

REPORT 1071

SAMPLING FREQUENCY CONVERSION AND SYNCHRONIZATION
OF DIGITAL SOUND SIGNALS

(Question 51/10, Study Programme 51B/10)

(1986)

When two or more digital sound signals are brought together in digital processing equipment, the sampling frequencies of the signals must be synchronous for the necessary arithmetic operations to take place.

In [CCIR. 1982-86a] a variable-delay synchronizer for digital sound signals having the same nominal sampling rate, is described.

The synchronizer comprises a buffer store into which sound samples are written, to be read out at the required output sampling rate. The buffer store operates effectively as a variable delay to compress or expand the input signal in time very slightly in order to achieve synchronization.

From time to time samples need to be repeated or discarded in order to prevent the store becoming completely full or empty (and thus being able to continue operating as a synchronizing element). Provided that the repetition or discarding of samples takes place during naturally-occurring "pauses" (or silences) in the programme, no audible impairment occurs.

An experimental sampling-rate synchronizer working on a variable-delay principle has shown that it can satisfactorily synchronize digital audio signals which have sampling rates which differ by up to $\pm 1 \times 10^{-5}$ from their nominal rate. However, it is recommended that sampling rates be stable to within $\pm 1 \times 10^{-6}$ of nominal rate where this type of synchronizer is used.

The experimental results verified that no perceptible impairment results from the use of this type of synchronizer. Moreover, the technique does not cause any increase in the level of quantization noise.

REFERENCES

CCIR Documents
[1982-86]: a. 10/19 (EBU).

BIBLIOGRAPHY

GILCHRIST, N. H. C. [October, 1980] Sampling-rate synchronization of digital sound signals by variable delay. *EBU Rev. Tech.*, 183, 222-226.
