

Color Monitor Colorimetry

1. Scope

This practice specifies the chromaticity values of the red, green, and blue visible radiation emitted by the phosphors used in professional television picture monitors.

2. Specifications

2.1 Expressed in terms of the CIE 1931 x, y chromaticity coordinate values, the values shall be:

	x	y
Red:	0.650	0.310
Green:	0.310	0.595
Blue:	0.155	0.070

2.2 Tolerances for x and y shall be ± 0.005 . (See Appendix.)

Appendix

(This Appendix is not part of the SMPTÉ Recommended Practice, but is included for information only.)

The tolerance specified for x and y has been accepted as necessary for applications requiring a critical evaluation of color and brightness. It is recognized, however, that the

micrology to ensure this close tolerance is complex and not widely available.

Transfer of Edit Decision Lists

1. General

1.1 Scope: This practice describes the data format for the interchange of a list of audio/video content decisions which specify an audio/video product. Exchange of this information allows the audio/video product to be reproduced on a compatible editing system. Such a list is commonly referred to as an edit decision list. The transfer medium and storage format are not specified in this document.

1.2 Defined Terms:

Alphanumeric: The term refers to any alphabetic character or the digits 0 through 9.

ASCII: American National Standard Code for Information Interchange. ANSI X3.4-1977, which describes the character encoding used by this practice.

Auto-assembly: Recording one or more edits automatically under system control from data in an edit decision list.

Edit Decision List: One or more events.

Edit Element: A single line in an edit decision list containing information specifying audio/video content decisions in an audio/video product.

Editing Mode: Specification of whether or not video is to be recorded on this edit and which audio tracks, if any, are to be recorded.

Event: One or more interrelated edit elements treated as a unit.

Field: A syntactical unit within an element that contains a functional grouping of data. Fields are delineated within an element by separators.

Mix: A method of combining two or more sources to produce a single source.

Separator: Character(s) used to delineate fields within an element.

Source: A reference to video or audio program material.

Submaster: A submaster is a medium, other than the master record medium, on which material is recorded for later use as source material. A typical use of a submaster would be the creation of a multiple mix effect on a system with only one mix effect bank.

Virtual Event: Specification of an effect that is not to be recorded directly, but can be referenced later as a source.

Virtual Source Reference: A reference to a virtual event defined earlier in the edit decision list.

1.2.1 Notation: The syntax of the edit decision list format is specified using a notation commonly used in the software industry called BNF. (Backus-Naur Form). The use of this notation allows precise, yet easy to understand, syntactic specification of the edit decision list format.

A BNF grammar consists of a list of rules which define grammatical terms. The first term defined is typically the highest level construct in the grammar, in this case, an EDIT_LIST. As there are many variations of the notation known as BNF, the following is a formal definition of the notation used in this practice:

Grammatical terms are capitalized, with an underscore (_) separating words.

Grammatical rules consist of:

the name of the grammatical term being defined,

followed by a colon (:),

followed by a list of grammatical terms,

BNF operators and/or literals,

and terminated with a semi-colon (;).

Literal strings are enclosed within double quotes ("").

Literal characters are enclosed by single-quotes ('').

Non-printable characters are represented by their name as shown in Appendix A4, ASCII Character Values.

Comments begin with #/* and end with #*/#.

The logical OR operation is specified with a vertical bar (|).

Use of square brackets, { and }, indicates that 0 or more occurrences of the items in the brackets are allowed.

Lower case alphabetic characters are considered equivalent to upper case alphabetic characters in the grammar. For the sake of clarity, grammatical rules are specified using only upper case alphabetic characters.

The complete grammar is defined in Appendix A2.

2. *Edit Decision List Structure.* The information in an EDIT_DECISION_LIST consists of 8-bit data bytes. The low-order 7 bits are interpreted as characters following the ASCII character set. The high-order bit is ignored. No distinction is made between upper- and lower-case alphabetic characters when interpreting edit elements and system directives. Upper- and lower-case alphabetic characters are considered distinct in comment elements and user elements.

2.1 Elements. The EDIT_DECISION_LIST consists of one or more "elements." The end of an edit decision list is indicated by either:

- a) the end of the storage medium
- b) a CONTROL_Z (SU/B) character

There are four types of elements:

```
COMMENT_ELEMENT
USER_ELEMENT
EDIT_ELEMENT
SYSTEM_DIRECTIVE
```

An element consists of a PRINTABLE_STRING, as defined by the grammar in Appendix A2, followed by a TERMINATOR (E/FB). The basic unit of information in an element is the field consisting of one or more characters. Fields are delineated by one or more separators, which can be any combination of space (SP), tab (HT), line-feed (LF), or carriage return (CR).

2.2 Event Structure. An event consists of one or more of the following element types:

```
COMMENT_ELEMENT
USER_ELEMENT
EDIT_ELEMENT
```

An event need not contain all three types, but must contain at least one.

All elements of an event have the same event number. The end of an event is indicated by a change in event number on the next element or by the end of the edit decision list.

The physical order of events on the transfer medium determines the order in which the events are to be executed. Note that this may result in later events recording over portions of prior events.

master/slave links between the members of the sync group.

If more than one source in a sync group has an edit element in an event, only the first source specified in the event will be used to determine synchronization of unspecified members of the sync group.

Time code values explicitly stated in edit elements will take precedence over any SYNC relationships for the duration of the given event. *

```
! "NOSYNC" SEPARATOR SOURCE_IDENTIFIER
FIELD [ SEPARATOR SOURCE_IDENTIFIER ]
/* Removes the indicated sources from all prior sync groups. */
```

```
! "SLAVE" SEPARATOR MASTER_SRC_ID '='
TIME_CODE_FIELD SEPARATOR SLAVE_SRC_ID '='
ID '=' TIME_CODE_FIELD [ SEPARATOR
SLAVE_SRC_ID '=' TIME_CODE_FIELD ]
/* Establishes master/slave link(s) between the master source and each indicated slave source. All slaves roll synchronously with the master source, whenever the master source is rolled, based on the time codes in the SLAVE directive. Establishing a master/slave link cancels any previous master/slave links between the indicated sources.
```

Time code values explicitly stated in edit elements will take precedence over any master/slave links for the duration of the given event. *

```
! "NOSLAVE" SEPARATOR MASTER_SRC_ID
SEPARATOR SLAVE_SRC_ID [ SEPARATOR
SLAVE_SRC_ID ]
/* Breaks the master/slave link between the indicated master source, and each listed slave source. */
```

MISCELLANEOUS_DIRECTIVES:

```
"AUDIO" SEPARATOR MODE_AUDIO_
SUBFIELD
```

/* The track(s) indicated are the ones that are used by the MODE_FIELD when all audio is called for. A range of audio tracks can be specified by separating two audio track numbers with a dash (—). *

```
! "INCLUDE" SEPARATOR FILENAME '='
TIME_CODE_FIELD
/* This directive causes the contents of the specified file to replace the include directive in the edit decision list. The time code specifies an offset which will be added to all sync entry and sync-exit times of edit elements in the included file. The filename can have up to 6 characters optionally followed by an extension of up to 3 characters. The extension, if present, is separated from the rest of the filename by a period (.). *
```

1 Events

1.1 Event Number General. The first field of an ELEMENT consists of up to four sub-fields, concatenated without separators:

```
EVENT_NUMBER_SUBFIELD (required)
```

```
VIRTUAL_EVENT_INDICATOR_
SUBFIELD (optional)
RECORDED_INDICATOR_
SUBFIELD (optional)
ELEMENT_TYPE_IDENTIFIER_
SUBFIELD (optional)
The EVENT_NUMBER_FIELD may be preceded by a separator, but embedded separators are not permitted.
```

4.1.1 Event Number Subfield. The EVENT_NUMBER_SUBFIELD consists of from one to six numeric characters, followed optionally by an alphabetic character. The range of valid event numbers is from 1 to 999999Z. The number zero (0) is not a valid event number. Leading zeroes are insignificant in differentiating event numbers (i.e., 0001 is equivalent to 1).

4.1.2 Virtual Event Indicator Subfield. A VIRTUAL_EVENT is indicated by the greater-than character (>) immediately following the EVENT_NUMBER_SUBFIELD. All elements of a VIRTUAL_EVENT must have this indicator.

4.1.2.1 Virtual Events. A virtual event is not recorded directly but is used as a source in the following event. It may be used to specify a transition or effect wherein one or more of the sources is itself an effect. The use of a virtual event is comparable to the use of a submaster. When the virtual event is referenced as a source, the SOURCE_ENTRY time and SOURCE_EXIT time refer to time codes in the audio/video product bounded by the SYNC_ENTRY time and SYNC_EXIT time of the virtual event.

4.1.3 Recorded Indicator Subfield. The RECORDED_INDICATOR SUBFIELD indicates that this event has been recorded, i.e., is not to be assembled. The RECORDED_INDICATOR SUBFIELD consists of an exclamation mark (!), immediately following the VIRTUAL_EVENT_INDICATOR SUBFIELD, which may be empty.

1.1.1 Element Type Identifier Subfield. The ELEMENT_TYPE_IDENTIFIER SUBFIELD indicates the type of ELEMENT. Element type identifiers are as follows:

```
*** — COMMENT_ELEMENT
!* — USER_ELEMENT
!* — EDIT_ELEMENT
```

The absence of this subfield indicates an EDIT_ELEMENT.

1.2 Comment Element. The COMMENT_ELEMENT contains information, specific to the event, which is to be interpreted by the operator and not the editing system. It consists of an event number field (with a COMMENT_ELEMENT identifier) followed by a PRINTABLE_STRING and terminated by a TERMINATOR.

1.3 User Element. The USER_ELEMENT is provided to allow an escape from the edit decision list format as defined by this practice and will not be infringed upon by any subsequent amendments to the practice. A USER_ELEMENT consists of an EVENT_NUMBER FIELD (with a USER_ELEMENT indicator) followed by a PRINTABLE_STRING and terminated by a TERMINATOR. The format of USER_ELEMENTS is left to the individual users.

1.4 Edit Element. The EDIT_ELEMENT defines the audio/video source, its related parameters, and its placement on the record medium. It consists of the following fields:

- EVENT_NUMBER
- SOURCE_IDENTIFICATION FIELD
- MODE_FIELD
- TRANSITION_TYPE FIELD
- TRANSITION_PARAMETER FIELD
- SOURCE_ENTRY FIELD
- SOURCE_EXIT FIELD
- SYNC_ENTRY FIELD
- SYNC_EXIT FIELD
- TERMINATOR

4.1 Source Identification Field. The SOURCE_IDENTIFICATION FIELD consists of one to eight alphanumeric characters. A SOURCE_IDENTIFICATION FIELD may be qualified by a SOURCE_AUDIO_SUBFIELD.

4.1.1 Special Source Identifiers. The following source identifiers have unique significance:

- BLACK — Indicates black video and silent audio.
- BARS — Indicate video color bars and audio test tone.

4.1.2 Virtual Source Identifier. A virtual event can be referenced as a source by the use of a VIRTUAL_SOURCE_IDENTIFIER, which consists of the event number of the virtual event followed by the less-than character (<). The event number in the virtual source identifier refers to the most immediately preceding virtual event with that event number. Each virtual event must precede any event which references that virtual event, and must not be separated from the event which references it by any non-virtual event.

Note that a virtual source identifier can refer to an event which itself contains virtual source references. Note also that the source times in an edit element containing a virtual source reference refer to the sync times in the event being referenced. Thus, an important restriction on both the SOURCE_ENTRY time and the SOURCE_EXIT time is that these times are bounded by the SYNC_ENTRY time and SYNC_EXIT time of the referenced event.

Example 1 in Appendix A3 represents the use of virtual source identifiers.

4.1.1.3 Source Audio Subfield. The optional SOURCE_AUDIO_SUBFIELD identifies the source audio tracks involved in an edit. It is separated from the source identifier by a decimal point (.) There are two components in SOURCE_AUDIO_SUBFIELD: audio sources and ranges of audio tracks. Combinations of audio sources and audio ranges can be linked by commas (,).

An audio source can be either a single audio track, or it can be a mix of two or more audio tracks. A single audio track is specified by one or two digits, (0 through 9), and can have any value from 1 to 99. An audio mix is specified by two or more audio sources, linked by a plus sign (+). Successive audio tracks to be mixed can be specified by a notation consisting of the smallest track number followed by two plus signs (+++) and the largest track number. In this case, all audio tracks from the smallest to the largest, inclusively, are to be mixed.

Each track number in the SOURCE_AUDIO_SUBFIELD that is not part of a range specification may be followed by a mix level in parentheses. The mix level is a real number, positive or negative, specifying the gain of that track in dB, where 0 dB represents unity gain and negative values represent less than unity gain. If a mix level is not specified for a given track, the editing system will not attempt to control the gain for that track.

An AUDIO_RANGE is a notation for denoting successive audio tracks. It consists of the smallest track number followed by a hyphen (-) and the largest track number. All audio tracks from the smallest to the largest, inclusively, are to be used.

The mapping between source audio tracks and record audio tracks is described in 4.1.2.2. An example of a SOURCE_AUDIO_SUBFIELD is shown in Example 2 of Appendix A3.

4.1.2 Mode Field. The MODE_FIELD specifies the editing mode (video and audio track selection) of the record medium, and consists of a MODE_INDICATOR SUBFIELD, optionally followed by an AUDIO_TRACK_SUBFIELD. If there is no AUDIO_TRACK_SUBFIELD, the audio track specification defaults to all available audio tracks, or, if an AUDIO system directive has been used, the default audio track specification follows the AUDIO system directive.

4.1.2.1 Mode Indicator Subfield. This subfield consists of one alpha character. The character 'V' indicates video only, 'A' indicates audio only, and 'B' indicates both video and audio.

4.1.2.2 Audio Track Subfield. The AUDIO_TRACK_SUBFIELD identifies the record audio tracks involved in the edit. It immediately follows the MODE_INDICATOR SUBFIELD. There are two possible elements in an AUDIO_TRACK_SUBFIELD: audio track numbers and audio

ranges. There can be any combination of audio track numbers and audio ranges linked by commas (,). Note that there can be no spaces in the AUDIO_TRACK_SUBFIELD.

A single audio track is specified by one or two digits (0 through 9), and can have any value from 1 to 99. An AUDIO_RANGE is a notation for denoting successive audio tracks. It consists of the smallest track number followed by a hyphen (-) and the largest track number. All audio tracks from the smallest to the largest, inclusively, are to be used.

Two mappings of audio sources to record audio tracks are allowed. The number of audio tracks specified in the AUDIO_TRACK_SUBFIELD matches the number of audio sources specified in the SOURCE_AUDIO_SUBFIELD, the order of each subfield specifies a one-to-one correspondence of audio source to record track. Note that the track numbers indicated by the AUDIO_TRACK_SUBFIELD must be exclusive, i.e., record track numbers must not repeat.

The only alternative to a one-to-one mapping is to specify one audio source and more than one record track. In this case, the single audio source is recorded on each of the specified record tracks.

Use of the AUDIO_TRACK_SUBFIELD is shown in Example 3 of Appendix A3.

1.4.3 Transition Type Field. The TRANSITION_TYPE_FIELD specifies the switcher transition or effect to be performed. The first character in the TRANSITION_TYPE_FIELD must be one of the following type identifiers:

- C — Cut: Video and audio cut to the new source.
- D — Dissolve: Video and audio dissolve to the new source.

W — Wipe: This must be followed by a pattern number. Video wipes to the new source and audio dissolves to the new source.

K — Key: The associated source indicates the key source (cutter). If no foreground source is specified in the following EDIT_ELEMENT, the foreground is the same as the key source. A pattern number following this type identifier and its modifiers, if any, indicates a wipe key. If a given audio track is indicated in only one of foreground or background, the audio track cuts to that source indicator. If the audio track is on both the foreground and background, audio dissolves.

M — Matte: The associated source indicates the key source (cutter). The foreground source is a matte (or color) generator. A pattern number following this type identifier and its modifiers, if any, indicates a wipe matte. Audio tracks cut to background.

F — Foreground Filler: The associated source indicates the filler for the immediately preceding foreground effect (e.g., fill hole cut by key signal or fill border of a wipe). No direct effect on audio.

Q — Quad Split: At least one edit element is required for each of the 4 quadrants, and the optional QUAD_MODIFIERS must be identical on each element. A QUAD_SPECIFIER must follow to identify which quadrant is filled by the video source of this edit element. There is no direct effect on audio.

N — Nonadditive Mix: Video does a nonadditive mix, audio dissolves.

R — Sync Roll: Although no switcher transition is indicated by this transition type, the 'R' in the transition type field indicates a source synchronization element. No direct effect on video or audio.

X — Audio Mix: Specifies a mix of audio channels. This transition type can appear in one or more edit elements, each of which specifies a source to be included in the mix. The transition type is followed by an optional level specifier. The level specifier consists of a REAL_NUMBER enclosed within parentheses, representing a gain, in dB, to be applied to each of the record audio tracks specified by the AUDIO_TRACK_SUBFIELD.

A source synchronization element ("sync roll") indicates that the specified time-coded source is to be rolled synchronously with the record machine. The source-entry time and sync-entry time define the synchronous relationship. If an event consists of no other type of edit elements than sync-roll elements, the first of these elements specifies the duration of the edit.

4.1.3.1 Wipe Pattern Number Codes. An extensive set of basic wipe patterns has been assigned codes. Variations on these basic patterns are available via pattern modifiers which specify horizontal and vertical replication of the basic pattern. The pattern codes have been grouped by basic geometry as follows:

Pattern Description	Code Range
Combinations of horizontal, vertical, and diagonal edges	1 - 99
Enclosed shapes, expanding from the picture's center	101 - 199
Combinations of horizontal and vertical edges rotating about various center points (clock wipes)	201 - 299
Wipes consisting of sequential revelation of picture squares (matrix wipes)	301 - 399

Pattern number zero is reserved to indicate no selection of pattern by the system. Gaps have been left in the numbering scheme to allow for future additions to the tables of pattern codes. The basic patterns and their assigned codes are included in Appendix A5.

4.4.3.2 Pattern Modifiers. Wipe patterns may be modified by appending one or more of the modifiers listed below. The modifiers directly follow the pattern number.

- R — Reverse direction
- S — Soft edge
- B — Wipe border
- P — Position
- M — Pattern modulator
- A — Shadow
- T — Tumble or revolve pattern
- G — Spot light. The presence of this modifier indicates a single-source effect, i.e., a wipe between the indicated source at full luminance level and reduced level.

H INTEGER — Horizontal replication factor. Specifies multiples of the basic pattern.

V INTEGER — Vertical replication factor. Specifies multiples of the basic pattern.

C — Checkerboard wipe. First pass creates a checkerboard, second pass fills it in (matrix wipes only).

Note that many patterns not included in the basic set of patterns in Appendix A5 can be specified using horizontal and vertical replication factors.

4.4.3.3 Key or Matte Modifiers. These modifiers must directly follow the key or matte type identifier:

- H — Shadow
- O — Outline
- E — Edge (border)
- I — Invert (inverts foreground and background)
- T — Soft edge between foreground and background
- C — Chroma-key

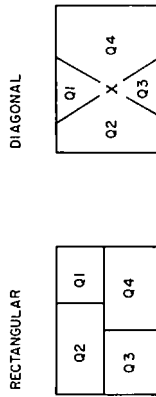
4.4.3.1 Quad Split Modifiers.

D — Diagonal quad split. Default is rectangular.

- S — Soft edge
- B — Bordered edge

4.4.3.5 Quad Specifier. The QUAD SPECIFIER is a single digit, from 1 to 4 inclusively, which specifies the quadrant of the quad split to

which this edit element refers. The quadrants are laid out as follows:



4.4.4 Transition Parameter Field. Some transitions require a TRANSITION PARAMETER FIELD following the TRANSITION TYPE FIELD and separated from it by a field separator. These transitions are dissolve, wipe, key, matte, and nonadditive mix. The first parameter is the transition duration which consists of an integer indicating the duration of the transition in frames. Following the duration there is an optional EFFECT_LIMIT_SUBFIELD.

4.4.4.1 Effect Limit Subfield. The EFFECT_LIMIT_SUBFIELD is optional. When it is missing, the effect transitions from its minimum level to its maximum level. When present, the EFFECT_LIMIT_SUBFIELD consists of a left parenthesis, an effect limit specifying the start level, a comma, and an effect limit specifying the end level followed by a right parenthesis. The effect limits consist of one to four digits, ranging from 0 to 1000, where 1000 indicates the maximum effect level and 0 indicates the minimum effect level. The effect starts at the level indicated by the first limit and ends at the level indicated by the second limit. When an EFFECT_LIMIT_SUBFIELD is used, the transition duration represents the time in frames required for the transition from the start level to the end level.

4.4.5 Source Entry Time Code Field. The SOURCE_ENTRY_TIME_CODE_FIELD consists of the source-entry time code followed by an optional PLAYBACK_SUBFIELD. The source-entry time code designates the first field taken from the indicated source, field 1 or 2 being differentiated by the seconds-frames separator, as described in Sec. 3.

4.4.5.1 Playback Subfield. The PLAYBACK_SUBFIELD, when present, directly follows the source-entry time and consists of a left parenthesis, followed by two optional specifiers, and ending with a right parenthesis.

The first specifier is the INITIAL_SPEED_SPECIFIER, and consists of a real number representing initial source speed as a percentage of normal play speed. Thus, the value 100 indicates full play speed, and 0 indicates still frame. Negative values indicate reverse motion.

The ability to specify the initial speed of an edit allows the specification of edits with constant acceleration/deceleration over the edit duration. For an edit of this kind, the average speed of the source material is calculated from the ratio of the record duration to the source duration. The final speed of the source material is calculated from the average speed and the initial speed.

Example: $\text{Final_spd} = \text{avg_spd} + (\text{avg_spd} - \text{init_spd})$

The second specifier is the VIDEO_FIELD_SEQUENCE_SPECIFIER, which allows specification of frame vs. field mode, and field sequencing. This specifier consists of one of the following options:

- F1 — Field 1, followed by field 2.
- F2 — Field 2, followed by the following frame's field 1.
- V — Vertical mode. Each field is presented as it is encountered during playback of the source material.

If both specifiers are present, the INITIAL_FIELD_SEQUENCE_SPECIFIER must precede the VIDEO_FIELD_SEQUENCE_SPECIFIER.

4.4.6 Source Exit Time Code Field. The SOURCE_EXIT time code will designate the first field of source material not included in the audio/video product. Note that the SOURCE_EXIT and SYNC_EXIT times include involvement of the current source in any transition specified in the following element(s) of the current event. If the source duration is not equal to the record duration, the source speed is defined by the ratio of source duration to record duration.

If the SOURCE_ENTRY time code is equal to the SOURCE_EXIT time code, this edit element does not specify the motion of the source material.

4.4.7 Sync Entry Time Code Field. The sync-entry time code designates, for each EDIT_ELEMENT, the video field in the audio/video product that is synchronous with the video source

field specified by the source-entry time code. Initiation of any indicated transition will also be synchronous with the sync-entry time. Every EDIT_ELEMENT within an event must have a sync-entry time greater than or equal to the sync-entry time of the first EDIT_ELEMENT in the event.

4.4.8 Sync Exit Time Code Field. The sync-exit time code designates the first field of the audio/video product not specified by the current EDIT_ELEMENT. The sync-exit and source-exit time codes also designate a synchronous relationship between the video source and the audio/video product.

The sync-exit time is also used to determine the playback speed of the source material, with the source-entry and source-exit times specifying the extent of the source material, and sync-entry and sync-exit times specifying the length of the resulting product. The play speed of the video source, for constant speed edits, is determined by the ratio of the source duration to the product duration. Source-exit time less than source-entry time implies reverse motion of the source.

5. Time Code Format. Time code is expressed, as per American National Standard for Television—Time and Control Code—Video and Audio Tape for 525-Line/60-Field Systems, ANSI/SMPTE 12M-1986, in terms of four two-digit groups representing hours (HH), minutes (MM), seconds (SS), and frames (FF), separated by punctuation marks (p), in the form HHpMMpSSpFF. The separator between the seconds and frames groups is significant in that it is used to denote drop-frame/nondrop-frame time code and to indicate field 1 or field 2, as follows:

- . (period) Nondrop-frame code, field 1
- : (colon) Drop-frame code, field 1
- ; (semicolon) Drop-frame code, field 2

Allowance is made for the expression of time code in compact form by the suppression of leading zeros and associated punctuations, up to but not including the seconds-frames punctuation.

Appendix

(This Appendix is not part of the SMPTE Recommended Practice, but is included for information only.)

Appendix A1
Edit Element Diagram

Edit Element Field Identifiers:

EVENT_NUMBER SOURCE_ID MODE TRANSITION_TYPE
[TRANSITION_PARAMETER] SOURCE_ENTRY SOURCE_EXIT
SYNC_ENTRY SYNC_EXIT 'ETB'

The following convention is used to express character combinations below:

- x exactly one instance of character x
[x] zero or one instance of x
[x]* zero or more instances of x
{x,m,n} between m and n instances of x
x|y|z any one of x or y or z
The following symbols are defined:
a any letter A-Z or a-z
d any numeric digit 0-9
dd decimal number of the number of digits shown
mm.n decimal numbers of between one digit and the number of digits shown

Edit Element Field Specifications:

EVENT_NUMBER
Event_number [Virtual Event Indicator] [Recorded Indicator]
nnnnn [a] [>] [i]
SOURCE_ID
Source_ID [Source Audio Subfield] [Virtual Source Indicator]
[a,d] {1,6} {nn|mm—nn|mm—+nn {nn,mm—nn|mm—+nn}*] [<]
nn — track nn
mm—nn — tracks mm through nn
mm+nn — mix of tracks mm and nn
mm++nn — mix of tracks mm through nn

MODE
Mode [Mode Audio Subfield]
V B:A [, nn|mm—nn [, nn|mm—nn] *]
TRANSITION_TYPE
Type [Modifier (6)] [Pattern]
C Switcher operation
D Cut
D Dissolve
W Wipe
K:M [H] [O] [E] [I] [T] [C] Key/Matte (mix)
K:M [H] [O] [E] [I] [T] [C] nn [R] [S] [B] [P] [M] [T] [G] [Hn] [Vn] [C] Key/Matte (wipe)
F Foreground filter
N Nonadditive mix
Q [D] [S] [B] n Quad Split
R Sync-roll
X { (nnnn.n) } Audio mix (dB level)
(following types D, W, K, M, N)

TRANSITION_PARAMETER
Duration [Effect Limits]
nnnn { (nnnn [, nnnn]) }
SOURCE_ENTRY
Source_entry_time [([Initial speed] [Field sequence])]
ddddd { (([nnnn] [V] [F])) }
(nnnn = percent of play speed)
(̂ represents time code separator, one of : | . ; .)

SOURCE_EXIT
ddd:ddd:ddd
SYNC_ENTRY
ddd:ddd:ddd
SYNC_EXIT
ddd:ddd:ddd

Subfields are separated by spaces for clarity; in practice, all subfields are concatenated.

Appendix A2
Edit Decision List Syntax

The following is a formal definition of the syntax of the edit decision list:
EDIT_LIST:
/*
/* Note that the semantics must determine
/* the groupings of elements that
/* constitute an event.
EVENT_LIST 'SUB'

ELEMENT_TERMINATOR
EVENT_LIST ELEMENT_TERMINATOR
ELEMENT_TERMINATOR

ELEMENT:
COMMENT_ELEMENT
EDIT_ELEMENT
USER_ELEMENT
SYSTEM_DIRECTIVE

COMMENT_ELEMENT:
EVENT_NUMBER ** PRINTABLE_STRING

EDIT_ELEMENT:
EVENT_NUMBER
SEPARATOR SOURCE_IDENTIFICATION_FIELD
SEPARATOR MODE_FIELD
SEPARATOR TRANSITION_FIELD
SEPARATOR TIME_CODE_FIELD PLAYBACK_SUBFIELD
SEPARATOR TIME_CODE_FIELD
SEPARATOR TIME_CODE_FIELD

USER_ELEMENT /* Format is user defined */
EVENT_NUMBER ** PRINTABLE_STRING

SYSTEM_DIRECTIVE:
INFORMATIONAL_DIRECTIVES
AUTO_ASSEMBLE_DIRECTIVES
CONTROL_DIRECTIVES
MISCELLANEOUS_DIRECTIVES

INFORMATIONAL_DIRECTIVES:
** PRINTABLE_STRING
** SEPARATOR PRINTABLE_STRING

AUTO_ASSEMBLE_DIRECTIVES:
"WAIT"
"SKIP"
"BELL"

```

CONTROL_DIRECTIVES:
| "RECORD" SEPARATOR MODE_FIELD SEPARATOR
| MEDIUM_IDENTIFIER '=' TIME_CODE_FIELD
| "NORECORD" SEPARATOR MODE_FIELD SEPARATOR
| MEDIUM_IDENTIFIER
| "SYNC" SEPARATOR SOURCE_IDENTIFIER '=' TIME_CODE_FIELD
| [ SEPARATOR SOURCE_IDENTIFIER '=' TIME_CODE_FIELD ]
| "NOSYNC" SEPARATOR SOURCE_IDENTIFIER [ SEPARATOR SOURCE_IDENTIFIER ]
| "SLAVE" SEPARATOR MASTER_SRC_ID '=' TIME_CODE_FIELD SEPARATOR
| SLAVE_SRC_ID '=' TIME_CODE_FIELD
| [ SEPARATOR SLAVE_SRC_ID '=' TIME_CODE_FIELD ]
| "NOSLAVE" SEPARATOR MASTER_SRC_ID SEPARATOR SLAVE_SRC_ID
| [ SEPARATOR SLAVE_SRC_ID ]
;

MISCELLANEOUS_DIRECTIVES:
| "AUDIO" SEPARATOR MODE_AUDIO_SUBFIELD
| "INCLUDE" SEPARATOR FILENAME '=' TIME_CODE_FIELD
;

MASTER_SRC_ID:
SOURCE_IDENTIFIER
;

SLAVE_SRC_ID:
SOURCE_IDENTIFIER
;

SOURCE_IDENTIFICATION_FIELD: /* Note the special significance */
/* of "BLACK" and "BARS." */
SOURCE_IDENTIFIER
| SOURCE_IDENTIFIER ',' SOURCE_AUDIO_SUBFIELD
;

SOURCE_IDENTIFIER: /* Note 8 character maximum. */
IDENTIFIER
| EVENT_NUMBER_SUBFIELD '<' /* Virtual Source Ref. */
;

MEDIUM_IDENTIFIER: /* Note 8 character maximum. */
IDENTIFIER
;

IDENTIFIER:
ALPHA
| NUMBER
| IDENTIFIER ALPHA
| IDENTIFIER NUMBER
;

FILENAME:
FILEID
| FILEID ',' FILE_EXTENSION
;

FILEID:
IDENTIFIER /* Note 6 character limit. */
;

FILE_EXTENSION:
IDENTIFIER /* Note 3 character limit. */
;

SOURCE_AUDIO_SUBFIELD:
AUDIO_SOURCE
| AUDIO_RANGE
| SOURCE_AUDIO_SUBFIELD ',' AUDIO_SOURCE
| SOURCE_AUDIO_SUBFIELD ',' AUDIO_RANGE
;
    
```

```

AUDIO_SOURCE:
AUDIO_TRACK_NUMBER AUDIO_MIX_LEVEL
| AUDIO_MIX_RANGE
| AUDIO_SOURCE ',' AUDIO_TRACK_NUMBER AUDIO_MIX_LEVEL
| AUDIO_SOURCE ',' AUDIO_MIX_RANGE
;

AUDIO_MIX_RANGE:
/* Audio Mix, Successive Channels
/* The second track number must be
/* greater than the first number.
AUDIO_TRACK_NUMBER '+' '+' AUDIO_TRACK_NUMBER
;

AUDIO_RANGE:
/* The second track number must be
/* greater than the first track number.
AUDIO_TRACK_NUMBER '-' AUDIO_TRACK_NUMBER
;

AUDIO_TRACK_NUMBER:
DIGIT
| DIGIT DIGIT
;

AUDIO_MIX_LEVEL: /* Audio mix level (dB) */
| (' REAL_NUMBER ') /* Empty Field */
;

MODE_FIELD:
/* Video only
/* All audio tracks
/* Video and all audio tracks
/* Only audio tracks
/* Video and audio tracks
'V'
| 'A'
| 'B'
| 'A' MODE_AUDIO_SUBFIELD
| 'B' MODE_AUDIO_SUBFIELD
;

MODE_AUDIO_SUBFIELD:
AUDIO_TRACK_NUMBER
| AUDIO_RANGE
| MODE_AUDIO_SUBFIELD ',' AUDIO_TRACK_NUMBER
| MODE_AUDIO_SUBFIELD ',' AUDIO_RANGE
;

TRANSITION_FIELD:
TRANSITION_SPEC SEPARATOR EFFECT_LIMIT_SUBFIELD
| 'C' /* Cut
| 'R' /* Sync Roll
;

TRANSITION_SPEC:
'D'
| 'W' WIPE_SPEC
| KEY_TYPE
| KEY_TYPE KEY_SPEC
| KEY_TYPE WIPE_SPEC
| KEY_TYPE KEY_SPEC WIPE_SPEC
| 'Q' QUAD_MODIFIER DIGIT
| 'F'
| 'N'
| 'X'
| 'X' '(' REAL_NUMBER ') '
;

WIPE_SPEC:
NUMBER
| WIPE_SPEC WIPE_MODIFIER
;
    
```



```

UPPER_ALPHA:
'A' | 'B' | 'C' | 'D' | 'E' | 'F' | 'G' | 'H' | 'I' | 'J'
'K' | 'L' | 'M' | 'N' | 'O' | 'P' | 'Q' | 'R' | 'S' | 'T'
'U' | 'V' | 'W' | 'X' | 'Y' | 'Z'
:
LOWER_ALPHA:
'a' | 'b' | 'c' | 'd' | 'e' | 'f' | 'g' | 'h' | 'i' | 'j'
'k' | 'l' | 'm' | 'n' | 'o' | 'p' | 'q' | 'r' | 's' | 't'
'u' | 'v' | 'w' | 'x' | 'y' | 'z'
:
REAL_NUMBER:
INTEGER
INTEGER '+' NUMBER
INTEGER '-' NUMBER
:
INTEGER:
NUMBER
NUMBER '+' NUMBER
NUMBER '-' NUMBER
:
NUMBER:
DIGIT
NUMBER DIGIT
:
DIGIT:
'0'
'NON_ZERO_DIGIT'
'1' | '2' | '3' | '4' | '5' | '6' | '7' | '8' | '9'
:
SEPARATOR:
SPACE | 'HT' | 'CR' | 'LF'
SEPARATOR SPACE
SEPARATOR 'HT'
SEPARATOR 'CR'
SEPARATOR 'LF'
:
SPACE:
:
TERMINATOR:
'ETB'
:

```

Appendix A3 Examples

Example 1. Virtual Source Identifiers:

```

1> REEL1 B C 00:05:00 00:06:00 01:00:00 01:02:00
1> TITL1 B K 30 (0.1000) 00:00:00 00:01:00 01:00:00 01:02:00
2> 1< B C 01:00:00 01:02:00 02:00:00 02:02:00
2> TITL2 B K 30 (0.1000) 00:00:00 00:01:00 02:00:00 02:02:00
3> REEL2 B C 02:00:00 02:02:00 03:00:00 03:02:00
3> TITL3 B K 0 (1000.1000) 00:00:00 00:02:00 03:00:00 03:02:00
17A 2< B C 02:00:00 02:02:00 04:00:00 04:02:00
17A 3< B D 30 03:00:00 03:02:00 04:01:00 04:03:00

```

Event 17A is a delayed dissolve between two virtual source references. The first virtual source reference is to virtual event 2 which is a key of TITL2 over virtual event 1. Virtual event 1 is itself a key of TITL1 over REEL1. Thus, virtual event 2 consists of TITL2 keyed over the key of TITL1 over REEL1. The second virtual source reference in event 17A is to event 3, a virtual event, which is a key of TITL3 over REEL2. Note that the source times in event 17A refer to the sync times in virtual events 2 and 3.

A good way to visualize the use of a VIRTUAL_SOURCE_IDENTIFIER is to consider that the referenced event was recorded on a submaster. Thus, the source times in the virtual source references refer to the sync times on the submasters. Event 17A can be recorded by first recording virtual event 1 on a submaster. Then that submaster would be used to create virtual event 2 for recording on a second submaster. Virtual event 3 would be recorded on a third submaster. The submasters can then be used as sources from which to assemble event 17A.

Alternatively, event 17A could be recorded in one pass by making use of a multiple mix effect switcher to create the appropriate keys and then dissolve between them.

Example 2. SOURCE_AUDIO_SUBFIELD:

A.1.1.2. Source ID is A. The two audio sources are tracks 1 and 2.
 5A.1.2. Source ID is 5A. The two audio sources are tracks 1 and 2.

2.3.4 (-3.4) + 9 (-5.2). Source ID is 2. The two audio sources are track 3 and a mix of track 4 at -3.4 db and track 9 at -5.2 db.

REEL3.3+8. Source ID is REEL3. The audio source is a mix of tracks 3 through 8.

STUDIO.4.4+15+22+24. Source ID is STUDIO. The two audio sources are track 4 and a mix of tracks 4 through 15 and tracks 22 through 24.

35B<.3.5. Source ID is event 35B. The two audio sources are track 3 and track 5. Note that the tracks specified by this SOURCE_AUDIO_SUBFIELD must be a subset of the tracks specified by the AUDIO_TRACK_SUBFIELD of event 35B.

15A.1.7-9.3.6.17. Source ID is 15A. The nine audio sources are tracks 1, 7 through 9, 3 through 6, and 17.

Example 3. AUDIO_TRACK_SUBFIELD:

```

V — Record video only.
A — Record all available audio tracks. Note that this mode may have limitations placed on it by the "AUDIO" system directive.
B — Record video and all available audio tracks.
A3 — Record audio track number 3 only.
B5 — Record video and audio track number 5 only.
A17 — Record audio tracks 1 and 7.
A2.5 — Record audio tracks 2 through 5.
B1.3 — Record video and audio tracks 1 and 3.
B2.5 — Record video and audio tracks 2 through 5.
B7.3-6 — Record video, audio track 7 and audio tracks 3 through 6.
A.1.7.9.3.6.17 — Record audio tracks 1, 7 through 9, 3 through 6, and 17.

```

Example 4. Edit Elements:

```

01> BKG1 V C 01:00:00 (50V) 01:03:15 00:00:00 00:07:00
01> BKG2 V D 60 02:05:00 (F2) 02:03:01 00:05:00 00:10:00
12 001< V C 09:02:00 00:10:00 15:00:00 15:08:00
12 MAT1 V K 0 10:00:00 10:03:00 15:03:00 15:08:00
12 FOG V F 05:00:00 (10) 05:01:00 15:03:00 15:08:00
12 MLC5.6.A.1.2 C 30:00:00 30:20:00 15:00:00 15:20:00

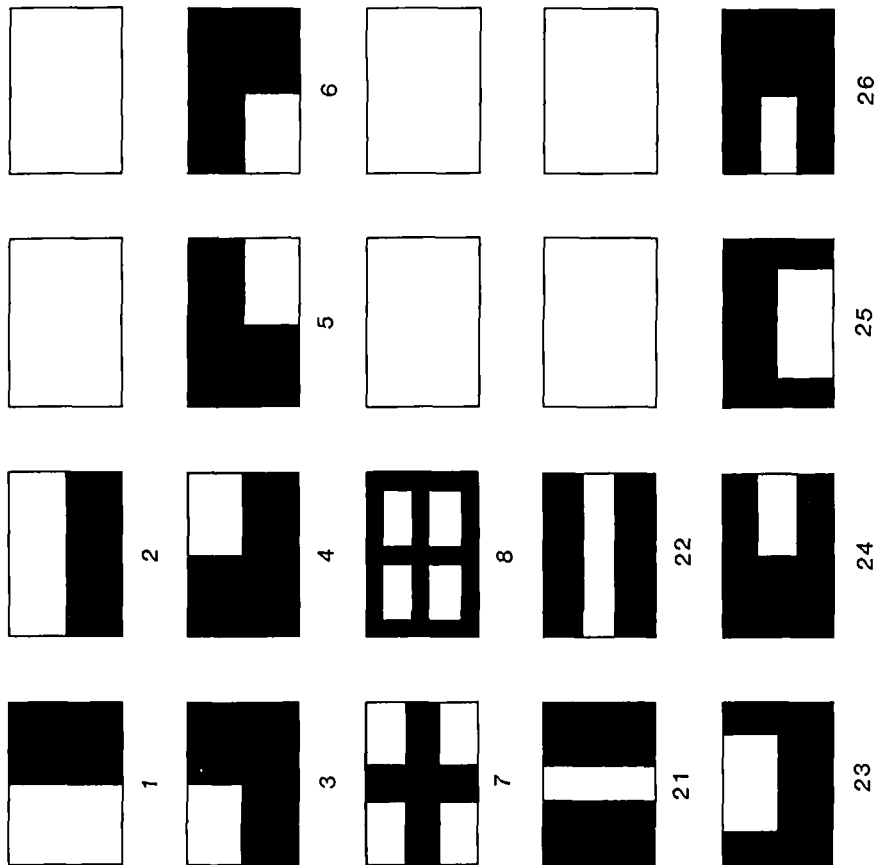
```

Virtual event 01 specifies BKG1 dissolving to BKG2 after 5 seconds. BKG1 is at 50% play speed with vertical field sequencing, i.e., fields presented sequentially. BKG2 is in still frame playback with field 2 dominant, i.e., field 2 alternating with the next frame's field 1. The SYNC_EXIT of BKG1 is 7:00 because it is active during the two-second dissolve. The SOURCE_EXIT is the time reached in 7 seconds at 50% speed.

The last 8 seconds of this event are used in event 12, with source MAT1 cutting a key 3 seconds in. Source FOG fills the foreground, accelerating from 10% play speed at the SYNC_ENTRY to 30% play speed at the specified SYNC_EXIT. In the same event, 20 seconds of audio tracks 3 and 6 of source MUS are recorded on tracks 1 and 2.

Appendix A5
Wipe Patterns

Sketch shows effect. Normal direction of change is toward increasing white area.



Appendix A4
ASCII Character Values

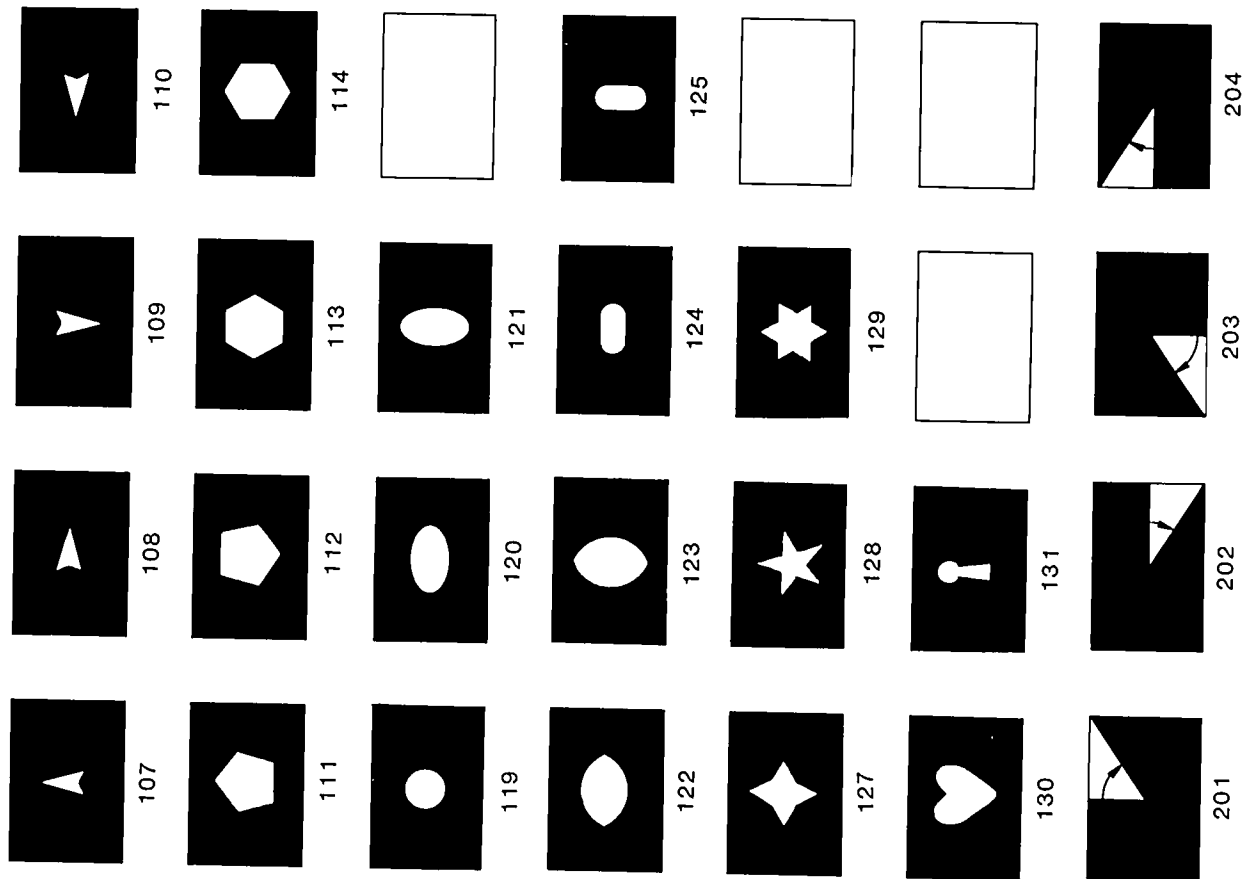
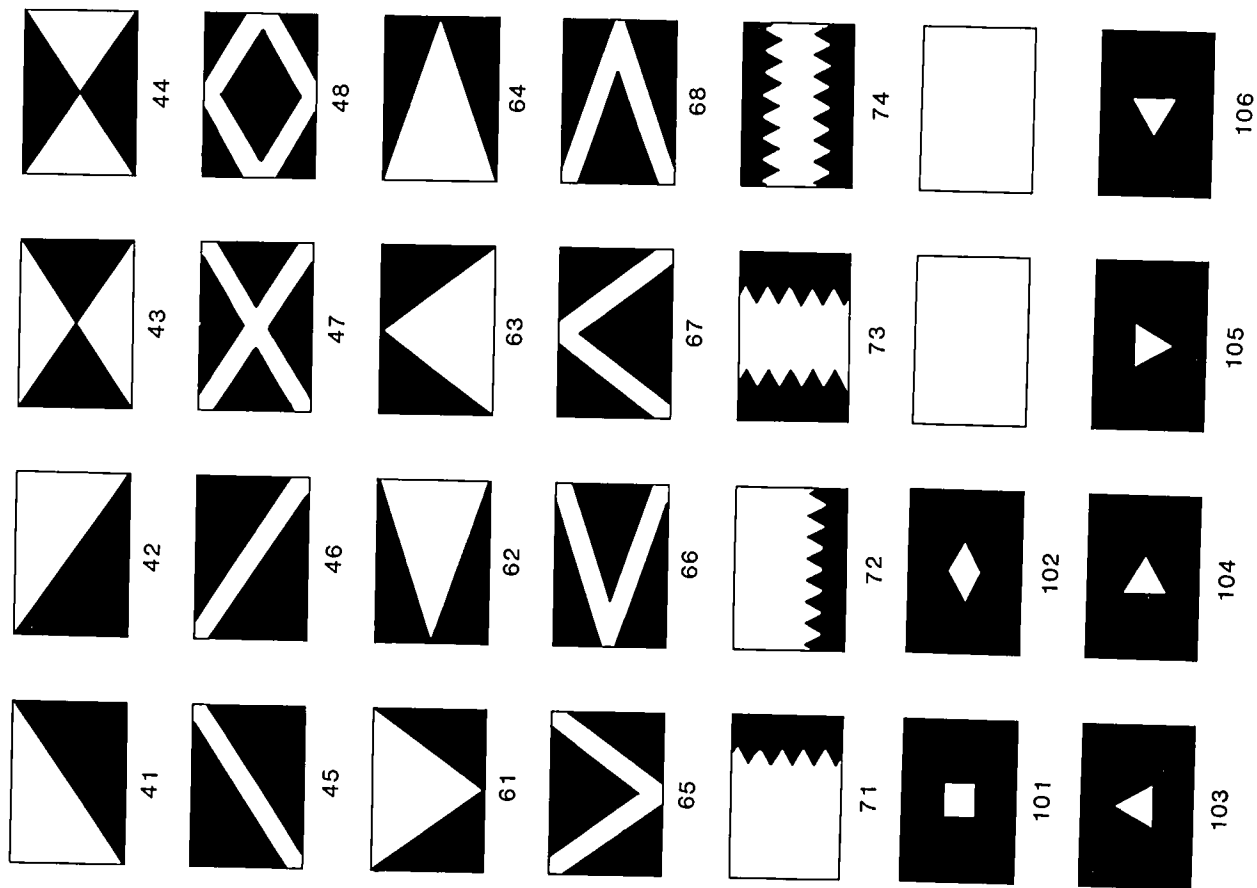
ASCII Character Set
(American National Standard Code for Information Interchange)

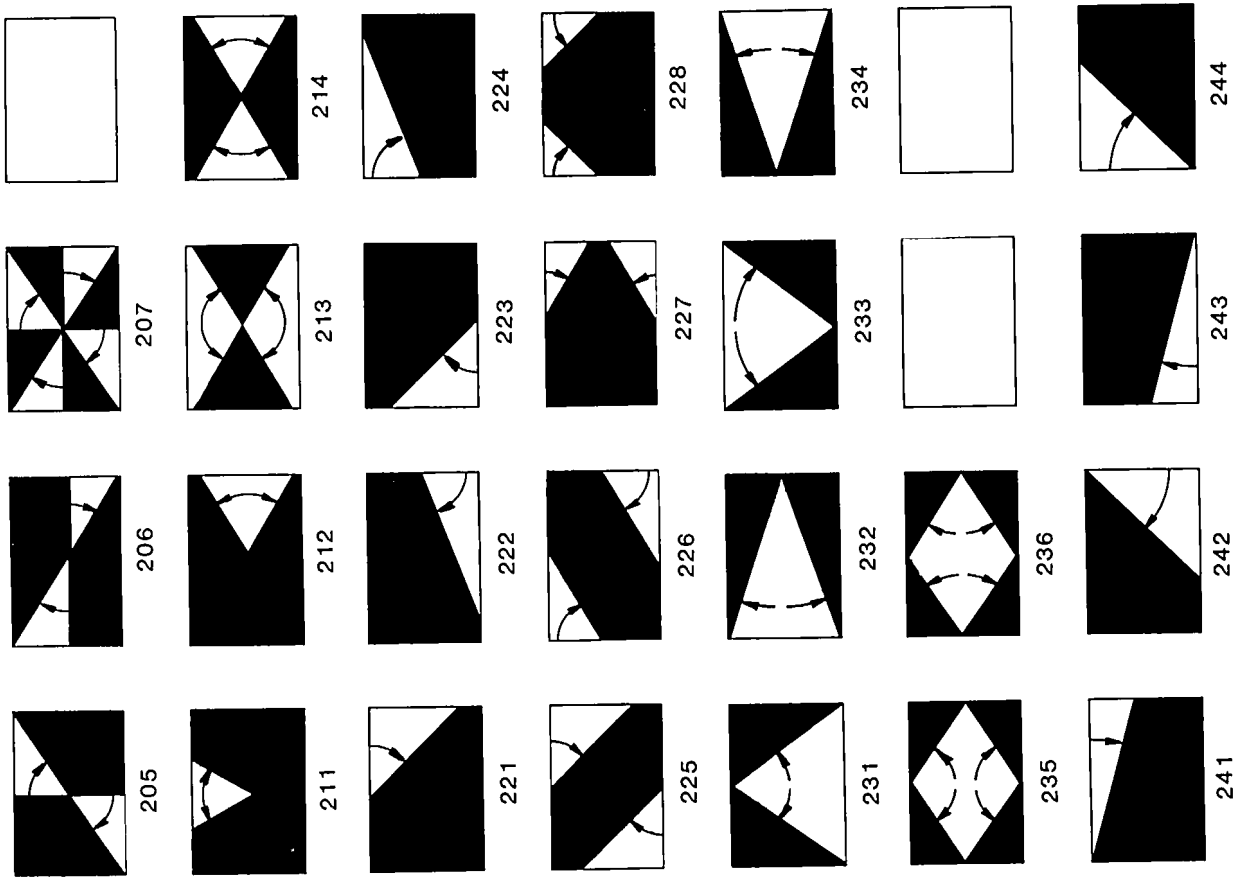
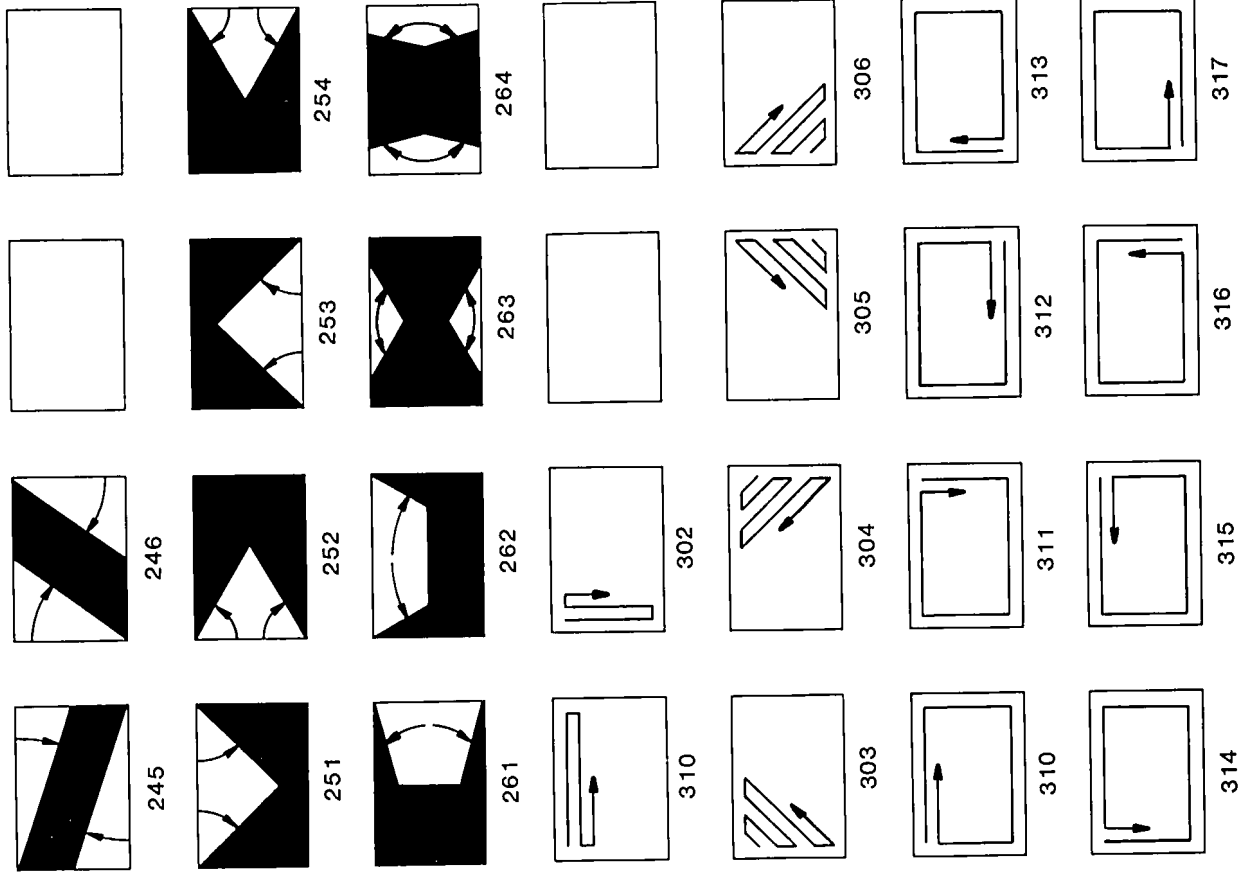
Character Values in Octal

000 NUL	001 SOH	002 STX	003 ETX	004 EOT	005 ENQ	006 ACK	007 BEL
010 BS	011 HT	012 LF	013 VT	014 FF	015 CR	016 SO	017 SI
020 DLE	021 DC1	022 DC2	023 DC3	024 DC4	025 NAK	026 SYN	027 ETB
030 CAN	031 EM	032 SUB	033 ESC	034 FS	035 GS	036 RS	037 US
040 SP	041 !	042 @	043 #	044 \$	045 %	046 &	047 *
050 (	051)	052 +	053 ,	054 -	055 .	056 /	057 /
060 0	061 1	062 2	063 3	064 4	065 5	066 6	067 7
070 8	071 9	072 :	073 ;	074 <	075 =	076 >	077 ?
100 @	101 A	102 B	103 C	104 D	105 E	106 F	107 G
110 H	111 I	112 J	113 K	114 L	115 M	116 N	117 O
120 P	121 Q	122 R	123 S	124 T	125 U	126 V	127 W
130 X	131 Y	132 Z	133 [	134 \	135]	136 ^	137 _
140 `	141 a	142 b	143 c	144 d	145 e	146 f	147 g
150 h	151 i	152 j	153 k	154 l	155 m	156 n	157 o
160 p	161 q	162 r	163 s	164 t	165 u	166 v	167 w
170 x	171 y	172 z	173 {	174 |	175 }	176 ~	177 DEL

Character Values in Hex

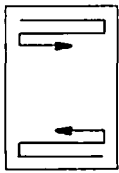
00 NUL	01 SOH	02 STX	03 ETX	04 EOT	05 ENQ	06 ACK	07 BEL
08 BS	09 HT	0A LF	0B VT	0C FF	0D CR	0E SO	0F SI
10 DLE	11 DC1	12 DC2	13 DC3	14 DC4	15 NAK	16 SYN	17 ETB
18 CAN	19 EM	1A SUB	1B ESC	1C FS	1D GS	1E RS	1F US
20 SP	21 1	22 @	23 #	24 \$	25 %	26 &	27 *
28 (	29)	2A +	2B ,	2C -	2D .	2E /	2F /
30 0	31 1	32 2	33 3	34 4	35 5	36 6	37 7
38 8	39 9	3A :	3B ;	3C <	3D =	3E >	3F ?
40 @	41 A	42 B	43 C	44 D	45 E	46 F	47 G
48 H	49 I	4A J	4B K	4C L	4D M	4E N	4F O
50 P	51 Q	52 R	53 S	54 T	55 U	56 V	57 W
58 X	59 Y	5A Z	5B [	5C \	5D]	5E ^	5F _
60 `	61 a	62 b	63 c	64 d	65 e	66 f	67 g
68 h	69 i	6A j	6B k	6C l	6D m	6E n	6F o
70 p	71 q	72 r	73 s	74 t	75 u	76 v	77 w
78 x	79 y	7A z	7B {	7C	7D }	7E ~	7F DEL



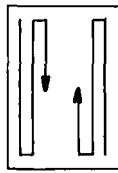


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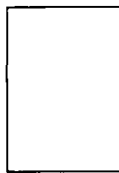
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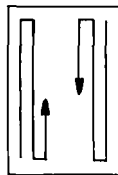
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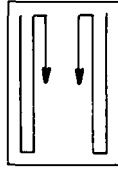
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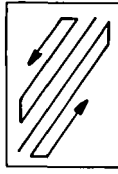
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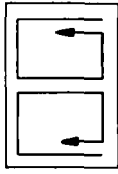
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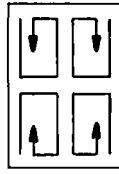
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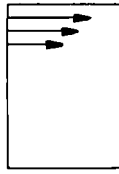
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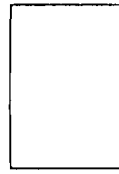
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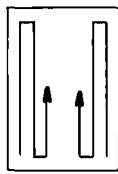
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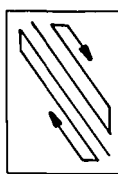
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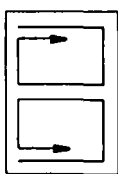
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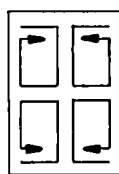
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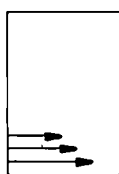
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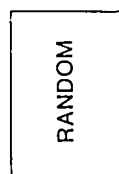
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