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United States Patent [19]

Lieberfarb et al.

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[45] **Date of Patent: Jan. 30, 1996**

[54] **SYSTEM AND METHOD FOR DISK SOFTWARE PUBLISHERS TO CONTROL DISK DISTRIBUTION**

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[51] **Int. Cl.**[6] **H04N 7/01**; H04N 7/16; H04N 7/167

[52] **U.S. Cl.** **348/5.5**; 348/441; 380/5

[58] **Field of Search** 380/3, 4, 5, 20; 348/5.5, 441, 443, 558, 555

[56] **References Cited**

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Living Books, Arthur's Teacher Problem (CD–ROM 4869913); Novato, CA.; Aug. 1992.

Primary Examiner—Stephen C. Buczinski

Attorney, Agent, or Firm—Gottlieb, Rackman & Reisman

[57] **ABSTRACT**

A system for allowing software publishers to control which video standard(s) can be recovered from an optical disk containing video source material. The disk may be digitally encoded so that any of NTSC, PAL and other video signal standards can be generated upon proper decoding. But the disk also includes a code which can lock out one or more standards. Players for such disks may be capable of generating video signals according to all popular standards, in which case the user selects a desired standard. However, the player will generate a video signal of the selected standard only if there is an appropriate authorization code on the disk. The system allows manufacture of "universal" players without necessarily impacting the contractual and marketing plans of motion picture companies, for example, which release films in different territories at different times. The control technique can be extended to lock out specific territories. Each player has a built-in territory code. The player will play a disk only if the disk contains an authorization code for the player's specific territory.

8 Claims, 11 Drawing Sheets

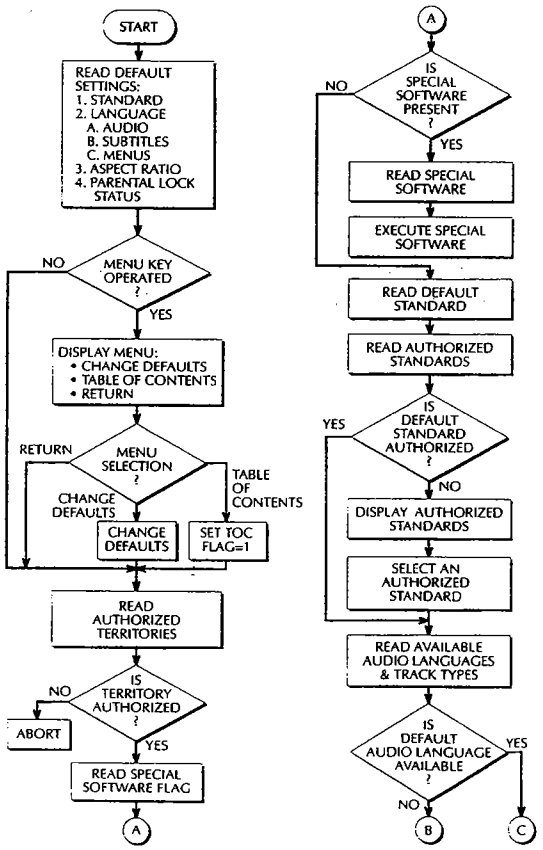


FIG. 1
PRIOR ART

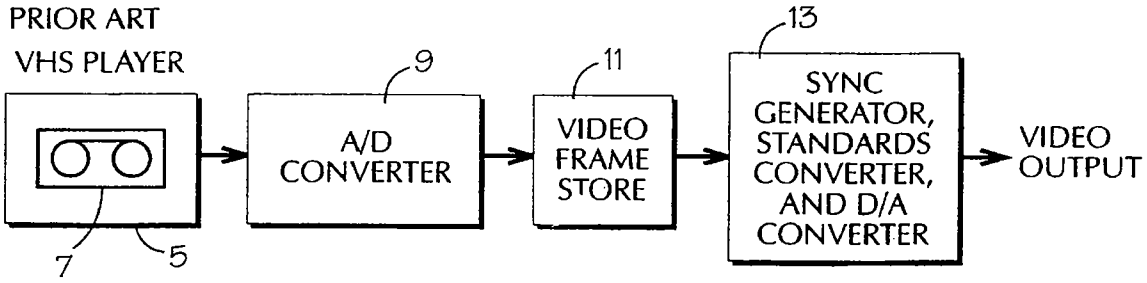
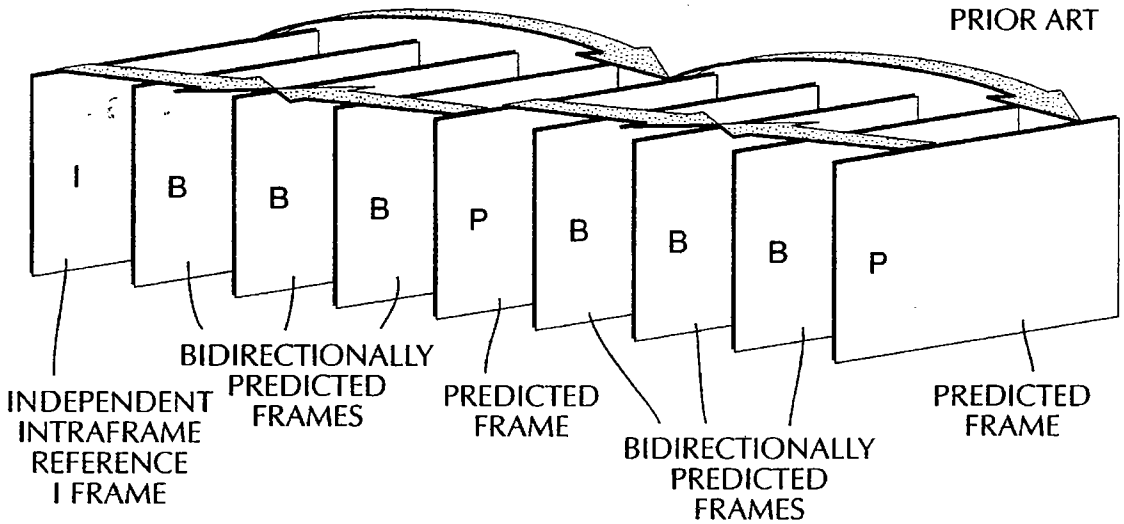


FIG. 8
PRIOR ART



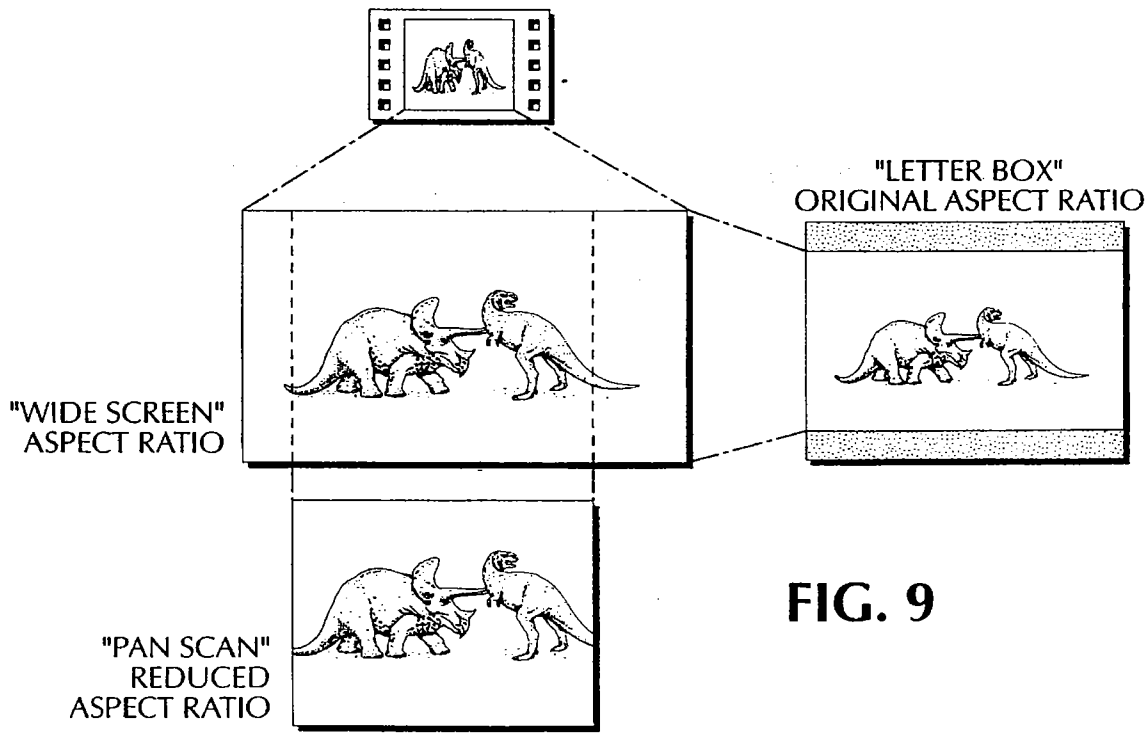


FIG. 9

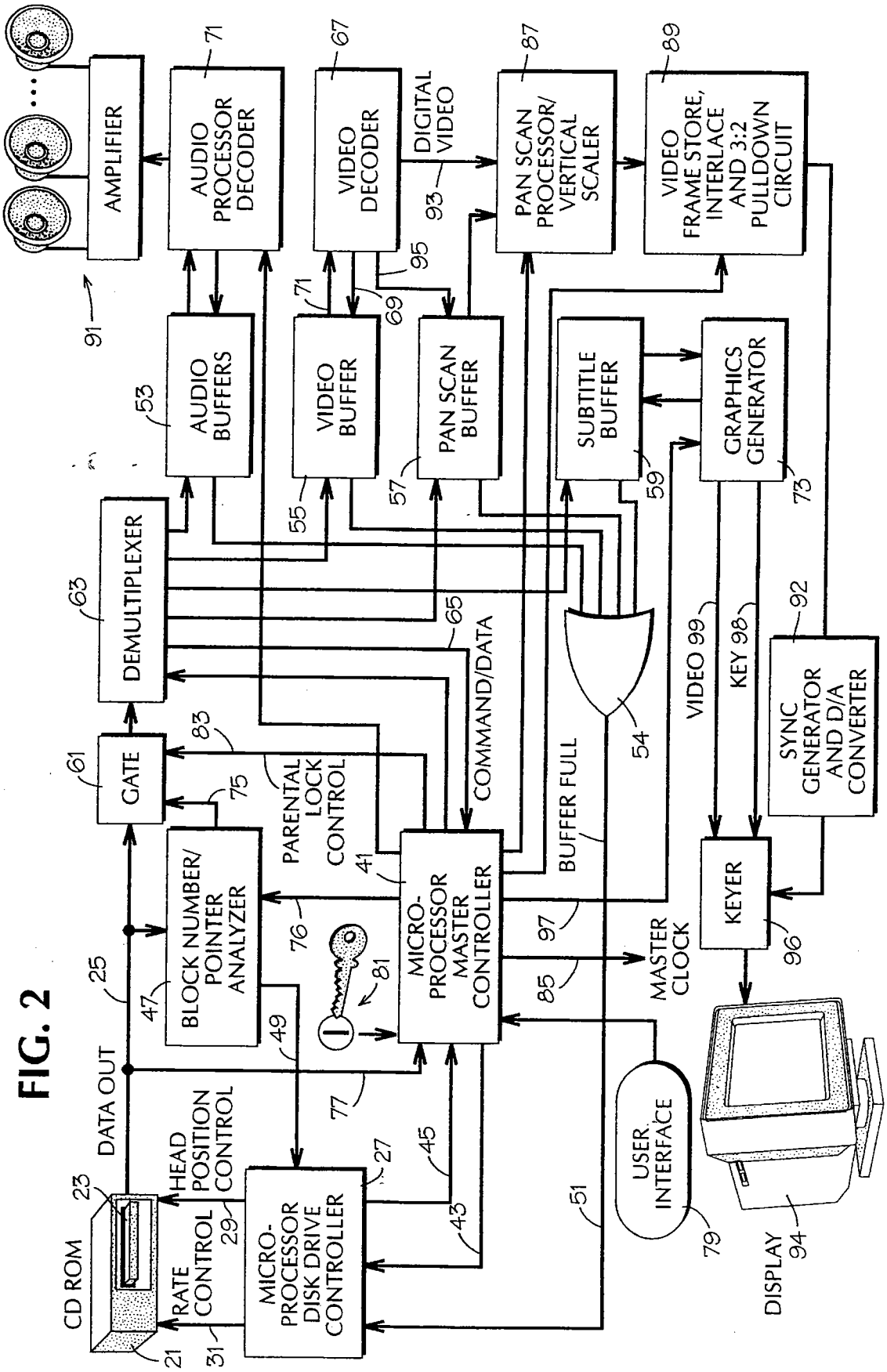

AMPLIFIER
AUDIO PROCESSOR DECODER
VIDEO DECODER
DIGITAL VIDEO
PAN SCAN PROCESSOR/ VERTICAL SCALER
VIDEO FRAME STORE, INTERLACE AND 3:2 PULLDOWN CIRCUIT
AUDIO BUFFERS
VIDEO BUFFER
PAN SCAN BUFFER
SUBTITLE BUFFER
GRAPHICS GENERATOR
DEMULTIPLEXER
GATE
PARENTAL LOCK CONTROL
COMMAND/DATA
BUFFER FULL
VIDEO 99
KEY 98
SYNC GENERATOR AND D/A CONVERTER
BLOCK NUMBER/ POINTER ANALYZER
MICRO-PROCESSOR MASTER CONTROLLER
KEYER
MASTER CLOCK
DATA OUT
HEAD POSITION CONTROL
MICRO-PROCESSOR DISK DRIVE CONTROLLER
USER INTERFACE
CD ROM
RATE CONTROL
DISPLAY
91
53
71
67
69
95
93
87
89
55
57
59
73
63
65
92
54
61
83
75
41
76
81
97
85
25
47
49
77
27
45
43
51
23
29
31
21
79
96
94

FIG. 2

FIG. 3

	BITS MIN	MAX		COMMENTS
1			LEAD-IN SYNC BITS	
2	40	40	AUTHORIZED TERRITORIES	
3	1	1	SPECIAL SOFTWARE FLAG	
4	0	UNDET	SPECIAL SOFTWARE W/ENDING SYNC WORD	
5	12	12	AUTHORIZED STANDARDS	
6	100	100	AVAILABLE AUDIO LANGUAGES, M&E PLUS 99	N "1"s, MAX 16
7	0	48	TRACK TYPES	N x 3
8	0	64	TRACK CODING	N x 4
9	6	6	NUMBER OF "OTHER" AUDIO TRACKS	M = 0 TO 63
10	0	252	CODING FOR "OTHER" AUDIO TRACKS	M x 4
11	100	100	AVAILABLE DISPLAY LANGUAGES	P "1"s, MAX 99
12	1	1	SPECIAL MIXING/DELETION SOFTWARE FLAG	
13	0	UNDET	SPECIAL MIXING/DELETION SOFTWARE W/ENDING SYNC WORD	
14	0	UNDET	P x M STRINGS EACH ENDING WITH ESC CHARACTER	
15	100	100	AVAILABLE SUBTITLE LANGUAGES	R "1"s, MAX 99
16	4	4	MULTIPLE VERSION CODE	
17	1	1	SPECIAL VERSION SOFTWARE FLAG	
18	0	UNDET	SPECIAL VERSION SOFTWARE W/ENDING SYNC WORD	
19	1	1	VIDEO AVAILABILITY FLAG	
20	1	1	BASE ASPECT RATIO	
21	1	1	PAN SCAN AVAILABILITY	
22	20	20	TOTAL NUMBER OF DATA BLOCKS	
23	0	20	NUMBER OF DATA BLOCKS IN VERSION A	
24	0	20	NUMBER OF DATA BLOCKS IN VERSION B	
25	4	4	ORIGINAL FRAME RATE	
26	10	10	BLOCK TIME FACTOR	
27	0	UNDET	TABLE OF CONTENTS FOR FIRST VERSION FOR EACH CHAPTER: 8-BIT CHAPTER NUMBER 20-BIT STARTING BLOCK SERIAL BLOCK NUMBER 20-BIT BLOCK DURATION OF CHAPTER AVAILABLE CHAPTER DISPLAY LANGUAGES (100 BITS) LANGUAGE STRINGS IDENTIFYING CHAPTERS, EACH ENDING WITH ESC CHARACTER	
28	0	UNDET	TABLE OF CONTENTS FOR SECOND VERSION	
29	100	1200	ENCRYPTED AUTHORIZATION CODE FOR EACH STANDARD W/ENDING SYNC WORD	
30	1	1	DATA BLOCK COMMAND/DATA FLAG	
31	1	1	SUPPLEMENTAL SOFTWARE FLAG	
32	0	UNDET	SUPPLEMENTAL SOFTWARE W/ENDING SYNC WORD	

FIG. 4

	BITS MIN	BITS MAX		COMMENTS
1	32	32	SYNC WORD	
2	20	20	SERIAL BLOCK NUMBER	
3	2	2	VERSION (A,B OR COMMON)	
4	0	2	2-BIT POINTER FLAG	
5	0	20	POINTER	
6	0	1	VIDEO PRESENT FLAG	
7	0	UNDET	VIDEO BLOCK W/ENDING SYNC WORD	
8	0	16	AUDIO TRACKS PRESENT	X "1"s, MAX=16
9	0	UNDET	X AUDIO LANGUAGE BLOCKS, EACH ENDING W/ESC CHARACTER	
10	0	63	"OTHER" AUDIO TRACKS PRESENT	Y "1"s, MAX=63
11	0	UNDET	Y "OTHER" AUDIO TRACK BLOCKS, EACH ENDING W/ESC CHARACTER	
12	0	99	SUBTITLE UPDATES PRESENT	Z "1"s, MAX=99
13	0	UNDET	Z SUBTITLE UPDATE BLOCKS, EACH ENDING W/ESC CHARACTER	
14	0	1	PAN SCAN UPDATE FLAG	
15	0	9	PAN SCAN UPDATE	
16	0	1	COMMAND/DATA PRESENT FLAG	
17	0	UNDET	COMMAND/DATA BLOCK ENDING W/ESCAPE CHARACTER	

FIG. 5A

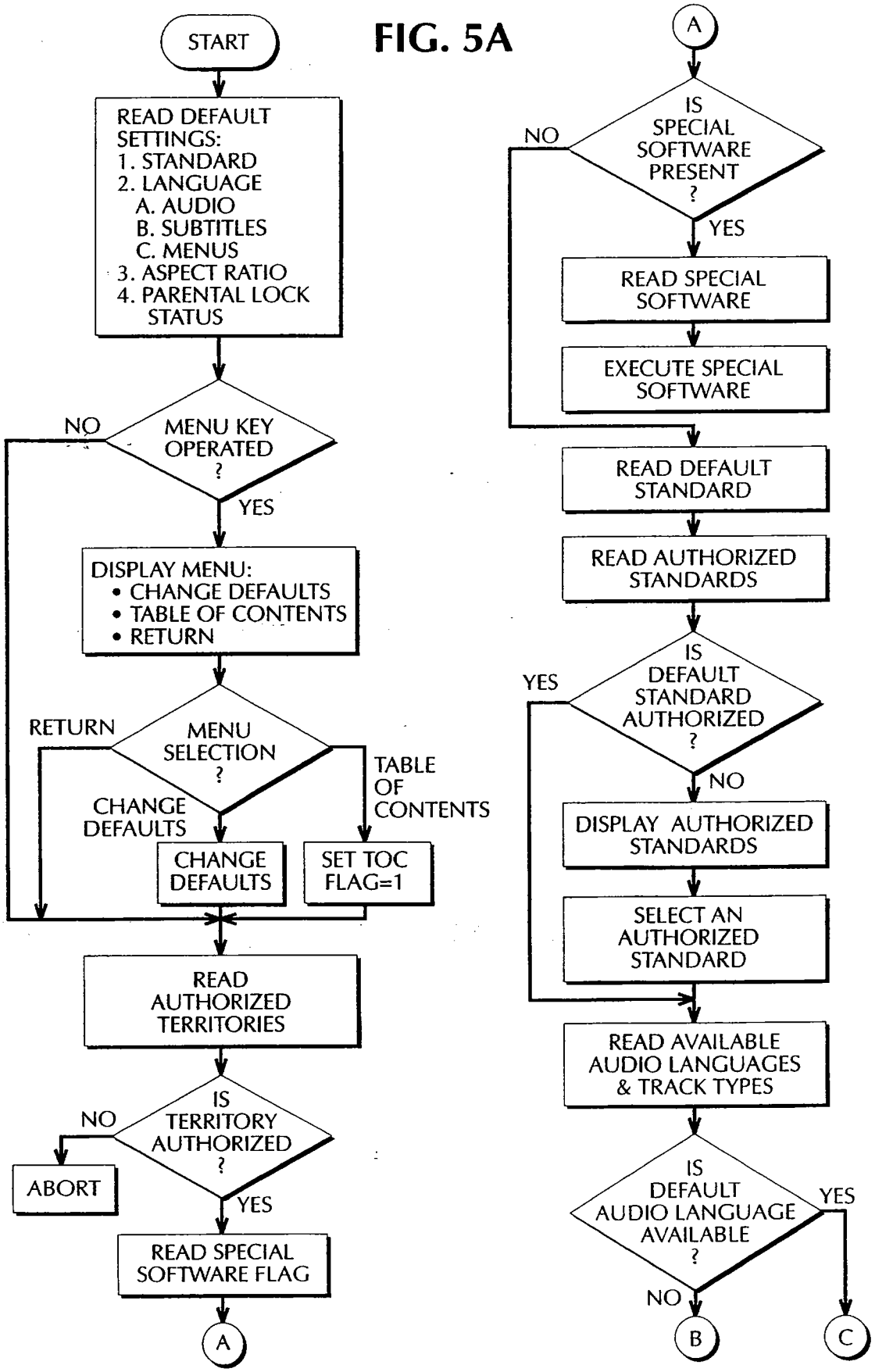

START
READ DEFAULT SETTINGS:
1. STANDARD
2. LANGUAGE
A. AUDIO
B. SUBTITLES
C. MENUS
3. ASPECT RATIO
4. PARENTAL LOCK STATUS
MENU KEY OPERATED ?
NO
YES
DISPLAY MENU:
• CHANGE DEFAULTS
• TABLE OF CONTENTS
• RETURN
MENU SELECTION ?
RETURN
CHANGE DEFAULTS
TABLE OF CONTENTS
CHANGE DEFAULTS
SET TOC FLAG=1
READ AUTHORIZED TERRITORIES
IS TERRITORY AUTHORIZED ?
NO
YES
ABORT
READ SPECIAL SOFTWARE FLAG
A
A
IS SPECIAL SOFTWARE PRESENT ?
NO
YES
READ SPECIAL SOFTWARE
EXECUTE SPECIAL SOFTWARE
READ DEFAULT STANDARD
READ AUTHORIZED STANDARDS
IS DEFAULT STANDARD AUTHORIZED ?
YES
NO
DISPLAY AUTHORIZED STANDARDS
SELECT AN AUTHORIZED STANDARD
READ AVAILABLE AUDIO LANGUAGES & TRACK TYPES
IS DEFAULT AUDIO LANGUAGE AVAILABLE ?
NO
YES
B
C

FIG. 5B

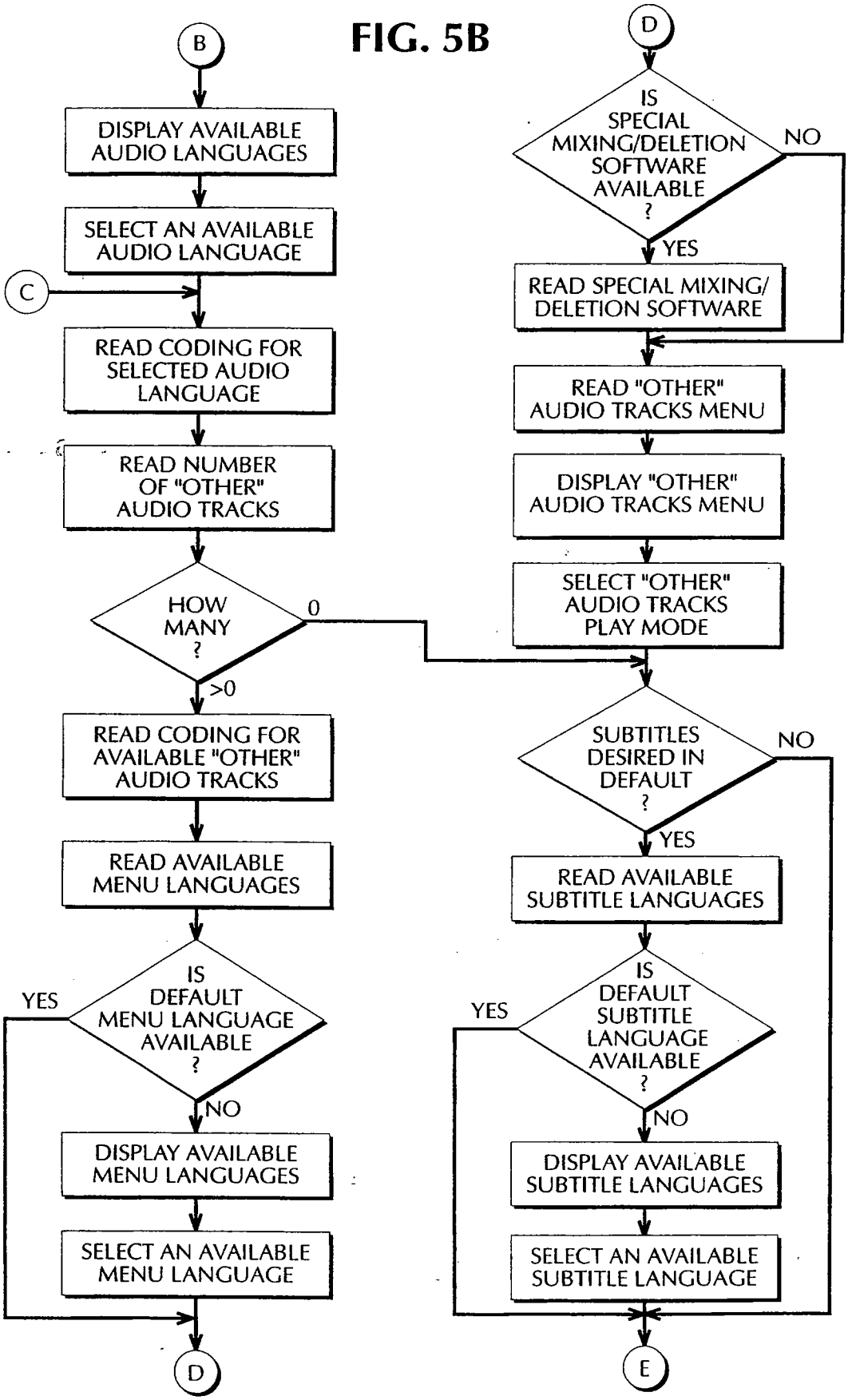

B
DISPLAY AVAILABLE AUDIO LANGUAGES
SELECT AN AVAILABLE AUDIO LANGUAGE
C
READ CODING FOR SELECTED AUDIO LANGUAGE
READ NUMBER OF "OTHER" AUDIO TRACKS
HOW MANY ?
0
>0
READ CODING FOR AVAILABLE "OTHER" AUDIO TRACKS
READ AVAILABLE MENU LANGUAGES
IS DEFAULT MENU LANGUAGE AVAILABLE ?
YES
NO
DISPLAY AVAILABLE MENU LANGUAGES
SELECT AN AVAILABLE MENU LANGUAGE
D
D
IS SPECIAL MIXING/DELETION SOFTWARE AVAILABLE ?
NO
YES
READ SPECIAL MIXING/ DELETION SOFTWARE
READ "OTHER" AUDIO TRACKS MENU
DISPLAY "OTHER" AUDIO TRACKS MENU
SELECT "OTHER" AUDIO TRACKS PLAY MODE
SUBTITLES DESIRED IN DEFAULT ?
NO
YES
READ AVAILABLE SUBTITLE LANGUAGES
IS DEFAULT SUBTITLE LANGUAGE AVAILABLE ?
YES
NO
DISPLAY AVAILABLE SUBTITLE LANGUAGES
SELECT AN AVAILABLE SUBTITLE LANGUAGE
E

FIG. 5C

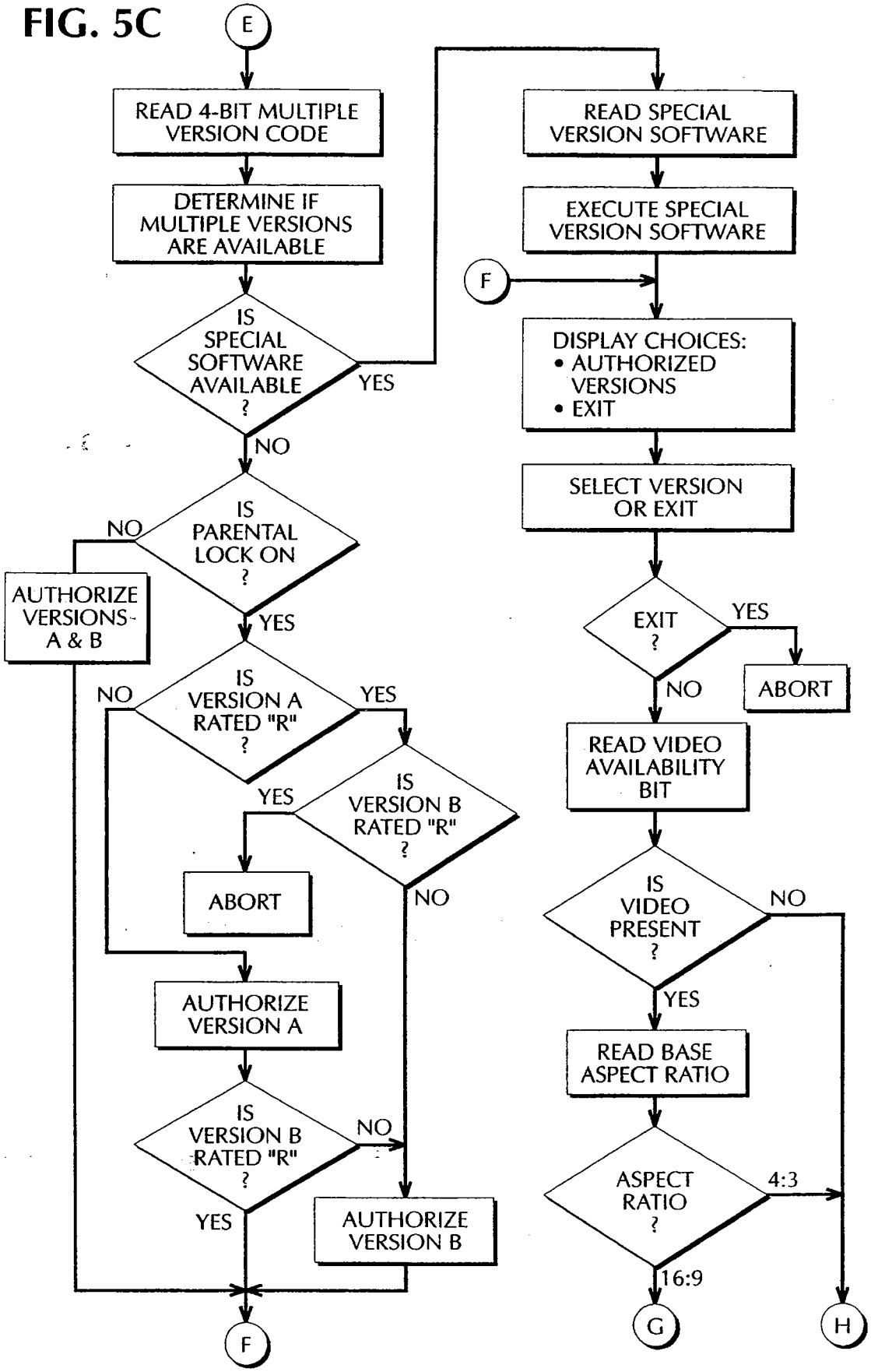

E
READ 4-BIT MULTIPLE VERSION CODE
DETERMINE IF MULTIPLE VERSIONS ARE AVAILABLE
IS SPECIAL SOFTWARE AVAILABLE ?
YES
NO
IS PARENTAL LOCK ON ?
NO
AUTHORIZE VERSIONS A & B
YES
IS VERSION A RATED "R" ?
NO
YES
IS VERSION B RATED "R" ?
YES
ABORT
NO
AUTHORIZE VERSION A
IS VERSION B RATED "R" ?
NO
YES
AUTHORIZE VERSION B
F
READ SPECIAL VERSION SOFTWARE
EXECUTE SPECIAL VERSION SOFTWARE
F
DISPLAY CHOICES:
• AUTHORIZED VERSIONS
• EXIT
SELECT VERSION OR EXIT
EXIT ?
YES
ABORT
NO
READ VIDEO AVAILABILITY BIT
IS VIDEO PRESENT ?
NO
YES
READ BASE ASPECT RATIO
ASPECT RATIO ?
4:3
16:9
G
H

FIG. 5D

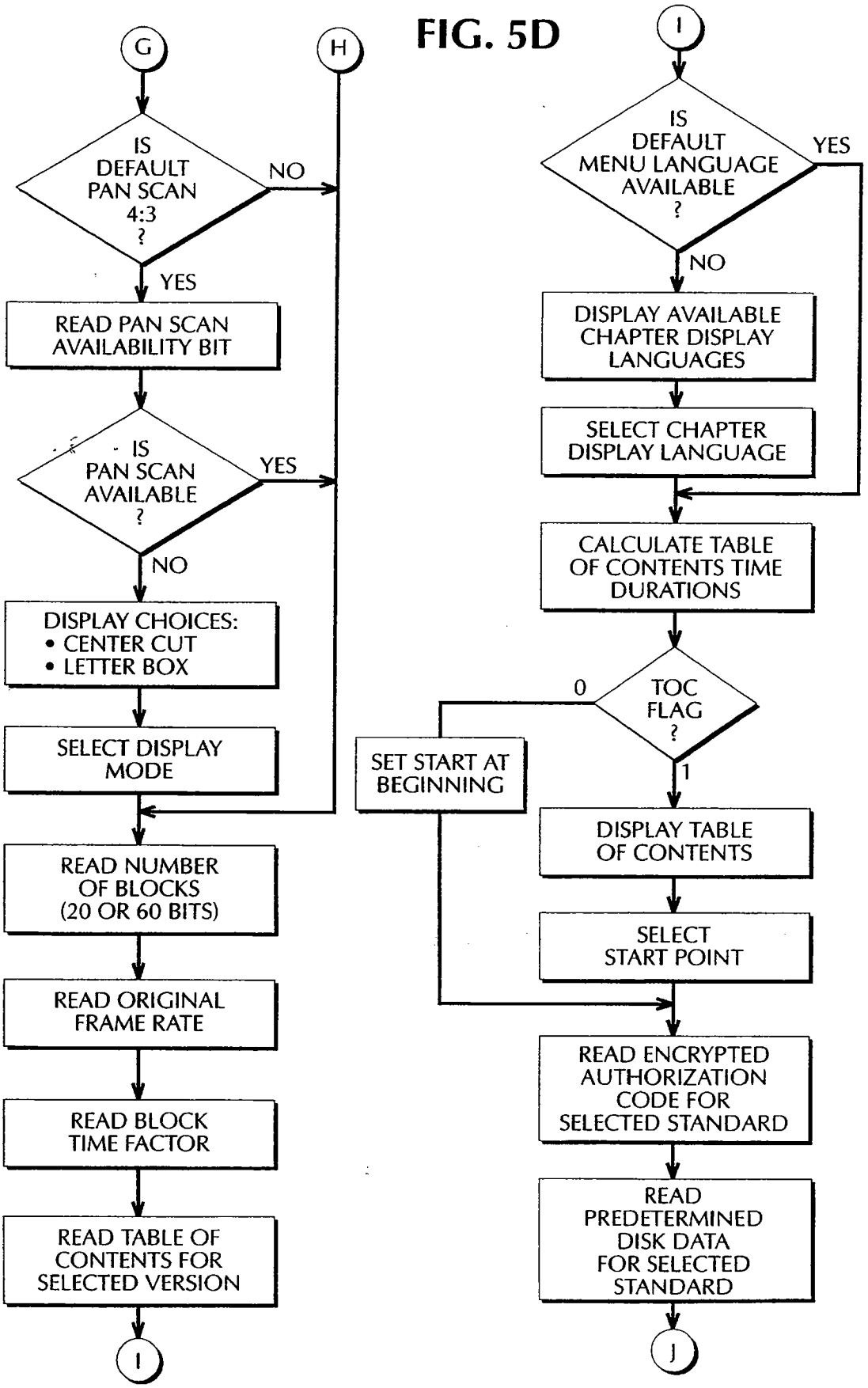

G
H
IS DEFAULT PAN SCAN 4:3 ?
NO
YES
READ PAN SCAN AVAILABILITY BIT
IS PAN SCAN AVAILABLE ?
YES
NO
DISPLAY CHOICES:
• CENTER CUT
• LETTER BOX
SELECT DISPLAY MODE
READ NUMBER OF BLOCKS (20 OR 60 BITS)
READ ORIGINAL FRAME RATE
READ BLOCK TIME FACTOR
READ TABLE OF CONTENTS FOR SELECTED VERSION
I
I
IS DEFAULT MENU LANGUAGE AVAILABLE ?
YES
NO
DISPLAY AVAILABLE CHAPTER DISPLAY LANGUAGES
SELECT CHAPTER DISPLAY LANGUAGE
CALCULATE TABLE OF CONTENTS TIME DURATIONS
TOC FLAG ?
0
1
SET START AT BEGINNING
DISPLAY TABLE OF CONTENTS
SELECT START POINT
READ ENCRYPTED AUTHORIZATION CODE FOR SELECTED STANDARD
READ PREDETERMINED DISK DATA FOR SELECTED STANDARD
J

FIG. 5E

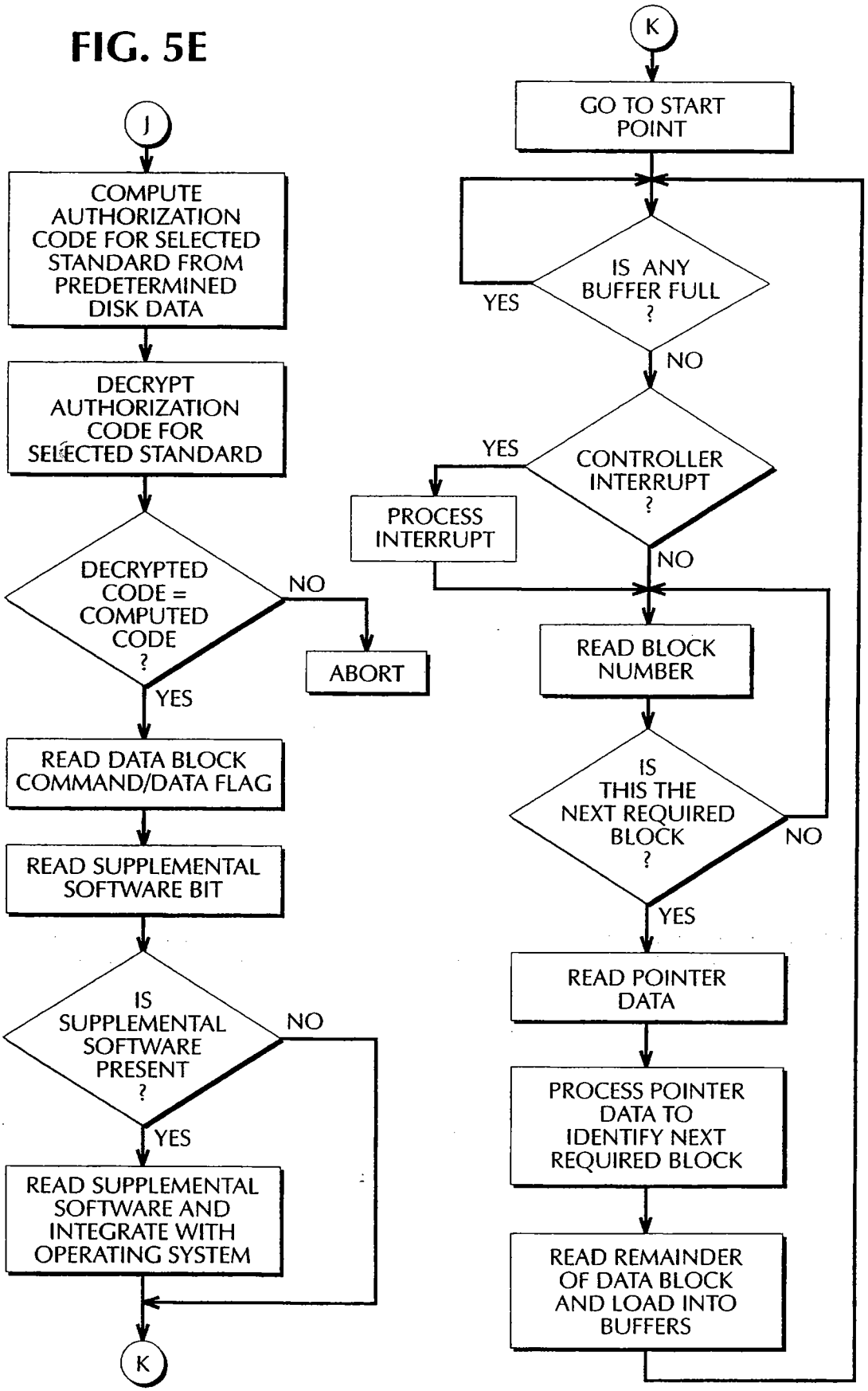
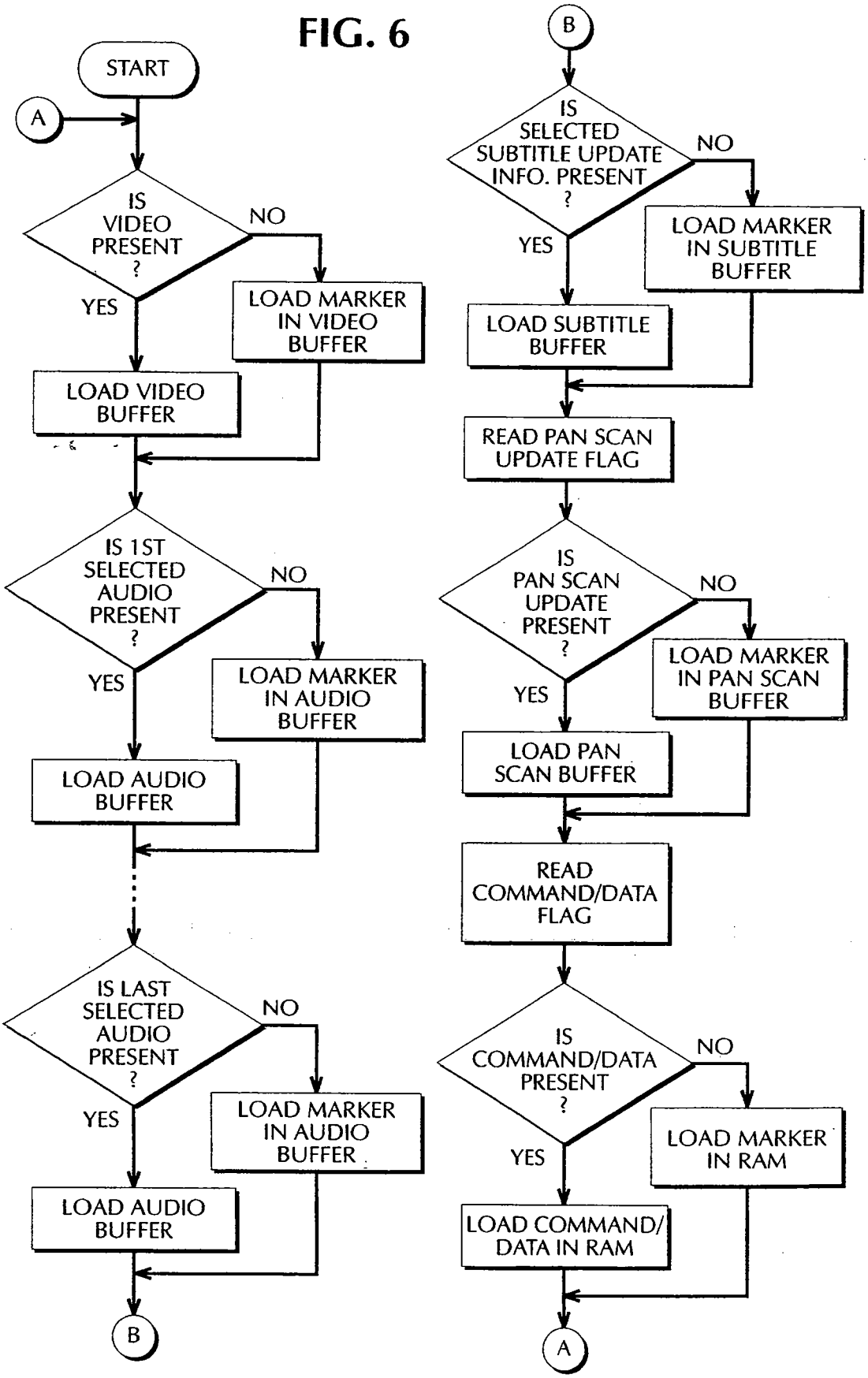

J
COMPUTE AUTHORIZATION CODE FOR SELECTED STANDARD FROM PREDETERMINED DISK DATA
DECRYPT AUTHORIZATION CODE FOR SELECTED STANDARD
DECRYPTED CODE = COMPUTED CODE ?
NO
ABORT
YES
READ DATA BLOCK COMMAND/DATA FLAG
READ SUPPLEMENTAL SOFTWARE BIT
IS SUPPLEMENTAL SOFTWARE PRESENT ?
NO
YES
READ SUPPLEMENTAL SOFTWARE AND INTEGRATE WITH OPERATING SYSTEM
K
K
GO TO START POINT
IS ANY BUFFER FULL ?
YES
NO
CONTROLLER INTERRUPT ?
YES
PROCESS INTERRUPT
NO
READ BLOCK NUMBER
IS THIS THE NEXT REQUIRED BLOCK ?
NO
YES
READ POINTER DATA
PROCESS POINTER DATA TO IDENTIFY NEXT REQUIRED BLOCK
READ REMAINDER OF DATA BLOCK AND LOAD INTO BUFFERS

FIG. 6


START
A
IS VIDEO PRESENT ?
NO
YES
LOAD MARKER IN VIDEO BUFFER
LOAD VIDEO BUFFER
IS 1ST SELECTED AUDIO PRESENT ?
NO
YES
LOAD MARKER IN AUDIO BUFFER
LOAD AUDIO BUFFER
IS LAST SELECTED AUDIO PRESENT ?
NO
YES
LOAD MARKER IN AUDIO BUFFER
LOAD AUDIO BUFFER
B
B
IS SELECTED SUBTITLE UPDATE INFO. PRESENT ?
NO
YES
LOAD MARKER IN SUBTITLE BUFFER
LOAD SUBTITLE BUFFER
READ PAN SCAN UPDATE FLAG
IS PAN SCAN UPDATE PRESENT ?
NO
YES
LOAD MARKER IN PAN SCAN BUFFER
LOAD PAN SCAN BUFFER
READ COMMAND/DATA FLAG
IS COMMAND/DATA PRESENT ?
NO
YES
LOAD MARKER IN RAM
LOAD COMMAND/ DATA IN RAM
A

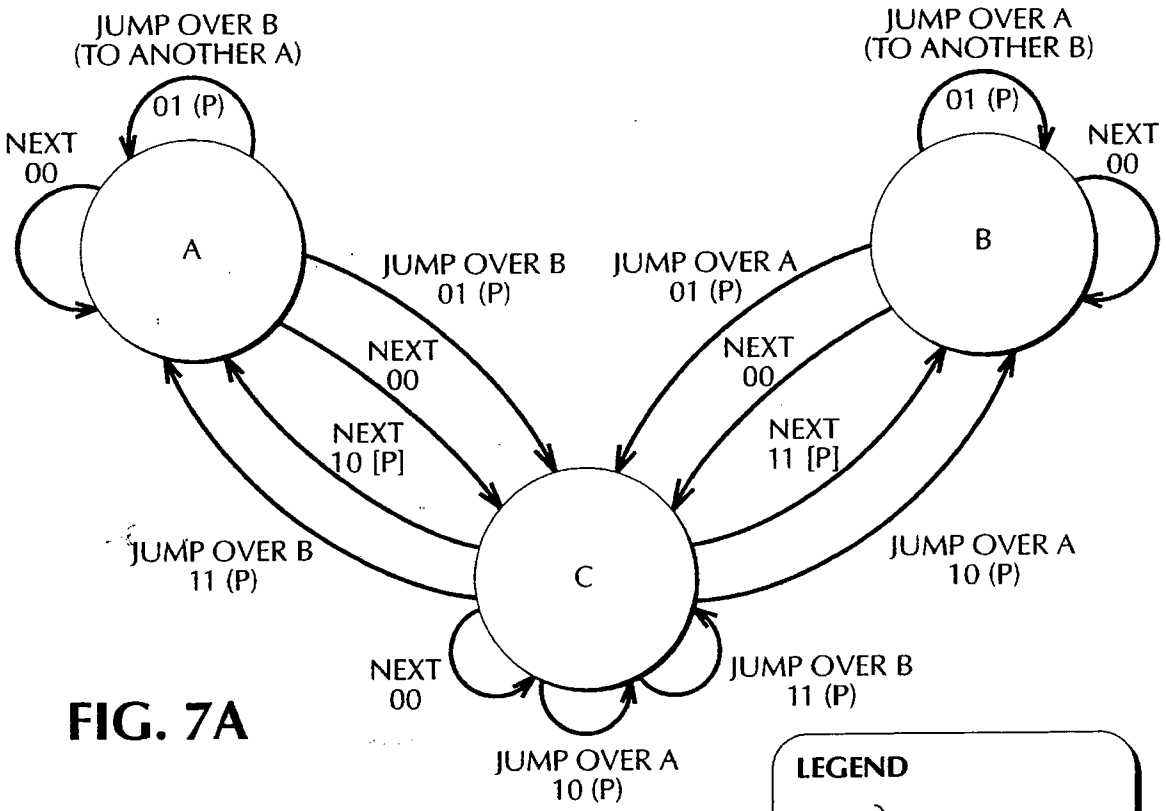


FIG. 7A

CODE

00 = Continue to next block

01 = Jump to same version or common, one pointer

10 = Branch from common:
Next block is an **A**, pointer is to a **B** or a **C**
(if version **A** is being played, continue to next block)
(if version **B** is being played, jump to block identified by pointer)

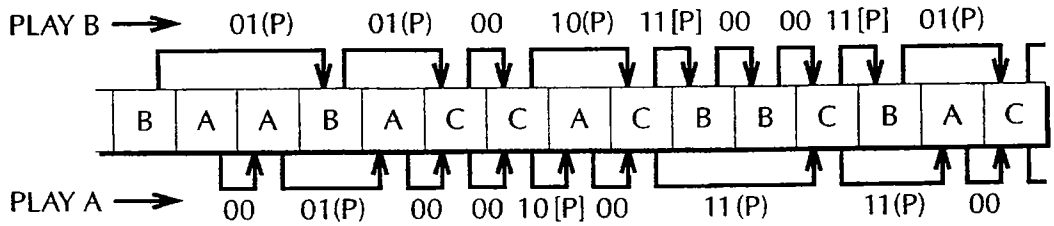
11 = Branch from common:
Next block is a **B**, pointer is to an **A** or a **C**
(if version **A** is being played, jump to block identified by pointer)
(if version **B** is being played, continue to next block)

LEGEND

10 (P), 11 (P) } Use Pointer P

10 [P], 11 [P] } Ignore Pointer P

FIG. 7B



SYSTEM AND METHOD FOR DISK SOFTWARE PUBLISHERS TO CONTROL DISK DISTRIBUTION

This invention relates to the generation of a video signal from play of a software (e.g., motion picture) carrier, and more particularly to a technique by which the software publisher can control where the software carrier may be played.

BACKGROUND OF THE INVENTION

There are three primary color transmission standards in use today. The 525-line, 30-frames-per-second NTSC (National Television Systems Committee) standard is used in the United States, Canada, Central America, most of South America, and Japan. The 625-line, 25-frames-per-second PAL (Phase Alternation Each Line) standard is used in England, most countries and possessions influenced by the British Commonwealth, many western European countries and China. Finally, the 625-line, 25-frames-per-second SECAM (Sequential Color With [Avec] Memory) standard is used in France, countries and possessions influenced by France, the former Soviet Bloc nations including East Germany, and other areas influenced by them. Other standards are becoming available, such as HDTV (High Definition Television). The video signal according to each standard is unique, and an ordinary television receiver designed to process a video signal of one type cannot process a video signal of another.

The most widespread medium for distributing motion pictures is the videocassette. Because of the different television industry standards used throughout the world, there are an equal number of videocassette standards. An NTSC videotape sold in the United States, for example, will not play on most videocassette players to be found in England. To a far lesser extent, motion pictures are also distributed on optical disk media. These media are for the most part analog recordings, and once again media designed to play on players of one type are incompatible with players of another.

Digitally encoded optical disks are in theory far superior for the distribution of motion pictures and other forms of presentation. Especially advantageous is the use of "compressed video" by which it is possible to digitally encode a motion picture on a disk no larger than the present-day audio CD. Especially in the case of compressed video, where there is no real-time analog video signal on a disk, it should be possible to play the same disk throughout the world—the players in any given territory will generate an analog signal of the appropriate standard from the same digitally encoded video source information. It might be thought that software providers such as the motion picture industry would welcome the advent of such a "universal" disk, but this in fact is not the case.

There is a compelling business reason for this. New motion pictures, and their follow-up consumer versions, are released in different territories at different times; often, many months may elapse, for example, between the release of a motion picture in Australia and its subsequent release in the United States. Contractual and marketing arrangements will be compromised by players, or player add-ons, which allow a carrier intended for play on television receivers of only one type to be played on television receivers of another type. In addition to the motion picture companies not being protected from unauthorized multi-standard playback of their releases, if present practices do not change, then the artistic community, and even the consumers who are responsible, will continue to object to the video degradation that results when converting from one standard to another. (High-quality conversion can be obtained today only at relatively high cost.)

Digitally encoded media facilitate the generation of high-quality video signals in conformance with all standards, and this only aggravates the problem faced by motion picture companies in their attempt to control the orderly release of new films throughout the world. Digital encoding makes it easier to generate analog video signals of all types. All players have to decode the same digital bit stream and generate an analog signal from it. Horizontal and vertical sync pulses have to be added to this analog signal, along with a frequency and phase reference for color signal encoding, with the synchronizing and reference signals being combined with the picture video signal to form what is known as a composite video waveform. It does not require too much additional circuitry to allow the same player to form composite video for all of the different standards. It thus becomes difficult to plan for orderly releases of films in different countries at different times.

Thus far it might appear that the problem pertains solely to video standards—how to control software carriers so that they play according to only a selected video standard. But the problem is more extended. It is sometimes desirable to distinguish between countries or territories that adhere to the same standard, so locking out standards, for example, will not always accomplish the broader objective. For example, for political reasons it might be desired to prevent play of a particular disk in China, but to prevent play according to the PAL standard would also preclude disk distribution in England. Thus while it is advantageous to exercise control over the video standards that are recoverable from a software carrier, it is also advantageous to exercise control over the territories in which a disk may be played.

It is therefore an object of this invention to provide a system and method for a software publisher to control the video standard(s) to which a video signal generated from the publisher's software carriers may conform.

It is also an object of this invention to provide a system and method for a software publisher to determine the territories in which the publisher's software carriers may be played.

SUMMARY OF THE INVENTION

The invention is a system that allows a software publisher to control which video standards can be recovered from software carriers. Each software carrier is a "master" in the sense that it can be used to play back the video program recorded on it according to all video standards, e.g., PAL, NTSC, etc. However, data on the carrier, preferably an optical disk, is coded by the publisher to authorize video signal generation conforming to only certain video standards. Players designed to play the disks may be equipped to form video signals of all types, with the user selecting a particular standard, but the player will not generate a video signal of a type which is not authorized by the program material itself.

As a single example, consider the case of a motion picture which is to be released first in the United States and thereafter in England. Let it be further assumed that the same players are sold in both countries, that is, while there may be differences such as the power supplies which are used, all players can generate video signals according to multiple