

Before The  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554

In the Matter of )  
 )  
Advanced Television Systems )  
and Their Impact on the )  
Existing Television Broadcast )  
Service )  
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Review of Technical and )  
Operational Requirements: )  
Part 73-E, Television Broadcast )  
Stations )  
 )  
Reevaluation of the UHF )  
Television Channel and Distance )  
Separation Requirements of )  
Part 73 of the Commission's Rule )

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Federal Communications Commission  
Office of the Secretary

MM Docket No. 87-268

COMMENTS OF ATTC

Advanced Television  
Test Center

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## SUMMARY

The Advanced Television Test Center was organized to ensure a prompt and thorough evaluation of proposed advanced television transmission ("ATV") systems. Test Center activities are being coordinated with the Commission's ATV Advisory Committee to ensure that the results will be of maximum usefulness. The Test Center is also committed to cooperating with affected industries in addition to broadcasters, including cable, equipment manufacturers and programmers.

Actual over-the-air tests of the propagation of ATV-type signals in various bands are scheduled to begin next month.

Facilities and procedures for the laboratory testing of individual proposed ATV systems are now being designed, and the tests will begin as soon as system developers make the necessary hardware available for evaluation. In general, the tests will measure the quality, resistance to interference, ability to co-exist with NTSC signals, and operating characteristics of each system tested. Testing will include both objective, technical measures and subjective, psychophysical evaluation.

The results of these tests are essential for the Commission to determine transmission standards, spectrum requirements and appropriate measures to protect the public's television service from objectionable interference. The Test Center asks the Commission to encourage the full and timely cooperation of advisory bodies, system proponents, and related industries with the efforts of the Test Center.

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Further Notice of Inquiry )

**Comments of the**  
**ADVANCED TELEVISION TEST CENTER**

The Advanced Television Test Center ("Test Center") submits its comments in response to the Tentative Decision and Further Notice of Inquiry ("Further Notice") (released September 1, 1988) in the above-captioned proceeding. The Test Center is an unprecedented cooperative undertaking established for the targeted purpose of conducting objective and psychophysical tests of advanced television ("ATV") systems and providing the resulting test data to the Commission, other government agencies, all affected industries, and the general public.

The Test Center brings together the views of the three commercial networks, the Public Broadcasting Service, National Association of Broadcasters, Association of Independent Television Stations ("INTV"), and Association of Maximum Service Telecasters ("MST"). MST and INTV raised funds from a combination of 34 group and individual television

stations for this purpose. The common bond among these member organizations in support of the Test Center is the conviction that ATV issues are seminally and urgently important and that government, industry and the public can intelligently resolve these issues only if they have available to them, as quickly as possible, the necessary test information.

The Test Center is also committed to reaching out to other affected industries -- cable, television set manufacturers, programmers, and the electronics and other key industries. It is similarly committed to full and effective cooperation with the Commission ("FCC"), the FCC ATV Advisory Committee on Advanced Television Service ("ATV Advisory Committee"), National Telecommunications and Information Administration, Congress, and others. The ultimate goal, which we are determined to achieve, is to enable the public to receive high quality ATV service.

The Test Center here assures the Commission that it is vigorously prosecuting the key function of system evaluation. While we believe that the private sector, and in particular the Test Center, has the key role, we ask for Commission assistance in three important respects:

-- The Commission, through its Advisory Committee and other informal means, should spur ATV system developers to ready their systems for Test Center evaluation as promptly as possible.

-- It should also urge its ATV Advisory Committee, through appropriate Working Parties, to devise and adopt realistic tests and procedures as quickly as possible.

-- Finally, the Commission should informally support the Test Center's efforts to enlist the cooperation of other industries.

I. **THE TEST CENTER'S GOALS ARE CRITICAL TO AN INFORMED RESOLUTION OF VARIOUS ATV ISSUES.**

In its Notice of Inquiry,<sup>1/</sup> Further Notice of Inquiry, and the charter of its ATV Advisory Committee, the Commission asked a number of important technical questions relating to development of an advanced television (ATV) transmission standard. Before any recommendation can be made, however, extensive laboratory and field (over-the-air) tests are required to determine the feasibility of alternative ATV systems for use in this country. The members of the Test Center do not recommend holding back other distribution media in implementing ATV, but feel it is of prime importance that the free and universal television system in this country have the opportunity to be competitive both in picture and sound quality and in marketplace timing.

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<sup>1/</sup> FCC MM 87-268, released August 20, 1987.

The Advanced Television Test Center was established to test the many advanced television transmission systems that have been proposed. In general, the tests will measure the quality, ruggedness against interference, ability to co-exist with NTSC signals, and operating characteristics of the new systems in the nation's electronic environment. The considerable breadth and magnitude of the required testing are becoming apparent as a result of the continuing work of the ATV Advisory Committee. Testing must include both objective, technical analysis and subjective, psychophysical evaluation of each system to be tested. The test parameters must be developed very promptly and they must be realistic. Needlessly elaborate procedures will only deter system developers and manufacturers and retard necessary testing.

In addition, the Test Center will explore the suitability of various spectrum bands for transmission of advanced television and assess the practicality of these bands (VHF, UHF, and bands above 1 GHz) for single channel and wideband systems, and, where appropriate, for such purposes as studio-to-transmitter links, network interconnection, and the like.

Finally, the members of the Test Center are considering ways to participate in the important areas of consumer and market research surrounding the introduction of ATV service.

The Test Center is developing the facilities and staff to perform the necessary tests in an independent and timely way. The government itself does not plan to test, and the ATV Advisory Committee does not have the resources or facilities to do so. In fact the Test Center was created in reponse to the expressed need for such tests. Results of the ATV Test Center's analyses will be made available to the Commission and other government agencies, the television industry, other affected industries, and the public.

**II. THE TEST CENTER IS MOVING FORWARD AGGRESSIVELY WITH ITS FACILITIES AND OPERATIONAL PLAN.**

Work is now underway to: 1) design the Test Center facilities and establish test procedures; 2) develop joint testing efforts with others; and 3) assess spectrum options for implementing advanced television transmission systems.

The Test Center is designing a laboratory and test facility to be built in the National Capital area, where several suitable sites have been identified. It will contain a laboratory, space for proponent systems' equipment, appropriate viewing facilities and necessary offices and related resources. Construction of the Test Center facility and acquisition of major equipment for it must begin as soon as possible. Completion of the laboratory is expected to take some nine months, given the lead time needed for designing and/or acquiring the specialized and sometimes unique equipment, and recruiting and training staff.

While this facility is being developed, the Test Center is operating from its offices in Alexandria, Virginia. It has hired key management, including the Executive Director and the Chief Scientist, and other full-time staff and project consultants. Additional staff is planned as Test Center work advances, including scientists, engineers, and other professional personnel.

Members of the Test Center have pledged \$3.5 million for the first two years of its operations; additional offers of equipment, facilities, and services have been received from others. The Test Center expects that substantial additional support will result from cooperative efforts with other organizations in the U.S. and Canada.

The Test Center staff has already developed a radio frequency ("RF") test bed design and equipment lists which have been received preliminary approval of the ATV Advisory Committee's working party on evaluation and testing. The RF test bed will simulate the over-the-air transmission environment in which advanced television systems must operate. It will permit the Test Center to introduce, across the range of proponent channel and spectrum possibilities, signal impairments, such as noise, co-channel and adjacent channel interference, and airplane flutter at different levels of desired and undesired signals. The Test Center presently plans also to conduct comprehensive testing of the systems' suitability for carriage by cable systems and is actively

enlisting the support of the Cable Television Laboratories for this and other test projects. The Test Center will also conduct or cooperate with others in conducting necessary over-the-air tests to supplement laboratory test results.

The Test Center has developed a close working relationship with the ATV Advisory Committee's working parties and Subcommittees involved in designing test specifications and procedures, through participation of its own staff and representatives of its member organizations. Drafts of these designs are now scheduled for submission to the ATV Advisory Committee at the end of February 1989.<sup>2/</sup> We anticipate that such designs will be used; but if there are any problems, we have pledged to work them out with the ATV Advisory Committee.

Test Center planning has been somewhat frustrated, however, by the difficulty of ascertaining when the various proposed systems will be ready in the necessary hardware form for evaluation. Nevertheless, a speedy and thorough testing process is required. It is presently estimated that four some weeks will be required for the evaluation of each system tested.<sup>3/</sup> Given that some 20 systems have been proposed so

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<sup>2/</sup> In September and again this month, the Test Center solicited proponents' comments on drafts of Test Center facility plans.

<sup>3/</sup> This schedule demonstrates the inefficiencies and delays that would result from a separate series of tests, for example, to evaluate the suitability of the various ATV

far, one can readily see that as much as a year and a half may be required to complete the testing.<sup>4/</sup>

An early start is therefore absolutely essential. Consequently the Commission should reinforce the message that system developers must make a commitment to submit system hardware for Test Center evaluation as soon as possible.<sup>5/</sup>

The Test Center is also drafting detailed procedures for conducting these tests. These procedures will be published well in advance to permit time for review by proponents.

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(footnote cont'd)

systems being broadcast over the air and then passed by cable systems. Such a separate test regimen would require each system developer to ship its equipment to two different locations and to undergo the considerable expense and burden that would require.

<sup>4/</sup> However, if necessary, the Test Center would hope to accommodate two proponent systems at the same time; while one system is being tested, the other may be brought in and set up in, or removed from, a second proponent equipment room. This would permit near continuous testing and could cut the total testing period in half. This arrangement would also expedite testing in the event of a system or facility breakdown, unexpected schedule delays or changes, or where retesting a system may be necessary or appropriate.

<sup>5/</sup> Estimates of system availability for testing may be facilitated by analysis of the presentations by system proponents on November 14-18, 1988, to the Advisory Committee's Systems Subcommittee/Working Party 1.

**III. THE TEST CENTER IS DEVELOPING COOPERATIVE ACTIVITIES WITH OTHER MEDIA AND ORGANIZATIONS.**

The Test Center staff has sought out other organizations and media to explore areas of cooperation in testing advanced television transmission systems. Such cooperation can reduce the burden on proponents by limiting the number of test sites and the number of separate tests that must be conducted on each system; and it can ensure that the tests will be consistent for various media and of maximum usefulness to the Advisory Committee, the Commission and others. It can also help expedite the testing process.

For example, the ATV Test Center and the Cable Television Laboratories have already concluded one joint agreement for the design of the psychophysical testing plan. Further discussions are underway about other joint facility and testing arrangements. Also, the Test Center and the Canadian Advanced Broadcasting Systems Committee and the Canadian Communications Research Center are discussing cooperative arrangements for testing in the U.S. and Canada. For example, in addition to contributions of equipment and talent from U.S. broadcast organizations to the Test Center's propagation works, the Canadian organizations are planning to lend equipment, expertise and development of specialized software for the analysis of propagation data.

**IV. THE FIRST PHASE OF TESTING IS UNDER WAY -- PROPAGATION TESTS OF VARIOUS SPECTRUM OPTIONS.**

The Test Center has adopted a plan for over-the-air propagation tests in the Washington, D.C., area to help determine the feasibility of using existing VHF and UHF television bands, as well as spectrum in the SHF bands, for terrestrial transmission of advanced television service. There are several reasons for undertaking all of these tests. First, this early analysis is key to understanding whether two-channel and wideband ATV transmission systems can work, and which spectrum might best accommodate such systems. Second, these tests will provide a better understanding of ATV performance in spectrum above 1 GHz where crucial links in the television distribution chain already operate and will remain. Finally, performing all these field tests in combination now is very cost-effective, inasmuch as they can be done with the same test vehicle and crew, with equipment already lent or purchased for this purpose.<sup>6/</sup>

Actual propagation testing is expected to begin next month, and to be completed by June 1989. The necessary authorization for the UHF testing has already been granted by the Commission. Applications for use of channels above 1 GHz are now before the Commission and coordination with other users in this band is being worked out. Finally, the Test

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<sup>6/</sup> For example, the incremental cost of conducting tests above 1 GHz at the same time as the VHF and UHF propagation tests is estimated at only \$25,000.

Center has adopted a budget for this work and is hiring staff and assembling appropriate equipment.

One set of the propagation tests will compare test signals transmitted simultaneously on: 1) one VHF and one UHF channel; and 2) two widely-separated UHF channels. Measured variations in relative signal strengths and the delay of one signal relative to the other will be used to test the ruggedness of ATV systems that rely on receivers being able to combine an NTSC signal and a second, augmentation signal. A second set of tests will study propagation characteristics of UHF and SHF channels carrying signals wider than 6 MHz.

Although questions remain about spectrum availability in both existing broadcast bands and bands above 1 GHz, the Test Center agrees with the ATV Advisory Committee that the data gathered by these tests will be valuable.<sup>7/</sup>

## V. CONCLUSION

Terrestrial television broadcasters have committed major resources to the Test Center in order to ensure prompt and thorough evaluation of proposed advanced television transmission systems. This will speed development of the country's future television services. The Test Center will conduct these tests in cooperation with the Commission's ATV

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<sup>7/</sup> ATV Advisory Committee Interim Report, pp 8, 15-16, June 16, 1988.

Advisory Committee and others. Evaluation of the full results of this laboratory and field testing is essential if the ATV Advisory Committee is to complete its work and present its recommendations to the Commission, and if full industry and public scrutiny of the systems is to be assured.

With regard to both system design and spectrum needs, the requirements for protecting the public's NTSC and ATV service from interference from each other are by no means clear. The adequacy of system design and of spectrum protection ratios can be answered only when the proposed ATV signals have been studied in the laboratory and in the field. The Test Center is committed to carrying out these studies as soon as the proposed systems are ready for testing.

Therefore, the Test Center urges the Commission to permit adequate testing before the Commission makes any final decisions affecting spectrum availability or ATV transmission standards.

Respectfully submitted,

ADVANCED TELEVISION TEST  
CENTER, INC.

November 30, 1988

  
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