Instructions for the Operation, Shutting Down and Maintenance of the ARRIBLOC Film Developing Machines

The ARRIBLOC Film Developing Machine is available in three standard constructions. The construction corresponds to our illustrated pamphlet.

1.) **Machine Type ARRIBLOC I**
   for 16mm black-and white negative or positive film
   (in changing over from one to the other the developer must be exchanged)

2.) **Machine Type ARRIBLOC II**
   for 16mm black-and white negative and positive film
   (in changing over from one to the other the film must bypass the respective negative or positive developer tank, both of which are built into the machine next to each other)

3.) **Machine Type ARRIBLOC III**
   for 16mm black-and white reversal film

All of the machines previously mentioned are of the so-called sprocket type which transport the film through the machine by means of a system of sprockets.

At the "PHOTOKINA 1963" photographic industrial fair we displayed for the first time an ARRIBLOC film developing machine with a sprocketless film transport which can be used for either complete tank development or spray development, whichever may be desired. This machine can also develop 16mm or 35mm film sizes.
The following information refers to the three standard types but is also valid to a great extent for the special machines. The machines are constructed in self-contained units and each forms a complete unit.

The machines are of the so-called daylight operating type, i.e. the entire machine operates in a well-illuminated room.

The exposed film is contained in a film magazine and the part of the machine in which the film is sensitive to light is sealed light-proof by a stainless steel cover.

Because of its self-contained construction the machine needs almost no installation work at the site where it is to be set up. It can be placed in any desired room as its dimensions are small and as no special preparations of the foundation or anything of that manner are required.

In its standard construction the machine has the following dimensions:

- approximately 3,40 metres length
- approximately 0,80 metres width
- approximately 1,40 metres height

The film contents of the entire machine amounts to approximately 240 metres; these values refer to the ARRIBLOC standard construction.

If the ARRIBLOC film developing machine is to be operated as a high capacity unit, the liquid section remains unchanged, however, the pre-run cabinet and the drying cabinet receive a height of approximately 1,8 metres. If desired an air conditioning unit can be installed at an increased price in place of the warm air dryer. The length of the machine is then increased from 3,40 to 3,90 metres. All ARRIBLOC machines are so completely equipped that only the following connections need to be prepared at the site of erection:

1.) a cold water connexion of 1/2" threaded pipe
2.) a warm water connexion of 1/2" (approx. 50°C) threaded pipe
3.) a main power connexion 3-phase approximately 9 KW
4.) the hose connexion for feeding the replenisher
solution into the built-in replenishment flow metres
5.) a drainage pipe

Note:

In order to hold the water consumption within reasonable bounds, it is necessary to restrict the pressure of the water supply to approximately 1 atmosphere.
For European conditions an 18 KW electric continuous flow hot water heater is sufficient for the warm water supply. This value is naturally relative and depends upon the temperature of the room in which the machine is to be set up.

All ARRIBLOC machine types are equipped as follows:

1. pre-run cabinet with film end detector and automatic brake including signal apparatus, a stapling device and a film magazine for 600 metres
1. wet section with appropriate tanks for solutions
1. film drying cabinet
1. main drive, variable transmission with tachometer control
1. vacuum unit including patented ARRI vacuum squeegee
1. warm air unit with automatic temperature control
2-5 circulation controls in the chemical solutions (the number of circulation pumps depends upon the respective machine type)
2-5 automatic temperature regulators in the chemical solutions
2-5 adjustable replenishment flow meters, range of adjustment up to 800 ccm per minute.

If desired, at an increased price plastic magnetic valves can be built into the machine ahead of the replenishment flow meters so the inflow — if desired — can be stopped electrically. The entire replenishing installation within the machine is complete and ready for operation and located at the rear of the machine are the prepared connexions for the feed-in from the replenishing solution containers.

Components of the ARRIBLOC Machines

1a) Pre-Run Cabinet

The pre-run cabinet and the stapling compartment with the film magazine mounting are built together as one unit. In the standard model approximately 18 metres of film are available for the stapling phase. The film magazine holds a maximum of 600 metres of film and is suitable for the accommodation of either 16mm or 35mm film.

In the stapling compartment an automatic film end detector is included. As soon as the end of the film roll passes through a magnetic brake receives an electrical impulse and the film end is caught within a fraction
of a second. An audible signal sounds and the magazine elevator moves upwards. A row of pilot lights indicates its respective position. At the uppermost position an automatic safety switch turns off the machine in case the film brake is not released soon enough. The new film magazine is put into place and the locking hand wheel is slightly tightened. The film is stapled in the stapling templet and then the film brake is released. The film, however, moves on into the pre-run cabinet only after the lid to the stapling compartment is closed.

The film magazine has a light-proof velvet mouth which opens automatically as soon as the lid to the stapling compartment is shut. The pre-run cabinet fills itself with film automatically and the film axle in the film magazine is automatically stopped when the elevator has reached its lowermost position. In case the film brake is unintentionally activated during the downwards movement of the magazine elevator an additional built-in magnetic brake stops the movement of the film magazine roll so that no loose film loops form within the magazine itself. The same purpose is served by the mechanical hand brake built onto the film magazine and which is released when the magazine is placed on its mounting. Therefore it cannot occur that the film material rolls loose and causes torn film during transport from the darkroom to the machine.

2.) Wet Section

The machine (according to its type) contains 5 or 6 film transport shafts in the wet section. The built-in tanks are partly single shaft and partly half single shaft tanks of hardened PVC. The film transport system is constructed according to an ARRI patent which utilizes so-called half shafts. In this manner the length of the machine is quite short in spite of the high capacity. It must be emphasized at this point that the machine is also easily accessible in all parts of the wet section so that no difficulties arise in the maintenance. Corresponding to each film transport shaft, two film slides are located in the tanks. Attached to the film slides are control rods with which the film slides can be lifted out of the tanks and which indicate the position of the slides when the machine is ready for operation.
The first three shafts of the machine are sealed light-proof and the hinged housing of acid-resisting steel has no influence on the operation of the machine.

Each tank compartment has a drainage valve at the rear of the machine and an overflow point for liquids at the inside of the upper edge of the tank. The tank compartments of the chemical solutions each have an independent circulation apparatus at the rear of the machine in the form of an automatic submersible pump. The current of the solution moves from the bottom of the tank upwards along the film strip at a high speed.

Through a grated opening the solution flow is again drawn into the submersible pump and flows back in the vertical pipe of the pump. In this manner a very thorough mixing of the photographic solutions is accomplished.

3) Temperature Control

For the developing solution independent precision thermostats are built into the machine and for the remaining solutions independent contact thermostats have been built-in. The temperature-measuring parts of these instruments are built directly into the liquid flow at the rear of the machine.

Each solution is therefore completely independently regulated at the selected temperature.

The developing solutions are regulated to within a constancy of approximately ± 1% and the remaining solutions such as the hypo are regulated to within a constancy of ± 3% of the nominal value.

All temperature control instruments indicate the exact actual temperature.

For the temperature regulation of the solutions themselves coiled pipes of acid-resisting steel are built into the individual tanks. Each coiled pipe is supplied with warm and cold water through magnetic valves controlled by the thermostat. The independent temperature regulation of the solutions is a decisive technical advantage of the ARRIBLOC developing machines (as opposed to many other makes). Even the water for washing the films can be regulated to any desired temperature by means of an automatic mixing valve.

In this manner the washing of the film can be adjusted to meet the most favourable conditions, whether the developing process is to be carried out at normal or at a raised temperature. In using the quick development pro-
cess one always works with raised temperatures and therefore under all circumstances heated water is required for the washing. The independent water temperature regulation therefore adds an essential technical refinement to the ARRIBLOC machines.

4.) **Replenishment**

For the replenishment of the photographic solutions special dosage instruments with precision regulating valves and liquid filters are built into the machine. The amount of replenisher can be read off in cc/min. and be continuously set, the ratio being 1 : 10.

The replenishing solutions are fed into the instruments by means of a gravity flow of about 3 metres or with artificial pressure. The feeding of the individual replenishing solutions into the respective tanks then takes place at the rear of the machine in such a manner so that the solution is immediately intensively mixed with the contents of the tank. The dosage takes place continuously taking into consideration the relatively small volume of the tanks. The volume of the solution tanks is approximately 70 litres for a full tank and 35 litres for each half tank.

5.) **Film Washing**

For washing the films in the individual handling stages high capacity water spray systems are built into the appropriate tanks in this manner an intensive rinsing of the film is accomplished whereby the water level in each tank can be individually adjusted from a pure full wash to a pure spray wash. Here again the best conditions for washing the films have been provided for.

At the rear of the machine under the solution tanks a PVC trough of large proportions is built in which collects all overflow of the solutions resulting from the continuous replenishment and all of the water from the film washing as well as all the water used in the temperature regulation. The trough has a single drainage outlet which can be connected to the floor drain of the room.
6.) Intermediate Exposure

In the ARBIBLOC III machine for reversal film the ARRI underwater re-
exposure lighting system (which has proven itself over a period of many
years) is built into the washing tank ahead of the second developer.
Through a window in the tank the film is illuminated under water. The
greatest possible light diffusion and heatless illumination of the film
are accomplished in this way. One group of lamps is in operation and a
second group in reserve. If a lamp defect occurs during the development
process the appropriate reserve lamp is automatically turned on with no
loss of time and the defective lamp can be exchanged later.

In this lighting system 8 Watt fluorescent lighting tubes are used.

Note:

In the ARBIBLOC film developing machines types I, II and III the solution
tanks are interchangeable so that - in case later required - each desired
machine type can be assembled. In this manner even in a conversion the
full value of the machine is retained.

7.) The High Capacity Drying Cabinet

with its relatively small dimensions reaches its high drying capacity by
means of an arrangement of components of high efficiency. Built-in air
jet chambers provide that the entire air volume comes directly into con-
tact with the emulsion surface of the film thereby taking up a large per-
centage of the moisture and carrying it away.

The built-in special ventilator provides for high speed air removal from
the jet chambers while operating very quietly.

An especially interesting feature in the drying plant of the ARBIBLOC
machine is the 100% utilization of the motor warmth from the ventilator in
the heating of the drying air.

Before entering the drying cabinet the air taken in first serves for the
necessary cooling of the ventilator motor. Whereby on the other hand the
amount of energy consumed in the warming of the drying air is reduced.
Two high capacity dry-layer filters provide for dust-free drying air.
Directly in the air distribution chamber the electric steel tube heating
rods are installed in such a manner so as to raise the temperature of the air in the cabinet. The outer surface of the steel tube heating rods consists of stainless steel so that no oxidation particles can get into the air current and thereby onto the surface of the film itself.

The film which is still wet moves through the section of the drying cabinet with the highest temperature whereas the film which is already dry comes into a section where the air temperature is near to the room temperature before leaving the cabinet. In spite of the intensive drying process the film is in this manner dried and handled with utmost care.

It is only natural that an automatically regulating temperature indicator is built into the cabinet. A maximum drying temperature of approximately 35°C can be set. For the exiting drying air a connexion opening for an exhaust air pipe has been provided for so that the air can be carried outside.

For tropical areas and for the installation of ARRIBLOC units where the utilization of exhaust air pipes presents difficulties an air conditioning unit can be delivered as a self-contained component for the ARRIBLOC machine. The normal ARRIBLOC machine model then becomes approximately 550mm longer. The air conditioning unit also contains a cooling machine along with other parts. The entire cooling mechanism installation is complete and ready for operation, needing absolutely no installation work at the erection site.

8.) Film Transport

A hydraulic variable speed transmission provides for the adjustment to the actual development speed desired. The built-in tachometer indicates the actual developing time. The range of speeds can be regulated from about 100 to 1000 metres per hour.

The transport of the film through the machine is accomplished by means of the ARRI sprocket system with patented double slide film guidance. The film transport shafts in the wet section and the drying cabinet each hold 12 film loops with 16mm film and a number of sprocket rollers together with smooth rollers. A very minimal roller weight and smooth operation combined with well-calculated film roller diameters characterize the film-protecting transport apparatus of the ARRIBLOC machine.
The film take-up reel at the end of the drying cabinet is equipped to take 300 metres of film. An almost automatic special friction device provides for gentle but exact film take-up.

With an additional hand crank the take-up reel can be operated independent of the machine. A control light immediately in front of the take-up reel enables easy observation of the exiting film strip. A hand crank located at the rear of the machine can be used for a short time to operate the machine in case of a power failure.

9.) Film Liquid Removal

In between the individual chemical solutions ARRI liquid removal rollers are mounted to cut down the amount of liquid clinging to the film.

These hold back approximately 80% of the liquid clinging to the film and cut down to a large extent the amount of liquid transported from one tank to another. Immediately ahead of the film drying cabinet the film travels through the ARRI vacuum squeegees (German Patent). In this device all liquid is removed from the surface of the film. This device is so efficient that absolutely no drying marks remain on the film. In addition the drying time is shortened. A special vacuum pump is built into the machine ready for operation.

The vacuum pump is also a strongly constructed component which has proven itself through decades of experience.

10.) Electrical Equipment

The rear surface of the drying cabinet is constructed as a switch board which can be shut and locked.

In setting up the machine only one single main connexion to the 3 phase network is necessary. All electrical circuits are independently safeguarded by automatic fuses. The contactors, relays and transformers etc. necessary for the function of the machine are built-in. The complete electrical equipment adds a great deal to the technical perfection of the machine.
11.) **Instruments**

The ARRIBLOC machine was consciously equipped with a minimum of indicator instruments so that the machine could easily be operated by nearly untrained workers.

12.) **Materials**

All parts coming into contact with chemical solutions are made of acid-resisting steel (quality V4a) or of hardened PVC.

All remaining mechanical parts are protected against chemical or atmospheric corrosion in an appropriate manner.

All electric or electro-mechanical components are of the very best quality (we are of the opinion that the higher cost for the best quality of the components is less expensive than the frequent exchange of spare parts and the undesirable operational failure of the machine).

All basic parts such as film rollers, regulators, relays, etc. are made according to a factory norm and remain unchanged over a period of many years so that the minimal spare parts service remains quite simple and the machines retain their high market value for a long time.

13.) **Technical Data:**

Main measurements:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Unit</th>
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<tbody>
<tr>
<td>total length</td>
<td>3.40 meters</td>
</tr>
<tr>
<td>total width</td>
<td>0.82 meters</td>
</tr>
<tr>
<td>total height</td>
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<tr>
<td>empty weight</td>
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<tr>
<td>operating weight</td>
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The smallest component of a partly dismantled machine (for heavy transport)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Unit</th>
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<tbody>
<tr>
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<tr>
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<td>0.82 meters</td>
</tr>
<tr>
<td>height</td>
<td>1.40 meters</td>
</tr>
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</table>

with the standard construction.
Power Supply: 3 phase current 220/380 Volt 50 cycles
(Special voltage if desired)

capacity approximately 9 KW

Water Consumption:
cold water connexion 1/2" approximately 400-800 litres per hour
warm water (pipe diameter 1/2") at approximately 50°C. approximately 150-300 litres/h.

These values change according to machine type and developing method.

Air consumption from the room: approximately 50 cbm per minute.
In case an air conditioning unit is built-in this air consumption does not occur.

14.) Installation of the Machine:
The machine is delivered from the factory in one piece ready for operation.

In emergencies it can be dismantled into three sections for transport within the laboratory.

The laboratory space should be protected against chemical corrosion in the usual manner. The floor must have the corresponding slope and drainage outlet. For the machine a flat standing area of 3.40 metres x 0.82 metres must be created. In emergencies the machine can also be set up on sloping floors with appropriate levelling support underneath, preferably of PVC.

To be connected to the machine are the following:
1/2" cold water (10 - 14°C)
1/2" warm water (40 - 60°C)
1/2" water drainage hose on the floor to the drainage gully
1 3-phase power connexion
2-5 replenishment feed-lines according to type of 3/8" PVC tubing
1 exhaust air pipe to outside in case no air conditioning unit is desired.

With this the machine is ready for operation. It is then tested in all functions with water.
When the machine has been checked out in all functions with liquid, the leader film is then "threaded in". Each film slide in the solution tanks should hang about 2-3 cm above the bottom so that the film receives the correct tension. Please take care that the film has no twists and that the film goes over the rollers at all positions with its blank side.

After a preliminary trial run the machine is regularly operated as follows:

a) The solution temperature is set.

b) As soon as the machine has reached its temperature the first film roll is stapled to the leader film in the opened stapling compartment by means of a stapler and a stapling templet. The film perforation must be exactly aligned and matched.

c) The film brake is released by hand and the stapling compartment is closed. The film magazine mouth opens automatically and allows the film to roll into the machine.

d) The dosage valves are opened at the beginning of the development to the previously determined dosage amount.

If desired, additional plastic magnetic valves can be built into the dosage lead-ins so that when the machine is shut off the replenisher flow is automatically stopped making a readjustment or change of the amount of flow in the dosage valves unnecessary.

e) The main water valves are opened and the water pressure in the machine should amount to 0.8 to 1 atmosphere.

f) The film transport is turned on and the drying time is set on the tachometer.

g) The drying temperature is controlled.

h) When the end of the film roll runs into the stapling cabinet it is automatically stopped there and an audible signal sounds.

i) The empty film magazine is removed by loosening the handwheel of the mounting. The loaded film magazine is put into place and the film ends are stapled together as above.

For this procedure a minimum of 60 seconds is available, according to the speed of the machine.

k) At the film take-up reel the finished film roll is cut while the machine is in motion and the free-hanging film is then threaded into a new core. The loose film is drawn taut with the hand crank.

l) On the end of the last film to be developed the leader film is again stapled. When the leader film appears in the drying cabinet the dosage flow is turned off.

If plastic magnetic valves are built-in the replenisher is automatically cut off when the film transport is turned off.

m) When the last film is taken up the water is turned off and the machine is shut down. The liquid removal rollers between the tanks are lifted up to their resting position.
16.) Maintenance of the Machine

The most important thing is to keep the machine clean. According to the hours operated all solution tanks should be cleaned every 4 to 12 weeks. According to experience this procedure is carried out as follows:

a) The machine is drained of all solutions.
   The flushing out is accomplished with the aid of a water hose utilizing warm water.
   The tanks are filled up with a 10% solution of hydrochloric acid and the circulation pump is turned on. The machine is then kept in operation for twenty minutes without the film axles having to turn.
   Solution tanks without circulation equipment must be stirred with an appropriate utensil by hand so that the hydrochloric acid removes all dirt particles and residues.
   The machine is emptied again and refloated with warm water.
   The circulation equipment should only be turned on when the machine is full.
   Immediately afterwards the machine is filled with cold water and the circulation is started again.
   It is of course understood that the cleaning procedure can only take place when the machine has been emptied of all film.

b) The pre-run cabinet and the drying cabinet are to be cleaned dry only. The most important thing here is that the ball-bearing rolls move easily.
   The ball bearings are not to be lubricated with grease but rather with a very few drops of fine acid- and resin-free oil.

c) In the hydraulic transmission the oil is to be changed approximately every 600 to 1000 operating hours. The oils that can be used are the following types only: Shell Turbo oil 33; Esso Teresso 52; and BP Energol T100 – HB.

d) On the vacuum pump the grease case is to be tightened one turn approximately every 100 hours of operation.

e) The air filter plates, according to the dust absorbed, are to be cleaned every 4 - 6 weeks, first dry then in warm soapy water. They are then remounted in the machine when dry.

f) The dosage filters are to be cleaned once a year. In cases of strong impurification of the chemicals perhaps earlier.

g) The rubber lips of the vacuum squeegee should be changed after every 5000 to 10,000 metres of film. (It depends here on the number of stapled ends passing through).
h) When the take-up friction begins to pull irregularly or too hard, then open and clean the felt ring with cleaning fluid or trilene and brush with fine, nonresinous oil.

i) According to the grade of water purity the filters of the magnetic valves of the temperature regulating devices are to be cleaned once or more each year.

k) For the cleaning of all plastic parts, do not use solvents such as acetone, benzol, etc. Only acids and caustics guarantee protective handling of the plastic.

17.) **Spare Parts**

Only a certain portion of the machine components are subject to normal consumption and wear.

If desired, please request our spare parts catalogue.
Dear Ron,

Here is the factory supplied list of oil you can use for your ARRI Bloc variable transmission film processor.

<table>
<thead>
<tr>
<th>Castrol (Company)</th>
<th>Castrol-H-Trieb-Öl (Original Oil)</th>
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<tbody>
<tr>
<td>Aral</td>
<td>Aral CMU</td>
</tr>
<tr>
<td>BP</td>
<td>Energol HP 15</td>
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<tr>
<td>Caltex</td>
<td>Ursa P 10</td>
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<td>Arctic Oil C Heavy</td>
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<tr>
<td>Shell</td>
<td>Clavus 27</td>
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<td>DEA</td>
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<tr>
<td>Fina</td>
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<tr>
<td>Antar</td>
<td>Friga 12</td>
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<tr>
<td>Calypsol</td>
<td>Bison SR 36</td>
</tr>
<tr>
<td>Kluber</td>
<td>Forminal DS 15 K</td>
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</tbody>
</table>

Auswechselölsorten (nur verwenden, wenn Castrol-H-Trieb-Öl nicht beschafft werden kann) (Substitute types of oils suitable)

Regards