

Methods for Governing or Influencing the Operation of
Equipment that is External to Conventional
Television and Radio Sets by Passing Instruction
and Information Signals that are Embedded in
Television and Radio Programming Transmissions to
Such External Equipment

Signal processor apparatus have the ability to identify instruction and information signals in one or more inputted television and radio programming transmissions, identify and discriminate among one or more pieces of external equipment to which such signals are addressed, and transfer such signals to such equipment as directed. This permits many valuable techniques for facilitating the operation of such external equipment.

Figure 6 illustrates one possible configuration of equipment in a home or office or other television and/or radio receiving site. Consideration of Figure 6 is facilitated by consideration, first, of examples of the types of co-ordination techniques that the signal apparatus and methods described here can permit.

Governing the Home or Office Environment

Figure 6A illustrates a method for governing a home or office environment. One or more channels of television programming transmissions input to signal processor, 200, and cable converter box, 201, may contain signals intended for microcomputer, 205, which signals convey information on

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local weather conditions. Such signals might include current outside temperature and barometric readings. They may include forecast data. Signal processor, 200, is always operating and monitors all incoming channels. It can convey such signals to microcomputer, 205, whenever it receives them. TV signal decoder, 203, can also identify such signals but only in the one TV channel transferred by box, 201, to TV set, 202, and then only when TV set, 202, is on and operating. Decoder, 203, transfers all received signals to processor or monitor, 204, which identifies the signals as addressed to microcomputer, 205, and transfers them to microcomputer, 205. Microcomputer, 205, uses such received signals, in a predetermined fashion, to govern the operation of furnace, 206, air conditioning system, 207, and window opening and closing means, 208.

Co-ordinating a Stereo Simulcast

Figure 6B illustrates a method for automatic co-ordination of a multimedia presentation in one place, in this case a stereo simulcast. A person decides to watch a program on television that is stereo simulcast on a local radio station, too. The person turns on television, 202, and tunes to the proper channel. TV signal decoder, 203, detects signals in the programming transmission on the channel which signals it transfers to monitor or processor, 204. Monitor or processor, 204, determines that certain signals are addressed to switch, 202, and transfers these signals to switch, 202. These signals instruct switch, 202, to turn power on to radio, 209, and its associated equipment, including a conventional digital tuner, 211. Monitor or processor, 204, also identifies signals addressed to tuner, 213, which it transfers accordingly. These signals instruct

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tuner, 213, to tune radio, 209, to the proper frequency for the simulcast. Automatically, by turning TV set, 202, to the channel with a stereo simulcast, the person has activated the stereo simulcast.

Figure 6B also shows signal processor, 200, monitoring for a data gathering and ratings service. TV signal decoder, 203, and radio signal decoder, 211, also identify certain signals that monitors or processors, 204 and 210 respectively, determine to identify the programs, etc. on the channels to which TV set, 202, and radio, 209, are tuned. The processors, 204 and 210, transfer this information to signal processor, 200, for recording and subsequent transmission to a remote data collection site. Simultaneously, processor, 200, is also monitoring sequentially all other broadcast transmissions in the locality to gather further data on programming availability to record and transmit to a remote site.

Methods for Receiving Selected Information and/or Programming

Figure 6C illustrates methods for monitoring multiple programming channels and selecting programming and information in a predetermined fashion. In this example, microprocessor, 205, is programmed to hold a portfolio of stocks and wishes to receive news about these particular stocks and about the industries they are in. Several separate news services transmit news on different channels carried on the multi-channel cable transmission to converter boxes, 222 and 201, and to signal processor, 200. The news services precede each news transmission with a unique signal that uniquely identifies the company or companies to which the news item refers and/or the industries. In a predetermined fashion, microcomputer, 205, instructs signal processor, 200, to

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hold examples of the sought for unique signals in its buffer/comparator, 8, and compare them with all incoming signals. Signal processor, 200, scans sequentially all channels. When it identifies a signal of interest, it relays that information and the channel identifier, in this illustration, to microcomputer, 205. In a predetermined fashion, either microcomputer, 205, or signal processor, 200, instructs tuner, 223, to set cable converter box, 222, to the proper channel, and microcomputer, 200, may record the information in memory or transfer it to printer, 221, for printing.

In the same fashion, microcomputer, 205, may also instruct signal processor, 200, to monitor single or multiple television channels and/or radio channels for programming of interest in addition to or instead of other transmission channels.

In another example, microcomputer, 205 may be preinformed that a certain television program, hypothetically "Wall Street Week," should be televised on TV set, 202, when it is cablecast. Microcomputer, 205, is preinformed of the time of cablecasting. When that time comes, microcomputer, 205, receives no program identification signals whatever from TV signal decoder, 203, which indicates that the set, 202, is not on. Microcomputer, 205, instructs signal processor, 200, to pass all program and channel identifiers on all programming being cablecast on the multi-channel system. Signal processor, 200, receives this instruction from microcomputer, 205, at its processor or monitor, 12, which reacts, in a predetermined fashion by also passing externally to microcomputer, 205, all signals that it passes to buffer/comparator, 14. Analyzing these identifier signals in a predetermined fashion, microcomputer, 205, determines that "Wall Street Week" is being televised on channel X. Then,

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in a predetermined fashion, microcomputer, 205, may instruct synet, 214, to switch box, 201, to channel X and may instruct control system, 220, to turn video recorder, 217, on and record "Wall Street Week," and also microcomputer, 205, may instruct switch, 216, to turn TV set, 202, on and tuner, 215, to tune appropriately to "Wall Street Week."

Method for Co-ordinating Multimedia Presentations in Time

Figure 6C can also illustrate how programming delivered at different times to one place can be co-ordinated to give a multimedia presentation at one time in one place.

Each weekday, microcomputer, 205, receives, about 4:30 PM, by means of a digital information channel, all closing stock prices applicable that day. It may receive these directly or it may automatically query a data service for them in a predetermined fashion. It records those prices that relate to the stocks in its stored portfolio.

Microcomputer, 205, is preprogrammed to respond in a predetermined fashion to instruction signals embedded in the "Wall Street Week" programming transmission. When the "Wall Street Week" transmission begins at 8:30 PM on a Friday evening, several instruction signals are identified by decoder, 203, and transferred to microcomputer, 205. These signals instruct microcomputer, 205, to generate several graphic video overlays, which microcomputer, 205, has the means to generate and transmit and TV set, 202, has the means to receive and display, and to transmit these overlays to TV set, 202, upon command. Subsequently in the program, the host says, "Here is what the Dow Jones Industrials did in the past week," and a studio generated graphic is pictured. The host then says, "Here is what the broader NASDAQ index

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did in the week past," and a studio generated graphic overlay is displayed on top of the first graphic. Then the host says, "And here is what your portfolio did." At this point, an instruction signal is generated in the television studio originating the programing and is transmitted in the programing transmission. This signal is identified by decoder, 203, and transferred via processor, 204, to microcomputer, 205. This signal instructs microcomputer, 205, to transmit the first overlay to TV set, 202, for as long as it receives the same instruction signal from processor, 204. The viewer then sees a microcomputer generated graphic of his own stocks' performance overlay the studio generated graphic. When the two studio generated graphics are no longer displayed, the studio stops sending the instruction signal, and the microcomputer, 205, ceases transmitting its own graphic to TV set, 202, and prepares to send the next locally generated graphic overlay upon instruction from the originating studio.

This is only one of many examples of the co-ordination at one time and in one place of programing and information material delivered at different times.

Co-ordinating Print and Video

Figure 6D illustrates one method for co-ordinating the presentation of information through the use of print with video. Figure 6B also illustrates possible uses of a decrypter and a local input.

Suppose a viewer watches a television program on cooking techniques that is received on TV set, 202, via box, 201. Julia Childs's "The French Chef" is one such program. Halfway through the program, the host says, "If you are interested in cooking what we are preparing here and want a

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printed copy of the recipe for a charge of only 10 cents, press 567 on your Widget Signal Generator and Local Input." The viewer then presses button 567 on local input, 225, which signal is conveyed to the buffer/comparator, 8 (referring to Fig. 1), of signal processor, 200, to hold and process further in a predetermined fashion. Five minutes later, a signal is identified in the incoming programming on TV set, 202, by decoder, 203, which is also transferred by processor, 204, to buffer/comparator, 8, of signal processor, 200. This signal instructs buffer/comparator, 8, that, if 567 has been received from signal generator, 225, signal processor, 200, should, in a predetermined fashion, instruct tuner, 223, to tune cable converter box, 222, to the appropriate channel to receive the recipe in encoded digital form and instruct control means, 226, to activate printer, 221. The signal transmission also passes a signal word to signal processor, 200, which, in a predetermined fashion, signal processor, 200, decrypts and transfers to decrypter, 224, to serve as the code upon which decrypter, 224, will decrypt the incoming encrypted recipe. Then, as part of the predetermined operation, signal processor, 200, conveys to its data recorder, 16, information that the 567 order was placed by the viewer and all necessary equipment was enabled. When the transmission of the recipe is received, box 222, transfers the transmission to decrypter, 224, for decryption and thence to printer, 221, for printing. Other signal decoder, 227, identifies a signal in the transmission received by printer, 221, which it passes via processor, 228, and buffer/comparator, 14, of signal processor, 200, to data recorder, 16. This signal indicates that the recipe, itself, has been received. Subsequently, when signal processor, 200, transfers the data in its data recorder, 16, via telephone

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to a remote site, that site can determine for billing purposes that the recipe was, first, ordered and, second, delivered.

(An alternate method for transmitting the recipe to printer, 221, would be for the recipe, itself, to be located in encoded digital form in the programming transmission received by TV set, 202. In this case, decoder, 203, would identify the signals conveying the recipe and transfer them via processor, 204, to signal processor, 200, which would decrypt them, itself, and transfer them, via means which in this case it would have, to printer, 221.)

Method for Using Signaling and Decryption Techniques in the Distribution of Copyrighted Materials

Figure 6E illustrates a signaling and decryption technique which could serve to facilitate the electronic distribution of copyrighted materials such as books and movies by tending to discourage piracy and the unauthorized retransmission of copies, whether they be properly acquired or pirated.

Figure 6E could be any home or commercial establishment but is described here as a book store. Using conventional laser videodisc equipment and techniques, well known in the art, a publisher has put his full line of books on laser discs in encrypted form and distributed one copy of each disc to each of his authorized book store retail outlets. He has also distributed to each a conventional computer floppy disk for use on conventional microcomputer, 205, that can operate conventional laser videodisc system, 232, in a predetermined fashion to locate and transmit individual titles in his line.

A customer comes into the book store and asks to buy a

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title, hypothetically, How to Grow Grass. The salesman asks the customer for suitable identification, types into micro-computer, 205, the customer's name and address and that he wishes to purchase How to Grow Grass. Microcomputer, 205, may check to determine that the customer has no record as a pirate then transfers his name and address to buffer/comparator, 8 (referring to Fig.1), of signal processor, 200, and instructs laser videodisc system, 232, to transmit its encrypted copy of How to Grow Grass to printer or other means, 221, via decryptors, 224 and 231. Laser system, 232, transmits one copy of the encrypted title to decryptor, 224, and one to signal processor, 200, for processing and evaluation.

In the encrypted title, signal processor, 200, identifies one or more signal words. If signal processor, 200, has the customer's name and address and the bookstore is a retail outlet in good standing, signal processor, 200, decrypts the signal word or words and transfers them to decryptor, 224, to serve as the code for the first stage of decryption.

Decryptor, 224, then decrypts a part of the encrypted transmission and passes the partly decrypted transmission to signal stripper, 229, and signal generator, 230. In the decrypted portion of the partially decrypted transmission, signal processor, 200, identifies a second signal word or set of words which it decrypts in a predetermined fashion and passes to decryptor, 231, to serve as the code basis for the second stage of decryption. Signal processor, 200, also may instruct signal stripper, 229, to remove this second signal word or words. Signal processor, 200, also passes the customer's name and address to signal generator, 230, which generates a signal embedding the customer's name and address in the programing in a suitable place or places in a suitable fashion. Signal processor, 200, may also transmit

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the customer's name and address to printer or other means, 221, for actually printing of the customer's name and address in the text.) The transmission then passes through decryptor, 231, which completes the decryption process and passes the decrypted programming transmission to printer or other means, 221, and also to signal processor, 200. Signal processor, 200, receives and analyzes the signal content of the programming output of decrypter, 231 to ensure that stripper, 229, and generator, 230, have functioned properly. If they have not, signal processor, 200, shuts down the decryption of the title and prevents its delivery to the customer.

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We claim:

1. In a signal processor, a carrier transmission receiving means; a means for demodulating said carrier transmission to detect an information transmission thereon; a detector means for determining the presence or absence of an embedded signal in the information transmission within a pre-determined time interval and for detecting said signal; a recorder means for receiving and recording the presence or absence of said detected signal; a control means for instructing said receiving means to receive the appropriate carrier transmission within said predetermined time interval; and a control means for instructing said recorder to direct information recorded thereon to a remote site.

2. In a signal processor, a carrier transmission receiving means; a means for demodulating said carrier transmission to detect an information transmission thereon; a detector means for determining the presence or absence of an embedded signal in the information transmission within a pre-determined time interval and for detecting said signal; a recorder means for receiving and recording the presence or absence of said detected signal; a control means for instructing said detector means to detect the presence or absence of said embedded signal within said predetermined time interval; and a control means for instructing said recorder to direct information recorded thereon to a remote site.

3. In a signal processor, at least one carrier transmission receiving means; at least one means for demodulating said carrier transmission to detect an information transmission thereon; at least one detector means for determining the presence or absence of an embedded signal in the information transmission within a pre-determined time interval and for

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detecting said signal; a buffer means for organizing said detected signals with detected signals from other detector means into a data stream; a recorder means for receiving and recording said stream; a control means for instructing said receiving means to receive the appropriate carrier transmission within said predetermined time interval; and a control means for instructing said recorder to direct information recorded thereon to a remote site.

4. In a signal processor, at least one carrier transmission receiving means; at least one means for demodulating said carrier transmission to detect an information transmission thereon; at least one detector means for determining the presence or absence of an embedded signal in the information transmission within a pre-determined time interval and for detecting said signal; a buffer means for organizing said detected signals with detected signals from other detector means into a data stream; a recorder means for receiving and recording said stream; a control means for instructing said detector means to detect the presence or absence of said embedded signal within said predetermined time interval; and a control means for instructing said recorder to direct information recorded thereon to a remote site.

5. A signal processor comprising a carrier transmission receiving means; a means for demodulating to detect an information transmission thereon; a detector means for identifying a signal embedded in the information transmission; a first control means for instructing said detector to identify and pass said embedded signal; and a second control means for receiving said embedded signal passed on instruction from said first control means and for conveying any instruction or information contained in said embedded signal.

6. The apparatus in claim 5 including means for receiving

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and detecting embedded signals on a plurality of carrier transmissions.

7. The apparatus in claim 5 wherein the embedded signal is encrypted and including a decrypter means for decrypting said signal.

8. A method of processing signals including:

- (a) the step of receiving a carrier transmission;
- (b) the step of demodulating said carrier transmission to detect an information transmission thereon;
- (c) the step of detecting and identifying an embedded signal on said information transmission;
- (d) the step of passing said embedded signal to a device to be controlled based on an instruction identified within said embedded signal; and
- (e) the step of controlling said device based on an instruction within said embedded signal.

9. A method of processing signals as claimed in claim 8 including the step of decrypting an encrypted embedded signal.

10. A method of processing signals as claimed in claim 8 including the step of assembling a disassembled signal unit.

11. A method of processing signals as claimed in claim 8 including the step of decrypting an encrypted information transmission.

12. A method of processing signals as claimed in claim 8 including the step of removing a portion or all of said detected and embedded signal.

13. A method of processing signals as claimed in claim 8 including the step of adding a second signal to the information transmission.

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Secret

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① ~~Single System~~

② ~~Need to coordinate computer~~
~~plan~~

Additionally, it is the object
of this invention to permit
simultaneous communication
~~and~~ of multi-systems
systems with ~~multi~~
many elements of ~~the~~
external equipment.

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So long as multi-media and multi-channel presentations

The objective of Federal policy is to encourage variety in communications, especially, variety in the communication of ideas.

Today, great potential exists for a ~~substantial~~^{significant} increase in the ~~scale of~~^{scope and} multi-media and multi-channel communication, ~~which is~~^{this increase is} desirable, because it will increase the variety and ~~richness of~~^{add substantially to the} presentations, ~~as regards both~~^{as regards both} ~~important to~~ entertainment and the communication of ideas and information.

This potential arises out of two independent trends in technology and communications. First, is

the ~~large~~^{widespread} ~~availability~~^{availability} and ownership of computers, most notably, especially microcomputers in the homes.

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2 The operation in circuit
where the encoded signal
is being cryptified and
~~is being cryptified~~
exists for a decryption
means for decrypting the
said signal.

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- 10 ^{an} The method of processing signals including:
- (a) the step of receiving a ^{carrier} ~~carrier~~ transmission;
 - (b) the step of demodulating said carrier transmission to detect an information transmission thereon;
 - (c) the step of detecting ^{and identifying} ~~an~~ ^{an} embedded signal in said information ~~signal~~ transmission;
 - (d) the ^{step} ~~process~~ of passing said embedded signal ~~to~~ ^{to} a device to be controlled based on ^{the} instructions identified within said embedded signal;
 - (e) the step of controlling said device based on ^{any} instructions within said embedded signal.

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5. A signal processor comprising a carrier transmission receiving means; a means for demodulating & to detect an information transmission ^{identifying} thereon; a detector means for ~~the detection~~ ^{a signal embedded in} ~~the information transmission~~ ^{the information transmission}; a first control means for instructing said detector to identify and pass said embedded signal; and a second control for receiving said embedded signal passed on instruction from said first control means and for conveying any instruction or information contained in said embedded signal.

6. The apparatus in claim 5 including means for receiving and detecting embedded signals on a plurality of carrier transmissions.

The apparatus in claim — wherein the embedded signal is encrypted and including a decrypter means for decrypting said signal

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1. In a signal processor, a carrier transmission receiving means; a means for demodulating said carrier transmission to detect an information transmission thereon; a ^{presence} detector means for determining the presence of an ^{embedded} ~~encoded~~ signal in the information transmission within a pre-determined time interval; a recorder means for receiving and recording the presence or absence of said ~~encoded~~ ^{detected} signal; a control means for instructing said receiving means to receive the appropriate carrier transmission within said predetermined time interval; and a control means for instructing said recorder to direct information recorded thereon to a remote site.

and for detecting said signal

3

2. → a control means for instructing said said detector means to detect the presence or absence of said ^{embedded} ~~encoded~~ ~~encoded~~ signal within said predetermined time interval;

3 a buffer means for organizing said ^{detected} ~~encoded~~ signals with ~~encoded~~ signals from other detector means into a data stream; a recorder means for receiving and recording said stream;

3 with 1

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4

4 with 2

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11 ^a The method of processing signals claimed in claim — including the step of decrypting an encrypted ~~the~~ embedded signal, and

12 the step of decrypting an encrypted information transmission.

13 A method of processing signals claimed in claim — including the step of removing ^{a portion} or all of the entire signal detected and identified embedded signal. ~~and the step of removing~~

14 ^a including of the step of adding ~~a signal~~ ^{an embedded} signal to the information transmission ~~signal~~.

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— The apparatus in claim 5
including
~~which includes~~ means for
~~receiving~~ receiving and
detecting ^{signals} embedded in a plurality
of carrier transmissions.

(6)

a control means for instructing
said receiving means to receive
~~the appropriate communication~~

the appropriate communication
within said predetermined time
and interval; and

(7)

a control means for instructing
said
~~the~~ detector means to
~~detect~~ detect the presence
or absence of the said
encoded signal within said
predetermined time and interval;

a control means for instructing
said recorder to detect
the information recorded
thereon to a remote site.

⑥ a control means for instructing
said receiving means as to receive
~~the appropriate communication~~
the appropriate communication
within said predetermined time
and interval; and

⑦ a control means for instructing
said ~~the~~ detector means to
~~detect~~ detect the presence
or absence of the said
encoded signal within said
predetermined time and interval;

a control means for instructing
said recorder to direct
the information recorded
thereon to a remote site.

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~~computer~~
~~computer~~
a buffer means means for
receiving signals and encoding
signals with and encoded
signals from other detector
means into a data stream;

-- -- said stream;

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2. To a signal processor, comprising:
~~at least one~~ ^{an} ~~transmission~~ ^{receiving} means;

~~a means for demodulating~~ ^{a means for demodulating}
~~which extracts the information~~ ^{which extracts the information}

~~as to detect at~~ ^{as to detect at} ~~the information~~ ^{the information}
~~transmission~~ ^{transmission}
~~thereon;~~ ^{thereon;}

~~at least one~~ ^a detector means for deter-
mining the ~~presence~~ ^{presence}

of an ~~encoding~~ ^{encoding} signal on
the information transmission;

~~with a predetermined~~
~~threshold;~~

~~a second means for~~
~~and sending the encoded~~
~~signals;~~

~~a display means~~

a recorder for receiving and ~~recording~~
recording the presence or absence
of such encoded signal;

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~~Received by the recipient;~~
~~control~~
A control means is instructing
the said device to ~~transmit~~ identify
and ~~transmit~~ the said encoded
signal; and
~~the~~
A control means for receiving
said ~~received~~ encoded signal
as a result of the instruction ~~from~~
said ~~the~~ said first control
means
and for ~~transmitting~~ ~~transmission~~
instruction ~~and~~ information ~~to~~
said ~~the~~ said ~~device~~ ~~transmission~~
contained in said encoded signal

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DECLARATION, POWER OF ATTORNEY AND PETITION

I, Kenneth James Reder, declare that I am a citizen of the United States residing in Stafford, Virginia, and that I have read the foregoing specification and claims and verily believe that I am the original, first, and sole inventor of the invention in

TAMPER-RESISTANT LOCK

described and claimed therein, that I do not know and do not believe the subject matter of this application was ever known or used before my invention or discovery thereof, or patented or described in any printed publication in any country before my invention or discovery thereof, or more than one year prior to the filing of this application, or in public use or on sale in the United States for more than one year prior to the filing of this application; and that said subject matter has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States on an application filed by me or my legal representative or ~~assignee more than twelve months before the filing of this~~ application, and that no application or patent on the said subject matter has been filed by me or my legal representatives or assigns in any country foreign to the United States.

And I hereby appoint Joseph A. Hill (Registration No. 17,130), Vito J. DiPietro (Registration No. 22,731), and Thomas J. Scott, Jr. (Registration No. 27,836), whose address is Department of Justice, Civil Division, Commercial Litigation Branch, Washington, D.C. 20530, my attorneys to prosecute this application and to transact all business in the Patent Office connected therewith.

Wherefore, I pray that Letters Patent be granted to me for the invention described and claimed in the foregoing specification and claims, and I hereby subscribe my name to the foregoing specification and claims, declaration, power of attorney and this petition.

The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Kenneth J. Reder
Kenneth James Reder

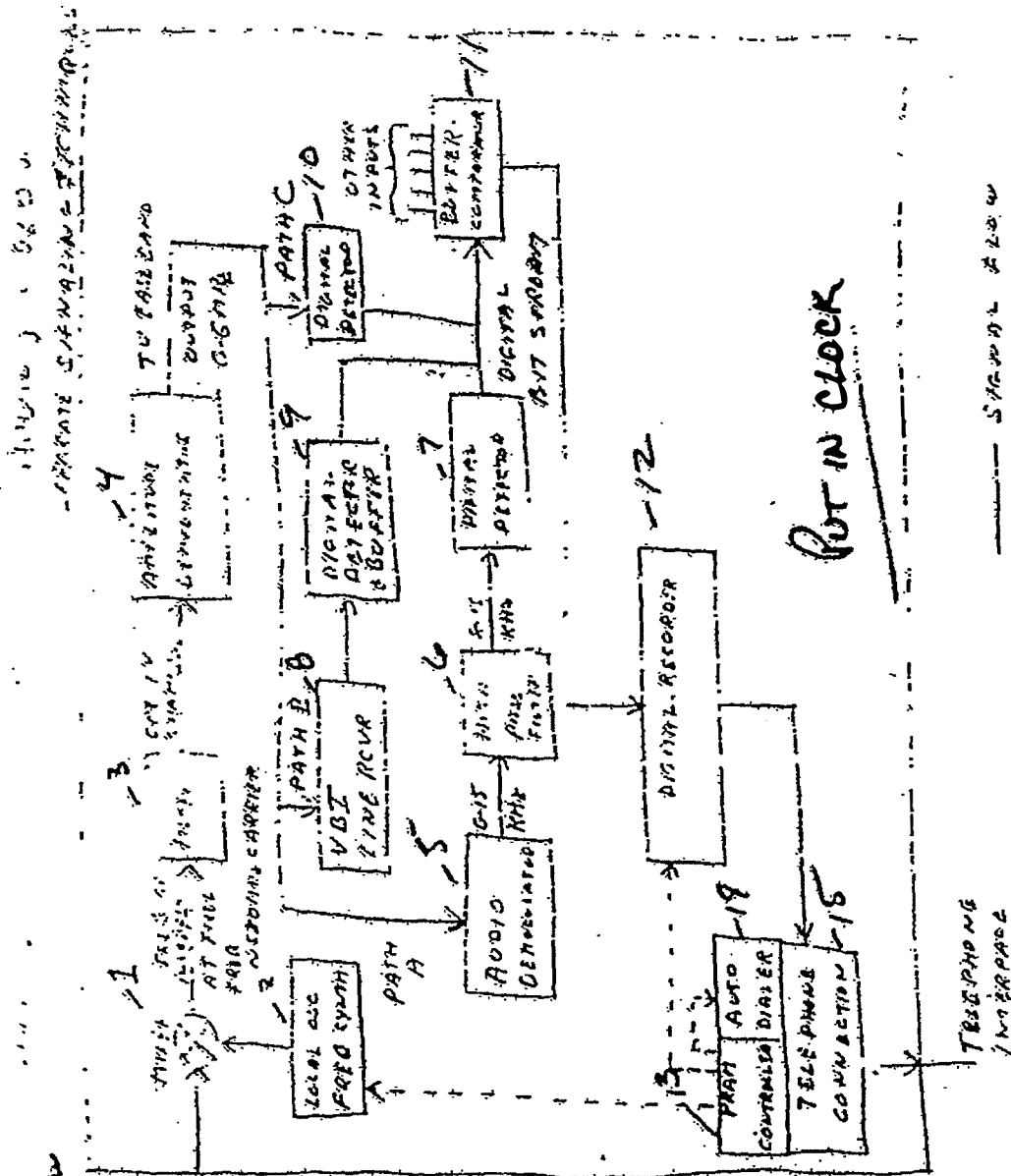
Date: 9/4/81

Address: 215 Oakridge Drive
Stafford, Virginia 22554

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FIG. 1



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FOR AUDIO SIGNALING
TELEPHONE PATH A
FOR VIDEO SIGNALING
TELEPHONE PATH B
FOR TELEPHONE SIGNALING
TELEPHONE PATH C

LIBRARY OF THE
U.S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C.



700.500.000
10.500.000.000

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Signal Collector Apparatus

Abstract

An apparatus for the collection and analysis of encoded information superimposed on or transmitted as a part of broadcast or cable programs. The signal collector which may be adapted to decipher coded transmissions from either over-the-air broadcasts or hard-wire transmissions selectively receives inputs from as many as a hundred channels. The transmissions are each sequentially decoded in separate receiver/decoders for each monitored channel. The decoded data is then transferred through a buffer to a data recorder. The data recorder is adapted to output its data to a remote site on the basis of a predetermined command. The recorded data is thus retransferred at specific intervals to data collection point where it may be analyzed.

Background Of The Invention

At the present time, vast amounts of programming are transmitted through various media throughout the United States. With the advent of so-called cable systems, the monitoring of program content of these transmissions by manual means is no longer practical. It is the purpose of the invention to provide a fully automatic means to monitor the content of such transmissions as well as to monitor the receipt of such transmissions at an individual receiver site. The present contemplates that the data collected from such monitoring will automatically be transferred to a remote geographic location.

In the prior art, there have been attempts to develop monitoring devices. One such device is described in U.S. Patent to Baselwood, et al. No. 4,025,851. Such prior art techniques have been limited to monitoring a single channel or unit and have lacked the ability to monitor multi-channel systems. Prior art devices have lacked the capacity to simultaneously record and transfer information. They have been unable to distinguish the

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absence of encoded information. It is the object of the present invention to overcome these and other deficiencies of the prior art.

It is a further object of the present invention to collect and decode encoded signals on numerous channels by sequentially scanning each channel in a predetermined manner. It is also an object of the present invention to detect the presence or absence of an encoded transmission in each scanning interval. It is also an object of the present invention to provide a record of the decoded transmissions which may be transferred to a geographically distant location on command.

Other objects of this invention will appear from the following description and the appended claims.

Summary Of The Invention

The present invention contemplates a signal collector apparatus comprising a group of individual receiver/detectors tuned to each channel to be monitored; decoders connected to each receiver/detector which analyze the outputs of the receiver/detector and convert the encoded signal to digital information; a buffer comparator which organizes the information stream; a digital recorder which receives and stores in memory the recorded information and a connection to a remote site for further transmission of the recorded information. The receiver/detector and decoder is connected to apparatus which can selectively scan selected television channels. Encoded signals may be located in the audio and video portions of a normal television signal and additionally, in any other frequency of transmission that might be selected. The buffer comparator would have inputs received in sequential order from each of the receiver/detectors and decoders and would record the information continuously. The digital recorder has the capacity to both transmit the recorded information and store new information in memory simultaneously.

Brief Description Of Drawings

Fig. 1 is a block diagram of the receiver/detector, decoder and collector device shown for use with a cable television signal.

Fig. 2 is a similar signal collector apparatus shown for use with broadcast television signals.

Description Of The Preferred Embodiments

The signal collector apparatus for use with a cable television signal is shown in Figure 1. As shown, the input signal is the entire range of frequencies or channels transmitted on the cable. This signal is inputted to a mixer, 1, which is acted upon by a controlled local oscillator, 2. The oscillator is controlled to provide a number of discrete specified frequencies for the particular channels required.

The mixer, 1, and the controlled oscillator, 2, act to select a frequency of interest which is inputted to a filter, 3, which defines the particular channel of interest to be analyzed. The television channel signal is then transmitted to a standard amplitude demodulator, 4, which uses standard demodulator techniques well-known in the art to define the television base band signal. This base band signal is then transmitted through separate paths to three separate detector devices. These separate detectors are designed to act on the particular frequency ranges in which the encoded information may be found. The first path designated A inputs to an audio demodulator, 5, which further inputs a high pass filter, 6, and a digital detector, 7. The digital detector, 7, through standard detection techniques well-known in the art determines whether a particular code is present in the signal at the specified time. The base band signal is also inputted through path B to a vertical band indicator line receiver, 8. This vertical band indicator line receiver, 8, detects the existence of an encoded signal in the vertical band

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normally used to define a television picture. It receives and detects only that portion of the video signal transmitting this line portion of the signal to a digital detector and buffer, 9, which acts to decode the encoded information in the line. Path C inputs the separately defined signal to a digital detector, 10. The three lines of information are then gated to a buffer comparator, 11, which also receives other inputs from the other separate receivers comprising similar filters, demodulators and decoders for other channels of interest. The combined information is then transmitted to a digital recorder, 12, which may be a memory storage element of standard design. The collector apparatus also has a controller device which includes a controller, 13, for control of the local frequency oscillator, 2, an automatic dialing device, 14, and the digital recorder, 12. The controller, 13, inputs the local oscillator, 2, in a sequential pattern to select the various channels being received by the mixer, 1. This then allows the channels to be diverted to the detectors, receivers and decoders in any predetermined pattern desired. The controller also inputs the digital recorder, 12, to direct it to output the information from the memory of the recorder to a telephone connection, 14, and hence to the collection site at the remote geographical location. The controller, 13, also controls the automatic telephone dialing device, 14, to allow the apparatus to automatically output its own information in accordance with a predetermined sequence.

Figure 2 describes the signal collector apparatus for use with a broadcast television input. The input is received through a standard television antenna and inputted into a normal television receiver circuit, 20, which defines the base band television signal. This television receiver circuitry may either be that of an individually owned television and the channel may be selected by the viewer, or it might be a receiver in a remote site

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which is sequenced to each channel in accordance with a predetermined pattern. This sequencing circuitry is not shown. The television base band signal information is then transmitted to a standard audio demodulator, 21, and hence to a high pass filter, 22, and to a digital detector, 23, which decodes the signal, if present, in the base band signal information. The decoded signal, in digital information format, is transmitted to a buffer, 24, which also collects the inputs of other receivers. This information is then transmitted to a digital recorder, 25. The controller, 26, directs the automatic telephone dialer, 27, and the recorder, 25 to output the information in the same manner as described with respect to the cable television signal.

Operation Of The Invention

Referring first to the cable television signal collector apparatus shown in Figure 1, the controller, 13, is programmed to sequence the local oscillator, 2, to select each desired frequency for a specific time interval in accordance with a predetermined pattern. This pattern may be selected in accordance with the standard broadcast practices known to exist on that particular transmission line. The local oscillator, being thus sequenced, will allow each receiver decoder to receive a particular frequency at a particular time interval. This will define the timing of the composite outputs of the digital detectors, 7, 9 and 10. The same controller will activate the digital recorder, 12, thus defining the location in memory of each of the encoded signals so that the record will clearly indicate the code found in each channel of information and each subpath thereof at each specified time interval. The controller, 13, also controls an automatic telephone dialing device, 14, which can automatically output the digital information on the digital recorder, 12, to a remote site through a telephone connection, 15. The broadcast television signal collector operates in much the same way using a similar

controller device to direct the outputted information. Although the information has been particularly disclosed as a device for receiving and decoding information on television channels it is to be understood that the invention is applicable to other types of broadcast transmissions in which encoded information is recorded. It is also obvious to one of ordinary skill in the art that the foregoing is presented by way of example only and that the invention is not to be unduly restricted thereby since modifications may be made in the structure of the various parts without functionally departing from the spirit of the invention.

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SIGNAL PROCESSING APPARATUS AND METHODS

Abstract

Apparatus and Methods for controlling, from remote sites, programing runs on television and radio equipment and monitoring the programing run. ("Programing" here means everything transmitted over television or radio intended for communication of entertainment or to instruct or inform.) The Apparatus can handle programing transmitted either over-the-air (hereinafter, "broadcast") or over hardwire (hereinafter, "cablecast"). The apparatuses receive transmissions from as many as one hundred or more channels that are sequentially scanned by one or more scanners/switches that transfer the transmissions to one or more receiver/decoders that identify signals in the programing and separate the signals from the programing transmissions. The signals may then be transferred through one or more decrypters. The separated and possibly wholly or partially decrypted signals are then transferred through one or more processors and buffers to external equipment and/or data recorders. The data recorders are adapted to output data to remote sites on predetermined instructions. In all these functions, the apparatus are governed by one or more controllers. The Methods co-ordinate and instruct equipment in the transmission and presentation of radio and television programing and in certain other functions.

Background of the Invention

At the present time, vast amounts of programing are transmitted through various media throughout the United States which programing is handled with significant degrees of manual processing as different, discrete units of

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On some occasions, co-ordination of programming on two channels of programming does occur in the form of stereo simulcasts, where one television station broadcasts a program, generally of classical music, and simultaneously, ~~the same~~ local radio station broadcasts the same music in stereo.

The fact that broadcasters expect viewers to tune to only one channel at a time is largely the result of the structure of the broadcasting industry. Each broadcast operator, whether at the network level or at the local station level, can broadcast only one channel of programming. Anti-trust policies prevent common ownership of two networks. Federal Communication Commission regulations prevent common ownership of two or more local broadcast stations. ~~Thus, each broadcaster~~ ^{has only one channel} to ~~transmit~~ ^{transmit} the objective of each broadcast operator is to have the largest number of consumers give their fullest attention to the single channel of programming that is the ~~only~~ ^{one} channel the broadcaster can transmit, and broadcasting is a mass medium.

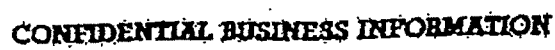
To be sure, on occasion on a limited scale, co-ordination of two media and two channels of programming does occur in the form of stereo simulcasts where one television station broadcasts a program, generally of classical music, and simultaneously, a local radio station broadcasts the same music in stereo. But such simulcasts always entail significant degrees of manual processing both at local transmission points of transmission and of reception.

With the growing development

an increasing variety and richness of programming presentations

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SIGNAL PROCESSING APPARATUSES AND METHODS

Abstract

Apparatuses and Methods for controlling, from remote sites, ~~transmissions and presentation~~ programming ~~even~~ on television and radio equipment and monitoring the programming run. ("Programming" here means everything transmitted over television or radio intended for communication of entertainment or information to one or more people.) The Apparatuses can handle programming transmitted either over-the-air (hereinafter, "broadcast") or over hardware (hereinafter, "cablecast"). The apparatuses receive transmissions from as many as one hundred or more channels that are sequentially scanned by one or more scanners/switches that transfer the transmissions to one or more receiver/decoders that identify signals in the programming and separate the signals from the programming transmissions. The signals may then be transferred through one or more decrypters. The separated and possibly wholly or partially decrypted signals are then transferred through one or more processors and buffers to external equipment and/or data recorders. The data recorders are adapted to output data to remote sites on predetermined instructions. The Methods co-ordinate and instruct equipment in the transmission and presentation of radio and television programming.

Background of the Invention

At the present time, vast amounts of programming are transmitted through various media throughout the United States which programming is handled with significant degrees of manual processing as different, discrete transmissions on single channel systems. Broadcasters and cablecasters transmit programming with the expectation that viewers in

*CONNECT the BUFFER
to the telephone*

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*provide read only memory with a
unique code identifying the
particular unit.*

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one place time to only one channel at a time. Without manual processing, television, radio, and other electronic data transmissions are interactive with one another only when transmitted together simultaneously. Even when co-ordinated transmissions do occur, they require significant degrees of manual processing at both the points of origination and reception, and the degree of interaction is limited.

With the advent of multi-media systems that allow coordination both as regards place (for example, a stereo simulcast in one place by means of co-ordinated television and radio transmissions) and as regards time (for example, the co-ordination by means of transmissions and data storage techniques of real-time or pre-recorded video programming with presentations from a microcomputer working with real-time or pre-supplied data or program instructions) and with the advancing development of multichannel systems such as so-called cable systems, much processing of such transmissions by manual means is no longer practical.

It is the purpose of this invention to provide automatic means and methods to process and monitor such transmissions at an individual receiver site or sites and control, in certain ways, the use of transmitted programming and the operation of certain associated equipment. Such receiver sites may be stations or systems that intend to retransmit the programming, or they may be end users of the programming. The present invention contemplates that certain data may be encrypted and that certain data collected from such processing and monitoring will automatically be transferred to a remote geographic location or locations.

The commercial interest of broadcast network is to provide alternate station and viewers to have their programming subject to the selection of time.

But with the development of supplying a network of other programming, environment of provider.

But it is necessary to provide means whereby programming can be processed by computers which require the multi-media multichannel programming and control.

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"In the prior art, there have been attempts to develop systems to control programing and systems to monitor programing, but the two have been treated as separate systems, and each has had limited capacity.

As regards control systems, cueing systems and equipment now exist that transmit instructions to operating equipment at receiver sites by means of tone signals that are carried, in television transmissions, in the audio portion and may be heard by the human ear. Such systems and devices are used to turn on equipment such as videotape players and recorders that have been manually loaded and to tell such equipment how long to run. Such systems operate by transmitting operating signals that precede and follow programing and are called "headers" and "trailers" respectively. The use of headers and trailers limits prior art in that headers and trailers can become separated from programing, thereby hampering automatic operations. Such prior art techniques have lacked the capacity to process the programing in various ways including to instruct receiver and equipment what specific programing to select to play or record other than that immediately at hand, how to load it on player or recorder equipment, when and how to play it or record it other than immediately, how to modify it, what equipment or channel or channels to transmit it on, when to transmit it, and how and where to file it or refile it or dispose of it. (Within television studios that are original transmitters of programing, certain systems and equipment do exist for certain automatic co-ordination of players, loaders, and other equipment; however, manual instructions still must be given, on site, for the co-ordination of such equipment which instructions are transmitted electronically on hard-wire channels that are strictly separate from the channels

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on which the programming is transmitted and such instructions are never broadcast. Such prior art systems and equipment have lacked the capacity to automatically coordinate multimedia presentations. They have lacked the capacity to decrypt encrypted processing signals. They have lacked the capacity to monitor whether receiver-end equipment are following instructions properly.

As regards monitoring systems, various systems and devices have been developed to determine what programming is played on television. One such system for monitoring programs is described in U.S. Patent to Haselwood, et al. No. 4,025,851. Another that monitors by means of audio codes that are only "substantially inaudible" is described in U.S. Patent to Crosby No. 3,845,391. Recently devices, called addressable converters, have been developed that facilitate so-called pay-per-view marketing of programming by monitoring what individual television receivers tune to and either permitting or preventing the tuners to tune to given frequencies. Such prior art techniques and equipment have been limited to monitoring single broadcast stations, channels or units and lacked the ability to monitor multimedia presentations. They have been able to monitor only the audio or the video portion of television transmissions. They have lacked the capacity to simultaneously record and transfer information. They have been unable to decrypt encrypted signals. They have been able to monitor only single signal word types or word lengths that are placed, within the transmissions, in locations that are unvarying and unvariable. They have lacked the capacity to compare, assemble, and/or evaluate multi-word, multi-location signals. Except in the possible case of addressable converters, they have been unable to distinguish the absence of signals or

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signal words in transmissions. They have lacked the capacity to communicate processing instructions to external equipment as described in the paragraph above. It is the object of the present invention to overcome these and other deficiencies of the prior art.

It is a further object of the present invention to process and monitor signals on numerous channels by sequentially scanning each channel in a predetermined manner which manner may be varied. It is also an object of the present invention to prevent unauthorized use of signals by permitting signal encrytion, the variation of word numbers, word lengths, word compositions, and/or word locations. It is also an object of this system to process different words in different ways. It is also an object of the present invention to provide a record of signals that may be transferred to a geographically distant location on command or predetermined instruction.

Other objects of this invention will appear from the following descriptions and the appended claims.

Summary of the Invention

The present invention consists of methods and apparatuses with several forms.

One method provides a technique whereby a broadcast or cablecast transmission facility can duplicate the operation of a television studio automatically through the use of instruction and information signals embedded in programming either supplied from a remote source or sources or prerecorded. The programming may be delivered to the transmission facility by any means including broadcast, hard-wire, and manual means. The transmission facility

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may transmit a single channel or multiple channels of programming. The method includes a monitoring technique to construct a record for each transmitted channel that duplicates the log that the Federal Communications Commission requires broadcast station operators to maintain. The method permits the transfer of such records to a predetermined site or sites in a predetermined fashion or fashions.

Another method has application at receiver sites such as private homes or public places like theaters, hotels, brokerage offices, etc.; whether commercial establishments or not. This method provides techniques whereby, automatically, single channel, single medium presentations, be they television, radio, or other electronic transmissions, may be recorded, co-ordinated in time, or processed in other fashions, and/or multimedia presentations may be co-ordinated in place and/or in time. This method provides techniques whereby the timing and fashion of the playing, processing, and co-ordination of a presentation or presentations may be determined at the time and place of transmission or of presentation, either in whole or in part, either locally or remotely, or a combination of these factors. The method provides monitoring techniques to develop data on patterns of viewership and to permit the determination of specific usage at individual receiving sites for various purposes including, for example, the billing of individual customers. The method provides techniques whereby unauthorized use of programming and/or of signals may be prevented.

Both methods employ signals embedded in programs. The advantage of such embedded signals, as compared to header and trailer signals is that they cannot become separated inadvertently from the programming and, thereby, inhibit automatic processing, they can convey signals to equipment

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that must switch manners or modes of operation during transmissions of individual units of programming, and they can be monitored. (The techniques described here may use headers and trailers from time to time.) The embedded signals may run and repeat continuously throughout the programming or they may run only occasionally or only once. They may appear in various and varying locations. In television they may appear on one line in the video portion of the transmission, or on a portion of one line, or on more than one line, and will probably lie outside the range of the television picture displayed on a normally tuned television set. In television and radio they may appear in a portion of the audio range that is not normally rendered in a form audible to the human ear. In television audio, they are likely to lie between eight and fifteen kilohertz. Signals may also be transmitted on frequencies outside the ranges of television and radio. Different and differing numbers of signals may be sent in different and differing word lengths and locations.

The present invention provides a method for obscuring the meaning of the signals to prevent unauthorized use of the signals and of their associated programming. Their meanings may be obscured through encryption so that apparatuses described below are necessary to decrypt them. In addition, the pattern of the composition, timing, and location of the signals may vary in such ways that only receiving apparatuses that are preinformed regarding the patterns that obtain at any given time will be able to process the signals correctly. The term "signal unit" here means one complete signal instruction or information message unit. Examples of signal units are a unique code identifying a programming unit, or a unique purchase order number identifying the proper use of

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a programing unit, or a general instruction identifying whether a programing unit is to be retransmitted immediately or recorded for delayed transmission. The term "signal word" means one full discrete appearance of a signal as embedded at one time in one location on a transmission. Examples of signal words are a string of one or more digital data bits encoded together on a single line of video or sequentially in audio. Such strings may or may not have predetermined data bits to identify the beginnings and ends of words. Signal words may contain parts of signal units, whole signal units, or groups of partial or whole signal units or combinations. Both the arrangement of signal units in signal words and the locations, timings, and lengths of signal words in individual transmissions or groups of transmissions may vary in fashions that can only be interpreted accurately by apparatuses that are preprogramed with the keys to such variations.

The present invention also provides a method for identifying attempts to make unauthorized use of signals and the programing associated with signals. When an apparatus finds that signal words fail to appear in places and at times when and where they are expected, the apparatus automatically contacts one or more remote sites and may or may not disable the flow of programing in one or more ways.

The present invention contemplates a signal processing apparatus comprising a device or devices that can selectively scan transmission channels as directed. The channels may convey television, radio, or other transmission frequencies. The input transmissions may be received by means of antennas or from hard-wire connections. The scanners/switches, working

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in parallel or series or combinations, transfer the transmissions to inline receiver/decoder/detectors that identify signals encoded in programming transmissions and convert the encoded signals to digital information; decryptors that may convert the received information, in part or in whole, to other digital information according to preset methods or patterns; and one or more processor/monitors and/or buffer/comparators that organize and transfer the information stream. The processors and buffers can have inputs from each of the receiver/detector lines and evaluate information continuously. From the processors and buffers, the signals may be transferred to external equipment such as computers, videotape recorders and players, etc. And/or they may be transferred to one or more internal digital recorders that receive and store in memory the recorded information and have connections to one or more remote sites for further transmission of the recorded information. The apparatus has means for external communication and an automatic dialer and can contact remote sites and transfer stored information as required in a predetermined fashion or fashions. The apparatus has a clock for determining and recording time as required. It has a read only memory for recording permanent operating instructions and a programmable random access memory controller ("PRAM controller") that permits revision of operating patterns and instructions. The PRAM controller may be connected to all internal operating units for full flexibility of operations.

Signal Processing Apparatuses that are employed in specific situations that require fewer functions than those provided by the basic apparatus described above may omit one or more of the specific operating elements described above.

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Brief Description of the Drawings

Fig. 1 is a block diagram of one embodiment of a Signal Processing Apparatus.

Fig. 2A is a block diagram of a TV Signal Decoder.

Fig. 2B is a block diagram of a Radio Signal Decoder.

Fig. 2C is a block diagram of an Other Signal Decoder.

Fig. 3 is a block diagram of Signal Processing Apparatuses and Methods as they might be used in an intermediate transmission facility, in this case a cable system head end.

Fig. 4 is a block diagram of one embodiment of a Signal Processing Apparatus used to prevent unauthorized reception and use of signals ~~and processing of signals at a consumer receiver site and to a home theater, business, etc.~~

Fig. 5 is a block diagram of one embodiment of a Signal Processing Apparatus used to gather data on viewership patterns and as a rating meter.

Fig. 6 is a block diagram of one embodiment of Signal Processing Apparatuses and Methods as they might be used at a consumer receiver site.

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SIGNAL PROCESSING APPARATUSES AND METHODS

Abstract

Apparatuses and Methods for controlling programming runs on remote television and radio equipment and monitoring the programming runs. ("Programming" here means everything transmitted over television or radio intended for communication of entertainment or information to one or more people.) The apparatuses and methods can handle programming transmitted either over-the-air (hereinafter, "broadcast") or over hard-wire (hereinafter, "cablecast"). The apparatuses receive transmissions from as many as one hundred or more channels that are sequentially scanned by one or more scanners, which transfer the transmissions to one or more receiver/decoders that identify signals in the programming and separate the signals from the programming transmissions. The signals may then be transferred through a decrypter. The separated and possibly wholly or partially decrypted signals are then transferred through one or more buffers to a processor and/or a data recorder. The processor is adapted to output its data to computers and other external equipment and control devices. The data recorder is adapted to output its data to remote sites on predetermined channels. The methods operate by co-ordinating equipment for the transmission and presentation of radio and television programming.

Background of the Invention

At the present time, vast amounts of programming are transmitted through various media throughout the United States which programming is handled with significant degrees of manual processing as different, discrete transmissions on a single channel system. Furthermore, television, radio, and other broadcast electronic data are not interactive with one another, except when transmitted simultaneously. Even when co-ordinated transmissions do occur, they require significant degrees of manual processing at both the points of origination and reception, and the degree of interaction is limited.

With the advent of multi-media systems that allow co-ordination both as regards place (for example, a stereo simulcast in one place by means of co-ordinated television and radio transmissions) and as regards time (for example, the co-ordination by means of transmissions and data storage techniques of real-time or pre-recorded video programming with presentations from a real-time or pre-programmed microcomputer working with real-time or pre-supplied data) and with the advancing development of multi-channel systems

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Broadcasters and cablecasters transmit programming with
the expectation that viewers in one place will tune in and
see the same at a time. Without manual processing,

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such as so-called cable systems, much processing of such transmissions by manual means, is no longer practical.

It is the purpose of the invention to provide automatic means to process and monitor such transmissions at an individual receiver site or sites and control, in certain ways, the use of transmitted programming and the operation of certain associated equipment. Such receiver sites may be stations or systems that intend to retransmit the programming, or they may be end users of the programming. The present invention contemplates that certain data may be encrypted and that certain data collected from such processing and monitoring will automatically be transferred to a remote geographic location or locations.

In the prior art, there have been attempts to develop systems to control programming and systems to monitor programming, but the two have been treated as separate systems, and each has had limited capacity.

As regards control systems, cueing systems and equipment now exist that transmit instructions to operating equipment at receiver sites by means of tone signals that are carried, in television transmissions, in the audio portion and may be heard by the human ear. Such systems and devices are used to turn on equipment such as videotape players and recorders that have been manually loaded and to tell such equipment how long to run. ~~Insert something on the limitations of headers and trailers that get repeated from programming~~
DUEA

Such prior art techniques have lacked the capacity to process the programming in various ways including to instruct receiver end equipment what specific programming to select to play or record other than that immediately at hand, how to load it on player or recorder equipment, when and how to play it or record it other than immediately, how to modify it, what equipment or channel or channels to transmit it on, when to transmit it, and how and where to file it or refile it or dispose of it. (Within television studios that are the original transmitters of programming, certain systems and equipment do exist for certain automatic co-ordination of players, loaders, and other equipment; however, manual instructions still must be given, on site, for the co-ordination of such equipment which instructions are transmitted electronically on hard-wire channels that are strictly separate from the channels on which the programming is transmitted and such instructions are never broadcast.) Such prior art systems and equipment have lacked the capacity to automatically co-ordinate multimedia presentations. They have lacked the capacity to decrypt encrypted processing signals. They have lacked the capacity to monitor whether receiver-end equipment are following instructions properly.

As regards monitoring systems, various systems and devices have been developed to determine what programming is played on television. One such system for monitoring programs is described in U.S. Patent to Haselwood, et al. No. 4,025,851. Another that monitors ~~what~~ monitors by means of audio codes that are only "substantially inaudible" is described in U.S. Patent to Crosby No. 3,845,391. Recently devices, called

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addressable converters, have been developed that facilitate so-called pay-per-view marketing of programming, but what individual television receivers tune to and either permitting or preventing the tuners to tune to given frequencies. Such prior art techniques have been limited to monitoring a single channel or unit, and have lacked the ability to monitor multimedia presentations. They have been able to monitor only the audio or the video portion of television transmissions. They have lacked the capacity to simultaneously record and transfer information. They have been unable to decrypt encrypted signals. They have been able to monitor only single signal word types or word lengths that are placed, within the transmissions, in locations that are unvarying and unvariable. They have lacked the capacity to compare, assemble, and/or evaluate multi-word, multi-location signals. Except in the possible case of addressable converters, they have been unable to distinguish the absence of signals or signal words in transmissions. They have lacked the capacity to communicate processing instructions to external equipment as described in the paragraph above. It is the object of the present invention to overcome these and other deficiencies of the prior art.

It is a further object of the present invention to process and monitor signals on numerous channels by sequentially scanning each channel in a predetermined manner which manner may be varied. It is also an object of the present invention to prevent unauthorized use of signals by permitting signal encryption, the variation of word numbers, word lengths, word compositions, and/or word locations. It is also an object of this system to process different words in different ways. It is also an object of the present invention to provide a record of signals that may be transferred to a geographically distant location on command or predetermined instruction.

Other objects of this invention will appear from the following descriptions and the appended claims.

Summary of the Invention

The present invention consists of methods and apparatuses with several forms.

One method provides a technique whereby a broadcast or cablecast transmission facility can duplicate the operation of a television studio automatically through the use of instruction and information signals embedded in programming either supplied from a remote source or sources or prerecorded. The programming may be delivered to the transmission facility by any means including broadcast, hard-wire, and manual means. The transmission facility may transmit a single channel or multiple channels of programming. The method includes a monitoring technique to construct a record for each transmitted channel that duplicates the log that the Federal Communications Commission requires broadcast station operators to maintain. The method permits the transfer of such records to a

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predetermined site or sites in a predetermined fashion or

Another method has application at receiver sites such as private homes or public places like theaters, hotels, brokerage offices, etc., whether commercial establishments or not. This method provides techniques whereby, automatically, single channel, single medium presentations, be they television, radio, or other electronic transmissions, may be recorded, co-ordinated in time, or processed in other fashions, and/or multimedia presentations may be co-ordinated in place and/or in time. This method provides techniques whereby the timing and fashion of the playing, processing, and co-ordination of a presentation or presentations may be determined at the time of transmission or of presentation, either in whole or in part, either locally or remotely, or a combination of these factors. The method provides monitoring techniques to develop data on patterns of viewership and to permit the determination of specific usage at individual receiving sites for various purposes including, for example, the billing of individual customers. The method provides techniques whereby unauthorized use of programming and/or of signals may be prevented.

Both methods employ signals embedded in programs. The advantage of such embedded signals, as compared to header and trailer signals is that they cannot become separated inadvertently from the programming and, thereby, inhibit automatic processing, they can convey signals to equipment that must switch manners or modes of operation during transmissions of individual units of programming, and they can be monitored. (The techniques described here may use headers and trailers from time to time.) The embedded signals may run and repeat continuously throughout the programming or they may run only occasionally or only once. They may appear in various and varying locations. In television they may appear on one line in the video portion of the transmission, or on a portion of one line, or on more than one line, and will probably lie outside the range of the television picture displayed on a normally tuned television set. In television and radio they may appear in a portion of the audio range that is not normally rendered in a form audible to the human ear. In television audio, they are likely to lie between eight and fifteen kilohertz. Signals may also be transmitted on frequencies outside the ranges of television and radio. Different and differing numbers of signals may be sent in different and differing word lengths and locations.

The present invention provides a method for obscuring the meaning of the signals to prevent unauthorized use of the signals and of their associated programming. Their meanings may be obscured through encryption so that apparatuses described below are necessary to decrypt them. In addition, the pattern of the composition, timing, and location of the signals may vary in such ways that only receiving apparatuses that are preinformed regarding the patterns that obtain at any given time will be able to process the signals correctly. The term "signal unit" here means one complete signal

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instruction or information message unit. Examples of signal units are a unique code identifying a programing unit, or a unique purchase order number identifying the proper use of a programing unit, or a general instruction identifying whether a programing unit is to be retransmitted immediately or recorded for delayed transmission. The term "signal word" means one full discrete appearance of a signal as embedded at one time in one location on a transmission. Examples of signal words are a string of one or more digital data bits encoded together on a single line of video or sequentially in audio. Such strings may or may not have predetermined data bits to identify the beginnings and ends of words. Signal words may contain parts of signal units, whole signal units, or groups of partial or whole signal units or combinations. Both the arrangement of signal units in signal words and the locations, timings, and lengths of signal words in individual transmissions or groups of transmissions may vary in fashions that can only be interpreted accurately by apparatuses that are preprogramed with the keys to such variations.

The present invention also provides a method for identifying attempts to make unauthorized use of signals and the programing associated with signals. When an apparatus finds that signal words fail to appear in places and at times when and where they are expected, the apparatus automatically contacts one or more remote sites and may or may not disable the flow of programing in one or more ways.

The present invention contemplates a signal processing apparatus comprising a device or devices that can selectively scan transmission channels as directed. The channels may convey television, radio, or other transmission frequencies. The input transmissions may be received by means of antennas or from hard-wire connections. The scanners/switches, working in parallel or series or combinations, transfer the transmissions to in-line receiver/detectors, decoders connected to each receiver/detector that analyze the output of each receiver/detector and convert the encoded signals to digital information; decryptors that may convert the received information, in part or in whole, to other digital information according to preset methods or patterns; and one or more processor/monitors and/or buffer/comparators that organize and transfer the information stream. The processors and buffers can have inputs from each of the receiver/detector lines and evaluate information continuously. From the processors and buffers, the signals may be transferred to external equipment such as computers, videotape recorders and players, etc. And/or they may be transferred to one or more internal digital recorders that receive and store in memory the recorded information and have connections to one or more remote sites for further transmission of the recorded information. The apparatus has an automatic dialer and can contact one remote site and transfer stored information as required in a predetermined fashion or fashions. The apparatus has a clock for determining and recording time as required. It has a read only memory for recording permanent operating instructions and a programable random access memory

transmission
reception
storage
transfer

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receiving/denying/detecting that identity signs
emitted by a person in the presence

~~CONFIDENTIAL BUSINESS INFORMATION~~
~~CONFIDENTIAL BUSINESS INFORMATION~~

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random-access memory controller ("PRAM controller") that permits revision of operating patterns and instructions. The apparatus has means for external communications via telephone lines and has an automatic dialer. The PRAM controller may be connected to all internal operating units for full flexibility of operations.

Signal Processing Apparatuses that are employed in specific situations that require fewer functions than those provided by the basic apparatus described above may omit one or more of the specific operating elements described above.

Brief Description of the Drawings

Fig. 1 is a block diagram of one embodiment of a Signal Processing Apparatus.

Fig. 2A is a block diagram of a TV Signal Decoder.

Fig. 2B is a block diagram of a Radio Signal Decoder.

Fig. 2C is a block diagram of an Other Signal Decoder.

Fig. 3 is a block diagram of Signal Processing Apparatuses and Methods as they might be used in an intermediate transmission facility, in this case a cable system head end.

Fig. 4 is a block diagram of one embodiment of a Signal Processing Apparatus used to prevent unauthorized reception and use of signals and programming at a consumer receiver site such as a home, theater, business, etc.

Fig. 5 is a block diagram of one embodiment of a Signal Processing Apparatus used to ^{gather} data on viewership patterns and as a ratings meter.

Fig. 6 is a block diagram of one embodiment of Signal Processing Apparatuses and Methods ^{as they might be used} at a consumer receiver site.

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Description Of The Preferred Embodiments

The Signal Processor Apparatus

The signal collector apparatus ^{shown in Fig. 1} for use with a cablecast and a broadcast TV ^{input} signal is shown in Figure 1. As shown, the input signal is the entire range of frequencies or channels transmitted on the cable and the entire range of broadcast TV ^{transmission} signals available to a local TV antenna. ^{for this configuration} This apparatus is designed to ^{transmission} The cable signal to input simultaneously to switch 1 and mixer 2.

The broadcast ^{transmission} signal is input to switch 1. Switch 1, ~~in the present embodiment~~ transfers signals to mixer 3. Switch 1 and mixers 2 and 3 are all controlled by local oscillator and switch control

6. ~~This signal is input to a mixer which is~~ ⁶ selected upon by a controlled local oscillator. ⁶ The oscillator is controlled to provide a number of discrete specified frequencies for the particular ^{radio and television} channels required.

~~The mixer, 2, and the controlled oscillator, 6, act to select a radio frequency of interest which is input to a radio signal decoder, 4.~~

^{shown in Fig. 2B.} The switch, 1, acts to select ~~a~~ ^{the} broadcast ^{made} transmissions or cablecast ^{made} transmissions and passes transmissions to ^{the} mixer, 3, which with the controlled oscillator, 6, acts to select a television frequency of interest that is ^{at a fixed frequency} passed to a TV Signal decoder ³⁰ shown in Figure Fig. 2A. In the decoder, the frequency passes first through

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Preferred Embodiment

Apparatus

Encryption/Signal Techniques

Use in Intermediate Transmission Facility

Adjustable Converter

Rating Meter

Use in Consumer Receiver Etc

Operation of the Invention

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Filter, 31, which defines the particular channel of interest to be analyzed. The television channel signal is then transmitted to a standard amplitude demodulator, 32, which uses standard demodulator techniques well-known in the art to define the television base band signal. This base band signal is then transmitted through separate paths to three separate detector devices. These separate detectors are designed to act on the particular frequency ranges in which the encoded information may be found. The first path designated A inputs to an audio demodulator, 35, which further inputs a high pass filter, 36, and a digital detector, 37. The digital detector, 7, through standard detection techniques well-known in the art determines whether a particular code is present in the signal at the specified time. The base band signal is also inputted through path B to a vertical band indicator line receiver, 38. This vertical band indicator line receiver, 38, detects the existence of an encoded signal in the vertical band of the signal occurring in the normally used to define a television picture. It receives and detects only that portion of the video signal transmitting this line portion of the signal to a digital detector and buffer, 39, which acts to decode the encoded information in the line. Path C inputs the separately defined signal to a digital detector, 10. The three lines of information are then gated to a buffer, 8, comparators, 11, which also receives other inputs from the other separate receivers comprising similar filters, demodulators and decoders for other channels of interest.

If one returns to Fig. 1, one sees that

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One such other path is that initiated ^{from} ~~at~~ mixer, 2, where Mixer, 2, and the controlled oscillator, 6, act to select a radio frequency of interest which is input to a radio signal decoder, 40, shown in Fig 2B. ??? FILTER ??? ~~is~~ The frequency passes first through standard radio receiver circuitry, ⁴¹, well known in the art, a radio decoder, ⁴², and a standard Digital detector, ⁴³. ~~As Fig. 1 shows, the~~ As Fig. 1 shows, the radio signal detector outputs to buffer 8.

(The signal processor apparatus described here is configured to receive broadcast TV signals and cablecast TV and radio signals. Were it desirable to ^{process signals in} ~~receive~~ other transmissions such as broadcast microwave transmissions or cablecast transmission on other than standard TV and radio frequencies, the mixers and switches would be ~~or~~ appropriately reconfigured ^{one or more} and, other signal decoders as described in Fig 2C would be added. As Fig 2C shows, the desired frequencies would pass through appropriate other ~~any~~ receiver circuitry, ⁴⁴, well known in the art, and ^{an} appropriate digital detectors, ⁴⁵, before being output to buffer, 8.)

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according to predetermined that permit buffer, 8, among other things, to assemble signal units from signal words.

From Buffer, 8, organized the data

stream that it receives ~~and identifies signals,~~

that according to predetermined instructions, Buffer, 8, identifies ^{signal words and/or signal units,} signals that must be decrypted,

either in whole or in part. ~~These signals words~~

Signal words and units requiring decryption are

passed to decrypter which operates using

conventional decryption techniques, well known

in the art, according to a predetermined pattern

or patterns to decrypt such signals as required.

Decrypter, 10, then passes the decrypted signals

to signal processor or monitor, 12. Buffer, 8,

passes signal words and units that do not require

decryption directly to signal processor or

monitor, 12.

Signal processor or monitor, 12, analyzes

the signal words and units ^{according to predetermined instructions,} that it receives, and

determines ~~whether~~ whether they are to be passed

to external equipment or to ^{be processed for recording} ~~the digital recorder~~ or both.

recorded by digital recorder, 16. If they are

to be passed externally, ~~unit~~ processor unit, 12,

^{identifies the} ~~determines which element~~ external equipment

to which the signals are addressed and passes

them ^{to} through appropriate jack ports. ^{OVER} If they are

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~~==~~
Processor unit, 12, may receive signals ~~that~~ to be passed externally that it also identifies, according to predetermined instructions, that it should hold and pass at a ~~its~~ subsequent point in time. Processor unit, 12, is connected to clock, 18, and has means for determining time and means for holding such signals as required and passing them externally when required.

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processed for recording,
to be recorded, processor unit, 12, passes them
to buffer comparator, 14.

Buffer comparator, 14, has means for identifying
which signals are to be recorded. To avoid
overloading digital recorder, 16, with duplicate
data, buffer comparator, 14, has means for
counting and discarding duplicate signals. Buffer
comparator, 14, is connected to clock, 18, and has
~~means for identifying the signals~~ It can identify
signals, according to predetermined patterns, that
require specific time of receipt information appended
and has means for doing so. Upon determining
that a signal word or unit should be passed,
~~to digital recorder, 16, buffer comparator, 14,~~
~~does so; transmits~~ the combined information
~~is then transmitted to a digital recorder, 12, which may be a~~
memory storage element of standard design.

JP signal processor
The collector
programmable random
access memory
apparatus also has a controller device which includes a
controller, 20, for control of the local frequency oscillator, 2,
an automatic dialing device, 24, and a telephone unit 2,
~~and the digital recorder, 12.~~
The controller, 20, governs the operation of all units and
elements of the apparatus. It
The controller, 20, inputs the local oscillator, 2, in a
sequential pattern to select the various channels being received

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by switch, 1, and mixers, 2 and 3.
by the mixers. This then allows the channels to be diverted to the detectors, receivers and decoders in any predetermined pattern desired. The controller, 20, can instruct signal decoders, 30 and 40, when, ^{and how} where, to look for signal words, which allows signal words to be received in any pattern or patterns. It can instruct buffer, 8, how to assemble signal words into signal units and join units together for further transfer and how to determine which signals to pass to the decrypter ¹⁰ and which to pass to processor unit, 12. It can tell decrypter, 10, when and how to change decryption patterns and techniques. It can tell processor unit, 12, how to determine which signals to pass externally and when and where and how to determine which signals to pass to buffer comparator, 14. It can tell buffer comparator, 14, how to what and how to count, what to record and how ~~to pass~~ ^{recorded signals} mark it, with time information, how to handle time information in general, and what received signals to discard.

The controller also inputs the digital recorder, 16, to direct it to output the information from the memory of the recorder to a telephone connection, 14, and hence to the collection site at the remote geographical location. The controller, 13, also controls the automatic telephone dialing

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device, 14, to allow the apparatus to automatically output its own information in accordance with a predetermined sequence. ^{and to change variables} ~~digital~~

To facilitate the operation of the device, the controller, 20, can receive certain information from elements of the apparatus. Signals can be passed to the apparatus through the programming transmission input at switch, 1, and mixer, 2. Examples of such signals include an instruction for the device apparatus to contact a remote telephone unit through ~~the~~ and signal information regarding time. The processor unit, 12, has the capacity to identify instruction signals for controller, 20, and pass them to controller, 20, over control information lines. Buffer Comparator, 14, has the capacity to pass received time signals to the controller, 20, in a predetermined fashion set by and changeable by controller, 20. Buffer, 8, and Processor unit, 12, each have the capacity to inform controller, 20, when signals that they are instructed to look for ^{, set by and changeable by controller, 20,} in predetermined fashions, fail to appear. Oscillator, 6, the controller, 20, and Buffer, 8, can interact in such a fashion that buffer, 8, ~~and~~ can identify the channel that any given signal is received on and make the signal for ^{subsequent} ~~future~~ identification of the channel.

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Digital Recorder, 16, can tell the controller, 20, when in reaches predetermined levels of fullness to permit the controller to instruct the auto dialer, 24, to contact ~~an external~~ an appropriate remote site allowing the recorder, 16, to output its data making more memory available. The controller, 20, can also shut off any element or elements of the apparatus in whole or in part. Controller, 20, as a read only memory for retention of permanent operating instructions. It is interactive with external sources via telephone connection, 22, and can be reprogrammed from such remote sources. It follows standard password protection techniques well known in the art.

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SIGNAL PROCESSING APPARATUSES AND METHODS

Abstract

Apparatuses and Methods for ^{receiving, transmitting and/or} controlling, from remote sites, programing runs on television and radio equipment and monitoring the programing run. ("Programing" here means everything transmitted over television or radio intended for communication of entertainment or ~~information~~ ^{as in entertainment} ~~one-to-one~~ ^{one-to-many} ~~person-to-person~~ The Apparatuses can handle programing transmitted either over-the-air (hereinafter, "broadcast") or over hardwire (hereinafter, "cablecast"). The apparatuses receive transmissions from as many as one hundred or more channels that are sequentially scanned by one or more scanners/switches that transfer the transmissions to one or more receiver/decoders that identify signals in the programing and separate the signals from the programing transmissions. The signals may then be transferred through one or more decrypters. The separated and possibly wholly or partially decrypted signals are then transferred through one or more processors and buffers to external equipment and/or data recorders. The data recorders are adapted to output data to remote sites on predetermined instructions. ^{over} The Methods co-ordinate and instruct equipment in the transmission and presentation of radio and television programing. ^{and in certain functions} ~~other~~ ^{other}

Does this section follow same document?

ff 20. define
progressing broadcast
& calculating below.

Background of the Invention

For the purpose of this application, --

At the present time, vast amounts of programming are transmitted through various media throughout the United States which programming is handled with significant degrees of manual processing as different, discrete ~~transmissions~~ ^{units of programming transmitted} on single channel systems. Broadcasters and cablecasters transmit programming with the expectation that viewers in

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one place tune to only one channel at a time. Without manual processing, television, radio, and other electronic data transmissions are interactive with one another only when transmitted together simultaneously. Even when co-ordinated transmissions do occur, they require significant degrees of manual processing at both the points of origination and reception, and the degree of interaction is limited.

- *class 11* -

With the advent of multi-media systems that allow coordination both as regards place (for example, a stereo simulcast in one place by means of co-ordinated television and radio transmissions) and as regards time (for example, the co-ordination by means of transmissions and data storage techniques of real-time ~~on-line~~ video programming with presentations from a microcomputer working ~~with real-time~~ ^{supplying data} ~~on-line~~ data ~~on program instructions~~) and with the advancing development of multichannel systems such as so-called cable systems, much processing of such transmissions by manual means is no longer practical.

- *class 11* -

It is the purpose of this invention to provide automatic means and methods to process and monitor such transmissions at ~~an~~ individual receiver ~~site~~ ^{or} sites and control, in certain ways, the use of transmitted programming and the operation of certain associated equipment. Such receiver sites may be stations or systems that intend to retransmit the programming, or they may be end users of the programming. The present invention contemplates that certain data may be encrypted and that certain data collected from such processing and monitoring will automatically be transferred to a remote geographic location or locations.

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In the prior art, there have been attempts to develop systems to control programing and systems to monitor programing, but the two have been treated as separate systems, and each has had limited capacity.

As regards control systems, cueing systems and equipment now exist that transmit instructions to operating equipment at receiver sites by means of tone signals that are carried, in television transmissions, in the audio portion and may be heard by the human ear. Such systems and devices are used to turn on equipment such as videotape players and recorders that have been manually loaded and to tell such equipment how long to run. Such systems operate by transmitting operating signals that precede and follow programing and are called "headers" and "trailers" respectively. The use of headers and trailers limits prior art in that headers and trailers can become separated from programing, thereby hampering automatic operations. Such prior art techniques have lacked the capacity to process the programing in various ways including to instruct receiver end equipment what specific programing to select to play or record other than that immediately at hand, how to load it on player or recorder equipment, when and how to play it or record it other than immediately, how to modify it, what equipment or channel or channels to transmit it on, when to transmit it, and how and where to file it or refile it or dispose of it. (Within television studios that are original transmitters of programing, certain systems and equipment do exist for certain automatic co-ordination of players, loaders, and other equipment; however, manual instructions still must be given, on site, for the co-ordination of such equipment which instructions are transmitted electronically on hard-wire channels that are strictly separate from the channels

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signal words in transmissions. They have lacked the capacity to communicate processing instructions to external equipment as described in the paragraph above. It is the object of the present invention to overcome these and other deficiencies of the prior art.

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It is a further object of the present invention to process and monitor signals on numerous channels by sequentially scanning each channel in a predetermined manner which manner may be varied. It is also an object of the present invention to prevent unauthorized use of signals ^{and associated programming} by permitting signal ^{word} encryption, the variation of word numbers, word lengths, word compositions, and/or word locations. It is also an object of this system to process ^{signal} different words in different ways. It is also an object of the present invention to provide a record of signals that may be transferred to a geographically distant location on command or predetermined instruction.

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Other objects of this invention will appear from the following descriptions and the appended claims.

Summary of the Invention

The present invention consists of methods and apparatus with several forms.

One method provides a technique whereby a broadcast or cablecast transmission facility can duplicate the operation of a television studio automatically through the use of instruction and information signals embedded in programing either supplied from a remote source or sources or prerecorded. The programing may be delivered to the transmission facility by any means including broadcast, hard-wire, and manual means. The transmission facility

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may transmit a single channel or multiple channels of programming. The method includes a monitoring technique to construct a record for each transmitted channel that duplicates the log that the Federal Communications Commission requires broadcast station operators to maintain. The method permits the transfer of such records to a predetermined site or sites in a predetermined fashion or fashions.

Another method has application at receiver sites such as private homes or public places like theaters, hotels, brokerage offices, etc., whether commercial establishments or not. This method provides techniques whereby, automatically, single channel, single medium presentations, be they television, radio, or other electronic transmissions, may be recorded, ~~co-ordinated in time, or processed in other~~ ^{with the program previously transmitted and recorded} fashions, ~~and/or~~ ^{for} Multimedia presentations may be co-ordinated ~~in time and/or in place as when a program is~~ ^{in place and/or in time}. This method provides techniques whereby the timing and fashion of the playing, processing, and co-ordination of a presentation or presentations may be determined at the time and place of transmission or of presentation, either in whole or in part, either locally or remotely, or a combination of these factors. The method provides monitoring techniques to develop data on patterns of viewership and to permit the determination of specific usage at individual receiving sites for various purposes including, for example, the billing of individual customers. The method provides techniques whereby unauthorized use of programming and/or of signals may be prevented.

Both methods employ signals embedded in programs. The advantage of such embedded signals, as compared to header and trailer signals, is that they cannot become separated inadvertently from the programming and, thereby, inhibit automatic processing, ^{they} they can convey signals to equipment

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that must switch manners or modes of operation during transmissions of individual units of programming, and they can be monitored. (The techniques described here may use headers and trailers from time to time.) The embedded signals may run and repeat continuously throughout the programming or they may run only occasionally or only once. They may appear in various and varying locations. In television they may appear on one line in the video portion of the transmission, or on a portion of one line, or on more than one line, and will probably lie outside the range of the television picture displayed on a normally tuned television set. In television and radio they may appear in a portion of the audio range that is not normally rendered in a form audible to the human ear. In television audio, they are likely to lie between eight and fifteen kilohertz. Signals may also be transmitted on frequencies outside the ranges of television and radio. Different and differing numbers of signals may be sent in different and differing word lengths and locations.

The present invention provides a method for obscuring the meaning of the signals to prevent unauthorized use of the signals and of their associated programming. Their meanings may be obscured through encryption so that apparatus described below are necessary to decrypt them. In addition, the pattern of the composition, timing, and location of the signals may vary in such ways that only receiving apparatus that are preinformed regarding the patterns that obtain at any given time will be able to process the signals correctly. The term "signal unit" here means one complete signal instruction or information message unit. Examples of signal units are a unique code identifying a programming unit, or a unique purchase order number identifying the proper use of

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a programing unit, or a general instruction identifying whether a programing unit is to be retransmitted immediately or recorded for delayed transmission. The term "signal word" means one full discrete appearance of a signal as embedded at one time in one location on a transmission. Examples of signal words are a string of one or more digital data bits encoded together on a single line of video or sequentially in audio. Such strings may or may not have predetermined data bits to identify the beginnings and ends of words. Signal words may contain parts of signal units, whole signal units, or groups of partial or whole signal units or combinations. Both the arrangement of signal units in signal words and the locations, timings, and lengths of signal words in individual transmissions or groups of transmissions may vary in fashions that can only be interpreted accurately by apparatuses that are preprogramed with the keys to such variations.

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The present invention also provides a method for identifying attempts to make unauthorized use of signals and the programing associated with signals. When an apparatus finds that signal words fail to appear in places and at times when and where they are expected, the apparatus automatically contacts one or more remote sites and may or may not disable the flow of programing in one or more ways.

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The present invention contemplates ~~the~~ signal processing apparatus comprising a device or devices that can selectively scan transmission channels as directed. The channels may convey television, radio, or other transmission frequencies. The input transmissions may be received by means of antennas or from hard-wire connections. The scanners/switches, working

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in parallel or series or combinations, transfer the transmissions to ~~the~~ receiver/decoder/detectors that identify signals encoded in programming transmissions and convert the encoded signals to digital information; decryptors that may convert the received information, in part or in whole, to other digital information according to preset methods or patterns; and one or more processor/monitors and/or buffer/comparators that organize and transfer the information stream. The processors and buffers can have inputs from each of the receiver/detector lines and evaluate information continuously. From the processors and buffers, the signals may be transferred to external equipment such as computers, videotape recorders and players, etc. And/or they may be transferred to one or more internal digital recorders that receive and store in memory the recorded information and have connections to one or more remote sites for further transmission of the recorded information. The apparatus has means for external communication and an automatic dialer and can contact remote sites and transfer stored information as required in a predetermined fashion or fashions. The apparatus has a clock for determining and recording time as required. It has a read only memory for recording permanent operating instructions and a programmable random access memory controller ("PRAM controller") that permits revision of operating patterns and instructions. The PRAM controller may be connected to all internal operating units for full flexibility of operations.

Signal Processing Apparatuses that are employed in specific situations that require fewer functions than those provided by the basic apparatus described above may omit one or more of the specific operating elements described above.

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Brief Description of the Drawings

Fig. 1 is a block diagram of one embodiment of a Signal Processing Apparatus.

Fig. 2A is a block diagram of a TV Signal Decoder.

Fig. 2B is a block diagram of a Radio Signal Decoder.

Fig. 2C is a block diagram of an Other Signal Decoder.

Fig. 3 is a block diagram of Signal Processing Apparatuses and Methods as they might be used in an intermediate transmission facility, in this case a cable system head end.

Fig. 4 is a block diagram of one embodiment of a Signal Processing Apparatus used to prevent unauthorized reception and use of signals and programming at a consumer receiver site such as a home, theater, business, etc.

Fig. 5 is a block diagram of one embodiment of a Signal Processing Apparatus used to gather data on viewership patterns and as a ratings meter.

Fig. 6 is a block diagram of one embodiment of Signal Processing Apparatuses and Methods as they might be used at a consumer receiver site.

Description of the Preferred Embodiments

The Signal Processor Apparatus

The signal processor apparatus for simultaneous use

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with a cablecast input that conveys both television and radio programming and a broadcast television input is shown in Figure 1. As shown, the input signals are the entire range of frequencies or channels transmitted on the cable and the entire range of broadcast television transmissions available to a local television antenna of conventional design. The cable transmission is input simultaneously to switch 1 and mixer 2. The broadcast transmission is input to switch 1. Switch 1 and mixers 2 and 3 are all controlled by local oscillator and switch control 6. The oscillator, 6, is controlled to provide a number of discrete specified frequencies for the particular radio and television channels required. The switch, 1, acts to select the broadcast input or the cablecast input and passes transmissions to mixer 3 which, with the controlled oscillator, 6, acts to select a television frequency of interest that is passed at a fixed frequency to a TV signal decoder, 30.

Decoder 30 is shown more fully in Figure 2A. In the decoder, 30, the frequency passes first through filter 31 which defines the particular channel of interest to be analyzed. The television channel signal is then transmitted to a standard amplitude demodulator, 32, which uses standard demodulator techniques well known in the art to define the television base band signal. This base band signal is then transmitted through separate paths to three separate detector devices. These separate detectors are designed to act on the particular frequency ranges in which the encoded information may be found. The first path, designated A, inputs to a ~~vertical band indicator~~ line receiver, 33. This ~~vertical band indicator~~ line receiver, 33, detects the existence of an encoded signal or signals in one or more of the vertical bands normally used to define a television picture. It receives and detects only that portion or portions

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of the overall video transmission and passes this line portion or portions to a digital detector ~~?? and~~ 34, which acts to decode the encoded signal information in the line portion or portions. The base band signal is also inputted through path B to an audio demodulator, 35, which further inputs a high pass filter, 36, and a digital detector, 37. The digital detector, 37, through standard detection techniques well known in the art, determines whether a particular signal is present in the transmission in a pre-determined fashion. Path C inputs the ~~separately~~ defined transmission to a digital detector, 37777.

If one returns to Figure 1, one sees that the three separate lines of information outputted from TV signal decoder, 30, are then gated to a buffer/comparator, 8, which also receives other inputs from the other separate receivers comprising similar filters, demodulators, and decoders for other channels of interest.

One such other path is that from mixer 2. Mixer 2 and the controlled oscillator, 6, act to select a radio frequency of interest which is inputted to a radio signal decoder, 40, shown in Figure 2B. ~~???~~ Filter ~~???~~ The frequency passes first through standard radio receiver circuitry, 41, well known in the art, a radio decoder, 42, and a standard digital detector, 43. As Figure 1 shows, the radio signal detector outputs to buffer/comparator 8.

(The signal processor apparatus described here is configured to receive broadcast TV transmissions and cablecast TV and radio transmissions. Were it desirable to process signals in other transmissions such as broadcast microwave transmissions or cablecast transmissions on other than standard TV and radio frequencies, the mixers and switches would be appropriately reconfigured and one or more other signal decoders as described in Figure 2C would be added. As

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(13)

Figure 2C shows, the desired frequencies would pass through appropriate other receiver circuitry, 45, well known in the art, and an appropriate digital detector, 46, before being outputted to buffer/comparator 8.)

Buffer/comparator, 8, organizes the data stream that it receives according to a pre-determined fashion that enables buffer/comparator, 8, among other things, to assemble signal units from signal words. In a pre-determined fashion, buffer/comparator, 8, identifies signal words and/or signal units that must be decrypted, either in whole or in part, and passes identified signal words and/or units to decrypter, 10. Decrypter, 10, uses conventional decrypter techniques, well known in the art, in a pre-determined fashion to decrypt such signals as required. Decrypter, 10, then passes the decrypted signals to processor or monitor, 12. Buffer/comparator, 8, passes signal words and units not identified as requiring decryption directly to processor or monitor, 12.

Processor or monitor, 12, analyzes, in a pre-determined fashion, the signal words and units that it receives and determines whether they are to be passed to external equipment or to buffer/comparator, 14, for further processing or both. If a signal or signals are to be passed externally, processor unit, 12, identifies, in a pre-determined fashion, the external equipment to which the signal or signals are addressed and passes them to appropriate jack ports for external transmission. If they are to be processed further, processor or monitor, 12, passes them to buffer/comparator, 14.

Buffer/comparator, 14, has means for identifying, according to a predetermined fashion, which signals are to be recorded. To avoid overloading digital recorder, 16, with duplicate data, buffer/comparator, 14, has means for counting and discarding duplicate signals. Buffer/comparator, 14, is connected to clock, 18. It can identify signals according

*External
Delayed Means*

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to telephone

Buffer/comparator, 18, has means for adding information such as time of receipt, for example, to signals. Upon determining in a pre-determined fashion that a signal word or unit should be passed, buffer/comparator, 14, transmits the combined information to a digital recorder, 14. Buffer/comparator, 8, also has

Digital recorder, 14, may be a memory storage element of standard design. It has means for determining in a pre-determined fashion how full it is and passing this information to controller, 20. The pre-determined fashion may include provisions whereby recorder, 14, informs controller, 20, automatically when it reaches a certain level of fullness.

The signal processor apparatus also has a controller device which includes programable random access memory controller 20, read only memory 21 that may contain a unique digital code capable of identifying the signal processing apparatus uniquely, when used, an automatic dialing device 24, and a telephone unit 2. The controller, 20, governs the operation of all operating elements of the apparatus. The controller, 20, inputs the local oscillator, 6, a sequential pattern to select the various channels to be received by switch, 1, and mixers, 2 and 3. This then allows the channels to be diverted to the detectors, receivers, and decoders in any predetermined pattern desired. The controller, 20, can instruct signal decoders, 30 and 40, when, where, and how to look for signal words, which allows signal words to be received in any pattern or patterns. It can instruct buffer/comparator, 8, how to assemble signal words into signal units and join units together for further transfer and how to determine which signals to pass to decrypter, 10. It can tell decrypter, 10, when and how to change decryption patterns, fashions, and techniques. It can tell processor or monitor, 12, how to determine which signals to pass externally and when and where and how to determine which signals to pass to

means for determining in a pre-determined fashion

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Smoking lock

and how to determine which signals to pass to buffer/comparator, 14. It can tell buffer/comparator, 14, what and how to count, what and how to mark signals, and what received signals to discard. The controller, 20, also inputs the digital recorder, 16, to direct it to output the information from the memory of the recorder, 16, to telephone connection, 22, and hence to the collection site at the remote geographical location. The controller, 20, also controls the automatic telephone dialing device, 24, to allow the apparatus to automatically output its own information in accordance with a predetermined sequence and to change telephone numbers dialed.

To facilitate the operation of the device, the controller, 20, can receive information from all operating elements of the apparatus. Signals can be passed to the apparatus ~~by means of the programming~~ by means of the programming transmissions input at switch, 1, and mixer, 2. An example of such a signal is an instruction for the apparatus to contact a remote telephone unit. The processor unit, 12, has the capacity to identify instruction signals for controller, 20, and pass them to controller, 20, over control information lines. Buffer/comparator, 14, has the capacity to pass received time signals to the controller, 20, in a predetermined fashion set by and changeable by controller, 20. Buffer/comparator, 8, and monitor or processor, 12, each have the capacity to inform controller, 20, when signals that they are instructed to look for in predetermined fashions, set by and changeable by controller, 20, fail to appear. Oscillator, 6, the controller, 20, and buffer/comparator, 8, can interact in such a fashion that buffer, 8, can identify the channel that any given signal is received on and mark the signal for subsequent identification of the channel. Digital recorder, 16, can tell the controller, 20 when it reaches predetermined

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levels of fullness to permit the controller, 20, to instruct auto dialer, 24, to contact an appropriate remote site allowing the recorder, 16, to output its data making memory available.

Note on remote telephone normally instructing the controller to erase memory following successful transmission of data but controller having authority to ignore such instructions in the event the same data is to be conveyed to a second remote telephone

The controller, 20, can shut off any element or elements of the apparatus in whole or in part. It is interactive with external sources via telephone connection, 22, and can be reprogrammed from such remote sources. It follows standard password protection techniques well known in the art.

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~~It is worth adding that~~ In any of the ~~cases~~ illustrated in Figures 4A through 4E, signal processors, 77777, could ~~also~~ operate in a predetermined fashion and telephone a remote site to get an additional signal or signals necessary for the proper decryption and/or transfer of incoming programing transmissions.

clarify programing signal words into signal units

Methods for Monitoring Reception and Operation

Figure 5 illustrates methods for monitoring reception and operation which methods can be used to gather statistics on programing usage and associated uses of other data transmissions and equipment. Such statistics are necessary, for example, in the development of television program ratings.

Figure 5 shows two conventional TV sets, 132 and 144, a conventional video cassette recorder, 135, a conventional videodisc player, 137, a conventional radio, 141, a conventional microcomputer, 142, a conventional data printer, 146, and a television set, 148, that is capable of displaying two different television television programing transmissions at once. This is only a representative group of equipment. Many other types of television and radio players and recorders could be included in Figure 5.

Except for the videodisc player which neither records nor displays programing or other data, each unit has an appropriate associated signal decoder. Each decoder is likely to be located physically inside its associated player/recorder unit. Each is located at a point in the associated unit's circuitry where it receives every ~~code~~ ^{subcarrier} signal on the programing channel or data channel to which the unit is tuned for which the decoder is programed in a predetermined fashion to search.

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If a unit like the microcomputer can receive transmissions from more than one source or of more than one kind--television, radio, or other--it will have ~~more than one decoder~~ ^{multiple decoders} in fact, each unit will have sufficient decoders of the right ~~kind~~ to monitor every channel and kind of transmission it can receive.

The signals for which the decoders are monitoring are likely to be unique digital codes that ~~identify the source~~ ^{may} of each programming or data unit received. They ~~will~~ ^{may} identify networks, broadcast stations, channels on cable systems, and possibly times of transmission. They may convey unique identifier codes for each program or commercial. In the case of data transmitted to the microcomputer, they ~~will~~ ^{may} be unique codes that identify the source and suppliers of the data. In the case of data received at the printer, they ~~will~~ ^{may} identify publications, articles, publishers, distributors, advertisements, etc. The decoders, 131, 136, 138, ~~139~~, 143, 145, 147, 149, and 150, may search for many types of codes, and the types described here provide only examples.

In Figure 5, each decoder receives every relevant signal received by its associated player or recorder unit. For example, TV decoder, 131, receives every signal for which it is instructed to search in a predetermined fashion in every programming unit played on TV set, 132, and transfers the signals to signal processor, 130, which has means to identify the source decoder from which each signal that it receives comes. TV set, 131, may receive such programming from many sources including cable converter box, 133, video cassette recorder, 135, and videodisc player, 137. Decoder, 136, receives every relevant signal on all programming recorded by video cassette recorder, 135, and transfers it to signal processor 130. Radio signal decoder, 138, operates similarly

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for radio, 141. Other signal decoder, 143, for microcomputer 142. TV signal decoder, 145, for TV set, 144 (which ~~may~~ ~~other programming~~ may receive programming inputs and associated signals generated or transferred by microcomputer, 142). Other signal decoder, 147, for printer 146. And TV signal decoders, 150 and 149, for each channel of programming received and displayed by multi-picture TV set, 148.

One particular advantage of these methods for monitoring programming is that, by locating the identifier signals in the audio and/or video and/or other parts of the programming that are conventionally recorded by, for example, conventional video cassette recorders, these methods provide techniques for gathering statistics on what is recorded on video cassette recorders and on how people replay such recordings. For example, a person might instruct video cassette recorder, 135, automatically to record the NBC Network Nightly News as broadcast over station WNBC in New York City. Recorder, 135, might receive the programming over Manhattan Cable TV channel 4 and record the programming from 7:00 PM to 7:30 PM on the evening of July 15, 1985. Each discrete bit of this information could be conveyed to recorder, 135, in a signal unit or units in the programming so received and recorded. Decoder, 136, would identify these signals and transfer them to signal processor, 130. Subsequently, the person might play the recorded programming on TV set, 132, from 10:45 PM to 11:15 PM the same evening. This time, TV signal decoder, 131, identifies the embedded signals and transfers them to signal processor, 131. Pre-recorded video cassettes and videodiscs could also contain unique embedded codes that would identify their usage (and could also transfer instructions to other external equipment). ~~Present set has no such method for gathering statistics on the operation of~~

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~~video cassette recorder and the usage of either recorded or
pre-recorded video cassettes or videodiscs~~

Signal processor, 130, would probably receive these signals from decoders, 136, and 131, ~~and also signals from decoders, 138, 143, 145, and 147~~ at its buffer/comparator unit, 14 (referring to Fig. 11, in a predetermined fashion that would permit signal processor, 130, to identify which decoder the individual signals come from and, in a predetermined fashion, create a signal string by appending digital information to the received signal which information might identify the individual decoder, 131, 136, 138, 143, 145, or 147, and the time of receipt at signal processor, 130. To minimize the use of data recorder, 16, buffer/comparator, 14, may evaluate signals in a predetermined fashion and discard some signals rather than passing them to the recorder, 16. It may compare each signal from a given source such as decoder, 131, with other signals received earlier from the same source. It may only count incoming duplicate signals or it may append a time code to the end of the basic signal string formed around the first received signal and alter this time designation each time a new duplicate signal is identified so that the time code identifies the time of receipt of the last duplicate signal. Whatever method is used, the buffer/comparator, 14, may discard all duplicate signals received. At a time when buffer/comparator, 14, determines in a predetermined fashion that it will receive no further duplicate signals, it transfers the full signal string to recorder, 16.

** device 139 illustrates another use and method.**

** Sig. Proc. can tell devices where to look.**

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Methods for Governing or Influencing the Operation of
Equipment that is External to Conventional
Television and Radio Sets by Passing Instruction
and Information Signals that are Embedded in
Television and Radio Programing Transmissions to
Such External Equipment

Signal processor apparatus⁴ have the ability to
identify instruction and information signals in one or more
inputted television and radio programing transmissions,
identify and discriminate among one or more pieces of external
equipment to which such signals are addressed, and transfer
such signals to such equipment as directed. This permits
many valuable ^{techniques} ~~methods~~ for facilitating the operation of such
external equipment.

Figure 6 illustrates one possible configuration of
equipment in a home or office or other television and/or
radio receiving site. Before...

Governing the Home or Office Environment

Figure 6A illustrates a method for governing a home
or office environment. One or more channels of television
programing transmissions input to signal processor, 200, and
cable converter box, 201, may contain signals intended for
microcomputer, 205, which signals convey information on
local weather conditions. Such signals might ^{include, e.g.,} ~~include~~ ~~include~~ ~~include~~
outside temperature and barometric readings. They may
include forecast data. Signal processor, 200, is always

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operating and monitors all incoming channels. It can convey such signals to microcomputer, 205, whenever it receives them. TV signal decoder, 203, can also identify such signals but only in the one TV channel transferred by box, 201, to TV set, 202, and then only when TV set, 202, is on and operating. Decoder, 203, transfers all ^{received} signals to processor or monitor, 204, which identifies the signals as addressed to microcomputer, 205, and transfers them to microcomputer, 205. Microcomputer, 205, uses such received signals, in a predetermined fashion, to govern the operation of furnace, 206, air conditioning system, 207, and window opening and closing ~~system~~, 208.

Co-ordinating a Stereo Simulcast

Figure 6B illustrates a method for automatic co-ordination of a multimedia presentation in one place, in this case a stereo simulcast. A person decides to watch a program on television that is stereo simulcast on a local radio station, too. The person turns on television, 202, and tunes to the proper channel. TV signal decoder, 203, detects signals in the programing transmission on the channel which signals it transfers to monitor or processor, 204. Monitor or processor, 204, determines that certain signals are addressed to switch, 202, and transfers these signals to switch, 202. These signals instruct switch, 202, to turn power on to radio, 209, and its associated ~~equipment~~, including a conventional ^{digital} tuner, 213. Monitor or processor, 204, also identifies signals addressed to tuner, 213, which it transfers accordingly. These signals instruct tuner, 213, to tune radio, 209, to the proper frequency for the simulcast. Automatically, by turning TV set, 202, to the channel with a stereo simulcast, the person has activated the stereo simulcast.

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At the end of the simulcast, signals are transcribed in the programing that decoder, 203, identifies and processor, 204, transfers to switch, 212, which signals instruct switch, 212, to turn off radio, 209, and deactivate the simulcast.

Figure 6B also shows signal processor, 200, monitoring for a data gathering and ratings service. TV signal decoder, 203, and radio signal decoder, 211, also identify certain signals that monitors or processors, 204 and 210 respectively, determine to identify the programs, etc. on the channels to which TV set, 202, and radio, 209, are tuned. The processors, 204 and 210, transfer this information to signal processor, 200, for recording and subsequent transmission to a remote data collection site. Simultaneously, processor, 200, is also monitoring sequentially all other broadcast transmissions in the locality to gather further data ~~on programming availability~~ to record and transmit to a remote site.

Methods for Receiving Selected Information and/or Programing

Figure 6C illustrates ~~methods for monitoring multiple programing channels and selecting information in a predetermined fashion~~. In this example, microprocessor, 205, is programed to hold a portfolio of stocks and wishes to receive news about these particular stocks and about the industries they are in. Several separate news services transmit news ~~that is carried on different channels~~ ^{on} ~~on~~ the multi-channel cable transmission to converter boxes, 222 and 201, and to signal processor, 200. The news services precede each news transmission with a unique signal that uniquely identifies the company or companies to which the news item refers and/or the industries. In a predetermined fashion, microcomputer, 205, instructs signal processor, 200, to hold examples of the sought for unique signals in its buffer/comparator, 8,

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and compare them with all incoming signals. Signal processor, 200, scans sequentially all channels. When it identifies a signal of interest, it relays that information and the channel identifier, in this illustration, to microcomputer, 205. In a predetermined fashion, either microcomputer, 205, or signal processor, 200, instructs tuner, 223, to set cable converter box, 222, to the proper channel, and microcomputer, 200, may record the information in memory or transfer it to printer, 221, for printing. ~~---~~

In the same fashion, microcomputer, 205, may also instruct signal processor, 200, to monitor single or multiple television channels and/or radio channels for programming of interest in addition to or instead of other transmission channels. *preinformed*

In another example, microcomputer, 205 may be *preinformed* that a certain television program, hypothetically "Wall Street Week," should be televised on TV set, 202, when it is cablecast. Microcomputer, 205, is preinformed of the time of cablecasting. When that time comes, microcomputer, 205, receives no program identification signals whatever from TV signal decoder, 203, which indicates that the set, 202, is not on. Microcomputer, 205, instructs signal processor, 200, to pass all program and channel identifiers on all programming being cablecast on the multi-channel system. Analyzing these identifiers in a predetermined fashion, microcomputer, 205, determines that "Wall Street Week" is being televised on channel X. Then, in a predetermined fashion, microcomputer, 205, may instruct tuner, 214, to switch box, 201, to channel X and may instruct control system, 220, to turn video recorder, 217, on and record "Wall Street Week," and also microcomputer, 205, may instruct switch, 216, to turn TV set, 202, on and tuner, 215, to tune

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in a predetermined fashion
Signal processor, 200, relays this information to microcomputer, 205, which is preinformed of the time of cablecasting. Microcomputer, 205, may instruct tuner, 214, to switch box, 201, to channel X and may instruct control system, 220, to turn video recorder, 217, on and record "Wall Street Week," and also microcomputer, 205, may instruct switch, 216, to turn TV set, 202, on and tuner, 215, to tune

appropriately to "Wall Street Week,"

Method for Co-ordinating Multimedia Presentations in Time

Figure 6C can also illustrate how programing delivered at different times to one place can be co-ordinated to give a multimedia presentation at ~~the same~~^{the} time in ~~the same~~^{the} place.

Each weekday, microcomputer, 205, receives, about 4:30 PM, by means of a digital information channel, all closing stock prices applicable that day. It may receive these directly or it may automatically query a data service for them in a predetermined fashion. It records those prices that relate to the stocks in its stored portfolio.

Microcomputer, 205, is preprogramed to respond in a predetermined fashion to instruction signals embedded in the "Wall Street Week" programing transmission. When the "Wall Street Week" transmission begins at 8:30 PM ^{on Friday evening,} several instruction signals are identified by decoder, 203, and transferred to microcomputer, 205. These signals instruct microcomputer, 205, to generate several graphic video overlays, which microcomputer, 205, has the means to generate and transmit and TV set, 202, has the means to receive and display, and to transmit these overlays to TV set, 202, upon command. Subsequently in the program, the host says, "Here is what the Dow Jones Industrials did in the past week," and a studio generated graphic is pictured. The host then says, "Here is what the broader NASDAQ index did in the week past," and a studio generated graphic overlay is displayed on top of the first graphic. Then the host says, "And here is what your ~~portfolio~~^{portfolio} ~~did~~." At this point, an instruction signal is generated in ~~in~~ the television studio originating the programing ~~which~~^{and} is transmitted in the programing transmission. This signal is identified by decoder, 203, and transferred

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via processor, 204, to microcomputer, 205. This signal ^{to TV set, 202,} instructs microcomputer, 205, to transmit the first overlay for as long as it receives the same instruction signal from processor, 204. The viewer then sees a microcomputer generated graphic of his own stocks' performance overlay the studio generated graphic. When the two studio generated graphics are no longer displayed, the studio stops sending the instruction signal, and the microcomputer, 205, ceases ~~transmitting~~ sending its own graphic to TV set, 202, and prepares to send the next locally generated graphic overlay upon instruction from the originating studio.

This is only one of many examples of the co-ordination at one time and in one place of programing and information material delivered at different times.

Co-ordinating Print and Video

Figure 6D illustrates one method for co-ordinating the presentation of information through the use of print with video. Figure 6D also illustrates possible uses of a ^{local input} decrypter and a ~~signal generator~~.

Suppose a viewer watches a television program on cooking techniques that is received on TV set, 202, via box, 201. Julia Childs's "The French Chef" is one such program. Halfway through the program, the host says, "If you are interested in cooking what we are preparing here and want a printed copy of the recipe for a charge of only 10 cents, ^{and local input} press 567 on your Widget Signal Generator." The viewer then presses buttons 567 on ^{local input} ~~signal generator~~, 225, which signal is conveyed to the buffer/comparator, 8 (referring to Fig. 1), of signal processor, 200, to hold and process further in a predetermined fashion. Five minutes later, a signal is identified in the incoming programing on TV set, 202, by

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decoder, 203, which is also transferred by processor, 204, to buffer/comparator, 8, of signal processor, 200. This signal instructs buffer/comparator, 8, that, if 567 has been received from signal generator, 225, signal processor, 200, should, in a predetermined fashion, instruct tuner, 223, to tune cable converter box, 222, to the appropriate channel to receive the recipe in encoded digital form and instruct control means, 226, to activate printer, 221. The signal transmission also passes a signal word to signal processor, 200, which, in a predetermined fashion, signal processor, 200, decrypts and transfers to decrypter, 224, to serve as the code upon which decrypter, 224, will decrypt the incoming encrypted recipe. Then, as part of the predetermined operation, signal processor, 200, conveys to its data recorder, 16, information that the 567 order was placed by the viewer and all necessary equipment was enabled. When the transmission of the recipe is received, box 222, transfers the transmission to decrypter, 224, for decryption and thence to printer, 221, for printing. Other signal decoder, 227, identifies a signal in the transmission received by printer, 221, which it passes via processor, 228, and buffer/comparator, 14, of signal processor, 200, to data recorder, 16. This signal indicates that the recipe, itself, has been received. Subsequently, when signal processor, 200, transfers the data in its data recorder, 16, via telephone to a remote site, that site can determine for billing purposes that the recipe was, first, ordered and, second, delivered.

(An alternate method for transmitting the recipe to printer, 221, would be for the recipe, itself, to be located in the encoded digital form in the programing transmission recieved by TV set, 202. In this case, decoder, 203, would identify the signals conveying the recipe and transfer them

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via processor, 204, to signal processor, 200, which would decrypt them, itself, and transfer them, via means which in this case it would have, to printer, 221.)

Method for Using Signaling and Decryption Techniques in the Distribution of Copyrighted Materials

Figure 6E illustrates a signaling and decryption technique which could serve to facilitate the electronic distribution of copyrighted materials such as books and movies by tending to discourage piracy and the unauthorized retransmission of copies, whether they be properly acquired or pirated.

Figure 6E could be any home or commercial establishment but is described here as a book store. Using conventional laser videodisc equipment and techniques, well known in the art, a publisher has put his full line of books on laser discs in encrypted form and distributed one copy of each disc to each of his authorized book store retail outlets. He has also distributed to each a conventional computer floppy disk for use on conventional microcomputer, 205, that can operate conventional laser videodisc system, 232, in a predetermined fashion to locate and transmit individual titles in his line.

A customer comes into the book store and asks to buy a title, hypothetically, How to Grow Grass. The salesman asks the customer for suitable identification, types into microcomputer, 205, the customer's name and address and that he wishes to purchase How to Grow Grass. Microcomputer, 205, may check to determine that the customer has no record as a pirate then transfers his name and address to buffer/comparator, 8 (referring to Fig.1), of signal processor, 200, and instructs laser videodisc system, 232, to transmit its encrypted copy

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of How to Grow Grass to printer or other means, 221, via decryptors, 224 and 231. Laser system, 232, transmits one copy of the encrypted title to decryptor, 224, and one to signal processor, 200, for processing and evaluation.

In the encrypted title, signal processor, 200, identifies one or more signal words. If signal processor, 200, has the customer's name and address and the bookstore is a retail outlet in good standing, signal processor, 200, decrypts the signal word or words and transfers them to decryptor, 224, to serve as the code for the first stage of decryption.

Decryptor, 224, then decrypts a part of the encrypted transmission and passes the partly decrypted transmission to signal stripper, 229, and signal generator, 230. In the decrypted portion of the partially decrypted transmission, signal processor, 200, identifies a second signal word or set of words which it decrypts in a predetermined fashion and passes to decryptor, 231, to serve as the code basis for the second stage of decryption. Signal processor, 200, also may instruct signal stripper, 229, to remove this second signal word or words. Signal processor, 200, also passes the customer's name and address to signal generator, 230, which generates a signal embedding the customer's name and address in the programing in a suitable place or places in a suitable fashion. (Signal processor, 200, may also transmit the customer's name and address to printer or other means, 221, for actually printing of the customer's name and address in the text.) The transmission then passes through decryptor, 231, which completes the decryption process and passes the decrypted programing transmission to printer or other means, 221, and also to signal processor, 200. Signal processor, 200, receives and analyzes the signal content of the programing output of decrypter, 231 to ensure that stripper, 229, and

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and generator, 230, have functioned properly. If they have not, signal processor, 200, shuts down the decryption of the title and prevents its delivery to the customer.

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- 2 This line receives
- 3 configured to
- 4 transmission.
- 5 look for signals
- 6 session set
- 7 digital signals
- 8 controller activates

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