# Navigation System Destination Entry: The Effects of Driver Workload and Input Devices, and Implications for SAE Practice

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## 1 Issues

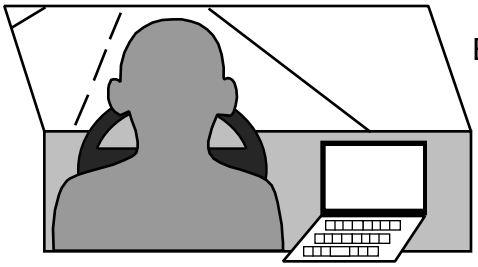
1. How much practice should be given before testing?
2. How do the measured keystroke times for remote control use compare to the SAE J2365 operator estimates, and what was the effect of input device?
3. What is the effect of age on the keystroke times and total task times?
4. What is the relationship between static (parked) and dynamic (while driving) destination entry task times?
5. How does destination entry affect driving performance?

## 2 Method

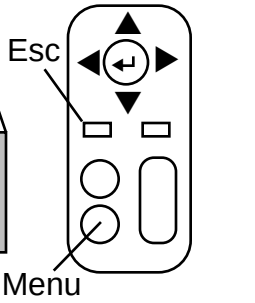
Test Participants

| Drivers | Age | |
|---|---|---|
| | 20-30 | 55-65 |
| Men | 4 | 4 |
| Women | 4 | 4 |

**Simulator 2-Lane Road Scenario**

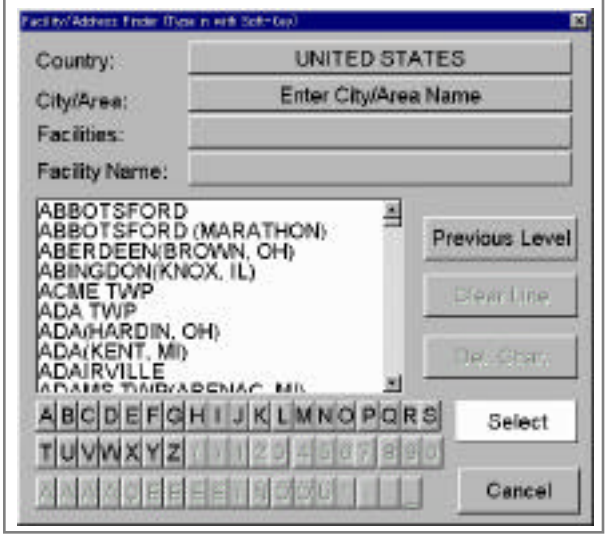


**Hand-Held Remote**



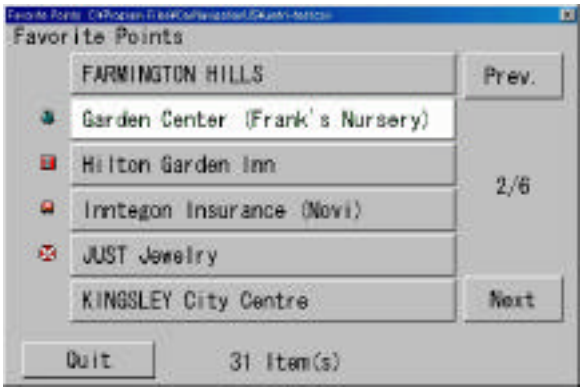

Address Entry Task (Static)

Input Device Tested: Keyboard




List Selection Task (Static & Dynamic)

Input Devices Tested: Keyboard & Remote

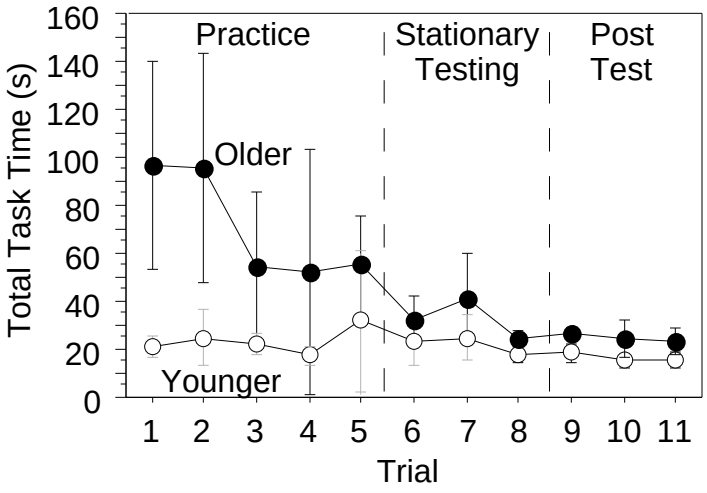


## 3 Results - Static Task Time

Overview - Mean (and SD) of the Total Task Times (s)

| Condition | Static - Parked | | | Dynamic - While Driving | |
|---|---|---|---|---|---|
| Task | Address Entry Keyboard | List Select Keyboard | List Select Remote | List Select Keyboard | List Select Remote |
| Age 20-30 | 70.8 (18.2) | 17.5 (6.2) | 21.7 (8.4) | 20.6 (4.7) | 23.0 (4.8) |
| Age 55-65 | 145.8 (31.3) | 36.4 (12.4) | 32.5 (13.6) | 46.8 (13.1) | 37.6 (8.5) |

Issue 1: Learning Effects (Static List Selection Tasks)



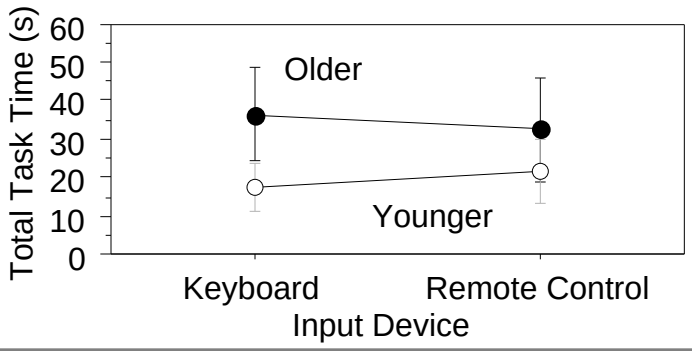

Conclusion:

The 5 practice trials specified in SAE J2364 are sufficient for subjects to learn the task (and to reach a stable performance level).

Issue 2: Operator Element Comparison

| Keystroke Type | Keystroke Times (s) Experiment | SAE J2365 | % Difference |
|---|---|---|---|
| Cursor once | 0.98 | 0.80 | 22.5 |
| Cursor additional | 0.43 | 0.40 | 7.5 |
| Enter key | 0.99 | 1.20 | -17.5 |

Issue 2: Effects of Input Device on Task Time




Conclusions:

For static test trials, the keyboard was 19% faster than the remote for younger drivers. Under the same conditions, the remote was 11% faster than the keyboard for older drivers.