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# VCR CONTROL SYSTEM

The present invention relates to a VCR control system.

The present applicant has already invented an automatic recording/playback system for TV programs disclosed in Japanese Laid Open Patent No. 61-284121. According to that prior art, the order of recording of programs is specified by programming of the VCR before a user leaves his home. The order of playback is the same as the order of recording, which is a disadvantage if the user has not time to watch all the recorded programs and if - as likely the order of recording is not the same as the order of preference of viewing.

It is an object of one aspect of the present invention to provide a video recorder control system which overcomes this disadvantage.

Accordingly, the present invention consists, in one aspect, in a video recorder control system comprising computer means including means for storing a list of recorded television programs in an order based on program recording operations; means for displaying the stored list of recorded television programs to the user; means for changing the displayed list of recorded television programs to a playback order different from the order based on the program recording operations; and means for automatically controlling the rewinding and fast forwarding of the video recorder to play back selected recorded programs in the playback order.

The present invention consists, in another aspect, in a method of controlling a computer controlled video cassette recorder (VCR), comprising the steps of:

recording a sequence of programs in accordance with an individual program table of a user;

storing a list of television programs recorded during a predetermined time period in an order based on program recording operations;

displaying the list of recorded television programs to the user;

changing the order of recorded programs to a new playback order selected by the user and different from the order based on program recording operations; and

automatically rewinding or fast forwarding the VCR as necessary to play back the recorded programs in the new playback order;

whereby the user can play back selected recorded programs in the new playback order.

The invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a block diagram of a computer controlled VCR system in accordance with the invention.

Figure 2 is a view of a CRT display showing a one week TV program schedule.

Figure 3 is a flow chart of a recording operation for TV programs in accordance with a TV program schedule in the VCR.

Figure 4 is a table of function keys and corresponding functions carried out by the invention.

Figure 5 is a menu displayed on the CRT during operation of the invention.

Figure 6 is a CRT display of a first order of TV recorded programs.

Figure 7 is a CRT display of a revised order of TV recorded programs in accordance with the invention.

Figure 8 is a representation of a data table used in the invention.

Figure 9 is a flow chart of computer programming for operating the VCR in accordance with principles of the invention.

In Figure 1, reference numeral 1 denotes a personal computer, e.g., an MSX type computer. In the personal computer 1, reference numeral 11 denotes a microprocessor (cpu: central processing unit), reference numeral 12 denotes a ROM (read only memory) which has prestored therein a program including a boot program for loading computer programming and data stored on a disk to be explained later. Reference numeral 13 is a RAM 9 (random access memory) for storing the data and program. Reference numeral 14 is a keyboard, and reference numeral 15 is an interface board for connecting the keyboard 14 to the cpu 11 through a common bus. Reference numerals 16 - 20 designate interface boards that connect a floppy device of reference numeral 2, a CRT display of reference numeral 3, a VCR of reference numeral 4, a mouse (to be explained later) of reference numeral 7 or a touch panel (to be explained later) of reference numeral 8 for inputting users' instructions to the personal computer 1.

Reference numeral 5 denotes a TV (television), and reference numeral 6 denotes a printer used for making a hard copy of a TV program schedule, etc., displayed on CRT display 3, to be explained later. Operation of the device shown in Figure 1 will now be described with reference to Figures 2 to 7.

A one week TV program schedule, which is favoured by the user, is prestored on a disk (not shown) in the floppy device 2 in Figure 1 by a process described in the above noted reference.

Figure 2 shows a part of the schedule for Monday displayed on the CRT display as an example, and this display for Monday is designated by a one week TV program schedule store on the disk. It is clear from Figure 2 that time schedules are divided by every fifteen minutes; TV programs on channel 1 are recorded from 10:00 AM to 10:30 AM in the VCR 4, TV programs on channel 4 are recorded from 10:30 AM to 10:45 AM in the VCR 4, and TV programs on channel 6 are recorded from 10:45 AM to 11:00 AM in the VCR 4 (the rest is omitted).

Figure 3 denotes a flow chart showing a recording operation for recording TV programs in accordance with a TV program schedule in the VCR 4.

When a power source of the personal computer 1 shown in Figure 1 is set to "ON" or the reset button 21 is operated, the boot program stored in the ROM 12, or the program stored on the disk by similar means, is loaded on the specific part in the RAM 13. A TV program schedule stored on the same disk or a different disk is loaded onto a different part in the RAM 13 by executing the program (step 301 and step 302).

As above, the loaded program compares the time of a real time clock (not shown in the drawings) in the personal computer 1 with the time of TV program schedule loaded as above. When the time of the clock coincides with the time of a desired TV program, the VCR 4 is operated in a recording condition through interface board 18, and starts to record a TV program of the required channel

(step 303). When fifteen minutes has passed in step 304, it is checked whether recording of the same program should be continued or not in accordance with the loaded TV program schedule (step 305). When recording of the same program is to be continued, the program returns to step 304, and extends only another fifteen minute recording time. However, when recording of a different TV program is started, step 306 checks whether recording of all the TV programs is finished or not. If not, in step 307, the next TV program is read out, and the software program returns to step 303 to switch on recording operation of the VCR for the new program. The starting position and the ending position on the tape in each program are recorded by reading out an output from a tape counter in the VCR 4, not shown in the drawings.

In this embodiment, the interface board 18 to connect the VCR 4 to the microprocessor 11 is made of an integrated circuit (e.g., an 8255 integrated circuit) for parallel input and output, and switching transistors. A switching transistor is set to be "ON" or "OFF" by a command from the personal computer 1 through the interface and a manual switch of the VCR 4, for example, the recording button, the channel button etc., of the VCR.

As above, when the program is loaded from the disk to the RAM 13, various controls can be carried out by the function keys F1, F2, F3, and F4 (each function key has each function shown in Figure 4) on keyboard 14.

For example, when the function key F1 is pushed, a one week TV program schedule is displayed on the CRT display in order, and the TV program schedule thus displayed can be modified at will.

The objective of the invention is to control the VCR to allow play back of the recorded programs in an order specified by the user after returning home, where the playback order may be different from the order in which the VCR recorded the programs. Thus, when the function key F5 is pushed, the sentences

shown in Figure 5 are displayed on the CRT display 3 by an interrupt operation. When the function "2... designation of the order for play back" is selected by the cursor key on the keyboard 14 and the return key is pushed, the indication shown in Figure 6 is displayed on the CRT display 3. This is the TV program recorded in accordance with the TV program schedule during an operator's absence.

In Figure 6, the language "a total of play back time" means the time actually recorded on the video tape, and this time is calculated by the clock (not shown) in the personal computer 1. For example, "3:10" shown in the drawings, which means three hours and ten minutes, is displayed. In watching all the programs recorded on the video tape, it is easy to confirm that it takes three hours and ten minutes to operate.

The times, the recorded TV programs, channels and status are displayed on the CRT display, wherein "status" is an indication of the condition of the recording. The reference symbol "o" indicates that the recording of a particular fifteen minute interval is midway. For example, if recording of the first TV program is started from 10:30 AM, however, when recording by the VCR is set to start at 10:35 AM, recording is not done for an entire fifteen minute interval, but is done for only ten minutes. The reference symbol "o" is displayed in the above condition. The reference symbol "o" indicates that recording for fifteen minutes has been done perfectly, and the reference symbol "X" indicates that no recording at all for fifteen minutes has done.

When it is clear to the user that it is difficult to watch all the recorded programs because of lack of time by the indication of the CRT display shown in the Figure 6, it is possible to designate the preferred order of viewing recorded TV programs by the process to be explained as follows.

A cursor (not shown) is set to the optional order position by the cursor key (except the position of the reference symbol "X", because nothing has been recorded in this position.) The number corresponding to the order is input and the return key is pushed. For example, after the cursor is set to "second order" shown in Figure 6 and the number "1" is input, when the return key is pushed, "second order" can be changed to "first order" (refer to the Figure 7 to be explained later).

When the number "0" as the order number is input, recording in this time is not played back (the recording in this time is passed by rewinding or forwarding the tape corresponding to the position of the next record to be played back).

When the requested designation of order is finished, only the return key is pushed. As a result, display on the CRT display 3 is switched, for example, to display of the order which is changed as shown in Figure 7. Namely, changing from "second order" to "first order" is displayed at the top ( the rest is omitted), "total of time for play back" is changed and the correct time for play back which is changed is displayed.

In order to play back the VCR in accordance with the preferred order changed as above, the cursor is set to "play back [ ]" of the bottom line on the CRT display shown in Figure 7, and the return key is pushed.

Various data displayed on the CRT display are transmitted to the specific place of the RAM as a data table shown in Figure 8, and the VCR is controlled in accordance with this data to be explained later.

In Figures 6 and 7, the beginning and ending positions (the beginning position and the ending position are read out by the personal computer which reads out the value of a tape counter displayed on the VCR corresponding to the running quantity of the video tape from the physical beginning point of the video tape through the interface board 18) of each program are not shown in the drawings because operation by a user is not directly related to these positions, but these positions are stored with each program in the RAM 13.

An operation of the VCR 4 controlled in accordance with the data transmitted to the data table in the RAM 13 is explained with reference to the flow chart shown in Figure 9. As above, a user orders play back, and after the data is transmitted to the data table in the RAM, the program shifts to step 901, and rewinding of the video tape is started. This operation is operated by a contact (not shown in the drawings) of a switch for rewinding the VCR 4 that is short-circuited by a switching transistor (not shown in the drawings) in accordance with a command from the cpu 1 through the interface board 18.

When the video tape is rewound to the physical beginning point, the value of the tape counter is set to "0000". Alternately, pulses form a revolution sensor (not shown in the drawings) connected to a reel for the video tape (not shown in the drawings) terminate to indicate the video tape has stopped.

When the program detects either condition, the program shifts to step 903, and stops running the video tape. A terminal of the stop key on the VCR 4 is short-circuited through a switching transistor. It is not necessary to rewind the tape to the physical

beginning point, because reference between the value of tape counter and value of tape position in the RAM is accurate.

In step 904 and step 905, the program reads out the first order from the data table, and displays the command at the corner on the TV 5 by the command function set in the personal computer 1.

The remaining time for watching and the channel are displayed on the TV 5, and so forth. (steps 906-909).

In step 910, the program reads out the starting position from the data table ( 100 ---- a value of tape counter) on the tape of the requested TV program. In steps 911, 912, 913 and 914, the program decides whether a video tape is played back or rewound or forwarded from the present position or not. In the above example, the starting position of the program which should be played back first in the condition where a video tape stops at the beginning point, is a value of 100 shown on the tape counter, and as a result, the program judges that step 911, step 912, and step 913 are negative and step 914 is affirmative (because "0" is input to the ending position of the last time.)

The program shifts to step 921, and forwarding of the video tape starts. The count value of the tape counter of VCR 4 is incremented from "0" corresponding to forwarding of the video tape at this time. This condition is tested in step 922, and when the value of tape counter on the VCR 4 coincides with the starting point (which means 100 in the above example) of the present TV program, step 922 is affirmative, the program shifts to step 923, and forwarding the video tape stops temporarily.

Next, in step 915, play back starts and is continued until the program is affirmative in step 916. Namely, the ending position on the tape for this program is read out from the data table in step 910 ("200" in the reference numeral 805 in Figure 8). The tape counter on the VCR 4 is counted up over "100" by play back. When a count in the tape counter reaches to '200", the count coincides with the ending position "200" on the data table. As a result, the program judges affirmative and shifts to step 917.

In step 917, an address on the data table shown in Figure 8 is incremented (which means increment of an address pointer). The address pointer has stopped in step 805 as is clear from the above explanation. However, the address pointer designates "2" which is the order of step 805 by increment (this operation will be explained later).

In step 918, it is tested whether play back of all the TV programs designating the preferential order is finished or not. With regard to an end mark, it is possible to use a specific symbol or it is possible to judge an end mark by occurrence of no data. In this time, the program is negative because the tape is being played back, and as a result, the program returns to step 904, and reads out "order", "remaining time for watching", "channel", "starting position/ending position of this program" etc. from the data table as the indicated explanation. However, in step 917, the data in relation to "2" of the order in step 806 - step 810 shown in Figure 8 is read out, because the address in the data table is incremented in step 917. The program shifts to step 914 through steps 904 - 913 like operation for the "order 1".

"Ending position of the last time" in step 914 means "200" in step 805 shown in Figure 8, and "starting position of this time" means "280" in step 809. Accordingly, the program is affirmative in step 914, and forwards the video tape in step 921. The program starts to play back the TV program of "order 2", when the value of the tape counter on the VCR 4 coincides with "280" of the starting position when the value of the tape counter on the VCR reaches "280" in step 922.

The starting position of the program of the last order "7" described in Figure 8 as an example is "0", and a TV program has been recorded from the physical beginning point of the video tape. Accordingly, when this TV program is played back, the program is affirmative in step 913, rewinding of the video tape starts in step 920 and play back of the TV program starts through step 923 and step 915.

When this TV program is continuous with the last TV program, the program is affirmative in step 912, and keeps playing back without rewinding or forwarding the video tape.

When the TV program that preferential order "1" has designated starts from the beginning point of the video tape, the program is affirmative in step 911, and as a result, the TV program starts to play back from the beginning point of the video tape at once.

In this embodiment, the cursor key on the key board is used for changing the preferential order, but this invention is not so limited. It is possible to use a mouse or a touch panel which is attached on the surface of the CRT display etc. by changing the program corresponding to preference of use.

In this embodiment, the video tape is rewound to the physical beginning point before the program plays back the TV programs recorded in accordance with the preferential order, with the value of the tape counter coinciding with the tape positions in the memory. However, recently, technology which reads out the present tape position by an angle of gyration between a rolling reel and a supplying reel, and a method of computation by moving the tape a few centimeters, has been applied to practical use. And even if the tape has escaped from the VCR, it is not necessary to return the tape to the physical beginning point at the start as the above explanation by using this technology. As a result, time to play back the recorded TV programs can be saved.

When the recorded video tape is desired to be kept, data is added to the information and the information is stored on the disk, and also the data is written down on the label of the video tape. Later, the stored information can be searched to retrieve the table of data for a specific tape and is displayed on the CRT display 3, preferential order is designated within the information as occasion demands, and it is possible to play back the video tape with the data in that preferential order.

After returning home, recorded information is displayed by the user on the CRT display 3. If a TV program which has not been recorded yet exists, it is possible to keep the recording condition active and to play back records later.

As the above explanation shows, in this invention, a user established a time given after returning home and designates a preferential order of TV programs which should be watched within the specific time, and it is possible to control the VCR in accordance with the above operation. This contrasts with conventional systems which enables the user to designate the order only before going outside. As a result, practical use of this kind of system is made more effective by the invention.

**CLAIMS:**

1. A video recorder control system comprising computer means including means for storing a list of recorded television programs in an order based on program recording operations; means for displaying the stored list of recorded television programs to the user; means for changing the displayed list of recorded television programs to a playback order different from the order based on the program recording operations; and means for automatically controlling the rewinding and fast forwarding of the video recorder to play back selected recorded programs in the playback order.

2. A system according to Claim 1, wherein the means for automatically controlling the rewinding and fast forwarding of the video recorder comprise means for selectively controlling rewind, fast forward and playback functions of the video recorder in accord with data relating to the playback order.

3. A system according to Claim 1 or Claim 2, wherein the means for changing the displayed list comprise at least one cursor key.

4. A system according to Claim 1 or Claim 2, wherein the means for changing the displayed list comprise a mouse.

5. A system according to Claim 1 or Claim 2, wherein the means for changing the displayed list comprise a touch panel.

6. A system according to any one of the preceding claims, further comprising means for displaying status information indicating whether a designated TV program included in the stored list of recorded programs has been partially recorded, completely recorded or not yet recorded at all.

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7. A system for controlling a video cassette recorder (VCR), comprising:

a display means;

computer means including an input means for receiving commands from a user, and

programmed means for

(a) storing a list of television programs which were recorded in accordance with an individual program table of a user;

(b) displaying the list of television programs on said display means;

(c) in response to a command applied to said input means by the user, changing the order of playback of recorded television programs to a new order different from the order displayed; and

(d) controlling rewinding and fast forwarding of said VCR to play back said recorded programs in said new order.

8. A system for controlling a VCR as in Claim 7, wherein said display means comprises a CRT.

9. A system for controlling a VCR as in Claim 8, wherein said input means comprises a mouse having an output visible on a screen of the CRT.

10. A system for controlling a VCR as in Claim 7 or Claim 8, wherein said input means comprises a touch panel on a screen of a CRT.

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11. A system for controlling a VCR as in any one of Claims 7 to 10, including a further display means for displaying a status of a television program to be recorded.

12. A system for controlling a VCR as in any one of Claims 7 to 11, wherein said input means comprises a cursor key of a keyboard.

13. A method of controlling a computer controlled video cassette recorder (VCR), comprising the steps of:

recording a sequence of programs in accordance with an individual program table of a user;

storing a list of television programs recorded during a predetermined time period in an order based on program recording operations;

displaying the list of recorded television programs to the user;

changing the order of recorded programs to a new playback order selected by the user and different from the order based on program recording operations; and

automatically rewinding or fast forwarding the VCR as necessary to play back the recorded programs in the new playback order;

whereby the user can play back selected recorded programs in the new playback order.

14. A video recorder control system substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

15. A method of controlling a video cassette recorder substantially as hereinbefore described with reference to the accompanying drawings.

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