

Duplication Of Cephalometric Roentgenograms And Tracings

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Roentgenograms are indispensable aids in orthodontic diagnosis and constitute an important part of every patient record. The cephalometric roentgenogram in particular has become a source of valuable information both in clinical practice and in research investigations of growth changes in the craniofacial complex.

Original headplate collections constitute a precious and irreplaceable repository of data which practitioners and research workers alike are understandably reluctant to allow out of their possession for even brief periods. This has necessitated considerable duplication of effort, particularly in cephalometric research. A satisfactory method for duplication of the original roentgenograms would facilitate the exchange of cephalometric records, but until recently such procedures have been too time-consuming and expensive. Modern office duplicating techniques appear to offer an inexpensive solution to this problem.

Before investigating the duplicating machines which were commercially available, certain criteria were established, as follows:

1. The technique must be relatively inexpensive, rapid and simple enough to be performed by unskilled personnel.

2. The reproduction must be the same size as that of the original film.
3. Essential landmarks must be clearly visible in the reproduction.
4. The reproduction must be of satisfactory quality to permit tracings to be made easily.

The purpose of this report is to describe (1) a technique for reproducing cephalometric and other roentgenograms, and (2) a separate method for the reproduction of cephalometric tracings.

Roentgenogram Reproduction

Only a few of the available office duplicating machines are capable of copying cephalometric x-rays. The most satisfactory results were obtained using the *Polymicro** machine, and the technique is described in detail. A two step process is required.

Stage 1: The original headplate film is placed in contact with a piece of *Polyclaur* "No. 1 slow" paper and exposed to the white light source of the machine. Exposure time varies with the density and quality of the roentgenogram itself.

The exposed paper is then passed through two solutions (developer and stabilizer) in the apparatus, propelled automatically by two sets of electrically driven rollers. A dry, permanently proc-

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* Manufactured in France. Retail price in the U.S.A. is less than \$200.00. The cost of each print, including required solutions and paper, is about fifteen cents.

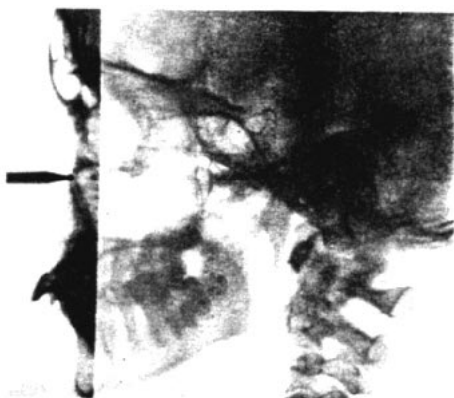


Fig. 1

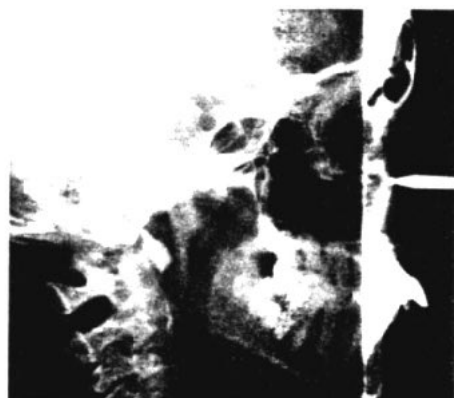


Fig. 2

essed reverse image (master negative) of the headfilm is thus obtained in about thirty seconds (Fig. 1). This master print may be used indefinitely to obtain duplicate images of the original following the procedure outlined in Stage 2.

Stage 2: The intermediate print obtained in Stage 1 is allowed to dry for at least 2 minutes. It is then placed in contact with a piece of *Polyclair* "No. 2 slow" paper and exposed to the white light source. Processing proceeds as described in Stage 1 (Fig. 2). Dark-room conditions are not required for the process. However, direct exposure to daylight or fluorescent light sources must be avoided. Background lighting should be subdued.

If a radiopaque substance is used to mark the skin outline in taking the cephalogram, the resulting line will be reproduced along with the denser structures in the technique described above. When filtration or radiation adjustments have been employed to obtain a soft tissue image, one further step is required in order to obtain a reproduction of the integumental contour. This entails making a second print of the headplate using *Polyclair* "No. 2 slow" paper with increased exposure time.

An excellent silhouette is obtained in this manner (Fig. 3). Surprisingly, in some cases a soft tissue outline was obtained in the reproduction by using "No. 2 fast" paper even when it was not possible to see a soft tissue image in the x-ray film with the usual light sources.

Polyclair paper is sufficiently thin so that cephalometric tracings may be made easily on acetate paper using customary transilluminating view boxes. Either the Stage 1 reverse or the Stage 2 duplicate will serve for this purpose. The soft tissue outline is added using the appropriate print.



Fig. 3

It also proved possible to reproduce wrist films with this technique. However, attempts to duplicate intraoral and lateral jaw x-rays were less successful, probably due to the relatively greater amounts of radiation employed in obtaining such films.

Cephalometric Tracing Reproduction

Most conventional office duplicating machines will reproduce tracings made with lead pencil on acetate paper with good fidelity. The operation of these machines differs, depending on the manufacturer, and will not be described here.

The similarity of *Thermofax* paper to acetate tracing paper offers certain advantages. For example, a series of tracings may be superimposed (either the originals or their *Thermofax* dupli-

cates) and a composite made in less than one minute using a *Photorapid* or similar duplicating machine. Also, duplication of original outline tracings allows for a number of analyses to be made on the copies while preserving the original tracing.

SUMMARY

1. A simple, inexpensive, rapid method for reproducing cephalometric images is described. Unlimited numbers of copies may be obtained using this technique which employs standard office duplicating equipment.
2. The reproduction of cephalometric tracings by a similar technique is also described.

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