# RECOMENDACIÓN UIT-R BT.1617

## Formato para la transmisión de vídeo comprimida en formato DV, de audio y de datos a través de una interfaz de conformidad con la Recomendación UIT-R BT.1381

(Cuestión UIT-R 12/6)

(2003)

La Asamblea de Radiocomunicaciones de la UIT,

*considerando*

a) que existen aplicaciones de producción y posproducción de televisión profesional en las que la compresión de señales de vídeo en formato DV puede ofrecer ventajas de explotación y económicas respecto a las operaciones basadas en la interfaz digital en serie (SDI);

b) que existe una aplicación basada en la trama de muestreo de 4:2:0 a velocidades de transferencia de datos de 25 Mbit/s, conforme a la Norma CEI 61834-2, conocida como DVCAM;

c) que los elementos de audio, datos y vídeo comprimido de los sistemas en formato DV llevan un formato diferente del de los sistemas basados en formato DV;

d) que se optimiza el formato para la interconexión entre magnetoscopios de formato DV y sistemas de disco;

e) que las velocidades de transferencia pueden ser de hasta cinco veces superiores a las de tiempo real;

f) que se están desarrollando actualmente decodificadores múltiples a fin de incorporar los trenes de datos basados en DVCAM en la producción basada en formato DV,

*recomienda*

**1** que para las aplicaciones de producción y posproducción de televisión profesional que utilizan la compresión en formato DV, se utilicen los parámetros indicados en la Norma SMPTE 322M-1999, «Format for Transmission of DV Compressed Video, Audio and Data Over a Serial Data Transport Interface».

**Resumen de la Norma SMPTE 322M-1999**

Esta Norma especifica la estructura de los datos y el formato para la transmisión de señales de vídeo comprimidas, en formato DV de audio y de datos a través de una interfaz de transporte de datos en serie (SDTI), que se define en la Recomendación UIT-R BT.1381 y en la Norma SMPTE 305M. La Norma es una combinación de datos de vídeo, de audio, de subcódigos y de control optimizada para realizar la conexión entre magnetoscopios de formato DV y sistemas de disco. Permite la transferencia de trenes de datos de alta velocidad, a velocidades hasta cinco veces superiores a las de tiempo real. Los datos de vídeo, de audio y de subcódigo cumplen con la Norma CEI 61834-2, tanto para los sistemas 525/60 como para los sistemas 625/50. Los trenes binarios están compuestos de bloques de datos DIF de 77 octetos, que son comunes a otras señales basadas en el formato DV. Se efectúa una transferencia de los bloques de interfaz digital DIF hacia la SDTI mediante un algoritmo limitado por la trama a fin de preservar la facilidad de manipulación de los datos de vídeo y de audio.

NOTA 1 – La Norma SMPTE 322M-1999 figura en el Anexo 1 y la Norma 305M puede encontrarse en: http://ties.itu.int/u/itu-r/ede/rsg6/SMPTE/. La Norma SMPTE 322M-1999 y su resumen se refiere únicamentee a la versión 1999, que es la aprobada por las Administraciones de los Estados Miembros de la UIT el 03-05-03 en cumplimiento de lo dispuesto en la Resolución UIT-R 1-3. En virtud del acuerdo entre la UIT y la SMPTE, la SMPTE ha facilitado y autorizado la utilización de esta versión y el UIT-R ha aceptado su inclusión en la presente Recomendación. Cualquier versión posterior de la Norma SMPTE 322M que no haya sido aceptada y aprobada por la Comisión de Estudio 6 de Radiocomunicaciones no formará parte de la presente Recomendación. Las últimas versiones de los documentos de la SMPTE se pueden consultar en el sitio web de la SMPTE: http://www.smpte.org/.

SMPTE 322M-1999

# SMPTE STANDARD

## for Television — Format for Transmission of DV Compressed Video, Audio and Data Over a Serial Data Transport Interface



Table of contents



## 1 Scope

This standard specifies the data structure and the transmission format of DV compressed video, audio, and data over a serial data transport interface (SDTI [SMPTE 305M]). The standard is a combination of video, audio, subcode, and control data optimized for the connection between DV-compliant VCRs and disk systems. It ensures high-speed data stream transfer up to five times faster than real time. The video, audio, and subcode data comply with IEC 61834-2 for both 525/60 and 625/50 systems. The bitstream consists of 77-byte DIF data blocks, which are common to other DV based signals. The DIF blocks are mapped onto SDTI using a frame-bounded algorithm preserving ease of manipulating the video and audio data.

The layers of signal processing and related standards are shown in figure 1.

NOTE – For descriptions of the SDTI, refer to SMPTE 305M, and for descriptions of video, audio, and subcode data, refer to IEC 61834-2. The standard corresponds to data type [$241_h$] registered as DVCAM-1 in SMPTE 305M.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

SMPTE 305M-1998, Television — Serial Data Transport Interface

IEC 61834-2 (1998-08), Recording — Helical-Scan Digital Video Cassette Recording System Using 6,35 mm Magnetic Tape for Consumer Use (525-60, 625-50, 1125-60 and 1250-50 Systems) — Part 2: SD Format for 525-60 and 625-50 Systems

## 3 SDTI header data

The SDTI header data as specified in SMPTE 305M shall contain the parameters shown in table 1, and shall be repeated on every line. The SDTI header data structure is as shown in figure 2.

## 4 Data structure

The following clause describes the basic data structure and the system parameters of the bitstream. The data structure of the SDTI paybad is shown in figure 3. The data block consists of a control data block and five vertical data slots, in which one compressed video stream shall be contained. The empty space and reserved area shall be set to all zeros ($200_h$) as default value.

### 4.1 Data block

The control data block and the DIF data shall be contained in B0 (LSB) through B7 (8 bits). B8 shall be a reserved data bit for future expansion, which is normally set to zero. B9 shall be the complement of B8.



Approved
December 7, 1999

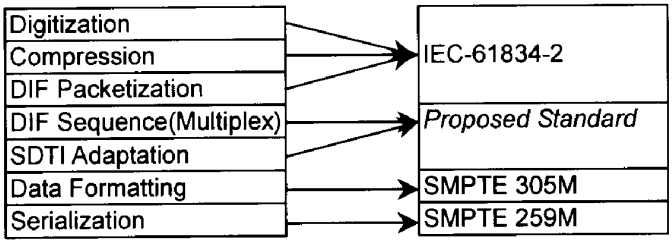


Figure 1 – Layers of signal processing and related standards

Table 1 – Header data packet

| Parameters | Length | Value |
|---|---|---|
| ADF | 3 words | [000h][3FFh][3FFh] |
| DID | 1 word | [140h] |
| SDID | 1 word | [101h] |
| DC | 1 word | [22Eh] |
| Line number | 2 words | — |
| Line number CRC | 2 words | — |
| Code | 4 bits | [1h] |
| AAI | 4 bits | — |
| Destination address | 16 words | — |
| Source address | 16 words | — |
| Block type | 1 word | [1C1h] |
| CRC flag | 1 word | [101h] |
| Data extension flag | 1 word | [200h] |
| Reserved data | 4 words | [200h][200h][200h][200h] |
| Header CRC | 2 words | — |
| CS | 1 word | — |

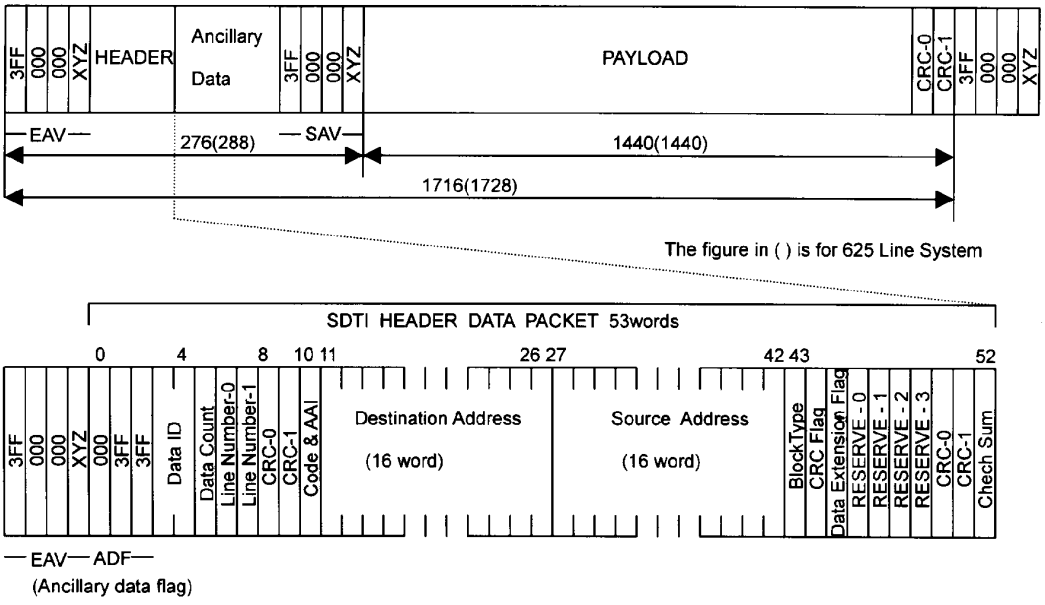


Figure 2 – SDTI header data structure

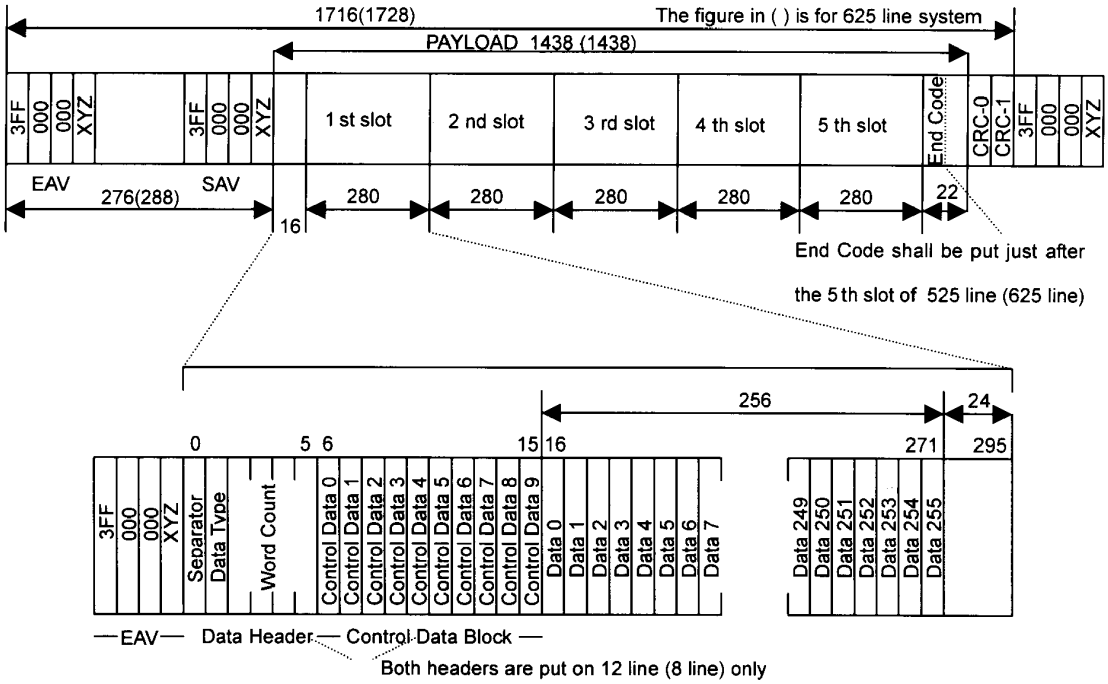


Figure 3 – Data structure

4.2 Data block header

The data block header, as specified in SMPTE 305M, shall contain the parameters shown in table 2. The data block header shall exist on line 12 for the 525/60 system or line 8 for the 625/50 system (refer to figures 4 and 7).

Table 2 – Data block header

| Parameters | Length | Value |
|---|---|---|
| Separator | 1 word | [309$_h$] |
| Data type | 1 word | [241$_h$] |
| Word count | 4 words | [B4720$_h$] (525/60 system)<br>[D8F50$_h$] (625/50 system) |

4.3 Control data block

Followed by the data block header, a control data block shall be inserted (immediately after the SDTI data block header). The control data block shall consist of 10 words (see figure 2), and the bits are allocated as shown in table 3. The control data block has some areas of commonality with the header section specified in IEC 61834-2, and also provides specific data required for data transfer between storage devices.

Byte 1: Indicates the data type (secondary).

Byte 2: Indicates the transfer conditions (transfer speed, bcked/unbcked, audio and video validity).

Bytes 3-10: Common information to IEC 61834-2.

4.3.1 Secondary data type

The control data block and the data slots are preceded with a secondary data type (1 word), with which the entire data block is defined. The initial code shall be set to all zero, and the receiver shall attempt to decode the data as soon as the desired secondary data type is detected.

| Value | Description |
|---|---|
| 0000 0000 | Initial code |
| 0000 0001 | Data block as defined |
| 0000 0010<br>\|<br>1111 1111 | Reserved |

Table 3 – Control data block structure

| | MSB | | | | | | | LSB |
|---|---|---|---|---|---|---|---|---|
| Byte 1 | Secondary data type | | | | | | | |
| Btye 2 | 0 0 (RESERVE) | | VIDEO INVALID | AUDIO INVALID | LOCK | TRANSFER MODE | | |
| Byte 3 | V 50/60 | V STYPE | A 50/60 | A STYPE | AP3 | AP2 | AP1 | APT |
| Byte 4 | FF | FS | V REC MODE | BCSYS | | DISP | | |
| Byte 5 | A-1 LF | A-1 CHN | | A-1 PA | A-1 AUDIO MODE | | | |
| Byte 6 | A-1 REC ST | A-1 REC END | A-1 REC MODE | A-1 EF | A-1 SMP | | A-1 QU | |
| Byte 7 | A-1 DRF | A-1 SPEED | | | | | | |
| Byte 8 | A-2 LF | A-2 CHN | | A-2 PA | A-2 AUDIO MODE | | | |
| Byte 9 | A-2 REC ST | A-2 REC END | A-2 REC MODE | A-2 EF | A-2 SMP | | A-2 QU | |
| Byte 10 | A-2 DRF | A-2 SPEED | | | | | | |

4.3.2 Transfer mode

The transfer mode specifies the desired transfer speed of the compressed video stream. The following transfer speed can be selected:

| Value | Description |
|---|---|
| 000 | Reserved |
| 001 | Normal speed (1X) |
| 010 | 2X speed |
| 011 | 3X speed |
| 100 | 4X speed |
| 101 | 5X speed |
| 110 | Reserved |
| 111 | Reserved |

LOCK: Indicates whether the VCR is being servo locked or not during the data transfer.

| Value | Description |
|---|---|
| 0 | VCR servo unlocked |
| 1 | VCR servo locked |

AUDIO INVALID: Indicates the validity of the audio data. When the AUDIO INVALID flag is active (1), the receiver shall not attempt to decode the audio data.

| Value | Description |
|---|---|
| 0 | Audio data valid |
| 1 | Audio data invalid |

VIDEO INVALID: Indicates the validity of the video data. When the VIDEO INVALID flag is active (1), the receiver shall not attempt to decode the video data.

| Value | Description |
|---|---|
| 0 | Video data valid |
| 1 | Video data invalid |

4.3.6 Common parameters

Other parameters contained in bytes 3 to 10 are common information to the international standard (IEC 61834).

4.4 Data slot

Each data slot consists of 280 words, and shall start from the word number address shown below. The data shall be contained in the first 256 bytes, and the last 24 bytes are reserved for future extensions.

| Word address | Number |
|---|---|
| Slot 1 | 16 |
| Slot 2 | 296 |
| Slot 3 | 576 |
| Slot 4 | 856 |
| Slot 5 | 1136 |

4.5 Endcode

The endcode as specified in SMPTE 305M shall be present at the word number address 1416 on line 525 for the 525/60 system, or line 625 for the 625/50 system.

| Parameters | Length | Value |
|---|---|---|
| Encode | 1 word | [30A$_h$] |

## 5 Transmission Format

The following clause describes the overall transmission format and the detailed data structure of the compressed video stream.

5.1 Digital interface format (DIF)

The data structure of the video, audio, and subcode in the DIF blocks shall be as specified in IEC 61834-2. However, the 3-byte ID shall not be carried over the interface (see figures 4, 5, and 6). The DIF blocks shall be mapped onto the data slots using a frame-bounded algorithm, which is different in sequence from the one specified in IEC 61834-2.

5.2 525/60 system

The data block shall be transmitted from line 12 through line 525, provided that valid data shall not exist on lines 9-11 and 272-274 for the 525/60 system as shown in figure 7. The areas in lines 247-271 and 510-8 are reserved for future extensions.

5.2.1 Video sections

The video sections are contained in lines 12-223 and 275-486 (see figure 8):

(n, V0) – (n, V134); n = 0 to 9

5.2.2 SC/VAUX sections

The SC/VAUX sections are contained in lines 224-231 and 487-494 (see figure 9):

(n, SC0), (n, SC1), n, VA0), (n, VA1), (n, VA2);
n = 0 to 9

5.2.3 Audio/AAUX sections

The audio/AAUX sections are contained in lines 232-246 and 495-509 (see figure 9):

(n, A0) – (n, A8); n = 0 to 9

5.3 625/50 system

The data block shall be transmitted from line 8 through line 625, provided that valid data shall not exist on lines 5-7 and 318-320 for the 625/50 system as shown in figure 10. The areas in lines 289-317 and 602-4 are reserved for future extensions.

5.3.1 Video sections

The video sections are contained in lines 8-261 and 321-574 (see figure 11):

(n, V0) – (n, V134); n = 0 to 11

5.3.2 SC/VAUX sections

The SC/VAUX sections are contained in lines 262-271 and 575-584 (see figure 12):

(n, SC0), (n, SC1), (n, VA0), (n, VA1), (n, VA2);
n = 0 to 11

5.3.3 Audio/AAUX sections

The audio/AAUX sections are contained in lines 272-288 and 585-601 (see figure 12):

(n, A0) – (n, A8); n = 0 to 11

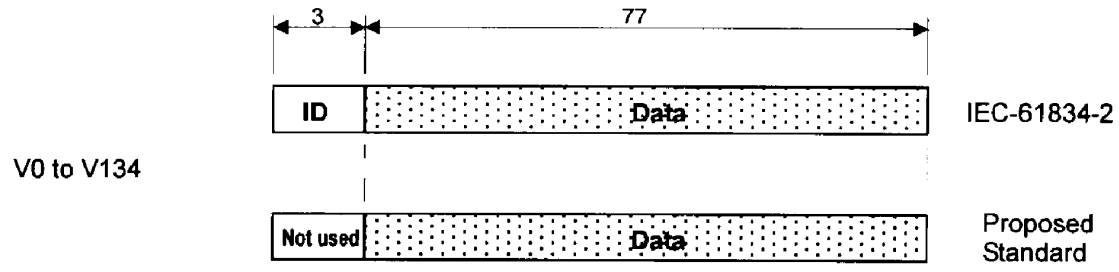


Figure 4 – Data in the video sections

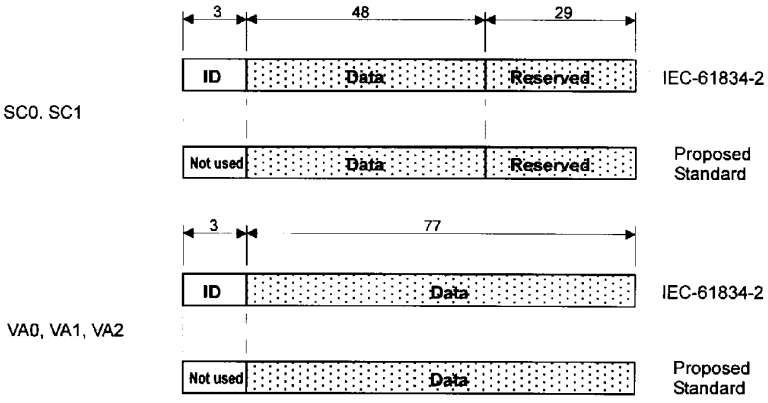


Figure 5 – Data in the SC/VAUX sections

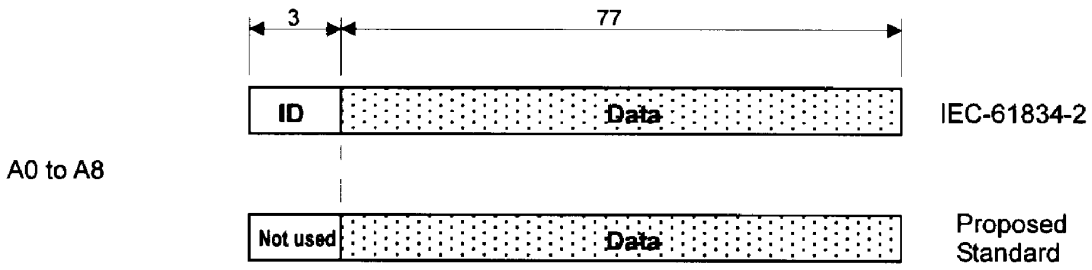


Figure 6 – Data in the audio/AAUX sections

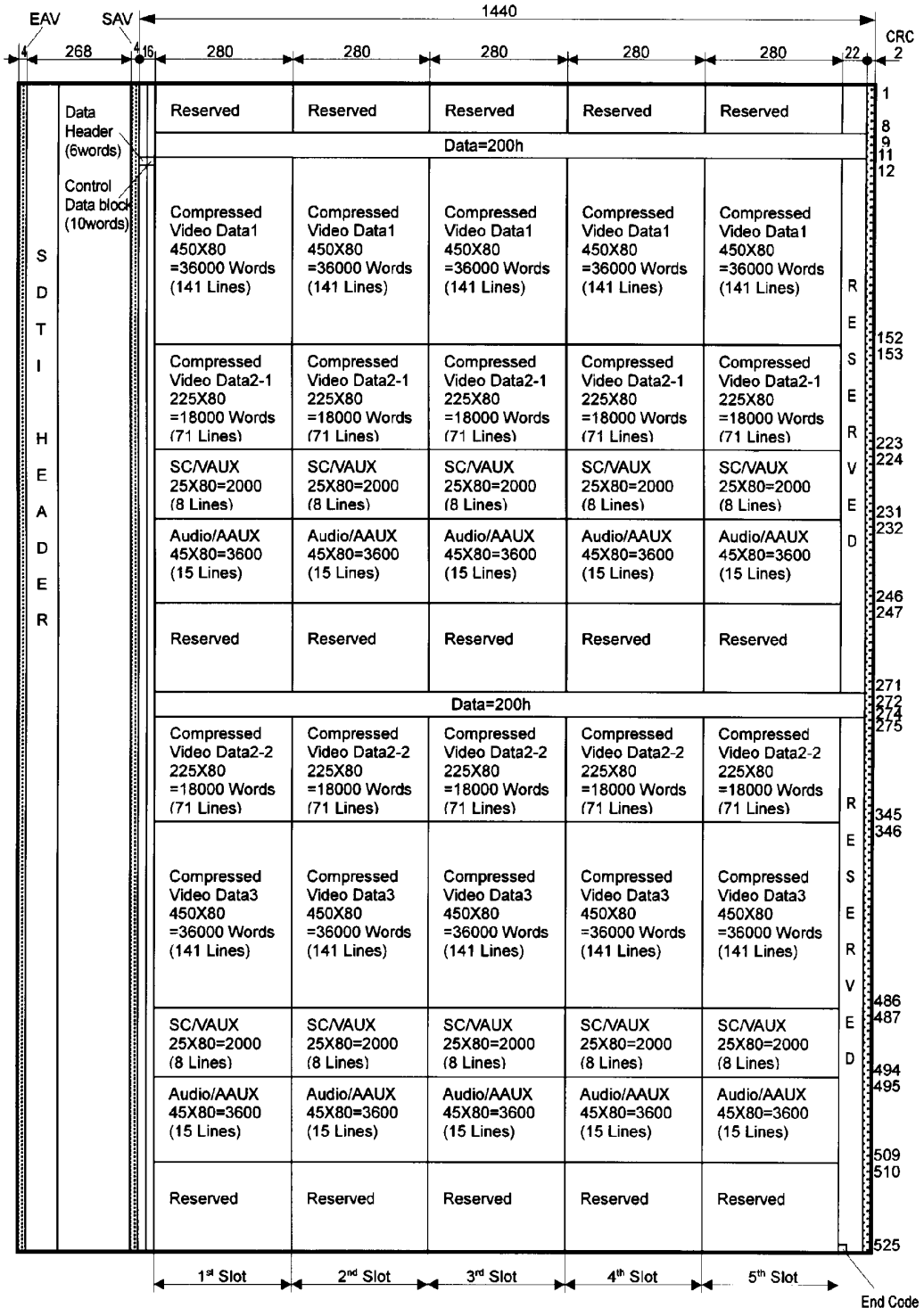


Figure 7 – Transmission format for 525/60 system

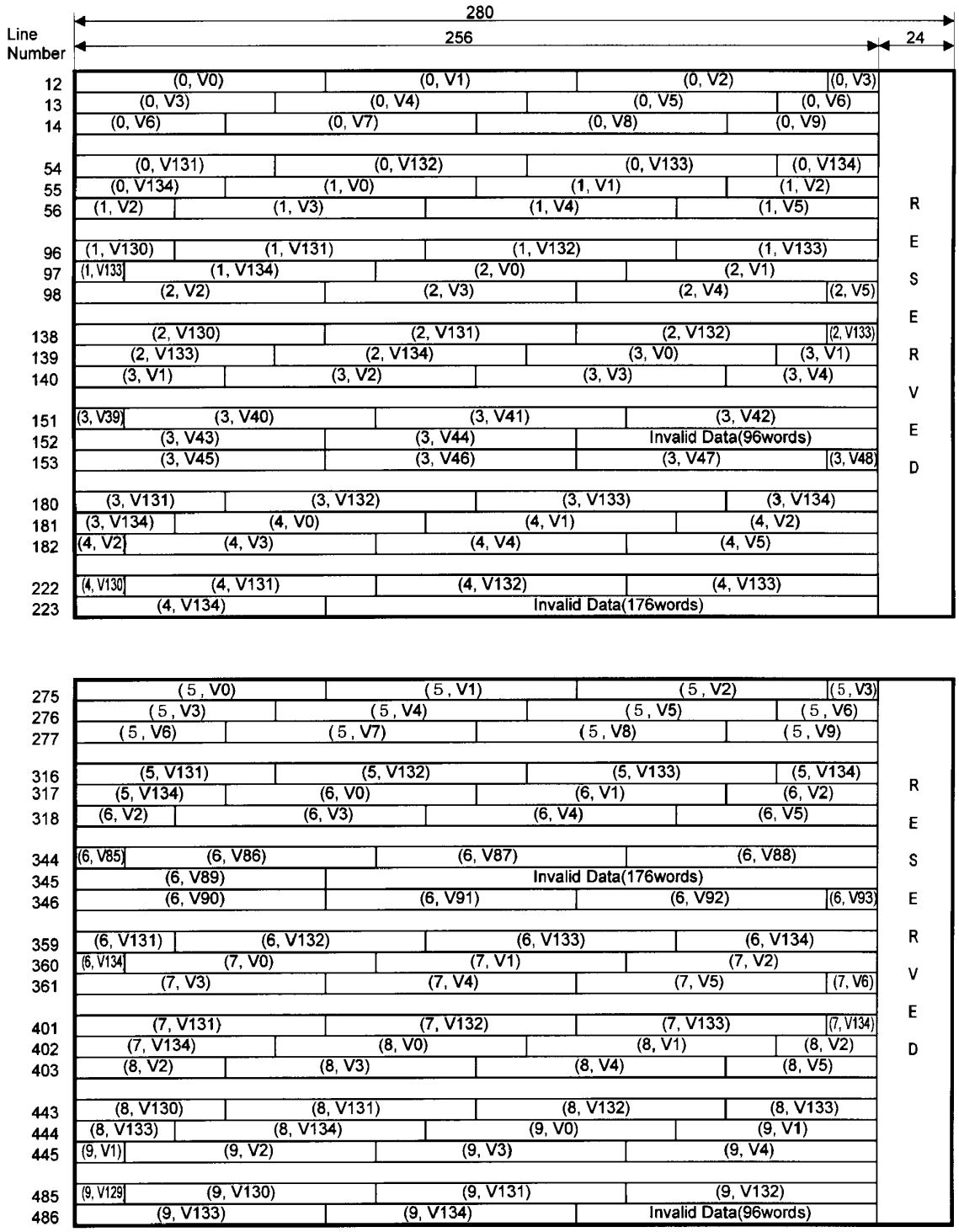


Figure 8 – Video sections for 525/60 system

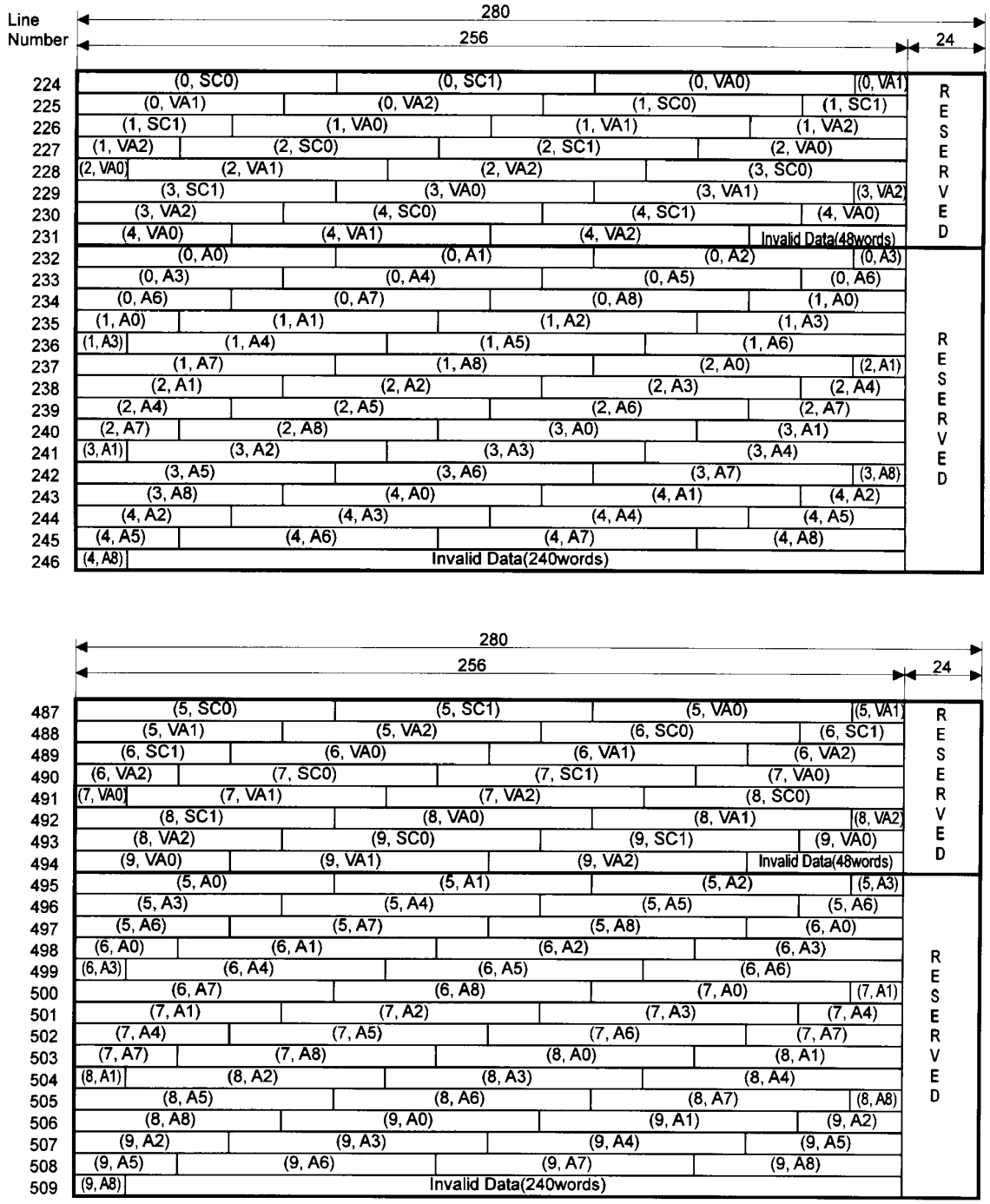


Figure 9 – SC/VAUX and audio/AAUX sections for 525/60 system

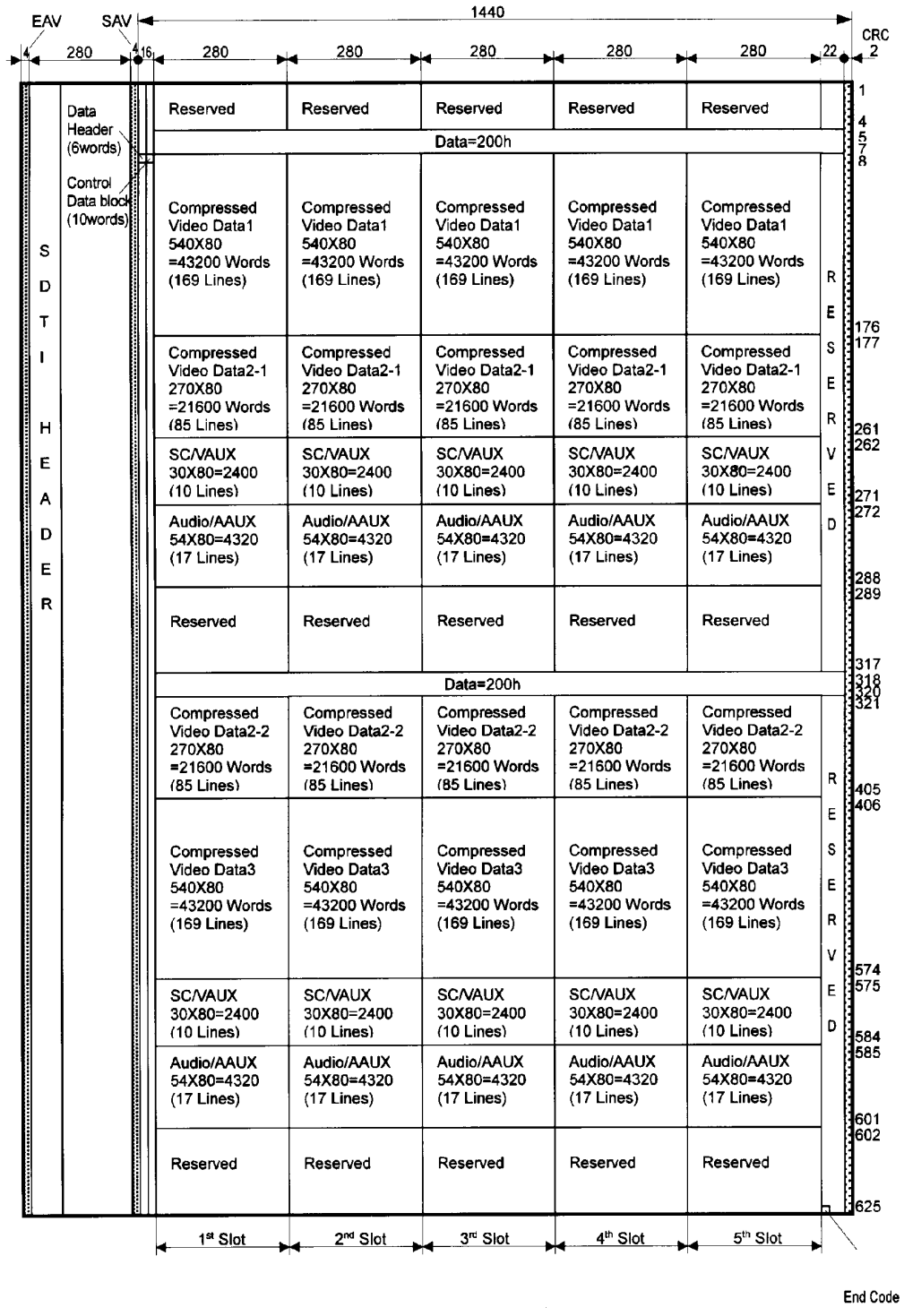


Figure 10 – Transmission format for 625/50 system

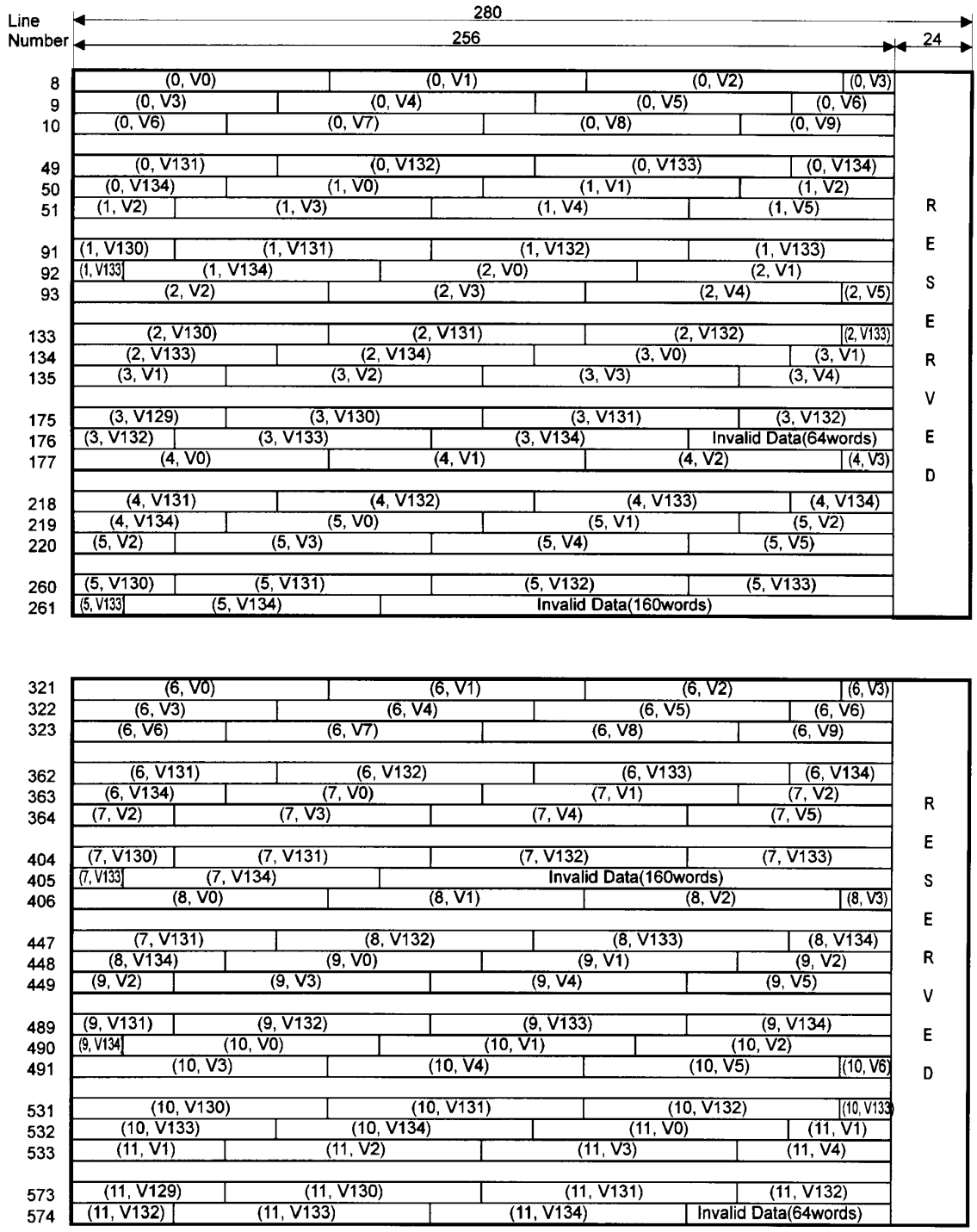


Figure 11 – Video sections for 625/50 system

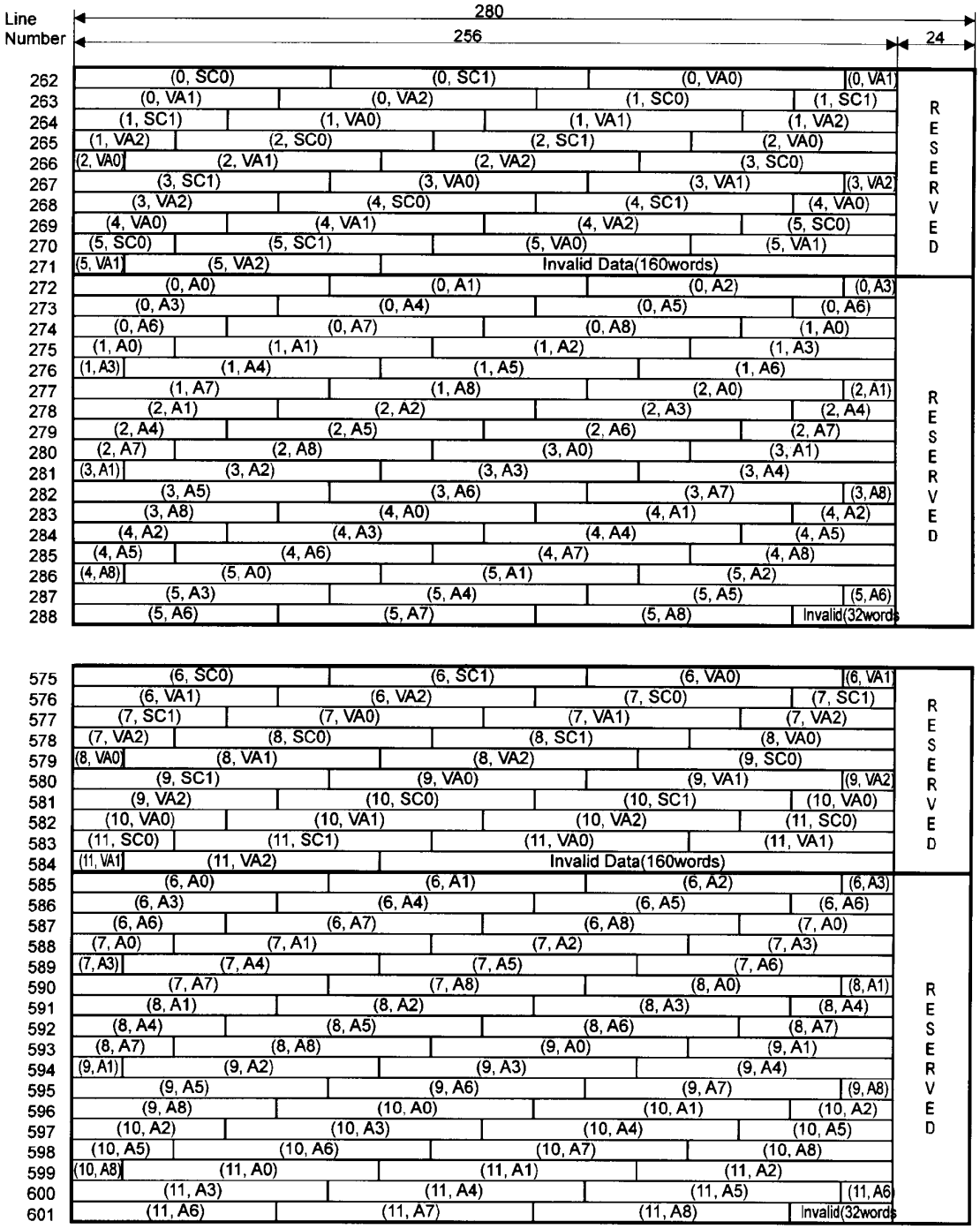


Figure 12 – SC/VAUX and audio/AAUX sections for 625/50 system

## Annex A (informative)
## Bibliography

ANSI/SMPTE 259M-1997, Television — 10-Bit 4:2:2 Component and $4f_{sc}$ Composite Digital Signals — Serial Digital Interface

SMPTE RP 168-1993, Definition of Vertical Interval Switching Point for Synchronous Video Switching

ITU-R BT.656-3, Interface for Digital Component Video Signals in 525-Line and 625-Line Television Systems Operating at the 4:2:2 Level of Recommendation ITU-R BT.601