

DUPLICATION TRIAL OF SO-212 FILM FOR SKYLAB S-056 EXPERIMENT

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## SECTION I

### SUMMARY

A section of film type SO-212 containing resolution targets was printed onto film type 5302 to produce a second generation master positive. This positive was then printed onto negative duplicating film type 5234. Samples and enlargements from sections of the film are presented. The original film is free of physical defects from this duplicating test.

This Technical Note follows the note titled Film Handling Procedures for Skylab S-056 Experiment dated September 1972. This note on film handling covers the processing of the film from which this duplication trial was made.

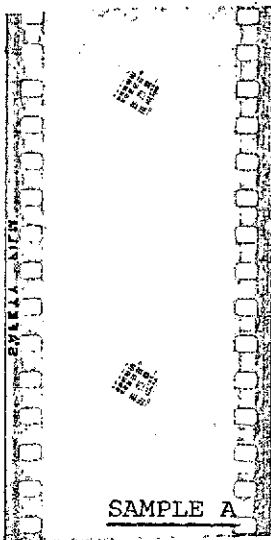
It has been demonstrated that SO-212 film can be duplicated without appreciable harm to the original.

A resolution target from the SO-212 first generation film has been enlarged onto high contrast paper in Figure 2. This particular piece of film has been run through the printer 16 times. This light print where the background is gray instead of black greatly accentuates any surface imperfections on the film. This film has been rather severely handled, even to being part of a printer loop, and yet shows no features to indicate image deterioration due to physical abrasions.

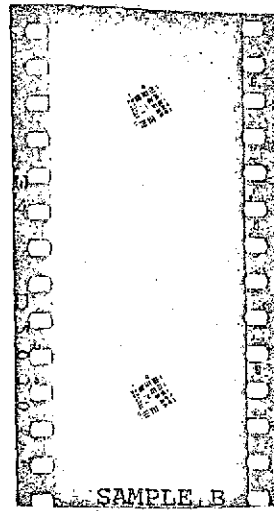
Figure 3 is a print from the same wedge onto film type 5302. This second generation positive had a rather high contrast and was difficult to print on this high contrast paper. Even with a long exposure printing the complete whiteness of the background indicates that little of the "texture" of Figure 2 was copied onto the positive master.

The same resolution target of Figure 2 is printed in Figure 4 from the third generation duplicate negative. This print is also exposed with a longer exposure than Figure 2 so that the resolution target would be more completely printed. Yet, it is evident by comparison of the prints, that some resolution has indeed been lost. We judge this quality of resolution to be about average.

Samples of the first generation original and third generation duplicate negative are enclosed for closer examination. Obviously, other methods of duplication are available, but because of availability of film stock and equipment this procedure was adopted as a first trial. The purpose of these tests was to show that this film could be duplicated without appreciable mechanical harm to the original. This has been accomplished.



Film Type SO-212  
after being printed  
sixteen times.



Film Type 5234  
third generation  
duplicate negative.

There are a number of duplicating options available. Listed below are five possible routes to duplicate negatives. So far only number 1 has been attempted.

DUPLICATION ROUTES FROM FIRST GENERATION ORIGINAL  
NEGATIVE ON FILM TYPE SO-212

	<u>Second Generation Master Positive</u>		<u>Duplicate Negative</u>
1	5302 Fine grain release positive  gamma = 2.0 to 3.2 D-19, Hi-Speed 35mm	→	5234 Fine grain duplicating pan negative  gamma = 0.6 to 0.7 D-19, Hi-Speed 35mm
2	5366 Grain duplicating positive gamma = 1.2 to 1.8 D-19, Hi-Speed 35mm	→	{ a) 5234 for low gamma b) 5366 for medium gamma c) 5302 for high gamma
3	<u>Second generation dupe negative</u>	→	5360 Direct MP Film gamma = 0.8 to 1.8 D-97, Hi-Speed 35mm

ORIGINAL PAGE IS  
OF POOR QUALITY

## SECTION II

### PROCEDURES

Approximately 500 feet of film type SO-212 were exposed to a resolution target in the camera magazine of the S-056 experiment. This exposure was made at the Marshall Spaceflight Center and processing was at the Manned Spacecraft Center. About 50 feet of the film was retained at MSC for duplication tests.

A five-foot section of this film, containing 41 resolution targets, together with two sensitometric strips containing resolution friskets, was made into a printing loop. The loop was printed a total of 16 times onto film type 5302 fine grain release positive using a Bell and Howell 35mm continuous printer. Five of these reproductions were cut off, and the remaining eleven were printed onto film type 5234 fine grain duplicating panchromatic negative to produce a third generation duplicate negative. In tabular form the sequence is as follows:

First generation original	- Film type SO-212	- 1 copy
Second generation master positive	- Film 5302	- 16 copies
Third generation duplicate negative	- Film 5234	- 11 copies

A sensitometric strip from each of these generations was contact printed with a single exposure onto normal contrast enlarging paper. This print is Figure 1. Generations 1 through 3 are from top to bottom respectively. The relative increase in contrast through each generation is evident. Whether this contrast increase is desirable or not is dependent on the information contained in the original negative. With other choices of duplicating film stock, it would be possible to adjust the contrast depending on the requirements.

- Figure 1. Contact print of sensitometric strips. Top, SO-212 original; middle, 5302 master positive; and bottom, 5234 duplicate negative.
- Figure 2. High contrast enlargement of minimum density area of SO-212 original including a resolution target. This sample has been through a printer 16 times.
- Figure 3. High contrast enlargement of maximum density area of 5302 master positive. Same resolution target as Figure 2.
- Figure 4. High contrast enlargement of minimum density area of 5234 duplicate negative. Same resolution target as Figures 2 and 3.