ELECTION COMMISSION OF INDIA
Nirvachan Sadan, Ashoka Road, New Delhi 110 001

No. 51/8/16/9/2009-EMS (Vol-IX)   Dated: 29th March, 2010

To,

Shri V.V. Rao
HIG-155, Phase-V,
KPHB Colony, KKP
Hyderabad – 500072
Andhra Pradesh

Sub: **Allegation of vulnerability/tamperability of the ECI-EVM.**

Ref: **1. The Commission's letter dated 22.07.09.**
2. The Commission's letter dated 31.07.09
3. Your letter dated 04.08.09
4. Your letter dated 08.08.09
5. The Commission's letter dated 12.08.09
6. Your letter dated 13.08.09
7. The Commission's letter dated 22.08.09
8. Your letter dated 27.08.09
9. The Commission's letter dated 01.09.09
10. Your letter dated 03.09.09
11. Your letter dated 10.11.09
12. Your letter dated 25.11.09
13. The Commission's letter dated 14.12.09
14. Your letter dated 22.12.09
15. The Commission's letter dated 12.01.10
16. Your letter dated 16.01.10
17. The Commission's letter dated 02.02.10
18. The Commission's letter dated 15.03.10
19. Your letter dated 18.03.10

Sir,

In inviting a reference to the above referred correspondence on the above subject, I am directed to say that the present proceedings before the Commission are being conducted in pursuance of the order dated 27th July 2009 of the Honourable Supreme Court in your Writ Petition (Civil) No. 292 of 2009, whereby the Honourable Supreme Court had disposed of your Writ Petition with the observation that you and other petitioners would be at liberty to pursue the matter with the Election Commission of India (ECI).   In the very first paragraph of your abovementioned writ petition, it has been stated that *"several experts and election watch groups and individuals who have*

been monitoring the election process have found that EVMs can be manipulated/tampered. They have analyzed the electronics results in several constituencies which indicate that there is something drastically wrong with the EVMs". Besides, making similar allegations in many other paragraphs of your writ petition, in the concluding para 19(xiii), it has been further stated that *"Because the election watch which was conducted at several places raises serious doubts on the functioning of the EVMs. The indications given in these studies point out how the machines could be tampered and used for casting votes in favour of a particular candidate".* Thus you had made <u>the</u> allegation that the EVMs could not only be tampered with but had in fact been manipulated/tampered with in some constituencies. However, while making these sweeping allegations, you did not mention the name of any constituency or polling station where the EVMs used by the ECI were manipulated or tampered with. It was in the context of these allegations in your petition that the Commission had asked you to demonstrate the alleged tamperability of EVMs. Moreover, the above invitation to you to demonstrate the alleged tamperability of EVMs also flowed from your prayer itself (Prayer-1) in your Writ petition, which is re-produced below :-

"Direct the respondents to provide such mechanism which is free from any manipulation/tampering so that free and fair elections in the parliamentary democracy are ensured and that the votes cast by the citizens as their right of free expression under Article 19(1)(a) of the Constitution are reflected correctly in such mechanism, whether EVM or ballots or any other device."

2. The Commission is fully convinced that the mechanism provided by it, including the use of ECI-EVMs alongwith the prescribed administrative procedures and safeguards, for conduct of elections is free from any manipulation/tampering and ensures free and fair elections. However, in view of your continued allegations about the tamperability/manipulation of ECI-EVMs, you have been given repeated opportunities to demonstrate the alleged tamperability of ECI-EVMs.

3. The Commission has noted that nowhere in your Writ Petition before the Supreme Court, have you raised the issue of ethical hacking or <u>sought</u> reverse-engineering of ECI-EVMs. However, when the Commission asked you to demonstrate the tamperability, instead of demonstrating the tamperability as alleged by you, you are

seeking to do reverse-engineering. The Commission has not allowed reverse-engineering of the ECI-EVMs, inter-alia, for the reasons that manufacturers of ECI-EVMs, BEL & ECIL, have a patent on the machines and have objected to any attempt at reverse-engineering. Your insistence on reverse-engineering of the ECI-EVMs in your letters, to be able to demonstrate the alleged tamperability, makes one thing absolutely clear - that as of now you are not aware of any process or mechanism by which the ECI-EVMs can actually be tampered with. It would appear that by reverse-engineering all you intend to do is to experiment and test your theoretical hypothesis of tamperability of the ECI-EVMs based on purely theoretical premises and assumption. The Commission has also noted that some of your team members including Mr. Hari Prasad of NET India have been showing fake look-alike EVMs on TV Channels and elsewhere to make a false propaganda against the ECI-EVMs and create confusion in the mind of the public by unethical means. The Commission is concerned that commercial interests could use the route of reverse engineering which may compromise the security and sanctity of the entire election system. It is, therefore, not possible for the Commission to permit reverse-engineering of ECI-EVMs.

4. In your letter dated 27th August 2009, you had sought information on some points many of which do not arise out of your Writ petition before the Supreme Court. Nevertheless, some of these points were explained to you during discussions. **Information on your questionnaire is enclosed with this letter.**

5. In your letter dated 18th March 2010, you have made wild allegations about threat from 'insiders'. However, you have not mentioned anywhere in your Writ petition or in any communication to the Commission, as to who are the 'insiders' who pose a threat to the ECI-EVMs and how they can tamper with them. There are more than 4 million personnel involved in the process of conduct of elections. The Commission has issued detailed instructions on ensuring security, accountability and transparency of the entire process of conduct of elections. The confidence of the Election Commission that there can be no threat from 'insiders' stems from these instructions and prescribed procedures. There is no possibility of insertion of Trojan by the manufacturer of the chip. The Commission, based on 3 decades of dealing with them, is fully satisfied with the internal procedures and safeguards of BEL and ECIL. These are Central Public Sector Undertakings (CPSU) of impeccable credential also dealing

with sensitive and critical defense and atomic sector equipments. The Commission does not find any substance in your insinuation of threat from 'insiders'.

6. You have also raised concerns on the Expert Committee. Prayer 2 of your Writ petition reads as follows:

"Direct appointment of an Independent Expert Committee to study in details all the aspects/objections concerning the present EVMs and submission of the said report before this Hon'ble court for passing appropriate orders."

7. You have requested the Commission to appoint experts who have no direct involvement in evaluating EVMs earlier. In your letter 18.03.10, you have suggested the names of Prof. David L. Dill and Prof. Alex Halderman. It needs to be mentioned that design of EVM does not only depend on technological knowledge of the expert, but also requires, knowledge of the Indian voting system and relevant statutes. Foreign computer professionals mentioned in your letter do not have knowledge of administrative safeguards in place in the Indian election system and Indian conditions. Prof. David L. Dill had sent a video statement to the Commission in which, while talking about an optical scan system he admits – "I do not know enough about elections in India to know whether that would work out or not". The Commission does not find any need for appointing any other experts, including foreign experts. Further more, worldwide, India is held in high esteem in the field of Information Technology. The Indian experts who have evaluated ECI-EVMs earlier are highly respected professors of internationally reputed Indian Institute of Technology (IIT). It may also be recalled that the original Expert Committee itself and indeed the Chairman of the present experts committee was identified and nominated as a member of the original expert committee in 1990 by the All Party Committee on Electoral Reforms headed by Shri Dinesh Goswami.

8. Judgments from various High Courts since 2001, like, High Courts of Madras, Bombay, Delhi, Karnataka and Kerala, have upheld the use of ECI-EVMs and technical experts have endorsed the machines from time to time. In fact, the Karnataka High Court in Election Petition No. 29/1999 [Michael Fernandes vs. C.K. Jafer Sharif] decided on 5th February 2004, has hailed the ECI-EVMs as "undoubtedly a great achievement in electronic and computer technology and a National Pride". The Madras High Court has also observed in W.P. Nos. 3346, 3633, 4417, 4454, 4466,

4945, 5077, 6038 and 6039 of 2001 filed by AIADMK, PMK, AIFB (TN), INL, CPI (TN State Council) & Mr. Haneefa against the Election Commission of India, order dated 10-04-2001 that "The mere statement that the petitioner could demonstrate some EVMs to show the possibility of misuse, is not helpful as those machines are not going to be used in the polls. In view of the earlier discussion, this court finds no ground to witness the demonstration". In a subsequent Writ Petition filed by Mr. Haneefa before the Madras High Court in August, 2009, the Hon'ble High Court while dismissing that petition, even imposed a fine of Rs.5,000/- on him, as the Court was convinced that the Writ Petition appeared to be filed in personal interest and not in public interest.

9. ECI has given you many opportunities to demonstrate tamperability of ECI-EVMs under all the conditions in which ECI-EVMs are used/found in the field. These stages were finally communicated to you in writing vide ECI letters No. 51/8/16/9/2009-EMS (Vol.-IX), dated 12th January 2010 and 2nd February 2010. It may be noted that once the EVMs leave the factory premises, they are found only in these three conditions/stages and therefore no additional conditions have been put on your demonstration of alleged tamperability of ECI-EVMs.

10. In this connection, please recall that ECI had written on 22nd July 2009 to Shri V. Lakshmana Reddy, State President, Janchaitenaya Vedika who was one of the co-petitioners in the above-mentioned Writ Petition inviting him for demonstration of so-called manipulation of EVM used by ECI. On 28th July 2009, the Commission received a letter from your Counsel Shri Sanjay Parekh requesting the ECI to consider points raised in the Writ Petition and such other questions which the petitioners wish to submit. The Commission wrote to Shri Sanjay Parekh on 31st July 2009 informing him that one of the petitioners Shri V. Lakshmana Reddy was already invited by the Commission. Shri Sanjay Parekh was further informed in this letter that petitioners may give a demonstration of the alleged tamperability of the ECI-EVMs in the Office of Election Commission of India without delay preferably in the week between 3rd to 7th August 2009. Instead of coming for demonstration, you wrote another letter to the Commission on 4th August 2009. This letter was mostly the repetition of all the points in your Writ Petition. On 12th August 2009, the Commission wrote to you reminding you that the Commission had already invited you with your team vide its letter dated 31st July 2009 addressed to your Counsel

Shri Sanjay Parekh and further said that you were again invited at 4.00 pm on 17th August 2009. On 17th August 2009, you came to the Commission along with Shri Hari Prasad of Net India Pvt. Ltd., Dr. Roxna Swamy, Advocate, Shri P.R. Krishnan, Senior Advocate, Shri Suresh Tripathi, Advocate, Shri Ashish Anand, Shri Kailash Mishra, Samajwadi Party, and Dr. Avinana Hota, Member Policy Board, All India Congress Committee. The full Commission met you along with the Expert Committee and representatives of manufacturers of EVM. A detailed discussion took place. The answers to the questions related to EVMs were explained to you in detail, as also the administrative procedures and safeguards laid down by the Commission whereby any apprehension of tamperability of ECI-EVMs is completely ruled out. Then the Commission gave you another opportunity for a demonstration of the alleged tamperability of ECI-EVMs at 3.30 pm on 3rd September 2009.

11. In the meantime, your letter dated 27th August 2009 was received in the Commission on 31st August 2009. In this letter you had enclosed your version of the proceedings held on 17th August, 2009. You had also enclosed a suggested procedure for demonstration of alleged tamperability and a detailed questionnaire on EVMs. In addition you had mentioned that ECIL had given you a legal notice. In the Element 4 of the procedure for demonstration on alleged tamperability suggested by you, you had clearly written that you intend to reverse-engineer the EVMs and wanted permission for reverse-engineering. The Commission advised ECIL on 1st September 2009 to consider the withdrawal of the legal notice in view of the pendency of the proceedings before the Commission. On 1st September 2009 itself the Commission wrote to you informing you of the advice given by the Commission to ECIL and allaying any misgivings in your mind on account of the notice given by ECIL to you. In this letter the Commission also informed you that the Annexure-1 in your letter dated 27th August 2009 which you had referred to as proceedings of ECI meeting of 17th August 2009 had several inaccuracies including wrong attributions and therefore could not be accepted as Minutes of the proceedings of the meeting. The Commission also informed you that questionnaire given by you has been referred to the Expert Group and replies will be given to you after receiving necessary information from them. The questionnaire was also referred to BEL and ECIL for their reply. On 1st September 2009 itself, the

Commission received communications from ECIL and BEL that reverse engineering of EVMs cannot be accepted as it violates their IP.

12. On 3rd September 2009 you came to the Commission alongwith your team. All questions raised by you on the EVMs were answered in detail. You were then allowed to open the EVM at your request for a visual understanding of the 'insides' of the ECI-EVM. However, when it became clear that you were taking measurements and making notes with a view to reverse-engineer the ECI-EVMs, you were informed that the Commission had only permitted demonstration of tamperability of EVMs and not its reverse-engineering. It may also be noted that on assurance from you that you will not misuse knowledge gained by you, you were allowed to take with you papers on which you had made notings about inner details of ECI-EVM.

13. On 10th November, 2009 you requested the Commission to fix a date for beginning the process of demonstration of tamperability of EVMs. Commission was extremely busy around this time with General Elections to Legislative Assemblies of Maharashtra, Haryana, Arunachal Pradesh and Jharkhand. In spite of this, the Commission wrote to you on 14th December 2009 informing you once again to demonstrate the alleged tamperability of EVMs on date of your convenience between 29th and 31st December 2009. In this letter, the Commission communicated to you the procedure on tamperability demonstration and made it clear that any attempt at reverse-engineering was not acceptable as it violates IP held by manufacturers of ECI-EVMs. On 22nd December 2009, you wrote another letter to the Commission confirming your participation in the discussion on 29th December 2009. In this letter, you again raised several questions, which had already been answered in previous discussions. However, you did not come to the Office of the Commission on 29th December 2009. On 12th January 2010, the Commission again wrote to you inviting you for demonstration of alleged tamperability of ECI-EVM from 2.00 pm to 6.00 pm on 19th January 2010. You wrote to the Commission on 16th January 2010 requesting to fix another date as your team members were away due to Sankranti and Pongal festival. On 2nd February 2010 you were again invited for demonstration of alleged tamperability of EVMs at 4.00 pm on 10th February 2010. You informed the Commission over

telephone that you were not available on 10th February 2010 and requested the Commission to defer the meeting. The Commission gave you yet another opportunity for a meeting to demonstrate the alleged tamperability of ECI-EVM on any of the dates convenient to you out of 19th, 20th or 22nd March 2010. Instead of coming for a demonstration, you have again written to the Commission a letter repeating the points earlier made by you.

14. It is clear from the above that in spite of many opportunities given to you by the Election Commission of India you have not been able to demonstrate and prove your allegation of tamperability in ECI-EVMs. The Commission would like to reiterate that the ECI is fully aware of its constitutional obligations and is always concerned about the conduct of free and fair elections. Towards this end the ECI has an open mind for concrete and positive suggestions for any improvements. The Commission is, therefore, willing to invite you to another meeting and give you yet another opportunity to demonstrate alleged tamperability of ECI-EVMs in accordance with the letters of Commission No.51/8/16/9/2009-EMS (Vol-IX) dated 12th January 2010 and 2nd February 2010, during the third or fourth week of April 2010 for which, you may suggest a specific date of your choice. It is once again made clear that any demonstration of alleged tamperability cannot include reverse-engineering as it compromises security and sanctity of the entire election system.

Yours faithfully,

(K.N. BHAR)
UNDER SECRETARY

Encl: Reply to the Questionnaire.

LIST OF QUESTIONS SUBMITTED ON PROCESS

Sr. No.	Issues raised by Shri V.V. Rao	Reply of the Commission
1.	What is the reason of using a generic chip instead of specifically designed ASIC chip in Electronic Voting Machine?	These chips have been found appropriate by the manufacturers of EVMs. They have been specially customized for ECI-EVMs. Such customized chips are not available in the market.
2.	Is the Chip with same part number available in the market for others for developing other applications?	Part numbers of chips are proprietary and are made exclusively for ECIL & BEL respectively. The same are not available for other applications.
3.	What is process involved in the procurement of the chip & who are the people involved in that process?	Chip is purchased from the chip manufacturer through their authorized distributor.
4.	What is the precise transport process of sending the code to the chip vendor?	The object code is handed over to the chip manufacturer through a secured process.
5.	Does the Election commission have the information on procurement chips & the process involved?	Manufacturers are reputed public sector undertakings on which ECI has full confidence. Entire information on the process of manufacturing of EVMs was given by the manufacturers to the Expert Committee. The Expert Committee after having considered all issues was fully satisfied with the process.
6.	Does Election Commission keep any audit/maintain a record on chips procured and chips used in EVMs, Chips damaged before manufacturing and chips in stock? Please provide the audit details from 1990 till date.	ECI does not keep records of components. These records are maintained by the manufacturers.
7.	Is there any encryption in the Ballot unit used for transfer of the data to control unit, if so what is the encryption and what is the software used in the Ballot Unit for enabling such encryption?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.

8.	Have the old machines been replaced, and how many more old machines have been used and can we obtain the manufacturing dates, batch numbers, serial numbers including the life of each of the Electronic Voting Machine used in the recent elections held? What is the status of the old mother boards in the upgraded machines?	1989-90 model EVMs are not being used any more. Information on manufacturing dates, batch nos., sr. nos. etc., of EVM is available with the manufacturers. There are no motherboards in the EVM. Old PCBs have not been used in new machines. Old machines are not upgraded. New machines with all its components are manufactured de-novo.
9.	Who are people involved in maintenance of EVM, are they permanent employees of ECIL / BEL or are there any contract labor involved? Please provide the details of the people	EVMs are maintained by ECIL and BEL using regular employees. Contract employees are occasionally used under supervision of permanent employees for non-core functions to help regular employees. Machine's certification is done by regular employees.
10.	In the recently concluded Elections, how many of the machines failed to read the E2PROM, & in case of memory becoming unreadable, what are the alternate methods adopted?	Out of 12.99 lakh EVMs in 122 EVMs result was not displayed on the display panel at the time of counting. Since difference of votes between the winner and first runner up was more than the number of total votes polled in that polling station, results were declared. BEL and ECIL is conducting diagnostic test on these EVMs to determine whether there was any case of E2PROM failure.
11.	What does Election Commission do with the faulty machines, if they are repaired what is the process and who are the people / organizations involved, is there any Annual Maintenance Contract for the Electronic Voting Machines?	Tests are carried out by BEL and ECIL. Only mechanical parts are repaired/replaced in the field. PCBs are not repaired in the field. They are replaced in the field and defective PCBs, if any, are repaired in the factory. There is no need of separate annual maintenance contract as machines are maintained only by ECIL and BEL.
12.	Is there any form of Randomization involved before EVM's are being sent to the Districts for the first level randomization.	EVMs are shifted from one State to another State and also to the districts based on their requirements and exigencies including logistics. In 2009 Lok Sabha Elections, more than 2 lakh EVMs were criss-crossed across the country for the above reasons.

| 13. | How many people are involved in the EVM code development? Have they signed any non disclosures on Code Security with ECI? Are all the developers are still working with the ECIL/BEL? Is there any guarantee on code security formally provided by ECIL and BEL to ECI? | Code for EVM is written in-house by ECIL and BEL in complete secrecy and is kept confidential in a fully secure manner. Details of security cannot be shared with anybody to prevent breach of security. All the employees of the BEL and ECI are covered under the Official Secrets Act. In view of this a separate guarantee is not necessary. |

Questions – On Expert Committee Report

Sr. No.	Issues raised by Shri V.V. Rao	Reply of the Commission
1.	Was the Chip used an OTP (Where the code is fused in house at the manufacturer's location) or Masked ROM (Where the code is sent outside the country to be fused into the chip at the vendor's location)?	It is OTP in the case of BEL. It is masked in the case of ECIL. Code is fused in the premises of the chip manufacturers in both cases.
2.	Are the CU & BU cards sealed and signed by the party representatives as suggested by the Prof. INDIRESAN committee report?	CU & BU cards are sealed by sealing the cover of the machine in the presence of representatives of political parties and candidates.
3.	Is there a micro controller in the BU both in old and new machines? Is it the same OTP or mask as in CU or a different chip?	<u>BEL</u> – In old EVM only the CU has micro controller which is OTP. In the new EVM both BU and CU have micro controllers both BU and CU micro controllers are OTP. <u>ECIL</u> – No micro controller in old BUs. Masked micro controller in old CU. Masked micro controller in the new EVM in both BU and CU.
4.	How many Electronic Voting Machines used were upgraded in the election held recently?	No existing machines were upgraded. Hence the question does not arise.
5.	Is there a self test signature for every Electronic Voting Machine including machines prior to 2006 and post 2006? If there is a signature available what is the process adopted and what are the records maintained for the same?	Yes. The details of the tests are confidential for reasons of security and to prevent reverse engineering.

6	Is there any other form of encryption used to store the data in EEPORM apart from dynamic key coding?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
7.	Is it a static allocation of memory in the EEPROM to store every vote like an incremental counter or whether it's read back vote by vote while results operation is being executed?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
8.	Did the Election Commission take the complete print out of every key pressed wherever there were incidents of Mal-Functioning of Electronic Voting Machines? As Expert Committee insisted on Data & Time Stamping every key pressed. Please provide details of such EVMs selected and the outcome after taking such printouts.	After the counting is over and results are declared, EVMs are sealed and kept in strong room. They cannot be opened without the order of competent court. Therefore, it is not permissible to take a printout as suggested in the question. (On the orders of the court such print outs have been taken). For declaration of results, in case there is a display malfunction, printouts of results only are taken. Printout of each key pressed as a rule is not taken because of secrecy of voting. In extreme contingency when the results are not possible any other way, with prior permission of Commission, key press prints have been taken out in rarest of the rare cases to ascertain the result.

9.	Why did Election Commission disregard certain suggestions made by the Expert Committee in regards with the modifications & upgrade of the Electronic Voting Machines used in the elections held recently?	All suggestions made by the Expert Committee have been implemented by the manufacturers. The suggestions of Expert Committee regarding post poll analysis has also been implemented in the machines, as it is possible to take a sequential print out of every vote cast during the poll. After the counting is over and results are declared, EVMs are sealed and kept in strong room and under the law they come under the jurisdiction of the court. Therefore, they cannot be opened without the order of competent court. Therefore, it is permissible to do a post poll analysis as suggested by the Expert Committee only on the orders of the competent court.
10.	What are the total number of votes that can be polled in an EVM, as Expert Review Report "Draft 1989-90 EVM's Replacement Additional features contemplated" mentions it to be 2000 maximum votes whereas FAQ's on ECI website mentioned it to be 3840? Is there a difference in the maximum votes between old & new machines?	For BEL - Total no. of votes that can be polled in 2000-2004 model EVMs 3840 and 2006-2009 model EVMs is 2000. For ECIL - In the new machines it is limited to 2000 votes and in the old machines (prior to 2006) it is 3902.
11.	What is the size of EEPROM used & what is the size of data used to store every vote?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
12.	What is the time diversity algorithm used for transmission of data? US Patent 4001692	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.

13.	Did Prof Indiresan committee evaluate the EVMs with detachable memory module (DMM)? If not why EVM-DMM models are not considered for evaluation? Are they used in any elections?	ECI-EVMs do not have DMM. Therefore, the question does not arise.
14.	Had the technical committee led by Prof Indiresan considered the point on willful Trojans inserted by the developers themselves?	The question has been considered by the Committee. The Committee did not find that it was possible to do so under conditions where administrative procedure prescribed by ECI is followed.
15.	Can a simple functional test be able to identify a Trojan inserted?	The presence of Trojan in ECI-EVMs is hypothetical. Therefore, this question itself is hypothetical. So far nobody has been able to demonstrate the presence of a Trojan in ECI-EVMs. The method of detection of a Trojan has been given in the report of the Expert Committee. According to the report of the Expert Committee, a Trojan can be detected by looking at a pattern in the post poll printout. This printout can be taken only on the order of a competent court. Besides, complete functional tests are carried out by the manufacturers before sending the EVM machines out of the factory, at the time of first level checking, machine setting by RO and mock poll before the actual poll.
16.	What kind of verification process was involved in the evaluation of EVM's by Technical Committee i.e. UAT, Functional Test or a simple over all Process Check, further are there any reports of these tests available?	The Expert Committee has carried out complete verification of EVMs to its satisfaction. The details are available in the Expert Committee Report.
17.	Post the changes made by the manufacturers of EVM according to the recommendations of Expert Committee review report were tests performed if so what are the test methods & test reports?	Manufacturers of EVMs have carried out tests and given a compliance report.

Questions – Security

Sr. No.	Issues raised by Shri V.V. Rao	Reply of the Commission
1.	What is the hardware level security (Board level & component level) on both the Ballot Unit & Control Unit provided to avoid Non-Invasive, Invasive & Semi-Invasive attacks?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
2.	Is there any security standard adopted in the EVM? If so please specify.	Security standards have been adopted. These details are kept confidential by the manufacturers for IP reasons, and also because secrecy of these details is necessary for security of EVM and prevention of reverse engineering.
3.	Are the EVMs covered or fall under E-Governance? Are e- governance standards applied to EVM?	Voting at elections is governed by the provisions of R.P. Act, 1951 and not by IT Act. ECI-EVMs are fully compliant with the provisions of R.P. Act, 1951.
4.	What is the prevention mechanism against Replication of EVMs? Can it be identified by a non technical person?	BEL and ECIL can identify fake EVMs. EVMs are kept in secure conditions. There are detailed instructions of the ECI on access control. Besides this there is electronic security in EVMs which is confidential and known only to BEL and ECIL.
5.	Is there any test to validate the ballot unit other than the Mock poll? (As the mock poll is not possible in case of BU change in the middle of the poll).	Yes. This validation is done at first level checking and at the time of setting the machine by the RO including that of the reserve EVMs which include both CU and BU.

6.	How many EVM circuit cards are replaced on malfunction while maintenance? What is the status of the OLD cards?	Less than 0.01%. Old cards are repaired and re-used wherever possible. Wherever it is not possible to use them, they are destroyed under strict supervision.
7.	How many machines are abducted/destroyed in poll disturbances? How many are recovered?	Since April, 2009 Looted – 71 Destroyed – 225 No EVM recovered
8.	How many spare machines shall be kept ready per assembly constituency and parliament constituency? Are they part of First level and Second level randomization?	ECI instructions are to keep approximately 10% reserve. They are also randomized. First level check is done on them as well.
9.	Who developed the Randomization software? Is there any kind of security validation done to the randomization software?	ECI gave detailed instructions for randomization of EVMs before use in the elections to enhance transparency and greater participation of the stakeholders in the system. ECI has laid down parameters of randomization for which the CEOs and DEOs in their respective State/District develop randomization software. The details of the instructions are enclosed at Annexure-1.

Questions – Technical

Sr. No.	Issues raised by Shri V.V. Rao	Reply of the Commission
1.	What are the specifications of Hardware, Firmware & Interfacing?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
2.	What are Standards & Guidelines followed while coding?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
3.	What are Standards followed for designing the Hardware?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
4.	What are the standards followed in designing the Encasings?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
5.	What are the Certifications available for Hardware?	Internal process and Quality audits during design and manufacturing phases to ensure quality product as per ISO 9001:2000.
6.	What are the test cases & reports of the entire project?	Equipment is tested as per QA manual.
7.	Was any Risk Analysis performed?	Yes.
8.	What is methodology of Full Load test?	Full performance functional checks simulating all the test conditions.

9.	What are the fail-safe parameters for Firmware, Hardware as well as Interfaces?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
10.	Was any Disaster recovery mechanism adopted?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.
11.	Is the Hardware unit capable of interoperability, to avoid monopoly & vendor Lock-In?	CUs and BUs of the same manufacturers & same model are interoperable.
12.	What are the MTBF (Mean Time between Failures) of various components used?	ECIL – Approx. 10000 hours BEL – Approx. 7800 hours
13.	Does the Program memory in the EVM chip is fully utilized by program? In case not is the space left out in the program memory is filled safe in the controller without Trojans?	These details are kept confidential by the manufacturers because secrecy of these details is necessary for security of EVM and prevention of reverse engineering and also for IP reasons.

ELECTION COMMISSION OF INDIA
NIRVACHAN SADAN, ASHOKA ROAD, NEW DELHI-110001.

K.N.BHAR
UNDER SECRETARY

No.51/8/7/2008-EMS (Inst.-I)   **Date**: 11/08/08

To,
        The Chief Electoral Officers of
        All the States and Union Territories

Sub: Use of EVM in the elections- additional transparency measures

Sir,

        The Election Commission of India used the Electronic Voting Machines (EVM) on an experimental basis for the first time in 1982 in an election in Kerala. After that the use of EVM was gradually increased and finally the universal use of EVM in the country became a reality in the year 2004 when EVM was used in all polling stations in the General Election to the Lok Sabha. The efficacy of EVM has stood the judicial scrutiny and the independent studies made on the use of EVM have also confirmed the voters' satisfaction about the use of EVM in elections.

        The Election Commission of India, from time to time, has been issuing instructions on various measures to be taken at the time of preparation of EVM for use in the elections (vide no 51/8/7/2007-PLN-IV12[th] October,2007); protocol for first level checking of EVMs before elections (vide 51/8/16/4/2007, dated 12th October,2007) and on protocol for security measures for EVMs (vide 464/OBS/EVM/2007 PLN-IV, 12th October,2007). The Handbook for Returning Officers (at elections where electronic voting machines are used) published by the Commission provides detailed instructions on the various aspects of the EVM management.

    As an additional measure that aims at greater transparency, the Commission has decided to introduce a randomization protocol for the deployment of EVM in various assembly constituencies/ assembly segments and has issued the following instructions to be followed meticulously without any deviation:-

1. STORAGE

As a general policy, the Commission desires that all EVMs available within a district shall be stored at the district headquarters under the direct control of the District Election Officer. It may be possible that due to want of storage space the EVMs may be stored in a decentralized manner in different locations. Even in such cases, for the purpose of first level checking and randomization procedure proposed to be introduced through this instruction, all EVMs available in the district shall be brought to the district headquarters under proper escort.

2. FIRST LEVEL CHECKING

a.   The first level checking as prescribed in the earlier instructions shall from now onwards be carried out only by the BEL/ECIL engineers, as the case may be, only at the district head quarters. For coordinating all activities connected with the first level checking, the DEO shall nominate a nodal officer at his level and intimate the name of such officer to the CEO. The first level checking will be done by following the existing instructions and procedures.

b.   For the purpose of tracking various steps taken in the process of first level checking, randomization and deployment of EVM, an adhesive label (pre-printed sticker) will be prepared and kept ready for use. (This can be organized centrally by the CEO or the DEO can print at their level as per the decision of CEO in this regard). A sample model of such label is given in Annexure 1.

3. NUMBERING OF EVMs

As soon as the first level check is over the sticker will be pasted on the back side of the CU and the checking- engineer will put his signature indicating the date in the relevant slot provided in the sticker. This would mean that the CU is in order in every respect. The unique machine number of the control unit (CU) will be also indicated in the relevant slot in the sticker; besides, a running serial number will also be allotted to the CU and will be indicated in the relevant slot. Simultaneously, the representative of DEO duly authorized for this purpose will also put his signature in the relevant space. After this, CU shall be stored with due precaution and care. In case of any CU found to be defective during checking, such CUs shall be isolated and kept separately for follow up action for rectification of defect. The above procedure will also be applicable for the Balloting Units which will be verified, signed and numbered in the above manner.

4. DATABASE

A database of the CUs and BUs verified and certified will be prepared separately and kept in readiness for randomization. The data base structure will contain details of CUs and BUs indicating the machine number (original number given by the manufacturer as inscribed on a metallic plate at the back side of the CU/BU as the case may be.) The CUs/ BUs so verified shall be kept under proper lock and key.

5. SCHEDULE FOR RANDOMIZATION OF EVM

The DEO will fix up a schedule, which should in any case be fixed before the start of training of polling personnel, for randomization of CUs/ BUs for distribution to ACs in the presence of the representatives of recognized political parties. The randomization will be done in such a way that the CUs /BUs are randomly selected by grouping them to match the poll day requirement including the reserve required for each constituency. Again, the surplus CUs/BUs shall also be randomly grouped and distributed AC wise for the purpose of training (for the training of the polling staff as well as for the purpose of voter awareness). A sticker of different color shall be affixed at the front side of the CUs/ BUs set aside for training purpose clearly indicating **"……………….(Name of State/UT along with year): Training CU/ BU"**. While randomizing

the CUs/ BUs the DEO shall take the number of polling stations in each constituency into account.

6. ALLOCATION OF ID

After AC wise grouping of CUs/ BUs is done in the above manner, a 'current ID' shall be assigned to each of CU/ BU in the relevant slot provided in the sticker. The 'current ID' would mean 'the AC no followed by a new running serial number for that AC'. For example if AC No 56 is allotted 280 CUs and BUs the current ID for the CUs would be from '56/CU/001' to '56/CU/280'. Similarly the current ID for BU would read '56/BU/001 to 56/BU/280'.

7. DISTRIBUTION OF LIST & EVM TO RETURNING OFFICER

   a. The randomized list of CUs and BUs allotted to each AC for use at polling stations as well as the training EVMs shall be prepared separately and signed by the DEOs representative and the R.O and that list shall be handed over to all representatives of the recognized political parties. Even if a representative is not available at the time of randomization the list shall still be sent to the party office and a receipt obtained.
   b. Thereafter, the R.O of the constituency, shall take charge of the CUs/BUs randomly allotted to his constituency. The CUs/BUs meant for use at the election shall be separately taken to R.O's strong room under proper escort and will be guarded. The training EVMs shall be distributed to the relevant officers for the training purpose. At the time of sealing the strong room, the representatives of political parties can remain present and they can also affix their seal on the lock.

8. PREPARATION OF EVM

   a. On the day fixed for preparing the CUs/BUs for use in the election, the R.O will ensure that the preparation of CUs/BUs is done invariably in the presence of the candidate or his agent or authorized representative and in the presence of observer as per the existing instructions. Now, the R.O will do the second randomization of the CUs/ BUs to allot the CU/ BU to specific polling stations. After that he will write the PS No to which the CU/BU has been randomly allotted in the slot provided for it in the adhesive label. The remaining CUs/BUs (not allotted to any specific PS) shall be kept as 'Reserve' for use if needed. Such CUs /BUs shall be marked as 'R' – meaning 'Reserve' in the slot meant for PS No.
   b. At this stage, the CU and BU randomly earmarked PS wise as above shall be identified by matching the PS no and kept in pair by tagging them together. Any candidate/ agent present at the preparation hall may choose to get the CU/BU again checked by the master trainers/ technical personnel if available through a 'mock poll cum result verification' in order to satisfy himself about the functioning of the EVM. The R.O should also, as a pro-active measure, do a random verification of at least 10% of such CU-BU pairs to test the working status of the EVMs.

c. Then a Polling Station wise list indicating the Current ID and machine number of the CU/BU allotted to each PS will be prepared and signed by the R.O. The R.O will also prepare a separate list of CUs/BUs marked as 'R' indicating the current ID and machine number. Both the above lists will be signed by R.O and copies shared with the candidates/ agents/ representatives and their signature shall be obtained as the token of receipt.

d. As per the existing instructions two types of address tags – one for use on CU and another on BU have been prescribed. From now on wards, the tag shall also contain the current ID no (as mentioned in the sticker- read para 7 above). The address tag attached to reserve CU/ BU shall indicate the 'Reserve' status of the unit. The tagging of address tag shall also be done at this stage itself – in the presence of candidates/ agents/ observer. All the CUs/ BUs allotted to Polling Stations as above as well as the reserve machines shall be kept in the strong room in the presence of candidates/ agents. They can also be allowed to affix their seal on the lock of the strong room.

9. DISPERSAL OF EVMs FOR ACTUAL POLL

a. When the EVMs are taken out of the strong room for dispatch the usual precaution of informing the date and time of opening of strong room in writing to the candidates/ agents shall be followed.

b. At the time of dispatch the Presiding Officers shall be advised to compare the machine number inscribed on the metal label and the adhesive sticker and also verify the PS no indicated on the sticker compared with PS no mentioned in the address tag before accepting the EVM. Discrepancy if any shall be brought to the notice of the officer in charge of dispatch arrangement and be reconciled.

c. The candidates may be advised to share the current ID and machine number of the EVM (both CU/ BU) allotted to the specific PS with their polling agent/ agents appointed by them so that they are in a position to inspect the EVM for their satisfaction before the commencement of mock poll on the poll day. The Presiding Officers shall be advised to display the sticker containing the machine number and current ID etc., to the agents present before the commencement of the mock poll. It is relevant to note that as per the existing instructions the presiding officer is supposed to mention the number of CU/ CUs used; serial numbers of CU/CUs used; numbers of BU/BUs used and serial numbers of BU/BUs used at the polling station in the Presiding Officer's Diary (refer: Chapter XXVIII, Para 1 of Handbook for Presiding Officers- At elections where electronic voting machines are used, 2004). This instruction shall be scrupulously followed.

10. REPLACEMENT OF EVM DURING POLL

In case of replacement of CU or BU due to reason at any polling station the sector officer or any authorized officer who effects such replacement shall prepare a special report indicating the machine number and current ID of the existing CU/BU and new CU /BU separately. The officer shall also mention in the special report, the reason for deployment of the spare CU/BU and the time of such replacement, votes polled in the replaced machine at that point of time and leave one copy of the special report with the Presiding Officer while retaining a copy to be handed over to the R.O..

11. RECEPTION OF EVMs AFTER POLL

The machines shall be escorted back after the poll is over to the reception centres under proper escort. After all formalities are completed, the EVMs shall be kept in strong room and the room sealed in the presence of the candidates/their agents and observer.

12. REPOLL

a. In case of repoll, the EVM required for repoll shall be drawn from the reserve list and the CU/BU number shall be informed to the candidates/agents in writing. Care shall be taken to ensure that the address tag on the CU and BU clearly mentions it to be the EVM for use in the repoll indicating the date and PS no..

b. After repoll, for the storage of the repolled EVM, the strong room shall be re-opened in the presence of the candidates/ their agents and observer. This repoll EVM should be placed together with the old EVM which was used earlier in the original poll. A tag '**Not to be counted**' shall be put prominently on the old EVM and another tag '**Repoll EVM – to be counted**' shall be put on the new repoll EVM. RO shall put signature on both the tags.

13. COMMUNICATION TO POLITICAL PARTIES/ CANDIDATES

The political parties/candidates should be advised in writing to properly train their counting agents and that they should bring (for tallying purpose) their copies of Form 17-C which shows the machine numbers used at the polling station and was handed over to them at the close of the polling by the presiding officer. Besides, the candidates have also been given a consolidated list of polling station wise list of CUs used during the polls (Read Para 12 above). This along with the additional information given by RO in writing to the candidates regarding the machine numbers of CUs used as replacement and the CUs used during repoll will give a complete picture of the all the EVMs used at polling stations. In order to further facilitate, additionally, the RO shall paste the EVM deployment account indicating the CU numbers of EVM used polling station wise in the relevant counting hall itself for everyone to see.

14. VIDEOGRAPHY OF THE EVENTS

All the stages enumerated above shall invariably be fully covered with videography and records kept properly.

15. **The above instructions should be complied with without any deviation and brought to the notice of all concerned, viz. the political parties, contesting candidates, all field officers concerned and the Observers.**

16. **The receipt of the letter may kindly be acknowledged.**

Yours faithfully,

Sd/-

(K.N.BHAR)

Name of the State/UT:				
Name of the election:				
District Name:				
Control Unit No.		**District Running Srl.No.**		
Current ID				
First Level Check			**CU Randomization 1**	
Date	**Rep.BEL/ ECIL**	**Rep. D.E.O**	**Date**	**Rep D.E.O/ R.O**
Randomization 2 Date	**Deployment Status**	**Polling Station No.**		**R.O./ARO.**