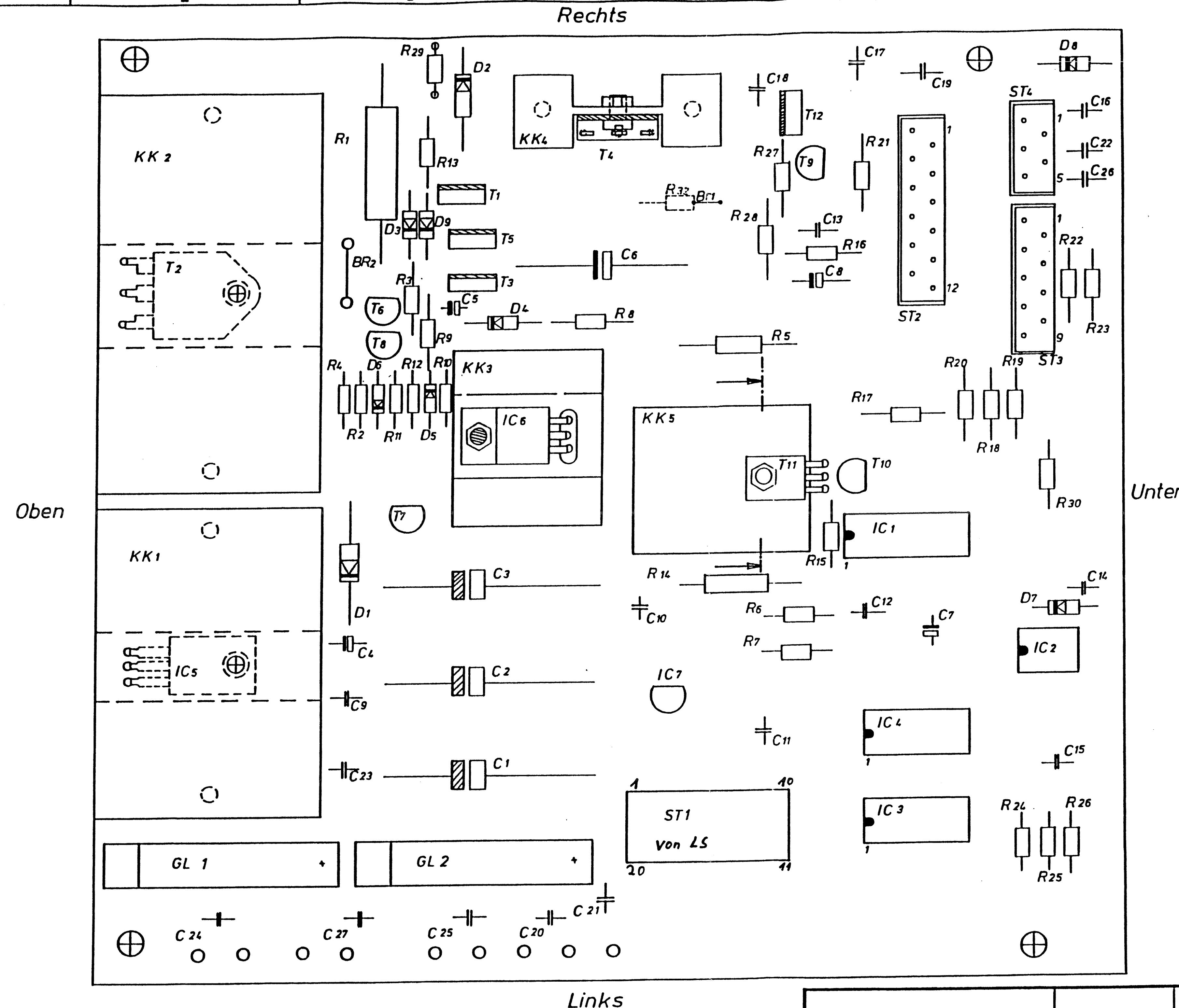
Baugruppe : 94108 Interfacepl. Steuerkopf ATL2/3000 INDEX A
Leiterplatte : 24049-9418

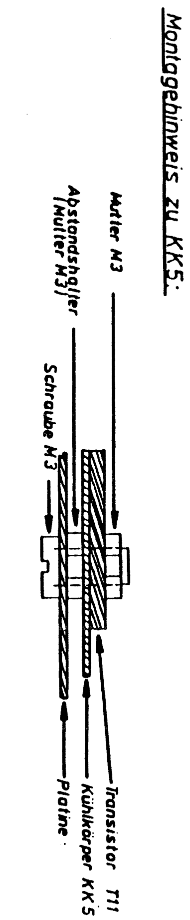
SCHALTER & STECKVERBINDER

BR1	0R	23051	GEGURTETE DRAHTBRÜCKE 0,65X60
ST1		25092	BANDKABELSTECKVERBINDER 135 mm
ST2	MINMOD12S	25036	STECKV.MINIMOD 12P M 2,5x3,5 180°
ST3	MINMOD9S	25096	STECKV.MINMOD 9P RM2,5*3,5 180°
ST4	MINMOD5S	25097	STECKV.MINMOD 5P RM2,5*3,5 180°

SONSTIGE

0		23103	ANSCHLUßKABEL INTERFACEPLATINE
0		23187	LITZENGRUPPE SPANN.VERS.INTERF.PL
GL1	B80C3700	42311	GLEICHRICHTER 3A B 80 C 3700/220
GL2	B80C5000	42312	GLEICHRICHTER 5A B 80C 5000/3300
KK1		44047	KÜHLKÖRPER SK 65-37,5 mm
KK2		44044	KÜHLKÖRPER SK 64
KK3	SK75	44048	KÜHLKÖRPER SK 75-25 mm
KK4		44045	KÜHLKÖRPER 6098 B-P2 SK104/25mm
KK5		44046	KÜHLKÖRPER KL-163 sw





Zust	Änderung	Datum	Name

19 94	Datum	Name
Bearb	04. 05.	Bm.
Gepr.		
Norm		

Maßstab

Interfaceplatine Steuerkopf
ATL 2000 / 3000

94 108

LP : 24 049 - 9418

Blatt
Bl

ge 24V
rt
sw
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ws
br
ge
gn
C27
C24
C25
Gl.1
Gl2
C1
C23
C2
C20
C3
C21
IC5
IC6
D1
C9
C4
C10
+10V
+24V
+36V
+18V
+5V
+36V
R28
R32
R8
T5
D4
D3
+18V
R13
T1
D9
T6
R9
D5
D2
R29
R12
C6
R11
D6
R10
R4
T7
T2
R2
R7
IC4
IC3
R1
T4
T9
R5
R27
R6
T3
T8
C5
R3
R21
C8
C19
C17
C18
ST2
1 HMS+
3 HMH+
11 GND
4 GND
5 HSHMH
6 +5V
8 +5V
9 HSTRA
10 GND
12 +24V
2 FSN
M Hebemot
Hallschalter Hebemotor Aus
IC 90
Hallschalter Trommel angehoben
IC 91
Füllsensor
HMH 5
E4 13
E3 14
HMS 8
TRA 2
SMT1 1 → Ⓐ
SMTϕ 3 → Ⓑ
18 → Ⓒ
ST 1
MVK 12
SETϕ 17
SMTV 4
SMTR 9
MVW 6
E1 16
E2 15
FP 7
GND 20
FSN 19
+24V 10
+10V
IC7 in out
C12
+5V
C13
T10
R15
R14
T11
R16
IC1
En1 En2 Vss
Vs
IN1 SMTV 2
IN2 SMTR 7
IN3 MVK 10
IN4 MVW 15
Out1 3
Out2 6
Out4 14
Out3 11
GND 4 5 12 13
R30
+v
R19
R18
R20
ST3
4 +5V
3 +5V
6 HSSMT1
7 HSSMTϕ
5 N.C.
2 GND
1 GND
8 SMTV+
9 SMTR+
Hallschalter Schrittmotor
Einzelschritt
Nullstellung
IC 92
IC 93
rt
sw
M Schritt-motor
C26
C22
D8
C16
ST4
5 MVK
4 GND
3 MVW
1 FP+
2 FP-
MVK
Magnetventile
MVK
M Füllpumpe
IC2
Strobe
V+
V-
out
C7
R22
C14
R23
R24
C15
R25
R26
D7
+24V
R17
T12

				Maßstab	
				ab 9418	
			1994 Datum	Name	Schaltplan
			Bearb 25.10.	Hoof	Interfaceplatine Steuerkopf
			Gepr.		
			Norm		
			94108		ATL 2/3000
Zust	Änderung	Datum	Name	Platinen Nr. 2409	Blatt

Baugruppe : 94107 Trafoplatine o. Trafo ATL2/3000 INDEX B
Leiterplatte : 24051-9417

WIDERSTÄNDE

P1	20K	40421	CERMET-MINITRIMMER 20 K OHM
R1	0.33R	40005	WIDERSTAND 0,33 OHM 2W
R2	100R	40018	WIDERSTAND 100 OHM 1/4 W
R3	47K	40124	WIDERSTAND 47 K OHM 1/4 W
R4	100K	40128	WIDERSTAND 100 K OHM 1/4 W
R5	75K 1%	40322	WIDERSTAND 75 K OHM 1/4 W 1%
R6	100K 1%	40308	WIDERSTAND 100 K OHM 1%
R7	5K1 1%	40310	WIDERSTAND 5,1 K OHM 1/4 W 1%
R8	100K	40128	WIDERSTAND 100 K OHM 1/4 W
R9	270R	40027	WIDERSTAND 270 OHM/0,5W Typ 104-
R10	n.b.	**	entfällt
R11	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R12	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R13	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R14	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R15	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R16	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R17	22K	40116	WIDERSTAND 22 K OHM 4 W
R18	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R19	4K7	40100	WIDERSTAND 4,7 K OHM 1/4 W
R20	270R	40026	WIDERSTAND 270 OHM 1/4 W
R21	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R22		40380	PTC SIEMENS C 915/30 V
R23	0R	23051	0 Ohm Brücke
R24	PTC-1,3A	40387	PTC-Überlastschutz 1,3A/30V/120°C

KONDENSATOREN

C1	2200uF/25V	41029	ELKO 2200 uF /25 V STEHEND
C2	2200uF/25V	41029	ELKO 2200 uF /25 V STEHEND
C3	1000uF/40V	41030	ELKO AS 1000-40 LIEGEND
C4	100uF/35V	41031	ELKO 100 uF /35V STEHEND
C5	100uF/16V	41013	ELKO 100 UF MIND. 16V RM 5
C6	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C7	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C8	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C9	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C10	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C11	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C12	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C13	0,22uF	41257	KONDENSATOR 0,22 UF MKC 63 V RM1
C14	0,22uF	41257	KONDENSATOR 0,22 UF MKC 63 V RM1
C15	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C16	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C17	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C18	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C19	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V

Baugruppe : 94107 Trafoplatine o. Trafo ATL2/3000 INDEX B
Leiterplatte : 24051-9417

C20	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C21	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C22	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C23	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C24	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V

DISKRETE HALBLEITER

D1	1N4001	42002	DIODE 1 N 4001
D2	1N4148	42001	DIODE 1 N 4148
D3	1N4148	42001	DIODE 1 N 4148
D4	27V	42113	Z-DIODE 27V/1,3W BZX 85 C27
D5	1N4148	42001	DIODE 1 N 4148
D6	1N4148	42001	DIODE 1 N 4148
D7	1N4148	42001	DIODE 1 N 4148
D8	1N4148	42001	DIODE 1 N 4148
T1	BC546	44007	TRANSISTOR BC 546
T2	BC327-16	44008	TRANSISTOR BC 327-16
T3	BC546	44007	TRANSISTOR BC 546
T4	BC337-40	44009	TRANSISTOR BC 337-40
T5	BC546	44007	TRANSISTOR BC 546
T6	BC546	44007	TRANSISTOR BC 546
T7	TIP140	44011	TRANSISTOR TIP 140
T8	BC546	44007	TRANSISTOR BC 546
TC1	TIC246	44101	TRIAC 600 V / 12 A

INTEGRIERTE SCHALTKREISE

IC1	3140E	45005	IC CA 3140 E
IC2	3140E	45005	IC CA 3140 E
IC3	3079	45004	IC CA 3079
IC4	7824	45209	FESTSPANNUNGSREGLER 7824 24V
IC5	7805	45201	FESTSPANNUNGSREGLER 7805 5V

SCHALTER & STECKVERBINDER

ST1	MINMOD3S	25047	STECKV.MINMOD 3P RM2,5 1reih 180°
ST2	CON20	25102	STIFTLEISTE 20-POLIG GERADE
ST3	FL48	25016	LÖT-FLACHSTECKERZUNGE 4,8x0,8
ST3	FL48	25016	LÖT-FLACHSTECKERZUNGE 4,8x0,8
ST4	FLACH63	25005	FLACHSTECKZUNGE 6,3mm
ST4	FLACH63	25005	FLACHSTECKZUNGE 6,3mm
ST5	FLACH63	25005	FLACHSTECKZUNGE 6,3mm
ST5	FLACH63	25005	FLACHSTECKZUNGE 6,3mm

Baugruppe : 94107 Trafoplatine o. Trafo ATL2/3000 INDEX B
Leiterplatte : 24051-9417

SONSTIGE

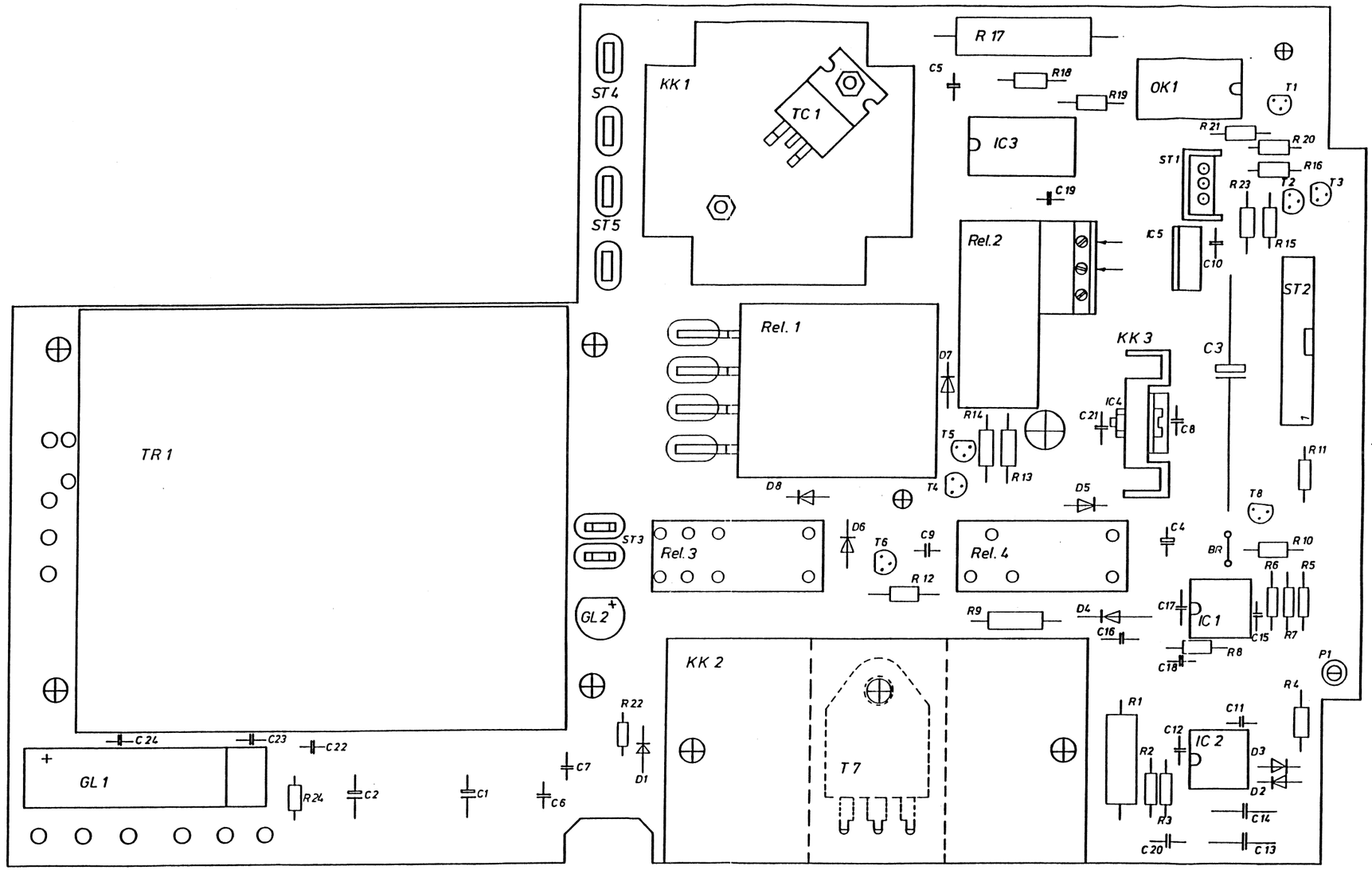
		23104	ANSCHLUßKABEL TRAFOPLATINE ATL2/3
		23538	LIGRU 2x0,75 / 570lg / Fl2,8 /AIM
GL1	B80C5000	42312	GLEICHRICHTER 5A B 80C 5000/3300
GL2	B80C1500	42310	GLEICHRICHTER B 80 C 1500
KK1		44041	KÜHLKÖRPER FK 201/CB/SA
zu KK1	M3x8	34139	Schraube M3 x 8
zu KK1	M3x8	34139	Schraube M3 x 8
zu KK1	M3	34061	Mutter M3
zu KK1	M3	34061	Mutter M3
zu KK1	M3	34047	Scheibe M3
zu KK1	M3	34047	Scheibe M3
KK2		44044	KÜHLKÖRPER SK 64
zu KK2	M3x8	34139	Schraube M3 x 8
zu KK2	M3x8	34139	Schraube M3 x 8
zu KK2	M3x8	34139	Schraube M3 x 8
KK3		44043	KÜHLKÖRPER KL 105/20/SW
zu KK3	M3x8	34139	Schraube M3 x 8
zu KK3	M3	34061	Mutter M3
N1		25004	LÖTSTIFT RTM 1,3
OK1	OK-0730	43004	OPTO-KOPPLER 0730
REL1	2S	21010	RELAIS E 3232 BV 03;2s
REL2	1S	21012	RELAIS 409 07 028 001
Zu REL2		25095	RELAISFASSUNG RFK 5
Zu REL2		25100	HALTEBÜGEL HF 83
REL3	2W	21009	RELAIS 24 V/ 2W/ VDE
REL4	1W	21011	RELAIS 409 32028 003

Rechts

Oben

Unten

Links



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				Gepr.			Trafoplatine ATL 2000 / 3000
				Norm			
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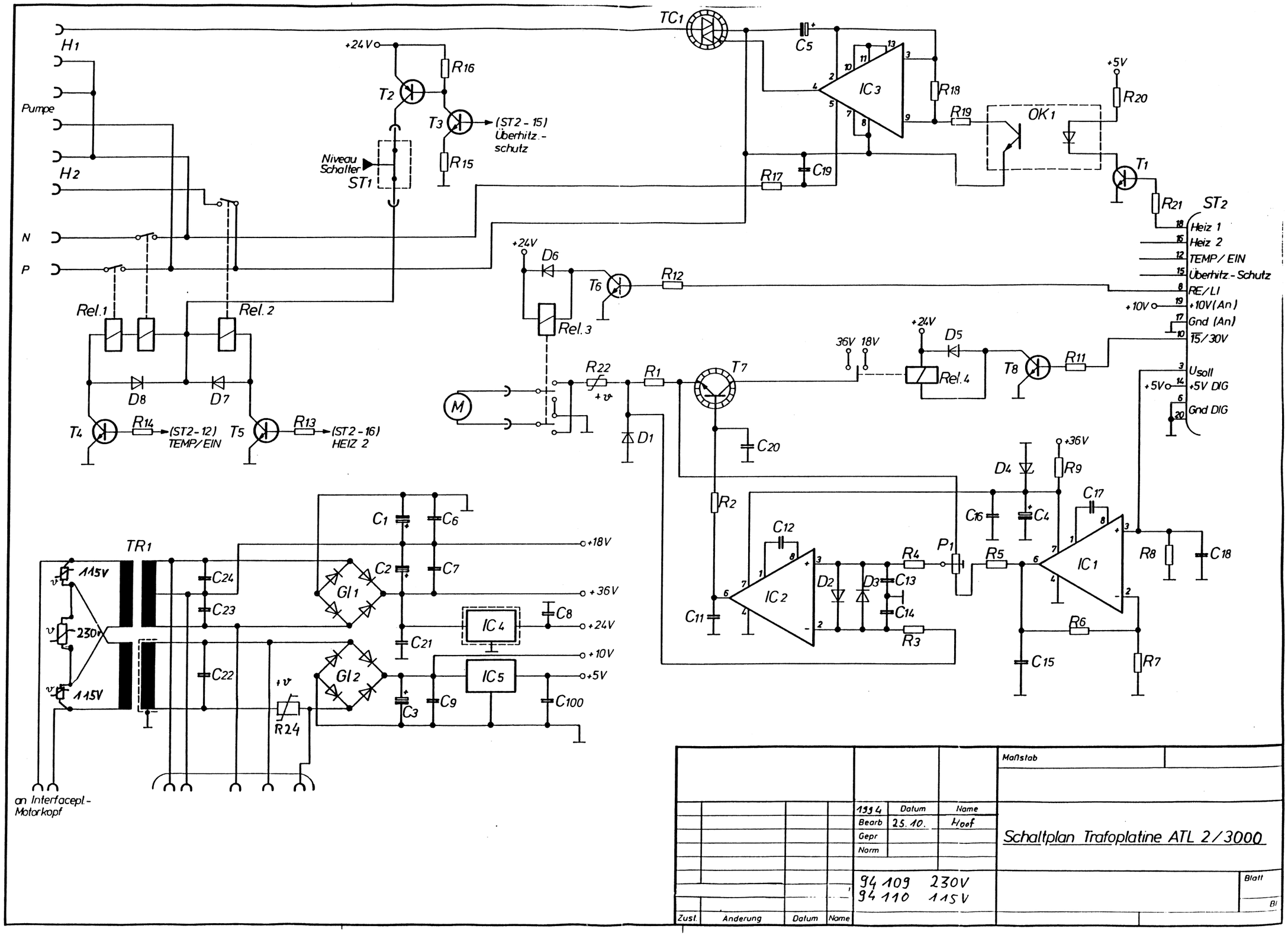
				94 110 115 V			Blatt Bl
Zust	Änderung	Datum	Name				



					Maßstab	
				1994	Datum	Name
				Bearb	25.10.	Hoef
				Gepr		
				Norm		
				94 109 230V 94 110 115V		Blatt
Zust.	Änderung	Datum	Name			

Schaltplan Trafoplatine ATL 2/3000

Liefereinheit: 18022 HAUPTPLATINE ATL2/3000 INDEX C
Leiterplatte : 24055-9434

WIDERSTÄNDE

P1	1K	40423	CERMET-25-GANG-TRIMMER 1 KOHM ST
R1	301K	40345	WIDERSTAND 301 KOHM 0,1% (0207)
R2	301K	40345	WIDERSTAND 301 KOHM 0,1% (0207)
R3	220R	40023	WIDERSTAND 220 OHM 1/4 W
R4	1M	40142	WIDERSTAND 1 M OHM 1/4 W
R5	2K8	40335	WIDERSTAND 1/4W 2,8 KOHM +/-0,1%
R6	n.b.	**	entfällt
R7	n.b.	**	entfällt
R8	1K02	40342	WIDERSTAND 1,02 KOHM 0,1% (0207)
R9	41K2	40328	WIDERSTAND 41,2 K OHM 1/4 1%
R10	41K2	40328	WIDERSTAND 41,2 K OHM 1/4 1%
R11	41K2	40328	WIDERSTAND 41,2 K OHM 1/4 1%
R12	6K19 0,1%	40344	WIDERSTAND 6,19K 0.1% (0207)
R13	2K8 0.1%	40335	WIDERSTAND 1/4W 2,8 KOHM +/-0,1%
R14	41K2	40328	WIDERSTAND 41,2 K OHM 1/4 1%
R15	41K2	40328	WIDERSTAND 41,2 K OHM 1/4 1%
R16	41K2	40328	WIDERSTAND 41,2 K OHM 1/4 1%
R17	41K2	40328	WIDERSTAND 41,2 K OHM 1/4 1%
R18	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R19	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R20	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R21	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R22	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R23	470R 5%	40040	WIDERSTAND 470 OHM 1/4 W
R24	1K 5%	40060	WIDERSTAND 1 K OHM 1/4 W
R25	5K1	40310	WIDERSTAND 5,1 K OHM 1/4 W 1%
R26	1M	40142	WIDERSTAND 1 M OHM 1/4 W
R27	6R8	40041	Widerstand 6,8Ω/3W/max dxl=6x13
R28	1K5 5%	40075	WIDERSTAND 1,5 KOHM
R29	100K	40128	WIDERSTAND 100 K OHM 1/4 W
R30	100K	40128	WIDERSTAND 100 K OHM 1/4 W
R31	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R32	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R33	22R	40011	WIDERSTAND 22 OHM 1/4 W
R34	1K5	40075	WIDERSTAND 1,5 KOHM
R35	1K5	40075	WIDERSTAND 1,5 KOHM
R36	1K5	40075	WIDERSTAND 1,5 KOHM
R37	1K5	40075	WIDERSTAND 1,5 KOHM
R38	1K5	40075	WIDERSTAND 1,5 KOHM
R39	1K5	40075	WIDERSTAND 1,5 KOHM
R40	1K5	40075	WIDERSTAND 1,5 KOHM
R41	1R	40001	WIDERSTAND 1 OHM 10%
R42	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R43	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R44	1R	40001	WIDERSTAND 1 OHM 10%
R45	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R46	47K	40124	WIDERSTAND 47 K OHM 1/4 W

Liefereinheit: 18022 HAUPTPLATINE ATL2/3000 INDEX C
Leiterplatte : 24055-9434

R47	47K	40124	WIDERSTAND 47 K OHM 1/4 W
R48	47K	40124	WIDERSTAND 47 K OHM 1/4 W
R49	47K	40124	WIDERSTAND 47 K OHM 1/4 W
R50	47K	40124	WIDERSTAND 47 K OHM 1/4 W
R51	47K	40124	WIDERSTAND 47 K OHM 1/4 W

NETZWERKE

NW1	8*15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW2	8*15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW3	8*15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW4	8*15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW5	8*15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW6	10K*4	40509	WIDERST.NETZW.SIL 4x10KO +-10%/L
NW7	8*15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW8	4K7*8	40503	Wid.netzwerk SIL 8 x 4,7 Kohm
NW9	6*15K	40505	Wid.netzwerk SIL 6 x 15 Kohm
NW10	8*15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW11	8*15K	40504	Wid.netzwerk SIL 8 x 15 Kohm

KONDENSATOREN

C1	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C2	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C3	100n	41303	KONDENSATOR KER 100 nF;50 V
C4	100n	41303	KONDENSATOR KER 100 nF;50 V
C5	100n	41303	KONDENSATOR KER 100 nF;50 V
C6	10pF	41288	KONDENSATOR 10 PF KER.63V RM2,5
C7	4700pF	41255	KOND. 4700pF/Polyprop/50V/RM5
C8	0,022uF	41256	KOND. 0,022uF/Polyprop/50V/RM5
C9	0,022uF	41256	KOND. 0,022uF/Polyprop/50V/RM5
C10	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C11	220uF	41014	ELKO 220 UF 16 V RM 5
C12	220uF	41014	ELKO 220 UF 16 V RM 5
C13	100pF/Ker	41291	KONDENSATOR 100 PF KER.63V RM5
C14	100n	41303	KONDENSATOR KER 100 nF;50 V
C15	100n	41303	KONDENSATOR KER 100 nF;50 V
C16	100n	41303	KONDENSATOR KER 100 nF;50 V
C17	100n	41303	KONDENSATOR KER 100 nF;50 V
C18	100n	41303	KONDENSATOR KER 100 nF;50 V
C19	1uF	41102	KONDENSATOR 1 uF / 16V TANTAL RM
C20	1uF	41102	KONDENSATOR 1 uF / 16V TANTAL RM
C21	10uF	41105	ELKO 10 UF 16V (TANTAL)
C22	100n	41303	KONDENSATOR KER 100 nF;50 V
C23	100n	41303	KONDENSATOR KER 100 nF;50 V
C24	100n	41303	KONDENSATOR KER 100 nF;50 V
C25	n.b.	**	entfällt
C26	n.b.	**	entfällt
C27	n.b.	**	entfällt

Liefereinheit: 18022 HAUPTPLATINE ATL2/3000 INDEX C
Leiterplatte : 24055-9434

C28	n.b.	**	entfällt
C29	n.b.	**	entfällt
C30	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C31	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C32	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C33	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C34	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C35	10nF/Ker	41301	KONDENSATOR KER. 10 nF 50V
C36	1nF/Ker	41297	KONDENSATOR KER. 1 NF RM 5

DISKRETE HALBLEITER

D1	6V8	42120	TRANSILDIODE P6KE 6V8
T1	BD679	44014	TRANSISTOR BD679

INTEGRIERTE SCHALTKREISE

IC1	MAX134	46308	IC MAX134 CPL 2 3/4 DIGIT ADC
Zu IC1	DIP40	25088	PRÄZISIONS-IC-FASSUNG 40-POLIG
IC2	ZN458B	45210	ZN 458 B (FERRANTI)
IC3	MAX660	45212	Spannungs Konverter MAX660 CPA
IC4	74HC138	46735	IC 74 HC 138
IC5	74HC14	46717	IC 74 HC 14
IC6	74HC4060	46770	IC 74 HC 4060
IC7	74HC00	46710	IC 74 HC 00
IC8	74HC574	46759	IC 74 HC 574
IC9	ZN508E	46309	IC ZN508E / 2x8Bit DAC
IC10	CA3240E	45016	IC CA3240E DIP8
IC11	74HC14	46717	IC 74 HC 14
IC12	74HC11	46721	IC 74 HC 11
IC13	C4538B	46124	CD 4538 BE-RCA
IC14	74HC574	46759	IC 74 HC 574
IC15	74HC574	46759	IC 74 HC 574
IC16	74HC14	46717	IC 74 HC 14
IC17	n.b.	**	entfällt
IC18	PC845	43008	OPTOKOPPLER PC845 4-FACH 16PIN
IC19	PC845	43008	OPTOKOPPLER PC845 4-FACH 16PIN
IC20	ULN2003	46404	IC ULN 2003 AN

SCHALTER & STECKVERBINDER

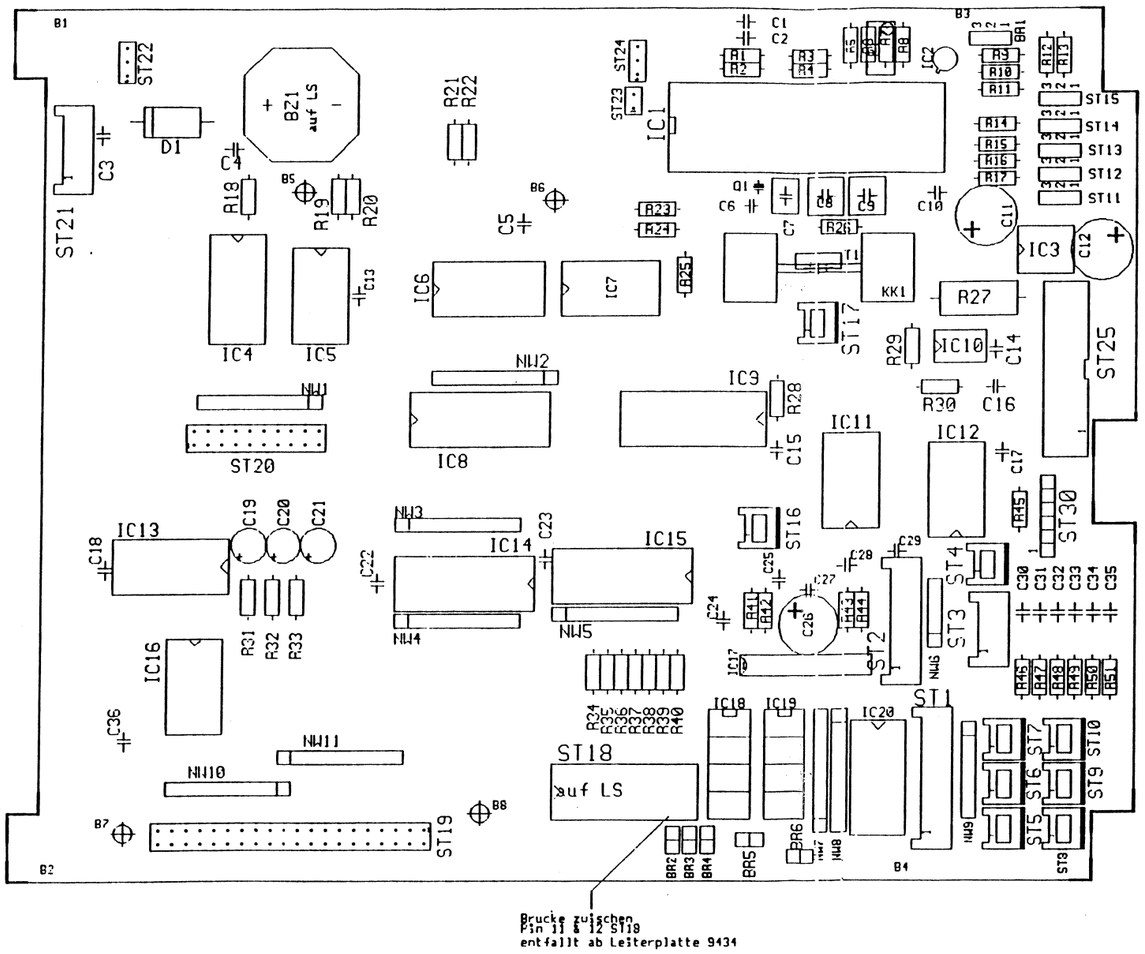
BR1	STIFT-3pol	25131	STIFTLEISTE GERADE,3-POL.VERGOL.
Zu BR1	STECKBR.2pol	25112	Pos 1+2 verbinden
BR2	BR.2POL	25113	STIFTLEISTE GERADE,2-POL.VERGOLD.
Zu BR2	STECKBR.2pol	25112	Brücke schließen
BR3	BR.2POL	25113	STIFTLEISTE GERADE,2-POL.VERGOLD.
Zu BR3	STECKBR.2pol	25112	Brücke schließen
BR4	BR.2POL	25113	STIFTLEISTE GERADE,2-POL.VERGOLD.

Liefereinheit: 18022 HAUPTPLATINE ATL2/3000 INDEX C
Leiterplatte : 24055-9434

Zu BR4	STECKBR.2pol	25112	Brücke schließen
BR5	BR.2POL	25113	STIFTLEISTE GERADE,2-POL.VERGOLD.
Zu BR5	STECKBR.2pol	25112	Brücke schließen
BR6	BR.2POL	25113	STIFTLEISTE GERADE,2-POL.VERGOLD.
Zu BR6	STECKBR.2pol	25112	Brücke schließen
ST1	MINMD9S	25096	STECKV.MINMOD 9P RM2,5*3,5 180°
ST2	MINMOD7S	25286	Bestückung nach links (pin1)
ST3	MINMD4S	25060	STECKV.MINMOD 4P RM2,5*3,5 180°
ST4	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST5	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST6	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST7	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST8	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST9	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST10	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST11	BR.3pol	25131	STIFTLEISTE GERADE,3-POL.VERGOL.
ST12	BR.3pol	25131	STIFTLEISTE GERADE,3-POL.VERGOL.
ST13	BR.3pol	25131	STIFTLEISTE GERADE,3-POL.VERGOL.
ST14	BR.3pol	25131	STIFTLEISTE GERADE,3-POL.VERGOL.
ST15	BR.3pol	25131	STIFTLEISTE GERADE,3-POL.VERGOL.
ST16	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST17	MINMD2S	25110	STECKV.MINIMOD 2P RM2,5 180° rast
ST18	DIP20	25090	IC-Fassung 20-polig
ST19	CART40B	25421	STECKV. ODUCART 40P F PCB 180°
ST20	CART20B	25419	STECKV. ODUCART 20P F PCB 180°
ST21	MINMD5S	25097	STECKV.MINMOD 5P RM2,5*3,5 180°
ST22	CART3B	25417	STECKV. ODUCART 3P F PCB 180°
ST23	CART2B	25415	STECKV. ODUCART 2P F PCB 180°
ST24	CART3B	25417	STECKV. ODUCART 3P F PCB 180°
ST25	CON20	25102	STIFTLEISTE 20-POLIG GERADE
ST30	BERG6	25336	STECKV. SIP6 pol stehend RM2,54

SONSTIGE

BZ1	SMA21B	26100	MINIATURSCHALLGEBER SMA 21B
KK1	SK104-25	44045	KÜHLKÖRPER 6098 B-P2 SK104/25mm
Q1	32768HZ	47004	Quarz 32,768 KHz Mini



Bestuckungshinweise:

C19,C20,C21 max Hohe uber der Platine 8mm

BR1 auf 1&2 stecken

23.7.94 / Hf

	Datum	Name
DESIGN	01/94	Px/Hf
CAD	29.1.94	Hoof
CHECK		

REV.	Changes	DATUM	NAME
B	01-94 D-1114.5	23.07.94	Hf
C	Neue LP 94M	24.8.94	Hf

JOBO Labortechnik
W-5270 Gummersbach 21 / Germany

ATL 2000 / 3000
Hauptplatine
Bestueckungsplan

94100

Platine: 24055 - 9434

Blatt 01.

Jobo Formblatt: large.pcb 17/06/92 Hf

REVISIONS				
Ind	Zone	Description	Date	Name
A	A11	New Schema for ATL 2000/3000	21.12.93	Hf
B	C5	R12 & R13 exchanged	23.7.94	Hf
C	BL2	ST18 11&12 connected	24.8.94	Hf

Keyboard-Connector

ST30 6 START
ST30 5 ENTER
ST30 2 DOWN
ST30 3 UP
ST30 4 F1
ST30 1

to Sheet 2 DAC-Select

UREF-ADC

IC1 MAX134

Temp. Sensors

TF1 ST11
TF2 ST12
TF3 ST13
TF4 ST14
TF-RESERVE ST15

ST25 14 5V-ANALOG
ST25 17 AGND
ST3 von Trafoplatine

RESET-KEY

ST18 19 FSN
ST18 3 SHT0
ST18 2 TAA
ST18 1 SHT1
CON to Interface Steuerkopf

FREE-IN1

TMT-SENSOR

ST18 7 FP-OSC

SW-1
SW-2
SW-3
SW-4
SW-5
SW-6

ST12 4 5V
ST12 1 HINTEN
ST12 5 VORNE
ST12 2 SCHIRM
ST12 3 GND

ST4 2
ST5 1 NIVEAU

JOBO			Jobo Labortechnik Germany
	DATE	NAME	ATL 2000/3000
DESIGN	04/94	Px/Hf	Main Control Board
CAD	27.4.94	Hf	- Schaltplan -
CHECK			
94100			PCB: 24055-9434

PAGE 1 of 2

REVISIONS				
Ind	Zone	Description	Date	Name
A	A11	Neu Schema for ATL 2000/3000	21.12.93	Hf
B	CD3	R23 & R24 exchanged	23.7.94	Hf
C	B3	ST18 11312 connected /Neu Layout	24.8.94	Hf

JOBO			Jobo Labortechnik Germany
	DATE	NAME	ATL 2000/3000
DESIGN	04/94	Px/Hf	Main Control Board
CAD	27.1.94	Hf	- Schaltplan -
CHECK			
94100			PCB: 24055-9434

PAGE 2 of 2

Baugruppe : 94101 Rechnerplatine ATL2/3000 INDEX D
Leiterplatte : 24900-9439

WIDERSTÄNDE

R1	4K7	40100	WIDERSTAND 4,7 K OHM 1/4 W
R2	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R3	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R4	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R5	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R6	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R7	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R8	22K 5%	40115	WIDERSTAND 22 K OHM 1/4 W
R9	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R10	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R11	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R12	10K	40110	WIDERSTAND 10 K OHM 1/4 W
R13	1K	40060	WIDERSTAND 1 K OHM 1/4 W
R14	390R	**	entfällt
R15	390R	**	entfällt
R16	180R	**	entfällt
R17	4K7	**	entfällt
R18	Trim.10K	40425	CERMET-MINITRIMMER 10K LIEG/GEKA
R19	3K3	40089	WIDERSTAND 3,3 KOHM 1/4 W
R20	0R	23051	0R Brücke RM10

NETZWERKE

NW1	n.b.	**	entfällt
NW2	n.b.	**	entfällt
NW3	n.b.	**	entfällt
NW4	n.b.	**	entfällt
NW5	8X4K7,SIL	40503	Wid.netzwerk SIL 8 x 4,7 Kohm
NW6	8X15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW7	8X15K	40504	Wid.netzwerk SIL 8 x 15 Kohm
NW8	8X15K	40504	Wid.netzwerk SIL 8 x 15 Kohm

KONDENSATOREN

C1	10u/16V	41105	ELKO 10 UF 16V (TANTAL)
C2	100n	41303	KONDENSATOR KER 100 nF;50 V
C3	100n	41303	KONDENSATOR KER 100 nF;50 V
C4	10u/16V	41105	ELKO 10 UF 16V (TANTAL)
C5	100n	41303	KONDENSATOR KER 100 nF;50 V
C6	10u/16V	41105	ELKO 10 UF 16V (TANTAL)
C7	100n	41303	KONDENSATOR KER 100 nF;50 V
C8	100n	41303	KONDENSATOR KER 100 nF;50 V
C9	100n	41303	KONDENSATOR KER 100 nF;50 V
C10	100n	41303	KONDENSATOR KER 100 nF;50 V
C11	10u/16V	41105	ELKO 10 UF 16V (TANTAL)
C12	10u/16V	41105	ELKO 10 UF 16V (TANTAL)

Baugruppe : 94101 Rechnerplatine ATL2/3000 INDEX D
Leiterplatte : 24900-9439

C13	100n	41303	KONDENSATOR KER 100 nF;50 V
C14	10u/16V	41105	ELKO 10 UF 16V (TANTAL)
C15	100n	41303	KONDENSATOR KER 100 nF;50 V
C16	47n	41302	KONDENSATOR KER.47 nF 50 V
C17	100n	41303	KONDENSATOR KER 100 nF;50 V
C18	100n	41303	KONDENSATOR KER 100 nF;50 V
C19	10u/16V	**	entfällt
C20	10u/16V	**	entfällt
C21	10u/16V	**	entfällt
C22	10u/16V	**	entfällt
C23	100nF/Ker	41303	KONDENSATOR KER 100 nF;50 V
C24	n.b.	**	entfällt

DISKRETE HALBLEITER

D1	6V8	42120	TRANSILDIODE P6KE 6V8
D2	1N4148	42001	DIODE 1 N 4148
D3	1N4148	42001	DIODE 1 N 4148

INTEGRIERTE SCHALTKREISE

IC1	65C02	46201	IC 65 C 02
Zu IC1	DIP40	25088	PRÄZISIONS-IC-FASSUNG 40-POLIG
IC2	27C512	46604	EPROM 27C512, 150ns
Zu IC2	DIP28	25089	IC-Fassung 28-polig
IC3	RAM8KX8	46613	C-MOS RAM 8192 x 8Bit, 200ns
Zu IC3	DIP28	25089	IC-Fassung 28-polig
IC4	65C22	46203	IC 65 C 22
Zu IC4	DIP40	25088	PRÄZISIONS-IC-FASSUNG 40-POLIG
IC5	65C22	46203	IC 65 C 22
Zu IC5	DIP40	25088	PRÄZISIONS-IC-FASSUNG 40-POLIG
IC6	65C51	**	entfällt
IC7	74HC245	46745	IC 74 HC 245
IC8	74HC04	46714	IC 74 HC 04
IC9	74HC132	46732	IC 74 HC 132
IC10	CD4011BC	46102	IC 4011 B C MOS
IC11	TL7705	46403	IC TL 7705 CP
IC12	CD4538BE	46124	CD 4538 BE-RCA
Zu IC12	DIP16	25085	PRÄZISIONS-IC-FASSUNG 16-POLIG
IC13	TBP18S030N	46601	TBP18S030N AUTOPRINT
Zu IC13	DIP16	25085	PRÄZISIONS-IC-FASSUNG 16-POLIG
IC14	74HC245	46745	IC 74 HC 245
IC15	74HC245	46745	IC 74 HC 245
IC16	74HC00	46710	IC 74 HC 00
IC17	LTC485	**	entfällt
IC18	ICL232	**	entfällt
OSC1	1.8432MHZ	**	entfällt
OSC2	1MHz	47010	QUARZ OSZILLATOR 1,000 MHZ

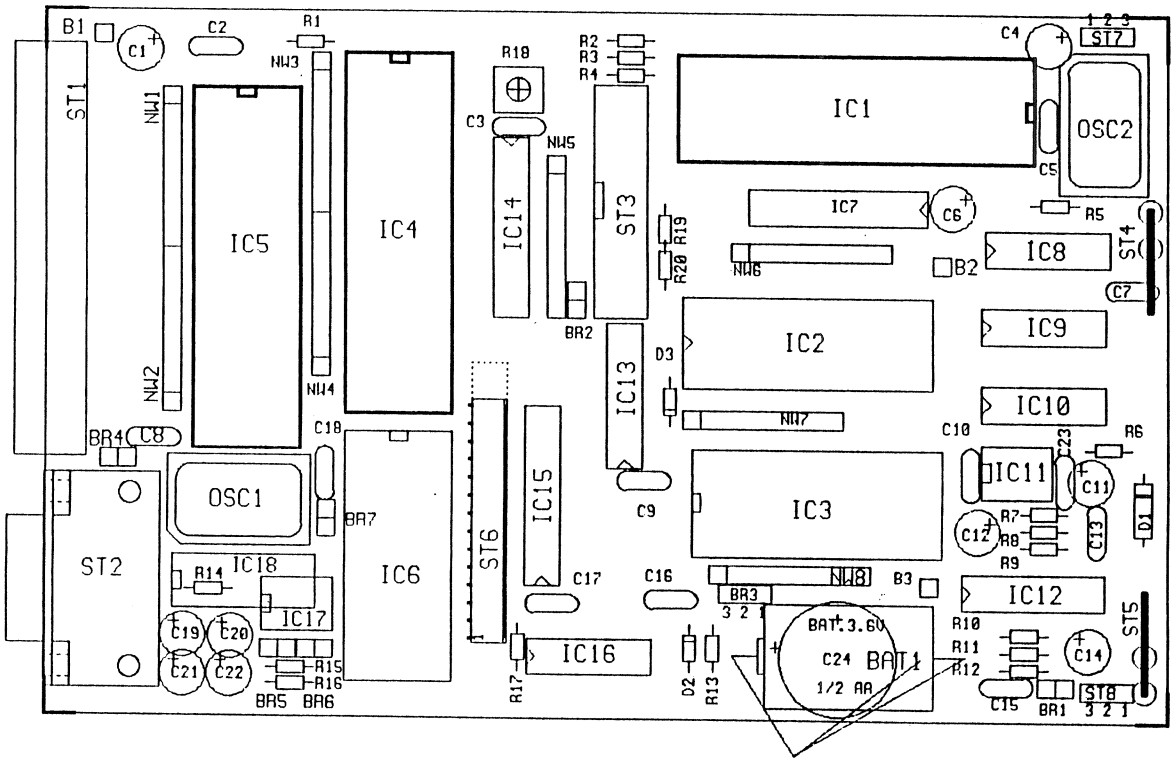
Baugruppe : 94101 Rechnerplatine ATL2/3000 INDEX D
Leiterplatte : 24900-9439

SCHALTER & STECKVERBINDER

	BR1	STIFTL.2POL	25113	STIFTLEISTE GERADE,2-POL.VERGOLD.
	BR2	STIFTL.2POL	25113	STIFTLEISTE GERADE,2-POL.VERGOLD.
Zu	BR2	STECKBR.2pol	25112	Brücke schließen
	BR3	STIFTL.3POL	25131	STIFTLEISTE GERADE,3-POL.VERGOL.
Zu	BR3	STECKBR.2pol	25112	POS 1+2 stecken (8K RAM)
	BR4	STIFTL.2POL	**	entfällt
	BR5	STIFTL.2POL	**	entfällt
	BR6	STIFTL.2POL	**	entfällt
	BR7	STIFTL.2POL	**	entfällt
	ST1	CART40-STIFT	25422	STECKV. ODUCART 40P M PCB 180°
	ST2	SUBD9FR	**	entfällt
	ST3	STIFTL.20POL	25102	STIFTLEISTE 20-POLIG GERADE
	ST4	FL2,8R	**	entfällt
	ST5	FL2,8R	**	entfällt
	ST6	CON14M	25335	STECKV. DUBOX-SIP14 M PCB 180°
	ST7	CART3	25418	STECKV. ODUCART 3P M PCB 180°
	ST8	CART3	25418	STECKV. ODUCART 3P M PCB 180°

SONSTIGE

	BAT1	BAT-3,6V	48105	Lithium Batterie Size 1/2 AA



3 Loetaugen BAT1 abkleben

Bestueckungshinweise:

Folende Bauteile entfallen:
ST2, ST4, ST5
BR4, BR5, BR6, BR7
R14, R15, R16, R17
C19, C20, C21, C22, C24
IC6, IC17, IC18, OSC1

Folgende Bauteile von der Loetseite bestuecken:
ST1, ST3, ST7, ST8, BR1

	Datum	Name
DESIGN	08.93	AS
CAD	08.93	AS
CHECK		

REV.	Changes	DATUM	NAME
D	IC2 - 512K	29.9.91	HH

JOBO Labortechnik
W-5270 Gummersbach 21 / Germany

Rechnerplatine 6502
ATL 2/3000
Bestueckungsplan

94101

Platine: 24900-9439

Blatt 01.

IC1
65C02

IC7
74HC245

IC2
27C256

IC3
RAM2KX8
8/32K 2K

IC13
TBP18S030N
ROM

IC14
74HC245
I/O

IC15
74HC245

IC6
65C51

IC5
65C22

IC4
65C22

IC8
74HC04

IC9
74HC132

IC10
CD4011BC

IC11
TL7705
(1=GND,8=VCC)

IC12
CD4538BE

IC16
74HC00

IC17
LTC485

IC18

OSC1

OSC2
OUT 1MHz

Externer Datenbus

ST1

ST2
SUBD9FR

ST3
STIFTL.20POL.

ST6
CON14M

ST7

ST8

BAT1
BAT-3,6V

D1
D2
D3
1N4148

C24
GOLDCAP

SYSR/W
R
RAM-R/W
I2
I2*
IRQ
RES

VCMOS

RS485 optional

	NAME:	DATE:
DESIGN:	RS	08.93
LAYOUT:	RS	08.93
CHECK:	RS	08.93
	NO.:	DATE:
VERS.:	REV D	9438/Hf

NO.:
94101

Leiterplatte:
24900-9439