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(54) **CONTROLLED-ACCESS BROADCAST SIGNAL RECEIVING SYSTEM**

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5,260,999 A	11/1993	Wyman	
5,319,705 A	6/1994	Halter et al.	
5,381,480 A	1/1995	Butter et al.	
5,400,402 A	* 3/1995	Garfinkle	380/231
5,428,529 A	6/1995	Hartrick et al.	
5,615,264 A	* 3/1997	Kazmierczak et al.	705/52
5,619,570 A	4/1997	Tsutsui	
5,625,690 A	* 4/1997	Michel et al.	705/53
5,634,012 A	5/1997	Stefik et al.	
5,689,560 A	* 11/1997	Cooper et al.	705/52
5,734,823 A	3/1998	Saigh et al.	
5,734,891 A	3/1998	Saigh	
5,764,762 A	* 6/1998	Kazmierczak et al.	705/52
5,765,152 A	6/1998	Erickson	
6,135,646 A	10/2000	Kahn et al.	
6,253,193 B1	6/2001	Ginter et al.	

Related U.S. Patent Documents

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FOREIGN PATENT DOCUMENTS

DE	4334931	* 4/1994	H04N/7/167
DE	43 34 931	4/1994		
EP	0267039	* 5/1988	H04N/5/91
GB	2272822	* 5/1994	H04N/7/167
GB	2 272 822	5/1994		

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(58) **Field of Search** **380/200-242, 380/277-286; 705/50-59; 713/150, 160-181, 200; 386/94; 359/118; 725/66**

OTHER PUBLICATIONS

Abyss: An Architecture for Software Protection; Steve R. White and Liam Comerford; IEEE Transactions on Software Engineering, vol. 16, No. 6, Jun. 1990; pp. 619-629.

Abyss: A Trusted Architecture for Software Protection: Steve R. White and Liam Comerford; Proc.s of IEEE Symposium on Security & Privacy; 1987; pp. 38-51.

* cited by examiner

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,030,128 A	* 6/1977	Perret	380/204
4,506,387 A	* 3/1985	Walter	359/118
4,649,510 A	* 3/1987	Schmidt	713/200
4,658,093 A	4/1987	Hellman	
4,700,386 A	* 10/1987	Kohn	380/242
4,817,140 A	3/1989	Chandra et al.	
4,916,737 A	* 4/1990	Chomet et al.	380/233
4,930,158 A	* 5/1990	Vogel	386/94
4,947,429 A	* 8/1990	Bestler et al.	380/241
4,975,951 A	* 12/1990	Bennett	380/231
5,054,064 A	* 10/1991	Walker et al.	380/239
5,109,413 A	4/1992	Comerford et al.	
5,151,782 A	* 9/1992	Ferraro	725/66
5,204,897 A	4/1993	Wyman	

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(57) **ABSTRACT**

An apparatus and method for transferring from a broadcaster to a receiver a limited reproduction right in data. A signal indicating the limited reproduction right is transmitted by the broadcaster and stored by the receiver with the data. The receiver reproduces and processes the data as a function of this signal.

88 Claims, 8 Drawing Sheets

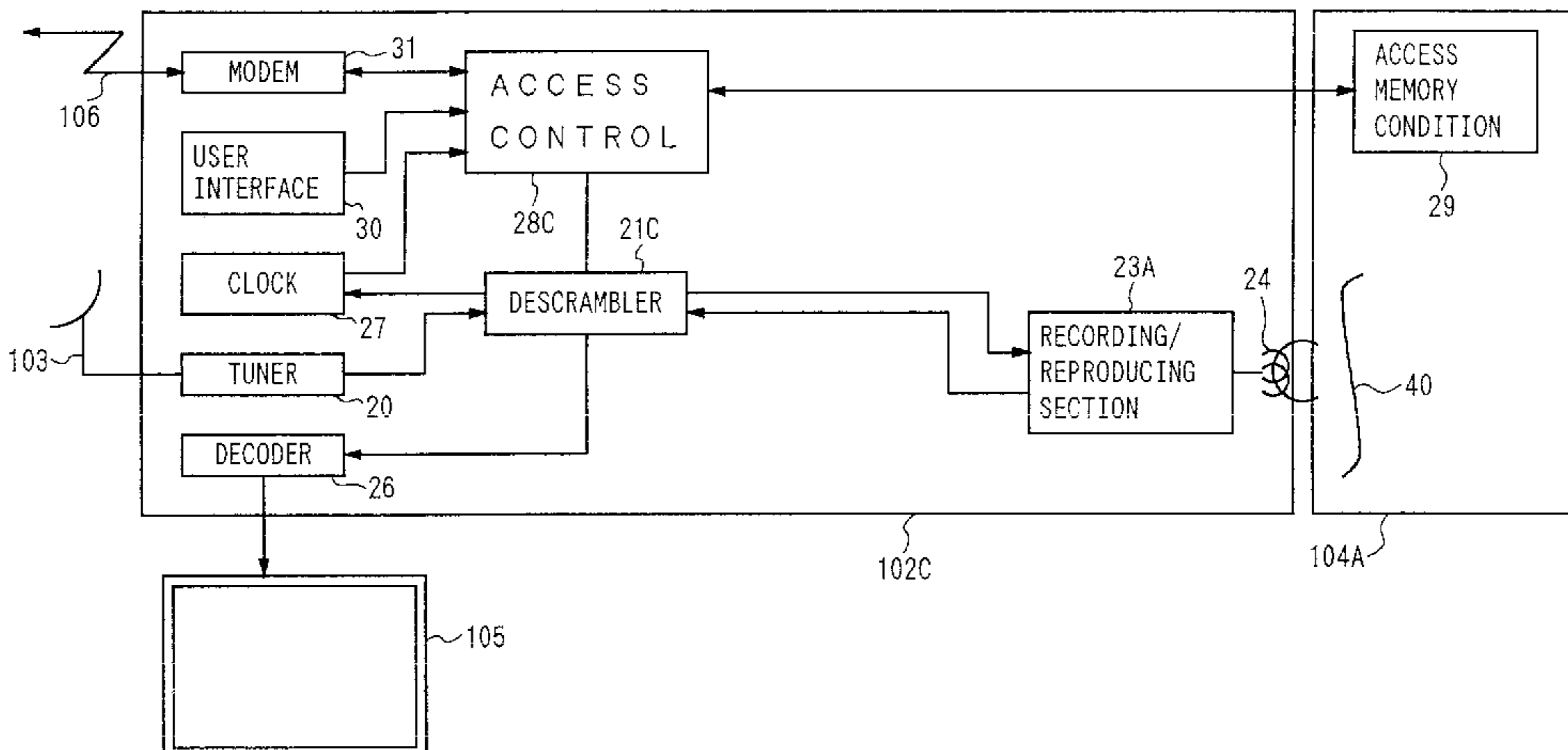


Fig. 1

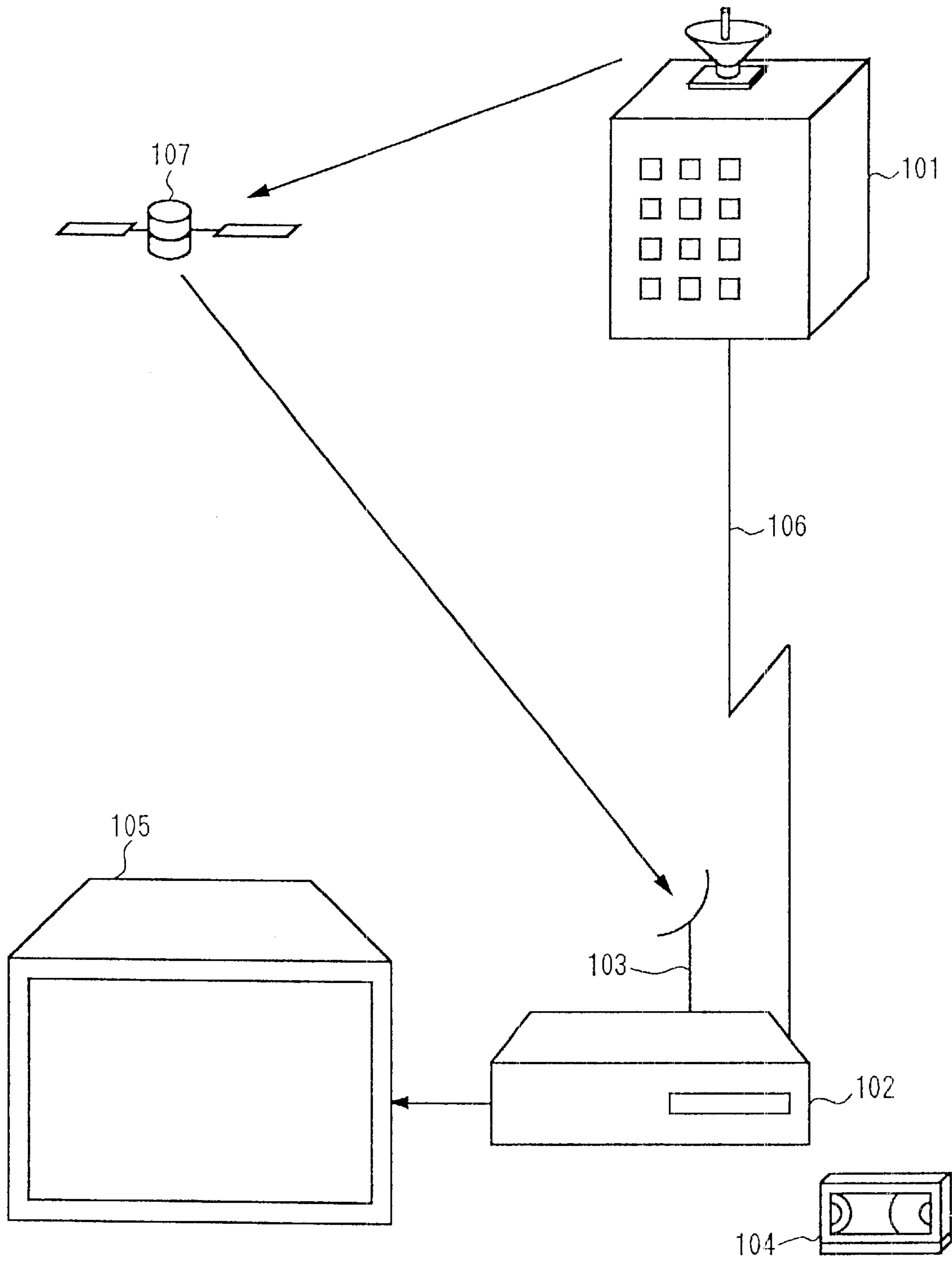


Fig. 2

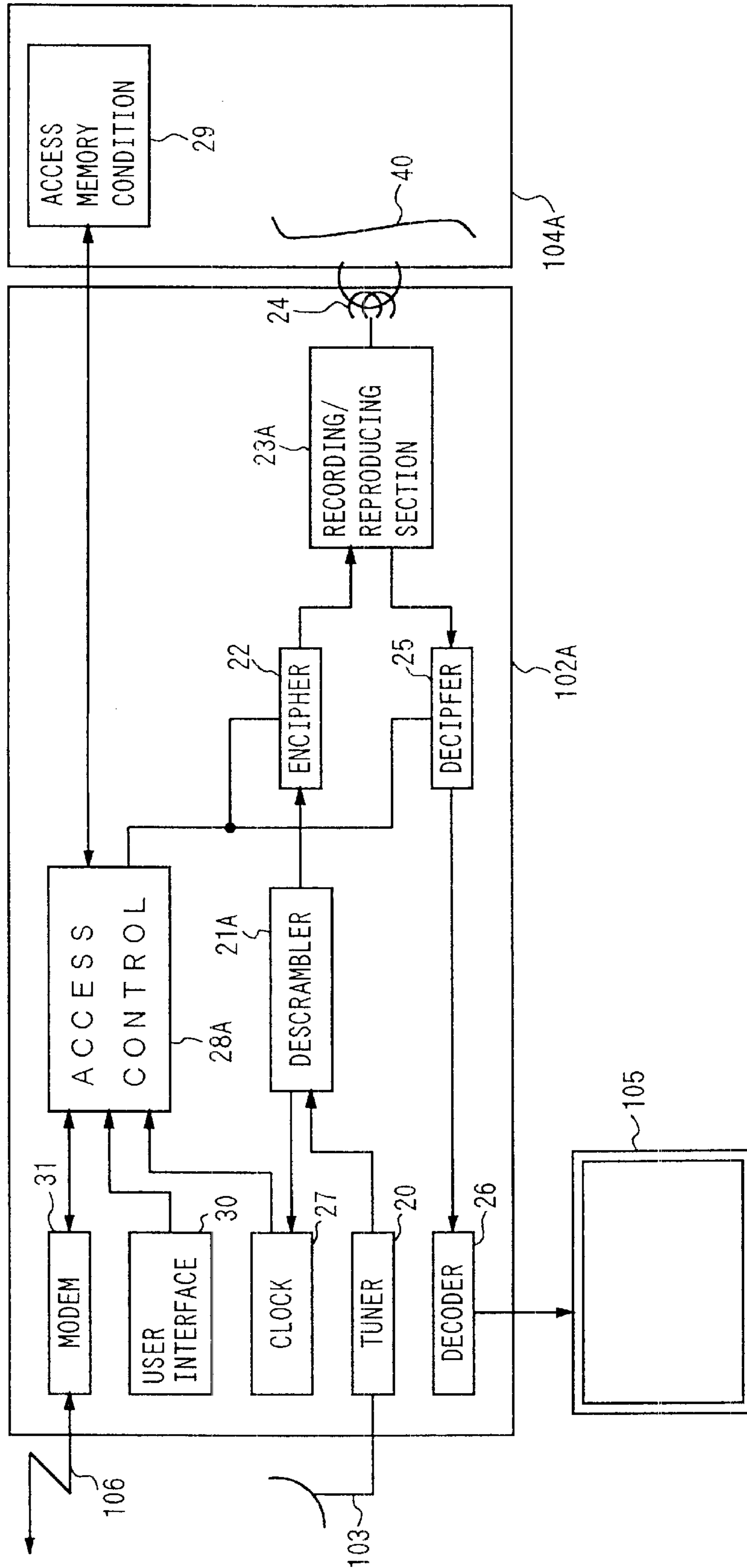


Fig. 3

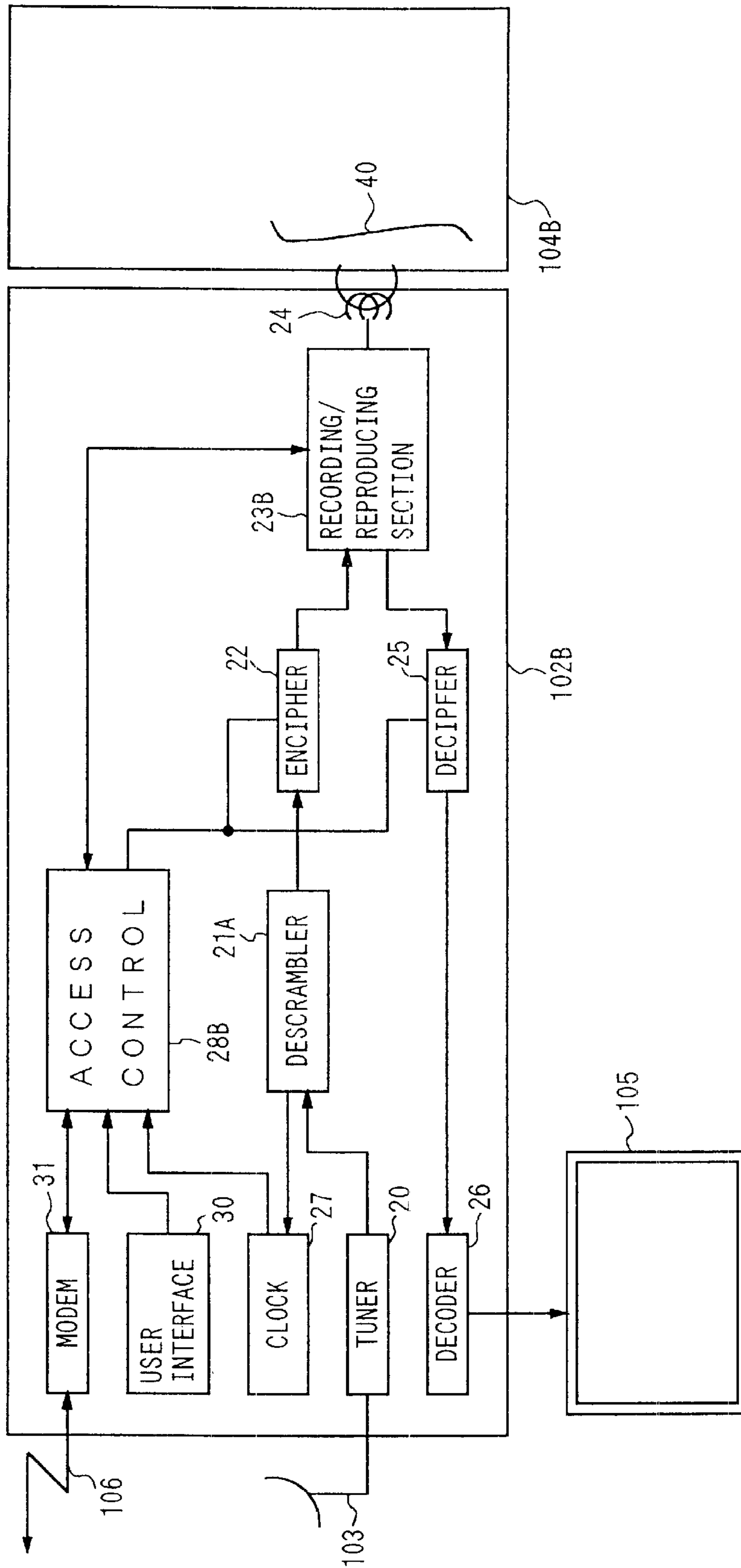


Fig. 4

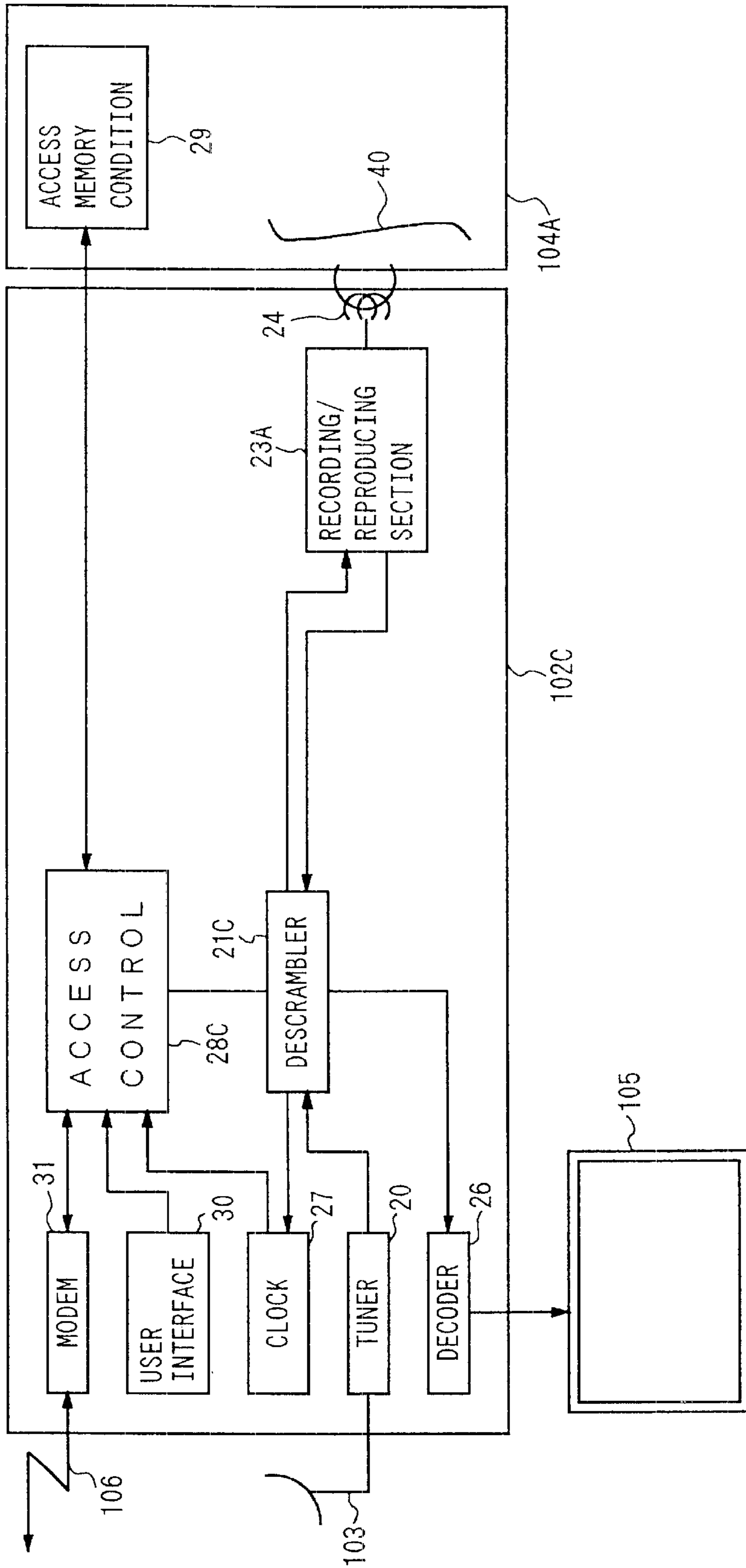


Fig. 5

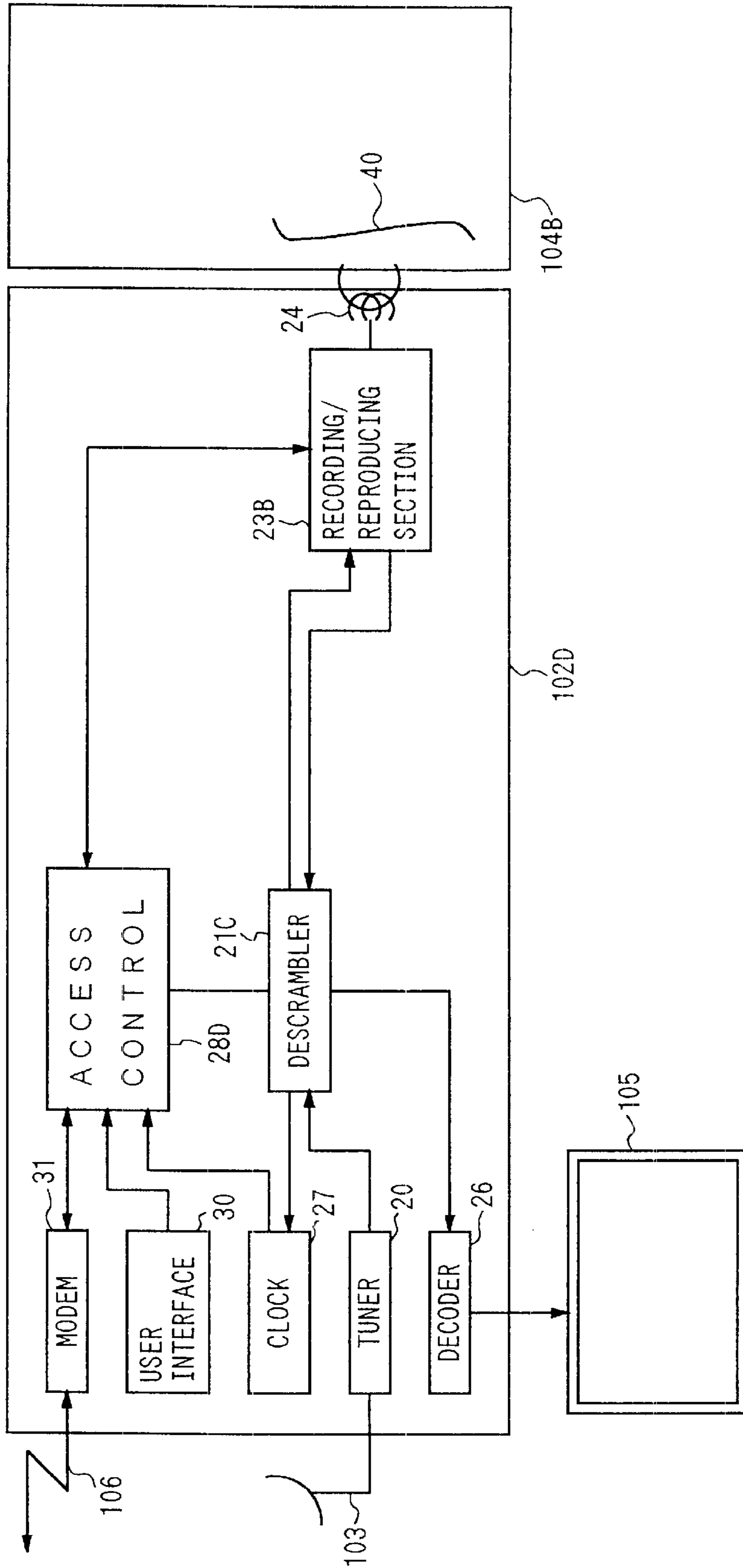


Fig. 6

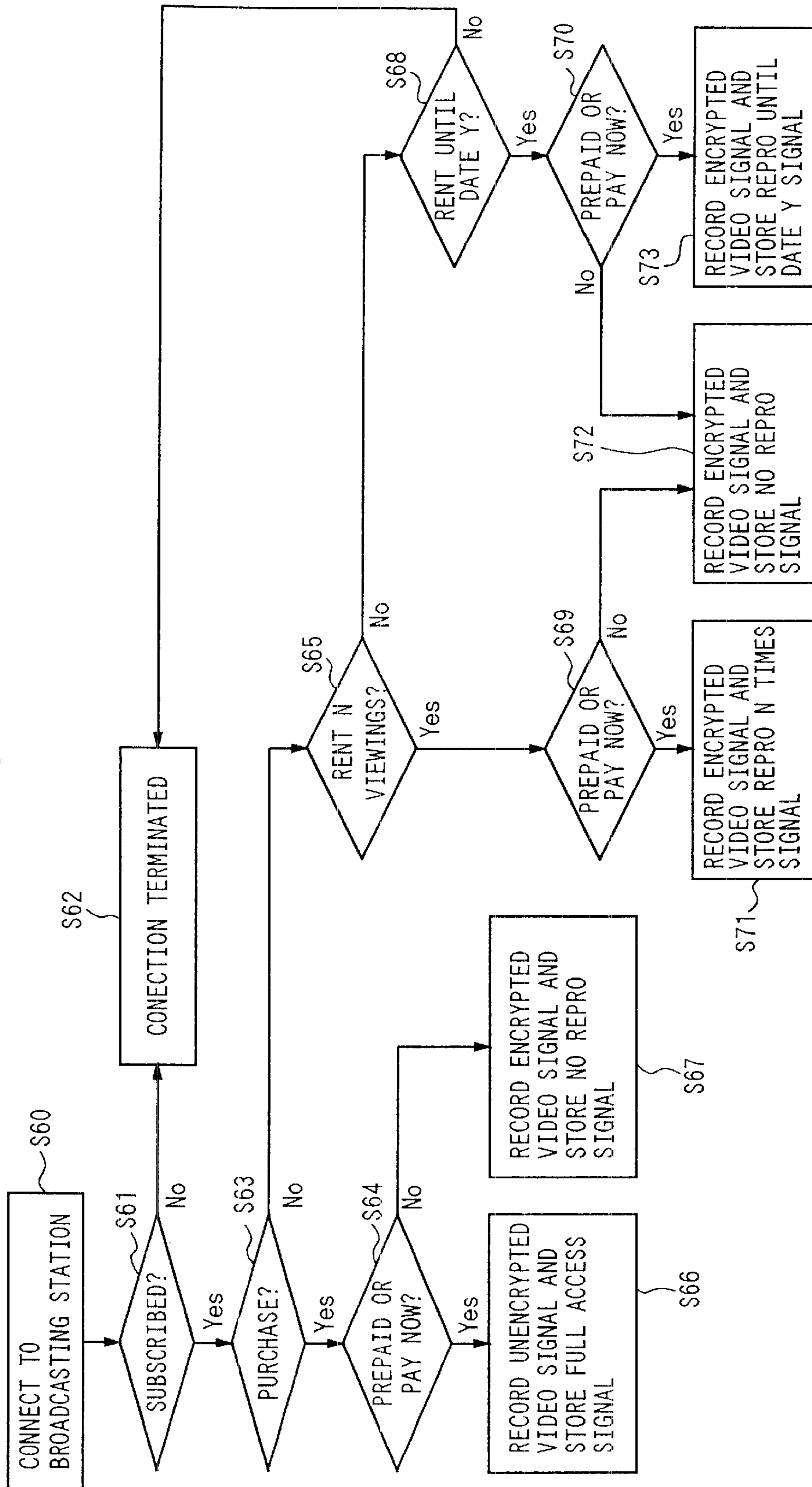


Fig. 7A

Fig. 7
Fig. 7A | Fig. 7B

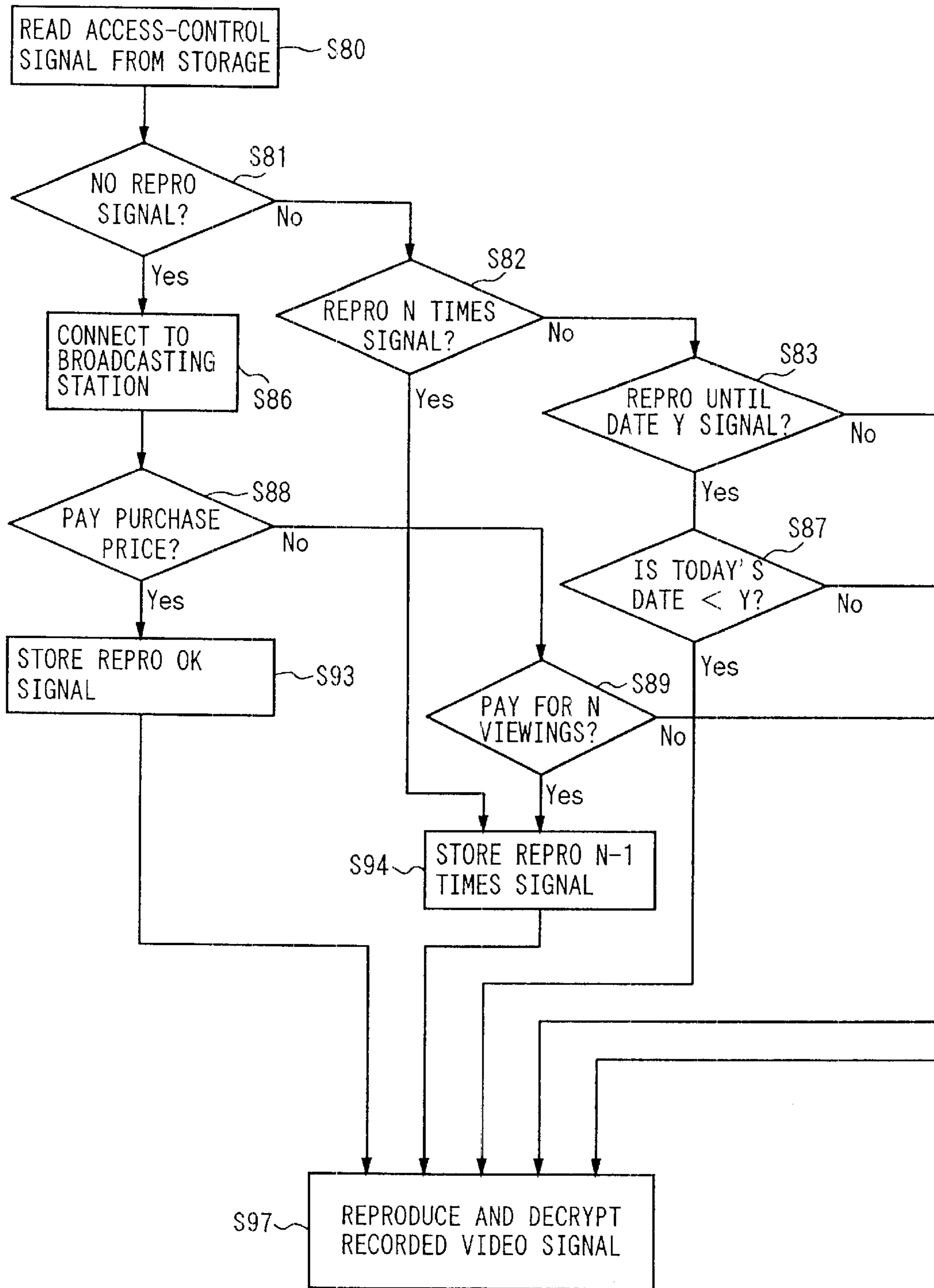
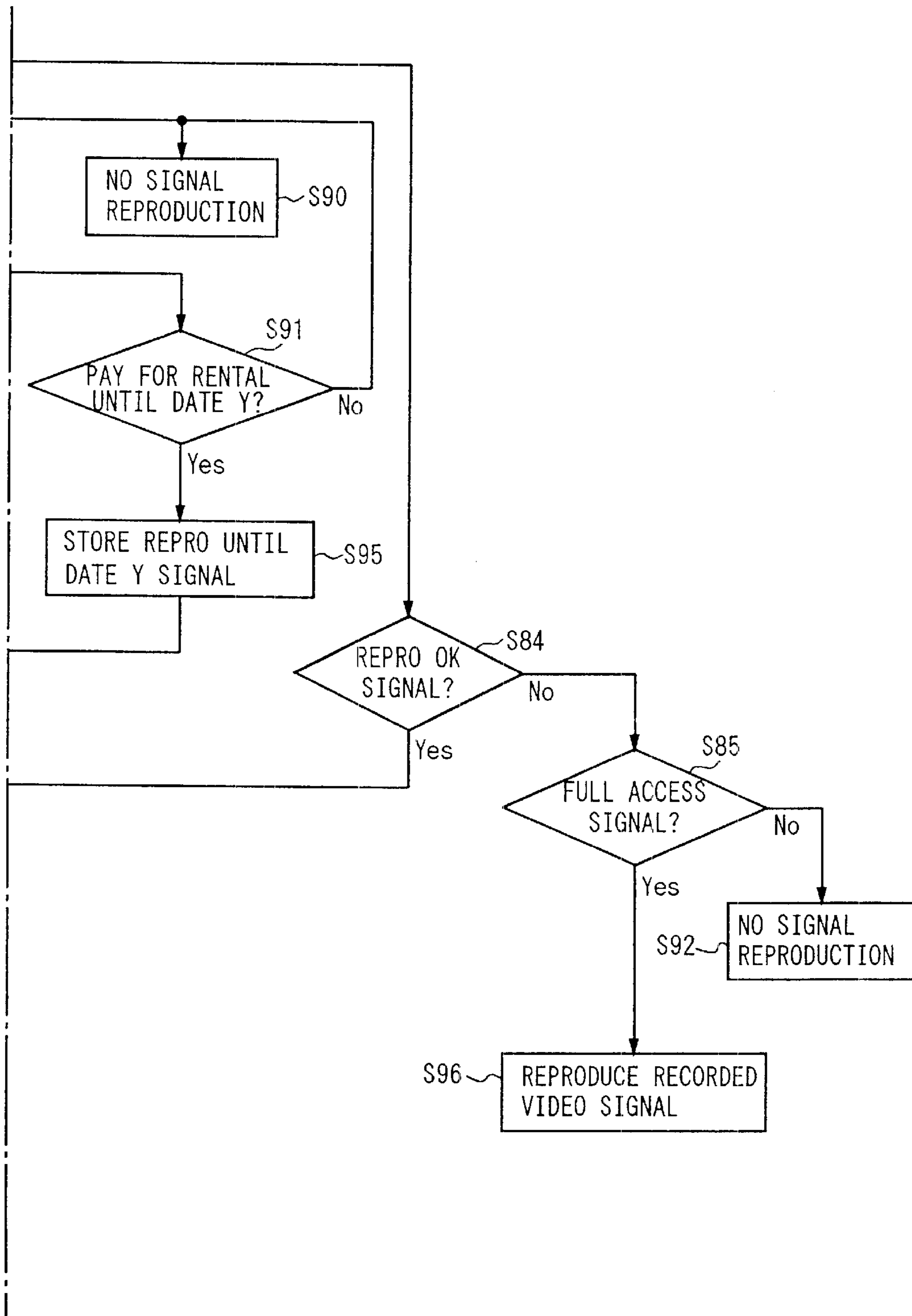


Fig. 7B



CONTROLLED-ACCESS BROADCAST SIGNAL RECEIVING SYSTEM

Matter enclosed in heavy brackets [] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND OF THE INVENTION

This invention relates to video data communication in which a limited reproduction right in video data is transferred between a broadcaster and a receiver.

Commonly, video programming is transmitted from a broadcaster to a user via a satellite or cable communications system. In some systems, users are able to request, and broadcasters provide, select video programming through the use of individually addressable decoding receivers. The user's decoder is activated upon receipt of the user's address which is transmitted along with the requested video programming.

The drawback of such systems is that the user is often able to record the requested video programming for later reproduction. This later reproduction occurs without any royalty payment to the broadcaster or other holder of copyrights in the video programming. Further, the recorded video programming can be disseminated by the user to others for additional reproductions without corresponding royalty payments.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide a system for the transfer between a broadcaster and a user of a limited reproduction right in transmitted data.

Another object of the present invention is to enable a user to request from a broadcaster a particular limited reproduction right in a selected video program.

Yet another object of the present invention is to prevent the reproduction of transmitted data by a user without adequate payment for each reproduction.

In accordance with the present invention, an apparatus for receiving, recording, and reproducing data signals is provided. A receiver receives transmitted data signals along with an access-control signal, the latter serving to control subsequent processing of the received data signals. The processed data signals are recorded in a first storage medium, and the access-control signal is stored in a second storage medium. When the processed data signals subsequently are reproduced from the first storage medium the access-control signal is retrieved from the second storage medium, and is used to control the reprocessing of the reproduced data signals.

The above, and other objects, features and advantages of the present invention will become apparent from the following detailed description of illustrative embodiments when read in conjunction with the accompanying drawings in which the same components are identified by the same reference numerals.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram of a satellite broadcast system in which the present invention finds ready application;

FIG. 2 is a block diagram of a controlled-access broadcast digital video signal receiving system according to one embodiment of the present invention;

FIG. 3 is a block diagram of a controlled-access broadcast digital video signal receiving system according to another embodiment of the present invention;

FIG. 4 is a block diagram of a controlled-access broadcast digital video signal receiving system according to a further embodiment of the present invention;

FIG. 5 is a block diagram of a controlled-access broadcast digital video signal receiving system according to yet another embodiment of the present invention;

FIG. 6 is a flow diagram illustrating a communication and processing operation controlled by the controller of the controlled-access broadcast digital video signal receiving system of FIG. 2; and

FIG. 7 is another flow diagram illustrating another processing operation controlled by the controller of the controlled-access broadcast digital video signal receiving system of FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a satellite broadcast system incorporating a controlled-access broadcast signal receiving system **102** according to the present invention. As explained in the following, it is preferred that the controlled-access broadcast signal receiving system **102** be specifically adapted to receive and process digital video data. Nevertheless, it should be appreciated that this system can be modified to accommodate other digital or analog signals without departing from the scope of the invention. As it is understood that the system can easily be implemented to accommodate other types of data, the following explanation is specifically directed towards a controlled-access broadcast digital video signal receiving system **102**.

The satellite television broadcasting system comprises a broadcasting station **101**, controlled-access broadcast digital video signal receiving system **102**, an antenna **103**, a video display **105**, a communication link **106**, and a satellite **107**. Broadcasting station **101** broadcasts video signals and access-control signals to the controlled-access broadcast digital video signal receiving system **102** which processes the video signals as a function of the access-control signals.

Broadcasting station **101** transmits video and access-control signals to receiving system **102** via communication link **106**, satellite **107**, or both. Communication link **106** is a signal transmission medium that couples broadcasting station **101** and receiving system **102**. Preferably, communication link **106** comprises a conventional telephone line. Alternatively, communication link **106** includes any of a number of other transmission media, such as a land-based broadcast system, a cable television system, a fiber optic network or the like.

Satellite **107** is a satellite broadcast signal relay station that receives signals from broadcasting station **101** and relays the signals to antenna **103**. Antenna **103** receives signals from satellite **107** and supplies the signals to receiving system **102**. Alternatively, satellite **107** can be replaced by any of a number of other transmission media, such as a land-based broadcast system, a cable television system, a fiber optic network or the like.

Receiving system **102** receives video signals and access-control signals supplied by broadcasting station **101** and processes (e.g. descrambles, decodes, and records) the signals. Typically, video signals are recorded on a storage medium and subsequently reproduced for display. Alternatively, video signals are recorded on a storage

medium and processed for display to a user substantially simultaneously. Access-control signals are stored in a memory or, alternatively, recorded on a storage medium which may be the same storage medium on which the video signals are recorded. In a preferred embodiment, receiving system **102** is adapted to receive a storage cassette **104** containing a tape on which video and access-control signals are recorded. Alternatively, storage cassette **104** comprises a tape for storing video signals and a separate memory, such as a memory chip included therein, for storing access-control signals. In other embodiments, receiving system **102** is adapted to receive any of a number of other storage media, such as a video disc, a magnetic media diskette, a compact disc or the like. Video display **105**, which preferably is a conventional display device, is coupled to and receives video signals from receiving system **102** for display to a user.

In a preferred recording mode of operation, broadcasting station **101** transmits video signals to satellite **107** which relays the signals to antenna **103** from which the video signals are coupled to receiving system **102**. Also, broadcasting station **101** transmits access-control signals through communication link **106** to the receiving system. Receiving system **102** processes and records the video signals as a function of the access-control signals.

In a preferred reproduction mode of operation, the receiving system retrieves the previously stored access-control signals and uses those access-control signals to control the reproduction and processing of the previously recorded video signals. The video signals are supplied to video display **105** or to another peripheral device (not shown).

An alternate satellite television broadcasting system according to the present invention comprises each of the elements described above except that only one of communication link **106** and satellite **107** is included. The alternate system is otherwise interconnected as in the above-described embodiment. Through the single transmission medium, broadcasting station **101** transmits both video signals and access-control signals to receiving system **102**.

In another variation, receiving system **102** transmits program requests, payment information, or other signals to broadcasting station **101** through one of the transmission media. Typically, communication link **106** is used for this purpose.

A first embodiment of the controlled-access broadcast digital video signal receiving system **102** according to the present invention is illustrated in FIG. **2** as system **102A**. Receiving system **102A**, is adapted for receiving, descrambling, enciphering, recording, deciphering and decoding digital video signals; and is comprised of a tuner **20**, a descrambler **21A**, an encipherer **22**, a recording/reproducing section **23A**, a decipherer **25**, a decoder **26**, an access controller **28A**, a user interface **30**, and a modem **31**.

Tuner **20** receives input digital video signals, selects particular digital video signals, and supplies the selected signals to descrambler **21A**. Preferably, input digital video signals are satellite broadcast digital video signals acquired by satellite antenna **103** which is coupled to tuner **20**. Alternatively, input digital video signals are acquired from another transmission medium that is coupled to tuner **20**. Preferably, a user controls tuner **20** to select signals from among different input digital video signals. The selected video signals include a time reference signal and a date reference signal.

Descrambler **21A** is coupled to tuner **20** and descrambles scrambled digital video signals supplied therefrom. As is

well known in the art, transmitted video signals are commonly scrambled or coded by a signal provider to prevent unauthorized reception of the video signals. Descrambler **21A** supplies an unscrambled version of the digital video signals to encipherer **22**. Further, descrambler **21A** is coupled to a clock **27** to supply the received time reference signal and the date reference signal thereto.

Encipherer **22** is coupled to descrambler **21A**, recording/reproducing section **23A**, and access controller **28A**. When enabled by the access controller, encipherer **22** encrypts, according to an encryption key, descrambled video signals supplied by descrambler **21A** to produce encrypted video signals. The encrypted video signals are supplied to recording/reproducing section **23A** for recording. However, the encrypted video signals cannot be displayed by ordinary means. It is contemplated that the encryption key is pre-stored in encipherer **22**, or is supplied by access controller **28A**, or is included in the video signals or in the access-control signals supplied by broadcasting station **101**. When disabled by access controller **28A**, encipherer **22** passes descrambled video signals from descrambler **21A** directly to section **23A** without encryption.

Recording/reproducing section **23A**, through a record/playback head **24**, or the like, records on storage medium **40** video signals supplied by encipherer **22**. Section **23A**, through head **24**, also reads previously recorded video signals from storage medium **40** and supplies the reproduced video signals to decipherer **25**. Preferably, section **23A** is a digital video tape recording/reproducing device (VTR) and storage medium **40** is a video tape. However, other types of storage media are contemplated, such as optical, magnetic or magneto-optic disc, solid-state memory, or the like.

Decipherer **25** is coupled to decoder **26** and, when enabled by access controller **28A**, is adapted to decrypt, according to an encryption key, encrypted signals supplied by recording/reproducing section **23A**. It is contemplated that the encryption key is pre-stored in decipherer **25**, or is supplied thereto by access controller **28A**, or is included in the video signals or the access-control signals supplied by broadcasting station **101**, or is stored in storage medium **40**, or is stored in access condition memory **29**. When disabled, decipherer **25** passes video signals from recording/reproducing section **23A** directly to decoder **26** without decryption.

As is well known in the art, video signals are commonly compressed or otherwise coded to facilitate their transmission through a transmission medium. Decoder **26** decodes such coded digital video signals as reproduced from storage medium **40** to produce uncoded digital video signals which are coupled to video display **105** for display. It is preferred that decoder **26** is adapted to decode digital video signals encoded in accordance with the Moving Picture Image Coding Experts Group (MPEG) standard.

Clock **27** is comprised of a clock device and a date device for tracking the time of day and the calendar date, respectively, known to those of ordinary skill in the art. Clock **27** is coupled to access controller **28A** and supplies time signals and date signals thereto. The clock receives a time reference signal and a date reference signal from descrambler **21A** and synchronizes its operation therewith.

User interface **30** is coupled to access controller **28A** and supplies user input signals thereto. The user input signals are generated as a function of input supplied by a user to the user interface which may include a keyboard or user-operated switches. Typical user input signals include a command to display video signals, a command to record broadcast video signals, an authorization code, a request for a specific video program, and so on.

Modem **31** is coupled to access controller **28A** and to communication link **106** and facilitates the communication of signals through the communication link between broadcasting station **101** (shown in FIG. **1**) and the access controller. As communication link **106** is preferably a telephone line, modem **31** is preferably a conventional telephone line modem.

Access controller **28A** is further coupled to an access condition memory **29**. It will be appreciated that, as a function of the signals supplied to access controller **28A** by clock **27**, user interface **30**, modem **31**, and access condition memory **29**, the access controller controls the operation of encipherer **22** and decipherer **25**. As will be discussed in greater detail below, depending upon whether applicable conditions have been fulfilled, the access controller enables or disables the operation of encipherer **22** and decipherer **25**. Access controller **28A** stores access-control signals in and retrieves access-control signals from access condition memory **29**. In an alternate embodiment, it is contemplated that the access controller **28A** stores both access-control signals and the encryption keys of encipherer **22** and decipherer **25** in access condition memory **29**.

Access-control signals indicate the conditions, if any, to be placed on the reproduction of the video component of the selected digital video signals. These conditions describe the circumstances under which a user may or may not reproduce the selected video signals. As a function of the access-control signals, the selected video signals recovered by descrambler **21A** are processed prior to recording and processed again following reproduction. Depending on the particular conditions and circumstances, a user can be prevented entirely from accessing the selected digital video signals, given limited access to the signals, or given full access to the signals. Such conditions may include, but are not limited to, one or more of the following: (1) previous receipt of a payment signal from broadcasting station **101**, (2) a numerical limit on the number of times particular video signals may be reproduced or displayed, (3) a temporal limit on the reproduction or display of video signals, and (4) previous receipt of a user authorization code. Preferably, the access-control signals are comprised of simple default values.

Also illustrated in FIG. **2** is storage cassette **104A** which comprises access condition memory **29** and storage medium **40**. Storage cassette **104A** is, as a whole, removably connected to receiving system **102A**. Access condition memory **29** stores access-control signals indicating the conditions, if any, to be placed on the reproduction and/or recording of video signals on storage medium **40**. Preferably, access condition memory **29** is an integrated circuit RAM, integrated into storage cassette **104A** but independent of storage medium **40**, as has been proposed heretofore, and electrically connectable to access controller **28A**. Storage medium **40** stores signals recorded thereon by head **24** and is preferably removably engaged therewith.

Operation of the embodiment of the controlled-access broadcast digital video signal receiving system **102A** shown in FIG. **2** will be described below. An important feature of this embodiment is that access-control signals, corresponding to video signals that are to be recorded on or reproduced from storage medium **40**, are stored in access condition memory **29**. Access controller **28A** controls the operation of encipherer **22** and decipherer **25** as a function of one or more of the access-control signals stored in access condition memory **29** and/or received from modem **31**. In this manner, the encryption and decryption of video signals is controlled to prevent unauthorized reproduction of the video signals.

The configuration of the present invention is compatible with many different sequences of signal transfer between broadcasting station **101** and receiving system **102A**. Examples of useful signal transfer sequences, implemented in different modes of operation of the present invention, will be described in detail below. Through the different modes of operation, video programs are securely transferred between a broadcaster and a consumer for recording, but the consumer's ability to display the programs can be subjected to limitations.

In a first video-on-demand mode, a user enters into user interface **30** a request for a specific video program. User interface **30** transmits this request to access controller **28A**, which, in turn, communicates the user's request through modem **31** and communication link **106** to broadcasting station **101**. The broadcasting station transmits the requested video program to satellite **107** which relays the video program to antenna **103** and supplies the video signals representing this program to tuner **20**. It is expected that several video signals are coupled to tuner **20**, which selects the particular video signals comprising the requested video program and supplies these selected video signals to descrambler **21A**. The descrambler descrambles these broadcast video signals and supplies a descrambled version of the video signals to encipherer **22**. Descrambler **21A** also supplies a time reference signal and a date reference signal, which accompany the video program transmission, to clock **27**.

Additionally, broadcasting station **101** communicates access-control signals through communication link **106** and modem **31** to access controller **28A** for storage in access condition memory **29**. The access-control signals serve to define the conditions or limitations, if any, upon the usage of the requested video program. In general, a user can either purchase or rent a particular video program from a broadcaster. In a prepayment method of purchase, a user pays for a video program and subsequently requests that the broadcaster transmit the program to the user's video receiving system. Broadcasting station **101** transmits the requested program and an access-control signal indicating that the video program can be unconditionally recorded and reproduced (FULL ACCESS). Access controller **28A** stores the FULL ACCESS signal in access condition memory **29** to disable encipherer **22**. Hence, descrambled video signals of the video program are supplied by descrambler **21A** through encipherer **22**, without encryption, to recording/reproducing section **23A**, whereat the descrambled and unencrypted video signals are recorded on storage medium **40**.

In a postpayment method of purchase, wherein a user elects to pay for a video program after it has been received by the user's receiving system, broadcasting station **101** transmits the particular video program to receiving system **102A** along with an access-control signal indicating that the video program cannot be reproduced (NO REPRO). Access controller **28A** stores the NO REPRO signal in access condition memory **29** and enables encipherer **22**, causing it to encrypt, according to an encryption key, descrambled video signals of the video program supplied by descrambler **21A**. Encipherer **22** supplies encrypted video signals to recording/reproducing section **23A**, whereat the encrypted video signals are recorded on storage medium **40**.

It is contemplated that the user subsequently purchases the video program from the broadcaster. Upon payment, broadcasting station **101** transmits an access-control signal to access controller **28A** indicating that the recorded video program can be reproduced (REPRO OK), and this REPRO OK signal replaces the previously stored NO REPRO signal

in memory 29. When the encrypted video signals subsequently are played back from storage medium 40, they are supplied to decipherer 25 which is enabled by the stored REPRO OK signal to decrypt the reproduced video signals.

In a second prepayment method of purchase, similar to the postpayment method, the user pays for the selected program prior to its transmission, but broadcasting station 101 first transmits the selected program to receiving system 102A along with a NO REPRO signal. Access controller 28A causes encipherer 22 to encrypt the video signals of the video program and the encrypted signals are recorded on storage medium 40 while the NO REPRO signal is stored in access condition memory 29. Upon completion of the video program transmission, broadcasting station 101 transmits a REPRO OK signal; and access controller 28A replaces the stored NO REPRO signal with the REPRO OK signal. Thus, the video program is recorded in encrypted form but the user can reproduce and decrypt the program an unlimited number of times. This second prepayment method has the advantage of producing video recordings that can only be reproduced in devices having compatible decryption capabilities.

Alternatively, a user can purchase the right to reproduce a video program a certain number (N) of times. The user thus "rents" the video program for N reproductions. In one mode, the user enters a request into user interface 30 to rent a video program for N reproductions. User interface 30 transmits the request to access controller 28A which forwards the request through modem 31 and communication link 106 to broadcasting station 101. Broadcasting station 101 transmits the requested video program along with an access-control signal indicating that the video program can only be reproduced N times (REPRO N TIMES). The access controller receives the REPRO N TIMES signal and stores it in access condition memory 29. The video program is received by tuner 20 and supplied to descrambler 21A which descrambles the video program and supplies descrambled video signals to encipherer 22. The encipherer, which is enabled by the access controller, encrypts the descrambled video signals, and supplies encrypted signals to recording/reproducing section 23A for recording on storage medium 40.

In another rental mode, wherein a user desires to rent a particular video program for a certain period of time, an access-control signal designating the period of time during which reproduction of the requested video program is authorized is supplied by the broadcasting system. For example, the user may request to rent a particular video program for a certain number of days (D). Receiving system 102A transmits this request via communication link 106 to broadcasting station 101. The broadcasting station calculates the date Y, as a function of D, on which the reproduction right should expire, and transmits the requested video program along with an access-control signal indicating that reproduction is allowed until date Y (REPRO UNTIL DATE Y). The access-control signal is received by receiving system 102A and stored in access condition memory 29. The access controller enables the operation of encipherer 22; and as described above, the requested video program is received, selected by tuner 20, descrambled, enciphered, and recorded in enciphered form. Subsequently, the encrypted video program is reproduced, deciphered (so long as the reproduction operation is performed prior to date Y) and displayed.

As another example, a user can request to rent a particular video program for a certain number of hours (H). Receiving system 102A transmits this request via communication link 106 to broadcasting station 101 which calculates the time T, as a function of H, when the reproduction right should expire, and transmits the requested video program along

with an access-control signal indicating that reproduction is allowed until time T (REPRO UNTIL TIME T). The received access-control signal is stored in access condition memory 29; and the operation of encipherer 22 is enabled by access controller 28A. As described above, the requested video program is received, selected, descrambled, enciphered, and recorded in an enciphered form.

Of course, there are many different methods of expressing the terms of a rental. The preceding expressions are intended merely as examples to assist in explaining the present invention and not as limits thereon. Further examples of useful rental terms include: reproduction of a video program for a certain number of hours or of days, or for a period of time in the future.

Analogous to the prepayment and postpayment methods of purchase, each rental of a video program can be prepaid or postpaid by the user. When the rental is prepaid, broadcasting station 101 transmits the requested program and the access-control signal specifying the terms of the rental to receiving system 102A which processes the video program (i.e., selectively encrypts the video signals) and stores the access-control signal as described above.

In contrast, when the rental is postpaid, broadcasting station 101 transmits the requested program and a NO REPRO signal to receiving system 102A, which encrypts and records the video program and stores the NO REPRO signal as described above. Upon proper payment, broadcasting station 101 transmits the access-control signal specifying the terms of the rental to the receiving system which replaces the NO REPRO signal in access condition memory 29 with the newly-transmitted access-control signal.

In a further variation, a certain segment of the video program can be made available for reproduction by a user in a "preview" mode of operation. In this "preview" mode a user can view a selected portion of the requested video program and later decide whether or not to purchase or rent the entire video program. In an illustrative implementation of the preview mode, the access-control signal corresponding to the preview segment is a REPRO OK signal and the access-control signal corresponding to the entire video program is a NO REPRO signal.

In a second video-on-demand mode, a user requests video programming from a broadcaster to be transmitted at a later time, perhaps the following day. The video programming may be, for example, one or more video programs selected by the user or a number of video programs selected by the broadcaster. In the latter case, it is contemplated that the user initially selects a particular type of video programming or selects video programming provided by a particular video program supplier.

The request for "delayed" transmission of the video programming is entered by the user into user interface 30. User interface 30 transmits this request to access controller 28A which communicates the user's request through modem 31 and communication link 106 to broadcasting station 101.

Some period of time later, broadcasting station 101 transmits the requested video programming to satellite 107 which relays the video programming to antenna 103. Preferably, transmission of the video programming occurs during periods when broadcasters are "off-the-air" or during periods of low viewership of broadcast video signals. Antenna 103 receives the video programming and supplies the video signals to tuner 20 from which the particular video signals comprising the requested video programming are supplied to descrambler 21A which, in turn, supplies a descrambled version of the video signals to encipherer 22.

In this mode, broadcasting station **101** also transmits two access-control signals via communication link **106** and modem **31** to access controller **28A**. One access-control signal indicates that the video programming is to be erased on a certain date Y (ERASE ON DATE Y) and the other access-control signal is the NO REPRO signal. Access controller **28A** stores the ERASE ON DATE Y signal and the NO REPRO signal in access condition memory **29**. Encipherer **22**, when enabled, supplies encrypted video signals to recording/reproducing section **23A** for recording on storage medium **40**.

Subsequently, but prior to date Y, the user selects a video program from the requested video programming stored on storage medium **40** and pays the fee to rent the selected program for a particular rental term. Upon payment, broadcasting station **101** transmits the access-control signal indicating the appropriate rental condition to access controller **28A** which replaces the previously stored NO REPRO signal in memory **29**. Hence, the ERASE ON DATE Y signal remains stored in access condition memory **29**.

Illustrative video signal reproduction modes of operation of receiving system **102A** now will be described. The process is initiated when a user enters a command into user interface **30** to reproduce a prestored video program recorded on storage cassette **104A**. The user interface transmits the command to access controller **28A** which retrieves the access-control signal stored in access condition memory **29** of the storage cassette. The operation of decipherer **25** is controlled as a function of the particular access-control signal(s) that is retrieved.

If, for example, the retrieved signal is a FULL ACCESS signal, then access controller **28A** disables decipherer **25**. Recording/reproducing section **23A** recovers video signals from storage medium **40** and supplies the reproduced video signals to decipherer **25**, which passes the video signals to decoder **26**. As described above, the reproduced video signals are unencrypted; and decoder **26** decodes the video signals and supplies uncoded video signals to video display **105**.

If the NO REPRO signal is retrieved from access condition memory **29**, access controller **28A** disables the operation of decipherer **25**. However, unlike the FULL ACCESS signal case, the video signals stored on storage medium **40** are encrypted. Hence, recording/reproducing section **23A** reproduces encrypted video signals which are supplied to decipherer **25** to be passed directly to decoder **26** without decryption. The decoder decodes the encrypted video signals to produce uncoded but encrypted video signals which are supplied to video display **105**. As a result, the video display either cannot display the video signals at all or can only display a distorted version of the original video program.

As a further alternative, access controller **28A** may retrieve a REPRO OK signal from access condition memory **29** to enable the operation of decipherer **25**. Recording/reproducing section **23A** reproduces the encrypted video signals stored on storage medium **40** and supplies the encrypted signals to enabled decipherer **25** which decrypts the video signals and supplies unencrypted video signals to decoder **26**. The decoder decodes the video signals and supplies the resulting uncoded and decrypted video signals to video display **105** for display. Because the video signals are uncoded and decrypted, video display **105** displays the reproduced video program without distortion.

As yet another alternative, when access controller **28A** retrieves a REPRO N TIMES signal from access condition

memory **29**, the access controller **28A** determines whether the number N is greater than a predetermined threshold value (e.g. zero). If the number N is not greater than the threshold value, then access controller **28A** disables operation of decipherer **25** and reproduction of the stored video signal proceeds as in the NO REPRO signal case. On the other hand, if the number N is greater than the threshold value, then access controller **28A** enables decipherer **25** and reproduction of the stored video signal proceeds as in the REPRO OK signal case.

After the video signal is reproduced from storage medium **40**, if the number N is greater than the threshold value, access controller **28A** subtracts one from the value of N to produce a new value N and writes a new REPRO N TIMES signal, utilizing the new value N, into access condition memory **29** whereat the previously stored REPRO N TIMES signal is replaced by the new REPRO N TIMES signal. According to this procedure, the particular video signals stored in storage medium **40** to which the REPRO N TIMES signal corresponds are only reproduced the number of times represented by the number N. The value N stored in access condition memory **29** thus reflects the remaining number of permitted reproductions of the particular video signals. Since the access condition memory is provided in the same storage cassette **104A** as storage medium **40**, and the video signals are encrypted on the storage medium, the video signals can only be reproduced for display N times even if the cassette is loaded into another receiving system, at least until a new access-control signal is stored.

When, as described above, a video program is rented for only a certain period of time, access controller **28A** retrieves the corresponding access-control signal from access condition memory **29** and also receives a clock signal and a date signal from clock **27**. The clock signal and the date signal are compared to the retrieved access-control signal, and if the particular condition expressed in the access-control signal is satisfied such that reproduction is allowed, then decipherer **25** is enabled and reproduction of the stored video signals proceeds as in the REPRO OK case. However, if the condition expressed by the access-control signal is not satisfied such that reproduction of the video signals is not allowed, then the decipherer is disabled and reproduction of the stored video signals proceeds as described with respect to the NO REPRO signal.

For example, when access controller **28A** retrieves a REPRO UNTIL DATE Y signal from access condition memory **29**, it compares the date signal from clock **27** to the date Y. If the date from clock **27** is prior to date Y, then the access controller enables the operation of decipherer **25** to decrypt the reproduced, encrypted video signals. In a similar fashion, when the access controller retrieves a REPRO UNTIL TIME T signal from the access condition memory, it compares the time signal supplied by clock **27** with the time T. If the time indicated by the time signal is prior to time T, then reproduction of the stored video signals proceeds as described with respect to the REPRO OK signal.

In an analogous manner, when access controller **28A** retrieves an ERASE ON DATE Y signal from access condition memory **29**, it compares the date signal from clock **27** to the date Y. If the date indicated by clock **27** is the same as or past date Y, then the access controller controls recording/reproducing section **23A** to erase the video signals stored on storage medium **40**. A suitable control channel, or link, may be provided between access controller **28A** and recording/reproducing section **23A**.

An alternate embodiment of receiving system **102A** additionally includes a connection between descrambler **21A** and

access controller **28A**. Here, scrambled access-control signals that are transmitted by broadcasting station **101** along with the video signals are supplied to and descrambled by descrambler **21A** from which they are coupled to the access controller. In this alternate embodiment, video signals are recorded and reproduced as described above, and encipherer **22** and decipherer **25** are selectively enabled and disabled in response to the received access-control signals in the same manner as has been discussed.

As will be appreciated by one of ordinary skill in the art, each of the abovedescribed modes of signal reproduction wherein the user has prepaid for the video programming can be achieved substantially simultaneously with the recording of the broadcast video signals. In such a mode of operation, recording/reproducing section **23A** functions both to record the processed broadcast video signals and to supply the video signals to decipherer **25**. Decipherer **25**, controlled by access controller **28A**, decrypts the video signals as a function of the access-control signal to be stored in access condition memory **29** and decoder **26** decodes the resulting video signals for immediate display on video display **105**.

Another embodiment of the controlled-access broadcast digital video signal receiving system **102B** according to the present invention is illustrated in FIG. **3**. Receiving system **102B** differs from abovedescribed receiving system **102A** in that receiving system **102B** stores access-control signals and video signals in the same storage medium **40** of storage cassette **104B**.

Recording/reproducing section **23B**, through head **24**, records on storage medium **40** in storage cassette **104B** video signals supplied by encipherer **22** and access-control signals supplied by access controller **28B**; and also reads previously recorded video signals and previously recorded access-control signals from the storage medium. The reproduced video signals are supplied to decipherer **25** and the reproduced access-control signals are supplied from the recording/reproducing section to access controller **28B**. As before, recording/reproducing section **23B** is a digital video tape recording/reproducing device (VTR) and storage medium **40** is a video tape; although the storage medium may be a magnetic disc, an optical disc, a magneto-optic disc, a solid-state device, or other recordable medium. It is also preferred that the access-control signals be stored in one or more sub-code regions of the storage medium.

When enabled by access controller **28B**, decipherer **25** decrypts, according to an encryption key, encrypted signals reproduced by recording/reproducing section **23B**. It is contemplated that the encryption key is prestored in the decipherer or is supplied thereto by access controller **28B**, or is included in the video signals or the access-control signals supplied by broadcasting station **101**, or is stored in and read from storage medium **40**. When disabled, decipherer **25** passes video signals from recording/reproducing section **23B** directly to decoder **26** without decrypting such signals.

As a function of the signals supplied to access controller **28B** by clock **27**, user interface **30**, modem **31**, and recording/reproducing section **23B**, the access controller controls the operation of encipherer **22** and decipherer **25** as has been described previously. Specifically, depending upon whether applicable conditions have been fulfilled, the access controller enables or disables the operation of encipherer **22** and decipherer **25**.

Each signal transfer sequence, including variations thereon, described above with respect to receiving system **102A** is also implemented in similar modes of operation of receiving system **102B**. It will be appreciated, then, that the

modes of operation of receiving system **102B** are substantially identical to the modes of operation of receiving system **102A** with the following illustrative exceptions. Access controller **28B** functions in the same manner as access controller **28A**, except that access-control signals are stored, through recording/reproducing section **23B**, in storage medium **40**, instead of in a separate access condition memory. Recording/reproducing section **23B** functions in the same manner as section **23A** except that section **23B** additionally records access-control signals on and reproduces access-control signals from storage medium **40**. The reproduced access-control signals are supplied from recording/reproducing section **23B** to access controller **28B**.

Similar to the alternate embodiment discussed in conjunction with FIG. **2**, an alternate embodiment of receiving system **102B** additionally includes a connection between descrambler **21A** and access controller **28B** so that scrambled access-control signals that are transmitted by broadcasting station **101** along with the video signals are descrambled and supplied to the access controller. Of course, access controller **28B** uses these access-control signals in the same manner as discussed above.

A further embodiment of the controlled-access broadcast digital video signal receiving system **102C** according to the present invention is illustrated in FIG. **4**. Receiving system **102C**, is adapted for receiving, descrambling, decoding, recording, and reproducing digital video signals and is similar to the abovedescribed receiving system **102A** of FIG. **2**. As in receiving system **102A**, receiving system **102C** stores access-control signals in access condition memory **29** of storage cassette **104A**, while the video signals are stored on storage medium **40** of the storage cassette.

FIG. **4** differs from FIG. **2** in that descrambler **21C** of receiving system **102C** is coupled to access controller **28C**, recording/reproducing section **23A**, and decoder **26**; and encipherer **22** and decipherer **25** are not provided as separate circuits. When enabled by access controller **28C**, descrambler **21C** descrambles video signals supplied by tuner **20** and supplies an unscrambled version of the digital video signals to recording/reproducing section **23A**. Also, when enabled by the access controller, descrambler **21C** descrambles video signals reproduced by recording/reproducing section **23A** and supplies an unscrambled version of the digital video signals to decoder **26**. When disabled by access controller **28C**, descrambler **21C** passes scrambled video signals from tuner **20** directly, without encryption, to section **23A** and also passes video signals reproduced by the recording/reproducing section directly, without decryption, to decoder **26**. Scrambled video signals can be recorded but they cannot be displayed in scrambled form.

It will be appreciated that access controller **28C** functions in the same general manner as access controller **28A**, except that descrambler **21C** is controlled in accordance with the access-control signals rather than encipherer **22** and decipherer **25**.

At those abovedescribed operational steps where access controller **28A** enables encipherer **22**, access controller **28C** disables descrambler **21C** to pass scrambled signals to the recording/reproducing section; and where access controller **28A** disables encipherer **22**, access controller **28C** enables descrambler **21C** to supply descrambled signals to the recording/reproducing section. However, in the operational steps where access controller **28A** enables decipherer **25**, access controller **28C** similarly enables descrambler **21C** to descramble the signals reproduced by the recording/reproducing section. Where access controller **28A** disables

decipherer 25, access controller 28C similarly disables descrambler 21C to pass to decoder 26 signals reproduced by the recording/reproducing section.

In an alternate embodiment of receiving system 102C, access-control signals, transmitted by broadcasting station 101 along with video signals, are received through antenna 103 and supplied by tuner 20 to descrambler 21C for descrambling and for coupling to access controller 28C.

A still further embodiment of the controlled-access broadcast digital video signal receiving system 102D according to the present invention is illustrated in FIG. 5. Receiving system 102D is seen to be a combination of portions of receiving system 102C and receiving system 102B (FIG. 3). Similar to receiving system 102B, receiving system 102D stores access-control signals and video signals in the same storage medium 40 of storage cassette 104B. Recording/reproducing section 23B supplies the reproduced video signals to descrambler 21C and supplies the reproduced access-control signals to access controller 28D.

It will be appreciated that the modes of operation of receiving system 102D are substantially similar to the modes of operation of receiving system 102C with the following illustrative exceptions. Access controller 28D functions in the same manner as access controller 28C, except that access-control signals are stored in storage medium 40 instead of in a separate access condition memory. Recording/reproducing section 23B functions in the same manner as section 23A except that section 23B additionally records access-control signals on and reproduces access-control signals from storage medium 40. The reproduced access-control signals are supplied from recording/reproducing section 23B to access controller 28D.

Similar to the alternate embodiment discussed in conjunction with FIG. 4, access-control signals, transmitted by broadcasting station 101 along with video signals, are received through antenna 103 and supplied by tuner 20 to descrambler 21C for descrambling; and the descrambled access-control signals are supplied to access controller 28D. It is seen that access controller 28D receives access-control signals from recording/reproducing section 23B and either from modem 31 or from descrambler 21C, or from both.

FIG. 6 is a flow diagram of a preferred mode of operation of receiving system 102A of FIG. 2, as controlled by access controller 28A, wherein a user orders from a broadcaster a limited or an unlimited right (as may be desired) to reproduce a video program. The user initiates the process by entering a request for a particular video program at user interface 30. The process begins at step S60, where access controller 28A causes modem 31 to connect to broadcasting station 101.

Access controller 28A transmits identification information through modem 31 and communication link 106 to broadcasting station 101 which checks the identification information against a subscription list and determines whether the user has subscribed to the broadcasting station's service, as represented by inquiry S61. If the user is not subscribed, the broadcasting station terminates the connection with receiving system 102A in step S62.

If the user is subscribed, inquiry S61 is answered in the affirmative and operation continues to inquiry S63, which polls the user to determine whether or not the video program is to be purchased. If the user enters an affirmative response into user interface 30, operation proceeds to inquiry S64. Otherwise, operation proceeds to inquiry S65.

At inquiry S64, the broadcasting station 101 determines whether the user has prepaid for the video program and if

not, the user is further queried to determine if payment will be made at that time. If the price of the video program has been previously paid or is immediately paid, then processing proceeds with step S66. Otherwise, processing proceeds with step S67.

In step S66, broadcasting station 101 transmits the video program via satellite to antenna 103 and transmits the FULL ACCESS signal via communication link 106 and modem 31 to access controller 28A. Access controller 28A disables encipherer 22, allowing the video program to be recorded in an unencrypted form on storage medium 40, and the access controller also stores the FULL ACCESS signal in access condition memory 29.

In step S67, broadcasting station 101 transmits the video program via satellite to antenna 103 and transmits the NO REPRO signal via communication link 106 and modem 31 to access controller 28A. The access controller enables encipherer 22, causing the video program to be encrypted and then recorded in encrypted form on storage medium 40, and the NO REPRO signal is stored in access condition memory 29.

If the video program is not to be purchased, resulting in a negative answer to inquiry S63, the operation proceeds to inquiry S65 whereat the user is polled to determine whether the video program is to be rented for a number (N) of viewings. If the user enters an affirmative response into user interface 30, the number N is entered, and operation proceeds to inquiry S69. Otherwise, operation proceeds to inquiry S68.

At inquiry S69, the broadcasting station 101 determines whether the user has prepaid for the N viewings of the video program and if not, the user is further queried to determine if payment will be made at that time. If the fee for N viewings of the video program has been previously paid or is immediately paid, processing proceeds with step S71. Otherwise, processing proceeds with step S72.

In step S71, broadcasting station 101 transmits the video program via satellite to antenna 103 and transmits the REPRO N TIMES signal via communication link 106 and modem 31 to access controller 28A. The access controller 28A enables encipherer 22, causing the video program to be encrypted and then recorded on storage medium 40; and the REPRO N TIMES signal is stored in access condition memory 29.

In step S72, broadcasting station 101 transmits the video program via satellite to antenna 103 and transmits the NO REPRO signal via communication link 106 and modem 31 to access controller 28A. The access controller enables encipherer 22, causing the video program to be encrypted and then recorded on storage medium 40; and the NO REPRO signal is stored in access condition memory 29.

If the video program is not to be rented for N viewings, inquiry S65 is answered in the negative and the operation proceeds to inquiry S68 whereat the user is polled to determine whether a video program is to be rented for viewing until a date Y. If the user enters an affirmative response into user interface 30, the date Y is entered, and operation proceeds to inquiry S70. Otherwise, operation returns step S62, described above.

At inquiry S70, the broadcasting station 101 determines whether the user has prepaid for the rental of the video program until date Y and if not, the user is further queried to determine if payment will be made at that time. If the fee for the rental period has been previously paid or is immediately paid, then processing proceeds with step S73. Otherwise, processing proceeds with step S72, described above.

In step S73, broadcasting station 101 transmits the video program via satellite to antenna 103 and transmits the REPRO UNTIL DATE Y signal via communication link 106 and modem 31 to access controller 28A. The access controller enables encipherer 22, causing the video program to be encrypted and then recorded in encrypted form on storage medium 40. Access controller 28A also stores the REPRO UNTIL DATE Y signal in access condition memory 29.

FIG. 7 is a flow diagram of a preferred mode of operation of receiving system 102A of FIG. 2 wherein a user seeks to reproduce a selected previously recorded video program. The user initiates the process by supplying a request to reproduce a prerecorded video program at user interface 30 and the process begins at step S80, where access controller 28A retrieves from access condition memory 29 the access-control signal corresponding to the selected video program. The process proceeds to inquiry S81 whereat the access controller determines if the access-control signal is the NO REPRO signal. If so, processing proceeds with step S86; otherwise, processing proceeds to inquiry S82.

In step S86, access controller 28A causes modem 31 to connect to broadcasting station 101 and transmits identification information and program information to the broadcasting station. Processing then proceeds to inquiry S88 which queries the user to determine if payment of the full purchase price for the video program will be made at that time. If the purchase price of the video program is paid, then processing proceeds with step S93. Otherwise, processing proceeds to inquiry S89.

In step S93, broadcasting station 101 transmits the REPRO OK signal via communication link 106 and modem 31 to access controller 28A which stores the REPRO OK signal in access condition memory 29, replacing the NO REPRO signal, and processing proceeds to step S97. In step S97, the access controller enables decipherer 25; and the selected video program which is reproduced from storage medium 40 is decrypted by decipherer 25, decoded by decoder 26, and supplied for display to video display 105.

If the retrieved access-control signal is not the NO REPRO signal, as represented by a negative answer to inquiry S81, inquiry S82 determines whether the access-control signal is the REPRO N TIMES signal. If so, processing proceeds with step S94. Otherwise, processing proceeds to inquiry S83. In step S94, access controller 28A decrements N by one, debiting the single reproduction which will immediately follow. Further, the REPRO N-1 TIMES signal is stored in access condition memory 29, replacing the access-control signal previously stored there, and processing proceeds to step S97 to reproduce and decrypt the video signal, described above.

If the retrieved access-control signal is not the REPRO N TIMES signal, inquiry S83 is made to determine if the access-control signal is the REPRO UNTIL DATE Y signal. If so, processing proceeds to inquiry S87. Otherwise, processing proceeds to inquiry S84. Inquiry S87 compares the date signal supplied by clock 27, indicating the current date, with date Y. If the current date is prior to date Y, then processing proceeds to step S97, described above. Otherwise, processing proceeds to step S90, whereat access controller 28A determines that the applicable condition has not been satisfied and therefore no video signal reproduction is authorized. The access controller thereafter terminates the connection with broadcasting station 101.

If the retrieved access-control signal is neither the NO REPRO nor the REPRO N TIMES nor the REPRO UNTIL DATE Y signal, inquiry S84 determines if the access-control

signal is the REPRO OK signal. If it is, processing proceeds with step S97, described above. Otherwise, processing advances to inquiry S85 whereat access controller 28A determines if the access-control signal is the FULLACCESS signal. If so, processing proceeds with step S96. Otherwise, processing proceeds with step S92.

In step S92, access controller 28A determines that it has failed to recognize the particular access-control signal stored in condition access memory 29, if any. Lacking a recognizable access-control signal, no video signal reproduction is authorized. Access controller 28A terminates the connection with broadcasting station 101. It should be appreciated that step S92 can be replaced with additional access-control signal definitions to provide further processing and access-control signal permutations.

In step S96, access controller 28A disables decipherer 25, and recording/reproducing section 23A reproduces the selected video program from storage medium 40. The reproduced video program passes through decipherer 25 for decoding by decoder 26, and is supplied to video display 105 for display.

If the retrieved access-control signal is the NO REPRO signal and payment of the full purchase price is not made, inquiry S88 is answered in the negative and the process advances to inquiry S89, which queries the user to determine if the fee for N viewings of the video program will be paid. If the fee for N viewings of the video program is paid, then broadcasting station 101 transmits the REPRO N TIMES signal via communication link 106 and modem 31 to access controller 28A, and processing proceeds with step S94, described above. Otherwise, processing proceeds to inquiry S91 which queries the user to determine if the fee for rental of the video program until date Y will be paid. If the fee for such a rental is paid, then processing proceeds with step S95. Otherwise, processing proceeds with step S90, described above.

In step S95, broadcasting station 101 transmits the REPRO UNTIL DATE Y signal via communication link 106 and modem 31 to access controller 28A which stores the REPRO UNTIL DATE Y signal in access condition memory 29, replacing the NO REPRO signal, and processing proceeds to step S97, described above.

Those of ordinary skill in the art will readily appreciate the modifications to be made to the flow diagrams of FIGS. 6 and 7 to control the operation of the controlled-access broadcast video signal recording systems shown in FIGS. 3, 4 and 5. Hence, in the interest of brevity, further description of such modified flow diagrams is not made.

Although illustrative embodiments of the present invention and modifications thereof have been described in detail herein, it is to be understood that this invention is not limited to these precise embodiments and modifications, and that other modifications and variations may be effected therein by one skilled in the art without departing from the scope and spirit of the invention as defined by the appended claims. For example, it is contemplated that a broadcast video program can be processed by an apparatus according to the present invention for display to a user without a preceding or simultaneous recording of the video program.

What is claimed is:

1. Apparatus for receiving, recording, and reproducing data signals, comprising:

receiving means for receiving said data signals and an access-control signal generated by a remote provider which grants users rights to reproduce said data signals;

processing means, coupled to said receiving means, for processing said data signals to produce processed data signals;

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control means for controlling said processing means in response to said access-control signal;

storage means for storing said processed data signals and for storing said access-control signal;

means for reproducing said stored processed data signals to produce reproduced data signals and for retrieving said stored access-control signal; and

reprocessing means coupled to said control means for reprocessing said reproduced data signals in response to said retrieved access-control signal.

2. Apparatus according to claim 1 wherein said data signals are digital video data signals.

3. Apparatus according to claim 1 wherein said receiving means receives said data signals and said access-control signal from a broadcasting station.

4. Apparatus according to claim 1 wherein said receiving means further comprises a tuner for receiving broadcast signals.

5. Apparatus according to claim 4 wherein said receiving means further comprises a modem for receiving said access-control signal.

6. Apparatus according to claim 1 wherein said receiving means further comprises a modem for receiving said access-control signal.

7. Apparatus according to claim 1 wherein said receiving means further comprises a user interface for receiving said access-control signal from a user.

8. Apparatus according to claim 1 wherein said processing means comprises a descrambler.

9. Apparatus according to claim 1 wherein said processing means comprises a descrambler and an encipherer and wherein said reprocessing means comprises a decipherer.

10. Apparatus according to claim 1 wherein said processing means comprises an encipherer and wherein said reprocessing means comprises a decipherer.

11. Apparatus according to claim 1 wherein said processed data signals are stored on a record medium and said access-control signal is stored in a separate storage medium.

12. Apparatus according to claim 11 wherein said record medium is a video tape.

13. Apparatus according to claim 11 wherein said separate storage medium is an integrated circuit memory.

14. Apparatus according to claim 1 wherein said processed data signals and said access-control signal both are stored on a common record medium.

15. Apparatus according to claim 1 further comprising a clock, coupled to said receiving means and to said control means, for supplying a clock signal to said control means; wherein said data signals include a clock reference signal; and

wherein said clock signal is synchronized with said clock reference signal.

16. Apparatus according to claim 1 further comprising a decoder, coupled to said reprocessing means, for decoding said reprocessed data signals.

17. Apparatus for receiving and recording data signals, comprising:

receiving means for receiving said data signals and an access-control signal generated by a remote provider which grants users rights to reproduce said data signals;

processing means, coupled to said receiving means, for processing said data signals to produce processed data signals;

control means for controlling said processing means in response to said access-control signal; and

storage means for storing said processed data signals and said access-control signal.

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18. Apparatus according to claim 17 wherein said processing means comprises a descrambler.

19. Apparatus according to claim 18 wherein said processing means further comprises an encipherer.

20. Apparatus according to claim 17 wherein said processing means comprises an encipherer.

21. Apparatus according to claim 17 wherein said storage means comprises a storage cassette.

22. Apparatus according to claim 21 wherein said storage cassette contains a record medium on which said processed data signals are recorded and an integrated circuit memory in which said access-control signal is stored.

23. Apparatus for reproducing processed data signals, comprising:

means for reproducing stored processed data signals to produce reproduced data signals and for retrieving a stored access-control signal generated by a remote provider which grants users rights to reproduce said data signals;

reprocessing means for reprocessing said reproduced data signals to produce reprocessed data signals; and control means for controlling said reprocessing means in response to said retrieved access-control signal.

24. Apparatus according to claim 23 wherein said reprocessing means comprises a descrambler.

25. Apparatus according to claim 23 wherein said reprocessing means comprises a decipherer.

26. Apparatus according to claim 23 wherein said processed data signals and said access-control signals are stored in a storage cassette.

27. A method for transferring from a broadcaster to a receiver a limited reproduction right in data, comprising the steps of:

transmitting from said broadcaster to said receiver an access-control signal generated by a remote provider and said data, said access-control signal indicating said limited reproduction right;

receiving, at said receiver, said access-control signal and said data;

processing, at said receiver, said data in response to said access-control signal to produce processed data;

storing, at said receiver, said processed data and said access-control signal;

retrieving, at said receiver, said stored access-control signal;

reproducing, at said receiver, said stored processed data to produce reproduced data; and

reprocessing, at said receiver, said reproduced data in response to said retrieved access-control signal.

28. The method, according to claim 27, wherein said limited reproduction right is the right to reproduce said data N times.

29. The method, according to claim 27, wherein said limited reproduction right is the right to reproduce said data until date Y.

30. The method, according to claim 27, wherein said limited reproduction right is the right to reproduce said data until time T.

31. The method, according to claim 27, wherein said data is transmitted in scrambled form and said step of processing said data comprises descrambling said data.

32. The method, according to claim 31, wherein said step of processing said data further comprises enciphering said data; and

wherein said step of reprocessing said reproduced data comprises deciphering said reproduced data.

33. The method, according to claim 27, wherein said step of processing said data comprises enciphering said data; and wherein said step of reprocessing said reproduced data comprises deciphering said reproduced data.

34. The method, according to claim 27, wherein said data is transmitted and stored in scrambled form, and said step of reprocessing said reproduced data comprises descrambling said reproduced data.

35. The method, according to claim 27, wherein said processed data and said access-control signal are stored on a storage cassette.

36. A method for transferring from a broadcaster to a receiver a limited reproduction right in prerecorded data, comprising the steps of:

transmitting from said broadcaster to said receiver an access-control signal generated by a remote provider, said access-control signal indicating said limited reproduction right;

receiving, at said receiver, said access-control signal;

reproducing, at said receiver, said prerecorded data; and processing, at said receiver, said reproduced data in response to said access-control signal.

37. The method, according to claim 36, wherein said step of processing said reproduced data comprises deciphering said reproduced data.

38. The method, according to claim 36, wherein said step of processing said reproduced data comprises descrambling said reproduced data.

39. A method for reproducing prerecorded data comprising the steps of:

reproducing an access-control signal generated by a remote provider which grants users rights to reproduce said data signals from a first storage medium;

reproducing processed data from a second storage medium in response to said access-control signal to produce reproduced data; and

reprocessing said reproduced data in response to said access-control signal.

40. A method for erasing prerecorded data stored on a record medium in response to an access-control signal stored in a separate memory, comprising the steps of:

retrieving said access-control signal from said separate memory;

determining that said access-control signal is an ERASE signal; and

erasing data stored on said record medium in response to said ERASE signal.

41. *An apparatus for receiving one or more encrypted data signals to be recorded on a recording medium, comprising:*

a receiver for receiving said one or more encrypted data signals;

a decryptor, coupled to said receiver, for decrypting said one or more received encrypted data signals; and

an encryptor coupled to said decryptor for re-encrypting said one or more decrypted data signals to produce re-encrypted data signals that are reproducible based upon a received access control signal generated by a remote provider which grants a user rights to produce said data signals.

42. *The apparatus of claim 41, further comprising:*

a reproducing device for reproducing said one, or more re-encrypted data signals; and

a second decryptor for decrypting said reproduced one or more re-encrypted data signals.

43. *The apparatus of claim 41, wherein said one or more re-encrypted data signals are recorded on said recording medium.*

44. *The apparatus of claim 43, further comprising:*

a reproducing device for reproducing said one or more re-encrypted, data signals from said recording medium;

a second decryptor for decrypting said reproduced one or more re-encrypted data signals; and

a playback device for playing back said decrypted one or more re-encrypted data signals.

45. *The apparatus of claim 44, wherein said reproducing device reproduces said one or more re-encrypted data signals from said recording medium in accordance with an instruction received by said apparatus for receiving encrypted data signals.*

46. *A method for receiving one or more encrypted data signals to be recorded on a recording medium, comprising the steps of:*

receiving said one or more encrypted data signals;

decrypting said one or more received encrypted data signals; and

re-encrypting said one or more decrypted data signals to produce re-encrypted data signals that are re-producible based upon a received access control signal generated by a remote provider which grants a user rights to produce said data signals.

47. *The method of claim 46, further comprising the steps of:*

reproducing said one or more re-encrypted data signals; and

decrypting said reproduced one or more re-encrypted data signals.

48. *The method of claim 46, further comprising the step of recording said one or more re-encrypted data on said recording medium.*

49. *The method of claim 48, further comprising the steps of:*

reproducing said one or more re-encrypted data signals from said recording medium;

decrypting said reproduced one or more re-encrypted data signals; and

playing back said decrypted one or more re-encrypted data signals.

50. *The method of claim 49, wherein said re-encrypted data is reproduced from said recording medium upon receipt of an instruction directing such reproducing.*

51. *A method for controlling reproduction of data signals stored on a recording medium, comprising the steps of:*

retrieving an access control signal generated by a remote provider which grants a user rights to reproduce said data signals and which represents the number of times said data signals are permitted to be reproduced;

reproducing said data signals from said recording medium, wherein said data signals are stored in an encrypted form;

decrypting said reproduced data signals; and

controlling the reproduction and decryption of said data signals in response to said retrieved access control signal.

52. *The method of claim 51, wherein said data signals are compressed signals and further comprising the step of decoding the decrypted data signals.*

53. *The method of claim 51, wherein the access control signal is retrieved over a communication channel.*

54. The method of claim 51, wherein the access control signal is retrieved by reproducing said access control signal from said recording medium.

55. The method of claim 51, wherein the access control signal is rewritable.

56. A method for controlling reproduction of data signals stored on a recording medium, comprising the steps of:

retrieving an access control signal generated by a remote provider which grants a user rights to reproduce said data signals and which represents a temporal limit on which said data signals are permitted to be reproduced;

reproducing said data signals from said recording medium, wherein said data signals are stored in an encrypted form;

decrypting said reproduced data signals; and

controlling the reproduction and decryption of said data signals in response to said retrieved access control signal.

57. The method of claim 56, wherein said data signals include clock reference data for adjusting the time of a clock used in reproducing said data signals.

58. The method of claim 56, wherein said data signals are compressed signals, and further comprising the step of decoding the decrypted data signals.

59. The method of claim 56, wherein the access control signal is retrieved over a communication channel.

60. The method of claim 56, wherein the access control signal is retrieved by reproducing said access control signal from said recording medium.

61. A method for transferring and receiving data signals, comprising the steps of:

transferring said data signals to a receiver;

transferring an access control signal generated by a remote provider to said receiver, the access control signal granting a user rights to reproduce said data signals at the receiver and representing the number of times said data signals are permitted to be reproduced;

receiving said transferred data signals at the receiver;

storing said received data signals in an encrypted form;

receiving said transferred access control signal at the receiver; and

storing said received access control signal.

62. The method of claim 61, wherein said data signals and said access control signal are transferred to said receiver from the same remote provider.

63. The method of claim 61, wherein said data signals and said access control signal are transferred to said receiver over different communication paths.

64. The method of claim 61, wherein said data signals and said access control signal are transferred to said receiver over the same communication path.

65. A method, for transferring and receiving data signals, comprising the steps of:

transferring said data signals to a receiver;

transferring an access control signal generated by a remote provider to said receiver, the access control signal granting a user rights to reproduce said data signals at the receiver and representing a temporal limit on which said data signals are permitted to be reproduced;

receiving said transferred data signals at the receiver;

storing said received data signals in an encrypted form;

receiving said transferred access control signal at the receiver; and

storing said received access control signal.

66. The method of claim 65, wherein said data signals and said access control signal are transferred to said receiver from the same remote provider.

67. The method of claim 65, wherein said data signals and said access control signal are transferred to said receiver over different communication paths.

68. The method of claim 65, wherein said data signals and said access control signal are transferred to said receiver over the same communication path.

69. A method for controlling reproduction of data signals stored on a recording medium, comprising the steps of:

retrieving a first access control signal generated by a remote provider and stored on said recording medium together with said data signals, said first access control signal granting a user rights to reproduce the data signals from the recording medium;

rewriting said first access control signal to produce a second access control signal; and

reproducing said data signals from said recording medium.

70. The method of claim 69, wherein at least one of said access control signals represents the number of times said data signals are permitted to be reproduced.

71. A method for transferring data signals, comprising the steps of:

receiving from a receiver a request for a desired data signal;

receiving from said receiver a request for limited rights to use said requested data signal at the receiver;

transferring said requested data signal to said receiver; and

transferring to said receiver an access control signal that is generated as a function of said requested limited rights.

72. The method of claim 71, wherein said access control signal represents the number of times said data signals are permitted to be used.

73. The method of claim 71, wherein said access control signal represents a temporal limit on which said data signals are permitted to be used.

74. A method for receiving data signals comprising the steps of:

requesting a desired data signal;

requesting limited rights to use said requested data signal;

receiving said requested data signal;

receiving an access control signal that is generated by a remote provider as a function of said requested limited rights;

using said received data signal;

controlling the use of said data signal in response to said received access control signal; and

storing said received data signal in an encrypted form.

75. The method of claim 74, wherein said access control signal represents the number of times said data signals are permitted to be used.

76. The method of claim 74, wherein said access control signal represents a temporal limit on which said data signals are permitted to be used.

77. The method of claim 74, wherein said access control signal defines one or more of the number of times said data

signals are permitted to be used and a temporal limit on which said data signals are permitted to be used.

78. The method of claim 74, wherein said step of using said received data signal comprises decrypting said received data signal.

79. A method for controlling the reproduction of data signals, comprising the steps of:

storing data signals received via a signal transmission medium;

storing an access control signal received via said signal transmission medium, said access control signal being generated by a remote provider to grant a user rights to reproduce said stored data signals, and said access control signal defining one or more of the number of times said stored data signals are permitted to be reproduced and a temporal limit on which said stored data signals are permitted to be reproduced;

checking the stored access control signal prior to reproducing the stored data signals to determine if said data signals are permitted to be reproduced;

reproducing said stored data signals dependent upon said access control signal; and

outputting to a monitor, in recognizable form, said reproduced data signals.

80. A method of controlling the use of data signals, comprising the steps of:

receiving and storing data signals;

receiving and storing a first access control signal generated by a remote provider to grant a user rights to use said stored data signals;

checking the stored first access control signal prior to decrypting the stored data signals to determine if said data signals are permitted to be used;

receiving and storing a second access control signal generated by a remote provider to grant a user rights to use said stored data signals if said first access control signal does not grant said user rights to use said stored data signals, said second access control signal defining one or more of the number of times said stored data signals are permitted to be used and a temporal limit on which said stored data signals are permitted to be used;

decrypting said stored data signals; and

outputting said decrypted data signals.

81. A method of controlling the reproduction of data signals, comprising the steps of:

receiving and storing data signals in an encrypted form;

receiving a request to reproduce said stored data signals; determining, in response to said received request, whether said stored data signals are permitted to be reproduced;

connecting to a remote location to receive an access control signal generated by a remote provider to grant a user rights to reproduce said stored data signals if said request does not permit said stored data signals to be reproduced;

decrypting said stored data signals; and

reproducing said decrypted data signals.

82. A method of controlling access to data signals, comprising the steps of:

receiving a request from a user to use data signals;

determining whether said user is a subscriber to use said data signals;

determining if said request defines one or more of the number of times said data signals are permitted to be used and a temporal limit on which said data signals are permitted to be used; and

transmitting to said user an access control signal determined by said request, if said user is determined to be a subscriber, said access control signal being generated by a remote provider to grant said user rights to use said data signals.

83. The method of claim 82 wherein said step of transmitting said access control signal to said user includes the step of satisfying terms of payment for said use of said data signals.

84. The method of claim 83 wherein said terms of payment are prepayment by said user for the use of said data signals.

85. The method of claim 83 wherein said terms of payment are immediate payment by said user for the use of said data signals.

86. A method of erasing stored data signals, comprising the steps of:

storing an erase control signal which establishes a time on which said stored data signals are to be erased;

receiving an access control signal generated by a remote provider to grant a user rights to use said stored data signals; and

erasing said stored data signals at the time established by said erase control signal upon satisfying conditions of use of said stored data signals determined by said access control signal.

87. A method of controlling the reproduction of data signals, comprising the steps of:

receiving and storing data signals;

receiving and storing a first access control signal generated by a remote provider to grant a user rights to reproduce a selected portion of said stored data signals;

permitting reproduction of only said portion of said stored data signals, consistent with said first access control signal;

transmitting a request to reproduce at least the remainder of said stored data signals;

receiving a second access control signal generated by a remote provider in response to said request to grant a user rights to reproduce said stored data signals, said second access control signal defining one or more of the number of times said stored data signals are permitted to be reproduced and a temporal limit on which said stored data signals are permitted to be reproduced; and

reproducing said stored data signals consistent with said second access control signal.

88. A method for controlling access to data signals stored in an encrypted form, comprising the steps of:

receiving via a signal transmission medium a first access control signal;

receiving, subsequent to the reception of said first access control signal, a second access control signal, said first and second access control signals being generated by a remote provider to grant a user rights to access said stored data signals, and said second access control signal representing a temporal limit on which said stored data signals are permitted to be accessed;

replacing said first access control signal with said subsequently received second access control signal prior to using said stored data signals; and

decrypting said stored data signals if said second access control signal indicates that said stored data signals may be used.

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CERTIFICATE OF CORRECTION

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APPLICATION NO. : 09/641611
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INVENTOR(S) : Junichi Tsukamoto et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 1, line 8 insert the following:

--Notice: More than one reissue application has been filed for the reissue of patent 5796828. The reissue applications are 10/320,264 and 12/123,786.--

Signed and Sealed this

Sixteenth Day of March, 2010



David J. Kappos
Director of the United States Patent and Trademark Office