Description

This invention relates generally to tracking apparatus and related methods for use in recovering information from a record medium, and, more particularly, to tracking apparatus of a type that align a beam of light relative to a selected one of a plurality of parallel recording tracks on a record medium.

Tracking apparatus of this particular type are of special use in video disc playback machines. One such apparatus directs a reading beam of light via a radially-movable tracking mirror onto a selected one of a plurality of substantially circular and concentric recording tracks on the disc. The beam is reflected in accordance with the recorded information, and the intensity of this reflected beam is detected and suitably processed, to produce a tracking error signal representative of the deviation of the reading beam from the centerline of the selected track. This error signal is coupled back to the tracking mirror, to form a servo for controllably positioning the point of impingement of the beam on the disc in alignment with the centerline of the selected track.

Other types of apparatus contain a reading beam of light controllably positioned relative to a selected track on a video disc by a tracking error signal that varies in accordance with the position of the beam relative to the track centerline.

Although the tracking systems described above have proven generally satisfactory in maintaining a reading beam aligned with a selected track on a video disc, they have not been entirely effective when the disc includes defects such as dimples in its information-bearing surface. Dimples are believed to be caused by minute particles being lodged beneath a thin, metallic stamper used in moulding the video discs, and they generally cause large groups of adjacent recording tracks to deviate momentarily from their normal radial locations.

Prior tracking apparatus have normally attempted to maintain the reading beam continuously aligned with a selected track, even when scanning in the vicinity of a dimple. However, because of the particular magnitude and duration of the track deviations caused by each dimple, this attempt at continuous alignment sometimes has caused the beam to overshoot the selected track and inadvertently jump to an adjacent track.

Japanese Patent Specification No. 5538686 (Okano) relates to a tracking apparatus comprising a conventional tracking servo for controlling the position of a deflecting mirror depending on the value of a tracking error signal and has means for preventing malfunction of the tracking servo when a defective part of the video disc is being scanned. The tracking error signal is applied to a window comparator where high and low reference voltages are set so that if the scanner shifts from the center of the track by more than a fixed value, a signal is generated to trigger a multivibrator whereby the tracking error signal is uncoupled from the tracking servo loop. Such a system is not satisfactory because it cannot distinguish between the cases when the reading beam is scanning a track on the approaching side of a dimple, and cases when the beam has passed through the center of a dimple and is scanning a track on its far side. In one case the beam can jump back and get into a stop mode, and in the other it can jump forward and information stored on track which have no defects can be lost.

According to the invention the tracking apparatus includes defect compensation means and associated switch means, for compensating for defects in the record medium. The defect compensation means monitors the tracking error signal to determine when the beam has encountered a defect, and produces a corresponding disable signal for coupling to the switch means, to selectively uncouple the error signal from the beam steering means. The reading beam is therefore maintained at its current position until the defect has been passed.

The defect compensation means compares the tracking error signal to both a prescribed positive threshold and a prescribed negative threshold. When the reading beam encounters a dimple while scanning a track on the far side of the dimple's center, the positive threshold is normally exceeded first, and a first control signal is produced. Conversely, when the reading beam encounters a dimple while scanning a track on the approaching side of the dimple's center, the negative threshold is normally exceeded first, and a second control signal is produced. The two control signals are produced by monostable multivibrator circuits and have prescribed, fixed durations that are at least as long as the normal duration of the dimple being scanned.

The threshold detector means of the defect compensation means compares the tracking error signal to a prescribed pair of positive and negative thresholds that are fixed in accordance with the first and second control signals. When the first control signal is present, the magnitude of the negative threshold in the pair is greater than that of the positive threshold. Conversely, when the second control signal is present, the magnitude of the positive threshold is greater than that of the negative threshold. This selectively-variable threshold feature helps ensure that the tracking apparatus does not permit the reading beam to overshoot the selected track and jump inadvertently to an adjacent track.

The tracking loop disable signal is produced whenever the tracking error signal exceeds either threshold of the threshold detector means. This disable signal is coupled to the switch means, to uncouple the error signal from a tracking mirror. While the error signal is uncoupled from the tracking mirror, the reading beam remains at its current radial location on the disc and is not urged to follow the deviating path of the selected track. After the dimple has been passed, the error signal

will no longer exceed either threshold, and the error signal is recoupled through the switch means to the tracking mirror.

The invention includes both the tracking apparatus and the tracking method, as defined in claims 1 and 6, respectively.

The accompanying drawings illustrate the invention. In such drawings:

FIG. 1 is a simplified block diagram of tracking apparatus in accordance with the present invention, for maintaining a reading beam of light aligned with a selected track on a video disc;

FIG. 2 is a fragmentary perspective view of a portion of a stamper used in molding the video disc of FIG. 1, showing in exaggerated form a dimple in the information-bearing surface of the stamper;

FIG. 3 is a plan view of the portion of a video disc produced by the stamper of FIG. 2, showing in exaggerated form the deviations in the directions of the recording tracks adjacent to the dimple;

FIG. 4 is a graph of a tracking error signal produced by tracking apparatus of the prior art when the reading beam encounters a typical dimple;

FIG. 5 is a schematic circuit diagram of the dimple compensation circuit of FIG. 1; and

FIG. 6 is a set of graphs showing several signals produced by the tracking apparatus of FIG. 1.

Referring now to the drawings, and particularly to FIG. 1, there is shown a tracking apparatus for use in a video disc playback machine, for maintaining a reading beam of light 11 aligned with a selected recording track on a video disc 13. The disc includes a plurality of closely-spaced recording tracks arranged in a spiral or concentric circle pattern. The reading beam is focused to a spot 15 aligned with a selected one of these tracks, as the disc is rotated in a prescribed fashion, to produce a reflected beam 17 that is modulated in intensity in accordance with the recorded information.

The apparatus includes a laser 19 for producing the incident reading beam 11, a radial tracking mirror 21 for controllably positioning the reading beam spot 15 at a prescribed radial location on the disc 13, and a beam splitter 23 for separating the reflected beam 17 from the incident beam. The apparatus further includes an information recovery device 25 for monitoring the intensity of the reflected beam and producing both an information signal, corresponding to the modulated intensity of the reflected beam, and a tracking error signal, indicative of the deviation of the reading beam spot 15 from the centerline of the selected recording track. This tracking error signal is coupled back to the radial tracking mirror 21 via a loop compensation circuit 27 and an amplifier 29, to form a servo for controllably positioning the reading beam spot in alignment with the selected track.

Tracking difficulties arise when the video disc 13 includes defects such as dimples in its information-bearing surface, which cause nearby recording tracks to deviate momentarily from their normal, substantially circular, shape. A typical dimple is generally conically-shaped, with a height of about 2 to 40 microns and a diameter of about 1 to 2 millimeters, extending over several hundred recording tracks. Dimples are believed to be created by the presence of foreign particles beneath a thin, metallic stamper used in molding the video disc. A perspective view of a stamper fragment 31 having such a dimple is shown in FIG. 2.

The efect a dimple has on the shape of the nearby recording tracks of the video disc 13 is depicted, in exaggerated form, in FIG. 3. It will be observed that on both sides of the dimple, the tracks deviate away from the dimple center.

FIG. 3 also shows, in diagrammatic form at 35, the path of the reading beam spot 15 when typical tracking apparatus of the prior art is used. Such prior apparatus typically attempts to maintain the spot continuously aligned with a recording track 37 that is deviating momentarily to the left because of a dimple. Because of the relatively slow response time of the apparatus, however, the spot reaches the deviating track only after the track is moving back to its original alignment. As a result, the spot overshoots the track 37 and becomes aligned with an adjacent track 39.

FIG. 4 depicts a typical tracking error signal that is produced by prior tracking apparatus when a dimple is encountered and the reading beam spot 15 jumps inadvertently to the adjacent track 39. It will be observed that the signal oscillates between relatively large positive and negative values as the spot first strays from the selected track 37 and then overshoots the track to become aligned with the adjacent track.

When scanning tracks on the approaching side of the dimple center, this track-jumping phenomenon will result in the reading beam hanging up on a single pair of tracks and the repeated recovery of the same information from the disc 13. When video information is being recovered, a stop-motion display will result. On the other hand, if by chance the reading beam spot has been passed through the dimple center and is scanning a track on its far side, this phenomenon will result in the skipping of some of the tracks. In this case, a fast motion display of the recovered video information will result.

The track-skipping phenomenon described above is eliminated by the inclusion of a dimple compensation circuit 41 and an associated FET switch 43 in the apparatus of FIG. 1. The dimple compensation circuit monitors the tracking error signal, to determine when a dimple of prescribed magnitude is being scanned, and produces a corresponding tracking loop disable signal to disable the FET switch and thereby uncouple the tracking error signal from the radial tracking mirror 21. Thus, when a dimple of the prescribed magnitude is encountered, the relative radial location of the reading beam spot 15 remains fixed. This is shown diagrammatically at 45 in FIG. 3. After the dimple has been passed, the error signal is once again coupled through the FET switch to the tracking mirror, and the apparatus

again functions as a servo to position the reading beam spot in alignment with the selected track.

A schematic circuit diagram of the preferred dimple compensation circuit 41 is shown in FIG. 5. It includes a threshold detector A 47 and a threshold detector B 49 for comparing the tracking error signal received on line 51 from the information recovery device 25 (FIG. 1) to prescribed, selectively-variable, positive and negative thresholds. The output signals of the two threshold detectors are OR'ed together by a pair of diodes 53, to form the tracking loop disable signal for coupling on line 59 to the gate terminal of the FET switch 43.

In accordance with the invention, the magnitudes of the two selectively-variable thresholds are selected according to whether the reading beam 11 is scanning a track on the approaching side or far side of a dimple. If the dimple compensation circuit 41 determines that the beam is scanning a dimple's approaching side, the positive threshold is selected to have a relatively high magnitude, $+V_2$, and the negative threshold is selected to have a relatively low mangitude, $-V_1$. Conversely, if the beam is determined to be scanning a dimple's far side, the positive threshold is selected to have a relatively low magnitude, $+V_1$, and the negative threshold is selected to have a relatively high magnitude, $-V_2$.

More particularly, the dimple compensation circuit 41 further includes a threshold detector C 61 and a threshold detector D 63, for comparing the tracking error signal to fixed, positive and negative trigger thresholds, respectively. These positive and negative trigger thresholds are selected by potentiometers 65 and 67, respectively, and are normally exceeded by the error signal only when the scanning reading beam 11 has encountered a dimple in the video disc 13. When scanning a track on the approaching side of a dimple, the negative threshold is normally exceeded first, and, conversely, when scanning a track on the far side of a dimple, the positive threshold is normally exceeded first. The threshold detector C outputs a first trigger signal on line 69 when the positive threshold is exceeded, and the threshold detector D outputs a second trigger signal on line 71 when the negative threshold is exceeded.

The dimple compensation circuit 41 of FIG. 5 further includes first and second monostable multivibrators 73 and 75, respectively. The first multivibrator produces a first control signal when triggered by the first trigger signal, and similarly, the second multivibrator produces a second control signal when triggered by the second trigger signal. The first and second control signals both have limited durations of about 600 microseconds, which corresponds to the nominal duration of a typical dimple's effect on the tracking error signal.

The first and second monostable multivibrators 73 and 75 are interconnected with each other to ensure that only one of the first and second control signals is produced at a time. More particularly, the first multivibrator ouputs a signal for coupling on line 77 to the second multivibrators, to inhibit the output of a second control signal whenever a first control signal is being produced. Similarly, the second multivibrator outputs a signal for coupling on line 79 to the first multivibrator, to inhibit the output of a first control signal when the second control signal is being produced. As a result, the second control signal indicates that a dimple has been encountered while scanning a track on the approaching side of a dimple, and the first control signal indicates that a dimple has been encountered while scanning a track on the far side of a dimple.

The dimple compensation circuit 41 further includes first and second switches 81 and 83, respectively, for selecting the appropriate positive and negative thresholds for coupling to the threshold detectors A 47 and B 49 respectively. Specifically, the first switch is responsive to the first control signal, and selects between the positive thresholds $+V_1$ and $+V_2$. Similarly, the second switch is responsive to the second control signal and selects between negative thresholds $-V_1$ and $-V_2$. The thresholds $+V_2$, $+V_1$, $-V_1$, and $-V_2$ are controllably selected by potentiometers 85, 87, 89, and 91, respectively.

Thus, when the reading beam 11 scans the approaching side of a dimple, the threshold detectors A 47 and B 49 compare the tracking error signal to the thresholds $+V_2$ and $-V_1$, respectively. If either threshold is exceeded, a tracking loop disable signal is coupled on line 59 to the FET switch 43, to uncouple the error signal from the radially-movable tracking mirror 21. The reading beam then continues to scan the disc 13 at its current radial location, and it is not urged to follow the deviating path of the selected track.

With reference now to FIG. 6a, there is shown a typical tracking error signal produced while scanning the approaching side of a dimple. It will be observed that the error signal has a significant negative excursion as the selected track deviates away from the scanning reading beam 11. The error signal first exceeds the negative trigger threshold at a location indicated by a reference numeral 93. When this occurs, the second monostable multivibrator 75 outputs the second control signal (FIG. 6b), which has a duration of about 600 microseconds. During this 600 microseconds interval, the first remains in the shown position and couples the threshold $+V_2$ to the threshold detector A 47, and the second switch 83 in response to the second control signal, couples the threshold $-V_1$ to the threshold detector B 49.

FIG. 6c shows the signal actually coupled to the tracking mirror 21 when the tracking error signal has the waveform shown in FIG. 6a. It will be observed that the two signals are identical except where the error signal exceeds either the $+V_2$ or $-V_1$ threshold, in which case the signal coupled to the mirror has a level of zero. The threshold $+V_2$ has a relatively large magnitude, so that when the dimple has been passed, any overshoot of the reading beam with respect to the selected track

will not cause it to jump inadvertently to the adjacent track. This overshoot is indicated by a positive swing 94 in the tracking error signal (FIG. 6a).

In similar fashion, when the reading beam 11 scans the far side of a dimple, the threshold detectors A 47 and B 49 compare the tracking error signal to the thresholds $+V_1$ and $-V_2$, respectively. If either threshold is exceeded, a tracking loop disable signal is coupled on line 59 to the FET switch 43, to uncouple the error signal from the tracking mirror 21. In this case, the threshold $-V_2$ has a relatively large magnitude, so that when the dimple has been passed, any overshoot of the reading beam with respect to the selected track will not cause the beam to jump inadvertently to the adjacent track.

It should be appreciated from the foregoing description that the present invention provides an improved tracking servo apparatus that aligns a scanning reading beam with a selected track on a record medium. The apparatus compensates for the presence of particular defects in the record medium, by comparing a tracking error signal to a pair of prescribed thresholds that are selectively variable according to the type of defect encountered. Whenever either threshold is exceeded, the tracking servo is disabled in a prescribed fashion, to ensure that the reading beam does not jump inadvertently to an adjacent track.

Although the invention has been described in detail, it should be understood by one of ordinary skill in the art that various modifications can be made. Accordingly, it is not intended that the invention be limited, except as by the appended claims.

Claims

1. Tracking apparatus for aligning a scanning reading beam in a prescribed position relative to a selected recording track on a record medium, comprising: means (25) for determining the location of the reading beam relative to the selected track on the record medium, and for producing a corresponding tracking error signal (51); beam steering means (21), responsive to the tracking error signal, for controllably positioning the reading beam in the prescribed position relative to the selected track; threshold detector means (43, 49) for comparing the tracking error signal to a prescribed pair of tracking thresholds and for producing a disable signal (59) whenever either threshold is exceeded, the disable signal indicating that a record medium defect of a prescribed type is being scanned; and means (43) responsive to the disable signal, for selectively uncoupling the tracking error signal from the beam steering means (21), whereby the reading beam is maintained in its current position relative to the record medium whenever the reading beam scans a record medium defect of the prescribed type, characterized by: first monitoring means (61) for comparing the tracking error signal to a first, prescribed trigger threshold, to produce a first trigger signal (69) whenever the threshold is exceeded, the first trigger threshold having a prescribed polarity; and second monitoring means (63) for comparing the tracking error signal to a second, prescribed trigger threshold, to produce a second trigger signal (71) whenever the threshold is exceeded, the second trigger threshold having a polarity opposite that of the first trigger threshold, whereby the first trigger signal is indicative of a first type of defect and the second trigger signal is indicative of a second type of defect, and further characterized by means (81 and 83) responsive to said first and second trigger signals for setting the values of said pair of tracking thresholds dependent upon which type of defect is being scanned.

2. Tracking apparatus as defined in claim 1, further including: first monostable multivibrator means (73) for producing a first control signal for controlling said means (81), said first multivibrator means being triggered by the first trigger signal; and second monostable multivibrator means (75) for producing a second control signal for controlling said means (83), the second multivibrator means being triggered by the second trigger signal; and wherein the first and second control signals both have a prescribed, constant duration.

3. Tracking apparatus as defined in claim 2, wherein the durations of the first and second control signals are at least as long as the normal duration of the record medium defects of the prescribed type.

4. Tracking apparatus as defined in claim 2, wherein: the first multivibrator means (73) includes means for inhibiting output of the first control signal when the second control signal is present; and the second multivibrator means (75) includes means for inhibiting output of the second control signal when the first control signal is present; whereby only one of the first and second control signals can be present at a time.

5. Tracking apparatus as defined in claim 1, wherein; the pair of thresholds present in the threshold detector means are opposite in polarity; the magnitude of the second threshold in the pair is greater than the magnitude of the first threshold in the pair when the first trigger signal is present; and the magnitude of the first threshold in the pair is greater than the magnitude of the second threshold in the pair when the second trigger signal is present.

6. A method for aligning a scanning reading beam in a prescribed position relative to a selected recording track on a record medium, comprising steps of: determining the location of the reading beam relative to the selected track on the record medium, and producing a corresponding tracking error signal; controllably positioning the reading beam in the prescribed position relative to the selected track in accordance with the tracking error signal; comparing the tracking error signal to a prescribed pair of tracking thresholds, and producing a disable signal whenever either threshold is exceeded, the dis-

will not cause it to jump inadvertently to the adjacent track. This overshoot is indicated by a positive swing 94 in the tracking error signal (FIG. 6a).

In similar fashion, when the reading beam 11 scans the far side of a dimple, the threshold detectors A 47 and B 49 compare the tracking error signal to the thresholds $+V_1$ and $-V_2$, respectively. If either threshold is exceeded, a tracking loop disable signal is coupled on line 59 to the FET switch 43, to uncouple the error signal from the tracking mirror 21. In this case, the threshold $-V_2$ has a relatively large magnitude, so that when the dimple has been passed, any overshoot of the reading beam with respect to the selected track will not cause the beam to jump inadvertently to the adjacent track.

It should be appreciated from the foregoing description that the present invention provides an improved tracking servo apparatus that aligns a scanning reading beam with a selected track on a record medium. The apparatus compensates for the presence of particular defects in the record medium, by comparing a tracking error signal to a pair of prescribed thresholds that are selectively variable according to the type of defect encountered. Whenever either threshold is exceeded, the tracking servo is disabled in a prescribed fashion, to ensure that the reading beam does not jump inadvertently to an adjacent track.

Although the invention has been described in detail, it should be understood by one of ordinary skill in the art that various modifications can be made. Accordingly, it is not intended that the invention be limited, except as by the appended claims.

Claims

1. Tracking apparatus for aligning a scanning reading beam in a prescribed position relative to a selected recording track on a record medium, comprising: means (25) for determining the location of the reading beam relative to the selected track on the record medium, and for producing a corresponding tracking error signal (51); beam steering means (21), responsive to the tracking error signal, for controllably positioning the reading beam in the prescribed position relative to the selected track; threshold detector means (43, 49) for comparing the tracking error signal to a prescribed pair of tracking thresholds and for producing a disable signal (59) whenever either threshold is exceeded, the disable signal indicating that a record medium defect of a prescribed type is being scanned; and means (43) responsive to the disable signal, for selectively uncoupling the tracking error signal from the beam steering means (21), whereby the reading beam is maintained in its current position relative to the record medium whenever the reading beam scans a record medium defect of the prescribed type, characterized by: first monitoring means (61) for comparing the tracking error signal to a first, prescribed trigger threshold, to produce a first trigger signal (69) whenever the threshold is exceeded, the first trigger threshold having a prescribed polarity; and second monitoring means (63) for comparing the tracking error signal to a second, prescribed trigger threshold, to produce a second trigger signal (71) whenever the threshold is exceeded, the second trigger threshold having a polarity opposite that of the first trigger threshold, whereby the first trigger signal is indicative of a first type of defect and the second trigger signal is indicative of a second type of defect, and further characterized by means (81 and 83) responsive to said first and second trigger signals for setting the values of said pair of tracking thresholds dependent upon which type of defect is being scanned.

2. Tracking apparatus as defined in claim 1, further including: first monostable multivibrator means (73) for producing a first control signal for controlling said means (81), said first multivibrator means being triggered by the first trigger signal; and second monostable multivibrator means (75) for producing a second control signal for controlling said means (83), the second multivibrator means being triggered by the second trigger signal; and wherein the first and second control signals both have a prescribed, constant duration.

3. Tracking apparatus as defined in claim 2, wherein the durations of the first and second control signals are at least as long as the normal duration of the record medium defects of the prescribed type.

4. Tracking apparatus as defined in claim 2, wherein: the first multivibrator means (73) includes means for inhibiting output of the first control signal when the second control signal is present; and the second multivibrator means (75) includes means for inhibiting output of the second control signal when the first control signal is present; whereby only one of the first and second control signals can be present at a time.

5. Tracking apparatus as defined in claim 1, wherein; the pair of thresholds present in the threshold detector means are opposite in polarity; the magnitude of the second threshold in the pair is greater than the magnitude of the first threshold in the pair when the first trigger signal is present; and the magnitude of the first threshold in the pair is greater than the magnitude of the second threshold in the pair when the second trigger signal is present.

6. A method for aligning a scanning reading beam in a prescribed position relative to a selected recording track on a record medium, comprising steps of: determining the location of the reading beam relative to the selected track on the record medium, and producing a corresponding tracking error signal; controllably positioning the reading beam in the prescribed position relative to the selected track in accordance with the tracking error signal; comparing the tracking error signal to a prescribed pair of tracking thresholds, and producing a disable signal whenever either threshold is exceeded, the dis-

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able signal indicating that a record medium defect of a prescribed type is being scanned; and selectively interrupting the step of controllably positioning, in accordance with the disable signal, whereby the reading beam is maintained in its current position relative to the record medium whenever the reading beam scans a record medium defect of the prescribed type, characterized by the steps of: comparing the tracking error signal to a first, prescribed trigger threshold, to produce a first trigger signal whenever the first trigger threshold is exceeded, the first trigger threshold having a prescribed polarity; and comparing the tracking error signal to a second, prescribed trigger threshold, to produce a second trigger signal whenever the second trigger threshold is exceeded, the second trigger threshold having a polarity opposite that of the first trigger threshold, the first trigger signal being indicative of a first type of defect, and the second trigger signal being indicative of a second type of defect, and further characterized by the step of setting the values of the pair of tracking thresholds dependent upon which type of defect is being scanned.

7. A method as defined in claim 6, wherein: the first step of comparing further includes a step of producing a first control signal in response to the first trigger signal; the second step of comparing further includes a step of producing a second control signal in response to the second trigger signal; and the first and second control signals both have a prescribed, constant duration.

8. A method as defined in claim 7, wherein the durations of the first and second control signals are at least as long as the normal duration of the record medium defects of the prescribed type.

9. A method as defined in claim 7, wherein: the first step of comparing includes a step of inhibiting output of the first control signal when the second control signal is present; and the second step of comparing includes a step of inhibiting output of the second control signal when the first control signal is present; whereby only one of the first and second control signals can be present at a time.

10. A method as defined in claim 6, wherein: the pair of thresholds used in the step of comparing are opposite in polarity; the magnitude of the second threshold in the pair is greater than the magnitude of the first threshold in the pair when the first trigger signal is present; and the magnitude of the first threshold in the pair is greater than the magnitude of the second threshold in the pair when the second trigger signal is present.

Revendications

1. Appareil d'asservissement pour le maintien d'un faisceau explorateur de lecture dans une position prédéterminée d'alignement avec une piste d'enregistrement choisie sur un support d'enregistrement, comprenant: des moyens (25) déterminant l'emplacement du faisceau de lecture par rapport à la piste choisie sur le support d'enregistrement, et produisant un signal correspondant d'erreur d'alignement (51); des moyens (21) de direction du faisceau, réagissant au signal d'erreur d'alignement, pour maintenir d'une manière réglable le faisceau de lecture dans une position prédéterminée par rapport à la piste choisie; des moyens détecteurs de seuil (47, 49) comparant le signal d'erreur d'alignement à une paire prédéterminée de seuils d'alignement et produisant un signal d'invalidation (59) quand l'un ou l'autre desdits seuils est dépassé, ledit signal d'invalidation indiquant qu'un défaut d'un type prédéterminé du support d'enregistrement est en cours de balayage; et des moyens (43) réagissant audit signal d'invalidation, pour découpler sélectivement des moyens (21) de direction du faisceau le signal d'erreur d'alignement, de sorte que le faisceau de lecture soit maintenu dans sa position relative présente par rapport au support d'enregistrement à chaque fois que le faisceau de lecture balaye un défaut d'un type prédéterminé du support d'enregistrement, caractérisé par: de premiers moyens de contrôle (61) comparant le signal d'erreur d'alignement avec un premier seuil prédéterminé de déclenchement, afin de produire un premier signal de déclenchement (59) quand le seuil est dépassé, le premier seuil de déclenchement ayant une polarité prédéterminée; et un second moyen de contrôle (63) comparant le signal d'erreur d'alignement à un second seuil prédéterminé de déclenchement, afin de produire un second signal de déclenchement (71) quand ce seuil est dépassé, le second seuil de déclenchement ayant une polarité opposée à celle du premier seuil de déclenchement, de sorte que le premier signal de déclenchement indique un premier type de défaut et que le second signal de déclenchement indique un second type de défaut, et caractérisé en outre par des moyens (81 et 83) réagissant auxdits premier et second signaux de déclenchement pour ajuster les valeurs de ladite paire de seuils d'alignement selon le type de défaut qui est balayé.

2. Appareil d'asservissement suivant la revendication 1, comprenant en outre: un premier multivibrateur monostable (73) pour produire un premier signal de commande desdits moyens (81), ledit premier multivibrateur étant déclenché par le premier signal de déclenchement; et un second multivibrateur monostable (75) pour produire un second signal de commande desdits moyens (83), ledit second multivibrateur étant déclenché par le second signal de déclenchement; et dans lequel lesdits premier et second signaux de commande ont tous deux une durée constant prédéterminée.

3. Appareil d'asservissement suivant la revendication 2, cans lequel les durées des premier et second signaux de commande sont au moins aussi longues que la durée normale des défauts d'un type prédéterminé du support d'enregistrement.

4. Appareil d'asservissement suivant la revendication 2, dans lequel: le premier multivibrateur

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(73) comprend des moyens d'inhibition de la sortie du premier signal de commande quand le second signal de commande est présent; et le second multivibrateur (75) comprend des moyens d'inhibition de la sortie du second signal de commande quand le premier signal de commande est présent; de sorte qu'un seul desdits premier et second signaux de commande peut être présent à un moment donné.

5. Appareil d'asservissement suivant la revendication 1, dans lequel: la paire de seuils présents dans le détecteur de seuil sont de polarités mutuellement opposées; la valeur du second seuil de ladite paire est supérieure à la valeur du premier seuil de la paire quand le premier signal de déclenchement est présent; et la valeur du premier seuil de la paire est supérieure à la valeur du second seuil de la paire quand le second signal de déclenchement est présent.

6. Procédé pour le maintien d'un faisceau explorateur de lecture dans une position prédéterminée d'alignement avec une piste d'enregistrement choisie sur un support d'enregistrement, comprenant les étapes suivantes: détermination de l'emplacement du faisceau de lecture par rapport à la piste choisie sur le support d'enregistrement, et production d'un signal correspondant d'erreur d'alignement; maintien d'une manière réglable du faisceau de lecture dans une position prédéterminée par rapport à la piste choisie selon le signal d'erreur d'alignement; comparaison du signal d'erreur d'alignement avec une paire prédéterminée de seuils d'alignement, et production d'un signal d'invalidation à chaque fois que l'un ou l'autre de ces seuils est dépassé, ledit signal d'invalidation indiquant qu'un défaut d'un type prédéterminé du support d'enregistrement est en cours de balayage; et interruption sélective du maintien réglable en position selon le signal d'invalidation, de sorte que le faisceau de lecture soit maintenu dans sa position présente par rapport au support d'enregistrement quand le faisceau de lecture balaye un défaut d'un type prédéterminé sur le support d'enregistrement, caractérisé par les étapes suivantes: comparaison du signal d'erreur d'alignement à un premier seuil prédéterminé de déclenchement, afin de produire un premier signal de déclenchement quand le premier seuil de déclenchement est dépassé, le premier seuil de déclenchement ayant une polarité prédéterminée; et comparaison du signal d'erreur d'alignement à un second seuil prédéterminé de déclenchement, afin de produire un second signal de déclenchement quand le second seuil de déclenchement est dépassé, le second seuil de déclenchement ayant un polarité opposée à celle du premier seuil de déclenchement, ledit premier signal de déclenchement indiquant un premier type de défaut, et le second signal de déclenchement indiquant un second type de défaut, et caractérisé en outre par un préréglage des valeurs de la paire de seuils d'alignement selon le type de défaut qui est balayé.

7. Procédé suivant la revendication 6, dans lequel: la première étape de comparaison comprend en outre une étape de production d'un premier signal de commande en réponse au premier signal de déclenchement; la seconde étape de comparaison comprend en outre une étape de production d'un second signal de commande en réponse au second signal de déclenchement; et les premier et second signaux de commande ont tous deux une durée prédéterminée constante.

8. Procédé suivant la revendication 7, dans lequel les durées des premier et second signaux de commande sont au moins aussi longues que la durée normale des défauts d'un type prédéterminé du support d'enregistrement.

9. Procédé suivant la revendication 7, dans lequel: la première étape de comparaison comprend une étape d'inhibition de la sortie du premier signal de commande quand le second signal de commande est présent; et la seconde étape de comparaison comprend une étape d'inhibition de la sortie du second signal de commande quand le premier signal de commande est présent: de sorte que seul l'un desdits premier et second signaux de commande peut être présent à un moment donné.

10 Procédé suivant la revendication 6, dans lequel: la paire de seuils utilisés dans la comparaison sont de polarités mutuellement opposées; la valeur du second seuil de ladite paire est plus élevée que la valeur du premier seuil de ladite paire quand le premier signal de déclenchement est présent; et la valeur du premier seuil de ladite paire est supérieure à la valeur du second seuil de ladite paire quand le second signal de déclenchement est présent.

Patentansprüche

1. Spurführungsvorrichtung zum Ausrichten eines Abtast-Auslesestrahls in einer vorgeschriebenen Position relativ zu einer ausgewählten Aufzeichnungsspur auf einem Speichermedium, mit: Mitteln (25) zum Bestimmen der Stelle des Auslesestrahls relativ zur ausgewählten Spur auf dem Speichermedium und zum Erzeugen eines entsprechenden Spurführungs-Fehlersignals (51); auf das Spurführungs-Fehlersignal ansprechenden Strahlsteuermitteln (21) zur gesteuerten Positionierung des Auslesestrahls in der vorgeschriebenen Position relativ zur ausgewählten Spur; Schwellenwertdetektormitteln (47, 49) zum Vergleichen des Spurführungs-Fehlersignals mit einem vorgeschreibenen Paar von Spurführungs-Schwellenwerten und zum Erzeugen eines Sperrsignals (59) immer dann, wenn einer der beiden Schwellenwerte überschritten wird, wobei das Sperrsignal anzeigt, daß ein Speichermediumfehler von einer vorgeschriebenen Art abgetastet wird; und auf das Sperrsignal ansprechenden Mitteln (43) zur selektiven Abschaltung des Spurführungs-Fehlersignals von den Strahlsteuermitteln (21), wodurch der Auslesestrahl immer dann in seiner momentanen Position relativ zum Speichermedium ge-

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halten wird, wenn der Auslesestrahl einen Speichermediumfehler der vorgeschriebenen Art abtastet, gekennzeichnet durch: erste überwachungsmittel (61) zum Vergleichen des Spurführungs-Fehlersignals mit einem ersten vorgeschriebenen Trigger-Schwellenwert, um ein erstes Triggersignal (69) immer dann zu erzeugen, wenn der Schwellenwert überschritten wird, wobei der erste Trigger-Schwellenwert eine vorgeschriebene Polarität hat; und zweite überwachungsmittel (63) zum Vergleichen des Spurführungs-Fehlersignals mit einem zweiten vorgeschriebenen Trigger-Schwellenwert, um ein zweites Triggersignal (71) immer dann zu erzeugen, wenn der Schwellenwert überschritten wird, wobei der zweite Trigger-Schwellenwert eine Polarität hat, die der des ersten Trigger-Schwellenwertes entgegengesetzt ist, wodurch das erste Triggersignal eine erste Art von Fehler und das zweite Triggersignal eine zweite Art von Fehler anzeigt, und weiter gekennzeichnet durch auf das erste und das zweite Triggersignal ansprechende Mittel (81 und 83) zum Einstellen der Werte des Paares von Spurführungs-Schwellenwerten in Abhängigkeit davon, welche Art von Fehler abgetastet wird.

2. Spurführungsvorrichtung nach Anspruch 1, weiter enthaltend: erste monostabile Multivibratormittel (73) zum Erzeugen eines ersten Steuersignals zur Steuerung der genannten Mittel (81), wobei diese ersten monostabilen Multivibratormittel durch das erste Triggersignal getriggert werden; und zweite monostabile Multivibratormittel (75) zum Erzeugen eines zweiten Steuersignals zur Steuerung der genannten Mittel (83), wobei die zweiten monostabilen Multivibratormittel durch das zweite Triggersignal getriggert werden; und bei der das erste und das zweite Steuersignal beide eine vorgeschriebene, konstante Dauer haben.

3. Spurführungsvorrichtung nach Anspruch 2, bei der die Dauern des ersten und zweiten Steuersignals zumindest gleich lang wie die normale Dauer der Speichermediumfehler der vorgeschriebenen Art sind.

4. Spurführungsvorrichtung nach Anspruch 2, bei der: die ersten Multivibratormittel (73) Mittel zum Sperren der Abgabe des ersten Steuersignals bei Vorliegen des zweiten Steuersignals enthalten; und die zweiten Multivibratormittel (75) Mittel zum Sperren der Abgabe des zweiten Steuersignals bei Vorliegen des ersten Steuersignals enthalten; wodurch zu einer bestimmten Zeit nur eines der beiden Steuersignale vorhanden sein kann.

5. Spurführungsvorrichtung nach Anspruch 1, bei der: die beiden in den Schwellenwertdetektormitteln vorhandenen Schwellenwerte entgegengesetzte Polarität haben; die Größe des zweiten Schwellenwertes des Paares größer als die Größe des ersten Schwellenwertes des Paares ist, wenn das erste Triggersignal vorliegt; und die Größe des ersten Schwellenwertes des Paares größer ist als die Größe des zweiten Schwellenwertes des Paares, wenn das zweite Triggersignal vorliegt.

6. Verfahren zum Ausrichten eines Abtast-Auslesestrahls in einer vorgeschriebenen Position relativ zu einer ausgewählten Aufzeichnungsspur auf einem Speichermedium, mit den Schritten, daß: die Stelle des Auslesestrahls relativ zur ausgewählten Spur auf dem Speichermedium bestimmt und ein entsprechendes Spurführungs-Fehlersignal erzeugt wird; der Auslesestrahl in der vorgeschriebenen Position relativ zur ausgewählten Spur in übereinstimmung mit dem Spurführungs-Fehlersignal gesteuert positioniert wird; das Spurführungs-Fehlersignal mit einem vorgeschriebenen Paar von Spurführungs-Schwellenwerten verglichen und ein Sperrsignal immer dann erzeugt wird, wenn einer der beiden Schwellenwerte überschritten wird, wobei das Sperrsignal anzeigt, daß ein Speichermediumfehler einer vorgeschriebenen Art abgetastet wird; und der Schritt der gesteuerten Positionierung in übereinstimmung mit dem Sperrsignal selektiv unterbrochen wird, wodurch der Auslesestrahl immer dann in seiner momentanen Position relativ zum Speichermedium gehalten wird, wenn der Auslesestrahl einen Speichermediumfehler der vorgeschriebenen Art abtastet, gekennzeichnet durch die Schritte, daß: das Spurführungs-Fehlersignal mit einem ersten vorgeschriebenen Trigger-Schwellenwert verglichen wird, um ein erstes Triggersignal immer dann zu erzeugen, wenn der erste Trigger-Schwellenwert überschritten wird, wobei der erste Trigger-Schwellenwert eine vorgeschriebene Polarität hat; und das Spurführungs-Fehlersignal mit einem zweiten vorgeschriebenen Trigger-Schwellenwert verglichen wird, um ein zweites Triggersignal immer dann zu erzeugen, wenn der zweite Trigger-Schwellenwert überschritten wird, wobei der zweite Trigger-Schwellenwert eine Polarität hat, die der des ersten Trigger-Schwellenwertes entgegengesetzt ist, wobei das erste Triggersignal eine erste Art von Fehler und das zweite Triggersignal eine zweite Art von Fehler anzeigt, und weiter gekennzeichnet durch den Schritt, daß die Werte des Paares von Spurführungs-Schwellenwerten in Abhängigkeit davon, welche Art von Fehler abgetastet wird, eingestellt werden.

7. Verfahren nach Anspruch 6, bei dem der erste Vergleichsschritt weiter den Schritt beinhaltet, daß ein erstes Steuersignal in Ansprechen auf das erste Triggersignal erzeugt wird; der zweite Vergleichsschritt weiter den Schritt beinhaltet, daß ein zweites Steuersignal in Ansprechen auf das zweite Triggersignal erzeugt wird; und das erste und das zweite Steuersignal beide eine vorgeschriebene, konstante Dauer haben.

8. Verfahren nach Anspruch 7, bei dem die Dauern des ersten und zweiten Steuersignals zumindest gleich lang wie die normale Dauer der Speichermediumfehler der vorgeschriebenen Art sind.

9. Verfahren nach Anspruch 7, bei dem: der erste Vergleichsschritt den Schritt beinhaltet, daß die Abgabe des ersten Steuersignals bei Vorliegen des zweiten Steuersignals gesperrt wird; und der zweite Vergleichsschritt den Schritt bein-

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haltet, daß die Abgabe des zweiten Steuersignals bei Vorliegen des ersten Steuersignals gesperrt wird; wodurch zu einer bestimmten Zeit nur eines der beiden Steuersignale vorhanden sein kann.

10. Verfahren nach Anspruch 6, bei dem: die beiden im Vergleichsschritt verwendeten Schwellenwerte entgegengesetzte Polarität haben; die Größe des zweiten Schwellenwertes des Paares größer als die Größe des ersten Schwellenwertes des Paares ist, wenn das erste Triggersignal vorliegt; und die Größe des ersten Schwellenwertes des Paares größer ist als die Größe des zweiten Schwellenwertes des Paares, wenn das zweite Triggersignal vorliegt.

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