Hart Verity Voting 2.3

The Hart Verity Voting 2.3 election system was examined in Austin on 5/23/19. This Verity release was certified by the Federal Elections Assistance Commission (EAC) in October 2018. Release 2.3 is a modification to the 2.0 release which was previously certified in Texas.

There were no major changes to the previously certified voting machines or software components other than the introduction of the Touch Writer Duo voting device. Most of the software changes are enhancements to improve the voting session and the EMS applications operator's workflow.

The new Touch Writer Duo voting device allows a voter to pick their selections on a screen and then print their human-readable selections onto the provided card stock. The printed voted ballot is then inserted into a precinct scanner (Scan application).

The security enhancements are:

- a serialized security seal that fully secures the Smart Panel CFast door compartment on devices and on all workstation chassis
- workstation chassis now feature a metal serialized security seal that fully secures the chassis from physical access to interior components
- digitally signed reports, exports and logs

The following table lists the Verity 2.3 components used for the examination.

Table 1 - Releases for Proprietary Software/Firmware Components

Software	Version	Location
Verity Data (data management)	2.3.1	central
Verity Build (election definition)	2.3.1	central
Verity Central (central bulk high-speed scanner)	2.3.1	central
Verity Count (tabulator/accumulator/reporting)	2.3.1	central
Verity Print (ballot on demand)	2.3.1	polling location
Verity Scan (precinct scanner)	2.3.1	polling location and/or central
Verity Touch Writer (BMD)	2.3.1	polling location
Verity Touch Writer Duo (BMD)	2.3.1	polling location
Verity Touch (DRE)	2.3.1	polling location
Verity Controller (used to activate and record votes of daisy chained devices)	2.3.2	polling location

For a detailed listing of all the hardware components and applications (including COTS) used in the

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2.3 release please refer to the EAC's certification test report.

Findings

- The responses provided on Form-101 are acceptable.
- The Technical Data Package (TDP) documentation provided appears to be accurate and complete.
- The system software was successfully built on the first day and a sampling of the hash values were verified to match the values of the executables that were used in the EAC testing.
- The system limitations outlined in the EAC's Scope of Certification document are acceptable.
- The pre-marked and the manually voted test ballots were recorded and tallied correctly.
- Accessibility testing went well; no issues reported.
- The internal CFast drive in the voting devices is used for backup. If necessary, due to a lost or corrupted vDrive (thumb drive), a recovery vDrive can be created from the CFast drive. Election data is only deleted from the CFast drive when the drive fills up which is typically after multiple elections. This depends on the size of the elections. When the device fills up, the oldest election is deleted first. Hart says there is enough capacity for the 22 months retention even after multiple elections.
- Workstations are sold with the system. Jurisdictions should not ever use their own, otherwise they will be violating the EAC certification. If an additional workstation is needed or a workstation needs to be replaced, it should be purchased from Hart.
- The Central Scan application is always on different workstation than the other EMS applications (i.e. Data, Build, Count).
- The EMS applications use roles to control access. Jurisdictions can customize access for each role.
- Audio ballot uses spoken word by a native speaker. Computer generated audio is not used.
- Straight-party logic defaults to the logic that satisfies the Texas requirement. Logic and Accuracy testing will reveal an error in the logic.
- This release eliminates pre-determined vDrive ID's in Verity Build. This is to allow batch writing of vDrives with a vDrive duplicator. A vDrive's unique ID is created when the vDrive is inserted into a voting device. This ID is then used to identify the vDrive for the remainder of the election.

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- Verity Keys (thumb drives) are unique for each election. They can have multiple passwords for different roles. Verity keys are necessary for most EMS applications and devices.

  Verity Key is not required by the poll worker role. Voting devices can be opened for voting without a Verity Key.

- A voting device firmware verifies the software integrity when it is booted with a certificate and hash comparison.

- A zero report will be printed before a voting device will allow voting. The format of zero report is set in the EMS, but can be changed on the device by someone with a maintenance role; not a poll worker.

  The Central Scan system prompts the operator whether to print zero report. The operator should always do so to be in compliance with the Texas regulations.

- The Touch Writer Duo paper stock is from the Brother Corporation. Jurisdictions must buy stock from Hart or Brother.

- The Touch Writer Duo creates a printed vote record called the PVR, (see photo 1 below). There is a barcode on the PVR ballot that is used to validate by Scan that the ballot is for the current election. The Scan application uses OCR (optical character recognition) to read the votes.

  A Touch Writer Duo ballot must be scanned on a Scan (precinct scanner machine) configured for Duo ballots, not on Verity Central. The central scanner cannot read ballots using OCR.

- A Touch Writer Duo can be used for curbside voting. It would have to be at the end of the daisy chain so that the other devices in the chain remain active. The complete device must be taken because of its integrated printer, not just the tablet. This is less than ideal because of its bulkiness.

  The Touch Writer DRE is a better option for curbside voting because the tablet can be undocked and easily taken to the curbside. As with the Touch Writer Duo, it should be at the end of the daisy chain.

  Regardless of the type of device used, the accessibility accessories should be on the device.

  Curbside voting was tested. Once the device was re-connected to the daisy chain, the vote was cast to the Verity Controller.

- All the precinct voting devices can be configured to use the accessibility features and input accessories.

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- Verity Controllers can be configured for either Touch Writer DRE's or Touch Writers (BMD's), but not both.

- There is no warning for an under-voted ballot on the Touch Writer DRE, except next to the race itself. I recommend making under-voted races more obvious, (i.e. a notification on cast ballot screen that there is an under-voted ballot).

- All write-ins candidate votes must be adjudicated. Late certified write-ins candidates can be added in Central Scan or Count on election day if the law permits.

- Provisional ballots are designated as such on the Verity Controller by the poll worker. The Touch Writer and Touch Writer Duo printed voted ballots should be put into a provisional envelope. The Touch Writer DRE electronic CVR (cast vote record) is marked electronically.

  Provisional ballot are accepted or rejected in Verity Count.

- Multiple vDrives from the same device are allowed in Verity Count. A second vDrive may be needed if the turnout is especially high.

  Exact duplicate vDrives are not excepted. This is determined by a hash to prevent duplicate counts. Even though a duplicate vDrive is not accepted, a jurisdiction must be diligent about the number of vDrives expected/accepted in Count.

- Verity Central logs are not written to vDrives. Logs have to be viewed on the Verity Central workstation or exported to XML, PDF, CSV format to be read on another workstation.

- There are no real-time printed audit logs on any of the EMS application or Verity Central workstations.

- A two page ballot on the Touch Writer Duo worked fine. Each sheet of the PVR has the same ID# and Page 1 of 2, or Page 2 of 2 printed on it. The Scan application will allow multiple page ballots to be interlaced (scanned) with other voters' ballots. The unique PVR ID# ties the ballot sheets together for tabulation as one complete ballot. The **public sheet count** on the machine is incremented for each sheet. The **public ballot count** is incremented for the first sheet only.

- The recommended procedures for complying with ballot numbering is:

  Jurisdictions would buy pre-printed numbered ballot stock beginning with the number 1, and polling places would be assigned a specific number range of ballots. For the Touch Writers and the Verity Print ballots, the paper tray would be loaded with shuffled ballots so the numbers on the voted ballots would be non-sequential. For the Touch Writer Duo's, the blank ballots would be shuffled on a table top and the voters would pick a random ballot for use.

If a jurisdiction is small enough, the blank ballots could be numbered by hand.

Potential Issues

- During a Touch Writer Duo voting session, the screen indicated that the paper was inserted correctly (see photo 2 and 3 below), but when casting the ballot, it said that it was not inserted correctly. The paper had to be re-inserted, but there was no loss of the selected votes.

  The printing is slow on the Touch Writer and Touch Writer Duo, so some voters may pull on the paper before it has completed printing. This happened during testing . The paper was pulled out before printing was complete. When it was then re-inserted, some of the selections from the 1st attempt to print appeared on the top of PVR (see top of photo 1). This problem could be minimized by instruction from the poll worker who is activating the devices.

- The Verity Controller only makes voter throughput faster because one poll worker can activate a voting session for multiple voters on multiple devices. The Touch Writer are still too slow for use for all voters. A Touch Writer should be used only by voters needing the accessibility options.

- There is a 25 character limit on the write-in candidate names. This is too short for some names.

- Hart described two options for the migration path for existing customers from Verity 2.0 to 2.3:
  1) The jurisdiction can return their CFast and workstation drives to Hart and Hart will upgrade the applications to the new program version. The jurisdiction will re-insert the upgraded drives back into their workstation and devices.
  2) Hart service personnel perform the upgrade at the jurisdictions site.

  For either option, workstation drives are imaged using a signed EMS Configurator, requiring an exit to the desktop, in accordance with the steps outlined in the Texas Verity Use Procedures. The CFast drives are upgraded using a CFast duplicator using images from the master CFast cards.

- The Touch Writer DRE's use a different tablet than Touch Writer Duo's. Therefore, a conversion from Touch Writer DRE to a Touch Writer Duo is not possible because it would not be the same as the federally certified (EAC) configuration.

- Because of the elimination of predetermined vDrive ID's in Verity Build, solid inventory control of the vDrives is essential. vDrives are generic until they are entered into a device, and multiple vDrives from the same device are accepted in Verity Count. Therefore, it is imperative that the jurisdiction knows how many vDrives were burnt in Verity Build for a given election and where

each vDrive is located.

- The Touch Writer Duo's paper stock could be an unexpected expense if the stock is pre-printed with the sequential numbers, and the unused stock for a given election, must be discarded.

Conclusion

The addition of the Touch Writer Duo does not seem to add much to the system, but it performed well. It may be less expensive to manufacture and purchase than the Touch Writer. It is not as well suited for curbside voting due to it's bulk as the Touch Writer DRE. Possibly, it will gain more functionality in the future.

The modifications to the EMS applications and previously certified voting devices were minor. There is no loss of functionality or security in this release.

The potential issues mentioned above can be mitigated by the jurisdiction. I do not think any of them should prevent the use of the Hart Verity Voting 2.3 system in Texas.

I believe the system examined meets the requirements of the Texas Election Code. I recommend certification.

Tom Watson
Examiner

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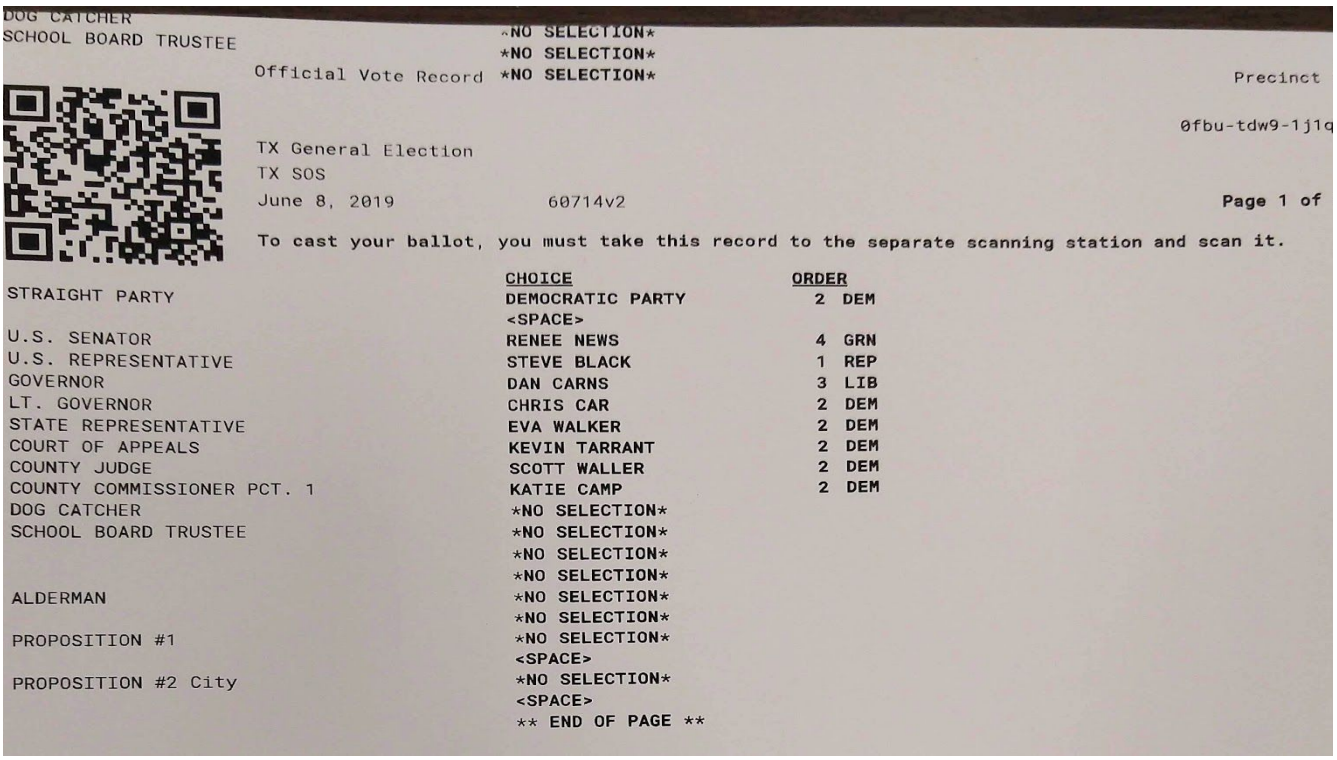
Photos

Photo 1



DOG CATCHER *NO SELECTION*
SCHOOL BOARD TRUSTEE *NO SELECTION*
NO SELECTION

Official Vote Record

Precinct

0fbu-tdw9-1j1q

TX General Election
TX SOS
June 8, 2019 60714v2

Page 1 of

To cast your ballot, you must take this record to the separate scanning station and scan it.

	CHOICE	ORDER
STRAIGHT PARTY	DEMOCRATIC PARTY	2 DEM
	<SPACE>	
U.S. SENATOR	RENEE NEWS	4 GRN
U.S. REPRESENTATIVE	STEVE BLACK	1 REP
GOVERNOR	DAN CARNS	3 LIB
LT. GOVERNOR	CHRIS CAR	2 DEM
STATE REPRESENTATIVE	EVA WALKER	2 DEM
COURT OF APPEALS	KEVIN TARRANT	2 DEM
COUNTY JUDGE	SCOTT WALLER	2 DEM
COUNTY COMMISSIONER PCT. 1	KATIE CAMP	2 DEM
DOG CATCHER	*NO SELECTION*	
SCHOOL BOARD TRUSTEE	*NO SELECTION*	
	NO SELECTION	
	NO SELECTION	
ALDERMAN	*NO SELECTION*	
	NO SELECTION	
PROPOSITION #1	*NO SELECTION*	
	<SPACE>	
PROPOSITION #2 City	*NO SELECTION*	
	<SPACE>	
	** END OF PAGE **	

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Photo 2

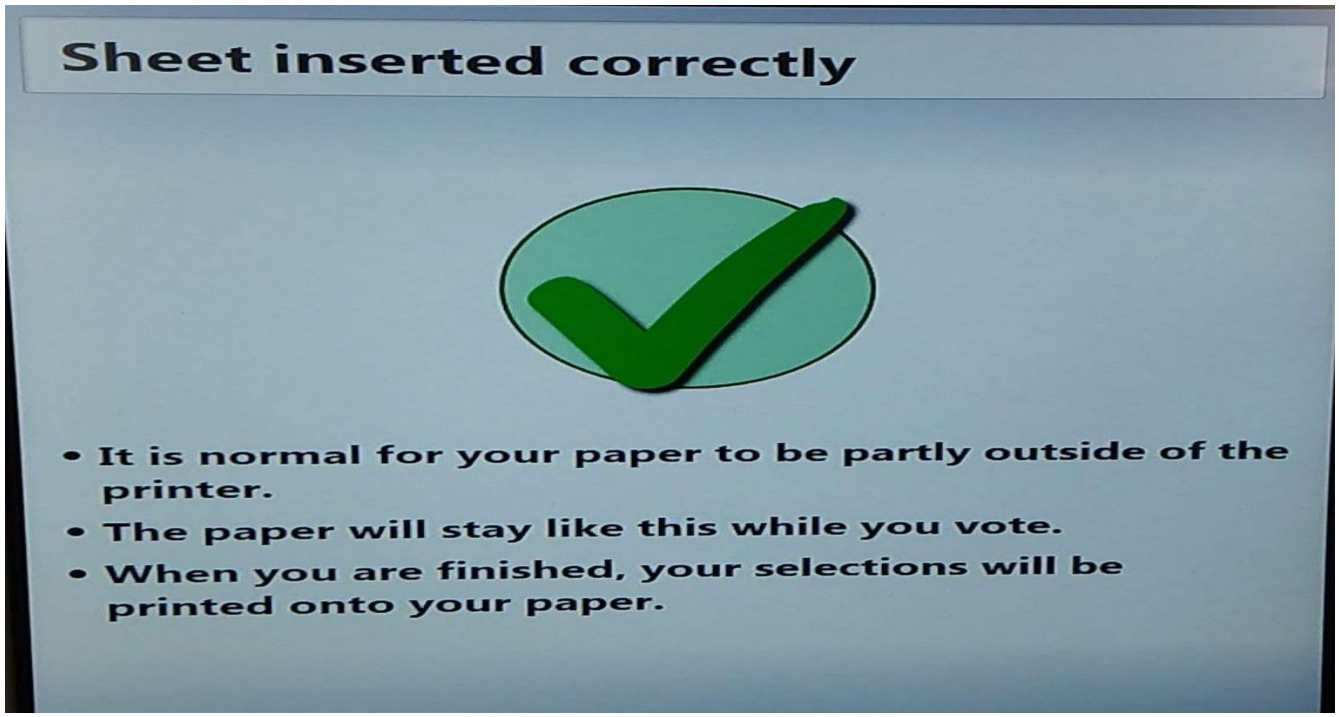

Photo 3