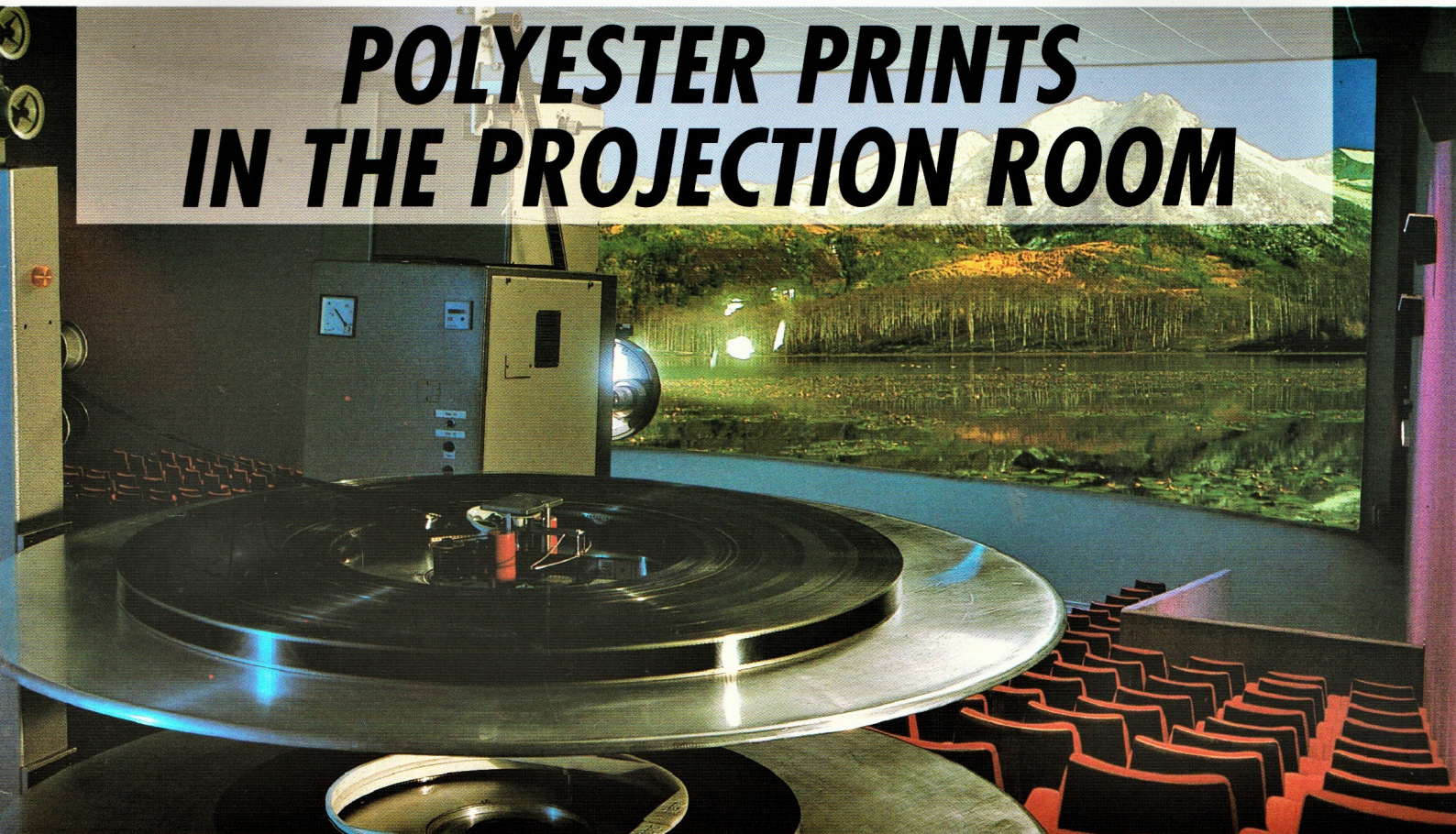
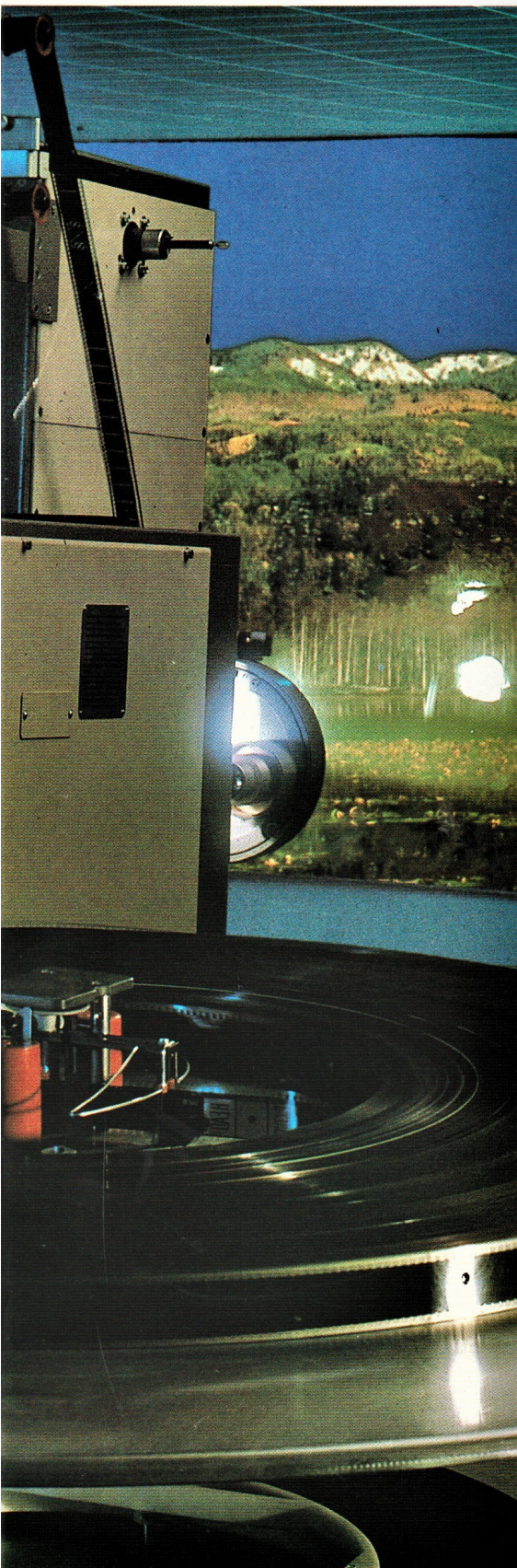


PRACTICAL RECOMMENDATIONS FOR THE USE OF

POLYESTER PRINTS IN THE PROJECTION ROOM





Polyester prints : optimum screen quality throughout the print run

As awareness of the advantages of polyester film base increases and the benefits are acknowledged, exhibitors are gradually seeing more and more release prints on polyester in their projection rooms. Polyester base film ensures optimum screen quality throughout the useful life of a print and enhances the cinema experience for the audience.

The advantages of polyester are a result of its mechanical strength, dimensional stability and chemical structure which make it highly resistant to the wear and tear of the projection room. Polyester film runs smoother and quieter through projection equipment. Perforations are never damaged and jamming is reduced to a minimum. Images are brighter and cleaner and picture steadiness is excellent. Annoying film breaks are a thing of the past and prints are in pristine condition at the end of a run.

Polyester is the film base of the future, offering guaranteed shelf life, extended projection time per reel diameter and reduced shipping costs. It also meets the ecological concerns of the industry as it can be manufactured and recycled without the use of hazardous organic solvents.

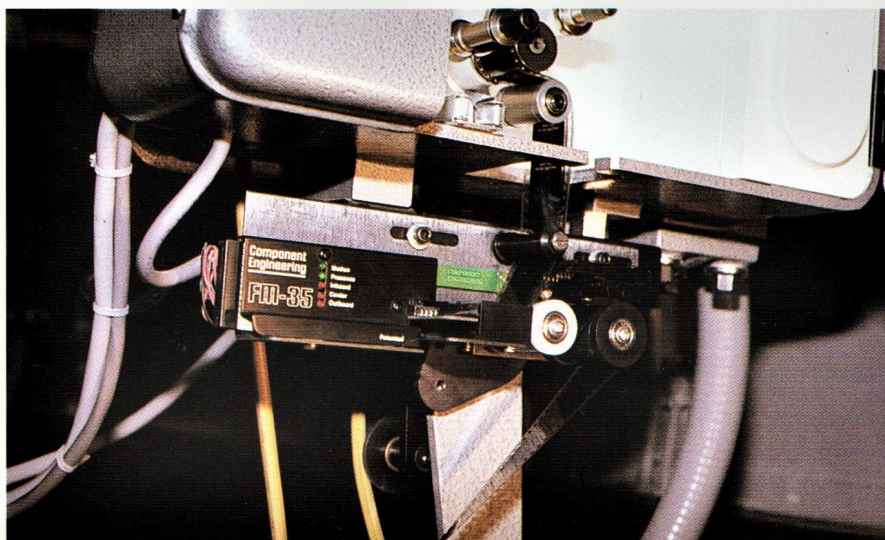
This publication is intended to familiarize you with this relatively new film base for release prints. Surveys in several countries and the experience of our own field engineers revealed that the majority of operators encountered no difficulties adapting to polyester prints. On the contrary, many confirmed that polyester performed exceptionally - as expected. However, we have identified a number of differences in handling polyester film as experienced by operators who are not familiar with polyester and propose practical recommendations.

DISTINCTIVE FEATURES OF POLYESTER

In comparison with the traditional triacetate film, three major differences in the physical characteristics of polyester base film contribute to inconveniences which may occur when screening polyester prints. These differences are described below together with simple general solutions to avoid possible problems. Many of the devices mentioned are standard on the latest projection systems. If the proposed devices are not installed on your system, they can be purchased from specialized suppliers.

Mechanical strength

The break strength of polyester is significantly higher than that of triacetate. This is a major advantage with respect to the presentation quality of a print but it may be the cause of inconveniences if film tension is not controlled sufficiently.



Projector fail-safe device

Proper maintenance of your equipment will keep the projection system in good working order and will prevent most of the potential problems.

In addition, the use of adequate fail-safe switches which stop the projector and feed system when film tension becomes too high, are recommended. These devices should be installed at various locations along the entire film path.

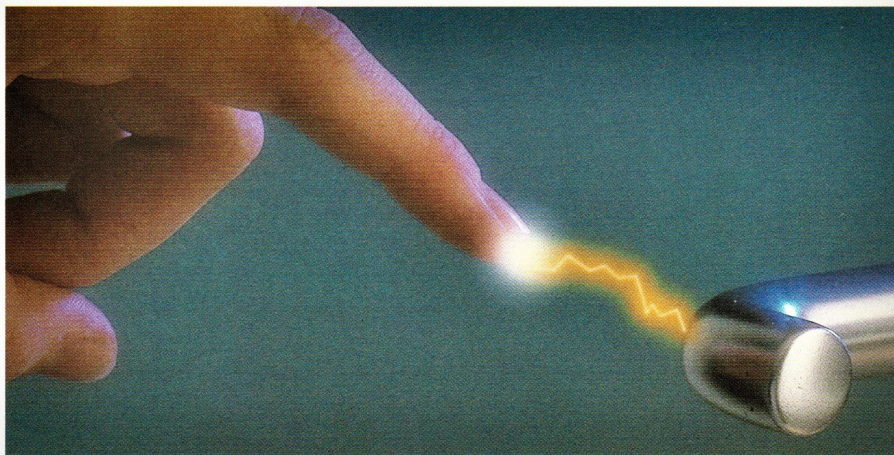
Flexibility

Physical properties of polyester, such as its stiffness and friction characteristics, and the fact that polyester base film is 5 % thinner than triacetate make polyester film appear more flexible than triacetate.

If equipment is properly maintained there is no cause for concern. However, slight adjustments to equipment may be carried out to optimize film transport and avoid possible film-feed problems.

Static electricity

Static electricity (see inset) is also experienced with triacetate but is more critical in the case of polyester. It is the result of an accumulation of electrical charges on the surface of the print film which is a non-conducting material.



Static electricity

In their normal condition, all materials contain equal amounts of negative and positive electrons. If two objects of certain dissimilar materials are rubbed together and then drawn apart, electrons are transferred between the materials and ions are formed : positive ions which have lost electrons and negative ions which have gained electrons. These electric charges are static electricity.

Static electricity can be generated between all kinds of materials but occurs in particular with non-conductive materials which are subject to friction and especially when the atmosphere of the work environment is dry.

In the case of motion picture film, static electricity may build up if it cannot be discharged via the grounding of the projection equipment.

The occurrence of static electricity is often unpredictable. Static varies according to temperature and humidity, the degree of friction and the type of materials involved.

An unusual and equally unpredictable phenomenon is the fact that the polarity (positive or negative) on a single roll of film may vary during screening. This frequently results in static attraction : the windings have a static charge of opposite polarity and tend to "stick" to each other, hindering the

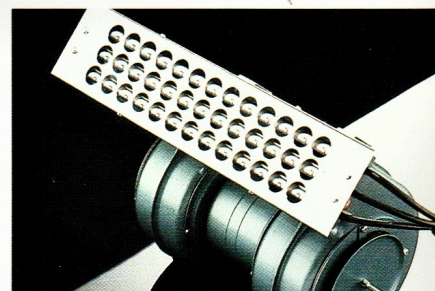
smooth flow of the film on the platters and through projectors. This phenomenon also causes the film to attract dust.

Repulsion, the opposite phenomenon which is caused by static charges of the same polarity, can be equally annoying and hinders the smooth flow of film.

To eliminate static electricity on the film surface, we recommend the following devices and procedures.

Ionizing air blowers

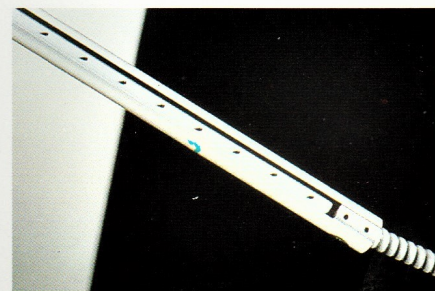
These air blowers produce ionized air which neutralizes static electricity on film. They should be installed along the film path in such a manner that they blow ionized air towards the film.



Ionizing air blower

Anti-static bars

The bars have the same neutralizing effect as air blowers but can be installed at selected positions along the film path.

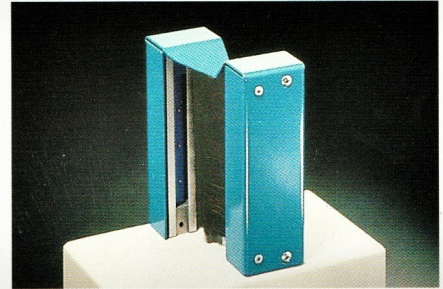


Anti-static bar

Film-cleaning brushes

These devices combine ultra-fine brushes to remove dirt and dust together with anti-static bars or air-blowers to neutralize static charges on the film.

Many of these devices are 'mobile' and can be placed temporarily.



Film-cleaning brushes

Grounding

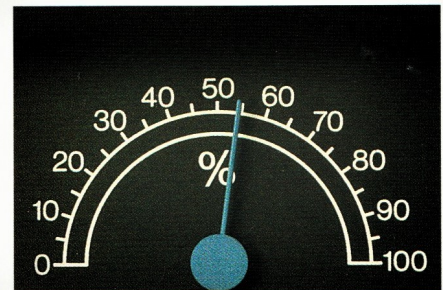
- Ground the whole projection installation by means of a proper grounding system with high conductivity ground connectors and large contact surfaces connected to a single point.

- Use anti-static floor tiles with carbon fibres which are connected to the ground.

Humidity control

Low humidity levels are the most important cause of static electricity. Humidity should be kept between 50 and 60 % by means of a humidifier in the room or incorporated in the air conditioning system. It is advisable to use industrial humidifiers which do not emit any minerals, i.e. humidifiers with a steam output between 1 and 3 litres/ hour.

Although most projection rooms are fairly small (between 30 to 40 m³), household humidifiers may not be sufficient for this purpose due to the considerable loss caused by air extraction via the lamphouse cooling unit (see table).



The level of humidity in the projection room can easily be monitored using a common hygrometer which can be purchased from most opticians.

Xenon lamp power rating	Volume of extracted air per hour
900 W	100 m ³ /hr.
2500 W	340 m ³ /hr.
7000 W	1000 m ³ /hr.

Air extraction via lamphouse cooling unit may reduce the efficiency of humidifiers

ACHIEVING THE BEST RESULTS WITH POLYESTER

If you are not familiar with polyester prints, you may be confronted with certain inconveniences for which there are adequate solutions. The potential problem areas and corresponding recommendations are listed below.

Malfunctioning of the speed control sensors on platters :

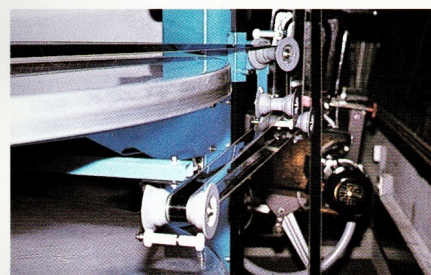
The flexibility of the film base and the "sticking" of film windings (attraction of electro-statically charged windings towards each other), may in some cases cause the speed control sensors to malfunction. This may in turn increase the tension of the windings and cause further deterioration of the sensors.



Correct alignment of the platter is essential

P R O C E D U R E

- Check that the platter is level.
- Check the mobility of the tension arm.
- Check the alignment of guide rollers on the platters
- Make sure the platter stand is grounded properly and eliminate static electricity (humidifier, grounding, ionizing air blowers, anti-static film cleaning brushes).
- Install a fail-safe device to control the tension between the platter and the projector.



Fail-safe devices control film tension

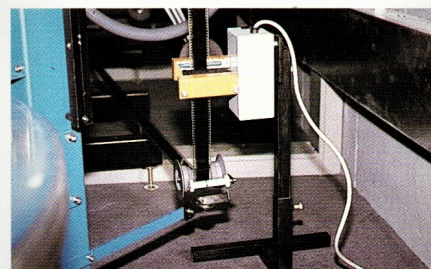
Loose windings on the take-up platter :

The most likely cause is a build-up of static charges on the platter. The same procedure as above should be followed. Remember that once the electro-statically charged film is on the platter it is very difficult to discharge it.

For this reason, we recommend that the devices and techniques mentioned above should be employed to eliminate static electricity along the film path and before the film reaches the platter.

P R O C E D U R E

- Install a static eliminator along the film path, before the platter.
- Install an ionizing air blower and direct towards the platters
- Take necessary precautions to keep static at minimum level.



Static eliminator along the film path

Increased sensitivity to dust :

Maintaining cleanliness in the projection room is obviously as important for polyester prints as for triacetate prints. However, polyester may attract more dust if a static charge is allowed to build-up.

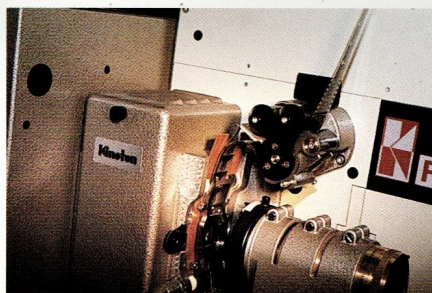
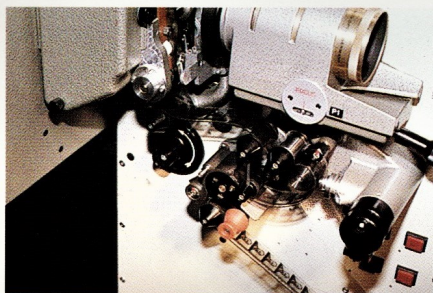
P R O C E D U R E

- Keep the projection room dust-free. Avoid carpets and degradable wall-covering.
- Install efficient air filters in the air-conditioning system.
- Create an overpressure in the projection room (note that air extraction used for cooling units of projector lamp-houses may neutralize this effect).
- Eliminate static electricity (see above-mentioned procedures).
- Keep make-up bins clean.

Deterioration of sprockets and rollers :

There are no indications that polyester base film causes more wear to sprockets and rollers if the tension throughout the film path is normal.

If twisted sprockets and roller shafts do occur, the sprockets and rollers are probably not aligned correctly. The consequences may be more severe with polyester due to its higher mechanical strength.



Fail-safe devices incorporated on recent projection equipment

P R O C E D U R E

- Install mechanical fail-safe devices before and after the projector mechanism to control tension.
- Install micro-switches which stop the projector if the hinging arm is pulled to the extreme position.
- Align sprockets and rollers properly.

Deterioration of the Dolby cells

Poor splices prevent the film from moving smoothly through the lamphouse and cause wear to the Dolby cells. This also occurs with triacetate film but is more critical in the case of polyester film which has greater

mechanical strength. The defect occurs between the Maltese cross sprocket and the lower sprocket. It is not always possible to install a mechanical fail-safe device there due to lack of space.

P R O C E D U R E

- Verify joins which you did not make yourself and avoid thick splices.

Crackling in the sound system

Static electricity discharging in the sound unit may cause crackling in the sound reproduction

P R O C E D U R E

- Mount anti-static brushes or air ionizers before the sound unit.
- Take other anti-static precautions as mentioned above.

Other recommendations

Film lubrication no longer necessary

Polyester film is slightly thinner than triacetate film. It is more flexible and has better friction characteristics. This means that polyester film runs smoother and quieter through projection equipment and does not require any lubricants.

On the contrary, we recommend to avoid the use of lubricants as they may create streaking or even damage the emulsion. In addition, lubricated film is sticky and attracts dust to the film and the equipment.

Focus on polyester

If triacetate and polyester are assembled together on one reel, a slight drift of focus may occur due to the difference in film thickness.

We recommend that you adjust focus for the polyester part rather than for the triacetate part of the reel.

Safety base

Polyester film has low flammability and complies with the international standard specifications for safety film.

There are no special fire hazard requirements for polyester base film.

Beware of excessive humidity

It is well-known that when prints are not properly dried during processing, the windings may tend to stick together and cause serious film transport problems in the projector and in particular when the film is unwound from the feed roll. However, this phenomenon may also occur under certain climatological conditions, i.e. high temperatures and excessive humidity as encountered in tropical regions, and when film rolls are left unprotected on shelves or even in the projector, or when condensation water has been allowed to drop on film rolls.

In the case of triacetate film, this will result in emulsion damage and film breaks. This is also the case with polyester film, however, the consequences may be more severe because polyester will not break as easily as triacetate. For this reason the installation of fail-safe devices as described above is strongly recommended.

PROJECTION CARE CHECK-LIST

- 1** Control and monitor humidity levels in the projection rooms.
- 2** Keep dust levels as low as possible.
- 3** Install static electricity eliminators if they are not provided on your equipment.
- 4** Apply other means to avoid static charges, such as efficient grounding, anti-static floor tiles, etc., if necessary.
- 5** Maintain your equipment on a regular basis.
- 6** Install fail-safe switches along the film path if they are not provided.
- 7** Do not lubricate the film.
- 8** Focus on polyester.
- 9** Avoid excessive humidity.

We would like to thank CST
(Commission Supérieure Technique de l'Image et du Son, Paris - France)
who provided information for this document.

*Photos of projection equipment courtesy of the
Kinopolis-Metropolis Group, Belgium.*

*Photos on page 4 courtesy of SIMCO B.V.,
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NOTICE TO CINEMA-OPERATORS AND PROJECTIONISTS

The print you have now received has been printed on GEVAR polyester base film.

Agfa-Gevaert has prepared this information leaflet to help familiarise yourself with polyester base, which has been widely used as base material for photographic emulsions for nearly twenty years, in a wide variety of applications, but which is relatively new to the motion picture release print industry. However, film laboratories have been familiar with polyester base for at least ten years, where it is used extensively as processing machine leader film and for both archival and library prints. Also intermediate negatives and sound recording films have, for some time now, been on polyester base.

CHARACTERISTICS OF POLYESTER

Dimensional Stability

Dimensional changes caused by humidity and temperature variations of the environment are significantly smaller with polyester base film than with traditional triacetate base film. Also, ageing shrinkage is much lower with polyester base film. This means that owing to this better dimensional stability, film width and perforation pitch are hardly affected by environmental factors or age. As a consequence, polyester base film can be kept running extremely smoothly through all kinds of projection systems, even under adverse climatic circumstances.

Mechanical Strength

The higher mechanical strength of polyester base versus triacetate base will virtually eliminate distortion and breaks. It can bear 40% more stress before a break occurs. Due to its greater tear strength, polyester base film does not tear easily, even in the unlikely event of edge nicks or damaged perforations.

Durability

Polyester base is tougher than triacetate base, making it considerably more resistant to adverse handling, physical damage and abrasion (scratching). Polyester base film also has a greater flexibility and lower friction which will ensure smoother and quieter running through projectors.

OTHER ASPECTS OF POLYESTER BASE USAGE

Film Thickness

The characteristics of polyester base make it possible to manufacture it thinner in order to match some of the physical characteristics of triacetate. This offers a smaller roll diameter and approx. 5% less weight for a given film length or, longer film length on the same roll diameter as a triacetate base film, allowing for longer projection time.

Splicing

Conventional cement splicing is **not** possible with polyester base film. Widespread use of simple and economic tape splicing in theatrical exhibition provides a suitable alternative to splice and assemble prints on polyester base print film.

Film Strength

It is an often heard misunderstanding that polyester base could be so strong that it would endanger your projection equipment. The better dimensional stability, its greater flexibility, the lower friction and the unlikelihood of perforation damage will ensure that well maintained and properly aligned equipment stands no danger whatsoever. This has been proved by billions of feet of polyester base film running through our manufacturing equipment and through film laboratory processors and printers.

Sprocket-wear

Polyester base film does not wear out sprocket teeth any more than triacetate base film. Running billions of feet of both through our own perforators indicated that no more frequent replacements of sprockets were required for polyester base film.

Maintaining Cleanliness

In maintaining excellent screen quality, adequate practices for avoiding abrasion, preventing dirt and maintaining cleanliness are obviously as important for polyester base film as they are for triacetate film.

Polyester base film has a somewhat higher electrostatic load factor which could result in increased dirt attraction. This is usually no problem in older equipment. In the modern so called "Tower" and "Platter" projection systems, in which the film path travels a longer distance in open unprotected areas, the likelihood of more dirt attraction could occur. This is also true for triacetate film. This is the reason why we recommend the installation of electrostatic eliminators on all such equipment regardless of the film base used. For the same reason it is recommended that an adequate humidity level in projection booths is maintained.

Fire hazard data

The flammability of polyester is low. It burns slower than triacetate and has a tendency to extinguish itself as the burning parts melt and drip away from the body of the film roll. The auto-ignition point of polyester is 480 °C (triacetate 430 °C). Below 400 °C no chemical decomposition takes place. Complete combustion of polyester results in the formation of harmless carbon-dioxide (CO₂) and water (H₂O).

Incomplete combustion, as in most fires, results in the formation of smoke, carbon dioxide (CO₂), carbon monoxide (CO) and acetaldehyde as the main harmful components. This is very similar to the decomposition of triacetate where, in addition acetone is formed.

As with all fires involving organic materials and plastics, fire intervention personnel should wear individual protective masks.

Many in our industry feel that a more widespread use of polyester base films for theatrical release-printing would contribute tremendously towards achieving a better screen quality due to its dimensional stability, mechanical strength and durability.

PLEASE ENSURE THIS LEAFLET REMAINS WITH THE PRINT.

