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That equalising pulses were not a panacea for interlacing difficulties was realised when the American system was stan-

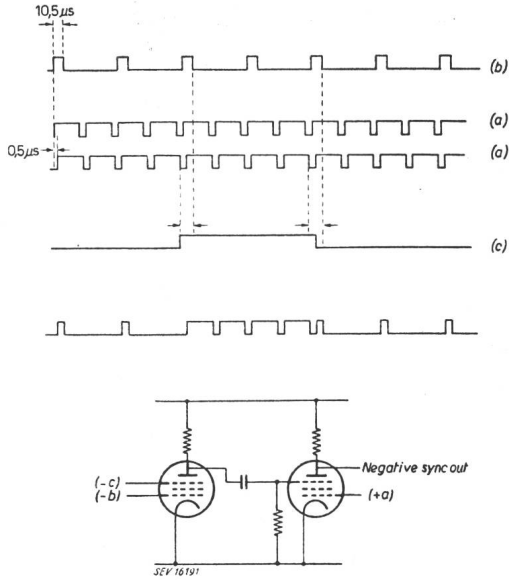

Fig. 2
Sync Wave-Form Generation

dardised. Also the complications introduced at the transmitter were not ignored. But the philosophy was that complications at the transmitter were well justified if it made for simplicity or flexibility of design at the receiver; no receiver, it was argued, would be any the worse for the presence of equalising pulses.

This last statement is no longer strictly true in view of the trend towards fly-wheel sync circuits. The presence of equalising pulses can, in fact, restrict flexibility of design in this case.

The extraordinary simplification of circuits at the transmitting end which results from abandoning the equalising pulse is shown in Fig. 2 which illustrates one method of arriving at the British standard sync waveform:

Looking at the finally desired waveform we note that it can be made up from the continuously running waveform (*a*) by quashing out certain parts. The required quashing waveform is shown as (*b*). As the leading edge of (*b*) is required to lead that of waveform (*a*), we sync it from primary waveform (*a'*) from which (*a*) is derived through a 0,5 µs delay line.

Waveform (*a*) when quashed with waveform (*b*) produces line sync pulses. To switch over to field sync we «quash the quash»; this latter quashing waveform is shown as (*c*). Waveform (*c*) is derived from a multivibrator which is controlled by two counting circuits. The first counts 405 pulses of waveform (*a*) and opens a gate. As soon as the gate is opened the second counter counts the required number of field pulses (8).

The very simple mixing process is shown schematically in the lower part of Fig. 2.

Conclusion

Equalising pulses would not appear to be justifiable on purely technical grounds.

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Contribution to discussion

By *C. G. Mayer*, London

Mr. Chairman, since Mr. Bedford has mentioned American television standards I would like to say a few words on this subject of negative versus positive modulation. We have discussed these questions together in the past, and both he and I have also discussed them with engineers on both sides of the Atlantic, with negative results — negative in the sense that since both sides have established standards they naturally endeavour to produce arguments to prove their own system the better. Having said this I will not take up the short time available in this discussion except to point out a new and important factor which affects one's choice in deciding on the sign of the modulation. I refer, of course, to the recent development of the system known as «Intercarrier Sound» which is only made possible by negative modulation of the picture combined with frequency modulated sound. Briefly, with negative modulation the carrier never drops to zero, so that the picture and sound signals can be amplified together in common intermediate and video amplifiers at the receiver. The two carriers beat together to produce a signal having the difference frequency — 4.5 Mc./s in the case of the U.S. standard. This beat frequency will be frequency modulated by virtue of the fm on the original sound carrier, and can be separated from the vision signal at the input to the picture tube by conventional treatment as an fm signal, and passed to the loudspeaker. We are rapidly gaining experience in America with this system, which not only offers real economies in receiver design (sound IF amplifier not needed) but also enables some of the shortcomings of conventional receivers to be overcome, principally in regard to stability, hum modulation, and microphonics of the local oscillator in the receiver. Since both carriers are influenced to the same extent the resultant beat frequency is free from these difficulties, and in fact, an «Intercarrier» receiver requires no fine tuning control. It was thought that the effect of phase or frequency modulation of the picture carrier at the transmitter would be serious, but tests have proved that transmitters having as much as ten degrees phase variation give excellent sound quality on properly designed receivers. In choosing negative modulation in the United States we cannot claim to have had the foresight that has made the development of this system possible, but it is a fortunate circumstance for which we are very grateful, just as we have also to be grateful now for 60 cycle power which enables us to obtain bright pictures free from flicker.

Finally, in regard to Mr. Bedford's remarks on the effects of interference on the picture, our experience — confirmed by others — is that subjectively white spots are certainly much more disturbing to the eye than the black specks obtained with negative modulation.

In view of the widespread interest in this subject I should be glad, Mr Chairman, if you would agree that these remarks be included in the record together with Mr. Bedford's expose.

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Apport à la discussion

Par *Y. L. Delbord*, Paris

Je voudrais présenter deux remarques:

La première remarque concerne un détail technique. Dans sa très intéressante communication Mr. Bedford a indiqué l'importance d'un double signal de synchronisation verticale, l'un provoquant le retour du spot vers le haut de l'image, l'autre marquant avec précision l'instant du commencement de l'analyse utile.

Dans ces conditions, l'intercalage des trames est en général absolument correct.

Plusieurs brevets ont été pris sur ces questions par des industriels français et quand, il y a un an, j'expliquais au regretté professeur Fischer l'importance de cette solution, il m'a fait remarquer que dès le début des expériences, un tel dispositif avait fonctionné sur le «Grossprojektor»; je sou-