

Finding Your Own Printer Light

by Richard Crudo, ASC

Among the numerous tests to be performed before starting a project destined for theatrical presentation, perhaps the most valuable one is the test that establishes a single printer light setting to be used in dailies printing. Although not connected to lighting in the literal sense, a direct relation does exist in that a consistent printer light precisely determines how lighting will be rendered on screen, and by extension influences the final release print's texture. The use of a single, predetermined set of numbers takes the guesswork out of the laboratory's dailies printing protocol and places total control of the film's look where it belongs — in the hands of the cinematographer.

Each night, dailies timers scroll an incredible amount of negative through their color analyzers. These tens of thousands of feet are culled from a wide range of productions shot under a variety of circumstances. Very often, their only guidance in determining what information gets sent to the printer is an unintelligible scrawl at the bottom of a camera report — print cool... print warm... day-for-night... dawn effect, and so on. While lab technicians are pretty good at drawing meaning from the indefinable, when using a single printer light setting — arrived at through one's own choosing — the problems caused by relying on vague, highly personal and subjective written or verbal descriptions are eliminated. In addition, working in this manner allows the cinematographer to introduce any amount of variation in color and density to the image in a quantifiable and repeatable way. Whether these changes are effected through filtration used on the lens, gels over the lamps or by ordering a measured shift in the printer light itself is a matter of taste and experience. Then, when a deviation from the norm occurs or a new batch of raw stock brings a shift in the film's look, the anomaly becomes easy to isolate and correct. Assuming the lab's chemistry is up to code, the immediate payoff is day-to-day image consistency on par with the still photographer's vaunted "pre-visualization." For the long term, answer and release printing are a much simpler affair, since making corrections is a matter of fine-tuning rather than a complete rebalancing of the entire film.

Preparations for an Emulsion Test to Establish a Single Printer Light (tungsten)

First, understand that the one-light print enabled by this test is markedly different in concept from what dailies personnel commonly refer to in the same words. Left to its own devices, any lab can deliver a one-light print every day. The difference is that since the dailies timer is making color and density choices on his or her own, the lab's version will inevitably change its R-G-B Hazletine values from negative roll to negative roll or even among different shots and setups within each roll. The printer light that ultimately results from the following procedure is something chosen by the cinematographer, and is meant for use in all situations matching the lighting conditions under which the test is performed. Thus, it is possible — indeed preferable — to shoot an entire feature film on the same printer light. That said, it is also viable to establish printer lights for defined situations, i.e. day/exterior, day/interior, night/exterior, night/interior, etc.

Preliminaries

A. Make sure that camera body and lens tests are already completed and approved.

B. Secure a pair of showcards flat against a wall, end-to-end in a horizontal fashion. The black side of one of the cards should be placed on the left, the white side of the second card on the right.

C. Recruit a model with a representative fleshtone. The term “representative” is somewhat ambiguous in its use here, but that is part of what this test is trying to determine. Avoid extreme complexions or coloring of any kind unless you anticipate dealing with them during principal photography. Also, make sure that your model dresses in neutral shades rather than solid blacks or whites or any heavily saturated colors.

D. Using a lens from your tested, matched production set, compose the shot so that the two showcards completely fill the frame. Place your model directly facing the lens, just slightly in front of the center seam where the two showcards meet. In 1.85 format, a 40mm lens works well at a distance of about eight feet and renders a pleasingly medium close-up of the model.

E. Create a series of individual flash cards that the model will hold within the frame to clearly indicate the exposure information relevant to each take:

| | | | |
|--------|--------|------|--------|
| NORMAL | +1 ½ | -½ | -2 |
| +½ | +2 | -1 | NORMAL |
| +1 | NORMAL | -1 ½ | |

F. In addition to a gray card, the following information should be mounted in a plainly readable fashion somewhere within the frame but not in such a way as to impede sight of the model:

- emulsion type and batch/cut numbers
- ASA/Exposure Index
- lens focal length
- T-stop
- development information (normal, push, pull, ENR, CCE, etc.)
- print stock type
- optional: color temperature of the light source you're using

Lighting

A 2K fresnel is an ideal unit to use with this test. Placed at an angle of about 20 degrees off camera right, make sure the light is evenly spread at full flood across both the model and the two showcards — with no hot spots or dropoff of any kind. From this position, the lamp serves a dual purpose by not only properly illuminating the model but by throwing the model's shadow onto the black-sided showcard that covers the left half of frame. The deep, rich, velvety darkness this provides will serve as an important point of reference when judging the projected print.

Do not use any diffusion on the lamp and do not add any light to the fill side.

ASA/Exposure Index

Since film speed is a relative concept, the best starting point is to rate the negative at the manufacturer's suggested value. Besides providing the information necessary to choose a single printer light for the run of the show, this test will also allow the setting of an effective ASA/EI rating for the manner in which the film is to be exposed.

T-Stop

In the interest of contrast uniformity and the elimination of as many variables as possible, lock the iris ring at a predetermined T-stop and leave it alone for the length of the test. It should rest precisely at or close to the primary setting intended for use across much of the shoot. Measured exposure shifts will be carried out through adjustments in lighting intensity and a combination of neutral-density filters and shutter-angle changes. (*For the purpose of this article, the working stop for the test will be T2.8.*)

Filters

If plans for principal photography include the use of filters in

front of or behind the lens, slip the appropriate grade into the matte box or filter slot before you begin the test.

Laboratory Instructions

The camera report should prominently display the following orders:

Develop — (normal, push, pull, ENR, CCE, etc.)

Print this negative roll two times.

First pass: print on best light for gray card/normal exposure only.

Second pass: correct each take back to normal in $\frac{1}{2}$ stop (4 points each)* increments.

Note well: normal exposures should all print at the same light in all cases!

Do not join these rolls together or to any other roll.

By keeping the two test rolls separate, you will be able to view them in rapid succession without having to deal with any other distracting material.

Basically, the one-light printing of the gray card and normal takes — and thus the timing of the entire first roll — allows the dailies timer a fighting chance at showing his or her interpretation of what will look best onscreen with respect to the lab's processing standards and the conditions set up by the cinematographer. The second uncorrected printing pass insures that you will see the effect over- and underexposure will have on the emulsion in its purest state — without any assistance or augmentation from the lab. Examining both rolls together essentially defines a place from which the lab timer and cinematographer can begin to deviate.

**For purposes of this test, it is given that the laboratory's system is calibrated so that 8 printer points equal one T-stop on the lens.*

Miscellaneous

Beware of ambient light or anything else that might compromise the test's integrity.

Be meticulous with meter readings. If you choose an iris setting of T2.8, your normal exposure should read precisely T2.8 at the model's face. Measuring the increase in light level needed to support the overexposure parts of the test should be handled with equal care.

Do a separate test for each emulsion you plan to use and each lighting condition you plan on encountering.

Be sure the model clearly displays the placards indicating the proper exposure for the take being photographed.

Don't rush.

The Test

First, fill the frame with a gray card. Light it to T2.8 and expose 20 feet at the same value.

Next, recompose to fill the frame with the black and white showcards, featuring the model at the center seam.

Following the notations in each column, expose 30 feet for each step as noted:

(Note that after the first normal exposure the light level increases from T2.8 to T5.6. This is done to facilitate the overexposure takes. The standard iris setting here is T2.8, so before starting the test, simply light the model to T5.6 and then use two double scrims on the 2K Fresnel to knock down the intensity to T2.8 when needed.)

If overexposure is to be carried as far as +3 stops, the basic light level must be increased to T8 to accommodate that portion of the test. Proportional changes should then be made to the scrims and shutter angle/neutral density filter combinations.

| | shutter angle/filter | shooting T-stop | light for |
|--------|----------------------|-----------------|-----------|
| NORMAL | 180 degrees | T2.8 | T2.8 |
| +½ | 135/ND3 | 2.8 | T5.6 |
| +1 | 180/ND3 | 2.8 | 5.6 |
| +1½ | 135 | 2.8 | 5.6 |
| +2 | 180 | 2.8 | 5.6 |
| NORMAL | 180 degrees | T2.8 | T2.8 |
| -½ | 135 | 2.8 | 2.8 |
| -1 | 180/ND3 | 2.8 | 2.8 |
| -1½ | 135/ND3 | 2.8 | 2.8 |
| -2 | 180/ND6 | 2.8 | 2.8 |
| NORMAL | 180 degrees | T2.8 | T2.8 |

The Results

When viewing the projected film, refer to the lab's printer-light notation sheet that corresponds to the test exposures.

You should speak to your lab contact as to what is considered a "normal" printing light for the lab you are using; however, we will assume for this article that a "normal" printer light would read 25 - 25 - 25. Roll One will now obviously play all the way through at light 25 - 25 - 25. Any exposure changes noted on screen will thus be a direct result of what was done at the lens. This pass is especially helpful in gauging color drift as it relates to exposure. It is also a good indicator of the emulsion's ability to hold detail at the noted extremes.

Roll Two is merely a second printing pass of the same negative but with the identical series of exposures corrected back to normal in measured increments by the Hazletine timer. Based on the concept of 25 across being normal, refer to the following boxed chart for the progression of printer lights (assuming a laboratory printing scale of 8 points = 1 stop).

In this instance, the dailies timer has “helped out” by correcting “mistakes” in exposure. The second pass thus provides an idea of how far the emulsion can be stretched before it falls apart. Special attention should be paid to the white and black showcards that make up the background behind the model. Grain, color shift and variation in detail will be most readily apparent in these areas. This

| | |
|-----------|--------------|
| GRAY CARD | 25 - 25 - 25 |
| NORMAL | 25 - 25 - 25 |
| +½ | 29 - 29 - 29 |
| +1 | 33 - 33 - 33 |
| +1 ½ | 37 - 37 - 37 |
| +2 | 41 - 41 - 41 |
| NORMAL | 25 - 25 - 25 |
| -½ | 21 - 21 - 21 |
| -1 | 17 - 17 - 17 |
| -1 ½ | 13 - 13 - 13 |
| -2 | 9 - 9 - 9 |
| NORMAL | 25 - 25 - 25 |

pass can also provide information about contrast. If necessary, it may be requested that the laboratory print “over scale” in order to achieve correction on an overexposure.

Conclusion

Now that the data needed to decide all critical concerns has been revealed, decisions that will directly affect the film’s look can be made in an informed manner. Subjective

judgement once again comes into play, but the difference is that the cinematographer is the one doing the judging.

Usually, the model’s fleshtone will need some tweaking regardless of which test exposure is most pleasing. Let’s say that Eastman 5217 was used at its recommended ASA/EI rating of 200. While viewing results of the corrected Roll Two on screen, it is decided that the grain structure and shadow detail of the take indicating ½ stop overexposure (printed back to normal) looks best. By referencing the lab’s printer light notation sheet, this would render a printer light of 29-29-29 to start and therefore an effective ASA/EI rating of 160. A desire for a different sort of fleshtone might lead the cinematographer to order a small adjustment in the addition of perhaps 1 point red and 2 points yellow. The resulting printer light of 28-29-31 would then be the one to use during principal photography. To verify the effect, it would be advisable to shoot an additional test under identical conditions with the same model, while printing it at these new numbers.

Hereafter, by having the assistant cameraperson stamp 28-29-31 in the camera report's printing instructions box, the cinematographer can be certain of two things. Besides meeting a specific standard that depends solely on the effort put into each shot, such items as silhouette effects will indeed come back from the lab as silhouettes — each and every time. Instead of communicating with such agonizing vagaries as “print for highlights,” this simple set of numbers conveys to the dailies timer exactly what is needed in a way that will stand up in court. This isn't to say, however, that the printer lights are by any means sacrosanct. Over the long haul of shooting a feature, modifications are inevitable.

Ultimately, however, what is most important is that the cinematographer is always the one who chooses how and when to do the modifying.

Among his numerous credits, Richard Crudo, President ASC has photographed the feature films Federal Hill, American Buffalo, American Pie and Down to Earth.

EDITOR'S NOTE: With so many different formats being used today, it is very important while testing to shoot a framing leader for each ground glass, or camera system. That way, your projection, editing system, laboratory, transfer house, optical and CGI effects will all be the same. A mistake or misunderstanding anywhere in the production chain can be very costly or impossible to fix.