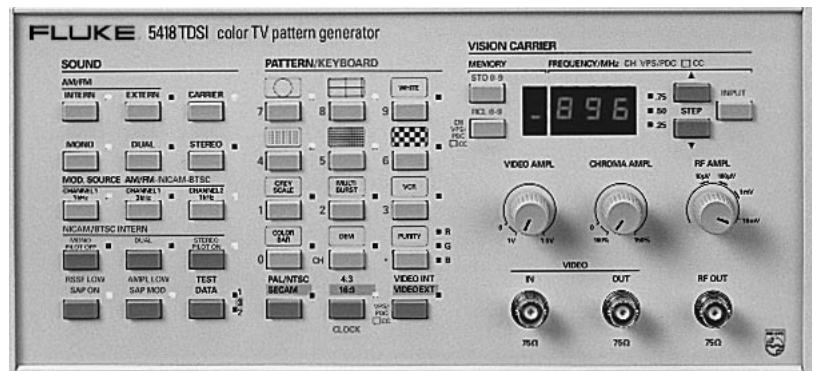
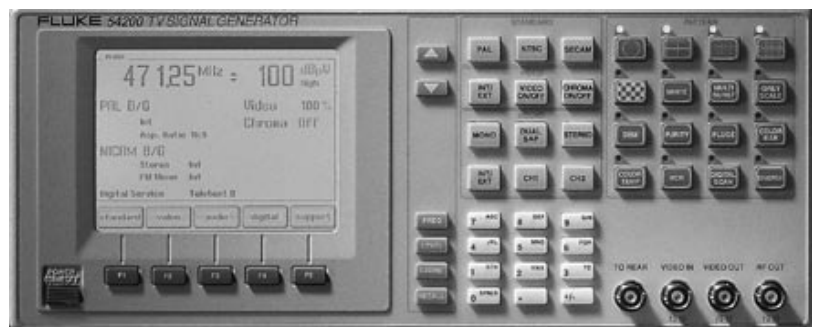


MTS stereo plus SAP sound (BTSC standard) demands a cost-effective test solution.

Application Note



New functions in TV receivers and Video Cassette Recorders increase viewing and listening enjoyment for the consumer. But at the same time they introduce additional testing requirements for developers, manufacturers and service workshops. One of these new functions is MTS stereo plus SAP according to the BTSC standard, which

enables stereo broadcasting for the NTSC M and PAL M systems, and also makes multi-language broadcasting possible.

A cost-effective test solution for MTS stereo plus SAP sound in TV receivers and video recorders is provided by a range of TV signal generators from Fluke.

MTS (Multichannel Television Sound) plus SAP enables stereo sound transmission according to the BTSC (Broadcast Television System Committee) standard. This standard has the advantage of allowing the transmission of stereo sound and a Second Audio Program (SAP), using only one carrier. The SAP channel can be used to broadcast the second language of a multi-language program. MTS stereo plus SAP is transmitted in the NTSC M system, and was first introduced in the USA and later in Canada and Taiwan.

In these regions, and especially in the USA, virtually all networks and most local broadcasters, as well as satellite and cable broadcasters, have adopted the BTSC standard. Most TV receivers and Video Cassette Recorders sold in these regions are now also equipped with MTS stereo and SAP decoders.

Channel bandwidths in the RF band are very small in the M system, and therefore the availability of frequencies for expansion of the present sound system is limited. A solution was found by using only one sound carrier (comparable to FM stereo radio). This sound carrier contains the mono, stereo and SAP sound information. Downward compatibility is achieved by using the existing 4.5 MHz sound carrier, and by leaving the mono channel

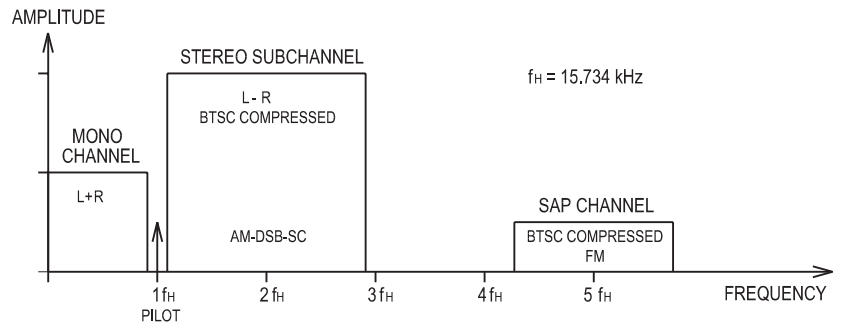


Fig. 1: MTS stereo plus SAP baseband spectrum.

unchanged. This means that the sound can still be received by both newer and older mono TV receivers.

Fig. 1 shows the total frequency spectrum of the MTS stereo plus SAP sound system. The mono channel contains the mono sound, L+R signal with a 75 μ s pre-emphasis. The pilot carrier is equal to the line frequency of the NTSC system (15.734 kHz) and is used for the AM demodulation. The stereo subchannel contains the L-R signal and is amplitude-modulated on a suppressed subcarrier of twice the line frequency. The signal is compressed by using dynamic noise reduction according to the BTSC specification. The normal stereo sound can be separated from L+R and L-R by using the addition and subtraction function. The SAP channel information is frequency-

modulated on a subcarrier of five times the line-frequency, and is also BTSC compressed to reduce noise. A simplified MTS stereo plus SAP transmitter system is shown in Fig. 2.

Due to the parabolic noise characteristics which are typical of FM transmission systems, the noise level increases at higher FM-modulation frequencies. In order to improve the signal-to-noise ratio of the L-R and the SAP signals, both channels are encoded by a BTSC compressor. This compressor on the transmitter side has a level- and frequency-dependent response. The expander on the receiver side has to respond in exactly the opposite way to ensure correct signal processing. It is therefore important to note that the audio signal levels are well defined, which is done mostly by giving the corresponding peak deviation of the sound carrier.

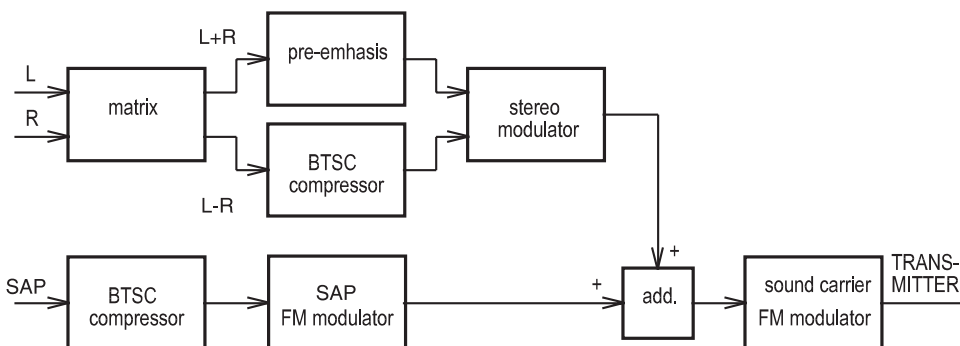


Fig. 2: Simplified MTS stereo plus SAP transmitter system.

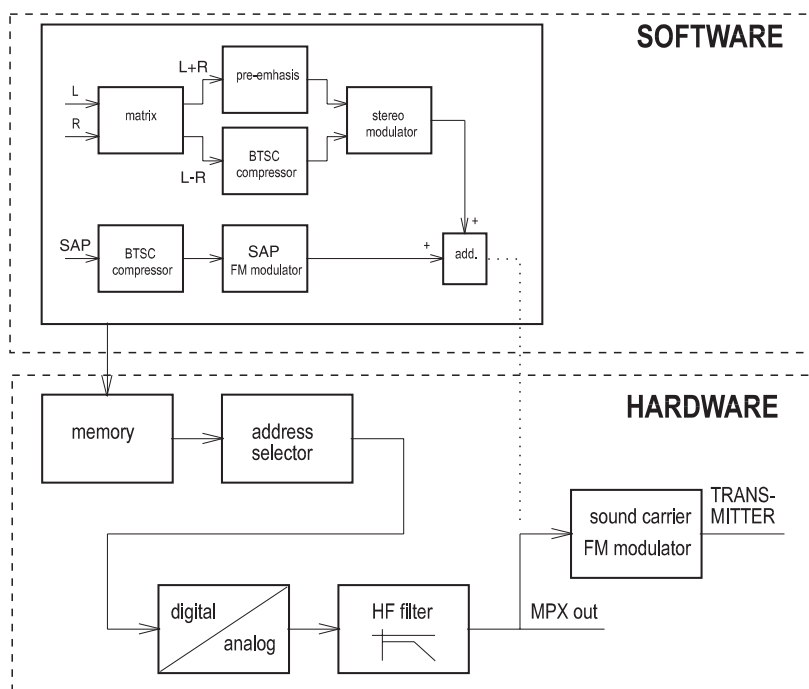


Fig. 3: MTS stereo plus SAP transmitter system of Fluke's TV Signal Generators.

MTS stereo plus SAP testing facilities

Fig. 3 shows the implementation of an MTS stereo plus SAP test generator in the TV signal generator. The memory of the sound system is pre-loaded by software simulation. The different memory locations are scanned by the address selector and converted to analog values. A low-pass filter is used to prevent switching interference at the output of the sound system.

The analog value at the filter output contains the mono channel, the stereo subchannel and/or the SAP channel. The presence of the different channels can be selected at the front panel of the signal generator. The frequency spectrum of a stereo channel including the SAP channel signal is shown in Fig. 1. This complete analog band, available at the MPX baseband output, is FM-modulated on a 4.5 MHz carrier and transferred to the RF modulator, where the luminance and color signals are added.

The software simulation solution offers excellent fitness-for-purpose in test terms with a high performance-price ratio. This

method provides high-stability sound signals due to digital signal generation. No adjustments are required, so proper signal processing at the receiver side is always guaranteed.

The software of the signal generator offers a number of frequency selections. Various frequencies and special test combinations are provided to ensure sufficient freedom of choice in the testing process. The sound signals are suitable for aligning or testing frequency response, THD (Total Harmonic Distortion), channel separation, audio level adjustment and other aspects of the TV receiver or Video Cassette Recorder's stereo/SAP decoder section. The sound signals are provided at the generator's RF output or via baseband processing at the precision MPX output. The BTSC standard is available in combination with the NTSC M and PAL M standards.

Comprehensive TV and video testing facilities

Fluke's TV Signal Generators offer comprehensive multistandard capabilities to speed and simplify every aspect of TV and video testing and troubleshooting. These

instruments are designed for use by both setmakers and service workshops which are faced with the need to manufacture and maintain products conforming to the many different broadcast standards and equipment operating modes in use around the world.

A wide choice of available models and options ensures optimum economy in meeting specific test requirements, both in terms of TV standards and special system features.

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