The Arribloc 1000 II is designed to develop 16mm negative, 16mm positive, 35mm negative and 35mm positive motion picture film.

There are several variables in processing films: the degree of concentration of chemical solutions, the replenishment rate, the machine speed, the development time, the temperature of the chemicals and so on. Since there are so many variables, there are many places where the process can go wrong. It is, therefore, necessary to follow procedures to the letter if results are to be of a high professional standard.

Generally speaking, it is a waste of energy, time and money to work in a manner that is anything less than professional. After all, pictures must first be clear before they can be seen and understood. Those ideas which people wish to celebrate on the screen cannot exist as conceived without the meticulous care and attention of the processing machine operator.

The Arribloc is a machine. Its performance is limited as is any machine's. But regardless of its failings, the competent operator always gets the best out of it. He therefore must learn what it will not do as well as what it will do. Shoddy operations will soon cause the machine to fail to do what it was meant to do. It is, therefore, incumbent upon you to learn how to operate the machine in a manner that preserves its functions and produces the best results possible.

About the Arribloc

Film is sprocket-driven from left to right through the machine; perforations away from you and emulsion out. It is pulled out of a light-tight magazine into a chamber where the head of the incoming film is stapled to the tail of the film that is already in the machine. The film movement is stopped by a film-catching device or brake which functions automatically when the end of a roll is reached. This film-catch may be operated manually as well. Since the film movement must be stopped in order to make a splice, a film collecting space or reservoir is provided in between the splicing chamber and the developing tank. This space is frequently referred to as the elevator or the pre-run cabinet. It allows the film to be continuously through the machine even though the film may be stopped in the splicing chamber. The length of film in the elevator is about 73 feet. When it is about half depleted, the film stops moving. This means that there is a limited time for making a splice. This time is directly dependent upon machine speed. Failure to make the splice in time results in the automatic stoppage of film movement.
"Main Drive" shuts off and that portion of the roll of film that is in the developing solution at that time becomes overdeveloped. This, of course, is undesirable. An audible signal (buzzer) is on during the time that the film is elevating in the chamber.

Tank No. 1 contains negative developer. Tank No. 2 contains positive developer. One or the other is used during processing, but not both. A minor re-threading operation is required to guide the film into one tank or the other. The film length in each of these tanks is about 57 feet. Tank No. 3 is split into two parts. The back half is a water tank that washes off the developer partially by spray and partially by emersion. The front half is the first half of the fixing tank. The front half of Tank No. 4 is joined to the front half of Tank No. 3 and is also part of the fixing bath. The back half of No. 4 and all of Tank No. 5 are water washing tanks.

The film passes between plastic squeegees at the end of the developing tank, at the end of the first wash tank and at the end of the second fixing tank. It passes between silicone squeegees when going from the first half of the fixing tank to the second half. Squeegees help to prevent one liquid from contaminating the next. The silicone squeegee between the two fixing tanks helps to prevent fixer from dripping onto the outer surface of the machine.

At the end of the wash, above tank No. 5, is a vacuum squeegee. It draws all water off the surfaces of the film before the film enters the drying cabinet. In the drying cabinet the film is subjected to rapidly moving warm air. The cabinet also has a refrigeration unit which controls the relative humidity.

At the end of the drying operation, the film is taken up onto one of two available take-up spools.

During development, solutions must be kept moving. They must be kept at a constant temperature and they must be replenished constantly.

Three circulating pumps which operate in conjunction with three thermostats keep the negative developer, the positive developer and the fixer in constant movement and within about half a centigrade degree of a preset temperature.

A thermostat for a solution will not function unless its companion circulation pump is turned on. Heating is achieved by emersed electric heating rods. Cooling is achieved by circulating cold water in a coiled pipe that is in contact with
the solution. The red light on the thermostat indicates that the heater is on. The green light indicates that cold water is on. This cold water is dumped down the drain after use.

The circulation pumps draw solutions off from the top of the tank, run them through the heating and cooling system and feed them back into the bottom of the tank.

Water temperature is controlled by a mixing valve behind the machine on the wall. A volume control is located on the back of the machine behind and below the splicing chamber.

The replenishment system is rather elaborate. Replenishment chemicals are mixed in large storage tanks and then pumped up to medium sized supply tanks about ten feet up in Room 325. These supply tanks feed the machine by gravity flow. On the machine itself, three flow rate controls are located at the left end beneath and in front of the splicing chamber. They are calibrated in cubic centimeters per minute. They function only when "Main Drive" is on.

**Magazine Loading**

(Practise loading in the light with scrap film.) The magazines are numbered. No. 1 is a 35mm mag and must not be used for 16mm film. Mags No. 2 and 3 are for 16mm film and hold a maximum of 2,000 feet.

The film that goes into the mag must be on a T core or a Z core. A 400' roll of exposed negative arriving tail out emulsion in on a core from a camera, may be placed into the mag without rewinding.

The mag, of course, with negative, must be loaded in complete darkness. The procedure for loading a single 400' roll of neg is as follows:

Take the magazine and the can of neg into the loading room. Turn on the loading room light. Close the door firmly and lock it. Place the magazine on the bench in front of you with the light trap (flat part) towards you.

Remove the cover by grasping the handle, depressing the silver button and rotating the handle to the left until it stops, (about an eighth of a turn). Pull the cover off and place it on the bench to your right. (To the left if you're left handed.) Remove the core if there is one in there. Take the can of film and remove the tape from it being very careful not to allow
it to open or drop out of your hand. Orient your body position in relation to the magazine and cover. **Turn off the light.** Open the can. The film should be in a black bag. Remove it. If it is taped, remove the tape. Hold the roll straight in front of your face so the end of the film hangs down on the left like this.

Double check the position of the perforations by running your left thumb and forefinger down the edge that is away from you. Be careful not to let the film unravel. Be extra careful with loosely wound film so the core won't slip out and unravel from the hub of the roll. Do not pull loosely wound film taut. This will cause cinch marks. Peel for the spindle in the magazine and lay the roll onto it. It is not necessary to make sure that the spindle registration springs into the core. Grasp the film with one hand about two inches from the end. Open the light-trap with the thumb or forefinger of the other hand. Slip the film between the guide rollers. Aim the end of the film straight down between the guide rollers. Aiming it on an angle will cause you to miss the light-trap aperture. With one of the fingers of the hand that is holding the trap open, feel to find if the end of the film has protruded. If it has not, pull the film back and aim again. If it has, let the light-trap spring closed. Check to see that the film has not unraveled in the magazine. Reach for the cover. Lay it on by feeling around the edge. Push it home and rotate the handle to the right until you hear it click to lock. Do not depress the silver button when turning the handle to the locking position. Turn the room light on. Turn the magazine over or hold it on its edge. On the back, locate the grey lever which is attached to a spring. This is the brake. Press the lever and pull out a little more film. There should be about 3 or 4 inches protruding from the light-trap. Check the following: with the magazine handle straight in front of your face, the film should be coming out of the trap with perforations away from you and emulsion facing to the right.

A 400' roll of negative coming from the Oxberry animation camera is wound a little differently. It arrives tail out, emulsion out. The difference in loading the Arribloc mag is quite simple. Take it from the black bag. Hold it straight in front of your face. The end of the film should hang down on the right, perfs away from you. It does not matter from which side the film comes off the roll in the mag. As long as the film protruding from the light-trap has perfs away from you, emulsion facing to the right. This is
This is the way the Oxberry roll will be when you load it.

When two or more rolls of the same type of film must be processed, it is more efficient to staple the rolls end to end in order to load the magazine with as much film as it will hold. A portable stapling plate is provided for this purpose. Joining 400' rolls together is done in the following way:

You need scissors, stapler and stapling plate. You need two split reels or one split reel and a tightwinder. If two split reels are used, both of them must be of large capacity (2,000') reels. In the dark, the first roll is placed onto the left rewind so that perfs are away from you, emulsion up. This means that film comes off the bottom of the reel. It is fed onto the bottom of the take up reel on the right. Wind the film slowly and keep it from rubbing against the flanges of the reels. This is important. Failure to observe these precautions will cause irremovable static marks on the negative. (Fast winding or permitting the film to rub against the flanges of the reel creates static electricity. This static electricity discharges with a continuing blue spark. This spark affects the emulsion. It has the shape of a lightning streak on the developed negative. There is no known way of removing it.)

After the first roll is wound onto the take up reel, load the second roll onto the left rewind in the same position as the first. 1) With the stapling plate between the two rewinds grasp the head of the second roll and lay it onto the pins in the stapling plate. 2) Grasp the tail of the first roll and lay it in the plate on top of the other piece of film. 3) Bring the hinged upper plates down so as to hold both films together. 4) Take the stapler and slip its lower lip into one groove until a slight resistance is felt. 5) Staple. 6) Push the stapler farther into the groove until it will go no further. 7) Staple. 8) Slip the stapler out and put it into the other groove until a slight resistance is felt. 9) Staple. 10) Ditto 6. 11) Ditto 7. This puts four staples into the films. 12) Lay down the stapler and pick up the scissors. 13) Remove the films from the stapling plate and trim off the ends to within an eighth of an inch from the staples. Make sure you move these unwanted ends of film out of the way. 14) Wind this roll onto the take up reel on the right. 15) Repeat the procedure for additional rolls. 16) When you're finished, rewind the film back to the left. It comes off the bottom and goes onto the bottom. HAVE PATIENCE! REWIND SLOWLY AND STEADILY!
17) Then remove the film from the split reel or tightwinder and load it into the magazine as previously described. It is important that when stapling one roll to the next, the head of the next roll be placed on the splicing plate first so that the tail of the previous roll sits on top of it.

When stapling a roll from the Oxberry to a normal roll, place the Oxberry roll in the left rewind so that the film comes off the top of the reel. Perfs will be away from you, emulsion up. Make a normal staple. It will be wound onto the bottom of the take up reel, emulsion in. If the Oxberry roll is the first roll, load it on the left rewind so that it comes off the top but thread it across to the take up reel so that it goes onto the bottom of the reel, emulsion in (towards the hub of the reel).

**Loading From Daylight Loading Spools**

When negative is sitting tail out on a hundred or two hundred foot daylight loading spool it cannot be loaded directly into the Arribloc magazine. It must first be wound onto a core. Place it in the left rewind so that film comes off the bottom of the spool perfs away from you, emulsion up. Thread it onto the bottom of the take up. **NOTE:** not all daylight loading spools have square holes on both sides at the hub. If you encounter one that has a square hole on one side only, you will not be able to put it on the left rewind with film coming off the bottom perfs away from you emulsion up. In this case, you place the spool onto the rewind so that film comes off the top, perfs toward you, emulsion down. Give it a twist and feed it onto the bottom of the take up spool on the right. An alternative is simply to hold the spool in the left hand with thumb and middle finger at the hub. This, however, enormously increases the risk of your allowing the film to rub against the flanges of spool and reel causing static marks. If a number of spools of film are to be developed, splice them together with the stapler as described previously. Rewind the film back to the left slowly. Load it into the magazine.

Hundred foot spools from the Oxberry animation camera will be wound emulsion out. If an Oxberry spool is placed on the left rewind with film coming off the top, perfs away from you, emulsion will be up and need only be wound directly onto the bottom of the take up on the right. If it is placed onto the left rewind with film coming off the bottom as would be the case with a spool with only one square hole, the film will be positioned with perfs towards you emulsion down. It will have to be twisted in order to feed correctly onto the take up.
Loading Positive Film Into Magazines

Positive film arrives from the contact printer tail out. It is of the opposite winding from original negative, being winding A. It is already on a core but is not possible for it to be loaded directly into a magazine. It must be rewound first. You may work with positive film using a yellow safelight. To rewind it, place it on a split reel on the right rewind with film coming off the bottom, perfs away from you, emulsion up. Wind it onto the bottom of the left take up. When splicing two or more rolls of positive together, remember that the film end on your left goes into the stapling plate first and that the film end on the right goes on top of it. Don't forget to trim off the unwanted ends and keep them out of the way.

Negative Developing Procedure For One 400 Foot Roll of Plus X Negative 7231

The machine remains threaded with double perforated green machine leader.

1. Check the film magazine. If there is adhesive tape on it do not touch it. Adhesive tape on a magazine indicates that it is loaded with undeveloped film. If there is no tape on it, open it and check if there is enough green leader to run the Main Drive for 4 or 5 minutes, OR check to see if there is an existing staple splice that will enter the splicing chamber after a few minutes' run. (You should pre-run the machine to check or set the speed. The speed of the machine must under no circumstances be altered unless the Main Drive is on. Speed must be changed while film is moving through the machine.)

2. Check under the light-tight cover to see whether the machine is threaded for positive or negative development. If it is threaded for positive, change it to negative.

3. Pre-run Procedure
   1. Turn on the water supply switch on the wall
   2. Turn on the power switch on the wall.
   3. Turn on the circulation pumps for negative developer and fixer.
   4. Turn on the blower.
   5. Turn on the refrigerator.
   6. Set the drying cabinet temperature to 39°C. The red pointer should point to 39°C.
   7. Turn on light.
   8. Turn on the vacuum pump.
   9. Turn on main drive.
   10. Set the speed to the mark that lies between 2 and 3 on the speed indicator.
This represents 19 feet per min. NOTE: if the machine has not been in use for several hours, it will be moderately sluggish when you first turn it on. The speed indicator will point somewhere slightly under the speed it will run at after the machine has warmed up. Therefore let it run for about 3 1/2 minutes. The speed indicator is calibrated in minutes developing time. It is not accurate. Plus X Negative should receive a 3:06 development. This is achieved by placing the indicator at the mark on the dial between 2 and 3.

11. Run the green leader until you reach the end of the roll in the magazine or until an existing splice arrives in the splicing chamber. The reasons for doing this are to warm up the machine a little and to minimize the number of splices in the green leader. If you run the leader to the end of the roll, the film-catch should automatically engage.

12. If you run the leader down to a splice, press the film-catch button.

13. Shut off Main Drive.

14. Shut off vacuum pump.

15. Set water temperature to 70°F.

16. Shut off water supply switch.

17. Turn on Negative developer and fixer thermostats. Set both of them to 21°C.

18. Check that the humidity setting inside the drying cabinet is at 50%.

4. Running Procedure: Shutting Down Procedure

Fill the stapler with staples.

Open the splicing chamber. Break the green leader at the splice.

Remove the magazine by rotating the release knob counter-clockwise.

In the loading room, load the raw stock into a magazine.

Put the magazine onto the machine. It is done in the following way:

Grasp the mag with the right hand and raise it up into position over its shoe.

With the left hand, guide the protruding film into the aperture. Lean the top part of the mag slightly towards you and lay it into the shoe. Push the mag both away from you and to the right at the same time. With the left hand slap the release knob inwards and tighten it by rotating it clockwise. (towards you)

Reach into the splicing chamber and move the tail of the leader out of the film guide rollers. Grasp the end of the film from the magazine. Pass it under the upper left guide roller, under the middle roller and over the upper right roller. When passing it over the right-hand roller, it is necessary to lift the
pressure guide. In addition, be sure that the film sits in this guide roller correctly. There is a small plastic wheel which rides on the edge of the film as it goes through this roller. This wheel must be pushed aside by the film. The wheel operates a micro-switch that triggers the automatic film-catch when the end of a roll is reached.

Pull the film back to the left and pass it over the lower left roller and finally onto the splicing block. The incoming film goes into the splicing block first; perforations away; emulsion up. Grasp the tail end of the leader, and being very careful not to twist it, lay it on top of the incoming film. Splice it with four staples and trim the ends off with scissors.

Hold the film firmly in the left hand and gently pull out the film-catch release. The left hand will have to guide the tail of the leader into the elevator. Make sure the film remains on the lower left guide roller. It slips off easily during this operation. If there is not enough tension in the elevator to pull this excess film into the elevator, turn the main drive on and off for a short burst. Close the chamber and pull the film-catch release out all the way. NOTE: when the chamber door is opened, the light trap on the magazine automatically closes. The film will, therefore, be a little bit difficult to pull around the guide rollers. When the chamber door is closed, the trap opens.

Have a magazine of green leader standing by on the shelf behind the splicing chamber. Take a T or a Z core and put it on the empty take up spool. Get a stop watch.

Go into room 325 and turn on the valves under the D76R and fixer supply tanks so that they point towards you.

When the temperature of the neg developer and the fixer reach 21°C, turn on the water. Turn on the vacuum pump. Then turn on main drive at the same time as you start the stop watch.

Look into the window of the splicing chamber. If the spiral is rotating, the film is moving into the elevator.

When the drying cabinet has reached 39°C., make sure the green arrow is set at about 37° or 36°C.

At 3:45 on the watch, turn on the neg replenisher flow meter. When you turn it on, a piece of metal will rise in the tube. Set the flat top of it to 67.5 cc's per minute. This is just a little bit above the bottom line. Set the fixer flow meter to the same position. These flow meters are marked off in 20cc's per minute divisions.
10.

Check the water temperature. It should read 70°F.

Take a cloth and wipe the machine clean while you're waiting.

Some time between 21:30 and 22:30 on the watch, the film-catch will engage.

You must work quickly as soon as you hear it because you have only two minutes in which to change magazines and attach green leader. For this reason, line up the stapler and the punch correct way round and within easy reach so that no time will be lost.

As soon as the film-catch engages:

1. Open the chamber.

2. Remove the magazine and put it on the floor or the small platform alongside the machine.

3. Reach for the magazine with the leader in it.

4. Put it on and fasten it.

5. Pull the tail of the neg out of the guide rollers.

6. Thread the incoming leader around the rollers and into the splicing block.

7. Lay the end of the neg on top of the leader. (Without twisting)

8. Staple. (4 staples)

9. Trim with scissors.

10. Hold the film with the left hand.

11. Release the film-catch. (The film will practically be pulled out of your left hand here because there is a great deal of tension in the elevator. Make sure the film doesn't slip out of the lower left guide roller.)

12. Close the chamber door.

13. Pull the film-catch release out all the way.

You should be able to see the spiral spinning quite rapidly.

Failure to accomplish this splice in time will cause the main drive to shut off automatically and a section of film will be overdeveloped. If you can get the main drive back on within about 6 seconds, the overdevelopment won't be noticed. There's a series of lights by the elevator which indicate how high up the elevator the film has travelled. When the red one has turned on you'd better get the chamber door closed and the release knob pulled pretty damn quick. There's a main drive switch located above these lights.

Even though there are about 73' of film in the elevator chamber, you have only about 39' during which to make the splice. At 19 feet per minute, this is two minutes, near enough. You should be able to make a changeover in 40 to 50 seconds.

At 27:30 turn off both replenishment flow meters. Turn off neg circulation pump and neg thermostat. At 31:30 on the watch, prepare to change from leader take-up
to negative take up. Take the flange off the empty take up. As soon as the splice from leader to film emerges, tear at that point. Guide the film downward and at the same time crease the end for insertion into the slit of the core. Guide the film down to the guide roller and pass it above the metal spindle underneath the roller.

Reach around and grab the take up crank and stop the take up from turning while you fasten the film to the core. After fastening, wind the crank by hand to take up the excess film. Put the flange back on.

If you did not have about 600' of green leader in the film magazine, you must load this leader, which is on the take up, into a magazine and have it standing by at the head of the machine.

At 32:00, turn off fixer circulation pump and fixer thermostat.

Go to room 325 and turn off the valves under the supply tanks. The arrows should point to the right for "OFF".

Get a core and put it onto the empty take up. At about 52:10, change from neg take up. To LEADER TAKE UP.

Shut off main drive.

Shut off vacuum pump.

Shut off blower.

Shut off light.

Shut off water supply.

Shut off power supply.

The developed roll is now ready for printing. It is head out, emulsion out.

If you develop more than one roll of negative at a time and do not break each roll down as it comes out of the machine you are NOT ready for contact printing. The splices FIRST must be removed. A contact printer has already been seriously damaged because some person who was in too much of a hurry, or who just didn't know any better ran a roll of negative in the printer and did not remove the staples first. This printer now scratches every roll of negative that goes through it! It has been rendered useless!

**Positive Developing**

1. Change the machine to positive mode. (Refer to page 18.)

2. Load the positive film into a magazine. (Page 7)

3. Follow the pre-run procedure. The machine speed should be 19fpm.

4. Turn on power, water, recirculation pumps for positive developer and fixer, blower, refrigerator, vacuum pump, thermostats. The pos developer and fixer
temperature for Kodak 7302 Fine Grain Release Positive is 23°C. at 19°F.
The water temperature should be set to 73°F.
5. Turn on supply valves in room 325 for fixer and positive replenishers (DA7R).
6. Place the magazine onto the machine. Have leader standing by.
7. When temperatures reach their appropriate levels, turn on main drive and
   start the stopwatch.
8. Calculate the start and stop times of the replenishers. Replenishment flow
   rate for pos developer and fixer is 10cc's per minute. This amounts to the
   smallest trickle possible on the flow meters. Set the meters so that the metal
   indicators are just floating. They will rotate very slowly.
9. Calculate the times when you should expect to splice back to leader and when
   you should transfer from one take up spool to the other.
10. Follow much the same procedure as for neg developing.
The film on the take up will not be wound correctly for projection. It is tail out,
emulsion out. It must be rewound. Put it on the right rewind, perfs away from you,
coming off the top of the roll. Wind it onto the bottom of the reel on the left
rewind and remove any staples as you go. Replace them with conventional wet splices.
Once the film is rewound it will come off the reel in the correct way on the
projector; (off the bottom, emulsion in, perfs towards you.)
Chemistry for the Arribloc

The Arribloc tanks accommodate about \( \frac{38}{2} \) U.S. gallons of solution. Half tanks accommodate about 19 U.S. gallons. The negative developer is D-76. The positive developer is D-97. The fixer is Kodak Rapid Fixer. (The inside back cover of the Yellow Pages gives conversion tables from British to U.S. to decimal systems.)

**Formula for D-76 Neg. Developer**

Water at 125°F (50°C)

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<td>Elon</td>
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<td>Sodium Sulphite</td>
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<td>Hydroquinone</td>
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<td>Balanced Alkali</td>
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Add water at 68°F to make 25 gallons U.S.

**Formula for D-76 Replenisher**

Water at 125°F (50°C)

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<td>Hydroquinone</td>
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<td>Balanced Alkali (Kadalk)</td>
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Add water at 68°F to make 50 gallons U.S.

**Formula for D-97 Developer - Positive**

Water at 125°F

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<td>Sodium Sulphite</td>
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<td>Hydroquinone</td>
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<td>Sodium Carbonate</td>
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<tr>
<td>Potassium Bromide</td>
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Add water to make 20 gal. U.S.

**Formula for D-97 Replenisher**

Water at 125°F

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<td>Sodium Carbonate</td>
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<td>Potassium Bromide</td>
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<tr>
<td>Sodium Hydroxide</td>
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Add water to make 60 gal. U.S.
Kodak Rapid Fixer and Fixer Replenisher

Water at 80°F
Solution A.
Solution B

25 gal. U.S.
1 x 5-gal. cube
1 gal. 1 qt.

When you're mixing solutions, chemicals must be added in the order of appearance on the list.

The supply of replenishing solutions for the Arribloc is located behind the machine in Room 325. Under normal conditions, the only solutions which need to be prepared are replenishing mixtures. These are mixed in the large 90 gal. storage tanks which sit on a low platform. Attach the portable electric propeller to the rim of the tank when mixing. Avoid positioning this stirring device in a manner that causes excessive bubbles to be produced. Before you start to mix, rinse the storage tank with hot water. Make it as clean as possible. There is a hose with a trigger-operated nozzle for this. Beneath and in front of the tank is a tap. The arrow on this tap should point to the right when you are rinsing the tank. This carries the water down the drain. Before you begin to fill the tank with water for mixing, turn this tap around so that the arrow points to the left.

After you've finished mixing, pump the solution up to the appropriate supply tank which is sitting on a shelf about ten feet up. Each of these tanks holds 30 U.S. gallons. The pumping switch for each tank is located on the wall near the tank it serves.

Underneath each supply tank is a 3-position tap. When you are pumping solution into the supply tank from the storage tank, open this valve so that the arrow points away from you. (towards the wall) As soon as you shut off the pump, turn the valve so that the arrow points to the right. Failure to do this results in the solution feeding back, by gravity flow, into the storage tank. When the valve is pointing to the right, the solution remains in the supply tank. When you turn the valve so that the arrow points towards you, the solution feeds into a pipe which goes through the wall to the Arribloc. This is to be turned on only when you are operating the machine.

The rate of flow of replenishers is controlled beneath and in front of the splicing chamber on the machine. The replenishing rate for EASTMAN PLUS X Negative type 7231 when the machine is running at 19fpm is approximately 67.5 cubic centimeters per minute. The fixer replenishment rate is also 67.5 cc's per minute. The replenishing rate for EASTMAN FINE GRAIN RELEASE POSITIVE type 7302 when the machine is running at 19 fpm is approximately 10cc's per min. Fixer replenishment is also at 10cc's per min.
At certain times it becomes necessary to dump a solution from the Arribloc and to mix a fresh batch. When this occurs, the appropriate draining valve behind the tank is turned on to empty the contents down the drain. The film should be unthreaded from the particular tank. Flush the empty tank with warm water. Close the drainage valve then fill the tank with warm water. Add about 2 U.S. gallons of hydrochloric acid to this warm water or make an appropriate solution of recommended tank cleaner. Turn the circulation pump on but do not turn on the corresponding thermostat. Circulate the solution for twenty minutes. Turn off the circulation pump. Drain the tank. Flush the tank with warm water. Fill the tank with plain water again. Circulate it for twenty minutes. Drain the tank.

Close the Valve

The new solution should be mixed in a mobile tank equipped with its own stirring device and an electric pump. Know the capacity of this tank in the event that two 1/2-batches might be necessary. Rethread the film. Fill the Arribloc tank. Turn on the circulation pump and the thermostat until the solution reaches the required temperature.
Arithmetic of the Arribloc

Negative Mode

From splicing block to negative developer entry 74 feet
From negative developer entry to wash entry 59 feet
From wash entry to fixer entry 28 feet
From fixer entry to wash entry 58 feet
From wash entry to drying cabinet entry 84 feet
From drying cabinet entry to take-up spool 199 feet

Positive Mode

From splicing block to positive developer entry 75 feet
From positive developer entry to wash entry 58 feet
From wash entry to fixer entry 28 feet
From fixer entry to wash entry 58 feet
From wash entry to drying cabinet entry 84 feet
From drying cabinet to take-up spool 199 feet

Machine Speed

<table>
<thead>
<tr>
<th>Speed dial setting</th>
<th>Actual Developing time</th>
<th>Machine Speed in fpm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Neg.</td>
<td>Positive</td>
</tr>
<tr>
<td>8</td>
<td>9:50</td>
<td>9:40</td>
</tr>
<tr>
<td>7</td>
<td>8:26</td>
<td>8:17</td>
</tr>
<tr>
<td>6</td>
<td>7:23</td>
<td>7:15</td>
</tr>
<tr>
<td>5</td>
<td>5:54</td>
<td>5:48</td>
</tr>
<tr>
<td>4</td>
<td>4:55</td>
<td>4:50</td>
</tr>
<tr>
<td>3</td>
<td>3:41</td>
<td>3:35</td>
</tr>
<tr>
<td>at the mark between 2 &amp; 3</td>
<td>3:06</td>
<td>3:03</td>
</tr>
<tr>
<td>2</td>
<td>2:27</td>
<td>2:25</td>
</tr>
<tr>
<td>1.7</td>
<td>2:06</td>
<td>2:04</td>
</tr>
<tr>
<td>1.5</td>
<td>1:50</td>
<td>1:49</td>
</tr>
<tr>
<td>1.2 maximum</td>
<td>1:29</td>
<td>1:27</td>
</tr>
<tr>
<td></td>
<td>1:07</td>
<td>1:06</td>
</tr>
</tbody>
</table>
To calculate when you should begin replenishment divide \( \frac{74}{19} \) (elevator capacity) by the machine speed in fpm. e.g. machine speed = 19fpm. 74 divided by 19 = 3 17/19. To change the 17/19 to seconds; 17/19 \( \times \) 60/1 = 53 13/19 or 54. So 3 minutes and 54 seconds from the time the machine is started, replenishment flow meters for developer and fixer should be turned on.

In order to make things less complicated, a machine run is started with a fully replenished developing solution and a depleted fixing solution. We turn both replenishers on at the same time so that the fixer will be replenished by the time the film arrives there. We stop replenishing both solutions at the same time so that at the end of a run, the fixer ends up depleted.

To calculate when to stop replenishment, add \( \frac{74}{19} \) (elevator capacity) 59 (neg developer capacity) and the length of the roll of film being developed; then divide the sum by the machine speed in feet per minute. The result will be the time from MACHINE-START that replenishment should be shut off. Turn both the neg replenisher and fixer replenisher off. Turn neg circulation and thermostat off.

To calculate the MAXIMUM time allowed, at a given machine speed, for making a splice in the splicing chamber, divide 39 by the machine speed. While the elevator holds 73 feet, the red light comes on at 35 feet and the main drive automatically shuts off after 39 feet have fed from the elevator to the developer. e.g. machine speed = 19fpm. 39 divided by 19 = 2 1/19 or 2 minutes and 3 seconds.

To convert centigrade to fahrenheit degrees multiply the \( C \) reading by \( \frac{9}{5} \) and add 32. e.g. \( 21^\circ C = 21 \times \frac{9}{5} + 32 = 37.8 + 32 = 69.8^\circ F \)

To convert fahrenheit to centigrade, subtract 32 from the \( F \) reading and multiply by \( \frac{5}{9} \). e.g. \( 68^\circ F = (68-32) \times \frac{5}{9} = 36 \times \frac{5}{9} = 20^\circ C \).

### OPERATING TEMPERATURES

<table>
<thead>
<tr>
<th>Negative Developing</th>
<th>Positive Developing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Developer</td>
<td>21°C</td>
</tr>
<tr>
<td>Fixer</td>
<td>21°C</td>
</tr>
<tr>
<td>Water</td>
<td>70°F</td>
</tr>
<tr>
<td>Drying Cabinet</td>
<td>39°C</td>
</tr>
<tr>
<td>Drying Cabinet Relative Humidity</td>
<td>50%</td>
</tr>
<tr>
<td>Water Pressure</td>
<td>15 lb/sq. in</td>
</tr>
</tbody>
</table>
Film Lengths

A 400' roll has about 412 feet on it. A 100' roll has about 110 feet on it.

To Change Operating Temperatures

For setting temperature on a thermostat for one of the solutions, a small screwdriver is needed. On the thermostat are two indicators; a green and a red. The red is set by turning a small screw on the lower right face of the thermostat. The green is set by turning a small screw on the lower left face of the thermostat. The red is set for the upper limit of the temperature you need. The green is set for the lower limit. The closest that they can be brought together is to a separation of one centigrade degree.

If you wanted to set the operating temperature of a solution to 22°C you would set the red indicator to 22 1/2 and the green indicator to 21 1/2. The needle on the thermostat indicates the actual temperature of the solution. Its adjustment is accomplished by turning the centre screw on the face of the meter. Please do not touch it. When this needle hits the red indicator, the green light goes on and cold water begins circulating through a coiled tube emersed in the fluid. The temperature begins to drop. When the needle hits the green indicator, the green light shuts off and the red light comes on. The cold water stops flowing and the emersion heaters turn on. While the cooling stage is operating, you will be able to hear the periodic dumping of the cooling water down the drain.

To set the temperature of the drying cabinet, turn the red knob on the thermostat to set the MAXIMUM temperature. This moves the red needle to the setting you want – 39°C. If you've just turned on the machine, the green needle, which is set for the MINIMUM cabinet temperature, will probably be lying quite low on the scale alongside the white indicator. You must wait until the cabinet heats up considerably before you will be able to set this. The green knob is used at 36 or 37°C. Relative humidity is set inside the cabinet on the back panel. The indicator on the door of the cabinet gives the actual relative humidity inside the cabinet.

To set the temperature of the water, rotate the mixing valve.

Changing From Negative Mode to Positive Mode

To change from neg to pos or pos to neg mode of operation of the Arribloc, it is necessary to do some minor rethreading. You need stapler and scissors. In neg mode, the film goes from the elevator to the neg developer. From the neg developer, the film passes over the top of the back guide roller of the positive tank thus bypassing this tank and going on to the wash tank.
To change mode, the film must be made to bypass the neg tank. There is a closed loop of film in the pos tank. No film is wrapped around a sprocket-drive while it's sitting in this tank. The part of the film which is supposed to go onto the sprocket has itself been stapled into a small loop and this loop has been placed around the guide roller next to the sprocket. A small loop has been made and wrapped around the back guide roller as well. The object is to disconnect the leader from the neg rollers and connect it to the pos rollers. This must be done without losing the end of the film into a tank or into the elevator. It must also be observed that the full capacity of film in the pos and wash tanks be maintained. During the changeover, it is possible to end up with less film in the pos tank if you're not careful. This will result in a shorter development time. Note that the sprockets turn clockwise.

1. Detach the loop going round the back guide roller of the pos tank by removing the staples.

2. Attach it to the leader going into the wash tank by placing it on the UNDERSIDE of this leader and stapling it with the customary 4 staples. Align the perfs before stapling.

3. Cut the film that is coming from the back of the neg tank, just near this splice. Hang on to it so it won't slip back into the neg tank.

4. Loop it around the back guide roller of the neg tank and splice it with one staple to the leader going into the neg developer.

5. Trim the splice made in step 3 and don't let the trimmed pieces fall into the tank.

6. Detach the loop going around the front positive guide roller by removing the staples.

7. Lead the end of the film around the positive sprocket drive. Attach this end to the film coming out of the elevator. If it doesn't reach, disengage it from the sprocket drive and pull up on it. Splice with 4 staples, placing this end on TOP of the leader coming from the elevator. Align the perfs before stapling.

8. Cut the leader that leads round the neg sprocket, on the right of the splice. Hang on to it. Remove it from the sprocket and loop it around the first negative guide roller. Put 1 staple in it to hold it.


10. Add in film that has been taken up in the process of changeover.
    a. Lift the film off the wash sprocket at the back and let the film feed into the wash tank until JUST BEFORE it becomes slack.
    b. Pull film in from the elevator. Lift the leader off the pos sprocket and let it feed into the pos tank until JUST BEFORE it becomes slack.
11. Lead the film coming out of the elevator so that it passes underneath the neg sprocket i.e. so it doesn't touch it.

In changing from pos mode to neg mode, follow much the same kind of procedure. Adhere to the principle of ATTACHING the film leader from the tank to be used BEFORE DETaching the film from the other tank. Remember that taut film will either have to be added into the tanks from the elevator OR slack film in the tanks will have to be taken up. Don't forget to close and lock the lid afterwards. If you're splicing an end on the right to a piece on the left, the end on the right goes on the top. If your splicing an end on the left to a piece on the right, the end on the left goes on the bottom.

To Change Machine Speed

It will not be necessary to change the speed of the machine very often but to do it, first ensure that there's enough leader in the magazine to run the machine for about five minutes. Turn on power, water, blower, vacuum pump, refrigerator, light and main drive. Let the machine run for about 3 1/2 minutes. The device for altering speed is on the right end of the machine. It's a large metal steering wheel that has a tightening knob in the centre. DO NOT CHANGE SPEED UNLESS THE MAIN DRIVE IS ON.

After 3 1/2 minutes, loosen the knob in the centre and rotate the outer wheel. Look at the speed indicator dial straight on and turn the wheel until the desired speed is reached. Tighten the centre knob. Turn off main drive, vacuum pump, light, blower, etc.

In Case of Power Failure

If there is positive film going through the developer and the power fails, forget it. You can reprint the damaged film. If it looks like it's going to be off for a long time, shut down the machine. Open the splicing chamber, cut the film coming from the magazine, load leader and splice it on. Be careful not to lose the end into the elevator. Close the chamber. Walk round to the end of the machine at the back. Take the crank, insert it into its receptacle and crank the machine by hand until the leader reaches the second wash tank. This has to be done in the dark. You can periodically stop cranking and go round to where the film comes out into the open and feel the film with your fingers. Leader is double perf. Pos is single perf. **Run the spoiled film out of the machine when power is restored.**
If there is negative going through and the power fails you should attempt to rescue it by immediately beginning to crank the film through by hand. The crank rotates counter-clockwise and the motor runs free. i.e. it is not governed. You will, therefore, have to estimate the speed and crank as steadily as possible. An assistant, of course, would be useful at this time. Naturally you don't want to be there cranking all day. Therefore you must make a very serious choice. Do you attempt to develop everything that's in the magazine? Do you attempt to develop everything down to the first splice in the magazine and have your assistant change over to leader at that point? Do you have your assistant cut the film right away and attach leader onto the end? What do you do if you have no assistant? These are bridges that you cross when you come to them but you should have several alternatives in the back of your mind ready to go into operation before the need arises.

There are other choices you must make when things go wrong. Suppose temperatures run wild? Suppose the water stops running? Suppose you've just loaded a fresh roll of film, started it flowing into the elevator and a minute later the film-catch engages? Suppose you have to load a magazine and change over from leader take up to film take up at the same time? Suppose there is a film break in the first fixing tank?

The Arribloc is only one tool in the long line of tools in the production of motion pictures. Learn to use it well.