



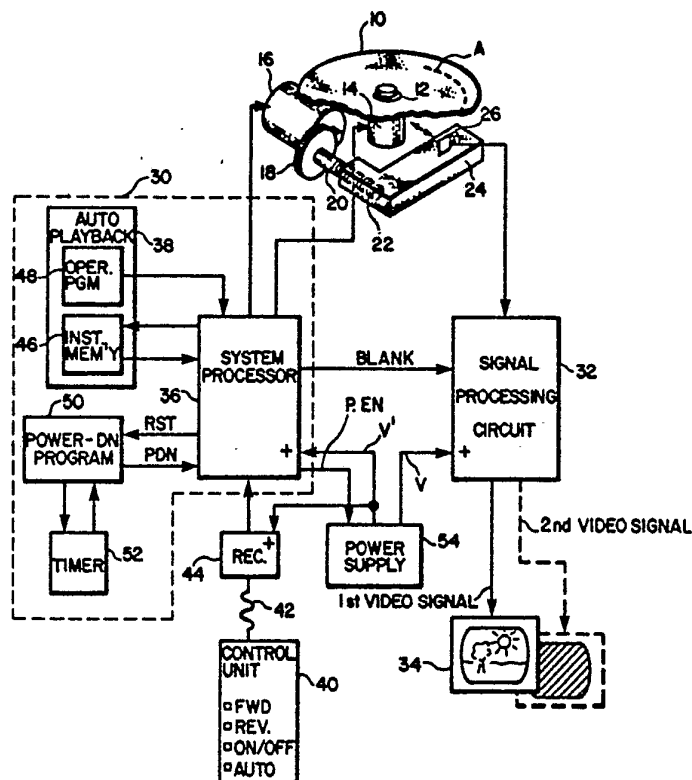
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<p>(21) International Application Number: PCT/US86/01811 (22) International Filing Date: 4 September 1986 (04.09.86) (31) Priority Application Number: 776,239 (32) Priority Date: 16 September 1985 (16.09.85) (33) Priority Country: US  (71) Applicant: EASTMAN KODAK COMPANY [US/US]; 343 State Street, Rochester, NY 14650 (US).  (72) Inventors: PAINTON, Richard, C. ; 419 Tara Lane, Webster, NY 14580 (US). MARCHETTI, Jay, D. ; 243 Milburn Street, Rochester, NY 14607 (US). AC- ELLO, John, J. ; 505 Grant Street, East Rochester, NY 14445 (US). BRADLEY, John, J. ; 148 Apple Creek Lane, Rochester, NY 14612 (US). BOLTON, Richard, H. ; #4 Forest Road, East Rochester, NY 14445 (US).</p>		<p>(74) Agent: WOODS, David, M.; 343 State Street, Roches- ter, NY 14650 (US).  (81) Designated States: BE (European patent), DE (Euro- pean patent), FR (European patent), GB (European patent), JP, NL (European patent).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>

(54) Title: VIDEO APPARATUS OPERABLE IN A QUIESCENT STATE

(57) Abstract

A video player includes a playback head (26) that repeatedly passes in contact with a circular track (A) on a flexible magnetic disk (10) in order to reproduce a still picture on a video display (34). By cycling the player into a special quiescent state after a certain interval elapses without user instructions, excessive disk wear is avoided. While in the quiescent state, the disk drive motor (14) is stopped... immobilizing the disk-to-head interface... and the video display (34) is blanked. If user instructions are received while in this state, the disk drive motor (14) is reenergized and the video display (34) is resumed, showing the still picture displayed prior to interruption. If no user instructions are received during a further interval, the player is shut off.



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VIDEO APPARATUS OPERABLE IN A QUIESCENT STATETECHNICAL FIELD

This invention pertains to the field of  
5 video recording and reproducing apparatus, and  
especially to apparatus of the type that processes  
signals representative of a still picture that is  
recorded on a magnetic medium. More particularly,  
the invention relates to a video player that  
10 reproduces a still picture by repeatedly traversing  
a circular track on a magnetic disk.

BACKGROUND ART

Video apparatus according to this invention  
utilizes a magnetic disk having a flexible recording  
15 member on which a picture is recorded as one field  
of a composite color video signal. A disk  
ordinarily contains many pictures recorded on  
separate tracks. Each picture may be put on the  
disk by a video still camera employing an electronic  
20 imager to capture an image of the still picture. A  
recording circuit in the camera transfers, for each  
picture, the contents of the imager to the magnetic  
disk as, for example, a circular record track  
containing one video field.

25 The recorded disk is removed from the  
camera and inserted into a video player to reproduce  
each recorded field as a visible picture. A disk  
drive motor in the player rapidly rotates the  
magnetic disk at an angular velocity of 3600 r.p.m.,  
30 which corresponds to the repetition frequency of a  
television field. Each revolution of the disk thus  
generates a playback signal having the correct field  
rate for NTSC reproduction. To complete a video  
frame, the player forms a second field from a second  
35 pass over the recorded field and interlaces the two

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fields for reproduction on a video display. Since the display time for a complete frame is one-thirtieth of a second, the player must repeatedly cycle the same video frame to the display (one minute of viewing, for example, corresponds to 3600 passes over the recorded track). U.S. Patent 4,470,076 describes a player of this type, that is, one that presumes continued passage over a single track for continued viewing of a single picture.

Such continued passage, however, is not without its problems. The recording member includes a magnetic coating on a flexible substrate. A playback head (as well as a record head) must remain in intimate contact with the surface of this type of disk for effective playback (or recording). Too much contact pressure between the head and the disk can quickly scrape the track clear of the magnetic coating and ruin the disk. Too little contact pressure results in an unstable interface and consequently degrades signal output. The disk-to-head contact, therefore, is ordinarily stabilized with minimum contact pressure by using such assists as a grooved guide plate to aerodynamically, and gently, urge the disk to the head. Nonetheless, continued passage of the head over the same track will apply enough stress and wear to the magnetic coating to eventually change its magnetic properties and thereby reduce signal output (a phenomenon called the Villari effect).

Clearly, a compromise is made between contact pressure and the useable life of the disk. The compromise, unfortunately, often dictates a rather short life. Some published work by Sony Corporation shows that after 24 hours of playback over the same track, the signal output has declined

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about one dB, a figure found to be acceptable by the Sony authors (see "The Electronic Still Camera A New Concept in Photography," by N. Kihara et al, IEEE Transactions on Consumer Electronics, Vol. CE-28, No. 3, August 1982, pp. 325-330). The Sony publication, while not drawing an outright conclusion about performance after 24 hours of use, shows signal output dropping even further. A 0.5 to 1.0 dB additional signal loss is about all that can be tolerated in a commercial system (considering that a total loss of 3db would mean half the signal power is lost).

Faced with the likelihood of a serious wear problem developing after 24 hours of use on one track, it is imperative that disk-to-head contact be kept to a useful minimum...useful in the sense that such apparatus is in fact being used during the period of disk-to-head contact. For example, if for some reason the user should leave the player --say to answer the telephone-- the disk-to-head contact is no longer serving a useful purpose. It is also likely that the player could be left on through forgetfulness or inattention. Whatever is done to alleviate wear should place little or no demand on the user. The user may feel obliged to answer the telephone but cannot be expected to intervene on behalf of the player anymore than for an ordinary television--which is usually left unattended and operating in such situations.

#### DISCLOSURE OF THE INVENTION

The invention treats the problem of minimizing disk wear without intervention from the user by cycling the apparatus into a special quiescent state in which the disk is stopped after a certain interval without user input. Even though

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disk-to-head contact may be maintained (which is optional), disk wear is minimized since the disk is immobilized with respect to the head. Any subsequent user input within a further interval  
5 (that of the quiescent state) causes the apparatus to resume operation with the same track being accessed as prior to entering the quiescent state. After the quiescent interval elapses without user input, the apparatus shuts off. In the quiescent  
10 state, and until the user reactivates the apparatus, the apparatus remains mostly powered except for the disk drive. This not only ensures a quick and simple reactivation but permits a more "hospitable" user environment. For example, in the case of a  
15 player, the display screen is blanked so as to keep the partial shutdown as inconspicuous as possible.

Video apparatus for processing signals representing still pictures according to the invention is characterized by means for generating a  
20 first power-down signal after a predetermined power interval has elapsed without any instructions from a control unit associated with the apparatus. In response to the first power-down signal a predetermined quiescent interval begins during which  
25 rotation of the magnetic medium is stopped. After the quiescent interval elapses a second power-down signal is generated and, in response thereto, the apparatus is inactivated. The video apparatus may be a video camera, for which purpose the power  
30 interval is a camera operating interval, or a video player, for which the power interval is a play interval.

A video player according to an embodiment of the invention produces still pictures on a video  
35 display depending on user selections entered from a

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control unit. A signal processing circuit included in the player operates in two modes. In its first mode, a playback signal recovered from the disk is converted into a first video signal for displaying a still picture on the display. In its second mode, a second video signal is generated for displaying some predetermined image (e.g., a blank screen) on the display in lieu of the still picture. A system controller in the player includes timing means for generating a power-down signal after a predetermined interval elapses without any selections from the control unit. Means responsive to the power-down signal inactivates the drive motor that rotates the disk and instructs the signal processing circuit to enter the second mode and route the second video signal to the display. Thereupon the disk comes to a stop and the display is blanked. The player then assumes a quiescent state in which it is still responsive to selections from the user. A selection made by the user during the quiescent state will reactivate the drive motor, thereby regenerating a playback signal, and instruct the signal processing circuit to return to the first mode and route the first video signal--the picture--to the display.

#### 25 BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described with reference to the drawings, in which:

Figure 1 is a block diagram showing a video disk player arranged according to the invention;

30 Figures 2A and 2B are diagrams elaborating in particular upon the system controller and signal processing blocks shown by Figure 1;

Figure 3 is a diagram showing more detail of the system controller; and

35 Figure 4 is a functional flow diagram for a

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computer program that may be used with the system controller of Figures 1, 2 and 3 to place the player in a quiescent state.

BEST MODE FOR CARRYING OUT THE INVENTION

5           Figure 1 shows a general diagram of a video disk player incorporating a quiescent state and auxiliary features according to the invention. A magnetic disk 10 is attached by its hub 12 to a disk drive motor 14. A stepper motor 16 is connected by  
10 a reduction gear 18 to a lead screw 20, which mates with a threaded hole 22 in a non-rotatable head block 24. A playback head 26 is mounted on the head block 24. The head block 24 is supported for movement radially of the disk 10 so that the  
15 playback head 26 may be positioned in contact with a selected track on the disk 10, such as a magnetic track A.

The player includes a system controller 30 (enclosed by broken lines) and a signal processing  
20 circuit 32. The primary function of the player is to reproduce a playback signal from the selected magnetic track A and to generate from that a video signal suitable for displaying a selected still picture (corresponding to the playback signal) on a  
25 video display 34. For purposes of this invention, the signal processing circuit 32 operates in two modes: in the first mode the circuit 32 responds to the playback signal sensed by the playback head 26 and produces a first video signal for displaying the  
30 selected still picture on the video display 34; in the second mode it responds to a control signal (BLANK) and produces a second video signal for displaying some predetermined image--normally that of a blank screen--in lieu of the still picture.  
35 (The first mode is depicted in Figure 1 by the



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display 34 being in solid line and its connection to the circuit 32 also in solid line; the alternative second mode is shown by broken line, both as to the same display 34 and its connection to the circuit  
5 32.)

The positioning of the head 26 in correspondence with the selected track A and the rotation of the disk 10 are controlled by the system controller 30. A system processor 36, residing in  
10 the system controller 30, responds to selection instructions from an automatic playback section 38 and from a control unit 40, which is the user interface with the player. The user turns the  
15 player on or off and controls the order of picture viewing (by forward and reverse buttons) from the control unit 40. As shown here, the control unit 40 emits a coded infra-red signal 42, which is received by an IR receiver 44 and transmitted to the system  
20 processor 36. An arrangement for automatically viewing the pictures on the disk 10, for example, as to the order or the time allotted for displaying each picture, is entered via the control unit 40 to an instruction memory 46 in the automatic playback  
25 section 38. When automatic playback is selected, the prearranged instructions in the instruction memory 46 determine the arrangement of playback according to an operating program 48. (More entry buttons, or dual functions for the existing buttons, may be desirable on the control unit 40 for  
30 specifying and entering the arrangement for automatic playback).

The player is put into a quiescent state according to the invention upon receipt of a power-down signal PDN from a power-down program 50.  
35 The signal PDN is generated after a timer 52

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indicates the elapse of a predetermined interval of time (the play interval) without the system processor 36 receiving any selections from the control unit 40 or instructions from the automatic playback section 38. Should the processor 36 receive a selection (or automatic instruction) before the signal PDN is generated, it sends a reset signal RST to restart the timer 52, which again starts counting from the beginning of the play interval. The play interval is set to such a time, say five minutes, that only in rare situations would no selection (or instruction) be received while a user is actually viewing a set of pictures. Ordinarily, then, the quiescent state would never be invoked during use of the player, and the user would go through the pictures unaware of the continuously resetting timer 52.

On the other hand, if no selection (or instruction) is received during the play interval, and the power-down signal PDN is generated, the system processor 36 inactivates the drive motor 14 and sends the blanking signal BLANK to the signal processing circuit 32. The signal BLANK instructs the signal processing circuit to enter its second mode and produce the second video signal, a picture blanking signal, for the display 34. Meanwhile the drive motor 14 comes to a stop, the disk 10 therewith, and the head 26 no longer generates a playback signal. Importantly, the head 26--though still adjacent the surface of the disk 10--is no longer traversing the track A and stressing, or even wearing away, the magnetic material. In addition, instead of showing an unappealing, noisy raster, the display 34 shows a blank (black) screen, or any other image desired (for example, from a text

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generator).

Once the system processor 36 puts the player into the quiescent state due to receipt of the power-down signal PDN, the system processor 36  
5 immediately sends the signal RST to restart the timer 52. The timer 52 proceeds to count until a second predetermined interval of time (the quiescent interval) has elapsed. Should a selection from the control unit 40 (or an instruction from the auto  
10 playback section 38) be received before the second interval has elapsed, the system processor 36 energizes the drive motor 14 and deactivates the blanking signal BLANK. The circuit 32 then reverts to its first mode during which its sends the first  
15 video signal to the display 34 and shows the selected still picture from the track A. At the same time the timer 52 is reset and starts counting again (toward the elapse of the play interval). The quiescent interval is set to a suitably long time,  
20 say one hour, during which the user has an opportunity to resume viewing at the point of interruption.

If, however, the end of the quiescent interval is reached without receipt of a selection  
25 (or an instruction), the player is put into a semi-powered shutdown in which most, but not all, of the player is deenergized. For this reason a power supply 54 is provided having two powered modes: a playback mode and an off mode. In the playback mode  
30 both power lines V and V' are energized, providing power to the system controller 30 and to the signal processing circuit 32, thereby effecting playback. The power supply 54 is put into the off mode upon receipt of a disable signal P.EN from the system  
35 processor 36 (after the quiescent interval has run

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out). The power supply 54 responds to the signal P.EN by deenergizing the line V, leaving energized only the power line V'. The energized line V' is connected to the receiver 44 and to the processor 36 to interpret and act upon an on/off signal from the control unit 40 via the receiver 44. This means that all parts of the player are deenergized except those parts necessary to restart the player if the on/off button is actuated from the control unit 40.

10           The functional routine for putting the player into the quiescent state, and then into shutdown, is shown by the flow diagram of Figure 4. For the example shown, the first predetermined interval (play interval) is 5 minutes and the second  
15 predetermined interval (quiescent interval) is 55 minutes. The timer 52 is shown in its preferred form as software timing routines 55 and 56. These timing routines are interrupted by a selection (or an instruction) and the flow reverts back to the  
20 beginning of the diagram. If 5 minutes run out before a new selection is entered, the display is blanked and the drive motor stops. Then, if 55 more minutes run out without any selection, the player is turned off. Thereafter, the player only responds to  
25 the on/off selection from the control unit. However, any selection (forward, reverse, etc.) other than "on/off" during the 55 minutes of the quiescent interval turns the drive motor on and returns the last picture to the display.  
30 (Depressing the "on/off" button puts the player into the semi-powered shutdown mode.) The user, in effect, always picks up where viewing left off regardless of the button pushed (except the "on/off" button); thereafter the buttons resume their normal  
35 functions and other pictures may be displayed.

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Figures 2A and B taken together are a generally more detailed diagram of the player, and in particular of the signal processing circuit 32; Figure 3 shows more detail of the system controller 5 30, which appears in both Figures 1 and 2A. Components already discussed in connection with Figure 1 are given like-numbered reference characters. The playback signal generated by the playback head 26 is, in the preferred embodiment, a 10 low-level, line sequential fm signal which is provided to the input terminals of a preamplifier and equalization circuit 60. RF equalization compensates for distortion present in the output voltage from the playback head. The output voltage 15 from the preamplifier and equalization circuit 60 is fed to a separation filter 62 for separating the luminance (Y) and chrominance (C) signals from the playback signal. The separate Y and C signals are applied to respective limiters 64a and 64b in order 20 to eliminate amplitude fluctuations. The limited Y and C fm signals are demodulated in respective circuits 66a and 66b, which also attenuate the higher frequencies (deemphasis) according to the amount that they were intentionally boosted at 25 recording. It should be recalled that the signal recorded on the disk 10 (track A) represents one field of a television signal. In order to provide a full-frame signal, the demodulated Y and C signals are applied to a field interlacer 68. As is 30 conventional, the interlacer 68 internally switches between two signal paths: one path directly passes the signals through for one field; the other path includes a 0.5 H delay and provides the interlaced field. The luminance signal Y for adjacent lines of 35 the recorded field may be averaged to generate the

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luminance of each line of the interlaced field. Ordinarily the chrominance for the interlaced field is just a repeat of the recorded field.

Since the signal from the disk is  
5 line-sequential (that is, a pair of color difference signals alternate from line to line), it is necessary to store the color difference signal from each line and repeat it for the next line so that both color difference signals are available for  
10 subsequent processing. Such a store and repeat operation is performed by a chroma repeater 70. The color difference signals R-Y and B-Y are then applied to respective clamps 72a and 72b for establishing appropriate dc levels. Meanwhile the  
15 tips of the synchronization portion of the luminance signal Y are clamped in a sync tip clamp 74 and then clipped off the signal in a sync clipper 76 (an operation that is desirable for subsequent encoding). The clipped luminance signal is then  
20 clamped to an appropriate dc level in a clamp 78. As will be shown, the clamps 72a, 72b and 78 operate on their respective signals whether the player is receiving a playback signal from the disk 10 or is in the quiescent state (and the disk 10 is  
25 stopped).

A playback synchronization signal CS is provided by a synchronization separator 80 connected into the path of the Y signal. Alternatively a synchronization signal CS' is locally-generated by a  
30 free-running sync generator 82 and used during the quiescent state to stabilize the picture on the display 34. Both sync signals are applied to the input terminals of a switch 84; its output signal is a composite sync signal CSP necessary for proper  
35 generation of an NTSC encoded signal in an encoder

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86. The switch 84 is operated according to the condition of the signal BLANK (also described in connection with Figure 1) received from the system controller 30. The signal BLANK changes state--and  
5 toggles the switch 84--whenever the head 26 is moving between tracks or when the disk 10 is not rotating (the quiescent state). This invention is especially concerned with the latter occurrence. When the signal BLANK is high because the motor 14  
10 is off (or the head is between tracks) the switch 84 conducts the locally-generated sync signal CS' through to the encoder 86 (as the playback sync signal CSP). At other times, when the signal BLANK is low, the switch 84 conducts the playback  
15 synchronization signal CS through to the encoder 86 (as the playback sync signal CSP).

The clamps 72a, 72b and 78 operate concurrently with the proper sync signal to clamp the color difference signals R-Y and B-Y and the  
20 luminance signal Y at correct dc levels for the encoder 86. The clamps are operated at selected dc levels L1, L2 and L3 by clamp and blank logic 88 during a substantial portion--preferably all--of the horizontal drive interval. Since the sync signals  
25 exist only for a short time at the beginning of the drive interval, a suitably long triggering pulse for the logic 88 is generated from the sync signal CSP by a horizontal drive generator 90. The logic 88 also needs to recognize the presence of the 0.5 H  
30 delayed interlace field in order to correctly time the clamps; this is done by a signal F from the field interlacer 68. The clamped luminance and color difference signals are formulated into an NTSC  
35 information provided by the playback sync signal

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CSP. The encoded video signal is converted into a radio frequency signal by an rf modulator 92 and sent to the video display 34.

The player is controlled according to user demands by the system controller 30. User selections are entered through the hand-held remote unit 40, which has its own battery power source. The remote unit 40 includes an infra-red transmitter, which generates a coded infra-red signal IR that radiates through space to the receiver 44. The receiver 44 decodes the input signal IR and provides the decoded user signal REM IN to the system controller. Pursuant to the appropriate user command, the four motor phase signals  $\Phi 1-\Phi 4$  applied to the stepper motor 16 which accordingly steps through its positions as directed. The lead screw 20 is turned and the head 26 is positioned adjacent a desired track (such as the track A). Meanwhile, a signal M.EN provided to a speed control circuit 94 starts the disk drive motor 14. A tachometer circuit (not shown) monitors the motor speed and, when operating speed is attained, a signal M.LOCK signifies that the disk is locked up at correct playback speed.

If the predetermined play interval passes without any input from the remote unit 40, then the disk drive motor 14 is deenergized by a signal M.STOP sent to the speed control circuit 94 from the system controller 30. No playback signal, consequently, is sensed by the head 26. At the same time, the signal BLANK is emitted by the controller 30 to the switch 84, toggling the switch so that the generated sync signal CS' forms the signal CSP sent to the encoder 86 (in lieu of the playback sync signal CS). The clamps 72a, 72b and 78 operate



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during the horizontal drive interval (from the generator 90) derived from the signal CSP (that is, the generated sync signal CS'). Thus the generated sync signal CSP occurs substantially at horizontal intervals, causing a stable picture to appear on the display 34. With the horizontal drive interval of each signal clamped to black by virtue of the clamps 72a, 72b and 78, and with no video signal coming from the field interlacer 68, the video portion of the clamped signals remains at a black level and provides a dark, blank picture on the display 34. The system controller, in the meantime, starts timing out the predetermined quiescent interval. If the quiescent interval passes without any user input from the remote unit 40, then the signal P.EN to the power supply 54 changes state and causes the power supply 54 to deenergize the section 54b producing the supply voltage V. This deenergizes the portion of the player devoted to signal processing and to the drive system. The system controller 30 remains powered from the supply section 54a, which provides the supply voltage V'.

The system controller 30 is shown in greater detail in Figure 3. A microprocessor 100 (such as an Intel 8031 microprocessor) provides the central processing capability. Operating programs for the player are stored in a program memory (ROM) 102. Input data is received from the player directly by the microprocessor 100 and by an input buffer 104. Output data is provided to the player by a latch 106 (and could also be provided directly by the microprocessor 100). The four phase signals  $\phi 1-\phi 4$  to the stepper motor 16 are generated by a driver 108 pursuant to instructions relayed from the microprocessor 100 through the latch 106. Addresses

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and data are moved back and forth through a bus structure 110. Memory instructions are accessed by addresses latched off the bus 110 by an address latch 112. The system controller components are each enabled by respective lines tied to the microprocessor 100. More particularly, the read and write enable lines RD and WR connect to the buffer 104 and the latch 106, respectively, for read and write operations. The address enable ALE and the program store enable line PSEN enable the address latch 112 and the memory 102, respectively, for external data memory access and external program memory fetch operations. Each component of the system controller 30 is continuously powered by the section 54a of the power supply 54, though the remainder of the player may be deenergized. A program of the type shown as a flow diagram in Figure 4 is stored in the program memory 102 for powering parts of the player down (the drive motor 14) when in the quiescent state and all of the player but the system controller 30 and the receiver 44 when in shutdown.

The player as thus far described assumes that the drive motor 14 stops and the head 26 simply stays put in the quiescent state (e.g., by providing only two of the phase signals  $\phi 1-\phi 4$ ). This makes it quite straightforward for the signal processing circuit 32 to resume in the first mode (Figure 1) when the motor 14 is restarted, again showing the picture last seen on the display 34. However, it may be desirable to move the head to some parking position at the edge of the disk or to separate the head from the disk when the drive motor 14 and the player sit in the quiescent state. In such a case, the microprocessor 100, which is

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normally monitoring track locations anyhow,  
memorizes the location of the track A (i.e., track 1  
or 2, etc.) in its internal (or external) memory.  
Then, if play is resumed within the quiescent  
5 interval (55 minutes) the microprocessor 100 will  
call for this track location and signal the stepper  
motor 16 to move the head 26 back to the track it  
was on before playback was interrupted.

The preceding disclosure of the operation  
10 of the system controller 30 constitutes a sufficient  
specification of the operating software for putting  
the player in or out of the quiescent state and  
shutdown, and for accomplishing ancillary activities  
(starting and restarting a timing routine, producing  
15 the blanking signal, providing the stepper motor  
phase signals, controlling the disk drive motor, and  
the like). A programmer of ordinary skill can, from  
this specification, develop the program code to  
accomplish the stated operation without engaging in  
20 any undue experimentation or effort.

\* \* \* \* \*

As explained in the above paragraphs, this  
invention makes it possible to conserve disk wear by  
utilizing an effective procedure that is relatively  
25 inconspicuous to the user. Being keyed to the level  
of activity of the apparatus, the invention allows  
normal use of the video apparatus without  
intervention (i.e., the power interval regulated by  
the timer is continuously being reset while the user  
30 is actively using the apparatus). If the apparatus  
is dormant over a period of time (e.g., 5 minutes),  
the timer runs out and the quiescent state is  
automatically entered. The disk/head interface thus  
is disabled without demanding anything from the  
35 user. This provides an effective way to limit the

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finite lifetime of the disk to productive uses.

\* \* \* \* \*

While video apparatus according to the invention has been described for use in connection  
5 with a player, it may also be used in connection with a video still camera that utilizes a similar type of magnetic disk. Though the picture recording takes place during one passage of the camera's recording head over a circular track on the disk,  
10 the head will repetitively pass over the same circular area prior to taking the picture. According to the invention, a quiescent timer is set when the camera is turned on. Then, if the camera's shutter is not released in, for example, 5 minutes  
15 the camera enters a quiescent state to minimize disk wear (and to conserve energy, since the camera runs off battery power). The power-consuming part of the camera's electronics, as well as a disk motor, are inactivated. The recording head remains in the  
20 recording position and certain parts of the electronics (e.g., a microprocessor) remain powered in order to receive and process a "reactivate" signal. A partial depression of the shutter button restores the camera to full operation and the  
25 quiescent timer is reset (e.g., to 5 minutes). Alternatively, if the shutter button was not depressed for, say, 30 minutes, the quiescent state is terminated and the camera is completely inactivated. The recording head is retracted to a  
30 home position (relative the edge of the disk) and all of the electronics is shut off. The user must reactivate a main power switch to use the camera again. The camera therefore utilizes the elements of the invention, that is, the automatic entry of a  
35 quiescent state after a first time interval and the

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automatic termination of the quiescent state and  
inactivation of the apparatus after a second time  
interval in the quiescent state. The camera also  
includes the important option of easily terminating  
5 the quiescent state (by instructions from a control  
unit, such as a shutter) and reactivating the  
apparatus anytime during the second interval.

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What is Claimed is:

1. Video apparatus for processing signals representing still pictures, said apparatus utilizing a magnetic medium on which the signals are recorded on recirculating tracks, said apparatus including a magnetic head positioned for contact with a selected track, means for supporting the medium for rotation relative to said magnetic head so that said head repeatedly passes the selected track, a signal processing circuit for processing the still picture signals, a system control means for controlling the signal processing circuit in relation to the recovery of signals from the rotating magnetic medium, and a control unit for entering instructions to the apparatus regarding the control and processing of the signals, said apparatus characterized by:

means for generating a first power-down signal after a predetermined power interval has elapsed without any instructions from said control unit;

means responsive to said first power-down signal for initiating a predetermined quiescent interval during which said rotation of the medium is stopped;

means for generating a second power-down signal after said quiescent interval has elapsed; and

means responsive to said second power-down signal for inactivating the apparatus.

2. Video apparatus as claimed in Claim 1 wherein said system control means includes a timer for counting said power and quiescent intervals and said means responsive to said first power-down signal is characterized by:

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means responsive to an instruction entered through said control unit during said quiescent interval for resuming rotation of the medium and for resetting said timer to again start  
5 counting said power interval.

3. Video apparatus as claimed in Claim 1 intended for use as a video player for producing a playback signal for generating still pictures on a video display from signals recorded on circular  
10 tracks on the magnetic medium, characterized in that said means responsive to said first power-down signal discontinues generation of said playback signal for said video display.

4. A video player as claimed in Claim 3  
15 wherein said signal processing circuit is responsive to said playback signal for generating a video signal suitable for displaying said selected still picture on the video display, said system control means of said video apparatus characterized by:

20 a power supply for selectively energizing said control unit and said signal processing circuit; and

means responsive to said first power-down signal for inactivating only the part of  
25 said power supply that energizes said signal processing circuit.

5. Video apparatus as claimed in Claim 3 in which:

said signal processing circuit is  
30 characterized in that it is responsive in a first mode to said playback signal for generating a first video signal suitable for displaying a selected still picture on the video display and in a second mode for generating a second video signal suitable  
35 for displaying a predetermined image on the video

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display in lieu of said selected still picture; and

said means responsive to said first power-down signal (1) instructs said signal processing circuit to enter said second mode and  
5 route the second video signal to the display and (2), in response to a subsequent instruction entered through said control unit, instructs said signal processing circuit to route the first video signal to the display.

10 6. Video apparatus as claimed in Claim 1 intended for use as camera imaging apparatus for recording signals representing pictures on circular tracks on the magnetic medium, characterized in that said means for generating a first power-down signal  
15 generates said power-down signal after a predetermined camera operating interval has elapsed.

20 7. Video apparatus as claimed in Claim 1 intended for use as video player for reproducing signals representing pictures that are prerecorded on circular tracks on the magnetic medium, characterized in that said means for generating a first power-down signal generates said power-down  
25 elapsed.

8. Video apparatus intended for use as a video disk player capable of cycling between a powered state and a semi-powered shutdown, the powered state one in which (a) a magnetic disk is  
30 supported for rotation in contact with a playback head for reproducing a playback signal from a track on the disk according to instructions from a control unit and (b) a video picture signal is generated from the playback signal for operating a display,  
35 the semi-powered shutdown being a condition in which



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the player is capable of processing at least some instructions from the control unit, particularly instructions to return the player to the powered state, the apparatus characterized by a quiescent state for use in which the player comprises:

5 means for generating a power-down signal after a predetermined time interval has elapsed in the powered state without any instructions from said control unit;

10 means responsive to said power-down signal for initiating the quiescent state by arresting movement of the disk relative to the head and by replacing the video picture signal with a blanking signal for blanking the display; and

15 means operative in the quiescent state and responsive to an instruction from the control unit during the quiescent state for resuming movement of the disk relative to the head and for returning the playback signal to the display.

20 9. A player as claimed in Claim 8 wherein said means operative in the quiescent state deenergizes the apparatus after a further predetermined interval has elapsed without receiving any instructions from the control unit.

25 10. A player as claimed in Claim 8 in which said means for generating a power-down signal comprises timing means for counting through said predetermined interval and for providing a timing signal at the end thereof, and means responsive to  
30 said timing signal for generating said power-down signal.

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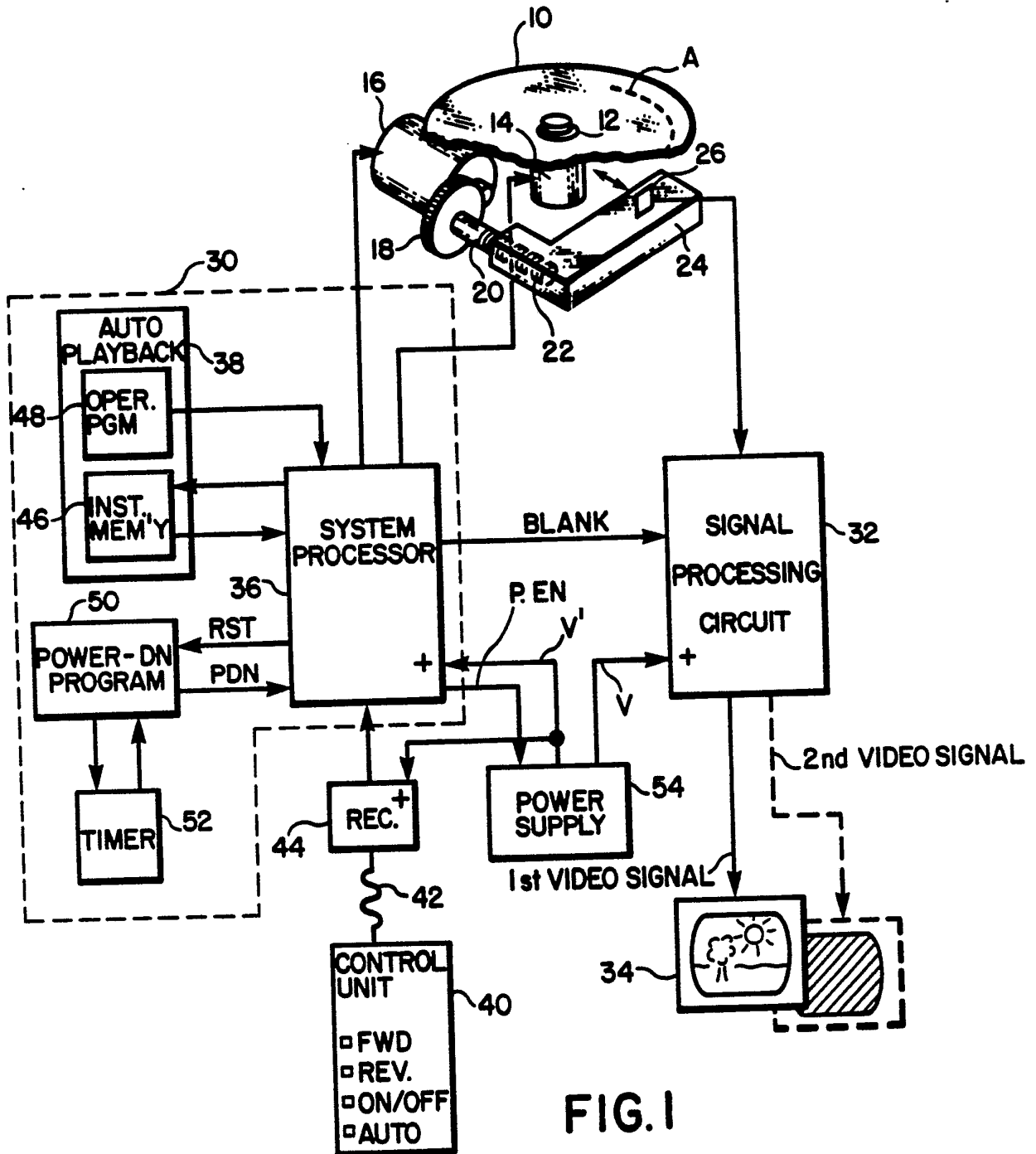


FIG. 1

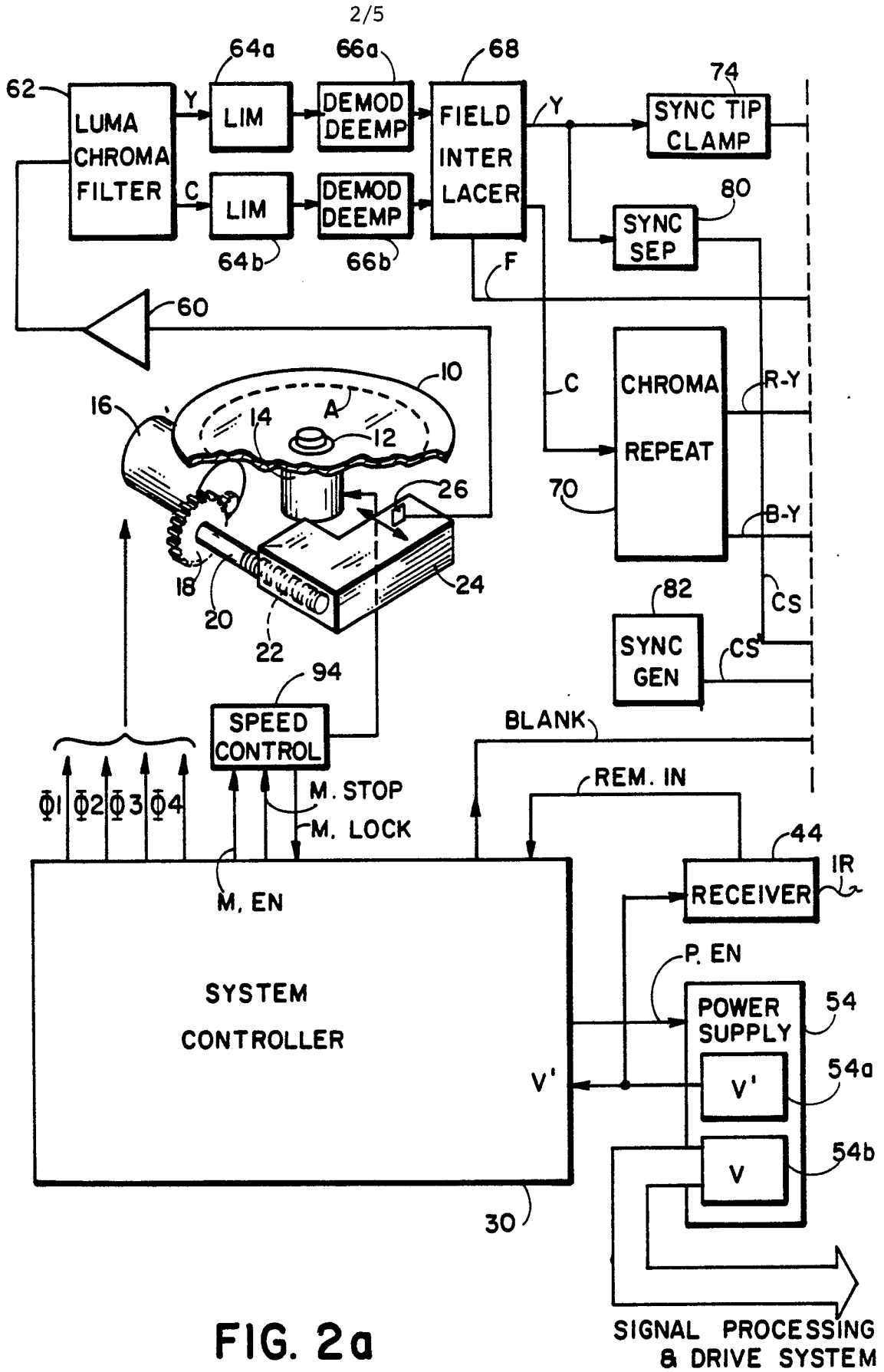


FIG. 2a

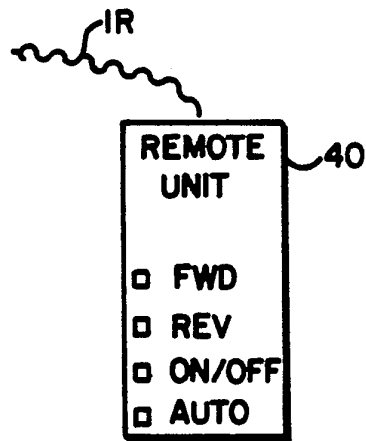
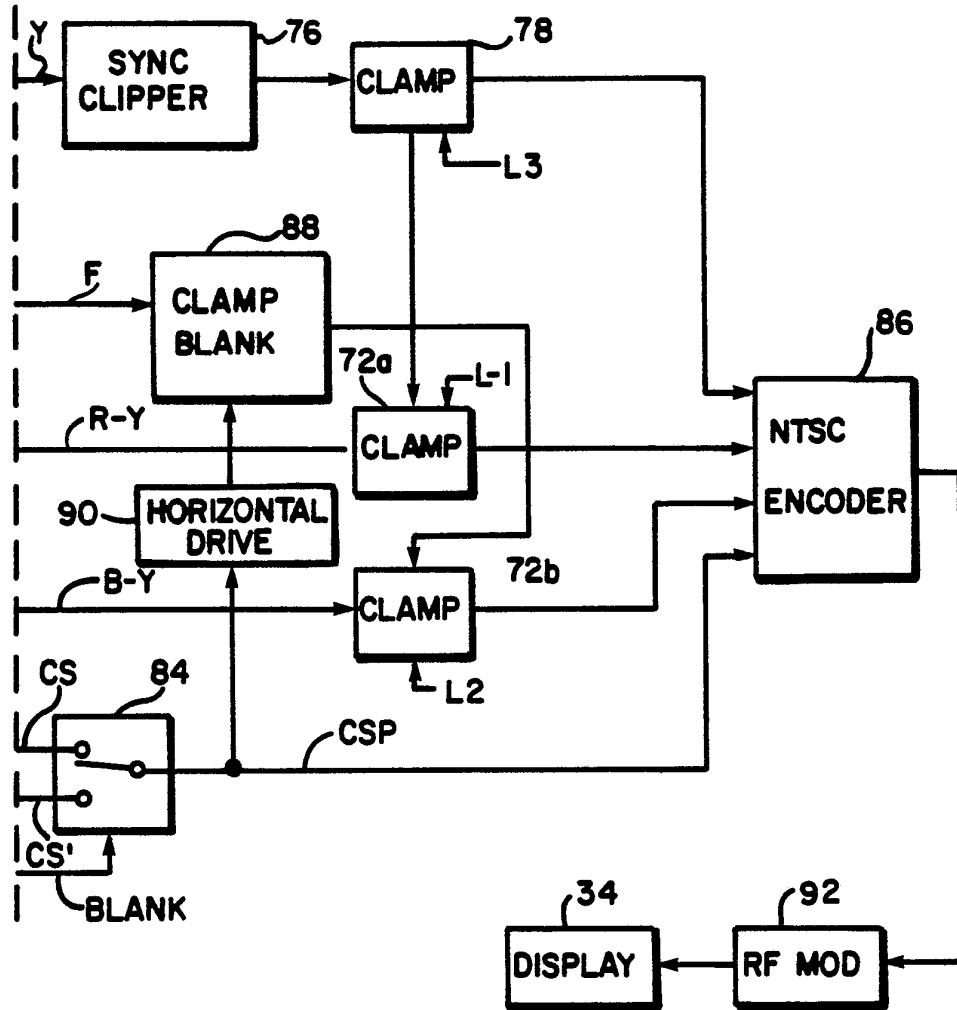


FIG. 2b

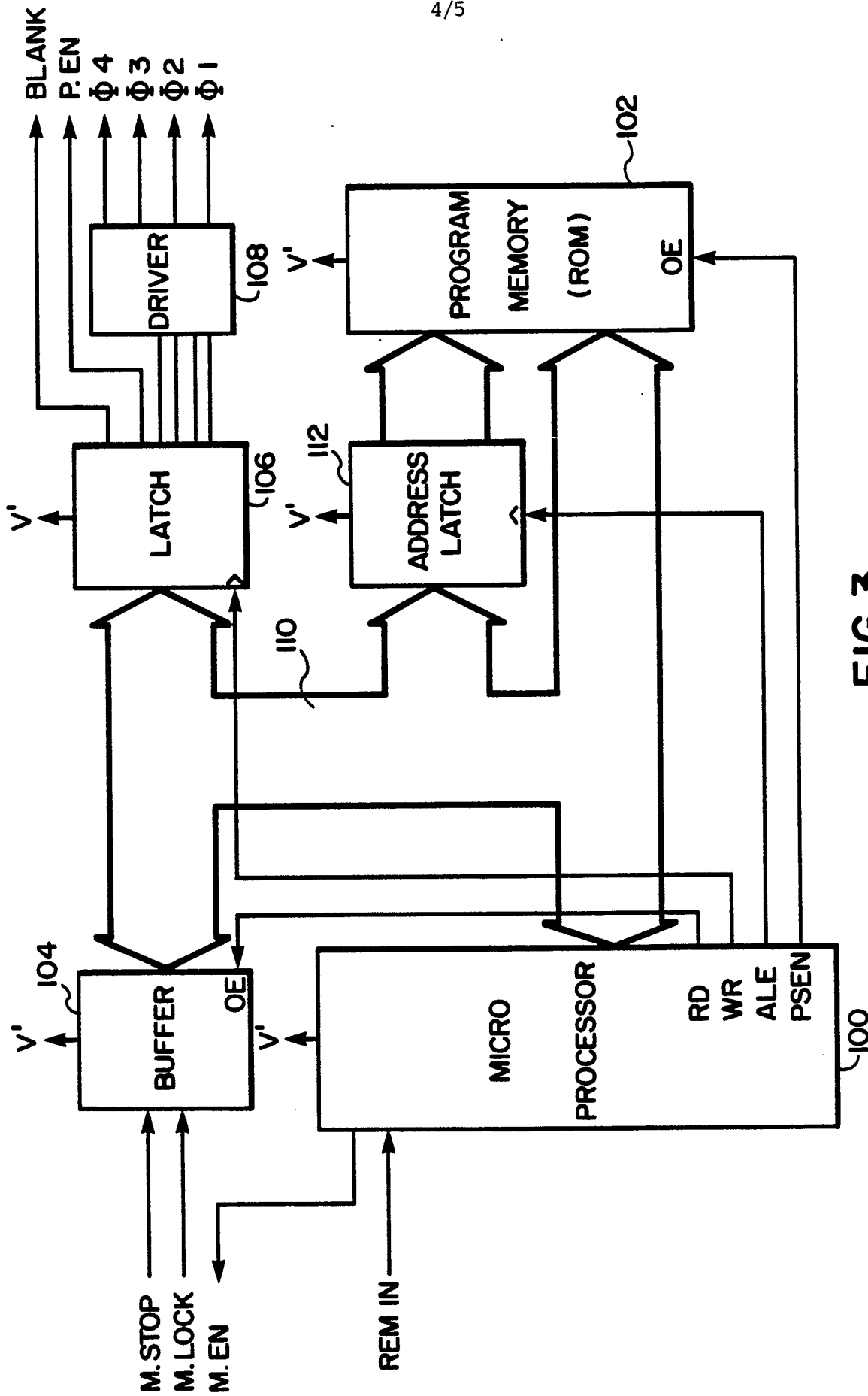


FIG. 3

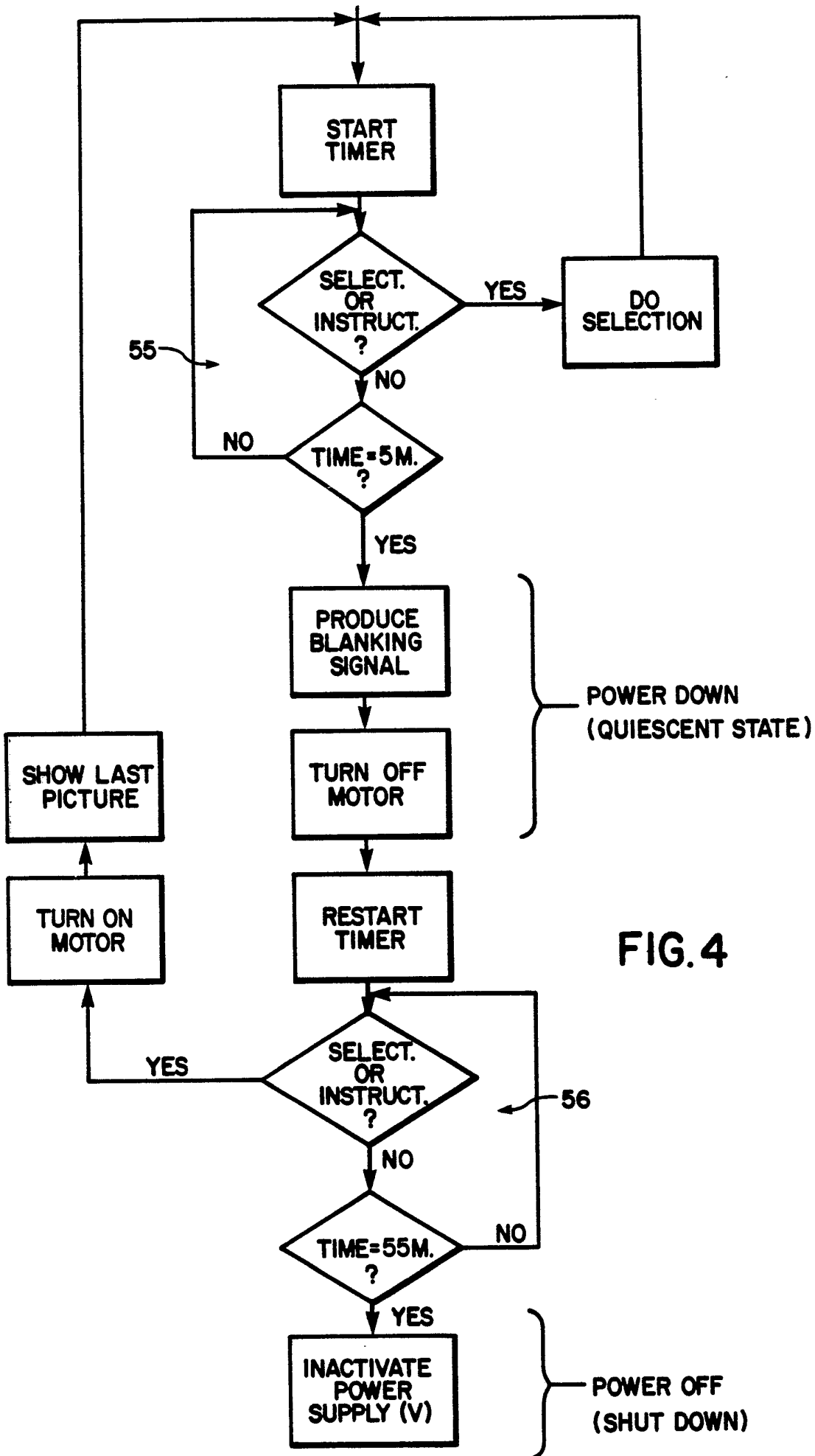



FIG. 4

# INTERNATIONAL SEARCH REPORT

PCT/US 86/01811

International Application No

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC <sup>4</sup> : G 11 B 19/06; G 11 B 19/20; G 11 B 19/04		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC <sup>4</sup>	G 11 B	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b>		
Category <sup>9</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	US, A, 4458273 (JEROME JOHNSON) 3 July 1984 see column 1, lines 52-62; column 2, lines 10-14; figure 2 --	1,8,10
A	US, A, 3814441 (LESTER CRAGGS) 4 June 1974 see column 1, lines 11-45; figure 5 --	1,8,10
A	Patents Abstracts of Japan, vol. 8, no. 257(P-316)(1694), 24 November 1984; & JP, A, 59127266 (Canon) 23 July 1984, see abstract and figures --	1,8,10
A	Patents Abstracts of Japan, vol. 8, no. 10(P-248)(1447) 18 January 1984; & JP, A, 58171764 (Tokyo Shibaura Denki) 8 October 1983 see abstract; figures --	1,8,10 ./.
<p><sup>9</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
10th December 1986		22 JAN 1987
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		M. VAN MOL 

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	<p>IEEE Transactions on Consumer Electronics vol. CE-28, no. 3, August 1982 (New York, US) M. Kihara et al.: "The electronic still camera a new concept in photography", pages 325-330 (cited in the application)</p> <p>-----</p>	



ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/US 86/01811 (SA 14533)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 05/01/87

The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4458273	03/07/84	None	
US-A- 3814441	04/06/74	FR-A- 2200578	19/04/74
		DE-A- 2347071	28/03/74
		GB-A- 1396069	29/05/75
		CA-A- 1010991	24/05/77
		JP-A- 49071910	11/07/74

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see Official Journal of the European Patent Office, No. 12/82