

Spectrum Management

Broadcasting Specification

Television Broadcast Videotex

Definition

Television Broadcast Videotex: A system consisting of a central data store (database) from which digital data representing text and pictorial information is transmitted in the active portion of available TV lines through a broadcast delivery system. User terminals then interpret and display the selected data on video receivers/monitors or other terminal devices.

Introduction

The parameters outlined in this document have been selected intending to comply with the following principles and requirements:

- (i) Terminal independence; this permits the use of a variety of terminals of varying capabilities, such as different levels of resolution.
- (ii) Compatibility between services carried over existing communications networks (e.g., public switched telephone, off-air broadcast, satellite and cable TV networks.) and common presentation format.
- (iii) Vertical blanking interval (VBI) and full field transmission compatibility.
- (iv) Forward and backward compatibility; permitting future terminals to access old data and requiring that an installed inventory of terminals be able to receive and decode all future command formats in an intelligent manner.
- (v) Adherence to already established national and international standards such as those contained in Appendix A.

Applicability

This document sets forth the requirements for the issuance of a Technical Construction and Operating Certificate (TC & OC) for a broadcasting transmitting undertaking when transmitting digitally encoded data for purposes including alphanumeric and/or pictorial information. The requirements also apply to a broadcasting receiving undertaking when the distributed signals are received from a broadcasting transmitting undertaking.

1. Data Positioning and Waveforms

Data may be transmitted in the active portion of a television line, commencing after the standard NTSC line synchronization and colour burst.

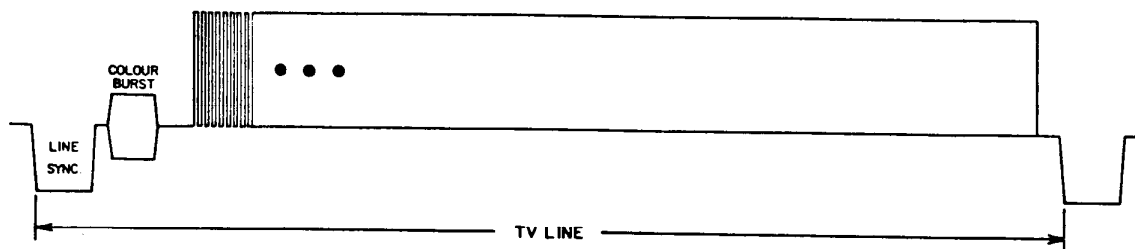


Figure 1

1.1 Vertical Blanking Interval and Full-Field Data Transmission

Data transmission uses the field-blanking interval and/or the active part of the video signal. Lines 1 through 21 in field 1 and the corresponding lines in field 2 of the 525 line 60 field/sec M/NTSC television system are designated as the vertical blanking interval (VBI). Of these, the allocation of lines 10 through 21 in field 1 and the corresponding lines in field 2 is the subject of Broadcast Specification 13. Full-field data transmission is achieved through utilization of lines 10 through 262 in field 1 and the corresponding lines in field 2 which comprises the vertical blanking interval as well as the active part.

1.2 Transmission Bit Rate

The transmission bit rate is $5,727,272 \pm 16$ bits/second* which is the 364th multiple of the horizontal line scanning rate for colour transmission ($15,734.264 \pm .044$ Hz) and 8/5 of the colour sub-carrier frequency ($3,579,545 \pm 10$ Hz). The data signal is to be phased locked to the colour sub-carrier when inserted into a colour television transmission and to the horizontal line scanning rate when inserted into a monochrome television transmission (with no burst present). The maximum rate of change bits/second/second.

***Note:** The adoption of the proposed bit rate of $5,727,272 + 16$ bits/sec will only be finalized following a period of adequate experimentation. Should it be determined that the proposed bit rate is unsatisfactory in providing adequate service, an alternate bit rate would be considered. This action would therefore necessitate the revision of related parameters as presented in this provisional document.

1.3 Data Encoding

The amplitude modulated data is non-return to zero (NRZ) binary encoded. Other encoding schemes are for further study.

1.4 Data Pulse Shape

The Spectrum of NRZ data after shaping and Impulse Response of the Nyquist filter have the following characteristics:

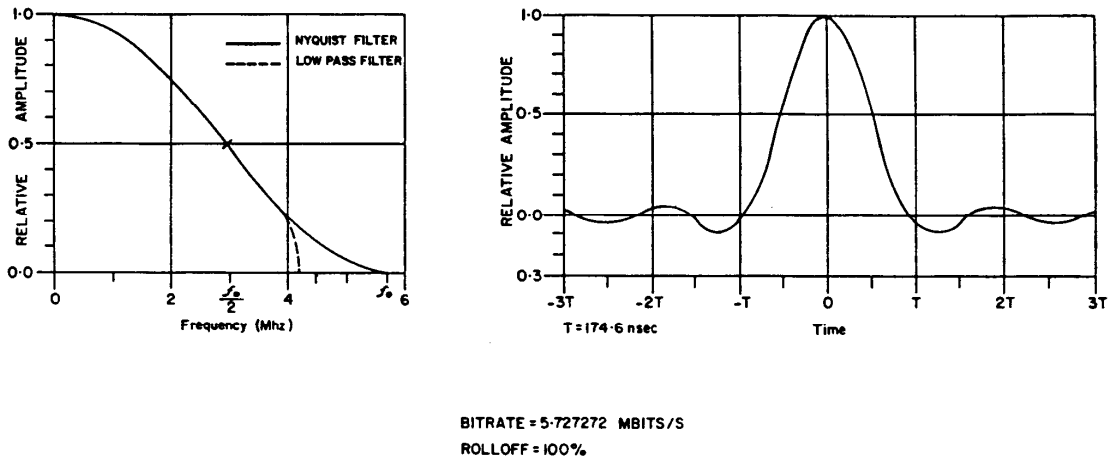


Figure 2

The data spectrum of the controlled raised cosine filter is described as follows:

$$=1$$

$$\text{for } f < (1-R) f_o/2$$

$$h(t) = \frac{\sin \pi f_o t}{\pi t} \frac{\cos \pi f_o t R}{1 - (2f_o t R)^2}$$

$$H(f) = \frac{1}{2} \left[1 - \sin \left(\frac{\pi}{2} \frac{f - f_o/2}{R f_o/2} \right) \right] \text{ for } |f - f_o/2| \leq R f_o/2$$

$$=0$$

$$\text{for } f > (1+R) f_o/2$$

The impulse response of the Nyquist filter is as follows:

where

- f = frequency in MHz
- t = time in nanoseconds
- f_o = bit rate in Mbits/sec
- $f_o/2$ = center position of roll-off in MHz
- R = roll-off = (i.e., 100%)

The spectral content of the shaped data is determined by a Nyquist filter with 100% roll-off, followed by a phase corrected low-pass filter with a cut off of 4.2 MHz.

1.5 Data Timing

The half-amplitude point of the first data bit, as shown in figure 3, is positioned $10.5 + 0.34 \mu\text{sec}$ from the half-amplitude point of the leading edge of the horizontal sync. pulse.

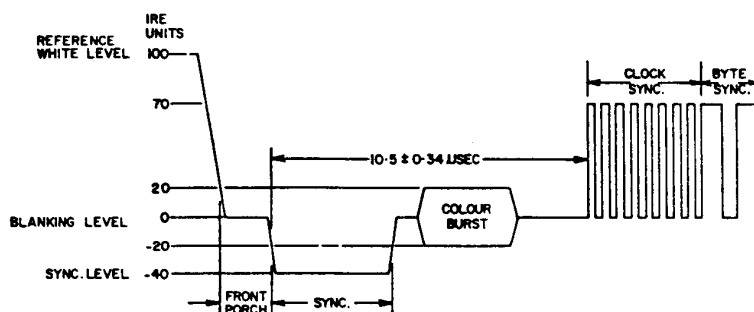


Figure 3

1.6 Data Amplitude Modulation

Data amplitude modulation parameters have been nominally established as 2 ± 2 IRE units for a logical 0 and 70 ± 2 IRE units for a logical 1, with provisions for positive and negative overshoots of 3 IRE units each. These nominal specifications permit a maximum peak-to-peak data amplitude of 78 IRE units.

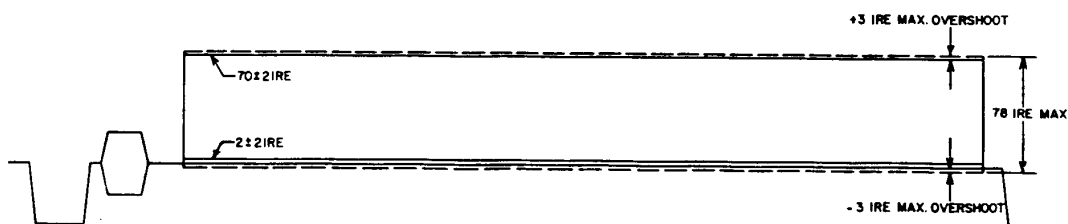


Figure 4

2. Data Line

The Data Line consists of a string of 288 bits (impulses) having the following format:

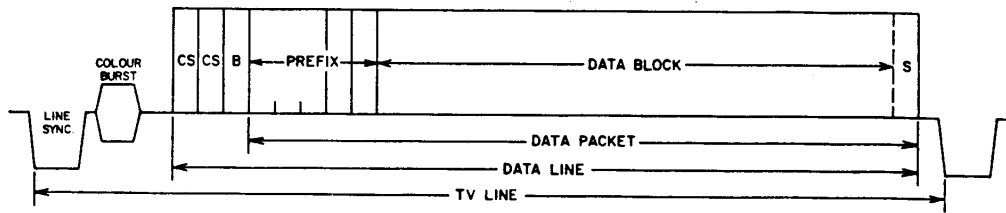


Figure 5

2.1 Bit Synchronization

The first 16 bits of the Data Line constitute the bit synchronization sequence (CS, CS) consisting of alternating 1s and 0s, leading in with 1. This sequence provides the decoder with a reference burst in order to synchronize the decoder's data clock and initialize the data slicer.

2.2 Byte Synchronization

The next 8 bits of the Data Line constitute the Framing Code (B) and serves to define the byte structure. This code has been chosen to minimize the potential of incorrect synchronization even in the presence of a single bit error in the Framing Code. The least significant bit (b1) is always transmitted first.

The sequence identified for Television Broadcast Videotex is:

$$\begin{array}{cccccccc}
 1 & 1 & 1 & 0 & 0 & 1 & 1 & 1 \\
 b_8 & b_7 & b_6 & b_5 & b_4 & b_3 & b_2 & b_1
 \end{array} \equiv 231_{10}$$

Two other compatible Framing Codes reserved for future use are:

$$\begin{array}{cccccccc}
 1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1
 \end{array} \begin{array}{l} \equiv 231_{10} \\ \equiv 45_{10} \end{array}$$

3. Data Packet

The Data Packet is an identifiable package transmitted after the Bit and Byte Synchronization codes and is made up of: a Prefix, a Data Block and an optional Suffix.

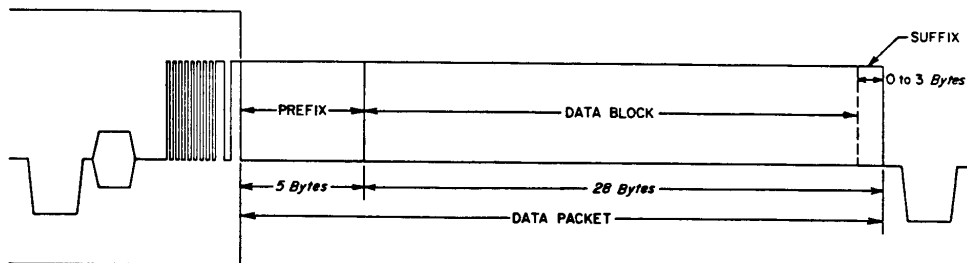


Figure 6

A Data Packet is contained within a single Data Line. Extended Packets, encompassing more than one Data Line, are for further study.

3.1 Prefix

The Prefix consists of 5 Hamming*-encoded bytes, the first 3 of which are Packet Address bytes followed by a Continuity Index byte (CI) and a Packet Structure byte (PS).

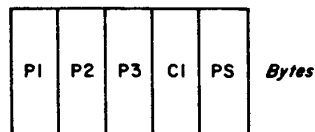


Figure 7

* In this document, an (8,4) Hamming data protection scheme is used, thus permitting single bit error correction, and even multiple bit error detection. In any Hamming-protected byte, bits b1, b3, b5 and b7 provide error protection and bits b2, b4, b6 and b8 present the information to be conveyed. Appendix B provides the Hamming Code Table.

3.1.1 Packet Address

Three Hamming-encoded bytes (P1, P2, P3) constitute the Packet Address, yielding 2^{12} (4096) possible data channels which may be time-division multiplexed onto a single television channel. Channel numbers correspond directly to Decimal Binary Coding permitting user selection of the first

1000 channels using a simple decimal keypad. The remaining channels are reserved for future use.

The scheme allows for interleaving of combinations of up to four consecutive data lines, with one Packet Address, with Data Lines of other Packet Addresses and requires a minimum time separation of 4 milliseconds for both VBI and full-field operation.

3.1.2 Continuity Index

The Continuity Index consists of one Hamming-protected byte (CI) used to detect the loss of a Data Packet due to transmission errors. The Continuity Index sequences from 0 to 15 and is incremented by 1 for each transmission of a Data Packet within a Data Channel.

3.1.3 Packet Structure

The Packet Structure byte consists of a Hamming-protected byte (PS) specifying the nature of the transmitted Data Packet as follows:

Information Bits				Assigned Significance
b8	b6	b4	b2	
			0	Standard packet
			1	Synchronizing packet
		0		Packet full of information bytes
		1		Packet not full* of information bytes
0	0			No Suffix
0	1			1 byte Suffix
1	0			2 byte Suffix
1	1			3 byte Suffix

* Bit b4 = 1 (Packet not full of information bytes) is not used to signal the end of the Data Group.

3.2 Data Block

The Data Block, which follows the Prefix, contains the Control Data (Header) and/or Presentation Data delivered to a terminal.

The Data Block may be full, or not full of information bytes, as indicated by bit b4 of the Packet Structure byte (PS).

If the Data Block is designated "Not Full", the non-information bytes may be assigned "don't care" values; however odd parity must be maintained to ensure correct interpretation when a one-byte Suffix is employed.

The Data Block is reduced by the number of Suffix bytes as specified by bits b8, b6 of the Packet Structure byte:

- no Suffix byte; the Data Block contains 28 bytes,
- 1 Suffix byte; the Data Block contains 27 bytes,
- 2 Suffix bytes; the Data Block contains 26 bytes,
- 3 Suffix bytes; the Data Block contains 25 bytes.

3.2.1 Control Data (Header)

The Header consists of information bytes used in instructing the terminal in processing Presentation Data.

3.2.2 Presentation Data

The Presentation Data is comprised of the data to be processed by the user terminal.

3.3 Suffix

An optional Suffix may follow the Data Block as determined by bits b8, b6 of the Packet Structure byte. This Suffix may contain one or more redundancy bytes which may be used by the data receiver for either error detection or correction in the Data Block.

A single byte Suffix is comprised of a longitudinal odd parity check of all bytes in the Data Block, which themselves contain an odd parity check in the most significant bit (b8) of each byte. This information forms the basis of the product code used to correct any single bit error and detect all double errors in each byte.

Other error detection/correction schemes for double or triple byte Suffixes are reserved for future assignments.

4. Data Group

Data Blocks associated with information from the same source (i.e., common Packet Address bytes: P1, P2, P3) may be sequentially organized into identifiable groups known as Data Groups. In broadcast videotex, these Data Groups are limited in length to a maximum of two (2) kilobytes.

The beginning of a Data Group is identified by bit b2=1 of the Packet Structure byte (PS). Each Data Group is composed of a Data Group Header followed by a Record.

4.1 Data Group Header

The Data Group Header follows the Prefix and is composed of the following Hamming-protected bytes:

TG	C	R	S1	S2	F1	F2	N
----	---	---	----	----	----	----	---

4.1.1 Data Group Type (TG)

This byte specifies the applicable class of processing to be applied by the data receiver.

TG = 0 designates the method of transmission used for broadcast videotex service. All other Type assignments are reserved for future use.

4.1.2 Data Group Continuity (C)

This byte is used to verify the sequence of Data Groups of a common Type (TG) in a particular Data Channel (P1, P2, P3). This continuity counter sequences from 0 to 15 and is incremented by 1 for each subsequent transmission of a Data Group of this nature.

4.1.3 Data Group Repetition (R)

This byte specifies the number of retransmissions of a given Data Group. This byte is restricted to the range 0-15.

4.1.4 Data Group Size (S1, S2)

Bytes S1, S2 specify the number of Data Blocks in a Data Group. These bytes indicate values ranging from 0 to 255.

4.1.5 Last Block Size (F1, F2)

These information bytes indicate the number of bytes in the last Data Block of a Data Group.

4.1.6 Data Group Routing (N)

A single byte, under broadcaster control, which identifies the routing of a Data Group through a broadcast network. Values in the range 0-15 may be assigned to this byte to control such functions as passage through time zone delay centers. This byte is not intended for use by the decoder.

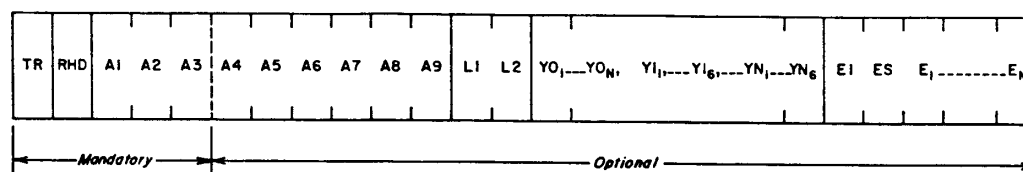
5. Record

The Record is essentially the same as the Data Group stripped off the Data Group Header and contains information pertinent to broadcast videotex service. Each Record is comprised of a series of up to 256 sequentially-numbered Data Blocks. The format consists of a Record Header, containing Record protocol information, followed by Presentation Data.

5.1 Record Header

The Record Header immediately follows the Data Group Header and is of variable length as determined by the Record Header Designator (RHD) and addition of optional subgroups. (Refer to Appendix C)

All Record Header bytes are Hamming-protected and are organized as follows:



5.1.1 Record Type (TR)

This byte characterizes the type of information transmitted within a Record and its associated structure. Values have been defined as follows:

Decimal Value	Record Type
0	Cyclic Broadcast (e.g.,: Broadcast videotex)
1	Non-Cyclic Broadcast (e.g.,: Captioning)
2 - 15	Reserved for Future Use

5.1.2 Record Header Designator (RHD)

The Record Header Designator byte (RHD) is comprised of four flags which, when set, indicate the presence of one or more following subgroups which are concatenated in the following order:

- b2: Address Extension
- b4: Record Linking
- b6: Complementary Record Classification
- b8: Header Extension Field

The status of each of the above subgroups is indicated by a single bit, where a binary 1 indicates the presence of the subgroup, and a binary 0 indicates its absence.

5.1.3 Address Bytes (A1, A2, A3, A4, A5, A6, A7, A8, A9)

Address bytes A1, A2, A3 represent a Record or Page number, and are considered mandatory. Address bytes A4, A5, A6, A7, A8, A9 are optional extension bytes which are transmitted when bit b2 of the Record Header Designator is set to 1. In this case, bytes A1-A7 are used to represent a Document number and bytes A8, A9 represent the number of a Page within a Document.

5.1.4 Record Linking (L1, L2)

The presence of the Record Linking bytes L1, L2 is indicated by bit b4 = 1 in the Record Header Designator. These bytes immediately follow the Address bytes. These bytes are used to link together Records identified by the same address and associated with the same message. The decoder must capture linked Records in sequential order.

Bits b6, b4 and b2 of byte L1 and b8, b6, b4 and b2 of byte 12 are used to indicate the order of the linked Records. Bit b8 of L1 is used to indicate the existence of additional linked Records (b8 = 1) or the last linked Record in the sequence (b8 = 0).

5.1.5 Complementary Classification Sequence (Y0₁-Y0_N, Y1₁-Y1₆ ... YN₁-YN₆)

The presence of the Complementary Classification Sequence subgroup is indicated by bit b6 = 1 in the Record Header Designator. This subgroup follows the Address and Link bytes, if present, or the Record Header Designator. This subgroup follows the Address and Link bytes, if present, or the Record Header Designator for the case b2 = b4 = 0.

This subgroup has a variable format and is divided into two sections:
(refer to Appendix D.)

- Designation bytes ($Y0_1 - Y0_N$)
- Complementary Classification bytes ($Y1_1 - Y1_6, \dots YN_1 - YN_6$)

Bit b8 of any $Y0$ byte indicates the status of any additional Designation bytes, where a binary 1 indicates the presence of an additional $Y0$ byte, and a binary 0 indicates the end of a $Y0$ sequence. For example, if bit b8 of $Y0_1$ is equal to 1 an additional $Y0$ byte designated $Y0_2$ exists. This pattern also applies to $Y0_2$ which in turn may indicate a $Y0_3$ byte, etc. The $Y0$ sequence is only terminated when bit b8 of the last $Y0$ byte is equal to 0. This scheme is illustrated in Appendix D.

The remaining usable bits (b6, b4, b2) of any $Y0$ byte point to a group of Classification bytes; (refer to Appendix E). Each bit of a $Y0$ Designation byte is associated with a Classification field, either specifying a function by default ($b_x = 0$) or calling a function ($b_x = 1$) and thus specifying it with a two-byte sequence.

When $Y0$ has bits $b8 = b6 = b4 = b2 = 0$, it is the end of the Record Header and all Record specification functions are specified by default.

5.1.6 Header Extension Field (EI, ES)

Any number of variable-length Header Extension Fields may be designated by $b8 = 1$ of the Record Header Designator (RHD) byte (see Appendix C). These fields directly follow the Address, Link and Complementary Classification bytes, if present, or the Record Header Designator for the case $b6 = b4 = b2 = 0$.

The first byte of the Header Extension Field is an extension field introducer byte (EI), with bit designations as follows:

- $b8 = 1$ indicates further Header Extension Field(s) to follow ($E_1 \dots E_N$)
- $= 0$ indicates last Extension Field
- $b6, b4, b2$ indicates Header Extension Code assignments whose values are given in Appendix E.

The second byte (ES) of the Header Extension Field indicates the number of bytes of Extension Field information in the current Extension Field.

5.2 Segmentation

The Data Record may be segmented by the use of a Segmentation Identification Sequence which consists of a three-byte sequence; the first byte of which is a specific code corresponding to the "US" (unit separator) code taken from the C0

code table at the presentation level. The remaining two bytes are designated for use by the presentation level and to indicate the relationship of segments.

6. Repertoire

The presentation coding scheme for text conforming to international recommendations from the C.C.I.T.T. and C.C.I.R. permits the coding of a large repertoire of characters and special symbols covering all Latin based alphabets. The languages of primary interest in North America are English, French and Spanish. The character repertoire implemented in a particular terminal should contain the appropriate accented characters for these languages, as well as all of the characters in the CSA basic character set Z243.41 set 1 (known as ASCII in the USA). To fully present the French (for Canada) and the Spanish languages requires that all appropriate accents be displayed. Technical compatibility requires that all terminals correctly interpret all coded accents and special characters and provide at least the appropriate defaults for these languages. In addition, the following special symbols should be provided:

« » ¿ ¡ ¢

6.1 Presentation Coding

The presentation coding scheme for Broadcast Videotex services is that adopted by the Canadian Standards Association (CSA). This coding scheme is based on the alpha-geometric coding scheme described in C.C.I.T.T. Recommendation S. 100 and the C.V.C.C. Videotex Field Trial Presentation Layer Standard No. 699 which are reflected in the proposed North American Standard Presentation level protocol.

6.2 Display Format

The default Display Format is defined as 20 rows of 40 alphanumeric characters per row within the S.M.P.T.E.* Safe Title Area of the television screen. Other display formats are also permitted.

* Society of Motion Picture and Television Engineers Recommended Practice RP 27.3

6.3 Display Attributes

C.V.C.C. Videotex Field Trial Presentation Layer Standard No. 699 and C.C.I.T.T. Recommendation F.300 present the various degrees of implementation of the display attributes for videotex systems.

Issued under the Authority of
the Minister of Communications

(original signed by W.W. Scott)

for Dr. John deMercado
Director General
Telecommunication Regulatory Service

Appendix A

The parameters outlined in BS-14 have been selected intending to comply with the following established national and international standards and the recognized principles and requirements contained therein.

International Telegraph and Telephone Consultative Committee (C.C.I.T.T.):

Recommendation S.100 "International Information Exchange for Interactive Videotex"

Recommendation F.300 "Videotex Service"

International Radio Consultative Committee (C.C.I.R.) Report 624-1 Characteristics of Television Systems (System M/NTSC).

International Organization for Standardization (I.S.O.):

Draft International Standard ISO/DIS 2022 "Code Extension Techniques for Use with the ISO 7-bit Coded Character Set"

Draft International Proposal ISO/DIP 6937 "Coded Character Set for Text Communication"

ISO/TC 97/SC 16 N 537 "Basic Specifications of the Reference Model of Open System Interconnection"

Canadian Videotex Consultative Committee (C.V.C.C.) Videotex Field Trial Presentation Layer Standard (Communications Research Centre Technical Note No. 699)

Videotex Standard: Presentation Level Protocol, May 1981, Bell System

Government of Canada, Industry Canada:

Radio Standards Specification, RSS-151: "Low Power TV Broadcasting Transmitters Operating in the 54-88 MHz, 174-216 MHz and 470-890 MHz Bands"

Radio Standards Specification, RSS-154: "Television Broadcasting Transmitters Operating in the 54-88 MHz, 174-216 MHz and 470-806 MHz Frequency Bands"

Broadcast Specification, BS-13: "Ancillary Signals in the Vertical Blanking Interval for Television Broadcasting."

Appendix B

Hamming Code Table

ENCODING		INFORMATION BITS							
		b8	b7	b6	b5	b4	b3	b2	b1
0	0	0	0	0	1	0	1	0	1
1	1	0	0	0	0	0	0	1	0
2	2	0	1	0	0	1	0	0	1
3	3	0	1	0	1	1	1	1	0
4	4	0	1	1	0	0	1	0	0
5	5	0	1	1	1	0	0	1	1
6	6	0	0	1	1	1	0	0	0
7	7	0	0	1	0	1	1	1	1
8	8	1	1	0	1	0	0	0	0
9	9	1	1	0	0	0	1	1	1
A	10	1	0	0	0	1	1	0	0
B	11	1	0	0	1	1	0	1	1
C	12	1	0	1	0	0	0	0	1
D	13	1	0	1	1	0	1	1	0
E	14	1	1	1	1	1	1	0	1
F	15	1	1	1	0	1	0	1	0

where

$$b7 = b8 \oplus b6 \oplus b4$$

$$b5 = b6 \oplus b4 \oplus b2$$

$$b3 = b4 \oplus b2 \oplus b8$$

$$b1 = b2 \oplus b8 \oplus b6$$

PROTECTION BITS

DECODING

X1	X2	X3	X4	INTERPRETATION	INFORMATION
1	1	1	1	NO ERROR	ACCEPTED
0	0	1	0	ERROR IN b8	CORRECTED
1	1	1	0	ERROR IN b7	ACCEPTED
0	1	0	0	ERROR IN b6	CORRECTED
1	1	0	0	ERROR IN b5	ACCEPTED
1	0	0	0	ERROR IN b4	CORRECTED
1	0	1	0	ERROR IN b3	ACCEPTED
0	0	0	0	ERROR IN b2	CORRECTED
0	1	1	0	ERROR IN b1	ACCEPTED
$X1 \cdot X2 \cdot X3 = 0$			1	MULTIPLE ERRORS	REJECTED

where

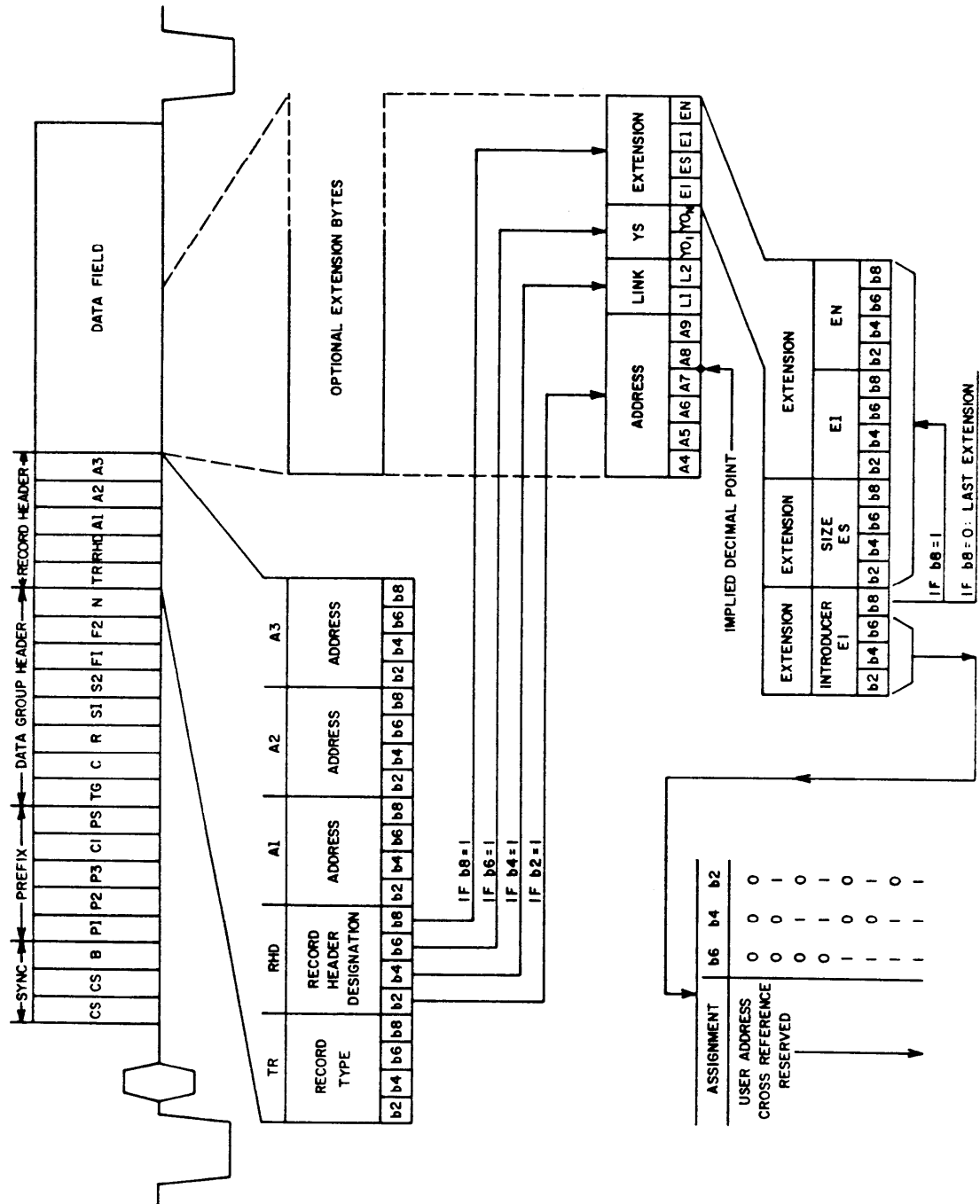
$$X1 = b8 \oplus b6 \oplus b2 \oplus b1$$

$$X2 = b8 \oplus b4 \oplus b3 \oplus b2$$

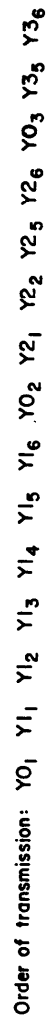
$$X3 = b6 \oplus b5 \oplus b4 \oplus b2$$

$$X4 = b8 \oplus b7 \oplus b6 \oplus b5 \oplus b4 \oplus b3 \oplus b2 \oplus b1$$

Appendix C



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Appendix E

Interpretation of the Complementary Classification Bytes (Y1₁ - Y1₆, ... YN₁ - YN₆ and Header Extension Field Byte (EI)

This Appendix describes the recommended interpretation of the broadcast videotex standards. The specific assignments are chosen as working designations which will be adhered to indefinitely unless operating experience dictates otherwise.

Interpretation of Classification Bytes Associated with Byte Y0₁

Byte Y1₁

b8, b6 Error Protection Levels: these bits are used to indicate the type of presentation level or error protection.

b8	b6	Four levels of message coding
0	0	Level 0 or no error protection being used
0	1	Level 1 or error protection being used
1	0	Reserved for future extension
1	1	Reserved for future extension

b4 = 1 Index message: This bit indicates that the message is an index message. Different index messages are possible which are numbered by byte Y1₂.

b2 = 1 Sub-index: This bit indicates that the message is a submessage. Different sub-indexes are possible which are numbered by byte Y1₂.

Byte Y1₂ This byte is used to number index messages or sub-index messages depending on the status of the bits in Y1₁.

Byte Y1₃

b8 = 1 Boxed message: This bit indicates that the message is related to the television program carrying the data signal. This bit indicates that the message is program related, and is to be displayed over the television program video with boxing. This may reset some options in the presentation layer to alternate values.

b6 = 1 Delayed message: The interpretation of the message and its presentation are delayed until the user manually requires its interpretation or until a specific "reveal" message is sent. This bit indicates that the message should not be revealed until a "reveal" message is sent, or until the user manually reveals the message.

b4, b2 Partial message: This indicates that the message contained in the Record cannot be interpreted alone. The terminal must first select a starting message which the partial message complements.

b4	b2	
0	0	Not partial message
0	1	First partial message
1	0	Last partial message
1	1	Intermediate partial message

Byte Y1₄

b8 = 1 Document Chain: This bit identifies a page which is part of a multi-page Document (not last).

b6 = 1 Cyclic Marker: This bit identifies the first occurrence of any channel number in a cyclic information retrieval data base. This may be used by a decoder to abort a search for a requested page which is not present in the cycle.

b4 = 1 Auto Read: This bit indicates that a "Target Page" whose number is contained in the Extension Field which has its Header Extension code equal to 1, is to be captured immediately following the current one. This, however, requires user input (depression of "proceed" key or equivalent) for display.

b2 = 1 Complementary Information: This bit indicates that complementary information is needed to properly interpret this message. The complementary information is to be found immediately following on the same Data Channel.

Byte Y1₅

b8 = 1 Program related message: This message is related to the television program carrying the data signal. When this bit is raised and the decoder is in the television mode, the message should be displayed over the television program.

b6 = 1 Alarm message: This bit indicates that the associated message has a priority function which can be interpreted by the decoder to override all other display functions.

b4 = 1 Update message: This a flag indicating that the message contained in the Record replaces a previous message with the same address.

b2 = 1 New: This bit is used as an indicator to identify material not previously included in the information retrieval index. This permits decoders to be

programmed to capture all new pages, or alternatively only those within a specific channel.

Byte $Y1_6$

Version: This byte, with four usage bits, is used to specify a version number of an information retrieval page.

Interpretation of Classification Bytes Associated with Byte $Y0_2$

Bytes $Y2_1$

Terminal: This byte, with four usage bits, is used to specify terminal functions.

Bytes $Y2_2 - Y2_6 \dots YN_1 - YN_6$

These bytes are not defined in this specification and are reserved for future extension.

Interpretation of Header Extension Field Byte (EI)

The first byte of the Header Extension Field is an extension field introducer byte (EI), with bit designations as follows:

$b8 = 0$ indicates last Extension Field

$= 1$ indicates further Header Extension Field(s) to follow ($E_1 \dots E_N$)

$b6, b4, b2$ indicate Header Extension Code assignments as follows:

$= 0$ reserved

$= 1$ cross reference;
identifies a Record to be captured immediately following the current one.

$= 2-7$ reserved for future extension.

The second byte (ES) of the Header Extension Field indicates the number of bytes of Extension Field information in the current Extension Field.