Chapter 3. Procedures

Section 1: Preparation

Handling film
You handle film when you unpack it from the can, when you inspect it, thread it, screen it, unthread it and repack it. Handling also occurs when you clean, repair, splice, break down, make up and store film. Each of these occasions is an opportunity for things to go wrong. But if you have learnt and practiced the right way to handle film you should have few concerns. More importantly, your suppliers will have confidence in your ability to care for their precious, and increasingly irreplaceable films.

The procedures outlined below are set out in an approximate chronological order, from the time you take delivery of the print until you send it back. If you borrow films from the National Film and Sound Archive you will be required to complete and forward a report for each film. This requirement is mentioned at appropriate places in the text. It's worth spending a few minutes on the report, as it is the most effective way of bringing the Archive's attention to the need for repairs and replacements.

Unpacking the print
When you receive a print for screening it will be in a case containing several plastic or metal containers called 'cans'. Each can contains a reel of film. Before opening a case you have just received, examine it for external damage. Note any damage for inclusion in your report.

When you open the case the cans should be a snug fit. Ideally, the cans should be wrapped in a layer of bubble wrap as extra protection, and any excess space in the case should be packed with bubble wrap or a similar material to buffer any movement of the cans during transit. Before opening each can inspect it for damage. Note any damage for inclusion in your report.

Each reel should fit snugly in its can. If the can is too big for the reel excess space should be packed to prevent the reel moving during transit. When unpacking, note that the can is the right size for the reel. If it isn't, make a note to include in your report.

Identifying the print
For each reel in a print, before untaping the leader, carry out the following checks:

1: Ensure you have the right print by checking the film title is written on the leader.

2: Ensure all reels are included and in the right order. If you were expecting a 120 minute film but you received only two cans, you definitely have a problem. Check the cans and the leaders on each reel to work out which reel is missing. Even when the right number of cans arrives don't rely on what is written on their labels. Check that each individual reel number and its sequential position eg 'Reel 1 of 3' or 'Reel 1/3' are written on the leader.

3: If you are expecting to screen the print in Cinemascope check that 'scope' is written on the leader. If it is not, inspect the film with a loupe or large magnifying glass to find out whether you have a scope print. The images on a scope film are compressed sideways by the camera lens, so they look unnaturally tall and thin. If the film images appear to be normal you won't be needing the anamorphic lens.

If you are unable to identify a reel after inspecting the leader:

Single reel print:
Inspect the first section of image using a loupe or large magnifying glass. It may be easier to thread and project the reel from the start until you can identify it. If you do this, don't try to save time by reversing the projector to rewind afterwards. Unthread the film and rewind it on the bench. Never reverse a projector with film threaded in the path. Never.

Individual reels in a multi reel print:
Use a loupe or large magnifying glass to check the print's other reels to make sure you have a complete print and that they fit together in sequence. You may need to do this on the projector or the rewind bench.

After you have identified the reel, correct any wrong information on the leader or splice a new leader, preferably green, to the beginning of the film and write all essential information on it. After screening, correct any wrong information on the tail, or splice a new red tail to the end of the film and write all necessary details on it. Note any problems for inclusion in your report. If all this sounds complicated, don't be alarmed. In practice, most reels are correct and easily identified.

Inspecting the film
When you take a reel out of its can, hold it vertically and look at one side, then the other. Take your time. Note any irregularities in the wind, such as perforation repairs and splices, that could affect smooth projection.

If you need to examine the film more closely, take it to the rewind bench and wind on slowly for a few metres of image, stopping as necessary and examining the film with a loupe or large magnifying glass to get a good idea of its condition. Examine as much of the print as you need to form an opinion. If you are still unsure, thread the print on to a projector and run it through until you are satisfied you know what to expect during a screening.

If necessary, strip the tape off bad splices and resplice (see *On the bench*, below). Film is precious, so don't cut out frames unless (a) only very few frames are affected and (b) they are irretrievably damaged. (If more than a few frames are affected you may have to shut down during a screening, re-thread and start again after the bad patch.) Bad splices show up as wrinkled, bubbled, wrongly aligned and overlapping. They can all cause problems when they get to the gate, but the worst are probably those made by lazy operators who just cut existing splices without bothering to remove the tape, then re-splice over the old tape. When the film is screened later the extra thickness of tape impedes the film's progress through the gate, but the sprockets continue to turn. Inevitably, the result is very serious perforation damage. Note any damage or problem areas and any repairs carried out for inclusion in your report.

Getting the film ready
Check the film is wound on correctly, head out. The leader at the start of the reel should be green. If the leader is red it is probably the end of the reel, which you can quickly verify by checking if the word 'tail' or 'end' appears on it. If the tail is out, rewind the film before doing anything else.

To make sure the film is correctly wound, hold the reel vertically in your left hand, so that when the leader is untaped it comes off the top of the reel to the right (clockwise). The perforations should be on the edge of the film closest to you (the near edge).

If the perforations are on the far edge of the leader it means either the tail is out, regardless of the leader's colour and markings, or that the print has been wound on to the reel inside out. In either case, inspect the print to find out what needs to be done, then fix the problem on the rewind bench (see *Troubleshooting: preparation, getting the film ready*, below).

Don’t even think about loading an incorrectly wound reel on the projector. In the past it wasn’t unknown for projectionists to thread an inside out film by twisting it through 180 degrees so that the perforations were on the correct side as they entered the film path. This practice can seriously damage old film, not to mention your reputation.

Section 2: Setting up

It’s useful to remember that all projection systems share the same basic requirements: a screen, which has to be positioned at the correct distance from the projector; they all need power, they all have reel arms that fold or dismantle, they all need at least one spare reel and they are all connected to at least one speaker. So it doesn’t matter what brand or model you usually operate. If you can operate one, you can just about operate them all.

The screen

Sixteen millimeter film stock has a frame aspect ratio of 1.33:1, which means the width of the frame is 1.33 times its height. So when you project a 16 mm film the width of the image on screen is 1.33 times its height. But films shot in wide screen and Cinemascope do not conform to this standard. If a full widescreen image (1.85:1) is transferred from 35 mm to 16 mm it will leave a ‘letterbox’, which has black bands at the top and bottom of the frame. To avoid the black bands, a process called ‘pan and scan’ is sometimes used. This retains only the centre portion of the original frame, and cuts off the sides of the original image. Films that are shot in Cinemascope (2.35:1) and transferred to 16 mm can be screened more or less faithfully using an anamorphic lens, provided your screen is wide enough.

The image should fill the available white space on screen. To achieve this result you need to place your projector at the right distance from the screen, which can best be done by experimenting, using a short film to test for frame, focus and volume level, before the audience arrives. If you don’t have a test film, start the motor, turn on the lamp and move the projector or the screen or both until the projector’s light fills the available white area on screen. Adjust focus until the edges are sharp. Repeat the process until the sharply focused light slightly overlaps all four edges of the white screen space.

The distance between the lens and the screen, called ‘the throw’, is determined by the size of the screen and the focal length of the lens. The following table shows the relationship between various focal lengths, throw and screen sizes.

Table 1. Lenses, screen sizes and throw

Lens focal length	Screen size	Throw (Distance in metres)							
		3 m	5 m	10 m	15 m	20 m	25 m	30m	40m
38mm	Height	0.56	0.94	1.89	2.84	3.79	4.74	5.69	7.58
	Width	0.76	1.26	2.53	3.80	5.07	6.34	7.61	10.15
50mm	Height	0.43	0.72	1.44	2.16	2.88	3.60	4.32	5.76
	Width	0.57	0.96	1.93	2.89	3.86	4.82	5.79	7.72
65mm	Height	0.33	0.55	1.10	1.66	2.21	2.77	3.32	4.43
	Width	0.44	0.74	1.48	2.22	2.96	3.71	4.45	5.93
76mm	Height	0.28	0.47	0.94	1.42	1.89	2.37	2.84	3.79
	Width	0.38	0.63	1.26	1.90	2.53	3.17	3.80	5.07
100mm	Height	0.21	0.36	0.72	1.08	1.44	1.80	2.16	2.88
	Width	0.28	0.48	0.96	1.44	1.93	2.41	2.89	3.86

If you are using a zoom lens or tele converter, setting the throw is very simple. You can position the projector at a wide range of distances from the screen and still fill the screen with a focused image.

When you set up the screen make sure it is clean and in good condition. Try to avoid vertical seams that make distracting lines down the middle of faces on screen. A badly wrinkled screen is not a good look. Brush off any cobwebs, wipe with a clean dry cloth to remove dust and if possible, remove mysterious spots.

It's nice to have a screen that meets the highest industry standards. But if you can't afford that level of quality, just about anything with a flat, white, non reflective surface will do the job. Everything from bed sheets to painted walls (ceiling paint is highly recommended) can be used, with varying levels of success.

Set the screen at 90 degrees, vertically and horizontally, to the lens. If the screen is not square to the lens, it will be impossible to get sharp focus on more than one section of the screen.

Masking
The screen should be surrounded by a frame (at least 30 mm wide) of black which serves to make the screen image appear brighter while creating sharp edges around the screen image. Depending on the type of screen you use, the mask can be fabric, painted ply wood or just paint.

Projector stands
In most rooms projectors have to be elevated so the light beam isn't interrupted between the projector and the screen. Special projector stands are available for this purpose, but they are generally not very high. If you need to allow for people walking under the beam you will probably have to build one to suit your circumstances, or make a suitable platform. Whatever you use, make sure it is strong enough to carry the weight of the projector/s easily and that it doesn't wobble around. It's also a good idea to round off any sharp or jagged corners.

Connecting to power
It doesn't matter when you connect power to the projector, provided electricity is available when you want to start the show. A recommended practice is to plug in and turn on the power only after everything else is set up and checked.

Try to avoid using extension leads. If there is no alternative, make sure your extension lead is in good condition, the connection points are clean and there are no suspicious black smudges or melted plastic anywhere. Never use two or more leads plugged into each other. If you intend screening at different venues such as halls, it's essential to have a lead, preferably 15 amp, long enough to go from the nearest wall socket, which is almost always at the screen end of the hall, to the projector at the other end. It's handy to have two or three shorter leads as well, for odd occasions when the wall socket is closer, so you don't have excess lead lying around on the floor, creating an accident waiting to happen.

If you are about to plug in a projector you've never seen before, and no one can tell you anything about it, check it is set to take AC power at between 230 – 250 volts and at 50 cycles. This is usually inscribed on a plate somewhere, or there is a switchable indicator that can be set at various voltages. American projectors were generally manufactured to run at 110 volts and have to be converted. If they haven't been converted, they need a separate transformer.

With most projectors, polarity doesn't matter. If your rare projector is polarity sensitive, test both the wall socket and your extension lead before using them. Small plug-in devices are readily obtainable for this purpose. If the wall socket polarity is incorrect you will have to use a different projector. If your extension lead is wrongly wired have a competent technician rewire it correctly. Don't use it for any purpose until the polarity is corrected.

If you intend using a power generator, follow the manufacturer's instructions religiously. And you will need a really long, heavy duty extension lead, otherwise your audience will have trouble hearing anything except the generator.

Preparing the projector

Getting the projector ready for a screening varies from make to make and model to model, but all projectors have a number of things in common.

The important points are:

1. Make sure your projector is clean.

If your projector hasn't been cleaned since the last screening, or you aren't sure about its condition, clean it thoroughly, paying special attention to the gate and film path, before bringing film anywhere near it. Film is easily scratched by particles of dust and grit that accumulate in the gate, on sprockets and along the film path. Film also builds up static electricity, which attracts dirt.

Take extra time with the gate, where the film passes down a vertical channel and is held in place by spring loaded guides and pressure plates. If grit is allowed to accumulate in this area it can destroy a print in a single screening. Be warned.

Clean the vertical channel, the pressure plate, side guides and sprockets with a cloth. Hard deposits should not be allowed to build up. To prevent them, run a small plastic scraper, toothpick, match or similar small wooden object along the channel, in the corners and anywhere else you think would benefit from the attention. Take your time.

> Note: Never use metal to clean your projector. Screwdrivers, knives and chisels can scratch metal surfaces. While they may be invisible to the naked eye, these scratches can cause catastrophic damage to film. And if you damage your gate, finding a replacement could be a real problem.

> Tip: Good quality cotton buds and isopropyl alcohol (IA) are a good cleaning combination. While the gate is open, don't forget to run a cotton bud dipped in IA around the lamp and pressure plate apertures to keep the image edges sharp. Before closing the gate, check with your loupe to make sure you haven't left any tiny cotton fibres behind.

The sound drum and all rollers should be cleaned and wiped with IA. Don't be afraid to use cotton buds dipped in IA anywhere along the film path. Cotton buds can get into all sorts of tight spots and you'll be surprised at the amount of dirt they pick up. Never use a cotton bud more than once. Finish the job with a quick wipe all over, including nooks and crannies that tend to be overlooked.

Cleaning lenses is another thing entirely. Lens coatings are very easily scratched. Get rid of loose dust with a puffer and soft lens brush. Don't clean the main lens unless you absolutely have to, and then use only proper lens cleaning tissue or cloth. Don't touch your lens with a dry cloth or ordinary household tissues. Cleaning the exciter lamp and photoelectric cell lenses can be difficult, depending on their locations. If you can, just blow any dust off the lens. You may have to use a cotton bud dipped in lens cleaner to get into a really tight spot. Don't use a dry cotton bud. Most importantly, don't be tempted to dismantle any exciter lamp or solar cell assemblies unless you know how to reset them precisely.

Keeping your projector clean has to be a top priority. Always store your projector with the manufacturer's soft cover in place. If the original cover has passed on to better things, make a replacement using an old sheet or drape a towel over the projector as a temporary measure.

2. Set up the reel arms.
Set up the reel arms and make sure they are secure so they will not collapse when loaded with full reels.

3. Connect an external speaker to the projector.
A single speaker should be positioned off the floor as close as possible to the centre of the screen. Make sure the connecting cable is well away from aisles and other places where people can trip over it. If you can't avoid laying it on the floor, either gaffer tape it down or cover it with carpet. With multiple speakers you will probably be using a separate amplifier, and setting up for the best sound will be a matter of experimentation.

4. If you are screening a cinemascope print, make sure the anamorphic lens is fitted on its bracket in front of the fixed lens, firmly in position.

5. Locate the nearest wall power socket and lay out the power cable ready to plug in. Make sure it is taped down or covered by carpet.

6. Many projectors have a switch that has two settings for lamp brightness. Set the switch to low. Under most circumstances the lower brightness will not be noticed, but your lamp will last much longer.

Section 3: Threading the projector

Allowing for physical differences between projectors, the following procedures apply universally. Where there are differences, refer to your user handbook in *Part 4*.

Don't be afraid to fiddle around. But don't loosen any nuts, change any settings or remove any screws until you know what they do. Follow the general principles outlined in this manual, use old film that you keep for testing, and, if you can find someone who knows about these things, ask questions. More detailed information on particular projectors is contained in *Part 4*.

Manual threading

All threading should be done manually. Manual threading familiarizes the projectionist with the machine; it keeps the projectionist aware of the need for a clean projector, and is a virtual guarantee that the projector will be cleaned properly and regularly. Manual threading is simple and reliable and takes only marginally longer than automatic or semi automatic methods which have more to go wrong with them; and manual threading is much less likely to damage precious film. Finally, it's much easier to achieve seamless reel changeovers when you can set your cues manually, because you can get them exactly right every time. (see also *Screening*, *Changeovers*, below).

1. Load the reels.
Load an empty reel on the take up arm. In most cases the take up arm is located to your left (the rear of the projector) as you look at the projector from the operating side. (If you are having difficulty working out which arm does what, refer to *Troubleshooting – getting started* below). Check the empty reel is the same capacity or larger than the full reel you intend screening, and that it is in good condition. If appropriate, close the keeper that prevents the reel slipping off the spindle.

Note: Be wary of 2000 ft reels, which look the same as 2200 ft reels because they have the same external diameter. You can tell the difference between the two by comparing their core diameters. The 2200 ft reel has a much smaller core. To make sure, check the footage numbers that are embossed on the reels.

After identifying the print, and making sure you have the right reel in the right order, untape its leader.

Load the full reel on to the feed arm so the film comes off the top of the reel to the right (clockwise). If appropriate, close the spindle keeper. Hold the end of the leader in your left hand and unroll a metre or so of film by rotating the feed reel clockwise with your right. Be careful not to let any film fall on the floor.

Before you go any further, check the perforations are on the near side of the film. If they are not you still have some work to do on the rewind bench before you can start threading. (See G*etting the film ready*, above.)

If you have a projector that only auto loads, or is too difficult to load manually, read no further. Skip to *Slot loading* or *Automatic loading*, below.

Insert the tip of the leader from the left into the slot in the core of the take up reel. Hold the leader in place with a finger and slowly rotate the take up reel clockwise until the leader is securely held and any slack film is taken up. Make sure the take up reel is not buckled or crimped by turning it for a few revolutions and watching to see if the leader catches anywhere. If you have any doubts, replace the suspect reel immediately.

Unroll more leader from the feed reel and take it up until you can see your preferred starting point (eg the number '4' or your own special cue mark) on the leader. If there is no numbered leader, measure off 24 frames of leader for every second of countdown you want to have. You can cut and keep a strip of light ply or vinyl and keep it handy for this purpose.

Make sure the projector motor switch is set at 'Off' and that when the motor is switched on the projector will run forwards. On most projectors the controls are clearly marked.

2. Threading starts at the lamp aperture.

Note: Setting the leader with the number 8 over the aperture is traditional ('8 in the gate') in commercial cinema, where cue dots signal reel changes. Since the adoption of single reel systems, cue dots are now rarely used. For 16 mm screenings, where seamless changeovers are highly desirable but not critical, a shorter countdown is adequate. If you want to execute changeovers you will need some sort of system (see *Changeovers* below). You can't always rely on numbers or cue dots, because the leaders on most 16 mm films are missing so many frames they have lost all practical value. It is better to have a method you can easily adopt and rely on for all screenings.

You can set your standard countdown by having a strip of material, such as light ply, cut to the length you want your countdown leader to be. For each second of countdown allow 24 frames. For example, if you want a countdown of three seconds (72 frames) make your countdown marker that length. Before threading simply lay your marker along the leader with one end on the film's first image frame and the other along the leader. This end marks the point at which the leader is set in front of the aperture during threading.

Hold the film at the cue point and draw film down off both reels until it touches the bench or projector stand. You now have enough slack to start threading. Open the gate by swinging open the lens bracket.

Some lenses have latches that must be released before they will swing open. Open the shoes on both the feed and take-up sprockets. Open any pressure rollers.

> Note: The feed sprocket is likely to be the one closest to the top of the gate. To find out, use the inching wheel to run the projector forwards. While this is happening, note the rotational direction of the sprockets. The sprocket that is turning towards the top of the gate is the feed sprocket.

Hold the leader loosely in the gate so that the cue point sits in front of the lamp aperture. Working from the gate towards the feed reel, set the top loop, position the leader in the feed sprocket with the teeth sitting in the perforations and close the sprocket shoe. Test the leader's setting in the sprocket by gently tugging the leader left and then right, or vice versa. If it is set properly you will feel the leader move slightly then stop when it encounters the sprocket teeth. If there is no slack the sprocket teeth may be pressing against the film, rather than sitting in the perforations. Release the shoe and draw the film one way or the other until you feel it click into place.

> Note: If the film is set in the sprocket correctly, but you can't feel any slack, the shoe clearance may need to be reset. Check the recommended clearance (see *Part 5*), and if you can, adjust it. If a technical reference is unavailable, the general rule of thumb for shoe clearances is two film thicknesses.

> Tip: With your projector it may be easier to start threading at the feed sprocket, setting the top loop then positioning the film in the gate, with your cue point in front of the lamp aperture. You'll soon work it out. Whichever way you do it, this part of threading is the key to getting the rest of it right.

Most projectors have some sort of guide printed or embossed on them to indicate the loop sizes. If your projector doesn't provide guides, follow the following general principles.

The top loop can be almost any size, because its only function is to provide enough slack film for the claw to pull down without retarding the forward progress of the film. A rough guide is to set the top loop so the film enters the gate vertically, without any curve on it at point of entry. If the top loop is too small the film will rub on the top of the gate. If it is too big it will flap and flutter, adding to the general noise level and probably not doing the film much good.

Make sure the leader is sitting correctly in the gate before closing it. Test the setting by gently sliding the leader up and down a few millimeters. The leader should slide freely unless it engages the claw. If the claw is exposed it will catch the perforations and stop further movement. When you close the gate, make sure you hear and feel it locking into position.

> Tip: After you have set the film in the gate, check if there are any splices or perforation repairs anywhere between the top loop and the feed reel. It is a good idea to set them forward of the gate, to reduce the possibility of problems at startup. You will then have to adjust your countdown.

The bottom loop must be set more precisely than the top loop. Its size is important in synchronizing image and sound, as the exciter lamp must strike the soundtrack exactly 26 frames ahead of the lamp aperture, give or take three frames. If the bottom loop is too large the sound will be out of sync, which is very distracting during dialogue scenes. If it is too small, the projector will protest loudly in the form of 'chatter'. Most projectors have automatic loop restorers that will make the necessary adjustment.

> Tip: If your projector doesn't have an automatic loop restorer, or if it isn't working, you might be able to restore the bottom loop by flicking the film down with a pencil. Some projectionists insist you can flick the moving film with a finger. You can pick them by their short index fingers.

After setting the bottom loop, thread the leader under any pinch rollers and over the sound drum. Ensure the pinch rollers are closed. They ensure the film travels over the sound drum at a constant speed.

From here it is on to the take up sprocket, which will have a spring loaded shoe, like the feed sprocket. Again, test the film is correctly located in the sprocket by moving it slightly one way then the other. Then make sure the film passes under the tension (or snubber) roller that absorbs sudden jerks from the take up reel, especially at startup, before it finishes up on the take up reel. Check the film is lying inside all guides, rollers and sprockets. Your user handbook will have a threading chart you can check your work against. After a bit of practice you will develop a feel for how the leader should lie in the gate and sprockets, and for the correct size of the loops.

Test your threading by rotating the inching wheel forwards. If all is well, the sprockets will turn, the film will advance smoothly and the take up reel will rotate clockwise. If the film doesn't move immediately, don't worry; just keep rotating the inching wheel until things start moving as they should. If they aren't moving after a few seconds, you might have a problem. Check the threading. Test again. If it doesn't work this time, open everything up and thread again from the beginning (See also *Troubleshooting, Threading* below).

Slot loading projectors

In slot loaders the film is slipped into a slot that runs along the side of the machine. All you have to do then is turn the motor on, after which mysterious things happen and the film is automatically positioned where it is supposed to be in the film path and you are ready to start your show. In the heyday of 16mm film slot loaders were very popular. They are easy to use and when they work well they make life very easy for projectionists. But when things go wrong slot loaders can be the stuff nightmares are made of. If the slot loading mechanism decides not to participate and you have to thread manually it can be a real test of your ingenuity and patience. Some slot loaders also have the undesirable habit of starting the motor and lamp simultaneously.

Automatic threading

In fully automatic threading projectors retracting guides are placed at strategic points along the film path and a special take up reel is fitted on the take up arm. After the auto-load mechanism is set the motor is started, the film is fed in and directed by the guides along the film path until it is picked up and loaded by the special take up reel. The mechanism automatically releases when threading is completed. The main problem with fully automatic threading is the special reel, which has to be retrieved for re-use.

These machines can be threaded without the special take up reel by setting the auto-load, turning the motor on and feeding the film into the start of the film path. After sufficient leader has emerged at the other end of the film path the motor is turned off and a tug on the film or the tension roller retracts the guides. The leader is then attached normally to an ordinary take up reel.

When it works, automatic threading is very convenient. But, as with slot loading there is a lot to go wrong and it doesn't save much time or add anything to the challenges or pleasure of projecting. When it goes off the rails it can damage film, especially where the mechanism is concealed and the projectionist cannot see what is happening in time to shut down quickly.

When threading automatically the following procedures are mandatory:

1. Trim the leader. All projectors with automatic threading function have trimmers built into them.

2. Activate the threading mechanism that sets the guides in position. This is generally done by pressing a lever or button that is clearly marked. After it is activated, the mechanism locks in place

until it is released. If you forget to set the guides, and if your projector doesn't make provision for your forgetfulness, the film can be damaged because it has nowhere to go after it enters the projector. At the very least it will be creased, which won't improve its chances of loading automatically at the next attempt.

3. When the guides are set in place switch the motor on. Insert the end of the leader at the start of the film path until it is drawn into the machine. If all is well, the film will be guided along the film path and emerge ready to load on the take up reel. Allow a couple of metres to emerge before switching off the motor.

4. Tug on the film or tension roller to release the automatic threading mechanism. This will cause the guides to retract away from the film path. If you forget to retract the guides the film can be impeded and damaged and if the claw doesn't engage the perforations the audience will see only a blur on screen.

If the film does not automatically thread properly, stop the projector immediately. With some projectors it is easy to release the guides, open whatever needs to be opened and retrieve the leader. You can then search for and fix the problem. Possible causes include: incorrectly trimmed leader; adhesive on the leader; badly damaged leader; the guides have not been properly set; the film path is obstructed by accumulated dirt and the gate is not properly closed. This list is not exhaustive.

Theoretically, any automatic threading problem can be fixed, after which you can start all over again. However, by the time you finish you could have threaded the projector manually and be well into your screening. On some projectors manual threading is made unnecessarily difficult by the machine design, which requires panels or other parts to be removed before you can access the film path.

Section 4: Final preparation before screening

Power up

Plug into the wall socket and switch power on. Switch on power at the projector. Most projectors have a pilot lamp that signals when power is available to the projector.

Sound

Test the exciter lamp by switching the sound on but keeping the volume level down. If the exciter lamp doesn't light, turn the power off and replace the lamp. Test again. When you switch on the exciter lamp there will probably be a short, sharp 'bip' from the speaker. You can test the system further by raising the volume until you hear a low hum.

For startup, set the projector treble control at about three quarters, and the bass at about one quarter. You will monitor these levels during the screening.

Check everything at least once

Power on; reels secure, keepers closed, threading and loops correct, exciter lamp lit; volume down.

Now check the projector is ready by rotating the inching wheel. Everything should move together. Sprockets should rotate, the film should move forward and the take up reel should start taking up film. Note the film is engaged on the sprockets, that the top and bottom loops are forming and reforming and that the film is confined by any guides. If the film is not moving, or if it slips out of the film path, something is wrong. Fix the problem then test again, using the inching wheel.

Note: On most projectors a lockout prevents power going to the projector lamp unless the motor is running. So there is no way of knowing if the projector lamp is working or not until your screening has commenced. You can work around this, at least partly, by delaying the house lights fade to blackout until a few seconds after you have started screening. If the lamp blows soon after startup you can stop the projector and replace the lamp without causing serious interruption to the program.

Section 5: Screening

Startup

At startup the following steps occur in sequence very quickly

1. Turn on the motor. If your projector is fitted with a clutch, engage it after you turn the motor on. The film is now running.

2. Countdown according to your predetermined setting.

3. At ‘zero’ turn on the lamp. There is now picture on screen.

4. Turn up the volume to a level you know will be adequate until you fine tune it.

5. Focus. If there are titles or captions on screen, it is easy to obtain good focus quickly. If not, concentrate on getting the image at the centre of the screen in focus.

The next three steps follow immediately.

6. Check that the screen image is centred. If the image is too low or high, adjust its position using the tilting device at the front of the projector. If the image is off centre, gently lift the front or rear of the projector and move it sideways until the centre of the image is in the centre of the screen. You may have to do this in several small increments until the image is right.

7. Check that the image does not contain any frame lines. Adjust as necessary using the framing knob or lever (check your handbook, or see *Part 4*).

8. Go to the rear of the audience and monitor the clarity and volume of the sound. Listen carefully to a few lines of dialogue and adjust the volume, treble and bass controls until you are satisfied. It may take several adjustments.

> Tip: Mark the final volume setting on a piece of masking tape stuck next to the volume control knob so you can return to it easily if needed.

The following procedures continue throughout the screening:

9. Continue to monitor focus, frame and volume.

10. Monitor the projector and reels from time to time. Check they are winding correctly and not grabbing the film. Especially check the take up reel for even wind.

During the screening be prepared for sudden events. For example:

(a) Loud chatter can indicate the projector is having trouble maintaining the loops. Be ready to shut down and reset the loops. You may have to quickly unthread and inspect the print for eg perforation damage or old repairs that run back into the feed reel. Before you rethread you will

have to decide whether to skip some footage and lose continuity or risk further interruptions.

(b) When a drive belt breaks on a belt driven projector, the film will stop moving but the lamp will keep burning at high temperature, very close to the film. Some loss of film is inevitable, but you can limit the damage to a single frame if you are alert and shut down quickly.

(c) When a lamp or exciter lamp blows you lose picture or sound. Fortunately neither happens very often, and when it does it is mostly at startup. In either event, shut down and replace the lamp. This won't delay proceedings for more than a minute or so. Never touch any part of a replacement lamp with your fingers. Always use a cotton glove or a soft cloth.

Changeovers

One of the more interesting challenges attached to being a projectionist is running a film on two projectors and switching from one reel to the next so seamlessly the audience doesn't notice the changeover.

This was standard practice in commercial cinemas until the introduction of systems that run a large single spool or platter through one projector. Very few cinemas still run two-projector systems, and they are a highly endangered species.

The traditional key to seamless changeovers are cue dots, which are small circles in the upper right corner of the screen image. Each dot is printed on 4 consecutive frames (a total of one sixth of a second) so if you blink and miss the first cue dot it's all guesswork after that. When the first cue dot appears on the screen, the projectionist knows he has eight seconds until the next cue dot appears. When the second dot appears the changeover is executed.

Achieving smooth changeovers takes practice. You have to know your equipment well and you need to become so familiar with the steps involved you can perform them quickly without thinking.

For changeovers to work smoothly both projectors have to be matched beforehand. That is, their frame and focus are identical, and their volume levels are the same, even if their individual settings are different. It is best to set them up using a small reel of test film you keep especially for the purpose, so you are familiar with its appearance on screen and its volume level. Run the test reel on both projectors until you are satisfied with your set up.

Briefly, the cue dot changeover procedure is:

1. While reel 1 is running on projector 1, thread reel 2 on projector 2. Make sure its leader is set in the gate at 8 seconds (Number '8', or 192 frames) from the first image frame. Switch on the exciter lamp on projector 2, but keep the volume level very low. (To switch sound from one projector to the other you will need a gadget that allows you to switch sound from either of two sources into a single line. These items are readily available at specialist audio stores.)

2. When the first cue dot appears, start counting and simultaneously start the motor of projector 2. This starts reel 2 running.

3. When you reach the count of '7' the second cue dot will appear or be very close and the first image frame on reel 2 will be about one second away from passing in front of the lamp aperture. The instant the second dot appears several things have to happen in close sequence:

    (a) Switch on the lamp in projector 2. This gets the new picture on screen. At the same moment switch off the lamp in projector 1. This takes out the old picture. The changeover

will often be helped by a fade to black that is edited into the print to coincide with the end of the reel.

(b) Switch sound from projector 1 to projector 2.

(c) Raise the volume to its preset level.

(d) Shut down projector 1.

Without pausing, check focus and frame, and make necessary adjustments. Then go to the back of the audience and check the sound and volume level. Make necessary adjustments.

With practice you can perform the first four of these functions (a, b, c and d) within 2 seconds and have time left over. The tail of reel 1 should be still on its feed reel.

When you are happy that everything is running normally you can unthread the tail of reel 1, wind it on, unload the reel, tape it down and replace the reel in its can, ready to be rewound or returned.

However, in the real world . . .
In practice the value of cue dots on 16 mm film is at best questionable, as many films and leaders have been cut and spliced so often they are completely unreliable. If you really want to use cue dots you will have to run each reel through on the rewind bench to check they are where they are supposed to be. If they are not, you will need to either mark the non-emulsion side of the film with a chinagraph pencil at the right places or use an alternative system. If you use a pencil, make sure the marks are removed before the film is returned to the supplier.

Note: In the past, projectionists sometimes scratched their own cue dots in the emulsion. On a list of things not to do, this is right at the top, up there with never reversing a loaded projector.

It is easy to devise a system that doesn't rely on cue dots at all. It's not as precise, and it takes a bit of time to set up, but it works. Wind reel 1 through on the rewind bench until you get to its final scene. Measure back a few seconds and examine the image until you spot a point you will recognize when it comes up on screen. Then measure the seconds (say, 6) between your cue point and the end of the reel. Make a note of your visual cue and its timing. Do this for all reels except the last reel.

For the purpose of the exercise, position projector 1 on the left and projector 2 on the right. When you are screening the film and reel 1 is running, load projector 2 and thread it so that 5 seconds (120 frames), which is one second shorter than your cue, separate the first image from the lamp aperture. Five seconds is now your countdown. (Allow one second in which to see your cue and to act on it. If your cue is at 8 seconds, your countdown is 7 seconds, and so on.) Turn on the exciter lamp and turn the volume up to the level that you established during your set up.

The changeover procedure now is:

1. When your cue appears on projector 1 start counting and simultaneously start the motor on projector 2. Place your right hand on the lamp control and keep it there. Place your left hand on the lamp control of projector 1.

2. Keep counting. On '5' turn on the lamp in projector 2 and turn off the lamp in projector 1.

3. With your right hand switch sound from projector 1 to projector 2.

4. With your left hand switch off the motor in projector 1. (Running the motor and the attached cooling fan for a few seconds after the lamp is switched off helps avoid sudden overheating in the lamp, which in turn helps increase lamp life.)

When you have completed these four steps the picture will be on screen and sound will be coming out of the speakers. The image and sound may not be perfect but you can fix them very quickly. Just run through the same steps you followed after startup.

Without any delay:

5. Check focus first, then frame and volume, and adjust as necessary.

While this method has little of the romance attached to the traditional cue dot system it is uncomplicated and actually works. Like all methods, it needs to be practiced. Some projectionists use mechanical blinds, slides and shutters to shift the image between projectors while they concentrate on switching the sound. These devices certainly make the job easier, but they aren't absolutely necessary.

A refinement in all changeovers is to turn down the volume before switching the sound, then turning it up after switching. While this cuts out telltale speaker noises it is not critical. But it is a nice touch and can be perfected with practice.

The End
With older films, when *The End* has faded to black on screen, or after the credits have finished rolling, switch the lamp off immediately and bring the house lights up. If you have been screening a contemporary film bring the house lights up while the credits are still rolling, as they can take several minutes to run all the way through. Wait until the end of the credits before shutting down the sound and starting any house music.

Let the motor run for a few seconds after switching the lamp off, but switch it off while the tail is still on the feed reel. If you allow the tail to be pulled through the projector, the last couple of centimeters, which are kinked because they were tucked into the core of the feed reel, tend to grab the sprocket teeth, tearing the perforations. This is especially likely to happen if the tail is old. Leaving the tail on the reel simply means you have to unthread and wind the tail on to the take up reel by hand, a process that takes perhaps 20 seconds on a bad day. Some projectors discourage this procedure by making manually unthreading very awkward and time consuming. In these instances, you don't really have any choice but to let the tail wind all the way through, and take your chances.

Section 6: After the show

Rewinding
Film libraries generally prefer to rewind their prints after they are returned, so they have to wind them only once while inspecting them. If the print you have just screened has to be returned, tape down the tail and replace it in its can ready to be sent off.

If you need to rewind a film use a rewind bench. Most projectors have a rewind function, but there's nothing like doing the job by hand. It doesn't take very long and you can vary the speed and tension to make sure of a good wind every time. More importantly, if you want to examine a print for problem spots, or fix a bad splice, it's a lot easier to find the place, stop, do the job and start again using a hand winder on a bench.

A good wind produces a reel of film that looks flat and even, without any sagging when you hold the loaded reel vertically. When you run your finger over the edge surface it feels smooth. The tension is firm but allows slight movement. Keep experimenting until you can do a good job every time.

Rewind procedure:

Load the feed reel on the left spindle so the film comes off the top of the reel clockwise. Attach the red tail to the take up reel on the right spindle so that it winds on at the top clockwise. The perforations will be on the far side of the film. Secure and finger tighten the nut on the take up spindle.

Start the wind slowly and build up to a moderate speed. You can control the speed and tension by holding a cloth pad over the centre of the feed reel and spindle and pressing gently against it. As the take up reel fills your winding speed will slow down. By the time you finish a 2200' reel the feed reel is really whizzing around while the take up reel is barely moving.

Don't stop in the middle of a wind unless you need to examine the print. If you have to stop, gently increase pressure on your cloth pad at the centre of the reel, not on its rims. Don't use reels that are bent and kinked. Apart from making it difficult to get good winds they can damage film. New reels don't cost much.

Repacking the film

Each reel should be packed in its can immediately it comes off the projector. When all the cans are back in their case, pack empty spaces with bubble wrap or a similar packing material to make sure they can't bounce around.

Before closing the case, complete your report and enclose it with the cans.

After you have closed and fastened the case, wrap adhesive or masking tape around the ends of the loose cloth tapes that secure the case to prevent their flapping around while in transit.

Section 7: On the bench

Splicing

Film splicing used to be an arcane craft involving overlapping leading edges, complicated mechanical devices, emulsion scrapers, mysterious fluids and other things best forgotten. Today, thanks to tape, splicing is easy. Simply make sure your splicer is in good working order, that the blades are sharp and the perforation punches are clean. Check the leading edges to be joined are cut square and in the right place (not part way through a frame), and that they are clean, so the tape will stick properly. Match the sides to make sure the perforations are all on the same side and that emulsion is joining emulsion, butt them together on the splicer and apply tape. Make sure there is no gap between the leading edges. Give the tape a good rub to flatten it completely, trim the tape using the spring loaded splicer blade (which also punches perforations in the tape), turn the film over and do the other side. After you've finished, inspect your work very carefully. When you bend the film, a good splice will curve with the film, but a poor one will collapse. If there are any wrinkles, bubbles, or overlaps, or if you just don't like the look of it, do it again.

If you need to repair an old splice, always strip the old tape off first and inspect the leading edges. Don't simply cut out a few frames to save time and don't ever just cut the tape and leave it there. If the leading edges and their frames are in good condition use them for the new splice, making sure any old tape and adhesive are removed first.

Using the wrong tape can cause real problems. Don't use ordinary adhesive tape to make a splice. It is not the right thickness, it dries out, becomes brittle and detaches from the film within a few months. Worse, its adhesive is unstable and over time will spread to adjoining layers of film on the reel, creating sticky patches that will arrest the film's progress during screening, causing serious damage to perforations, lots of consequent screening problems and inevitable loss of some frames. Don't do it.

Making up and breaking down

In commercial cinemas most prints are delivered on cores, which have replaced reels. Before the print can be screened all the cores have to be combined into one continuous length of film that will go through a projector without stopping. This process is called 'making up'. After the film's season is finished, the print has to be sent back to the distributor the way it arrived. So it has to be 'broken down' to its original component cores.

Unless you are equipped with a single reel system, it is unlikely you will ever need to make up or break down a 16 mm feature. However, you may need to combine several short films on a single reel for a special event.

Making up:

1. Sort the films into the screening order, and for the purpose of the exercise call them #1, #2 and #3.

2. Start with #3. If it is head out, rewind it so that the tail is out.

3. Select a reel that is large enough to hold all three reels of film.

4. Wind #3 on to the large reel, tail first.

5. Undo the splice joining the leader to the first image frame. Remove any adhesive still on the film. Some people recommend cutting at the first frame, so when you want to rejoin the film to the leader it's easy to make certain you have the right bits the right way around. This is not recommended, as it creates two splices very close together. Clearly marking the discarded leader takes only a few seconds, and matching film and leader really doesn't take any longer.

6. Roll the leader around a couple of fingers and tape the end of the roll down with masking tape. Using a felt tip pen, write '#3 Head' on the masking tape, and put the rolled leader in its can.

7. Make sure the tail of #2 is out, if necessary by rewinding.

8. Remove the splice between tail and final image, roll, tape, mark and put in its can, as above.

9. Splice the final image frame of #2 to the first image frame of # 3. Check the splice is satisfactory.

10. Wind #2 on to the large reel.

11. Remove the splice joining the leader and the first image frame of #2, roll, tape, mark and put in its can.

12. Repeat the process for #1, leaving the leader in place. Your made up reel is ready to roll.

Note: If you want to create a short break between films, so that the audience can have a think about one film before going to the next, splice in a few seconds of black.

When you are breaking down the composite reel everything happens in reverse order:

1. Put the large reel on the feed (left) spindle of your rewind bench.

2. The first piece of film to come off the large reel will be the tail of #3. Wind #3 on to its original reel, tail first.

3. Undo the splice joining #3 and #2.

4. Splice the #3 leader (make sure you have the right leader) to its film.

5. Wind the leader on, tape the end down and return the film to its can.

6. Splice the tail of #2 to its film.

7. Wind the film on to its original reel.

8. Undo the splice joining #2 and #1.

9. Splice the #2 leader to its film.

10. Wind the leader on, tape the end down and return the film to its can.

11. Repeat the process for #1.

Unless you are methodical it is very easy to get loose leaders and tails mixed up. Always keep them rolled, taped, marked and in their correct cans until you need them again. And always identify leaders and tails before you re-attach them to their films.