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October 16, 2009

Division of Criminal Investigation  
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**Report:** Analysis of TASER® X26™ electronic control devices (ECDs) with the serial numbers X00-200582 and X00-284820. Three probes with attached wires were also analyzed. The analysis was performed at the TASER International facility in Scottsdale, AZ on October 1, 2009.

**ECD Analysis:** The devices were tested for output and data recording accuracy.

The units were fired into an Ohmite LN100J600 600 Ohm Resistive Load. The pulses and waveform are measured using a Tektronix DPO3034 Oscilloscope (SN C010663), calibrated by Sypris Test and Measurement in September 2009, a Tektronix P6015 Voltage Probe (SN NSN1258764B) calibrated by Sypris Test and Measurement in April 2009, and a Tektronix TCP-202 Current Probe (SN B054660).

The TASER X26 ECD factory test procedure is designed to test the critical parameters of the X26 ECD: charge; pulse duration; and repetition rate.

The factory test protocol uses an average of at least 8 sample pulses for analysis. The samples are taken from at least 8 consecutive pulses from the same ECD (i.e., about half a second of output from one ECD). For evaluating pulse trains, this sampling method improves the precision of the data versus simply measuring a single pulse and extrapolating from that single data point.

Unit X00-200582 is functioning within factory specifications for voltage, current, and proper waveform. The ECD was also tested for proper data recording and accuracy of the data recording system. Unit X00-200582 recorded the test firings both properly and accurately.

Unit X00-284820 is functioning within factory specifications for voltage, current, and proper waveform. The ECD was also tested for proper data recording and accuracy of the data recording system. Unit X00-284820 recorded the test firings both properly and accurately. The ECD has undergone several clock resets that were not corrected; the last series was corrected and is highlighted in blue as a part of this report.

Below is a chart with the testing results for the two ECDs:

|   | ECD Serial No.                    | Main Phase Charge<br>(Micro coulombs) | Pulse Duration<br>(Microseconds) | Pulse Rate<br>(Pulses per second) | Peak Loaded<br>Voltage (Volts) |
|---|-----------------------------------|---------------------------------------|----------------------------------|-----------------------------------|--------------------------------|
|   | Factory<br>Specification<br>Range | 80 - 125                              | 105 - 155                        | 19 +/-2.5                         | 1,400 - 2,520                  |
| 1 | X00-200582                        | 115.6                                 | 134                              | 18.3                              | 1976                           |
| 2 | X00-284820                        | 114.6                                 | 130                              | 18.4                              | 1877                           |

#### Probe Analysis:

##### Analysis of Probe A

On inspection, TASER probe A showed no indication that a substantial amount of energy was transferred through the probe to indicate a completed circuit or that TASER pulses were being delivered through the probe into the target. Figure 1 below is a photograph of the wire knot from Probe A.

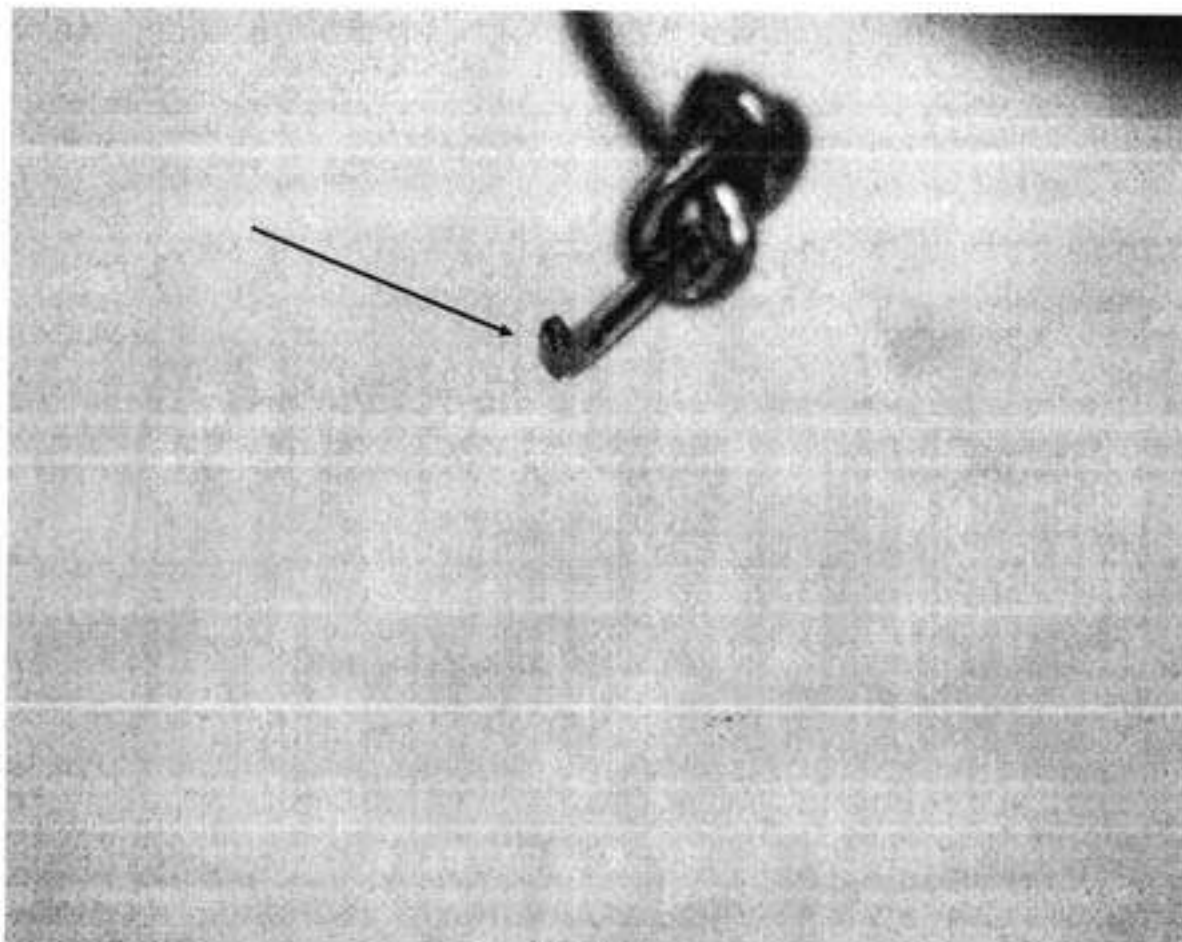


Figure 1

#### **Analysis of Probe B**

On inspection, TASER probe B showed no indication that a substantial amount of energy was transferred through the probe to indicate a completed circuit or that TASER pulses were being delivered through the probe into the target. Figure 2 below is a photograph of the wire knot from Probe B.

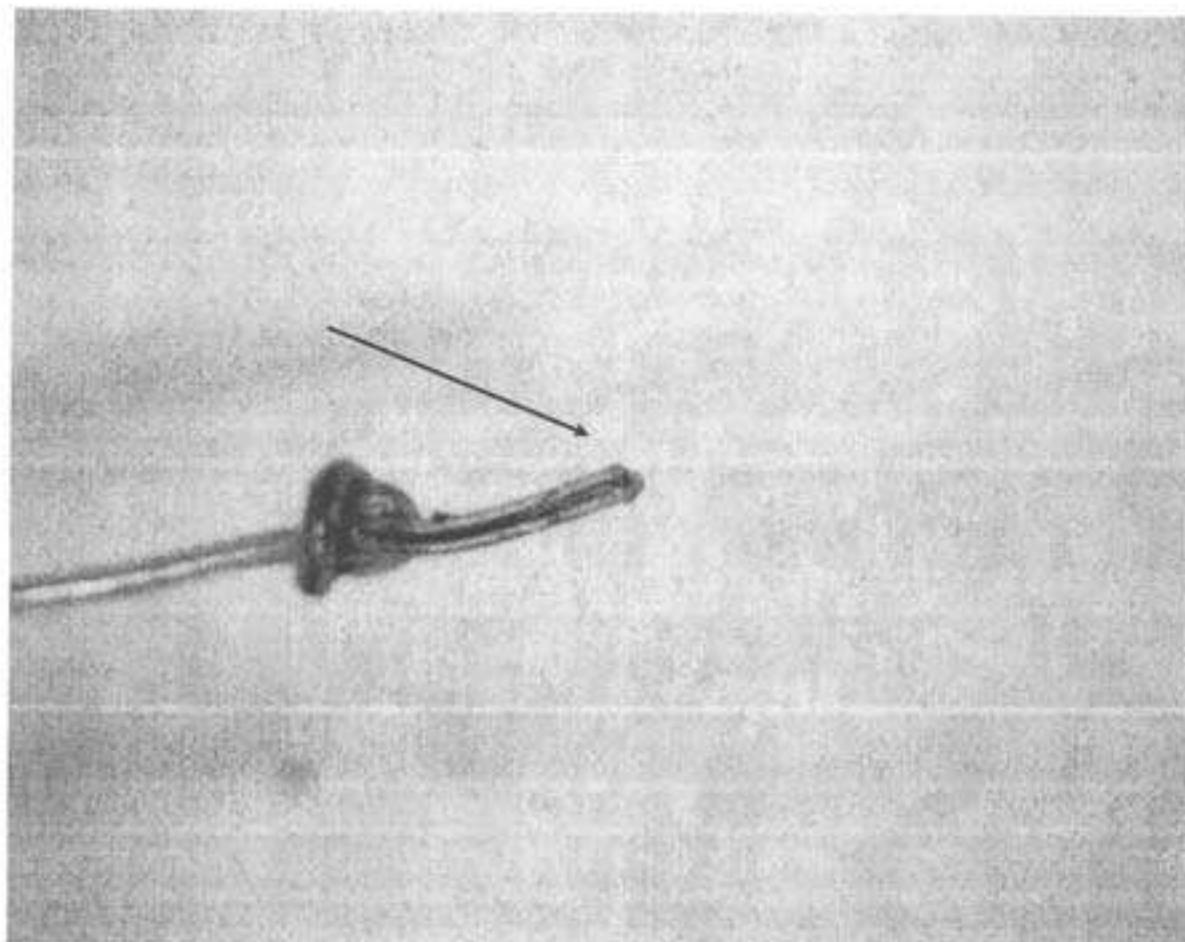


Figure 2

#### Analysis of Probe C

On inspection, TASER probe C showed no indication that a substantial amount of energy was transferred through the probe to indicate a completed circuit or that TASER pulses were being delivered through the probe into the target. Figure 3 below is a photograph of the wire knot from Probe C.

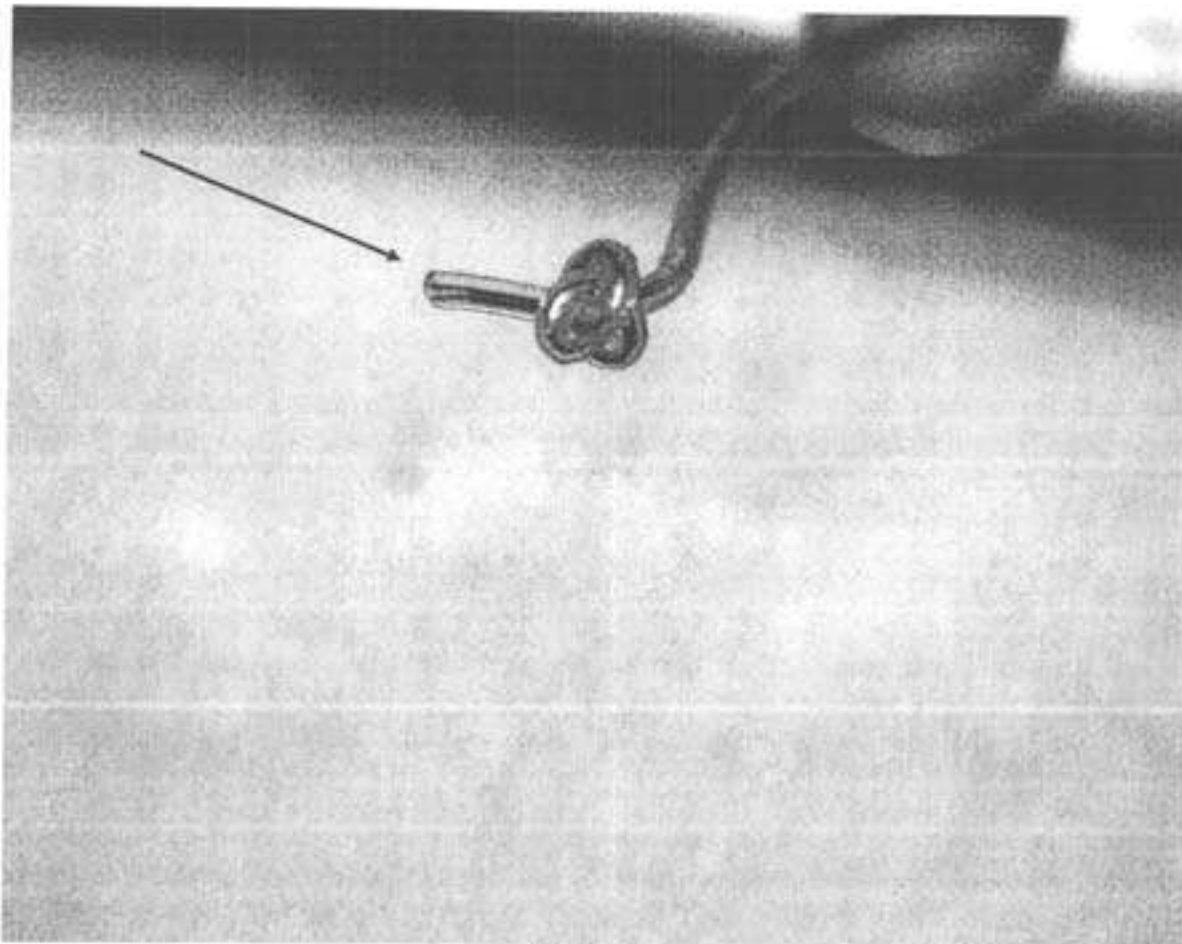


Figure 3

**PROBE ANALYSIS BACKGROUND:** Analysis of a TASER cartridge probe can indicate physical changes to the TASER probe wire knot and the probe itself. By analyzing the probe we can determine whether or not successful contact was made to the subject to complete the circuit and deliver TASER energy.

When a TASER ECD is activated, electricity fires a small primer in the cartridge that forces the nitrogen capsule rearward into a hollow puncture pin. The compressed nitrogen in the capsule is then released into two chambers forcing the blast doors, probes, probe wires, and AFIDs forward out of the cartridge. The two aluminum darts, attached to a thin insulated wire, will then impact into a target. If the target is conductive then energy will be transferred between the two probes, completing the electrical circuit and delivering TASER pulses to temporarily incapacitate a human target.

If the probes instead impact on material that is not conductive, then the energy of the TASER ECD will arc in front of the electrodes of the ECD. See Figure 4 below. Energy will then not be delivered into the target.



Figure 4

For energy to be transferred from the TASER ECD via the probes contact must be made with the target by *both* probes to complete the circuit. For example, a TASER probe needs to penetrate or be within one inch of a human target's skin for the energy to jump the air gap and complete the electrical circuit.

If either probe does not make good contact with the target, then the TASER ECD will arc in front of the ECD with no TASER energy being transferred downrange and the target will likely not receive any of the TASER energy nor be incapacitated.

If energy is transferred downrange to the target via a probe deployment, there will be physical changes to the probes' wire air gap that can be verified with a microscope. Where energy is transferred at the point where the wire attaches to the probe, there is an "air gap." When both probes make contact, the probes will have carbon buildup or "scoring" at this air gap, as energy is transferred from the wire to the probe surface and then into the target. There will also be melting of the insulation of the wire attached to the probe. See Figures 5 and 6 below. Figure 5 shows energy arcing thru the probe. Figure 6 shows the carbon buildup and melting of insulation consistent with 5 seconds of energy.

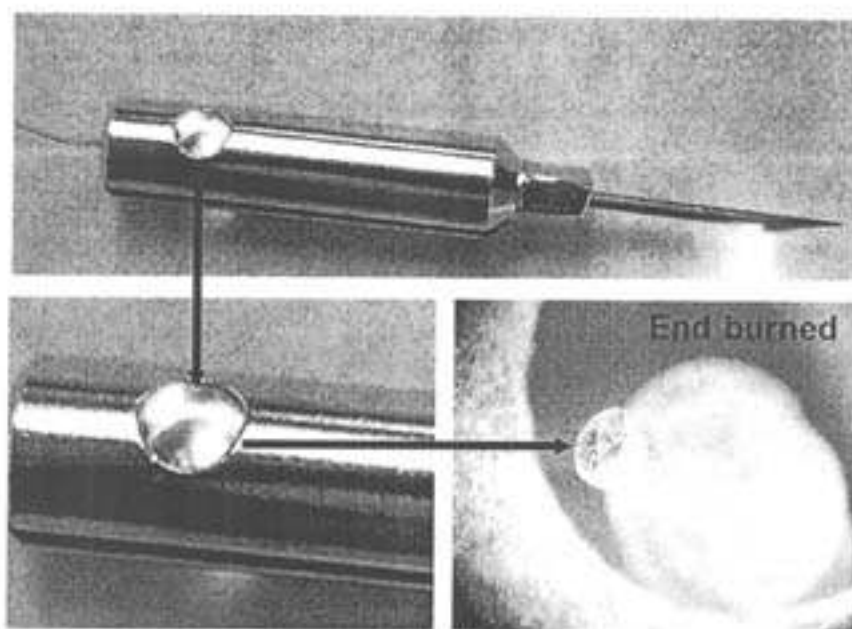


Figure 5

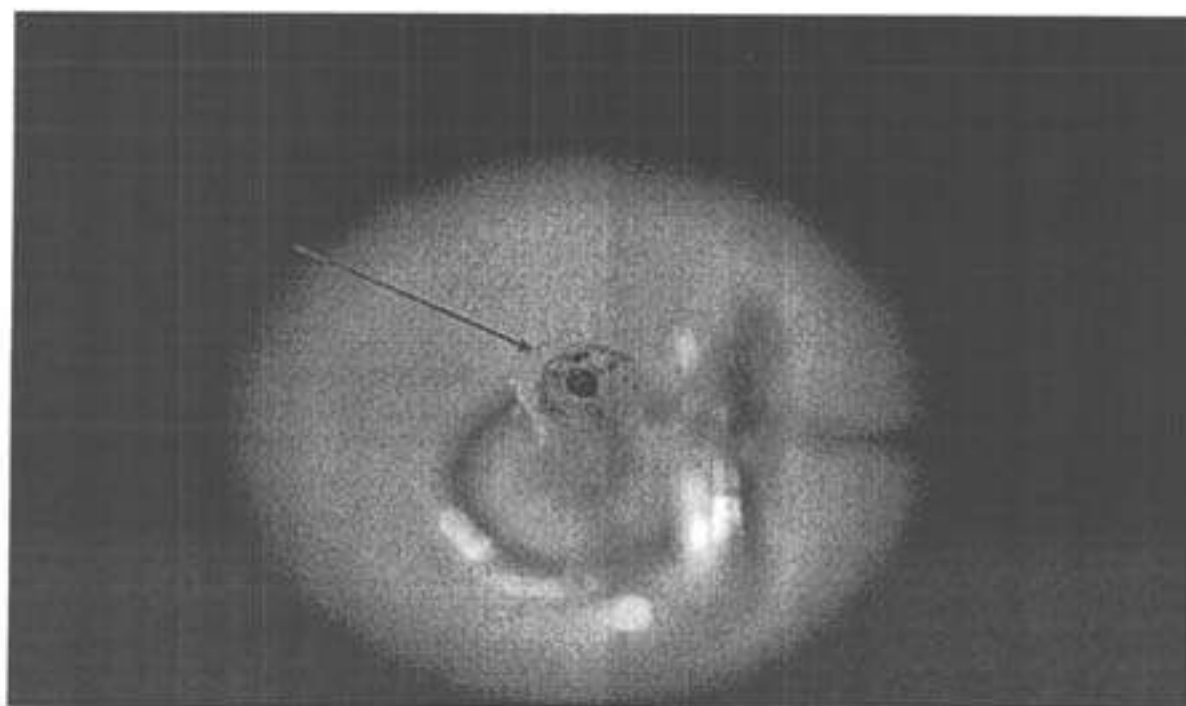


Figure 6 (6 second knot)

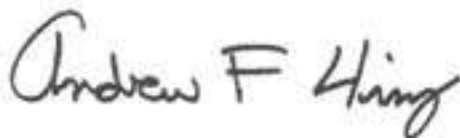
**Summary:** TASER ECDs with serial numbers X00-200582 and X00-284820 are operating within factory specifications for TASER X26 ECDs. The units are operating normally for output waveform, pulse rate, and data recording.

From a design performance and manufacturer's specification basis, there is no reason not to return the TASER X26 ECDs with serial numbers X00-200582 and X00-284820 to service.

The lack of physical changes to the wire surface from the probe sample provided indicate that current no greater than one pulse traveled through the probe. This is consistent with the firing of the cartridge only. The physical changes therefore indicate that the circuit was not completed and that current did not reach the target.



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