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⑧ **Timing control apparatus.**

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**TURNRIGHT CONTROLS LTD: "Cooker control
clock with self-test"**

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Description

The present invention relates to timing control apparatus including timing data storage means, control data storage means and logic means for effecting the operation of the timing control apparatus, control means operable to effect the entry and control of timing data in the timing data storage means, display means for displaying the timing data, and output means providing output signals for controlling equipment to which the timing control apparatus belongs.

Timing control apparatus often forms part of the control system of domestic equipment, such as domestic cookers, and are arranged to provide an indication of the time of day and to accept and execute instructions resulting in the equipment being switched on at a specific time, or at specific times, for a specific duration, or for specific durations.

Timing control apparatus fitted to equipment reduces the need for a user to supervise the equipment but the increased ease of operation is generally accompanied by an increased difficulty in maintaining the equipment in a working state.

It is an object of the present invention to provide timing control apparatus which reduces difficulties of maintenance compared with known systems.

The present invention provides timing control apparatus which includes a self-test capability for facilitating maintenance of the timing control apparatus and equipment to which the timing control apparatus belongs.

In accordance with the present invention, timing control apparatus includes timing data storage means, control data storage means and logic means for effecting the operation of the timing control apparatus control means operable to effect the entry and control of timing data in the timing data storage means, display means for displaying the timing data, and output means providing output signals for controlling equipment to which the timing control apparatus belongs, characterised in that the timing control apparatus is arranged to go into a self-test mode on the operation of the control means as said apparatus is being energised, or immediately following such energisation.

In a preferred form of timing control apparatus it will be arranged that said control means comprises a plurality of separate controls, said timing control apparatus being so arranged that, in the self-test mode, operation of each separate control effects energisation of selected parts of said display means.

The maintenance of equipment to which the timing control apparatus belongs is facilitated by the use of the timing apparatus self-test mode.

Timing control apparatus, in accordance with the present invention, will now be described, by way of example only, with reference to the accompanying block diagram representation of the apparatus.

Referring to the drawing, the timing control-

apparatus is intended for controlling a domestic cooker and includes five push-button control members 4, 5, 6, 7 and 8, housed in a cover member 2 which has a window 3 through which four seven-segment and other display devices are visible. The apparatus includes a buzzer (not shown). The timing control apparatus also includes a digital signal generating and processing circuit 1, known more generally as a micro-processor, which includes timing data storage means, control data storage means and logic means, and output means for providing control output signals.

The digital signal generating and processing circuit 1 is connected to switch contacts operable by means of the push-button control members 4, 5, 6, 7 and 8 by way of a first group of connectors 10 and a part 12 of a second group of connectors 9. The digital signal generating and processing circuit 1 is connected to the display devices by way of a third group of connectors 11 and a part 13 of the second group of the connectors 9.

The interconnection of the switch contacts, referred to above, the first group of connectors 10, and the part 12 of the second group of connectors 9, is such as to form a cross-point switch matrix in which closure of one of the switches effects connection of one of the connectors 10 with one of the connectors of the group 12. The digital signal generating and processing circuit 1 is so arranged as to scan across the connectors of the group 12 with pulses, and to recognise which of the switch contacts is closed by the time of return of one of its pulses on one of the connectors 10 when a switch contact is closed.

The digital signal generating and processing circuit 1 is arranged also to scan across the connectors of the group 13 to energise each display device in turn while applying to the segments, in synchronism with its scan pulses, data representative pulses, for effecting data display.

The five push-button control members 4, 5, 6, 7 and 8 control respective switch contacts recognised by the digital signal generating and processing circuit 1 as follows:—

Push button 4—MANUAL—selecting manual control (as opposed to the normal AUTO control).
 Push button 5—READY TIME.
 Push button 6—COOK TIME.
 Push button 7—MINUTE MINDER.
 Push button 8—DECREMENT.

The digital signal generating and processing circuit 1 is so arranged as to check the condition of the switch contacts associated with the MANUAL push button 4 immediately after the timing and control apparatus has being energised, and to go into the self-test mode if the switch contacts are closed.

With the apparatus in the self-test mode, the control data storage means and logic means controls the display devices to provide the following sequence:—

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1. The right-hand digit of the display is energised to display zero and then to display all values up to eight.

2. The number eight then transfers to each digit in turn until all the digits have been energised to display eight, with only one digit energised at a time.

3. The message AUTO is displayed briefly.

4. The switched output of the apparatus is energised momentarily and a display device representing output energisation is also energised.

5. The buzzer is energised briefly.

6. All the digits are energised to display zero.

The apparatus, still in the self-test mode, is further controlled by the control data storage means and logic means to permit energisation of the display digits by the operation of respective ones of the push-button members as follows:—

1. Operation of the push-button 5 results in the energisation of the right-but-one digit to display the value four.

2. Operation of the push-button 6 results in the energisation of the right-but-one digit to display the value two.

3. Operation of the push-button 7 results in the energisation of the right-but-one digit to display the value one.

4. Operation of the push-button 8 results in the energisation of the left-but-one digit to display the value 4.

5. Operation of the push-button 4 results in the energisation of the left digit to display the value 5.

It will be evident that one or other of self-test routine performed automatically and the self-test routine conducted by the operation of the push-button may be included, or both may be included, in the apparatus.

Also, variations in the order in which events occur or the specific events themselves may be varied by those skilled in the art.

The timing and control apparatus is returned to its normal mode by de-energising it and re-energising it without operating the MANUAL push-button 4 at the time of re-energisation.

In the normal mode, the timing and control apparatus is operative to accept push-button controlled input timing data representing "time of day", "cook time", and "ready time". Alternative arrangements including "start time" may be used.

The timing and control apparatus, in the normal mode, is used as follows for the entry of "cook time", say:—

The push-button 6 is operated to select "cook time" as the timing data for entry and the apparatus will display zero value cook time, (any previously entered "cook time" will have been replaced by a zero value immediately after energisation, in known manner). The push-button 6 is held in the operated condition and after a delay the display will show that "cook time" is incrementing. The push button 6 is held until the displayed value "cook time" is equal to the desired "cook time". Should the centered value of

"cook time" overshoot the desired value, the push-button 8 is operated to decrement the value of "cook time". There is no delay between the operation of the push-button 8 and the decrementing of the displayed value of "cook time".

The control of the entries of the other timing data is effected in a similar manner to that described above for the entry of "cook time", by the use of one of the other push buttons, as appropriate.

It will be evident from the above that the timing data entry push buttons perform the dual functions of indicating which timing data is to be entered and of incrementing the value for the data.

The arrangement for causing the timing data entry push buttons to perform the dual functions, referred to above, is the subject of European Patent Application No. 86.300686.2 (EP—A2—190899).

Claims

1. Timing control apparatus including timing data storage means (1), control data storage means and logic means (1) for effecting the operation of the timing control apparatus, control means (4 to 8) operable to effect the entry and control of timing data in the timing data storage means (1), display means (3) for displaying the timing data, and output means (1) providing output signals for controlling equipment to which the timing apparatus belongs, characterised in that the timing control apparatus is arranged to go into a self-test mode on the operation of the control means as said apparatus is being energised, or immediately following such energisation.

2. Timing control apparatus as claimed in claim 1, in which said control means (4 to 8) comprises a plurality of separate controls (4, 5, 6, 7, 8), said timing control apparatus being so arranged that, in the self-test mode, operation of each separate control (4, 5, 6, 7, 8) effects energisation of selected parts of said display means (3).

Patentansprüche

1. Zeitsteuerungsvorrichtung mit Speichereinrichtung für Zeitdaten (1), Speichereinrichtung für Steuerungsdaten und Logikbaustein (1) zur Herbeiführung des Betriebs der Zeitsteuerungsvorrichtung, Bedienungselemente (4 bis 8) zur Eingabe und Steuerung der Zeitdaten in der Speichereinrichtung für Zeitdaten (1), Anzeigeeinrichtung (3) zur Anzeige der Zeitdaten, und Ausgabe-einrichtung (1) für die Ausgangssignale zur Steuerung des Geräts, zu dem die Zeitsteuerungsvorrichtung gehört, dadurch gekennzeichnet, daß die Zeitsteuerungsvorrichtung so eingerichtet ist, daß sie bei Betätigung der Bedienungselemente, zum Zeitpunkt der Erregung der besagten Vorrichtung bzw. direkt darauf in den Selbstüberprüfungsmodus geht.

2. Zeitsteuerungsvorrichtung wie unter 1 ange-

führt, bei der die genannten Bedienungselemente (4 bis 8) aus einer Vielzahl einzelner Bedienungselemente (4, 5, 6, 7, 8) bestehen, wobei die besagte Zeitsteuerungsvorrichtung so eingerichtet ist, daß im Selbstüberprüfungsmodus die Betätigung jedes einzelnen Bedienungselements (4, 5, 6, 7, 8) eine Erregung ausgewählter Teile der besagten Anzeigeeinrichtung (3) bewirkt.

Revendications

1. Appareil de contrôle de synchronisation comprenant un moyen de mémorisation des données de synchronisation (1), un moyen de mémorisation des données de contrôle et un moyen logique (1) pour permettre le fonctionnement de l'appareil de contrôle de synchronisation, un moyen de contrôle (4 à 8) exploitable pour effectuer des entrées et le contrôle des données de synchronisation dans le moyen de mémorisation des données de synchronisation (1), un moyen d'affi-

chage (3) permettant d'afficher les données de synchronisation, et un moyen de sortie (1) émettant des signaux de sortie permettant de contrôler l'équipement auquel est attaché l'appareil de contrôle de synchronisation, caractérisé par le fait que l'appareil de contrôle de synchronisation est conçu pour se mettre en mode de vérification automatique lorsque le moyen de contrôle est actionné au moment où ledit appareil est excité, ou immédiatement à la suite de cette excitation.

2. L'appareil de contrôle de synchronisation tel qu'il est défini dans l'affirmation 1, dans laquelle ledit moyen de contrôle (4 à 8) comprend plusieurs commandes séparées (4, 5, 6, 7, 8), ledit appareil de contrôle de synchronisation étant conçu de telle sorte qu'en mode de vérification automatique, le fonctionnement de chaque commande séparée (4, 5, 6, 7, 8) entraîne l'excitation de pièces sélectionnées dudit moyen d'affichage (3).

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