

This Invention relates to an Electronic Voting Machine (EVM)

PREAMBLE

The prior art is known as manual ballot paper voting method in which every voter is provided with a ballot paper containing serial number, names of the contesting
5 candidates, their election symbol and space to record votes. The recording of vote is done by putting 'X' mark using rubber stamp in the space provided against the candidate in the ballot paper. After recording vote, the voters deposit the ballot paper in a sealed metallic box (Ballot box). On completion of voting, the ballot papers are taken to the counting centers. The seals of ballot box is opened in the presence of candidates/agents and the
10 votes are counted manually by identifying 'X' stamp mark against the candidate. The candidate who secured highest number of votes is declared winner as per the constitution of India.

The shortcomings of the prior art (manual ballot paper voting method) are

1. Involves printing of huge volume of ballot paper.
- 15 2. Storage and distribution of ballot paper requires large manpower and security.
3. Accounting and issue of ballot paper is a tedious work and error prone.
4. Manual counting of votes requires large manpower, time and prone to human error.
5. Re-counting is time consuming and costly.
6. Segregation of invalid votes is cumbersome and leads to disputes /fights, among
20 candidates.

7. Manual voting is prone to mal – practices, booth capturing – not tamper proof.

Due to the ever increasing population and frequency of elections, there is a definite need to bring out improvement over manual ballot paper voting method, which is

1. Fool proof, trouble free and cost effective.
- 5 2. To conduct election, paper less and count the votes automatically, so that the result can be declared immediately.
3. To eliminate the invalid votes so that the dispute of segregation of invalid votes eliminated.
4. Reduce the overall election expenditure, to the government (The election expenditure
10 is increasing due to the frequent elections).
5. Reduce drastically the volume of Ballot paper printing from the current requirement of more then 70 million papers for manual voting for one general election (Papers less system)

The Electronic Voting Machine (EVM) of the present invention is provided with all the
15 above needed improvements over the manual ballot paper voting method which are explained in the succeeding paragraphs.

Summary of the invention.

The present invention relates to an Electronic Voting Machine (EVM) consisting of Control Unit (CU) and Ballot Unit (BU) for conduct of elections in place of conventional
20 manual ballot paper voting method. The invention totally replaces the existing manual

method by the use of apparatus constructed in accordance to the invention and operational requirements as per the constitution of India for fool proof, error free and cost saving way to conduct elections for electing members of state assembly, parliament and other municipal bodies based on majority voting scheme. The apparatus of the invention
5 is convenient, simple to operate and portable. Another important feature of this machine is the facia construction of the control unit and ballot unit, which is as per the constitutional requirement of India. Use of this machine eliminates invalid voters, cumbersome procedure and disputes in segregation of invalid votes as in manual ballot voting scheme. By the use of EVM, the labour can be minimized at poling centers as well
10 as counting centers. The feature of the machine are illustrated below.

The Electronic voting machine of the present invention consists of two units, i.e. a balloting unit which the voter operates to exercise his/her franchise and a control unit which controls the polling process. It is operated by the Presiding Officer or the First Polling Officer.

15 The Control Unit (CU) constructed in accordance with a invention is built around a Micro – Controller [One time Programmable (OTP)]. The control unit is divided into four sections, i.e. a. display section, b. candidate set section, c. result section and d. ballot section. The said sections, are provided with seven control buttons namely cand.set, ballot, close, result I, result II, total and clear buttons. Light emitting diode (LED)
20 indicates ON and BUSY condition of the machine. Six digits of seven segment LED is

provided for the display of result and error messages. Operation of cand.set switch sets the number of contesting candidate in control unit. Ballot switch operation energizes the ballot unit, receives and records one vote in control unit. Close button operation ends the voting process. The machine records the total number of votes polled and votes against each contesting candidate during the polling. On the operation of Result switch, the vote recorded against every contesting candidate is displayed sequentially. Clear operation erases all previous voting data stored in the machine. Print of recorded voting data is obtained through a printer interface unit.

The Ballot Unit (BU) constructed in accordance with the invention has sixteen (16) push button voting switches and indicator lamps. The voting buttons are provided in a recessed oblong cutout in the cover so that the buttons are deliberately pressed by the voters for recording of votes and not by accidental pressing. The top cover has a transparent cover for inserting ballot paper to display the names of contesting candidates, their serial number and election symbol. This cover can be sealed inside the panel by thread seal to protect the ballot paper against any tampering. Green LED lamp is provided for indicating the energized condition of the machine to the Voter. Five meter flat cable provides interconnection to the control unit to receive the signal. Slide Switch is used to indicate the ballot unit number, which is set depending on the number of contesting candidates. The rear compartment receives the interconnecting cable of the cascading ballot unit when the machine is used for more than sixteen contesting candidates.

The machine is constructed using injection moulded plastic parts, which provides consistent quality, high volume output for mass production. Fastnerless assembly of plastic components used in the construction of machine to achieve consistent quality and cost effective product. The voting machine designed with injection moulded carrying cases for movement/transportation to any location for usage. The machine constructed to operate with 7.5V battery power source. It can be deployed in places where no electrical power is available. Machine construction with multilevel interlocking panels/section makes it fool proof, easy to use by common man.

Other features and advantages of the machine will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS:

- Fig.1 shows the perspective view of control unit to control the polling process, which is constructed in accordance with the invention.
- Fig.2 is a fragmentary perspective view showing hinging arrangement of Door I & Door II to the Base of the control unit.
- Fig.3 is a fragmentary perspective view of showing the rear door of the control unit.
- Fig 4 is a fragmentary perspective view of the control unit base showing the assembly of *Printed Circuit Board* (PCB).

- Fig 5 is a perspective view of the control unit in fully assembled conditions showing four sections, of the control unit namely A) Display section B) candidate section, C) Result section D). Ballot section.
- Fig 6 is an exploded view of control unit showing parts constructed in accordance
5 with the invention.
- Fig 7 shows view of *switch knob and closing knob of Ballot Unit* constructed in accordance with the invention.
- Fig 8 is a fragmentary perspective view illustrating the arrangements of *hinge, flap right*, cover LED red.
- 10 Fig.9 is a perspective view of Ballot unit, which is constructed in accordance with the invention.
- Fig.10 is a perspective view of internal construction of ballot unit.
- Fig.11 is a fragmentary perspective view illustrating door connector box with *cable clamp, locking pin* with flaps and *rubber stand*.
- 15 Fig.12 is an exploded view of balloting unit constructed in accordance with the invention.
- Fig.13. is a diagram of Auxiliary Control Unit (ACU) constructed in accordance with the invention.
- Fig.14 is a schematic block diagram of Control Unit constructed in accordance with the
20 invention.

Fig.15 is a schematic block diagram of Ballot Unit constructed in accordance with the invention.

Fig.16 is the connectivity scheme of EVM for single poll mode.

Fig.17 is the connectivity scheme of EVM for dual poll mode.

5 Fig.18 is the state transition diagram of Electronic Voting Machine constructed in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT:

Referring the drawing of the Control Unit illustrated in Fig.1 includes an aesthetically designed plastic molded *base* 2 which enclosed Printed Circuit Board 35 (PCB) shown in
10 Fig.4 and *cover* 1 consists of four sections Display Section, Candidate Section, Result Section and Ballot Section as shown in fig.5.

- a) Display Section consists of two lamps *ON*, *Busy*, and two display panels, one of 2 digits and other of 4 digits. (Fig.5)
- b) The *Candidate Section* (fig.5) has a cover, which opens from, left to right. On
15 opening its cover by pressing the latch on the left-hand side, two compartments are seen. The left compartment is for the *battery* 34 rated 7.5V, 2Ah. In the right compartment, a *Cand.Set* button is located. The Candidate Set Section is closed and sealed by *Door IV* as shown in (fig.1).
- c) The cover of the *Result* Section has an elliptical aperture on the left hand side
20 through which the *close* button is seen. The left portion of the *Result* Section

houses a black *close* button. The right portion contains an inner compartment with its own door. The door of the inner compartment has two elliptical apertures through which buttons marked *Result I and Result II* is seen. The *inner door* can be opened by inserting the thumb and a finger through the two apertures above the

5 *Result I and Result II* 'buttons' and then pressing the inner latches simultaneously slightly inwards. On opening the door of the inner compartment by inserting forefinger and thumb through the holes which are marked *Result I and Result II* and pressing the latches and pulling the cover up, there are two frames around the two apertures for fixing green paper seals. The inner

10 compartment has three sub-sections with two yellow buttons marked *Result I and Result II* and a white *Clear* button.

- d) In the ballot section, there are two buttons – a Grey *Total* button 32 (fig.6) and a large blue *ballot* button as indicated in fig.5.

The cover 1 (fig.5) defines four sections namely

- 15 a. Display section, b. Candidate section, c. Result section and d. Ballot Section.

The base 2 (fig.6) has provision to mount printed circuit board 35 (PCB) using self tapping screws 37. It has also a compartment with *rear door* 3 (fig.6). This *rear door* is hinged in the bottom and opens swinging downwards, when the latch in the middle is pressed downwards. This has a provision for thread sealing. The *rear door* when opened

20 will reveal a socket on the left hand side for plugging the interconnecting cable from the

ballot unit and a toggle switch 36 in the middle for switching the EVM *ON or OFF* (Fig.3).

The *door I* 4 (fig.5) is a protection cover for result section. *Door I* when opened reveal knob (*Result I*) 29; Knob (*Result II*) 30; and knob (*clear*) 31 (fig.6) & has provision for
5 thread sealing. The insert 16 (Fig.5) is used for the thread sealing of the result section. Two elliptical cutouts are provided in the door 4 to access *Result I, Result II and Clear* – buttons.

The door II referred by reference numeral 5 (fig.5) is the top cover of the result section having an elliptical cutout for the knob (close) 28 (fig.6). The elliptical cutout is sealed
10 by plate – paper seal 26 (fig.5) and green paper seal. The door III indicated by reference numeral 6 (fig.5) is a protection cover for candidate set section with provision for thread sealing. The door III when opened will reveal battery compartment and candidate compartment. The candidate set compartment is accessed by opening door IV (cand.set)
7 (fig.5) by removing thread sealing. The knob (cand.set) 27(fig.6) can then be operated.

15 The hinge 8 (fig.4) shows the hinging action of the door II 5 & door III 6 with the cover. The plexy glass display 12 (fig.6) is a red acrylic sheet to view the digits of 7-segment display mounted on the Printed Circuit Board (PCB). There are 2 digits for serial number and 4 digits for number of votes. There are seven knob bases 11 (fig.6) used for the seven different knobs such as knob 27 (cand.set). Knob 28 (close), knob 29 (result I),
20 knob 30 (result II), knob 31 (clear), knob 32 (total) and knob 13 (Ballot) (Fig.6). The

knob (ballot) 13 (fig.6) is a dark blue colour plastic button to register vote. Cover 38 is provided for the green LED.

The bush short 14 (fig.6) and bush long 15 (fig.6) are assembled after mounting the Printed Circuit Board (PCB) on to the base of the control unit. The pin (door IV) 22 and
5 hinge (door IV) 23 (Fig.5) are required to assemble door IV onto the cover of the control unit. At first hinge and door IV are assembled by using pin (door IV) and then the door IV assembly is fixed to the cover by heat sealing as shown in fig. 6.

The washer 24 (fig.6) are used along with five knobs namely knob (cand.set). Knob (close), knob (result I), knob (result II) and knob (clear). It gives cushioning effect to the
10 knobs. It is made out of foam. The washer 25 (fig.6) are used to fix display Printed Circuit Board (PCB) rigidly on to the base of the control unit. After mounting the display board on the base, washer is placed and then fixed by screws. Rubber cap 33 (Fig.6) is fixed to cover screw head.

Referring to the drawings, the ballot unit illustrated in fig. 10 includes a rectangular
15 plastic moulded base 39, which encloses PCB cover & PCB (not shown). It also encloses door connector box 64 (fig.11) for interconnecting cable. The base has got a rubber stand 40 as shown in fig.7. The cover 42 (fig.10) defines cover ballot sheet 62 for inserting the ballot paper of the sixteen contestants, cover (ready Light Emitting Diode (LED) 44 (fig.10) & Light Emitting Diode (LED) cover 45 (fig.10). It protects ballot
20 paper. The cover 42 & base 39 of the ballot unit are assembled with two numbers of

plastic hinges 46 (fig.8) and the cover ballot sheet is assembled with locking pins 47 and 48 (fig. 11). The hinges are assembled to the base and cover by heat sealing process.

The Printed Circuit Board (PCB) cover 49 (fig.12) is a rectangular plastic moulded part, dark Grey in colour having provision for sixteen closing knobs 50 (fig.7), sixteen switch knobs 51 (fig. 7). This protects Printed Circuit Board (PCB) 63 (Fig.12) from tampering. It is fixed to the base by screws. The closing knob 50 (fig. 7) used for blocking the switch knob 51. In order to access the switch knob 51 one has to open the closing knob. This is used during polling depending on the number of contestants in fray.

Locking pin 52 (fig. 12) used for closing & opening the cover and base of the ballot unit. Flap right 53 (fig.11) and flap left 54 (fig. 11) are used for covering locking pin 52 after latching the cover to base. Bracket 55 (fig. 10) used for clamping the interconnecting cable at two places after crimping the 25 core flat cable to the 25-pin dip header, which is soldered to the Printed Circuit Board (PCB). Support LED 56 (fig. 12) is a plastic moulded part in which ready LED assembly is mounted in order to avoid damage during operation and transportation of the Ballot Unit.

Rubber Stand 40 (Fig. 7) supports the ballot unit while placing on table during operation. It is a plastic moulded part having provision for fixing serrated rubber stand 41 (fig.7). Rubber foot 57 (Fig 11) prevents sliding of the ballot unit from the table while the unit is in operation. Clamp cable 58 (fig. 11) clamps the interconnecting cable of the cascading

Ballot unit (incase of more than sixteen contesting candidates), 25 contact D-sub connector) inside the connector box compartment of the ballot unit.

Interconnecting cable 59 (Fig.9) is a sheathed 25 core flat cable, one end of which is permanently attached to the Ballot unit. The other end is with 25 contact D-sub connector with hood for connecting it to the control unit. Ready lamp 60 (Fig.9) is on the top left side of the Ballot unit. This lamp glow when the presiding officer presses the 'Ballot button' on the control unit enable the voter to record his vote. It goes off when the voter has recorded his vote.

Slide switch 61 window (Fig 10) is on the top right side of the Ballot unit. The slide switch inside the Ballot unit is used to set the Ballot Unit for 1-16, 17-32, 33-48 or 48-64 positions in cascading configurations. Sixteen candidates button 51 (Fig. 7) provide convenient access for the voter to record his/her vote by pressing the candidate's button against the name and symbol of the candidate of his / her choice. When the button is pressed the lamp on the left side of that button glows and voters choice is recorded.

Provision for insertion of ballot paper 43 (fig. 12) is provided on the top cover of ballot unit. The ballot paper contains serial number, names and symbols of the contesting candidates. A transparent polycarbonate sheet 62 covers the ballot sheet 43 (Fig.12) to protect the said ballot paper.

Referring to the diagram 13, Auxiliary control unit is constructed by means of cover 65, base 66, Printed Circuit Board (PCB) 67, inter-connecting cable 68 to connect to the main

control unit. The PCB is held by self-tapping screws 69, cover and base is held by screws 70, ballot knob 71 is inserted into the packet in the cover and knob base 72 is fitted from inside. Partition box 73 is used to control light dispersion on indicator. Rear door 74 provides access to connect Ballot Unit and Cable Clamp 75 is used to Clamp the Cable.

- 5 Referring to the diagram 14 which shows the block level details of hardware construction of control unit built around a Micro-controller (One Time Programmable). The non-volatile data memory is interfaced serially to the Micro controller. All the required control signals are generated through the shift register. In order to have an orderly power up and power down sequence, power monitoring circuit (DS1231) is used. To protect
- 10 EEPROMs during power up and power down, the low voltage detector in the power monitor is used. Additionally, the reset signal also inhibits the write operation under low voltage condition. A seven-segment drive-decoder is used to generate display data. In order to reduce the hardware complexity, these displays are driven in a multiplexed mode using an 8-digit, high current display driver.
- 15 Minimum numbers of components have been used to construct the machine to keep cost and power consumption at optimum. Industrial grade and surface mount technology have been used to achieve high reliability. The total hardware has been populated in only three PCBs with minimum number of interconnections to provide high field reliability and serviceability. Signal integrity is established between Micro-controller, Data memory and

ballot unit so that these three will work in unified manner. Without connecting the ballot unit the voting is not possible.

The battery is packaged in moulded case with polarized plug, which is unique and fool proof that different battery can not be used. Low battery indication is provided in the machine to facilitate replacement of battery at any stage of polling process and the process can be continued. The ballot units are powered from the control unit, which gives a unique nature of signal integrity (Scanning process) for the machine. High current drivers are used to drive the ballot unit to cater to the twenty-meter distance between the polling officer and voting compartment. The slide switch setting in ballot unit makes it unique and cannot be interchanged during poll.

Micro-controller (One Time Programmable) is used to store the firmware, which cannot be changed or modified once fused. The non-volatile data memory (EEPROM) is tightly coupled to the micro-controller through unique protocol to store the data during the voting process. Every time the micro-controller checks the check sum of the data memory (EEPROM) to confirm data integrity , otherwise the machine displays Er, which eliminates the tampering the micro-controller or EEPROM by replacement of external components.

The data memory is written in encrypted form and has been split into two banks and the ballot counting is stored in both banks. 2 Nos. are used for redundancy and hence voting data is stored at 4 locations. At every instance of a change in the data memory, the data

stored in 4 locations are verified to check the correctness of the operation. The data can be decrypted only by the firmware in the micro-controller. Hence it is not possible to corrupt the firmware or data by any known means.

To have effective redundancy, two independent non-volatile memory devices (EEPROM) are used. Effectively four banks are used to store data and at every operation all the four banks are checked and at-least two banks should contain the correct data as per the firmware's expectations. If data are not found in at-least any of the two banks then a fatal error is declared and the whole unit is unusable at this state.

The stored data can be read and printed through a printer interface module at any number of times in the life of the machine unless deliberately erased by operating the clear button. This emulates the manual ballot paper method as per the constitutional requirements.

Figure 15 shows switch and LED matrix interfaced to Control unit.

Figure 16 shows the connectivity details of electronic voting machine for single poll mode.

Figure 17 shows the connectivity details of electronic voting machine for dual poll mode where in the EVM is deployed for parliament and assembly elections simultaneously.

Figure 18 shows the state transition diagram of voting process. It also gives the different state of the machine and change over from one state to other. The state transition has

been done to prevent mal-practices and to strictly follow the procedure of voting as per the constitutional requirements.

OPERATION: Before the Electronic Voting Machine is sent to the Polling Stations, the Ballot Unit has to be prepared by the Officer-in-charge as given below:

- 5 a) Inserting the Ballot paper,
- b) Masking the Candidate's buttons, which are not required to be used,
- c) Setting the Slide Switch at the appropriate position, i.e. 1,2,3, or 4 as the case may be according to the number of such units which are to be used depending upon the number of candidates and the sequence in which, they are to be used and
- 10 d) Sealing the unit.

After taking out the Ballot Unit from the carrying case, the top cover of the unit may be opened carefully by pressing simultaneously, towards the right, the latches at the top and bottom on the right edge of the unit (fig.11), and swinging the cover up. (fig.13).

OPENING OF BALLOT PAPER SCREEN

- 15 Open the Ballot Paper Screen, which is a transparent acrylic sheet, hinged to the top cover on the extreme left side. The release latches of the screen are inside the top cover (Fig.9). By pressing the latches simultaneously, first slightly towards right and then pushing them downwards, the Ballot Paper Screen will become free for opening on the

upper side of the said top cover. While opening the screen care should be taken to ensure that it is not damaged.

FIXING OF BALLOT PAPER

- Place the Ballot Paper in the space provided for the purpose on the upper side of the top
- 5 cover. Align the Ballot paper properly so that each candidate's name and his symbol are in line with the corresponding Candidate's lamp and button. After ensuring this alignment, close and press fit the Ballot Paper Screen to secure the Ballot Paper firmly underneath that screen.

- After the Ballot Paper has been firmly fixed and the Ballot Paper Screen has been pressed
- 10 fit on the upper side of the Top Cover, the screen is to be sealed on the inner side of the Top Cover. This is to be done by passing the thread through the two holes on the screen specially provided for the purpose and by putting the thread seal on the prescribed address tag showing the particulars of the election with the seal of the Returning Officer.

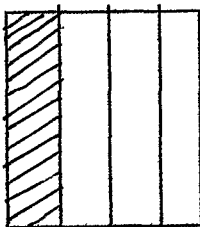
MASKING OF CANDIDATES' BUTTONS

- 15 If the number of Candidates on the ballot paper is less than 16, the white masking tabs should be moved onto the Candidates' buttons not required to be used.

SETTING OF SLIDE SWITCH

Inside the Ballot Unit on the top right side, there is a Slide Switch, which has four positions 1,2,3 and 4. If only one Ballot Unit is to be used, set this Switch to the position marked '1'. If two Ballot Units are to be used, set this Switch to the position marked '1' in the Ballot Unit in which the names of the Candidates at Sl. Nos. 1 to 16 appear, and in the second Ballot Unit set this Switch to the position marked '2'. If three Ballot Units are to be used, the Slide Switch will be set to the position marked '1' in the first Ballot Unit in which the names of candidates at Sl. Nos. 1 to 16 appear, to the position marked '2' in the second Ballot Unit in which the names of contesting candidates at Sl.Nos.17 to 32 appear, and to the position marked '3' in the third Ballot Unit. Likewise, if the 4th Ballot Unit is also to be used if the number of contesting candidates exceeds 48, then the Slide Switch will be sent to the position marked '4' in the last Ballot Unit.

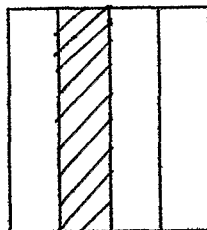
1 2 3 4



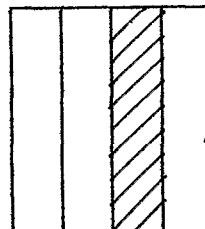
15

Position 1

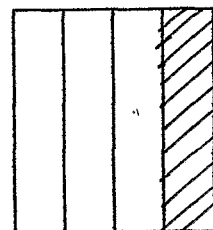
1 2 3 4

**Position 2**

1 2 3 4

**Position 3**

1 2 3 4

**Position 4**

SEALING OF BALLOT UNIT

Close the Ballot Unit by bringing the top cover back to its original position. Pass two threads, one through the three holes at the top and the other through the three holes at the bottom provided for the purpose and seal each thread with Returning Officer's seal.

5 CONTROL UNIT

The Control Unit is to be prepared by the Returning Officer by-

- a) Installing the Power Pack.
- b) Setting the number of contesting candidates and
- c) Sealing the Candidate Set Section

10 POWER PACK INSTALLATION

Open the cover of the Candidate Set Section by pressing slightly inward the latch provided on the left side. Install the Power Pack specially supplied by mating the socket of the Power Pack to the plug. Ensure that Power Pack is pressed tight.

SETTING THE NUMBER OF CONTESTING CANDIDATES

- 15 After connecting the Power Pack, open the compartment at the bottom of the Control Unit as explained above, and proceed as follows for setting the Number of contesting candidates:

- a) Connect the Ballot Unit to the Control Unit by plugging the connector of the Interconnecting Cable in the socket in that compartment. As the connector and the plug are multi-pin connectors, it will need some practice to plug them properly. The EVM will work only when this connection is made properly.
- 5 b) After plugging the connector properly, push the 'Power' switch to 'ON' position. It will give a beep sound and the "ON" lamp on the Display Section of the Control Unit will glow GREEN.
- c) After the 'ON' lamp glows GREEN, press the 'Cand Set' button in the Candidate Set Section. There upon the 2 digit Display Panel in the Display Section will now
10 flash the letters 'Cd'.
- d) When the letters 'Cd' start flashing on the Display Panels on the Control Unit, press the Candidate's button against the last contesting candidate in Ballot Unit. For example, if there are 9 contesting candidates, press the 9th candidate's button. On that button being pressed, the Display Panels will stop flashing the letters
15 'Cd'. Instead, the full panel will start displaying the following information sequentially –

Cd

0009

nP

0001

This way the machine is set for 9 contesting candidates.

- e) Switch OFF the EVM by pushing the “Power” switch downwards to OFF position and disconnect the Interconnecting cable from the control unit. For this purpose, the spring type clips on both sides of the connector hood should be pressed inward simultaneously and then the connector pulled out. Then close the door of the compartment at the bottom of the Control Unit.

SEALING THE CANDIDATE SET SECTION

Close the flap which houses the Cand Set button and pass a thread through the two holes provided on the left side and seal with the seal of the Returning Officer. Then close the candidate set section and do the thread seal. While sealing take care that direct flame does not come in contact with the Control Unit and molten wax does not fall on any part of the Control Unit.

Put back the Ballot Unit and the Control Unit in their respective carrying cases. They are ready for transportation to the Polling Station.

- 15 On the day of Election, the presiding Office shall make the following preparations:

The Ballot Unit will be checked to see if the Ballot Paper is properly fixed in ballot display panel under the ballot paper screen and that the two seals are intact.

In the Control Unit, the presiding officer will check if the Candidate Set Section is intact and then connect the Ballot Unit to the Control Unit by plugging the connector of the

interconnecting cable, put the 'Power' switch to 'ON' position and then close the bottom compartment. Then open the 'Result' Section in the Control Unit and press the 'Clear' button to set all counts to 'ZERO'. On completion of the clearing process, the display panel will start displaying that all counts are set to 'ZERO' sequentially (i.e. one by one, 5 the display panel will show the total number of candidates, total votes polled and number of votes for each candidate). If need be the presiding officer will conduct a "MOCK POLL" in the presence of some polling agents & others.

During the actual poll, the 'Result Section' should be sealed, using special security paper serially numbered. This paper seal has to be firmly fixed in the inner cover frame of the 10 Result Section. Here is also a provision for making a thread seal on the left side of the inner door. After this, the outer cover of the Result Section has to be pressed for closing this section.

PROCEDURE DURING POLL

The Poll shall commence at the hour fixed for such commencement. After all procedural 15 requirements relating to identification of voter, application of indelible ink on his/her forefinger and obtaining his/her signature/thumb impression in the Register of Voters have been completed with regard to the first voter, the voter concerned has to be allowed for recording his vote. For that purpose, press the 'Ballot' button on Ballot Section of the Control Unit which would make the Ballot Unit ready for recording of the vote by that 20 voter as has been explained herein above. Repeat that procedure every time the next voter

is to be allowed to record his vote. It should be ensured that only one voter goes inside the voting compartment to vote. Special care should be taken to ensure that a voter goes in that compartment in the same order in which his Name is entered in the 'Register of Voters.' Also ensure that the Ballot button is pressed only when the earlier voter has
5 come out of the voting compartment. At any time, if the total number of votes polled has to be ascertained, 'Total' button should be pressed. The Display panel will then show the total number of votes polled by that time. Please remember that the 'Total' button is to be pressed only when the 'Busy' lamp is OFF.

After the close of the poll, the close button will be pressed. When this button is pressed
10 the display panel will show the total number of candidates and the total number of votes polled during the day.

On the day of counting, after making the necessary checks, the Result button I in the Control Unit pressed to start the Result computation process. On completion of the result computation process, the total number of candidates, the total number of votes and the
15 total number of votes for each candidate will be displayed in the 'Display Panel' sequentially.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope and
20 spirit of the invention as defined in the appended claims.

CLAIMS

1. An Apparatus for conducting elections for Parliament, State Assembly, Municipal and other local bodies on the majority voting scheme as per constitution of India on secret ballot and one voter-one-vote principle comprising.
- 5 a) A control unit having an OTP Micro controller (One time programmable) to collect, record and store, count and display, a non volatile data memory being interfaced serially to the Micro – controller, the said memory stores the data during voting process, the various control signals are generated through the shift register, a power monitoring circuit to generate the reset to the Micro-controller, a
10 seven segment drive-decoder to generate display data, a ballot unit interface along with the necessary connector, all being housed in a housing, the top portion of the control unit being divided in to four sections i.e.,
 - (i) A display section consisting of two lamps ON to indicate that the machine is ready for use and BUSY to indicate that the voter can record his vote, and
15 the display panels- one of 2 digits and the other of four digits to display the no of candidates, total number of votes polled, individual votes for each candidate and the errors, if any,
 - (ii) Candidate set section divided into two parts, one having “Candidate Set
20 Button” to set the number of contesting candidates, the other part for carrying the power pack, two doors, one to cover the candidate set button individually and the other which covers the entire section,

(iii) Result section divided into two parts, one having the close button to close the polling operations, the other part divided into three sub sections wherein result I and Result II buttons and clear buttons are housed, the result buttons are used to display the results and clear button is used to clear the previous voting records, two separate doors, one to lock the result button sub sections and another to cover the entire section and

(iv) Ballot section wherein "ballot button" to permit the voter to cast a vote and total buttons to show the total number of votes polled are housed, and

(b) a ballot unit having a base which encloses a printed circuit board and a cover thereof, a connector box for inter connecting cables to the control unit, sixteen push button voting switches (one switch for each contesting candidates), an indicator lamp which glows when the voter is permitted to vote, a slide switch to indicate the ballot unit number.

2. Apparatus as claimed in claim 1, wherein multilevel thread sealing provision is made to protect against any possible tampering.

3. Apparatus as claimed in claim 1, wherein the control unit and ballot unit are made by injection moulded plastic parts, fastenerless heat sealing assembly technique, which provides consistent quality for mass production at economical cost.

4. Apparatus as claimed in claim 1, wherein said base comprises of rectangular moulded base providing locating latches, guides for inserting PCB, self tapping

bosses to fix PCB, heat sealing pipes to seal door II & III, cutout for accommodating rear door and pips with depression for fixing serial number plate.

5. Apparatus as claimed in claim 1, including cover, rectangular moulded part contains compartments for ballot, total, close, result I, result II, cand.set and clear buttons, a cavity to accommodate doors II, door III & door IV, a compartment for power pack, windows for ON, Serial number, Votes and busy indication, protrusion to hold the rear door, counter bore to fix cover to base at the four locations with self-tapping screws.
6. Apparatus as claimed in claim 1, wherein said door I is a moulded cover including cutouts to reach result keys from cover, latches to open from inside, lugs for thread sealing to the cover.
7. Apparatus as claimed in claim 1, wherein said door II is a cover hinged to base and enclosing the close, results and clear button, Slots for latching to base, and slant surface with hole to thread seal to the base.
8. Apparatus as claimed in claim 1 including door III comprising moulded panel hinged to base enclosing cand.set switch, power pack compartments, slot for latching to base, and slant surface with hole to thread seal to the base.
9. Apparatus as claimed in claim 1 including door IV, comprising moulded cover hinged to the main cover and enclosing cand.set switch and lugs for thread sealing to the cover.

10. Apparatus as claimed in claim 1, wherein a panel enclosing the out going connector compartment, rotates and opens out for inter-connection, latch and thread sealing lugs on both sides.
11. Apparatus as claimed in claim 1, including spacers for sandwich mounting of
5 PCB between base and cover.
12. Apparatus as claimed in claim 1, including the construction of recessed switch knob to ensure deliberate pressing by voter to record the votes.
13. Apparatus as claimed in claim 1, wherein said base is a rectangular moulded panel with self tapping holes to fix PCB, provision for fixing stand, compartment for
10 connector inter-connecting and sealing pipes to fix serial number plate.
14. Apparatus as claimed in claim 1, wherein said base is a rectangular moulded panel with self tapping holes to fix PCB, provision for fixing stand, Compartment for connector inter-connecting and sealing pipes to fix serial number plate.
15. Apparatus as claimed in claim 1 including cover, rectangular moulded panel with
15 oblong cutouts to operate switch knob to register the vote, stepped slot to fit cover ballot sheet, slots to hold right and left flops at extreme corners and pips for fixing hinges at the bottom side.
16. Apparatus as claimed in claim 1 including PCB cover, rectangular panel enclosing the PCB and provided fixing holes for inserting sixteen sets of switch and close
20 knobs.

17. Apparatus as claimed in claim 1, including cover ballot sheet, transparent cover for inserting paper containing name, serial number and election symbol of contesting candidates, fixed to cover with round latch for easy rotation.
18. Apparatus as claimed in claim 1, including switch knob and closing knob
5 constructed in that form to operate one at a time in the oblong opening, the construction of movement of one knob brings other knob into position.
19. Apparatus as claimed in claim 1, including flap right and left enclosing latch of main cover and provided with thread sealing slots to cover and base to protect against possible tampering by the voters.
- 10 20. Apparatus as claimed in claim 1, including door connector box, moulded cover enclosing rear compartment to protect cascading connector and cable.
21. Apparatus as defined in claim 1, including the signal integrity established between Micro-controller, Data memory and ballot unit so that these three will work in unified manner.
- 15 22. Apparatus as claimed in claim 1, including the construction of Battery pack in moulded case with polarised plug, which is unique and fool proof that different battery cannot be used along with Low battery indication means to facilitate replacement of battery at any stage of polling process and the process can be continued without any loss of voting data.
- 20 23. Apparatus as claimed in claim 1, including the powering scheme of ballot units from the control unit, which gives a unique nature of signal integrity (Scanning

process) for the machine, high current drivers used to drive the ballot unit to cater to the twenty-meter distance between the polling officer and voting compartment and the slide switch setting in ballot unit makes it unique and cannot be interchanged during poll.

- 5 24. Apparatus as claimed in claim 1, including the method Micro-Controller (OTP) used to store the firmware, which cannot be changed or modified once fused, the non volatile data memory (EEPROM) is tightly coupled to the micro-controller through unique protocol to store the data during the voting process, and every time the micro-controller checks the check sum of the data memory (EEPROM) to establish link to proceed with the voting process, in case of mismatch the machine displays *Er* message, which eliminates the tampering the micro-controller of EEPROM by replacement of external components.
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25. Apparatus as claimed in claim 1, including the scheme of data memory written in encrypted form and has been split into two banks and the ballot counting is stored in both banks, at every instance of a change in the data memory, the data is stored in two different ways and both are verified to check the correctness of the operation and the data can be decrypted only by the firmware in the micro-controller, hence it is not possible to corrupt firmware of data by any known means.
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- 20 26. Apparatus as claimed defined in claim 1, including the implementation of effective redundancy scheme with two independent non-volatile memory devices

(EEPROM) to store the data, effectively four banks are used to store data and at every operation all the four banks are checked and at-least two banks should contain the correct data as per the firmware's expectations and if data are not found in at-least any of the two banks then a fatal error is declared and the whole unit is unusable at this state.

27. Apparatus as defined in claim 1, including the printing of stored data memory through a printer interface module at any number of times in the life of the machine unless deliberately erased by operating the clear button. This emulates the manual ballot paper method as per the constitutional requirements.

10 28. Apparatus as defined in claim 1, including the unidirectional operational sequence of Machine in which

- a) Contesting candidate setting cannot be changed unless the result is seen once,
- b) Votes cannot be cast on the machine unless it is in the cleared condition (Previous voting data erased),
- c) Votes cannot be added to the machine once it is closed (by pressing the close button),
- d) Result cannot be seen unless the machine is closed,
- e) The machine cannot be cleared unless the result is seen at least once and the clearing operation requires the ballot unit inter connection, which eliminates accidental erasing.

29. Apparatus as defined in claim 1 including the regulation of voting in which the machine accepts maximum of 5 votes per minute and this feature discourages rigging and both capturing.

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