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Cohen

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[54] **NON-OBTRUSIVE PROGRAMMING MONITOR**

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[51] **Int. Cl.**[5] **H04N 17/00**

[52] **U.S. Cl.** **358/84**; 455/2; 455/151.4

[58] **Field of Search** 358/84, 181; 455/2, 455/151, 151.4, 151.1, 151.2; 340/825.22, 825.56

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,225,970	9/1980	Jaramicco et al.	455/89
4,622,583	11/1986	Watanabe et al.	455/2
4,876,736	10/1989	Kiewit	455/2
4,885,632	12/1989	Mabey et al.	358/84
4,907,079	3/1990	Turner et al.	358/181
4,912,552	3/1990	Allison et al.	358/84
4,943,963	7/1990	Waechter et al.	455/2
4,972,503	11/1990	Zurlinden	455/2

Primary Examiner—Reinhard J. Eisenzopf
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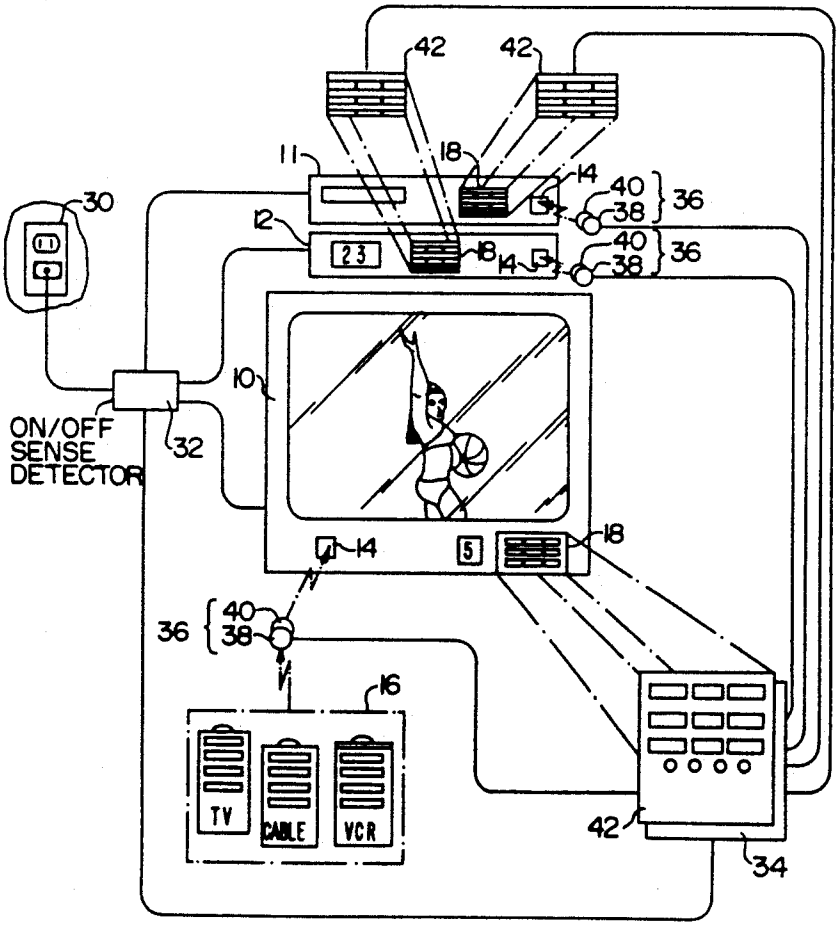
[57] **ABSTRACT**

A meter for unobtrusively monitoring the tuning of a home entertainment center. The device is able to work with remote controls of components of the center. The present invention receives signals from the remote control(s), decides to which component the signal was intended, sends an infrared signal to the proper component, and stores tuning information regarding the center. The stored information may be retrieved at a later time and used to make programming decisions. The present invention includes infrared sensors which receive the signals from the remote(s), a microprocessor, and a transmission device to transmit the signal to the intended device. Alternately, the control signal may be generated by a touch panel array placed over digital keypads of the center's components. When a key is pushed, the control signal is generated. The touch panel array(s) can serve solely or in combination with the remote control(s) to generate control signals.

40 Claims, 3 Drawing Sheets



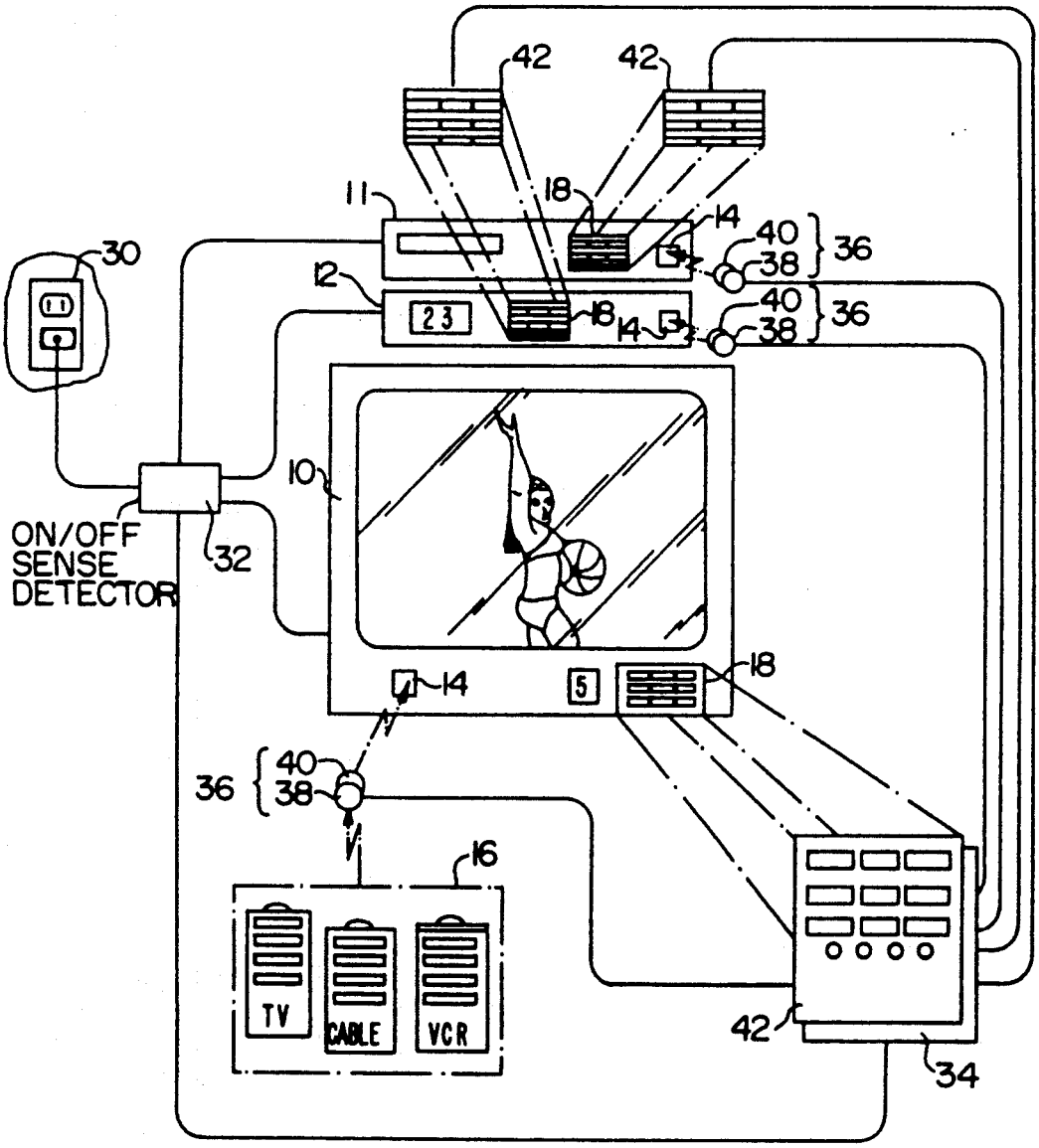


FIG. 1

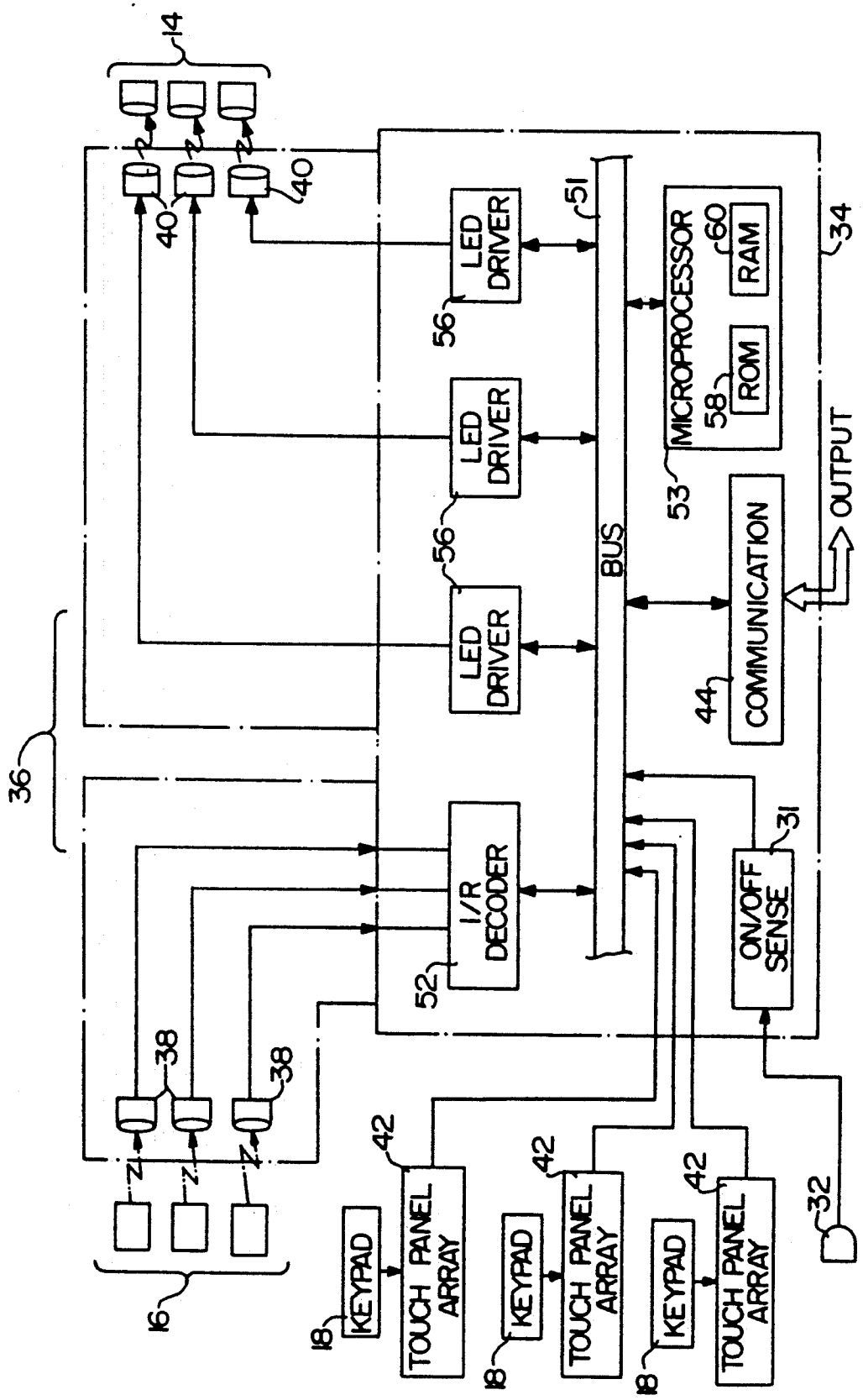


FIG. 2

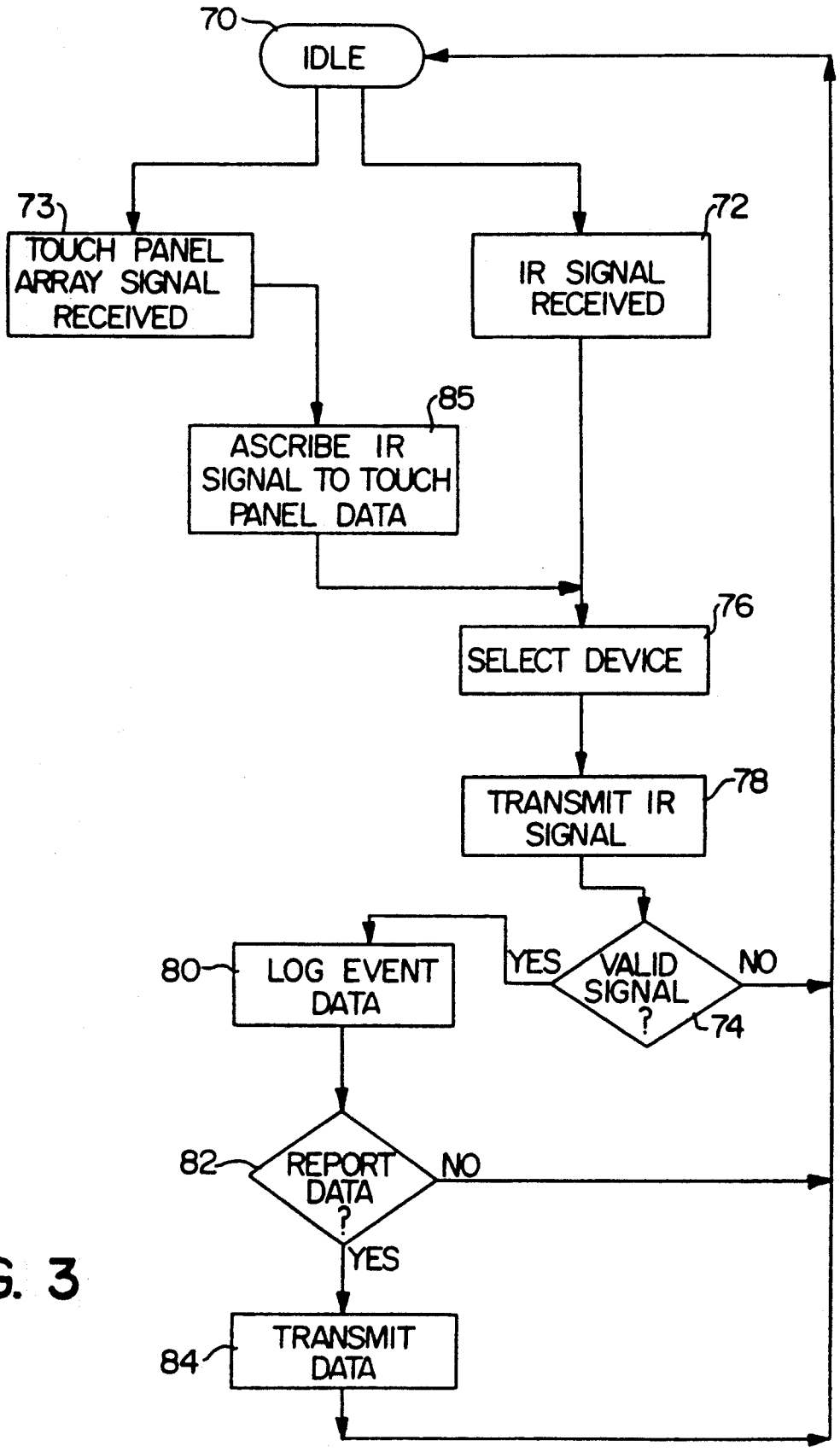


FIG. 3

NON-OBTRUSIVE PROGRAMMING MONITOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the monitoring of home entertainment centers having components with either digital controls thereon or digital remote controls. More particularly, the present invention can monitor the programming being enjoyed by an audience through an audio/video receiver (such as a television or audio receiver), even though the programming may be coming from any of a number of sources such as over the air, from a cable or from a video cassette recorder (VCR).

2. Description of the Prior Art

In the entertainment industry, ratings are all important for determining advertising rates and for adjusting programming. The viewing habits of an audience must be monitored to generate the ratings without altering or disturbing such habits. Any monitoring equipment must present the same or equivalent ergonomics that the viewer had previously enjoyed. Information obtained from such monitoring is used by networks and other programming sources in making programming decisions, especially since the entertainment industry is locked in fierce competition for larger shares of the viewing market.

Television monitoring systems have recently been developed and are described in the patent literature. U.S. Pat. No. 4,769,697 to Gilley et al. teaches a passive television audience measuring system. This system accepts viewer responses concerning the programming being watched, and can therefore collect viewer as well as programming information. However, this information must be supplied by the viewer. No suggestion is made concerning how to monitor complete home entertainment centers that include cable and VCRs, particularly without viewer input.

U.S. Pat. No. 4,613,904 to Lurie also discloses a television monitoring device. This device monitors a rolling bar code that is displayed when initiating viewing or switching channels. This device does not monitor a plurality of components nor is it unobtrusive as it requires a photocell to cover a section of the television screen so that the rolling bar code can be detected. There is no suggestion that this device may be used with a plurality of components.

Another patent to Lurie, U.S. Pat. No. 4,626,904, discloses a device for passively logging the presence and identity of viewers of a television, and stores channel information. This device requires that all the viewers wear headphones and is therefore not "ergonomic".

A final patent to Lurie, U.S. Pat. No. 4,779,198, deals with an audience monitoring system. This device is particularly oriented towards monitoring people entering and leaving a room. Each entrance to a room is fitted with a motion detector. In response to the detector the monitor records when people come and go and further records channel selection from the television. There is no mention of monitoring a complete home entertainment center.

Systems for detecting and monitoring the channel to which television receiver systems are tuned are known in the art. However such systems are not useful with entertainment systems having plural components with digital controls or digital remote controls. Previous monitoring systems are disclosed in U.S. Pat. Nos. 4,605,958 and 4,816,904 to Machnik et al and McKenna et al. respectively.

Machnik et al. monitor the channel selected by a cable converter of a television system and stores information pertinent thereto. The cable is attached to the device which monitors the signal. The output of the device is applied to the cable converter.

McKenna et al. disclose remote units that are controlled from a central location, each unit being attached to a television receiver. The device can store information relating to television mode as well as viewer identification.

Previous patents have disclosed a "smart" or reconfigurable remote control transmitter which may be used with a plurality of remotely controlled products, each of which is normally controlled by signals from an associated remote control. Such a device is taught by Evans et al. in U.S. Pat. No. 4,825,200. A similar device, which is capable of learning, storing and repeating the control codes from any other infrared transmitter, is disclosed in both U.S. Pat. No. 4,626,848 to Ehlers and U.S. Pat. No. 4,623,887 to Welles, II. Seymour et al. in U.S. Pat. No. 4,709,412 teach a device which can hold a plurality of infrared remote controls.

While all of the devices above have the ability to learn the functions of other remote controls, none teach or suggest recording the information about channel selection or about which device is in use at certain times for later retrieval and analysis.

Dockery, U.S. Pat. No. 4,809,359, teaches a system for extending the effective operational range of infrared remote control system using a radio signal. A remote control transmitter incorporated into a television receiver is disclosed by Rumbolt et al. in U.S. Patent 4,841,368. Uehira, in U.S. Pat. No. 4,755,883, discloses a removable information inputting device. Uehira is intended to put information into an electronic device so that a specific function, such as taping a movie on a specific day and time, may be carried out. U.S. Pat. No. 3,641,299 to Mayer discloses a switch having a transparent area that is suitable for placement over a video display.

Hence, the prior art is deficient in not being able to unobtrusively monitor the viewing habits of an audience with regard to a home entertainment center where multiple components can receive signals from multiple sources. None of the known prior art can transfer information from one or more remote controls or on-device digital inputs to the appropriate piece of equipment in a home entertainment center and at the same time store data relating to what piece of equipment was in use at what time and what channel of a television was being viewed.

SUMMARY OF THE INVENTION

The present invention provides a device that can receive a digital command, transfer it to the appropriate member of an entertainment system, store information reflecting what piece of equipment was in use and what channel was the active channel of the television and later transmit such information to a central computer.

The present invention accurately monitors and meters the audio/video (A/V) tuning and channel selection of a digitally controlled home entertainment center in an unobtrusive manner so that control signals are not interfered with and there is no requirement for any electrical connections to the tuning systems of the com-

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