Technical Notes on *Synchromy* (1971)

Around 1950, Evelyn Lambart and I worked out a method of shooting soundtrack optically on film, without using a microphone or regular sound system, but with the use of an animation camera. We called it "animated sound", because it was shot frame by frame, onto the soundtrack area at the edge of the picture.*

For pitch control we used a set of 72 cards, each having stripes or striations, and each representing a semi-tone in a chromatic scale of six octaves. The more stripes the higher the note, the less stripes the deeper the note.

Our first set of the cards (with which the music for *Neighbours* was made) had soft-edge undulating stripes, corresponding roughly sine-wave sound. A later set of cards had simple hard-edge black-and-white stripes, corresponding acoustically to square-wave sound. It is with the square-wave cards that I shot the music for *Synchromy.*

The volume was controlled by varying the width of the soundtrack. A moveable shutter, controlled this width. If the shutter was almost closed, the extremely narrow band of striations would give a pianissimo note. If the shutter was wide open, the broad band of stripes would give fortissimo. All intermediate degrees of volume were possible by regulating the position of the shutter, which was calibrated in decibels.

In *Synchromy* the music was composed first, and filmed by the above method. It started with a single musical part, later to be joined by another, and finally by a third (mid pitch, treble and bass).

These three parts were shot on separate strips of film, which were rerecorded and finally mixed in the normal manner onto magnetic tape and thence to standard optical track for release prints.

The Visuals

To create the visuals the three-striated card soundtracks were kept separate and in their striated form. By means of an optical printer they were moved over into the picture area of the film.

Since the shape of the soundtrack opposite a single frame of film is a long, narrow column, and since the visual frame is rectangular, it was possible to fit as many as eleven columns for soundtracks, side by side in the picture area.

* See "Technical Notes on Animated Sound by the Card Method" available from the NFB.

At the very outset of the film, where there is just one musical part, only the central column carries the striations; but somewhat later the same striations are moved into one or more of the other columns.

What is on the screen, be it in one or several columns, is strictly the striated images of the original sound shot with cards. Thus, there is exact parallelism between sound and image. When the second and third musical parts enter they are clearly visible as such.

While optically shifting the soundtrack into the picture area, we added colour by filtering a black-and-white master positive, and its dupe-negative. We opticalled one column at a time (the rest being masked off).

In column with no striations, or with just white striations on a coloured ground only one pass was needed.

Where there were coloured striations on coloured ground, two passes were needed, one using a clear-on-black master positive, the other using its matching black-on-clear dupe negative.

Towards the end of the film, where all eleven columns were active, if we wished both ground, and striations to be coloured, 22 passes were required.

Variety was given to the visuals by frequently changing the track positions from one column to another. In general the colouring was changed at the beginning and end of musical sentences or phrases for variety's sake; although no "colour-sound-theory" was relied upon, pianissimo passages were usually in mutes hues, and fortissimo passages in highly saturated contrasting hues.

Apart from planning and executing the music, the only creative aspect of the film was the "choreographing" of the striations in the columns and deciding on the sequence and combination of the colours.

Norman McLaren (1971, revised in 1984)