RECEIVED

AUG 14 1992

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

ORIGINAL FILE

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

In the Matter of	)	
	)	
Amendment of Section 73.682(a)(21)(iv)	)	
of the Commission's Rules To Permit	)	RM -
The Transmission of Ghost Canceling	)	
Reference Signals on Line 19 of NTSC	)	
Color Television Transmissions.	)	

Petition for Rule Making

Pursuant to Section 1.401 of the Commission's Rules, the United States Advanced Television Systems Committee ("ATSC")[1] asks the Commission to amend Section 73.682(a)(21)(iv) of its Rules to restrict the kind of signal that can be placed on Line 19 of the vertical blanking interval of NTSC color television transmissions to the Ghost Canceling Reference signal standardized by ATSC ("ATSC GCR signal") and included as Attachment A.

The reasons for our request are described fully below.

I. Introduction.

Section 73.682(a)(21)(iv) of the Commission's Rules specifically reserves Line 19 of the NTSC television system vertical blanking interval for the transmission of a Vertical Interval Reference signal ("VIR signal") and precludes transmission of alternative or different

[1]ATSC is a private-sector organization whose charter and terms of reference provide for the voluntary standardization of advanced television technologies. The membership of ATSC is broadly constituted among the industries most affected by advanced television: broadcasting, cable, satellite, manufacturing, and motion picture production. A complete list of member companies and organizations is included as Attachment B.

No. of Copies rec'd 0+5
List A B C D E

signals.[2] Because the VIR signal no longer serves the purposes for which it was developed, reservation of Line 19 for the VIR signal is unnecessary. At the same time, Line 19 is an optimal choice for the transmission of the ATSC GCR signal.

The ATSC has completed a standardization process that has culminated in the development of a single technical standard for ghost canceling service. ATSC believes that its standard will have maximum likelihood of being implemented by the broadcast, cable, and consumer electronics industries if the Commission protects the use of Line 19 for the transmission of the ATSC GCR signal. In order to encourage manufacturers, and to assure the compatibility of ghost canceling encoders and decoders, ATSC strongly urges the Commission to reserve the use of Line 19 exclusively for transmission of the ATSC GCR signal standard.

II. The Commission Should Begin a Rulemaking Proceeding Proposing to Adopt the ATSC GCR standard for Line 19.

In order for broadcasters, cable companies, and consumer electronics manufacturers to cooperatively bring ghost canceling service to American television viewers, Commission regulatory approval is necessary in light of the industry's clear preference to use Line 19. The VIR signal now specified in the Commission's Rules simply no longer serves the purposes for which it was intended. Consumer electronics manufacturers are not currently using the Line 19 VIR signal. ATSC can conceive of no possible reason why the existing Line 19 regulations should NOT be changed to permit transmission of standardized ghost canceling service. The Commission should begin rulemaking as soon as possible.

---

[2]Specifically, the Commission's Rules provide that "line 19, in each field, may be used only for the transmission of the reference signal described in Figure 16 of § 73.699." 47 CFR § 73.682(a)(21)(iv) (1991). The VIR signal transmission requirement was adopted by the Commission on November 12, 1974.

A. The VIR Signal no longer serves the purposes for which it was intended.

Television receivers being manufactured today do not have VIR signal circuitry and, as discussed further below, there are very few receivers in the hands of consumers that contain VIR capability. Accordingly, no compelling reason exists for the FCC to strictly maintain the Section 73.682(a)(21)(iv) regulatory requirement that constrains use of Line 19 to the transmission of VIR signals. The public interest would be better served if Line 19 became available exclusively for transmission of the ATSC GCR signal.

Section 73.682(a)(21)(iv)'s VIR signal requirement was designed to promote greater uniformity and consistency of color television reception.[3] Although the VIR signal potentially could have improved color television reception, for a variety of reasons discussed below, that potential was not realized. A far better improvement to NTSC service would be the use of ghost canceling technology. Ghost canceling, when implemented, is an attractive new feature that will generate a significant improvement in consumer color television reception. Similarly, the use of ghost cancelers at cable television "head-ends" could improve their customers' reception of broadcast television signals.

As television broadcasters and the viewing public made the transition from monochrome to color, significant variation in color characteristics (observed on home television receivers from program to program and from station to station) became

[3]See Report and Order, Docket No. 19907, adopted November 12, 1974, released November 20, 1974, FCC 74-1234, 49 FCC 2d 884, 31 RR2d (P&F) 1505.

increasingly evident. Most color television receivers used the color burst amplitude as a reference that enabled control of the chrominance channel gain using the receiver's automatic chrominance circuits. However, the color burst amplitude varied enough to make such a reference almost useless.[4] Also, the original program reference burst phase was not retained by many broadcasters. To remedy these difficulties, the VIR signal was devised as a means to reduce undesired variations in color throughout the television system by providing a more precise reference signal. In theory, the VIR signal would have enabled television producers, broadcasters, and the automatic color correction circuits in home receivers to adjust signal parameters in such a way as to restore the original program's color, notwithstanding distortions or artifacts that may have been introduced into the television system prior to color correction.[5]

Unfortunately, however, effective implementation of the VIR signal did not occur to the extent that cognizable VIR signal benefits were provided to consumers. Primarily due to the advances made in the chroma circuitry processing of the color burst signal, circuitry to maximize the potential benefits of the VIR signal was not widely implemented by the receiver manufacturing industry. Only one manufacturer, General Electric, actually produced any significant quantity of VIR equipped receivers, and production of these receivers ceased in

---

[4]The FCC's specifications for NTSC color transmission permitted up to an 8.4 dB variance between the burst amplitude and the resulting chrominance gain. See, e.g., Loughlin, B.D., The VIR Signal and its Status, Proceedings of the 28th Annual Broadcast Engineering Conference, National Association of Broadcasters (1974) at 25.

[5]See EIA Recommended Practice for Use of a Vertical Interval Reference (VIR) Signal, EIA Television Systems Bulletin No. 1, EIA Engineering Department (July, 1972).

1985. ATSC believes the number of these receivers that now exist in the hands of consumers is very small. Tests performed during the course of ATSC's work indicate that receivers with VIR circuitry are not adversely affected by the presence of a GCR signal on Line 19.[6] Moreover, the few VIR receivers remaining in the market are capable of operation using the color burst signal in the absence of the VIR signal. No receivers manufactured today use the presence of the VIR signal to maintain consistent color rendition, and ATSC is not aware of any plans to begin manufacturing of VIR receivers.[7] Also, the implementation of the VIR signal by broadcast stations and networks was such that it could not be adequately relied upon to provide a standard reference for a VIR receiver. For the VIR signal to be maximally effective for the consumer, the VIR signal must be added at the time the program is originally created and must remain unchanged during distribution of that program. It was difficult for television stations to consistently apply the VIR signal given the complexities of program production and distribution. And, a mis-applied VIR signal could actually change

---

[6]The Public Broadcasting Service (PBS) conducted tests to determine the effect on VIR receivers of four candidate ATSC GCR signals placed on line 19. Two General Electric VIR receivers were tested. PBS concluded:

> "The test result indicated that the receivers tested did not recognize [the ATSC GCR signal]. Therefore, the receivers acted as if there was no VIR signal present; The VIR indicator LEDs were off and manual adjustments could be used to set proper color, tint and brightness even [if] the VIR function was turned on."

Public Broadcasting Service, VBI Utilization Tests of Ghost Canceling Systems (hereinafter "PBS VBI Tests"), ATSC Document No. T3/204, Section 6.7 (May, 1992).

[7]As can be seen from Attachment B, virtually all major manufacturers of television receivers are members of ATSC and participated in the ghost-canceling standardization activities of ATSC.

the consumer's received color rendition for the worse. A ghost canceling signal, in contrast, needs to be added only once -- at the point of over-the-air transmission.

Based on these factors -- no manufacturing, and insufficient implementation -- ATSC believes there is no compelling reason to maintain a reservation of Line 19 for the transmission of the VIR signal by television stations.

B. The Commission Should Encourage Standardized Implementation of the ATSC GCR Signal.

At the request of the National Association of Broadcasters (NAB), the ATSC has successfully developed and agreed to a single technical standard for a ghost canceling reference signal.[8] GCR technology was conceived and originally discussed well over a decade ago.[9] Today, with the advent of smaller, faster and less expensive digital devices, it is now possible to develop ghost canceling decoders at costs that suggest a consumer and professional market may develop rapidly for ghost canceling decoders both in the head-ends of cable television systems as well as in consumer television receivers.

---

[8]The broadcasting industry strongly supports a ghost canceling technical standard. In 1990, NAB surveyed television station chief engineers on the importance of a ghost canceling technical standard. Almost half (47%) of the respondents rated a ghost canceling standard as Very Important and another 40% responded rated ghost canceling as Somewhat Important. See Memo from ATSC T3/S5 VBI Study Group, ATSC Document No. T3S5/1067 (August 1, 1990).

[9]See Ciciora, W., Sgrignoli, G., and Thomas, W., A Tutorial on Ghost Canceling in Television Systems, IEEE Transactions on Consumer Electronics, Vol. CE-25 at 9-44 (February, 1979). See also Miyazawa, H., Matsuura, S., Takayama, S. and Masao, U., Development of a Ghost Cancel Reference Signal for TV Broadcasting, IEEE Transactions on Broadcasting, Volume 35, No. 4 at 339-347 (December, 1989).

ATSC has worked extensively on ghost canceling since July, 1989. Through June, 1992, ATSC held nineteen meetings of its specialist group on ghost canceling ("T3/S5"), three subsequent meetings of a special task force on ghost canceling, and conducted computer simulations, cable system field tests, and two sets of laboratory and over-the-air field tests.[10] ATSC also performed compatibility tests to insure that the presence of GCR signals in the VBI does not cause any adverse reaction to the existing receiver population.[11] There is no longer any doubt that ghost canceling technology is available and can be implemented quickly once a single location in the vertical blanking interval is found for the GCR signal.

On August 13, 1992, the ATSC completed a letter ballot vote of the ATSC membership and thereby established an ATSC voluntary technical standard for a GCR

---

[10]See Report of T3/S5 (ATSC Specialist Group on Ghost Canceling), ATSC Document No. T3/188 (March 20, 1992) (hereinafter, T3/S5 Report). See also PBS VBI Tests, supra n.6; Cable Television Laboratories, Inc., Phase II Laboratory Tests of NTSC Ghost Cancelers, ATSC Document No. T3/205 (June 16, 1992); and NAB/MSTV, Laboratory and Field Tests of Philips, Sarnoff/Thomson and Hybrid Philips/Sarnoff/Thomson Ghost Canceling Systems for NTSC Television Broadcasting, ATSC Document No. T3/204 (June 18, 1992).

[11]GCR compatibility tests were performed under the auspices of the Electronic Industries Association (EIA) "to ascertain if the presence of the GCR signals in broadcast transmissions caused any degradation to television reception on existing television receivers." Receivers with closed captioning decoders were included in these tests. EIA concluded:

> "No effects to off-air reception or to closed captioning information, attributable to GCR signal insertion, were observed on the television receivers. . . ."

GCR Compatibility with Existing Equipment, Appendix I to NAB/MSTV Results of Field Test of Ghost Canceling Systems (January 31, 1992) at 36.

signal.[12] All of those voting approved the proposed systems.[13] The selection of one system for GCR signal standardization culminated a long process of testing and intensive technical discussion that at one time considered five different proposals for ghost canceling systems. Having completed this three-year standardization process, the ATSC GCR signal standard has a great deal of support among ATSC members. Still, ATSC believes that FCC action is necessary to enable widespread and low-cost availability of ghost canceling service to American viewers. The ATSC urges the FCC to encourage standardized implementation of the ATSC GCR signal by amending Section 73.682(a)(21)(iv) of its Rules to restrict transmissions on Line 19 of the vertical blanking interval to the ATSC GCR signal included herein as Attachment A. While use of the GCR Signal by broadcasters should be optional, FCC incorporation of the ATSC standard in the Commission's Rules will strongly encourage all industry segments to bring ghost canceling service to the American viewing public as soon as possible.

C. Line 19 Should Become Available for Transmission of the ATSC GCR Signal.

After carefully considering the various locations within the vertical blanking interval that might be appropriate to carry the GCR signal, the ATSC believes that use of Line 19 represents the optimal location for the GCR signal. For technical reasons, the location of the GCR signal must be in the vertical blanking interval of NTSC television station

---

[12]See Ghost Canceling Reference Signal for NTSC, ATSC Standard, Doc. A/49 (August 14, 1992), included here as Attachment A.

[13] 38 ATSC Members voted in favor. 4 Members abstained. None voted against.

transmissions. Committing a specific line in the VBI to GCR signals (rather than, for example, a flexible placement) minimizes costs in the necessary receiver circuitry.[14] Identification of a specific VBI line will also bolster the confidence of the television industry in ghost canceling technology and encourage local broadcasters to initiate this improvement as rapidly as possible. Because Line 19 has been protected by the Commission, it is the only line that today is passed unencumbered through the entire broadcast chain: transmitters, translators, CATV systems, MATV systems, and home recording systems. The use of Line 19 for ghost canceling is acceptable to broadcasters and will help lead to rapid introduction of an effective and inexpensive NTSC ghost canceling service.[15]

III. Conclusion.

For the reasons discussed above, we no longer believe the VIR transmission requirement contained in Section 73.682(a)(21)(iv) of the Commission's Rules should remain part of the FCC's rules. Instead, the implementation of the ATSC GCR signal should replace VIR signals on Line 19 and, as a result, enable a pronounced improvement in the reception of television broadcasts in the presence of multipath, ghosting, and other linear channel distortions that may exist between the television transmitter and television receiver. To help

---

[14]VBI space is used for a variety of functions by broadcast stations and cable system operators. These functions include teletext, closed-captioning for the hearing impaired, vertical interval test signals, many varieties of data transmissions, and additional test signals.

[15]The ATSC's views on the use of Line 19 are the result of a special task force on the use of the vertical blanking interval, T3/S5 Report, n.10, supra at 51, as approved by the ATSC Technology Group on Distribution (T3). See Meeting Minutes of the ATSC Technology Group on Distribution (T3), ATSC document No. T3/206 (June 25, 1992).

ensure that the benefits of ghost canceling technology are available to American viewers as soon as possible, ATSC urges the Commission to promptly begin a Rulemaking proceeding to permit the ATSC standard ghost canceling service to begin.

Respectfully submitted,

United States Advanced
Television Systems Committee
1776 K St., N.W., Suite 300
Washington, D.C. 20006

James C. McKinney
Chairman

August 14, 1992

CERTIFICATE OF SERVICE

I, Christy Kehlbeck, do hereby certify that a true and correct copy of the foregoing "Petition for Rule Making" was sent by first class mail, this August 14, 1992, to the following:

The Honorable Alfred C. Sikes
Chairman
Federal Communications Commission
1919 M Street, N.W.
Room 814
Washington, D.C. 20554

The Honorable James H. Quello
Commissioner
Federal Communications Commission
1919 M Street, N.W.
Room 802
Washington, D.C. 20554

The Honorable Sherrie P. Marshall
Commissioner
Federal Communications Commission
1919 M Street, N.W.
Room 826
Washington, D.C. 20554

The Honorable Andrew C. Barrett
Commissioner
Federal Communications Commission
1919 M Street, N.W.
Room 844
Washington, D.C. 20554

The Honorable Ervin S. Duggan
Commissioner
Federal Communications Commission
1919 M Street, N.W.
Room 832
Washington, D.C. 20554

Mr. Roy J. Stewart
Chief, Mass Media Bureau
Federal Communications Commission
1919 M Street, N.W.
Room 314
Washington, D.C. 20554

Mr. Thomas P. Stanley
Chief Engineer
Office of Engineering and Technology
Federal Communication Commission
2025 M Street, N.W.
Room 7002
Washington, DC 20554

Mr. Gordon W. Godfrey
Acting Chief, Engineering
Mass Media Bureau
Federal Communications Commission
2025 M Street, N.W.
Room 8112
Washington, DC 20554

Mr. William Hassinger
Assistant Chief, Mass Media Bureau
Federal Communications Commission
1919 M Street, N.W.
Room 314
Washington, D.C. 20554

Christy Kehlbeck

Christy Kehlbeck

United States Advanced Television Systems Committee

ATSC Standard

GHOST CANCELING REFERENCE SIGNAL FOR NTSC

1. Scope

This document describes a ghost canceling reference (GCR) signal for NTSC television signals.

2. Specification of the GCR Signal

The GCR signal permits detection of ghosts from -3 μsec to +45 μsec. The signal has a flat spectrum and high energy up to 4.1 MHz and has a very low level of energy beyond 4.3 MHz (Figure 1). The normalized GCR signal as a function of time is shown in Figure 2.

The GCR signal shall be placed on line 19* of the vertical blanking interval on a 30 IRE pedestal. The pedestal has a rising transition from 0 IRE to 30 IRE 9.5 μsec after the leading edge of horizontal sync (defined at the 50% point). The falling transition from 30 IRE to 0 IRE is 58.5 μsec after the leading edge of horizontal sync. Both transitions have a 4T transition curve.

The GCR signal has a time duration of 35.5 μsec (measured at 1% of the maximum value) and begins 12.0 μsec after the leading edge of horizontal sync. The first peak (positive or negative) is 16.7 μsec after the leading edge of horizontal sync. The GCR signal varies from -10 to +70 IRE (the pedestal is the average of these extreme values).

Waveforms of the GCR signal on the pedestal are shown in Figure 3 and Figure 4 and represent line A and line B, respectively. Line A and line B have the same 30 IRE pedestal but the GCR polarity is inverted from line A to line B. The line A and line B signals are contained in an 8-field sequence as follows:

field 1 - line A; field 2 - line B; field 3 - line A; field 4 - line B;
field 5 - line B; field 6 - line A; field 7 - line B; field 8 - line A.

Numerical values of the GCR signal as a function of time are given in Annex I. These values were calculated from (1).

$$f(t) = \frac{A}{2\pi} \left[\int_0^{\Omega} [\cos(b\omega^2) + j\sin(b\omega^2)]\, W(\omega)\, e^{j\omega t}\, d\omega + \int_{-\Omega}^{0} [\cos(b\omega^2) - j\sin(b\omega^2)]\, W(\omega)\, e^{j\omega t}\, d\omega \right] \quad (1)$$

where A = 9.0, b = 110.0, and $\Omega = \frac{4.3}{7.16}\pi$ Rad. W(ω) is the window function (2).

$$W(\omega) = \int_{-\frac{\pi}{c}}^{\frac{\pi}{c}} \left[\left[\frac{1}{2} + \frac{1}{2}\cos(ct) \right] \left[\frac{1}{2\pi} \int_{-\Omega_1}^{\Omega_1} e^{j\gamma t}\, d\gamma \right] \right] e^{-j\omega t}\, dt \quad (2)$$

where $c = 2.8 \cdot 10^5\, \pi$ Rad. and $\Omega_1 = \frac{4.15}{7.16}\pi$ Rad.

---

* Subject to reservation of line 19 by the FCC exclusively for the optional placement of the GCR signal.

NOTE: The user's attention is called to the possibility that compliance with this standard may require the use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to the validity of this claim or of any patent rights in connection therewith. The patent holder has, however, filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license. Details may be obtained from the publisher.

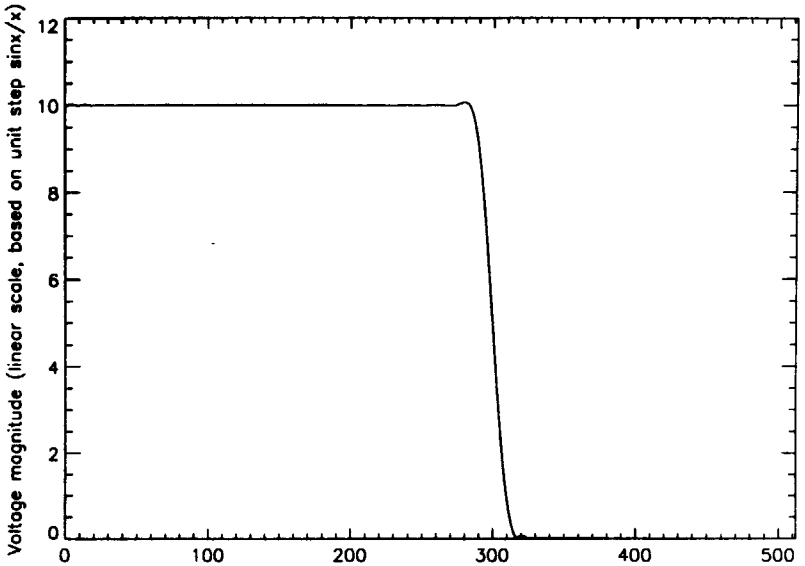

Figure 1. The Spectrum of the GCR Signal

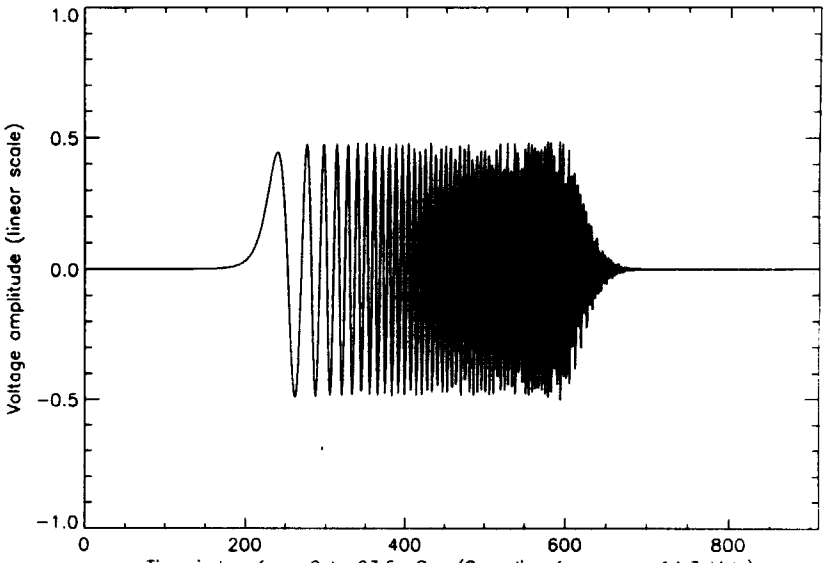

Figure 2. The Time Domain Normalized Waveform of the GCR Signal

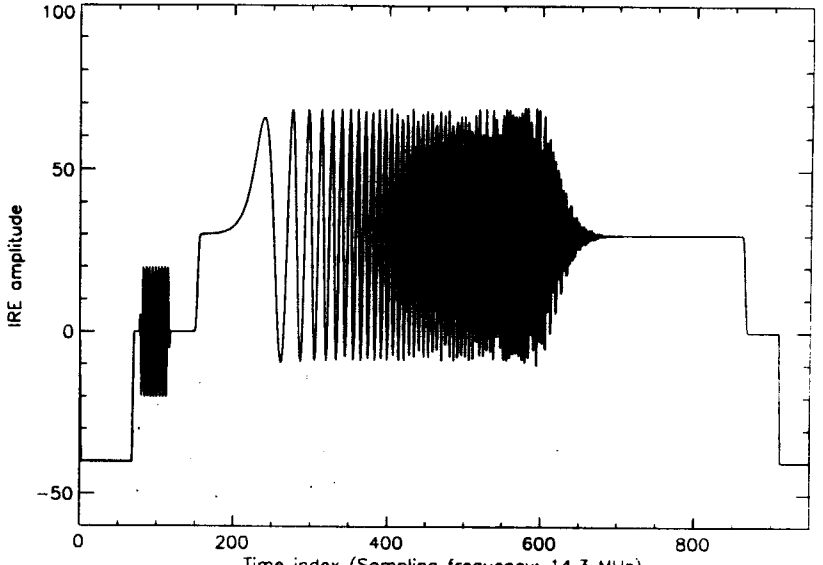

Figure 3. Line A

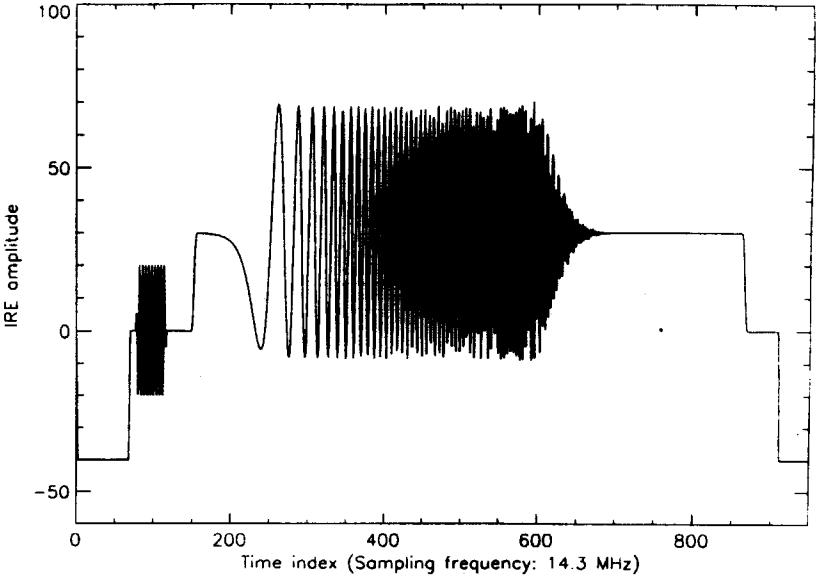

Figure 4. Line B

Annex I

This Annex contains the GCR signal values. The 910 data values were sampled at 14.3 MHz (4 times color subcarrier) and represent a complete GCR waveform in a full TV line (63.5 μsec). The first sample is coincident with the 50% point of the leading edge of horizontal sync. The data are normalized to 1.0 unit peak to peak and represent the GCR signal with positive polarity. A negative polarity GCR signal can be obtained by multiplying all the data by -1.

000	0.00000000000000E+0000	067	0.00000000000000E+0000	134	0.00000000000000E+0000
001	0.00000000000000E+0000	068	0.00000000000000E+0000	135	1.02260999999970E-0003
002	0.00000000000000E+0000	069	0.00000000000000E+0000	136	1.05892999999924E-0003
003	0.00000000000000E+0000	070	0.00000000000000E+0000	137	1.09718000000036E-0003
004	0.00000000000000E+0000	071	0.00000000000000E+0000	138	1.13701999999982E-0003
005	0.00000000000000E+0000	072	0.00000000000000E+0000	139	1.17906999999917E-0003
006	0.00000000000000E+0000	073	0.00000000000000E+0000	140	1.22286999999943E-0003
007	0.00000000000000E+0000	074	0.00000000000000E+0000	141	1.26910000000002E-0003
008	0.00000000000000E+0000	075	0.00000000000000E+0000	142	1.31748000000087E-0003
009	0.00000000000000E+0000	076	0.00000000000000E+0000	143	1.36846999999918E-0003
010	0.00000000000000E+0000	077	0.00000000000000E+0000	144	1.42190000000042E-0003
011	0.00000000000000E+0000	078	0.00000000000000E+0000	145	1.47821000000015E-0003
012	0.00000000000000E+0000	079	0.00000000000000E+0000	146	1.53740000000013E-0003
013	0.00000000000000E+0000	080	0.00000000000000E+0000	147	1.59988999999960E-0003
014	0.00000000000000E+0000	081	0.00000000000000E+0000	148	1.66547000000072E-0003
015	0.00000000000000E+0000	082	0.00000000000000E+0000	149	1.73485999999912E-0003
016	0.00000000000000E+0000	083	0.00000000000000E+0000	150	1.80787000000038E-0003
017	0.00000000000000E+0000	084	0.00000000000000E+0000	151	1.88510000000086E-0003
018	0.00000000000000E+0000	085	0.00000000000000E+0000	152	1.96657000000044E-0003
019	0.00000000000000E+0000	086	0.00000000000000E+0000	153	2.05283000000023E-0003
020	0.00000000000000E+0000	087	0.00000000000000E+0000	154	2.14390000000009E-0003
021	0.00000000000000E+0000	088	0.00000000000000E+0000	155	2.24045999999944E-0003
022	0.00000000000000E+0000	089	0.00000000000000E+0000	156	2.34250000000102E-0003
023	0.00000000000000E+0000	090	0.00000000000000E+0000	157	2.45085999999972E-0003
024	0.00000000000000E+0000	091	0.00000000000000E+0000	158	2.56557000000157E-0003
025	0.00000000000000E+0000	092	0.00000000000000E+0000	159	2.68752999999933E-0003
026	0.00000000000000E+0000	093	0.00000000000000E+0000	160	2.81685999999937E-0003
027	0.00000000000000E+0000	094	0.00000000000000E+0000	161	2.95447999999965E-0003
028	0.00000000000000E+0000	095	0.00000000000000E+0000	162	3.10071999999906E-0003
029	0.00000000000000E+0000	096	0.00000000000000E+0000	163	3.25656000000052E-0003
030	0.00000000000000E+0000	097	0.00000000000000E+0000	164	3.42231000000126E-0003
031	0.00000000000000E+0000	098	0.00000000000000E+0000	165	3.59925000000061E-0003
032	0.00000000000000E+0000	099	0.00000000000000E+0000	166	3.78781999999944E-0003
033	0.00000000000000E+0000	100	0.00000000000000E+0000	167	3.98931000000147E-0003
034	0.00000000000000E+0000	101	0.00000000000000E+0000	168	4.20439999999900E-0003
035	0.00000000000000E+0000	102	0.00000000000000E+0000	169	4.43461999999784E-0003
036	0.00000000000000E+0000	103	0.00000000000000E+0000	170	4.68077000000022E-0003
037	0.00000000000000E+0000	104	0.00000000000000E+0000	171	4.94463999999795E-0003
038	0.00000000000000E+0000	105	0.00000000000000E+0000	172	5.22724000000352E-0003
039	0.00000000000000E+0000	106	0.00000000000000E+0000	173	5.53064000000347E-0003
040	0.00000000000000E+0000	107	0.00000000000000E+0000	174	5.85610000000258E-0003
041	0.00000000000000E+0000	108	0.00000000000000E+0000	175	6.20609999999999E-0003
042	0.00000000000000E+0000	109	0.00000000000000E+0000	176	6.58219999999687E-0003
043	0.00000000000000E+0000	110	0.00000000000000E+0000	177	6.98715000000050E-0003
044	0.00000000000000E+0000	111	0.00000000000000E+0000	178	7.42307000000153E-0003
045	0.00000000000000E+0000	112	0.00000000000000E+0000	179	7.89319000000432E-0003
046	0.00000000000000E+0000	113	0.00000000000000E+0000	180	8.40024000000028E-0003
047	0.00000000000000E+0000	114	0.00000000000000E+0000	181	8.94780000000139E-0003
048	0.00000000000000E+0000	115	0.00000000000000E+0000	182	9.53912999999318E-0003
049	0.00000000000000E+0000	116	0.00000000000000E+0000	183	1.01788000000056E-0002
050	0.00000000000000E+0000	117	0.00000000000000E+0000	184	1.08706000000041E-0002
051	0.00000000000000E+0000	118	0.00000000000000E+0000	185	1.16199999999935E-0002
052	0.00000000000000E+0000	119	0.00000000000000E+0000	186	1.24318000000017E-0002
053	0.00000000000000E+0000	120	0.00000000000000E+0000	187	1.33122999999955E-0002
054	0.00000000000000E+0000	121	0.00000000000000E+0000	188	1.42673999999943E-0002
055	0.00000000000000E+0000	122	0.00000000000000E+0000	189	1.53047000000015E-0002
056	0.00000000000000E+0000	123	0.00000000000000E+0000	190	1.64313999999877E-0002
057	0.00000000000000E+0000	124	0.00000000000000E+0000	191	1.76562000000047E-0002
058	0.00000000000000E+0000	125	0.00000000000000E+0000	192	1.89881000000014E-0002
059	0.00000000000000E+0000	126	0.00000000000000E+0000	193	2.04373999999916E-0002
060	0.00000000000000E+0000	127	0.00000000000000E+0000	194	2.20148999999878E-0002
061	0.00000000000000E+0000	128	0.00000000000000E+0000	195	2.37329999999929E-0002
062	0.00000000000000E+0000	129	0.00000000000000E+0000	196	2.56043999999918E-0002
063	0.00000000000000E+0000	130	0.00000000000000E+0000	197	2.76438999999868E-0002
064	0.00000000000000E+0000	131	0.00000000000000E+0000	198	2.98664999999971E-0002
065	0.00000000000000E+0000	132	0.00000000000000E+0000	199	3.22896999999784E-0002
066	0.00000000000000E+0000	133	0.00000000000000E+0000	200	3.49309999999718E-0002

201	3.78107999999884E-0002	280	1.84488000000101E-0001	359	3.56715999999778E-0001
202	4.09500000000094E-0002	281	5.59898000000203E-0002	360	4.80940999999802E-0001
203	4.43718999999874E-0002	282	-7.91186000000152E-0002	361	4.16690999999901E-0001
204	4.81004000000098E-0002	283	-2.10235999999895E-0001	362	1.85821000000033E-0001
205	5.21621999999979E-0002	284	-3.26232999999775E-0001	363	-1.21634999999969E-0001
206	5.65846999999735E-0002	285	-4.16419000000133E-0001	364	-3.81190000000061E-0001
207	6.13976000000207E-0002	286	-4.71591999999873E-0001	365	-4.84109999999873E-0001
208	6.66313000000400E-0002	287	-4.85105000000203E-0001	366	-3.84040999999797E-0001
209	7.23186999999825E-0002	288	-4.53794000000016E-0001	367	-1.19752999999946E-0001
210	7.84923999999592E-0002	289	-3.78679999999804E-0001	368	1.97697999999946E-0001
211	8.51879000000508E-0002	290	-2.65297999999802E-0001	369	4.30369000000155E-0001
212	9.24387000000024E-0002	291	-1.23576999999955E-0001	370	4.73501999999826E-0001
213	1.00280999999995E-0001	292	3.28038999999762E-0002	371	3.04200000000037E-0001
214	1.08748999999989E-0001	293	1.87584000000015E-0001	372	-4.45780999999812E-0003
215	1.17876000000024E-0001	294	3.23534999999993E-0001	373	-3.12843000000157E-0001
216	1.27694000000020E-0001	295	4.24414000000070E-0001	374	-4.77105999999822E-0001
217	1.38230999999905E-0001	296	4.77027999999791E-0001	375	-4.17065000000093E-0001
218	1.49511000000075E-0001	297	4.73159000000123E-0001	376	-1.57408999999916E-0001
219	1.61552999999913E-0001	298	4.11086000000068E-0001	377	1.79722999999967E-0001
220	1.74367999999959E-0001	299	2.96408000000156E-0001	378	4.30503999999928E-0001
221	1.87959000000092E-0001	300	1.41969000000017E-0001	379	4.69046000000162E-0001
222	2.02316999999994E-0001	301	-3.32369999999855E-0002	380	2.72319000000152E-0001
223	2.17419999999947E-0001	302	-2.06171999999924E-0001	381	-6.37966000000461E-0002
224	2.33228000000054E-0001	303	-3.52687000000060E-0001	382	-3.68903000000046E-0001
225	2.49684999999999E-0001	304	-4.50949999999921E-0001	383	-4.83776999999918E-0001
226	2.66712000000098E-0001	305	-4.84910000000127E-0001	384	-3.44759999999951E-0001
227	2.84204999999929E-0001	306	-4.47235999999975E-0001	385	-2.16183999999942E-0002
228	3.02032999999938E-0001	307	-3.41190000000097E-0001	386	3.14663999999993E-0001
229	3.20032000000083E-0001	308	-1.80984000000080E-0001	387	4.81103000000076E-0001
230	3.38005000000067E-0001	309	9.63199000000259E-0003	388	3.83209000000079E-0001
231	3.55717999999797E-0001	310	2.00563999999986E-0001	389	7.12525999999798E-0002
232	3.72897000000194E-0001	311	3.59968000000208E-0001	390	-2.82396000000062E-0001
233	3.89230000000225E-0001	312	4.59641999999803E-0001	391	-4.76846999999907E-0001
234	4.04360999999881E-0001	313	4.80308000000150E-0001	392	-3.97513999999774E-0001
235	4.17892999999822E-0001	314	4.15771999999833E-0001	393	-8.63047999999935E-0002
236	4.29389999999785E-0001	315	2.75076999999783E-0001	394	2.77078999999958E-0001
237	4.38381999999820E-0001	316	8.19416000000501E-0002	395	4.77041000000099E-0001
238	4.44367000000057E-0001	317	-1.28693999999996E-0001	396	3.90680999999859E-0001
239	4.46823000000222E-0001	318	-3.16683999999896E-0001	397	6.61678999999822E-0002
240	4.45215000000189E-0001	319	-4.44307000000208E-0001	398	-3.00528000000213E-0001
241	4.39011999999821E-0001	320	-4.84112000000096E-0001	399	-4.82100000000173E-0001
242	4.27705000000060E-0001	321	-4.25353000000086E-0001	400	-3.61706000000140E-0001
243	4.10821999999825E-0001	322	-2.77427999999873E-0001	401	-1.12785000000031E-0002
244	3.87955000000147E-0001	323	-6.92708000000266E-0002	402	3.47796000000017E-0001
245	3.58785999999782E-0001	324	1.55655000000024E-0001	403	4.82912999999826E-0001
246	3.23113999999805E-0001	325	3.48071999999775E-0001	404	3.02329000000100E-0001
247	2.80886000000010E-0001	326	4.63710999999876E-0001	405	-7.90537999999970E-0002
248	2.32228000000077E-0001	327	4.73907999999938E-0001	406	-4.09227999999985E-0001
249	1.77474000000075E-0001	328	3.73398000000179E-0001	407	-4.64552999999796E-0001
250	1.17197000000033E-0001	329	1.83113999999932E-0001	408	-2.03408999999965E-0001
251	5.22252000000094E-0002	330	-5.32258000000070E-0002	409	1.98789999999917E-0001
252	-1.63339000000065E-0002	331	-2.78533000000152E-0001	410	4.64230000000043E-0001
253	-8.70900999999549E-0002	332	-4.35938999999962E-0001	411	4.04536999999891E-0001
254	-1.58376000000089E-0001	333	-4.83456999999817E-0001	412	5.75837999999749E-0002
255	-2.28262000000086E-0001	334	-4.05898999999863E-0001	413	-3.32002000000102E-0001
256	-2.94597000000067E-0001	335	-2.20585999999912E-0001	414	-4.82986999999866E-0001
257	-3.55059999999867E-0001	336	2.53643000000068E-0002	415	-2.81882000000223E-0001
258	-4.07236000000012E-0001	337	2.66195000000153E-0001	416	1.27741000000015E-0001
259	-4.48710000000119E-0001	338	4.34799999999996E-0001	417	4.43717999999990E-0001
260	-4.77181000000201E-0001	339	4.81733999999960E-0001	418	4.27357000000029E-0001
261	-4.90596000000096E-0001	340	3.90551999999843E-0001	419	8.67075999999543E-0002
262	-4.87282999999934E-0001	341	1.84567999999899E-0001	420	-3.21608000000197E-0001
263	-4.66113999999834E-0001	342	-7.78073999999833E-0002	421	-4.82884000000013E-0001
264	-4.26633000000038E-0001	343	-3.18760000000111E-0001	422	-2.68137000000024E-0001
265	-3.69197999999869E-0001	344	-4.63948000000073E-0001	423	1.58376000000089E-0001
266	-2.95083999999861E-0001	345	-4.65948999999910E-0001	424	4.60480000000189E-0001
267	-2.06552999999985E-0001	346	-3.20834999999988E-0001	425	3.94394999999804E-0001
268	-1.06861999999978E-0001	347	-7.18414000000394E-0002	426	8.97358999999653E-0003
269	-2.26569000000065E-0004	348	2.02201999999943E-0001	427	-3.85126000000128E-0001
270	1.08304999999973E-0001	349	4.11149000000023E-0001	428	-4.63401999999860E-0001
271	2.13048999999955E-0001	350	4.83345000000099E-0001	429	-1.56926999999996E-0001
272	3.07967000000190E-0001	351	3.91160000000127E-0001	430	2.82047000000148E-0001
273	3.87016000000131E-0001	352	1.62923000000092E-0001	431	4.83843999999863E-0001
274	4.44562000000133E-0001	353	-1.24134000000026E-0001	432	2.73432999999841E-0001
275	4.75829999999860E-0001	354	-3.68950000000041E-0001	433	-1.73019000000068E-0001
276	4.77361000000201E-0001	355	-4.82100000000173E-0001	434	-4.70732000000226E-0001
277	4.47440999999799E-0001	356	-4.19299000000137E-0001	435	-3.57265000000098E-0001
278	3.86449999999968E-0001	357	-2.00237999999899E-0001	436	7.19904999999699E-0002
279	2.97098000000005E-0001	358	9.56523999999490E-0002	437	4.38375000000178E-0001

438	4.12060999999994E-0001	517	1.61409999999933E-0001	596	4.79287999999997E-0001
439	1.23822000000047E-0002	518	4.80509999999867E-0001	597	-2.06691999999975E-0001
440	-3.99836000000050E-0001	519	4.47993000000224E-0002	598	-4.09948999999870E-0001
441	-4.45055000000139E-0001	520	-4.62160999999924E-0001	599	3.29295000000002E-0001
442	-7.71581999999853E-0002	521	-2.35175999999910E-0001	600	2.97392999999829E-0001
443	3.63976000000093E-0001	522	3.67765999999847E-0001	601	-4.18125000000146E-0001
444	4.62701999999808E-0001	523	3.80204000000049E-0001	602	-1.51035000000093E-0001
445	1.21280999999954E-0001	524	-2.21663999999919E-0001	603	4.57456999999977E-0001
446	-3.37500999999975E-0001	525	-4.63874000000033E-0001	604	-1.21829999999932E-0002
447	-4.71152000000075E-0001	526	5.13983000000167E-0002	605	-4.37680000000000E-0001
448	-1.45841000000019E-0001	527	4.82525999999780E-0001	606	1.69366000000082E-0001
449	3.23628000000099E-0001	528	1.17171999999982E-0001	607	3.58297000000221E-0001
450	4.73699000000124E-0001	529	-4.42914000000201E-0001	608	-2.95907000000170E-0001
451	1.51135999999951E-0001	530	-2.64184000000114E-0001	609	-2.30043000000023E-0001
452	-3.24419000000034E-0001	531	3.57844999999998E-0001	610	3.70323999999982E-0001
453	-4.72220000000107E-0001	532	3.76622000000225E-0001	611	7.37844000000223E-0002
454	-1.37774000000036E-0001	533	-2.43244999999888E-0001	612	-3.79878000000190E-0001
455	3.39390999999978E-0001	534	-4.48910999999953E-0001	613	8.26819999999771E-0002
456	4.65411000000131E-0001	535	1.14519999999970E-0001	614	3.24047000000064E-0001
457	1.04878999999983E-0001	536	4.81073999999808E-0001	615	-2.10759999999937E-0001
458	-3.67131999999856E-0001	537	1.47939000000008E-0002	616	-2.15877000000091E-0001
459	-4.50452000000041E-0001	538	-4.77703000000020E-0001	617	2.87343999999848E-0001
460	-5.20331000000169E-0002	539	-1.34743000000071E-0001	618	7.92186999999558E-0002
461	4.03378999999859E-0001	540	4.45565999999872E-0001	619	-3.00759000000198E-0001
462	4.21691999999894E-0001	541	2.38581000000067E-0001	620	5.63948000000210E-0002
463	-2.14152000000070E-0002	542	-3.92727999999806E-0001	621	2.53298000000086E-0001
464	-4.41976000000068E-0001	543	-3.23120999999901E-0001	622	-1.63127999999915E-0001
465	-3.72757999999976E-0001	544	3.26771999999892E-0001	623	-1.60753000000113E-0001
466	1.13511000000017E-0001	545	3.87517000000116E-0001	624	2.21193999999969E-0001
467	4.72905000000083E-0001	546	-2.54672999999912E-0001	625	4.78082000000200E-0002
468	2.96350999999959E-0001	547	-4.33148000000074E-0001	626	-2.23539999999957E-0001
469	-2.19368000000031E-0001	548	1.81812000000036E-0001	627	5.81391000000053E-0002
470	-4.83674999999948E-0001	549	4.62328000000070E-0001	628	1.76492000000053E-0001
471	-1.87777999999980E-0001	550	-1.12458999999944E-0001	629	-1.34119999999939E-0001
472	3.27948999999990E-0001	551	-4.78289000000132E-0001	630	-9.74677000000383E-0002
473	4.59028000000217E-0001	552	4.92869999999925E-0002	631	1.66602999999895E-0001
474	4.67350000000124E-0002	553	4.84148000000005E-0001	632	9.46428999999682E-0003
475	-4.22157999999854E-0001	554	5.86423000000025E-0003	633	-1.54275999999982E-0001
476	-3.85088999999880E-0001	555	-4.83146999999917E-0001	634	6.49469999999610E-0002
477	1.17635999999948E-0001	556	-5.22940999999832E-0002	635	1.06955999999968E-0001
478	4.78071999999884E-0001	557	4.77914999999939E-0001	636	-1.09595000000013E-0001
479	2.53111999999874E-0001	558	8.96437999999762E-0002	637	-4.21787000000222E-0002
480	-2.84720999999990E-0001	559	-4.70905000000130E-0001	638	1.18017000000009E-0001
481	-4.69815999999810E-0001	560	-1.18200000000002E-0001	639	-2.05329000000063E-0002
482	-6.75424999999450E-0002	561	4.63843999999881E-0001	640	-9.43591999999853E-0002
483	4.20501000000058E-0001	562	1.38171000000057E-0001	641	6.49757999999565E-0002
484	3.76236999999946E-0001	563	-4.58263999999872E-0001	642	5.07000999999718E-0002
485	-1.48369000000002E-0001	564	-1.50045999999975E-0001	643	-8.26296000000184E-0002
486	-4.83322999999928E-0001	565	4.55015999999887E-0001	644	-2.79875000000018E-0003
487	-1.93813000000091E-0001	566	1.53954999999996E-0001	645	7.37881000000016E-0002
488	3.48465000000033E-0001	567	-4.54807999999957E-0001	646	-3.52417999999943E-0002
489	4.35011999999915E-0001	568	-1.50088000000096E-0001	647	-4.63371999999822E-0002
490	-5.20594999999844E-0002	569	4.57700999999815E-0001	648	5.46148000000244E-0002
491	-4.70860999999786E-0001	570	1.38134999999920E-0001	649	1.19423999999952E-0002
492	-2.61331000000155E-0001	571	-4.63569999999891E-0001	650	-5.37128000000280E-0002
493	2.99838999999793E-0001	572	-1.17764999999963E-0001	651	1.78473999999937E-0002
494	4.56122000000050E-0001	573	4.71551999999974E-0001	652	3.70907000000216E-0002
495	-8.47457000000418E-0003	574	8.81894999999986E-0002	653	-3.52100999999720E-0002
496	-4.62175000000116E-0001	575	-4.80403000000024E-0001	654	-1.32136000000003E-0002
497	-2.79306999999790E-0001	576	-4.87550000000283E-0002	655	3.75063999999838E-0002
498	2.91294999999991E-0001	577	4.87923000000137E-0001	656	-8.99504000000206E-0003
499	4.55973999999969E-0001	578	-1.28841999999985E-0003	657	-2.73909000000003E-0002
500	-1.96689999999933E-0002	579	-4.91308000000117E-0001	658	2.27873000000045E-0002
501	-4.68189000000166E-0001	580	6.19993000000250E-0002	659	1.08742000000035E-0002
502	-2.51569000000018E-0001	581	4.86694000000170E-0001	660	-2.56093000000135E-0002
503	3.25217999999950E-0001	582	-1.32732999999917E-0001	661	5.03203000000241E-0003
504	4.34597999999824E-0001	583	-4.69751999999971E-0001	662	1.90342999999871E-0002
505	-8.52701999999681E-0002	584	2.11195000000089E-0001	663	-1.51086999999990E-0002
506	-4.81628999999884E-0001	585	4.35657999999876E-0001	664	-7.63514999999870E-0003
507	-1.72663999999941E-0001	586	-2.93380999999954E-0001	665	1.72402000000034E-0002
508	3.91235999999935E-0001	587	-3.80208000000039E-0001	666	-3.46168000000091E-0003
509	3.75564999999824E-0001	588	3.72847999999976E-0001	667	-1.26917999999989E-0002
510	-2.00489999999945E-0001	589	3.00403000000188E-0001	668	1.03507000000036E-0002
511	-4.76438000000144E-0001	590	-4.41198999999870E-0001	669	4.70225000000113E-0003
512	-3.35570999999959E-0002	591	-1.96052999999893E-0001	670	-1.16266999999937E-0002
513	4.60794000000078E-0001	592	4.88281999999799E-0001	671	2.92620999999826E-0003
514	2.51975000000130E-0001	593	7.05491999999595E-0002	672	8.12958999999580E-0003
515	-3.44184000000041E-0001	594	-5.03888000000188E-0001	673	-7.45025999999882E-0003
516	-4.09337999999934E-0001	595	6.79192000000057E-0002	674	-2.37827999999851E-0003

675	7.79329000000217E-0003	754	0.00000000000000E+0000	833	0.00000000000000E+0000
676	-2.83968999999828E-0003	755	0.00000000000000E+0000	834	0.00000000000000E+0000
677	-4.85918999999768E-0003	756	0.00000000000000E+0000	835	0.00000000000000E+0000
678	5.45333000000170E-0003	757	0.00000000000000E+0000	836	0.00000000000000E+0000
679	6.50574999999876E-0004	758	0.00000000000000E+0000	837	0.00000000000000E+0000
680	-5.05228000000102E-0003	759	0.00000000000000E+0000	838	0.00000000000000E+0000
681	2.66608000000090E-0003	760	0.00000000000000E+0000	839	0.00000000000000E+0000
682	2.55376999999868E-0003	761	0.00000000000000E+0000	840	0.00000000000000E+0000
683	-3.93425000000036E-0003	762	0.00000000000000E+0000	841	0.00000000000000E+0000
684	3.76394999999974E-0004	763	0.00000000000000E+0000	842	0.00000000000000E+0000
685	3.09312999999989E-0003	764	0.00000000000000E+0000	843	0.00000000000000E+0000
686	-2.39051000000146E-0003	765	0.00000000000000E+0000	844	0.00000000000000E+0000
687	-1.06363999999992E-0003	766	0.00000000000000E+0000	845	0.00000000000000E+0000
688	2.75651000000110E-0003	767	0.00000000000000E+0000	846	0.00000000000000E+0000
689	-9.89122000000009E-0004	768	0.00000000000000E+0000	847	0.00000000000000E+0000
690	-1.69909999999973E-0003	769	0.00000000000000E+0000	848	0.00000000000000E+0000
691	2.01841000000158E-0003	770	0.00000000000000E+0000	849	0.00000000000000E+0000
692	2.12075999999894E-0005	771	0.00000000000000E+0000	850	0.00000000000000E+0000
693	-1.75568000000048E-0003	772	0.00000000000000E+0000	851	0.00000000000000E+0000
694	1.21378999999955E-0003	773	0.00000000000000E+0000	852	0.00000000000000E+0000
695	6.16308999999760E-0004	774	0.00000000000000E+0000	853	0.00000000000000E+0000
696	-1.49133999999940E-0003	775	0.00000000000000E+0000	854	0.00000000000000E+0000
697	5.30142999999761E-0004	776	0.00000000000000E+0000	855	0.00000000000000E+0000
698	8.80323999999710E-0004	777	0.00000000000000E+0000	856	0.00000000000000E+0000
699	-1.11185999999996E-0003	778	0.00000000000000E+0000	857	0.00000000000000E+0000
700	0.00000000000000E+0000	779	0.00000000000000E+0000	858	0.00000000000000E+0000
701	0.00000000000000E+0000	780	0.00000000000000E+0000	859	0.00000000000000E+0000
702	0.00000000000000E+0000	781	0.00000000000000E+0000	860	0.00000000000000E+0000
703	0.00000000000000E+0000	782	0.00000000000000E+0000	861	0.00000000000000E+0000
704	0.00000000000000E+0000	783	0.00000000000000E+0000	862	0.00000000000000E+0000
705	0.00000000000000E+0000	784	0.00000000000000E+0000	863	0.00000000000000E+0000
706	0.00000000000000E+0000	785	0.00000000000000E+0000	864	0.00000000000000E+0000
707	0.00000000000000E+0000	786	0.00000000000000E+0000	865	0.00000000000000E+0000
708	0.00000000000000E+0000	787	0.00000000000000E+0000	866	0.00000000000000E+0000
709	0.00000000000000E+0000	788	0.00000000000000E+0000	867	0.00000000000000E+0000
710	0.00000000000000E+0000	789	0.00000000000000E+0000	868	0.00000000000000E+0000
711	0.00000000000000E+0000	790	0.00000000000000E+0000	869	0.00000000000000E+0000
712	0.00000000000000E+0000	791	0.00000000000000E+0000	870	0.00000000000000E+0000
713	0.00000000000000E+0000	792	0.00000000000000E+0000	871	0.00000000000000E+0000
714	0.00000000000000E+0000	793	0.00000000000000E+0000	872	0.00000000000000E+0000
715	0.00000000000000E+0000	794	0.00000000000000E+0000	873	0.00000000000000E+0000
716	0.00000000000000E+0000	795	0.00000000000000E+0000	874	0.00000000000000E+0000
717	0.00000000000000E+0000	796	0.00000000000000E+0000	875	0.00000000000000E+0000
718	0.00000000000000E+0000	797	0.00000000000000E+0000	876	0.00000000000000E+0000
719	0.00000000000000E+0000	798	0.00000000000000E+0000	877	0.00000000000000E+0000
720	0.00000000000000E+0000	799	0.00000000000000E+0000	878	0.00000000000000E+0000
721	0.00000000000000E+0000	800	0.00000000000000E+0000	879	0.00000000000000E+0000
722	0.00000000000000E+0000	801	0.00000000000000E+0000	880	0.00000000000000E+0000
723	0.00000000000000E+0000	802	0.00000000000000E+0000	881	0.00000000000000E+0000
724	0.00000000000000E+0000	803	0.00000000000000E+0000	882	0.00000000000000E+0000
725	0.00000000000000E+0000	804	0.00000000000000E+0000	883	0.00000000000000E+0000
726	0.00000000000000E+0000	805	0.00000000000000E+0000	884	0.00000000000000E+0000
727	0.00000000000000E+0000	806	0.00000000000000E+0000	885	0.00000000000000E+0000
728	0.00000000000000E+0000	807	0.00000000000000E+0000	886	0.00000000000000E+0000
729	0.00000000000000E+0000	808	0.00000000000000E+0000	887	0.00000000000000E+0000
730	0.00000000000000E+0000	809	0.00000000000000E+0000	888	0.00000000000000E+0000
731	0.00000000000000E+0000	810	0.00000000000000E+0000	889	0.00000000000000E+0000
732	0.00000000000000E+0000	811	0.00000000000000E+0000	890	0.00000000000000E+0000
733	0.00000000000000E+0000	812	0.00000000000000E+0000	891	0.00000000000000E+0000
734	0.00000000000000E+0000	813	0.00000000000000E+0000	892	0.00000000000000E+0000
735	0.00000000000000E+0000	814	0.00000000000000E+0000	893	0.00000000000000E+0000
736	0.00000000000000E+0000	815	0.00000000000000E+0000	894	0.00000000000000E+0000
737	0.00000000000000E+0000	816	0.00000000000000E+0000	895	0.00000000000000E+0000
738	0.00000000000000E+0000	817	0.00000000000000E+0000	896	0.00000000000000E+0000
739	0.00000000000000E+0000	818	0.00000000000000E+0000	897	0.00000000000000E+0000
740	0.00000000000000E+0000	819	0.00000000000000E+0000	898	0.00000000000000E+0000
741	0.00000000000000E+0000	820	0.00000000000000E+0000	899	0.00000000000000E+0000
742	0.00000000000000E+0000	821	0.00000000000000E+0000	900	0.00000000000000E+0000
743	0.00000000000000E+0000	822	0.00000000000000E+0000	901	0.00000000000000E+0000
744	0.00000000000000E+0000	823	0.00000000000000E+0000	902	0.00000000000000E+0000
745	0.00000000000000E+0000	824	0.00000000000000E+0000	903	0.00000000000000E+0000
746	0.00000000000000E+0000	825	0.00000000000000E+0000	904	0.00000000000000E+0000
747	0.00000000000000E+0000	826	0.00000000000000E+0000	905	0.00000000000000E+0000
748	0.00000000000000E+0000	827	0.00000000000000E+0000	906	0.00000000000000E+0000
749	0.00000000000000E+0000	828	0.00000000000000E+0000	907	0.00000000000000E+0000
750	0.00000000000000E+0000	829	0.00000000000000E+0000	908	0.00000000000000E+0000
751	0.00000000000000E+0000	830	0.00000000000000E+0000	909	0.00000000000000E+0000
752	0.00000000000000E+0000	831	0.00000000000000E+0000		
753	0.00000000000000E+0000	832	0.00000000000000E+0000		

Attachment B

Membership LIST
ATSC

Members

Ampex Corporation
AT&T
AT&T Bell Laboratories
Baylor University - Telecommunications
Bell Communications Research
Cable Television Laboratories
Capital Cities/ABC
CBS Broadcast Group
Comsat Video Enterprises, Inc.
David Sarnoff Research Center
Dolby Laboratories, Inc.
Eastman Kodak Company
EIDAK Corporation
Electronic Industries Association
Florida Atlantic University
Fox Inc.
General Instrument Corporation
GTE Telephone Operations
Hitachi America, Ltd.
Home Box Office
Ikegami Electronics USA, Inc.
Institute of Electrical and Electronics Engineers
INTV
Jansky/Barmat Telecommunications
Koichi Sadashige & Associates
Massachusetts Institute of Technology
Maximum Service Television
Mitsubishi Electric Sales America
Motion Picture Association of America
National Association of Broadcasters
National Broadcasting Company
National Cable Television Association
New York Institute of Technology
North American Philips
Panasonic Broadcast Systems Company
Panasonic Technologies, Inc.
Public Broadcasting Service
Sanyo Manufacturing Corporation
Scientific Atlanta
Sharp Electronics Corporation
Society of Motion Picture & TV Engineers
Sony Advanced Systems Company
Sony Corporation of America
Sony Pictures Studios
Tele-Communications, Inc.
Thomson Consumer Electronics
Toshiba America Consumer Products, Inc.
Tribune Broadcasting Company
Universal City Studios, Inc.
Viacom International Inc.
Visnews International, USA Ltd.
Westinghouse Broadcasting Company
Zenith Electronics Corporation

Observers

INTELSAT
Tomlinson Holman
Vivian Associates

August 14, 1992