Medium-Scan Television — A New Amateur Frontier

Just what is MSTV? It's about to happen, on 10 meters!

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As the radio spectrum becomes more and more crowded, what better way is there to promote Amateur Radio worldwide than to be the first to transmit moving television pictures to Europe, *without* the aid of a repeater satellite? This very task has been undertaken recently by an energetic group of experimental SSTV hams who, with the help of the ARRL, have received a Special Temporary Authorization (STA) from the Federal Communications Commission.

This STA was granted on June 16 to W9NTP, W3EFG, WB9LVI, W6MXV and WØLMD. It permits the testing of a 36-kHz-bandwidth television system on the 10-meter band on a frequency segment of 29.0-29.3 MHz. The task of transmitting moving television pictures in such a bandwidth will not be easy. It rivals much of the work being done in commercial and military fields where systems are being developed for low bandwidth and long-distance transmission.

Why should this group succeed when many other investigators have not had success? Let us look back in history. Twenty years ago SSTV was an infant and there was very little interest in low-bandwidth, still-picture transmission. While SSTV started out with a few technically oriented hams, it has resulted in pictures from Mars and become one of the main tools in commercial and military systems today. This would probably not have happened if amateurs hadn't persisted in promoting SSTV through magazines, STAs and the Military Affiliated Radio System (MARS).

The hams listed on the MSTV STA will need the help of hundreds of others. This is where the reader can help. Cooperation is needed in Europe, too.

Squeezing the Bandwidth

The only possibility of transmitting moving television images over international distances is to reduce the rf bandwidth to near 36 kHz. The problem therefore becomes one of reducing a standard TV video image of 3-MHz bandwidth to one of 15-20 kHz. No magic breakthrough is going to occur in video processing. The designer will be forced to leave "something" out of the regular TV image in order to bring the bandwidth down to the acceptable width. The choices are (1) reduce the number of pixels (resolution cells), (2) reduce the number of lines in the image, (3) reduce the number of fields in the frame, or (4) intermix some of the above deletions of data in some acceptable manner.

Table 1
Suggested Interim MSTV Standards
Field rate: 5 fields/second
Fields: Interlaced
Frame rate: 2.5 frames/second
Lines per field: 64
Lines per frame: 128

Many years ago television was standardized to a field rate of 50/60 Hz in order to reduce viewer flicker. This transmission rate is not necessary today because data-storage systems (digital scan converters with semiconductor memories or possibly P7 phosphor screens) can reduce the necessary data rate and bandwidth to present acceptable moving pictures which have no flicker. Experimenters have demonstrated that field rates as slow as 7.5 fields per second are adequate for many applications of television.

The STA experimenters are suggesting the specifications given in Table 1 in order to get as many hams involved as possible. The final system will be much more exotic, but these standards will permit modification of all existing analog SSTV gear. Later the progress will require the use of a digital scan converter (such as a converted Robot 400) or a microprocessor system such as that produced by one of the STA investigators (Digital Group, WØLMD), to take full advantage of the more complicated system with greater degrees of motion.

The video bandwidth can be calculated from the following formula: Base video bandwidth = (number of field/s) = (number of lines/field) × (number of pixels/line)/2. The video bandwidth based on the above specifications of Table 1 therefore is (5 fields/s) × (64 lines/field) × (128 pixels/line)/2 = 20,480 Hz. These standards can be made synchronous with both 50- and 60-Hz power countries. This video bandwidth will possibly fit the 36-kHz STA segment.

Let's list the work that needs to be done by those who want to help. We would like to enlist each interested amateur in participating in this two-year experiment. The immediate plans are given in the following paragraphs.

1) Develop an fm transmitter (36-kHz bandwidth) on 29.150 MHz. This transmitter will transmit a gray-scale television image when accessed. This will be the test beacon to catch band openings.

2) Develop a 36-kHz fm receiver for MSTV. Perhaps some of the rf modules produced today can be used.

3) Convert the driven-sweep P7 SSTV monitors such as the W6MXV and WØLMD circuits to the new MSTV standards.

4) Convert digital fast-scan converters (like W6MXV's circuit) to the new standards.

5) Convert analog Robot gear to the new MSTV standards.

I would like to hear from any readers who desire to take the responsibility for any of the above conversions. All of the above suggestions should be completed during the first year of the STA (June 1978 to June 1979). During the second year, concentration will be on the development of a digital scan converter or microprocessor software for the finalized standards. The STA investigators would like to send out progress reports individually, even though we hope to publish reports in the amateur magazines. If you would like to be a part of this electronic adventure into experimental ham radio, send a self-addressed envelope to W9NTP. If you are seriously interested in having your name added to the list of the STA investigators (this would permit transmission of MSTV) it will be necessary to show that you have developed receiving equipment before you can apply to the FCC. Recently, personnel on the FCC were heard to say, "Hams should be building their own equipment." I certainly agree.

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