

Sypher: Videotape Sound Post-Dubbing

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Summary: The Sypher method of videotape sound post-dubbing has now been in use at BBC Television Centre for more than three years. It has been used for processing some 1300 programmes of all types and continues to be popular with Production and Operational staff. This article deals with the origins of the system, its operational functions and the influence it has had on programme-making.

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1 Original system of dubbing

Soon after the introduction of the videotape recording process, it became obvious that sound dubbing would follow. The ability to edit videotape and the consequences of discontinuous recording made the process inevitable but there were serious limitations. For example, a director who needed to embellish a programme with incidental music and effects was hindered by shortage of videotape review time to assess the precise needs.

The dubbing system was very simple: it involved the use of two videotape machines, one to replay and one to record the sound after rebalancing in a separate sound control room. The recording was intended to be continuous, but it seldom happened that way. Balance errors, operational mistakes, changes of mind, all incurred breaks which required retakes with overlaps. These were time-consuming jobs for the sound supervisor and particularly for the videotape editor, who had subsequently to join the pieces together to form a continuous synchronised track to accompany the picture.

These difficulties persisted despite the introduction of extra pairs of hands at the dubbing stage and more reproducing machines to break down the operation into precise sections. It was not uncommon on a 'Dr Who' dub to use two tape/gram operators, the Musical Adviser, the Producer and a trainee, all of them taking part in the operation to keep the exercise running.

Figure 1 indicates the laboriousness of the system for a 50-minute programme such as 'Onedin Line'. The operation

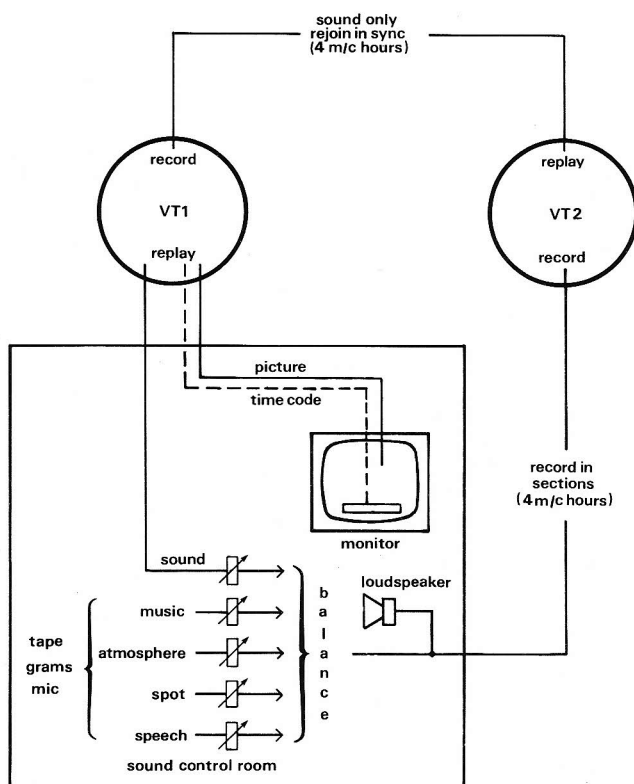


Fig. 1 Dub from videotape machine to videotape machine: time taken for 50-minute programme, 10 machine hours including technical reviews.

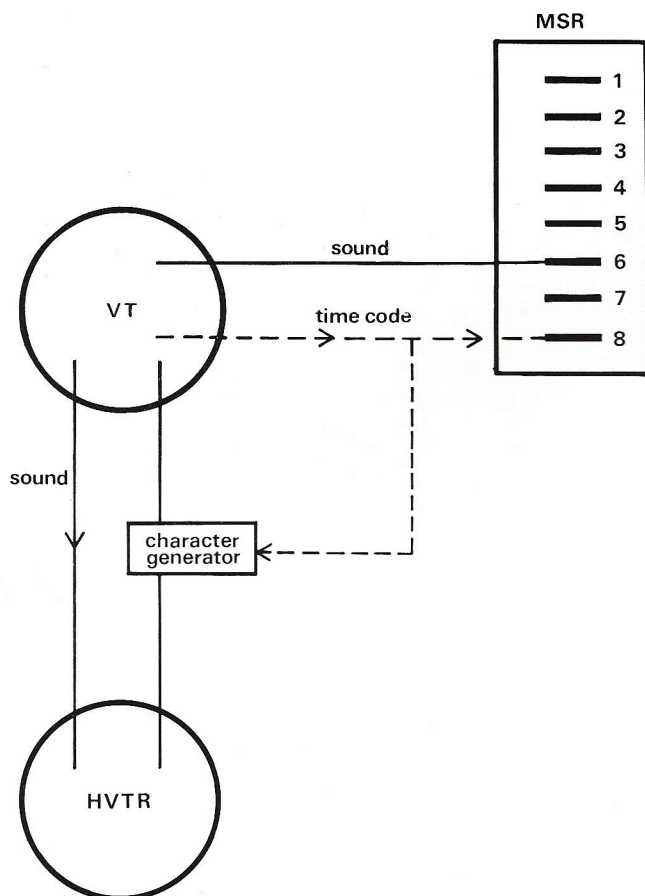


Fig. 2 Dub to Sypher in videotape.

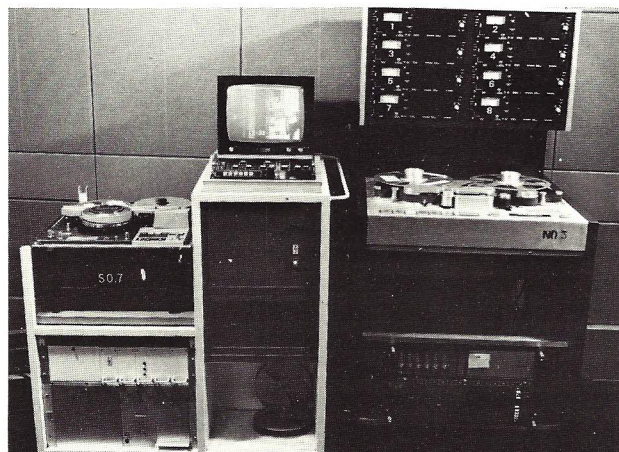


Fig. 3 Helical-scan videotape recorder and multitrack sound recorder used in 'Dub to Sypher'. Similar equipment is used in the control room for 'Sypher dub'.

was, however, always carried out with as much professionalism as time and the Sound Supervisor's expertise would allow. The element of adventure which accompanied it was frequently tinged with disappointment when the review of the dub showed deficiencies of balance, timing or content.

It was in 1966, when the 'Paul Temple' series was being recorded that incidental music was specially composed by Dudley Simpson to heighten and augment the action. The opportunity to review the programme was limited to

observing the studio run-through and recording, and the edited programme as it was finally reviewed, non-stop, in the videotape cubicle. With stopwatch and script, and to the incessant noise of the videotape machine, the composer had to make notes and timings so that, at his piano a few hours later, he could compose suitable mood music to fit the action and vision or sound edits.

2 Beginnings of a new system

The first step toward an improved system was taken when it became possible to use a helical-scan videotape machine as a review machine for the Musical Adviser. Later the introduction of other helical-scan machines into Drama Department for a trial period as 'Pre-VT Edit' office review machines for directors prompted their use also for increasing rehearsal time before a videotape machine-to-machine dub.

When time-code editing appeared and Wattesta read-out units displayed the 8-figure code, ways of using this visual indication of timing were examined. Logically it was inserted into the picture so that production and operational staff could use it during both rehearsal and dubbing. For the first time since the introduction of video recording there was an accurate reference, in real clock time, to the artists' dialogue, the action, or picture changes which, once established, was irrefutable. It compared with footage counters in film dubbing and marked the beginning of new thinking into an entirely different system of dubbing. Additional impetus came from the increased popularity of drama dubbing, the consequential extra loading on videotape machine scheduling and the resulting extra cost of hiring videotape facilities. The high cost of the system was obvious and led to a comprehensive analysis of technical facilities.

3 Proposal for a new system

The proposed new system would make use of a multitrack sound recorder (MSR) to accommodate a copy of the edited videotape sound track, the rebalanced and dubbed track and a time-code sync track. Synchronised with the MSR would be a helical-scan videotape recorder (HVTR) to provide a copy of the videotape picture and an identical time-code track. An essential accessory would be a comparator/synchroniser to ensure that Playback and Record functions would produce accurate synchronism of sound and pictures.

The advantages to be expected were as follows.

1. Reduced use of videotape machines — only two machine hours required instead of ten (for a 50-minute programme). In other terms, a saving of 1000-1500 machine hours per year.
2. Lessening of multigeneration tape noise because two of the recordings occur on tape designed specifically for sound, not picture signals.
3. Allocation of sound staff made independently from the videotape operation. The practice of keeping members of the realisation team (Director and Sound Supervisor) together from studio through to the dub, would be attainable.
4. Lengthy technical line-up of videotape — sound

control room — videotape no longer required.

5. Rehearse/record (rock 'n' roll in film terms) would become normal practice.
6. Track-laying would become the normal method of resolving complex balances and a combination of the two would provide the Sound Supervisor with flexibility that had for long been denied him.

The overriding advantage of the proposed system would be the reduced use of videotape machines in the sound dubbing operation, thereby returning them to their main use of editing. With his independence from the videotape machine, the Sound Supervisor would be free to meet all the artistic needs of the Director in the manner of his choice.

The arguments were accepted, the installation was built and it was christened *SYPHER*. This is a contraction of *S*ynchronous *P*ost-dub *H*elical-scan and *E*ight-track *R*ecorders. It is also a dictionary word meaning, appropriately, to join up flush with overlapping joints.

4 Technical procedures

4.1 'Dub to Sypher' in videotape (figure 2)

The programme to be dubbed is transferred to a helical-scan colour videotape machine (HVTR) with time-code taken from the videotape cue track. Simultaneously the sound track is transferred to track 6 of the MSR, accompanied with the same time-code to track 8. The HVTR and MSR machines are shown in figure 3.

4.2 'Sypher dub'

The two one-inch tapes are loaded onto HVTR and MSR machines of the same type as are used in 'Dub to Sypher' and shown in figure 3. They are in the custom-built Sypher control room. The machines are synchronised, via a BBC-designed comparator, but thereafter refer to station synchronising pulses for PLAY and RECORD selections.

During a SPOOL selection, when the tape is withdrawn from all head stacks, time-code is read off from a separate jockeyed head so that the two tapes run at the same speed, that of the HVTR. When coming to rest after a STOP selection synchronism is within 12 frames (1 frame = $\frac{1}{25}$ second = 1 television picture). On PLAY, synchronism is obtained after two to five seconds. All transport controls are made remotely operable from the sound control desk (figure 4) for operation by the Sound Supervisor. The HVTR provides an external time-code read-out so that spool positioning may be monitored. This display can be 'frozen' to permit the noting of significant times, updating occurring automatically on release.

5 Sound control desk (figure 5)

This is a 12-channel 8-group Neve desk with a comprehensive 8-group monitoring matrix. The twelve channels may be either MSR playback control (tracks 1 to 8) or source material from tape and disc machines or microphones from the adjacent studio. The eight group controls accept routings



Fig. 4 Part of sound control desk showing, at top, monitoring matrix for MSR, at bottom, remote controls for HVTR and MSR transports, mode and time-code selectors and source switcher.



Fig. 5 Sound control desk and picture monitor showing inset time-code.

from the channels and are main faders to the MSR record heads.

The monitoring matrix provides 8-track playback, 8-group output or a combination of both according to recording circumstances. It should be noted that playback is not monitored during recording because of the displacement relationship with the picture, hence 'sync' (record head) monitoring is used.

6 The dubbing operation

6.1 Assemble 'mix mode' (figure 6)

The simplest form of dub and the one recommended wherever possible is the ASSEMBLE. The ORIGINAL DIALOGUE track (6) is balanced as a playback source 'on the fly' with the new material and is recorded direct via group 5 onto the FINAL MIX, track 5. The operation is carried out in a rehearse/record or 'rock 'n' roll' fashion, assembling track 5 progressively throughout the programme.

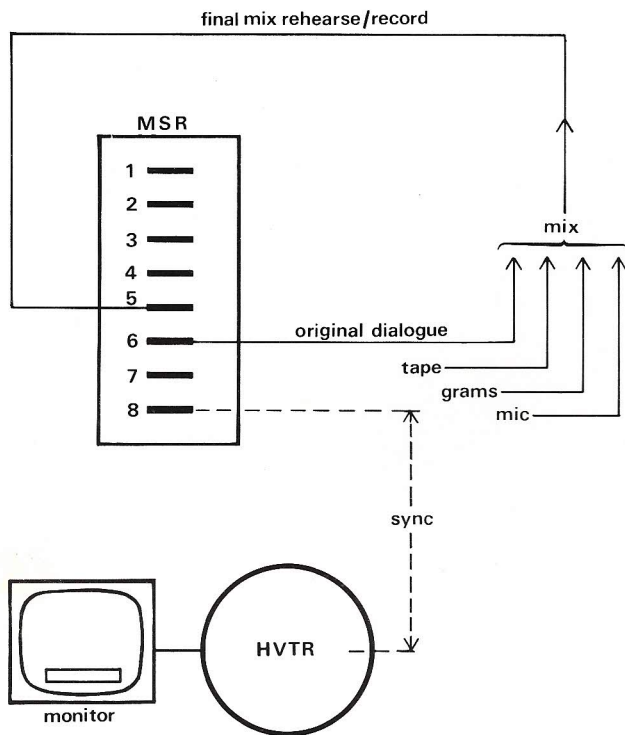


Fig. 6 Sypher dub (ASSEMBLE).

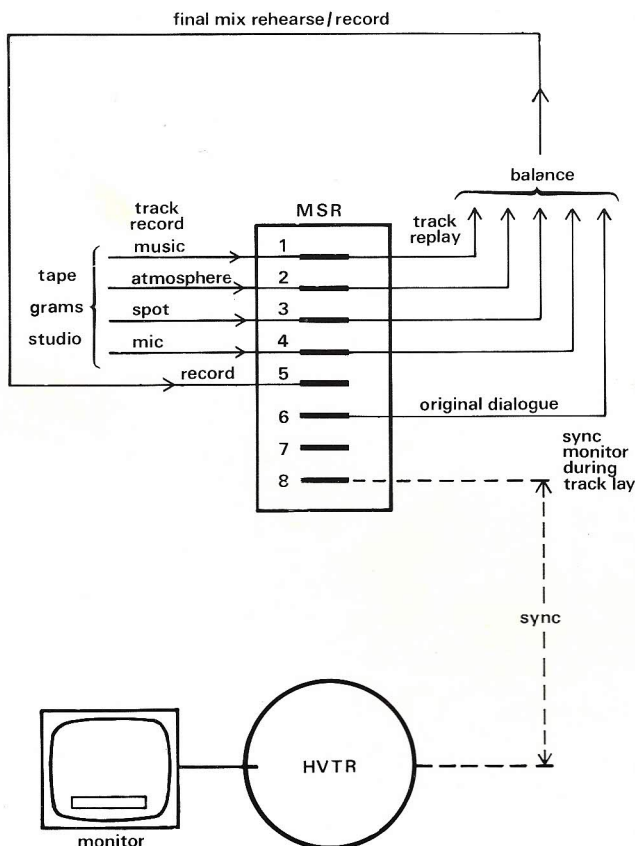


Fig. 7 Sypher dub (TRACK LAY followed by ASSEMBLE).

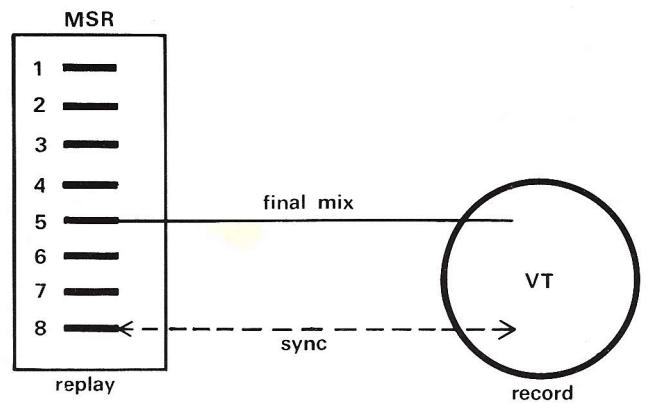


Fig. 8 Dub back to master.



Fig. 9 Sypher control room showing control desk, loudspeakers, picture monitors and twin-track quarter-inch tape machines.



Fig. 10 Studio adjacent to Sypher suite, showing commentators' sound and picture facilities. On right, sound effects tray for footstep effects on gravel, stone, wood and linoleum.

6.2 'Track lay mode' (figure 7)

When it is necessary to balance a number of sound sources, each requiring accurate timing as well as careful blending, TRACK LAYING becomes the mode of operation.

The ORIGINAL DIALOGUE track (6) is monitored 'off record head' (sync). Music, effects, backgrounds, spots and voices are then recorded selectively on tracks 1 to 4. They are

then treated as playback sources and balanced with the ORIGINAL DIALOGUE in an 'assemble' mode onto track 5, again in the rehearse/record fashion.

A whole programme may be considered for a track-lay operation and 'Dr Who' is an example. The majority of programmes, however, use the ASSEMBLE, with the TRACK LAY mode used only to handle complex sections within it.

6.3 Mode selector

The correct MSR head requirements (Sync, Safe, Ready) for the ASSEMBLE (mix) and TRACK LAY operations are automatically available by operating single controls. ASSEMBLE mode provides record function on track 5 and inhibits record function on all other tracks. TRACK LAY mode provides record function on tracks 1 to 4 and 7, and inhibits record functions on tracks 5, 6 and 8.

6.4 Review mode

At the completion of a dub the programme is reviewed to provide a check of technical performance and balance. REVIEW mode provides an offset between the MSR and HVTR equivalent to the time difference between the playback and record heads. This allows playback quality to be monitored in synchronism with the picture, which was originally recorded adjacent to the record head.

6.5 Insert mode

If, during the review of the dub, blemishes or errors of balance have to be corrected, the INSERT mode allows 'record in — record out' conditions without noticeable overlap or gap.

6.6 Dub back to master (figure 8)

The last stage of the Sypher operation is to transfer the 'final mix' track (5) back to the original videotape machine from which the 'original dialogue' track (6) was recorded. This substitution does not eliminate the possibility of further editing of dubbed sequences because the undubbed 'original dialogue' remains available on the one-inch MSR.

7 Peripheral facilities

Equipment which is linked to the main system by the use of time-code is becoming increasingly important and the frequency and range of problems from different production departments is increasing.

7.1 Quarter-inch recorders

These are shown in figure 9 and offer the following facilities.

1. 'Twin-track' operation.

2. 'Frame-lock' operation in which the television frame signal is used on track 2 and then referred to station syncs in replay. This will allow the removal and return of material from the MSR or to replace music tracks after multigeneration videotape edits.
3. 'Remote start', using coincidence detectors which respond to a preset time-code. Accuracy of cueing new material is essential and is now certain.
4. Variable-speed capability of $\pm 30\%$. This will enable lengthening or shortening of a sound, provided that the resulting pitch change is not a disadvantage. Conversely of course, it permits pitch changes as a deliberate effect.

7.2 Source switching

Facilities for manually or automatically switching or mixing MSR tracks, quarter-inch tape or disc outputs are available from either time-code selections or time-code-controlled tone on track 7 of the MSR. The Sound Supervisor can arrange for music or effects perspectives to match changing pictures, the repositioning of effects to create more realism or the substitution of individual words if necessary.

7.3 Studio (figure 10)

The adjacent studio is equipped to handle 'voice-over' situations such as were used in 'One Man and his Dog', 'World Wide' and 'Sporting Super Stars'. Effects surfaces, doors, chains, etc. are available and were used extensively on 'Hunchback of Notre Dame'.

8 Philosophy of design

The philosophy in the design of Sypher has been to service the production departments quickly and effectively and to provide technical facilities which enable the Sound Supervisor to do his job in a discriminating way in relation to the artistic needs of the Director. The basic system is straightforward and the associated facilities are adjuncts to it.

There is no doubt that Directors are making much better use of Sypher now that they are more familiar with it. Directors who are also accustomed to film production realise that they may ask for a wide range of sound treatment to be provided at the dub, which is now the last production stage before transmission. There is also no cost or time involvement for pre-recorded contributions on sepmag as in a film dub. The Sound Supervisor who does the dubbing is the Supervisor who balanced the sound content of the programme in the studio. Familiarity with the Director's intentions is important and the ability to contribute aesthetically to the programme style is an extremely desirable feature of the Supervisor's work.