

WASHING MACHINE

This invention relates to a washing machine wherein an agitator mounted on the inner bottom of a tub is driven by an electric motor and the load applied to the motor is
5 detected to determine a volume of laundry loaded into the tub.

The prior art has provided automatic washing machines comprising a motor load sensor serving as motor load detecting means for detecting a load applied to an electric
10 motor driving an agitator and a microcomputer serving as laundry volume determining means for determining a volume of laundry loaded into a tub on the basis of a motor load detection signal from the motor load detecting means. After determination of the laundry volume, conditions for a
15 washing operation such as a water level and a washing period of time are set in accordance with the determined laundry volume, such that the washing is automatically executed.

For export purposes, the washing machines of the above-described type are usually designed to be operated from a
20 power supply of 200 volts and accordingly, are provided with an electric motor operated at 200 volts. The power supply voltage takes different values in countries to which the washing machines are exported. For example, the power supply voltage takes the values of 200, 220, 230 and 240
25 volts in Southeast Asian countries. The motor operated at 200 volts can also be operated at 220, 230 and 240 volts and

accordingly, the same motors are used in the washing machines exported to these countries.

However, the motor load detection signal employed for the determination of the laundry volume largely varies with changes in the power supply voltage even under the condition of the same laundry volume. Consequently, an output level of the motor load detection signal from the motor load sensor needs to be compensated so as to correspond to the power supply voltage of 200 volts when the washing machines are used in the regions where the power supply voltage takes the values of 220, 230 and 240 volts. In view of the circumstances, a compensation resistor has conventionally been provided between the motor load sensor and the microcomputer for compensating the output level of the motor load detection signal generated by the load sensor in accordance with the power supply voltage values in the importing countries.

According to the above-described arrangement, however, the resistance value of the compensation resistor needs to correspond to the power supply voltage in every importing country. Accordingly, even in one model of washing machine, different types need to be manufactured, the number of which types is equal to the number of the power supply voltage values in the importing countries. Thus, control of the types becomes troublesome and the manufacturing cost is increased.

Therefore, an object of the present invention is to

provide a washing machine wherein a single type of the washing machine can be used commonly in a plurality of importing countries such that the number of types of the washing machines to be manufactured can be reduced, the control of types can be simplified and the manufacturing cost can be reduced.

In one form of the present invention, a washing machine comprises an electric motor driving an agitator mounted in a tub, motor load detecting means for detecting a load applied to the motor to thereby generate a motor load detection signal, laundry volume determining means for determining a volume of laundry loaded into the tub, based on the motor load detection signal from the motor load detecting means, the laundry volume determining means storing data of the determined laundry volume, power supply voltage detecting means for detecting a power supply voltage, and compensation means for compensating the determined laundry volume data stored in the laundry volume detecting means.

According to the above-described arrangement, the determined laundry volume data is automatically compensated in accordance with the values of the power supply voltage. Consequently, a single type of washing machines can be exported in common to a plurality of countries where different values of the power supply voltage are adopted.

The above-mentioned compensation means preferably comprises voltage comparing means for comparing the value of the power supply voltage detected by the power supply

voltage detecting means with a plurality of reference voltage values, voltage determining means for determining as to which of intervals between the reference voltage values and the respective subsequent reference voltage values the
5 detected power supply voltage value belongs to, based on the result of comparison by the voltage comparing means, and data rewriting means for rewriting the determined laundry volume data of the laundry volume determining means into the determined laundry volume data for the interval to which the
10 detected power supply voltage value belongs.

In another form of the invention, a washing machine comprises an electric motor driving an agitator mounted in a tub, motor load detecting means for detecting a load applied to the motor to thereby generate a motor load detection
15 signal, laundry volume determining means for determining a volume of laundry loaded into the tub, based on the motor load detection signal from the motor load detecting means, power supply voltage detecting means for detecting a power supply voltage, thereby generating a power supply voltage
20 detection signal, and compensation means for compensating an output level of the motor load detection signal from the motor load detecting means, in accordance with the power supply voltage detection signal from the power supply voltage detecting means.

25 The above-described power supply voltage detecting means may be replaced by power supply voltage selecting means for selecting one of a plurality of power supply

voltage values by a manual operation. In this regard, the compensation means may compensate the determined laundry volume data stored in the laundry volume detecting means in response to the selecting operation of the power supply voltage selecting means. In this arrangement, the compensation means may compensate the output level of the motor load detection signal from the motor load detecting means in response to the selecting operation of the power supply voltage selecting means.

10 Furthermore, the washing machine may further comprise an operation panel and the power supply voltage selecting means may comprise a power supply voltage selecting switch provided on the operation panel for generating an "on" signal when operated, voltage setting means for switching
15 and setting the power supply voltage value in response to the "on" signal from the power supply voltage selecting switch every time the power supply voltage selecting switch is operated, the voltage setting means storing data of the set power supply voltage value, and power supply
20 voltage displaying means provided for displaying the selected power supply voltage value every time the power supply voltage value is selected to be set. Furthermore, the power supply voltage selecting means may comprise a power supply voltage change-over switch having a plurality
25 of contact pairs corresponding to a plurality of power supply voltage values which can be changed over to be selected. In this case, the power supply voltage change-

over switch is preferably disposed inside the body of the washing machine.

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

FIG. 1 is a schematic block diagram showing an electrical arrangement of a washing machine of a first embodiment according to the invention;

FIG. 2 is a longitudinally sectional view of the
10 washing machine;

FIG. 3 is a flowchart explaining a controlling manner of a microcomputer employed as a control circuit in the washing machine;

FIG. 4 is also a flowchart explaining another
15 controlling manner of the microcomputer;

FIG. 5 is a top plan view of an operation panel employed in the washing machine of a second embodiment;

FIG. 6 is a view similar to FIG. 1 showing the electrical arrangement of the washing machine;

20 FIG. 7 is a flowchart explaining the control manner of the microcomputer;

FIG. 8 is a view similar to FIG. 5 showing the operation panel of the washing machine of a third embodiment; and

25 FIG. 9 is a partial circuit diagram showing an electrical arrangement of the washing machine.

A first embodiment of the present invention will now be

described with reference to FIGS. 1 to 4. Referring first to FIG. 2 showing an overall construction of an automatic washing machine, an outer cabinet 1 encloses a stationary water receiving tub 2 elastically suspended therein. A rotatable tub 3 serving both as a wash tub and as a dehydration basket is provided in the water receiving tub 2. An agitator 4 for the washing operation is mounted on the inner bottom of the rotatable tub 3.

A washing and dehydrating motor 5 and a drive mechanism 6 therefor are provided on the outer bottom of the water receiving tub 2. The rotational speed of the motor 5 is reduced by the drive mechanism 6 to be transmitted only to the agitator 4 during the washing operation to rotate it. In the dehydrating operation, on the other hand, the rotational speed of the motor 5 is transmitted by the drive mechanism 6 both to the agitator 4 and to the rotatable tub 3 to rotate them simultaneously at a high speed.

The water receiving tub 2 has a drain hole 7 formed in its bottom and connected via a drain valve 8 to a drain hose 9. An air trap 10 is adjacent to the drain valve 8. A water level sensor 11 is disposed at the rear inside of a top cover 13 and connected via an air tube 12 to the air trap 10. A water supply valve 14 is also disposed at the rear inside of the top cover 13. An operation panel (not shown) including various switches 15 (see FIG. 1) is mounted on the front of the top cover 13.

Referring now to FIG. 1 showing an electrical

arrangement, a microcomputer 16 serving as a control circuit is provided with an internal memory for storing data of a control program for controlling the washing and dehydrating operations. In the embodiment, the microcomputer 16 also functions both as laundry volume determining means and as compensation means. The microcomputer 16 is supplied with switch signals from the switches 15, a water level detection signal from the water level sensor 11, a voltage detection signal from a power supply voltage detecting circuit 17 serving as power supply voltage detecting means, and a motor load detection signal from a motor load sensor 18 serving as motor load detecting means.

The above-mentioned power supply voltage detecting circuit 17 detects the magnitude of a power supply voltage applied to the washing machine, thereby generating a voltage detection signal. The motor load sensor 18 detects the phase difference of a motor current flowing in the motor 5, for example, thereby obtaining a load applied to the motor 5. The internal memory of the microcomputer 16 or more specifically, a read only memory (ROM) previously stores data of determined laundry volume data employed for the microcomputer 16 to determine a volume of laundry loaded into the rotatable tub 3 on the basis of the motor load detection signal from the motor load sensor 18. The stored, determined laundry volume data is for the power supply voltage of 200 V, for example. The microcomputer 16 further controls a display 19 provided in the operation panel, the

motor 5, the water supply valve 14 and the drain valve 8.

The operation of the washing machine will be described with reference to FIGS. 3 and 4. Each of FIGS. 3 and 4 shows a part of the control performed by the microcomputer 5 16 on the basis of the control program. More specifically, FIG. 3 shows the control manners of compensating the determined laundry volume data in accordance with the detected power supply voltage, detecting the volume of laundry loaded into the rotatable tub 3, setting a water 10 level suitable for the detected laundry volume, and supplying water to the set water level. FIG. 4 shows the subroutine for the compensation of the determined laundry volume data.

In execution of the washing, a volume of laundry or 15 clothes to be washed is loaded into the rotatable tub 3 and then, a sensor-based control course is set (step A1). Thereafter, the start switch is turned on. Consequently, the microcomputer 16 advances from step A2 to step A3 where the water supply to the rotatable tub 3 (water receiving tub 20 2) is commenced.

The motor 5 is then energized so that the agitator 4 is rotated and a quantity of load applied to the motor 5 is detected by the motor load sensor 18 (step A4). Then, the power supply voltage is detected by the power supply voltage 25 detecting circuit 17 and the microcomputer 16 inputs data of the detected power supply voltage (step A5). Based on the input data of the detected power supply voltage, the

microcomputer 16 compensates the determined laundry volume data (step A6).

The compensation of the determined laundry volume data will be described with reference to FIG. 4. A plurality of reference voltage values, 170 V, 250 V, 236 V, 226 V and 211 V are employed in the embodiment. First, it is determined whether or not the detected power supply voltage is at 170 V or above (step B1). The microcomputer 16 answers in the affirmative at step B1 when the detected power supply voltage is at 170 V or above. Then, it is determined whether or not the detected power supply voltage is at 250 V or below (step B2). The microcomputer 16 answers in the affirmative at step B2 when the detected power supply voltage is at 250 V or below. The microcomputer 16 answers in the negative at steps B1 and B2 in the cases where the detected power supply voltage is below 170 V and where it is above 250 V, respectively. In each case, an indication of error is displayed on the display 9 so that the user is informed that the power supply voltage is unsuitable (step B3).

After answering in the affirmative at step B2, the microcomputer 16 advances to step B4 where it is determined whether or not the detected power supply voltage is at 236 V or above. The microcomputer 16 answers in the affirmative when the detected power supply voltage is at 236 V or above. Then, the previously stored determined laundry volume data for the power supply voltage of 200 V is converted or

compensated into that for the power supply voltage of 240 V and the converted data is stored at step B5. In this case, the compensated determined laundry volume data is stored in a random access memory (RAM) of the internal memories of the microcomputer 16. When the detected power supply voltage is below 236 V, the microcomputer 16 answers in the negative (step B4). It is then determined at step B6 whether or not the detected power supply voltage is at 226 V or above. When the detected power supply voltage is 226 V or above, the microcomputer 16 answers in the affirmative. At step B7, the determined laundry volume data for the power supply voltage of 200 V is compensated into that for the power supply voltage of 230 V and the data is stored (step B7).

When the detected power supply voltage is not at 226 V nor above, the microcomputer 16 answers in the negative at step B6, advancing to step B8 where it is determined whether or not the detected power supply voltage is at 211 V or above. When the detected power supply voltage is at 211 V or above, the microcomputer 16 answers in the affirmative at step B8 and advances to step B9 where the determined laundry volume data for the power supply of 200 V is compensated into the data for the power supply of 220 V and the compensated data is stored. On the other hand, when the detected power supply voltage is below 211 V, the microcomputer 16 answers in the negative at step B8 and advances to step B10 where the previously stored, determined laundry volume data for the power supply of 200 V is set.

In the above-described control, the microcomputer 16 serves as voltage comparing means and voltage determining means at steps B1, B2, B3, B6 and B8. The microcomputer 16 further serves as data rewriting means at steps B5, B7 and B9.

5 Subsequently, the microcomputer 16 advances to step A7 in FIG. 3. The volume of laundry loaded into the rotatable tub 3 (the water receiving tub 2) is determined on the basis of the motor load detection signal from the motor load sensor 18 at step A7. The determination of the laundry
10 volume relies upon the determined laundry volume data compensated according to the magnitude of the power supply voltage as described above. Then, Washing conditions suitable for the determined laundry volume are set at step A8. The washing conditions include the water level, washing
15 period of time, strength of water stream and the like. Water is then supplied into the rotatable tub 3 to the set water level at step A9. Thereafter, the microcomputer 16 returns to a main routine (not shown) where the wash, rinse and dehydration steps are sequentially executed.

20 According to the above-described embodiment, the 200 V determined laundry volume data previously stored in the microcomputer 16 is compensated in accordance with the detection signal from the power supply voltage detecting circuit 17. Even when the motor load detection signal from
25 the motor load sensor 18 varies with variations of the power supply voltage, the determined laundry volume data is compensated in accordance with the variations of the power

supply voltage. Consequently, a single type of washing machines can be exported in common to the countries where the different power supply voltage values are employed. Thus, differing from the prior art, the present invention
5 can provide for reduction in the number of types of manufactured washing machines. Consequently, the control of the types of the washing machines can be simplified and the manufacturing cost can be reduced.

Although the determined laundry volume data is
10 compensated in accordance with the power supply voltage in the foregoing embodiment, an output level of the motor load detection signal from the motor load sensor 18 may be compensated in accordance with the power supply voltage, instead. More specifically, one or a plurality of
15 compensation resistors are provided between the motor load sensor and the microcomputer for compensating the output level of the motor load detection signal from the motor load sensor in accordance with the power supply voltage. In this arrangement, one of the compensation resistors is
20 selectively effected in response to the detection signal from the power supply voltage detecting circuit 17, whereby the output level of the motor load detection signal from the motor load sensor 18 is compensated in accordance with the power supply voltage. The same effect can be achieved in
25 this arrangement as in the foregoing embodiment.

Although the motor load sensor 18 detects the phase difference of the current flowing in the motor 5 in the

foregoing embodiment, another type of sensor may be employed for detecting a rotational speed of the motor 5 to detect the load applied to the motor.

FIGS. 5 through 7 illustrate a second embodiment of the invention. The difference between the first and second embodiments will be described. Referring to FIG. 5, an operation panel 23 has various switches 15 including those for setting various washing conditions, the start switch and the like and a display 19 comprising a number of light-emitting diodes for displaying the set washing conditions and an operating state of the washing machine. The operation panel 23 further includes in the right-hand portion thereof a power supply voltage selecting switch 24 comprising a push-button switch and a power supply voltage displaying section 25 displaying the selected power supply voltage, as viewed in FIG. 5. The power supply voltage displaying section 25 is composed of four light-emitting diodes 25a, 25b, 25c and 25d corresponding to the power supply voltage values of 200 V, 220 V, 230 V and 240 V respectively. Referring now to FIG. 6, the microcomputer 16 selectively sets the power supply voltage and stores the data of the set power supply voltage in response to a switch signal from the power supply voltage selecting switch 24. The microcomputer 16 further controls the power supply voltage displaying section 25. The microcomputer 16 thus serves as voltage setting means, and the power supply voltage selecting means is comprised of the power supply

voltage selecting switch 24, the microcomputer 16 and the power supply voltage displaying section 25.

Referring to FIG. 7, the operation of the above-described washing machine will be described. The flowchart of FIG. 5 shows a part of the control program of the microcomputer 16, that is, the control manners of selecting the power supply voltage after the power supply has been put to work, starting the washing operation, compensating the determined laundry volume data in accordance with the selected power supply voltage, detecting the volume of laundry loaded into the rotatable tub 3, setting the water level suitable for the detected laundry volume, and supplying water to the set water level.

The microcomputer 16 answers in the affirmative at step C1 when a power switch (not shown) is turned on in the condition that a power supply plug (not shown) of the washing machine body has been plugged into a power supply plug socket. The microcomputer 16 then advances to step C2 where it is determined whether the power supply voltage has been selected or not. This determination depends upon whether or not data of the selected power supply voltage has been stored in a memory of the microcomputer 16 such as RAM.

Suppose now that the plug has just been plugged into the plug socket. The selected power supply voltage data is not stored in the microcomputer 16 immediately after the plug has been plugged into the socket. In this case, the microcomputer 16 answers in the negative at step C2 and

advances to step C3 where the four diodes 25a-25d of the power supply voltage displaying section 25 are sequentially flashed so that the operator is called upon to select the power supply voltage. Subsequently, the power supply voltage selecting switch 24 is operated and the power supply voltage is selected at steps C4 and C5. More specifically, the light-emitting diode 25a of the power supply voltage selecting section 25 is continuously lighted when the power supply voltage selecting switch 24 is depressed once, so that the power supply voltage of 200 V is selected and data of the selected power supply voltage of 200V is stored in RAM of the microcomputer 16. Subsequently, the light-emitting diodes 25b-25d are continuously lighted in turn every time the power supply voltage selecting switch 24 is depressed, so that the power supply voltage is selected sequentially in the values of 220 V, 230 V and 240 V and the selected power supply voltage data are sequentially stored in the microcomputer 16. When the power supply voltage selecting switch 24 is further depressed after the light-emitting diode 25d for the value of 240 V has been lighted, the light-emitting diode 25a indicative of the value of 220 V is lighted and the above-described process is then repeated.

Subsequently, the laundry is loaded into the rotatable tub 3 and a sensor-based control course is set at step C6. Then, when the start switch is turned on, the microcomputer 16 answers in the affirmative at step C7, advancing to step

C8 where the water supply to the rotatable tub 3 (the water receiving tub 2) is initiated. The water is supplied to a predetermined water level for the purpose of detection of the laundry volume. The motor 5 is then energized to rotate the agitator 4 and the motor load is detected by the motor load sensor 18 at step C9.

The microcomputer 16 then inputs the selected power supply voltage data stored therein as described above at step C10. Based on the input, selected power supply voltage data or the selected power supply voltage, the microcomputer 16 compensates the determined laundry volume data (the previously stored data for the power supply voltage of 200 V) so that the data corresponds to the selected power supply voltage value at step C11.

Subsequently, based on the motor load detection signal from the motor load sensor 18, the microcomputer 16 determines the volume of laundry loaded into the rotatable tub 3 at step C12. The determined laundry volume data compensated in accordance with the power supply voltage as described above is employed for the determination of the laundry volume. The optimum washing conditions for the determined laundry volume are set at step C13. The washing conditions include the water level, the washing time period, the strength of water stream and the like. After the water has been supplied to the set water level at step C14, the microcomputer 16 returns to the main routine (not shown) where the wash, rinse, and dehydration steps are

sequentially executed.

The same effect can be achieved in the second embodiment as in the first embodiment. When the second or subsequent washing operation is to be executed after the plug has been plugged into the plug socket, the microcomputer 16 answers in the affirmative at step C2 since the selected power supply voltage data has been stored in the first washing operation. In this case, one of the light-emitting diodes 25a-25d of the power supply voltage displaying section 25 is continuously lighted on the basis of the selected power supply voltage whose data is stored in the microcomputer 16. Thus, the operation to select the power supply voltage is not necessary when the second or subsequent washing operation is executed.

Although the determined laundry volume data is compensated in accordance with the selected power supply voltage in the second embodiment, a plurality of compensation resistors may be provided between the motor load sensor and the microcomputer so that the output level of the motor load detection signal from the motor load sensor 18 is compensated in accordance with the power supply voltage, instead. The same effect can be achieved in this arrangement as in the second embodiment.

FIGS. 8 and 9 illustrate a third embodiment of the invention. The difference between the second and third embodiments will be described. Referring to FIG. 8, the operation panel 23 includes, in the right-hand end thereof,

a rotary power supply voltage change-over switch 26 serving as the power supply voltage selecting means, for example. The power supply voltage change-over switch 26 has a common contact a connected to the motor load sensor 18 and four
5 change-over contacts b, c, d and e connected via respective compensation resistors 27 through 30 to the microcomputer 16.

The compensation resistors 27-30 are provided for compensating the output level of the motor load detection
10 signal from the sensor 18 into the values corresponding to the respective power supply voltage values of 200, 220, 230 and 240 V. When the power supply voltage change-over switch 26 is rotated to the point of 200 V, the circuit is made between the contacts a and b. In the same manner, the
15 circuit is made between the contacts a, c, the contacts a, d and the contacts a, e when the change-over switch 26 is rotated to the respective points of 220 V, 230 V and 240 V. Thus, the contacts a-e form a plurality of contact mechanisms corresponding to the respective power supply
20 voltage values which can be switched to be selected. The change-over switch 26 and the compensation resistors 27-30 form compensation means 31.

In the above-described embodiment, the change-over switch 26 is operated to select the power supply voltage
25 adopted in the region before initiation of the washing operation. Consequently, the same effect can be achieved in the third embodiment as in each of the first and second

embodiments.

In the third embodiment, the output level of the motor load detection signal from the motor load sensor 18 is compensated in accordance with the selected power supply voltage value when the change-over switch 26 is operated, as described above. Instead, the power supply voltage selected by the change-over switch 26 may be distinguished by the microcomputer so that the determined laundry volume data is compensated in accordance with the power supply voltage distinguished by the microcomputer.

Although the change-over switch 26 is disposed in the operation panel 23 in the third embodiment, it may be disposed inside the outer cabinet 1 or inside the upper cover 13 so that it cannot usually be operated readily by the user. More specifically, the change-over switch 26 may be disposed on a printed circuit board provided inside the outer cabinet 1 or the upper cover 13. Furthermore, although the rotary change-over switch 26 may be employed in the foregoing embodiment, a slide switch, a plug-in type switch or dip switch may be employed, instead.

The foregoing disclosure and drawings are merely illustrative of the principles of the present invention and are not to be interpreted in a limiting sense. The only limitation is to be determined from the scope of the appended claims.

CLAIMS

1. A washing machine comprising:

a) an electric motor driving an agitator mounted in a tub;

5 b) motor load detecting means for detecting a load applied to the motor to thereby generate a motor load detection signal;

c) laundry volume determining means for determining a volume of laundry loaded into the tub, based on the motor
10 load detection signal from the motor load detecting means, the laundry volume determining means storing data of the determined laundry volume;

d) power supply voltage detecting means for detecting a power supply voltage, thereby generating a power supply
15 voltage detection signal; and

e) compensation means for compensating the determined laundry volume data of the laundry volume detecting means in accordance with the power supply voltage detection signal from the power supply voltage detecting means.

20 2. A washing machine according to claim 1, wherein the compensation means comprises voltage comparing means for comparing the value of the power supply voltage detected by the power supply voltage detecting means with a plurality of reference voltage values, voltage determining means for
25 determining as to which of intervals between the reference



voltage values and the respective subsequent reference voltage values the detected power supply voltage value belongs to, based on the result of comparison by the voltage comparing means, and data rewriting means for rewriting the
5 determined laundry volume data of the laundry volume determining means into the determined laundry volume data for the interval to which the detected power supply voltage value belongs.

3. A washing machine comprising:

10 a) an electric motor driving an agitator mounted in a tub,

b) motor load detecting means for detecting a load applied to the motor to thereby generate a motor load detection signal;

15 c) laundry volume determining means for determining a volume of laundry loaded into the tub, based on the motor load detection signal from the motor load detecting means;

d) power supply voltage detecting means for detecting a power supply voltage, thereby generating a power supply
20 voltage detection signal; and

e) compensation means for compensating an output level of the motor load detection signal from the motor load detecting means, in accordance with the power supply voltage detection signal from the power supply voltage detecting
25 means.



4. A washing machine comprising:

a) an electric motor driving an agitator mounted in a tub;

b) motor load detecting means for detecting a load
5 applied to the motor to thereby generate a motor load detection signal;

c) laundry volume determining means for determining a volume of laundry loaded into the tub, based on the motor load detection signal from the motor load detecting means,
10 the laundry volume determining means storing data of the determined laundry volume;

d) power supply voltage selecting means for selecting one of a plurality of power supply voltage values by a manual operation; and

15 e) compensation means for compensating the determined laundry volume data of the laundry volume detecting means in response to the selecting operation of the power supply voltage selecting means.

5. A washing machine comprising:

20 a) an electric motor driving an agitator mounted in a tub;

b) motor load detecting means for detecting a load applied to the motor to thereby generate a motor load detection signal;

25 c) laundry volume determining means for determining a volume of laundry loaded into the tub, based on the motor



load detection signal from the motor load detecting means, the laundry volume determining means storing data of the determined laundry volume;

d) power supply voltage selecting means for selecting
5 one of a plurality of power supply voltage values by a manual operation; and

e) compensation means for compensating an output level of the motor load detection signal from the motor load detecting means in response to the selecting operation of
10 the power supply voltage selecting means.

6. A washing machine according to claim 4 or 5, further comprising an operation panel and wherein the power supply voltage selecting means comprises a power supply voltage selecting switch provided on the operation panel for
15 generating an "on" signal when operated, voltage setting means for switching and setting the power supply voltage value in response to the "on" signal from the power supply voltage selecting switch every time the power supply voltage selecting switch is operated, the voltage setting
20 means storing data of the set power supply voltage value, and power supply voltage displaying means provided for displaying the switched power supply voltage value every time the power supply voltage value is switched to be set.

7. A washing machine according to claim 4 or 5, further
25 comprising an operation panel and wherein the power supply



voltage selecting means comprises a power supply voltage change-over switch provided on the operation panel and having a plurality of contact pairs corresponding to a plurality of power supply voltage values which can be
5 changed over to be selected.

8. A washing machine according to claim 4 or 5, wherein the power supply voltage selecting means comprises a power supply voltage change-over switch having a plurality of contact pairs corresponding to a plurality of power supply
10 values which can be changed over to be selected, the power supply voltage change-over switch being disposed inside the body of the washing machine.

9. A washing machine substantially as herein described with reference to the accompanying drawings.