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(71) Applicant : **WESTINGHOUSE ELECTRIC CORPORATION**
Westinghouse Building Gateway Center
Pittsburgh Pennsylvania 15222 (US)

(72) Inventor : **Winter, Marlan Lee**
1111 Cherokee Drive
Hendersonville, NC 28739 (US)
Inventor : **Innes, Mark Edmund**
10 Auburndale Road
Asheville, NC 28806 (US)
Inventor : **Saletta, Gary Francs**
7 Penn Hills Drive
Irwin, PA 15642 (US)
Inventor : **Prather, Edward Clarke**
2728 Miller Lane
Hendersonville, NC 28739 (US)
Inventor : **Engel, Joseph Charles**
107 Overlook Circle
Monroeville, PA 15146 (US)
Inventor : **Hurley, Rick Alan**
9 Candor Drive
Fletcher, NC 28732 (us)

(74) Representative : **van Berlyn, Ronald Gilbert**
23, Centre Heights
London, NW3 6JG (GB)

(54) Voltage regulator, power supply and calibrator.

(57) A control circuit for electrical contactors, starters and the like which include one or more pairs of separable main contacts is controlled by an electromagnet assembly 10. In order to reduce, if not eliminate, audible noise generated by the electromagnet assembly, the electrical current to the electromagnetic assembly is regulated to minimize the rate of change of magnetic flux therethrough to thereby reduce, if not eliminate, audible noise. The circuitry is also adapted to compensate for alternating current (AC) magnetic coupling from the main poles in order to provide a relatively larger hold in force when the contacts are to remain in a closed position. Apparatus for calibrating an electrical device is taught. A precision power supply device PCS is interconnected by way of appropriate input channels to the device 10 to be calibrated for supplying a precise accurate calibration variable as an input. A personal computer PC is interlinked by way of a communications network CONI with the apparatus 10 to be calibrated and is also interlinked with the precision supply device so that the personal computer PC has available the exact value of input variable utilized. Upon command, the personal computer PC instructs the device being calibrated to deliver to the personal computer PC those values of input variable which the device being calibrated interprets as the input variable value. The personal computer PC compares this value with the actual value and generates a correction factor which the personal computer PC sends back to the device being calibrated for storage in an EEPROM. A power supply 202 which includes a rectifier input circuit MCR1 which provides either half wave or full wave rectified electrical current at an instantaneous voltage value to the input terminal of a controlled switch MQ3 is taught. The controlled switch is controlled by the combination of a "low voltage reset" device MU6 and a field effects transistor MQ2 combined to form a voltage sensing and switching circuit SSM which is interconnected at its input between the input terminal of the voltage regulator and ground and at its output or reset terminal to the control terminal of the voltage regulator. The output terminal of the voltage regulator is connected to the anode of a diode MCR7, the cathode of which is connected to one side of a storage capacitor MC6.

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EUROPEAN SEARCH REPORT

Application Number

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	GB-A-2 155 266 (FORD MOTOR COMPANY) * page 1, line 39 - page 2, line 4; figures 2-5 *	1	H 01 H 47/04 H 01 H 47/32
A		2,3	
D,Y	US-A-4 893 102 (J.A. BAUER) * abstract; claim 1; figure 2 *	1	
A		2,3	
A	IBM TECHNICAL DISCLOSURE BULLETIN vol. 27, no. 2, July 1984, page 1057, New York, US; W. RENZ et al.: "Clocked Magnet Driver" * the whole document *	1	
A	WO-A-8 701 765 (MOTOROLA, INC) * page 9, line 32 - page 10, line 26; abstract; figures 5,6 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H 01 H

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
BERLIN	05-03-1992	NIELSEN K G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.

☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid,

namely claims:

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions,
namely:

1. Claims 1-5: Current supply for an actuator coil of a switch.

2. Claim 6 : Digital storing of a calibration factor.

3. Claim 7 : Voltage regulator.

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid,

namely claims:

☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims,

namely claims: 1-5