

70MM Service Instructions

NOTE

These instructions are not identical to TAP instructions for other films, so be sure to read and perform all the service required!

TEST FILMS

1. Picture: The enclosed SMPTE film allows you to check focus, jump & weave, matting, and shutter ghosting per the following and the enclosed SMPTE instructions.
2. Sound: Enclosed are two pieces of film for sound: one with Dolby Tone, and one with pink noise.

PICTURE QUALITY

1. Matting: *The Untouchables* was photographed "scope", at 2.35:1 in 35 mm. When blowing up this 35 mm negative to 70 mm, the 2.35:1 aspect ratio of the picture image was maintained. The 70mm frame, normally having an aspect ratio of 2.2:1, will not be filled. Therefore, the laboratory prints black borders above and below the picture image to fill out the conventional 70mm frame area.

This technique allows for the projection of this format with a normal 70mm aperture plate (2.2:1). You should not need to cut new aperture plates, or readjust the masking from its conventional setting for 70mm. The black matte will be visible on the screen so frame the image very carefully allowing an equal area of black to be projected above and below the image.

2. Screen brightness: Check for an optimal level of 16 fL with a minimum of 11 fL measured at the center of the screen from the center seat of the theatre with no film in the projector(s). The distribution of light should be even, with points 10% in from the edges, top, and bottom having 75% of the center brightness. For high gain screens and unusual theater configurations, see SMPTE RP-98. Multiple projectors to be used during changeover shall match at center screen within 2 fL. Change the bulbs and clean the lamphouse as necessary to achieve the standard as closely as possible.
3. Check for flicker which shall not be noticeable on a sample reel. If condition 1 above is met, shutter rate flicker should not be objectionable, so other sources of fluctuation should be examined if variation of brightness with time is observed.
4. Color temperature: Check for $5400^{\circ} \pm 400^{\circ}$ Kelvin. Projectors used during changeover should match within a total range of 400° Kelvin. Xenon lamp sources should match this easily. There is no easy way to check this without a three-color color temperature meter — but you can check by eye that the projectors match reasonably well.
5. Stray light: Check for less than 1% of that measured in 1 above. This can be measured with the projection lens capped for stray light due to sources in the room, and by using the method in

SMPTE PH.22-196-1978 for light from the projection lens illuminating the wrong part of the screen. Make certain that lighting sources such as exit lights, lobby lights when the doors are open, audience lights, and especially sunlight during the day cannot reach the screen.

6. Sharpness: Check that at least 48 horizontal and vertical line pairs/mm of the targets of the 70-PA test film are visible at center, 34 line pairs/mm at the edges. The focus shall not drift with time or temperature.

7. Jump: Check for less than 0.2% (one vertical square equals 1.0% on 70-PA); Weave: Check for less than 0.25% (one horizontal square equals 0.46% on 70-PA).

8. Check for no visible shutter ghost on 70-PA.

9. *Triple check* the film path for scratching film, either picture or sound emulsion. Sound emulsion scratching, due to worn gate bands for example, can ruin an entire \$10,000 print in just a few passes!

SOUND QUALITY

A. A-Chain Alignment

1. Check the film path for magnetized components: include the platter if one, and all metal rollers and parts in close proximity to the film including the path between the platter and projector. With a magnetometer, check for no more than 2 ½ gauss at the film plane anywhere in the path. If you don't have one, run the degaussed film and listen for any build-up of "ticking" or "thumps" indicating magnetized parts. Do this before running your other test films, and demagnetize parts as needed. If you can't reach an acceptably low level of magnetization with the hand demagnetizer, try removing the offending parts and taking them to an automobile generator rebuilding shop for stronger demagnetization.

2. Adjust head mounting for best head contact and track alignment. The 10 kHz test film has been provided to check for head contact problems by listening to the purity of tone (level stability) at 10 kHz on each track in turn.

3. Set azimuth on an XY 'scope using the pink noise test film. Start with tracks 3 and 4, then trim for best azimuth with tracks 1 and 5.

4. Set preamplifier response adjustments for flat output playing the pink noise test film within ± dB from 50 Hz to 12 kHz. *Dolby MPU Preamplifiers may require a modification to reach the time constants which became standardized in April 1986. This is covered by Dolby Field Bulletin No. 149.*

5. Set preamplifier gain for Dolby level playing the 1 kHz Dolby level loop. The loop is a pure 1 kHz tone which can also be used for a flutter test by listening.

Set up the 35 mm optical A-chain following sound system manufacturer procedures in case there is print damage to the 70 mm print and a 35 mm print is substituted at any time during the run.

B. B-Chain Alignment

1. See the section called matting, above. Make certain the main left and right loudspeakers are not obscured by non-acoustically transparent masking.
2. Adjust the Dolby system equipment using the normal method so that a fader setting of 7 produces 85 dBC playing a pink noise generator Cat. 85, and measuring on a slow reading meter for each channel in turn. If the sound system is of another make, it shall be adjusted so the normally used fader setting yields 85 dBC from a pink noise test film for each channel.
3. The room response shall be equalized according to ISO 2969 equivalent to the procedure in the Dolby manual.
4. If the stereo processor is a CP-200, follow these instructions from the installation manual:
 - (a) Move the toggle switch on the Cat. No. 142 Equalizer Filter card to the 'Off' position (down). Select Le on the Pink Noise Generator and adjust the Le trimpot on left Remote Fader card (53) for a sound pressure level of 85 dBC. The shape of the response will depend on the auditorium and speaker characteristics (the accessory unit has provision for adding equalizers in the Le, Re, S, P and Q channels; these equalizers are aligned following the Accessory Unit instructions).
 - (b) Repeat for Re and S channels.
 - (c) Select Le again on the Pink Noise Generator, and move the toggle switch on the Equalizer Filter card Cat. No. 142 (36) to the center or 'On' position, and observe the real time analyzer display of signal in the auditorium. The spectrum should roll off sharply above about 200 Hz. Switch filter in and out by toggle switch to check filter operation, and note the auditorium level with filter out. If the low frequency end of the spectrum is also curtailed, remove Equalizer Filter card and check that the two soldered links are in place. (These links are removed if a separate sub-woofer channel is used.)
 - (d) Set format 04 on an unused preselector, and press 'GO' to switch the Cat. No. 142 into the optical mode.
 - (e) Adjust Optical gain control on Equalizer card to give a level which with the filter in is 4-6 dB above the level with the filter out. This is a rough adjustment and will be trimmed after the other controls are adjusted (Step (m)).
 - (f) Set format 44 on the same preselector, and press 'GO' to switch the Cat. No. 142 into the magnetic mode.
 - (g) Adjust Magnetic gain control on the Equalizer Filter card to give a level 4 to 6 dB above the level with filter switched out. This is a rough adjustment and will be trimmed after the other controls are adjusted (Step (l)).
 - (h) Also on the Equalizer Filter card are three controls affecting the setting of a variable dip equalizer. This "parametric" equalizer is intended to remove the effect of a single, large peak

in the response, often found in large rooms. The controls of a parametric equalizer adjust: 1. the depth of the dip, 2. the frequency of the dip, and 3. the 'Q' (relative sharpness) of the dip.

(i) Adjust the parametric equalizer controls as follows: first set the 'cut' control to minimum and note the frequency of the single, largest peak in the auditorium response.

(j) Set the 'Q' control to minimum, and the 'depth' control to maximum. Adjust the 'frequency' control until the dip is set to the same frequency as the peak resonance.

(k) Alternately adjust the 'cut' and 'Q' controls until a smooth response characteristic is achieved.

(l) Switch the filter in and out, and adjust the Magnetic Gain control until the level with the filter in is 4 to 6 dB above the level with the filter out.

(m) Switch back to format 04; switch filter in and out, and adjust Optical Gain control until the level with the filter in is 4 to 6 dB above the level with the filter out.

(n) Repeat steps (c) - (k) for Right channel; note however, optical and magnetic gain control *should not* be readjusted since a single control is used for both channels. If there is a difference in levels between Le and Re after both the dip filters are adjusted, *small* changes can be made to the Le and Re Output controls.

(o) Move the toggle switch on the Cat. No. 142 Equalizer Filter card to the up or 'Auto' position. Leave it in this (normal) position.

(p) Remove the Pink Noise Generator and replace the switch card Cat. No. 141; use mute control to avoid thumps in auditorium speakers. If P and Q channels are provided in the auditorium, follow the procedure in the CP-200 manual.

There should be no clipping or distortion audible when reproducing the film at the standard fader setting; the film has been mixed very carefully and checked in theaters before audiences. Please make certain there are no rattles, buzzes, scraping voice coils, or the like while reproducing the film at several dB above the normal fader setting. If there are bad drivers, the best procedure is to replace them, or, failing that, to disconnect them and report the facts to TAP.

Thank You Very Much,

THEATRE ALIGNMENT PROGRAM

MINIMUM REQUIREMENTS 70MM SOUND SYSTEM

1. The combination of head(s) and preamplifier(s) must be able to play the encoded characteristic on the film (3180 and 35 microsecond time constants, 185 nW/m reference level) within plus or minus 2 dB from 100 Hz to 10 kHz and within plus or minus 3 dB from 50 Hz to 12.5 kHz on recorded channels 1, 3, 5, and 6. The preamplifier shall not clip at less than +16 dB over 185 nW/m at 1 kHz. The signal-to-noise ratio shall be better than 58 dB below 185 nW/m reference input measured with CCIR weighting and rms detection.
2. Channels 1, 3, 5, and 6 must decode the recorded noise reduction characteristic (Dolby A) within plus or minus 3 dB at any level or frequency from 50 Hz to 10 kHz either statically or dynamically.
3. Channels 2 and 4 must have a low-pass filter of 12 dB/octave at a nominal frequency of 200 Hz.
4. Equalizers must be provided to meet the standards of ISO 2969 (the standard calls for response flat from 50 Hz to 2 kHz, with -3 dB/octave from 2 kHz to 8 kHz, all plus or minus 3 dB). This requirement means that 1/3-octave equalization is required.
5. There must be left, center, and right wide range loudspeakers at the front of the room. There must be provision for playing boom channels, either left extra and right extra loudspeakers, or subwoofer. There must be surround loudspeakers.
6. The combination of power amplifier and loudspeakers must be capable of playing without audible clipping distortion at 105 dB Sound Pressure Level in each octave band from 63 Hz to 1 kHz and at 100 dB Sound Pressure Level from 2 kHz to 8 kHz.
7. The background noise level of the theater is preferably below NC-30. Consult an acoustician as required.

