

STANDARD REPORT

SEARCH CRITERIA

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Status = RELEASED

REQUIREMENTS SUMMARY

FSMS ID (SETK Legacy)	RQT Version	Requirement Title	Publish Date	Priority Level	Associated Detail ID(s)	Associated Verification Types
RQT-002004-021878 (27-0048)	4	DNA WELCOME/FAREWELL STRATEGY	16-Aug-2017	Specification	DET021878-1	00.20-L-12995/1;1

REQUIREMENT**ID:** RQT-002004-021878 **Rev:** 4 **Title:** DNA WELCOME/FAREWELL STRATEGY**Legacy ID:** 27-0048 **Owner:** Prescott,Jennifer-JPRESCO2 (jpresco2) **Priority Level:** Specification**Release Status:** Released **Rqmt Published Date:** 16-Aug-2017 **Obsolete Date:** **Superseded Date:****Recipient CPSCs:**

000600-Vehicle Electrical/Electronic Subsystem
002004-Harmony
010523-Switches - Rear End Trim
010905-Mirror Electronic Controls
011016-Switches - Front Seat
011017-Switches - Rear Seat
011109-Power Window Electronics
011116-Switch Pack - Front Door
011117-Switch Pack - Rear Door
011207-Floor Console Switches
011211-Rear Console Switches
011214-Overhead Console
011220-Switch Pack - Instrument Panel
011221-Switches - Overhead
011414-Power Liftgate / Trunk Module and Electronics
011415-Sliding Door Module and Electronics
012901-Module - Overhead Complete
012902-Module - Overhead Console
050703-Gear Shift Module (GSM)
070501-Automatic / Automated Manual Selector Assembly
070502-Auto Trans External Controls/Electrical/Electronic
110602-Steering Wheel Mounted Switches
120402-Mechanical Control Head
120403-Electronic Climate Control Unit
120406-Rear AC Control Module
130100-Instrument Cluster Subsystem
130101-Driver Information Module (Instrument Cluster)
131300-Parking or Reversing Aid Subsystem
132401-Head-Up Display Unit
150101-Infotainment Head Unit
150102-Center Stack Display
150109-Electronic Finish Panel
150701-Rear Seat Entertainment
170200-Interior Lighting Subsystem
170202-Lighting - Interior
170207-Lighting - Instrument Panel (IP) & Consoles
170208-Lighting - Ambient
170500-Lighting Switches Subsystem
170501-Master Lighting Switchpack
180300-Electrical Distribution Switches Subsystem
191000-Multiple Function Electronic Control Subsystem
191203-Exterior Switch Pack / Keypad

Rqmt Sources(s) :

Source ID	Source Name	Source URL	Source Comments
DNA	Global Ford/Lincoln DNA	No URL	No Comments

Cascade To:

Cascade From:

Markets:

GLOBAL;

Vehicle Types:

GLOBAL:All

Comments:

1- Added reference to systems level spec RQT-000600-o22315

2- Fixed state matrix link

Requirement Description:

RQT-002004-021878

The Ford Blue Oval DNA Welcome Farewell Strategy is a sequence of illumination events that occur as the customer approaches, enters, starts and exits the vehicle. In order to meet the character of the DNA, the events identified in the following state matrix must be followed. This strategy is for Ford vehicles globally.

System level details for execution of this specification can be found in RQT 000600-022315 -Lincoln Embrace/ Ford Welcome Farewell compliance with feature specification.

DNA Welcome-Farewell Strategy – RQT-002004-021878

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1.0 INTRODUCTION

1.1 Document Intent

This specification is a guideline of the required elements for Ford vehicle programs to meet the Blue Oval DNA Welcome Farewell Strategy.

2.0 WELCOME FAREWELL STRATEGY OVERVIEW

The Welcome Farewell strategy is a sequence of illumination events that occur as the customer activates remote start, approaches from a distance (with proximity detection technology, if equipped), unlocks, enters, starts, stops, exits, and then locks the vehicle. The globally agreed upon state matrix for the Blue Oval DNA Welcome Farewell strategy is detailed in Appendix I.

2.1 Welcome

The vision statement for Welcome is: "As you approach your Ford vehicle, you are welcomed by the lights. Opening the door reinforces the invitation. As the vehicle wakes up, the displays and switches illuminate with crisp, clear Ice Blue™ backlighting hinting at the exciting driving experience."

2.2 Farewell

The vision statement for Farewell is: "As you exit your Ford vehicle, interior lighting is turned on to aid in exiting. Exterior lighting remains on for a period of time to enable you to see obstacles and your pathway when leaving your vehicle."

2.3 Welcome Farewell Components

Exterior lighting components include, as standard equipment: headlamps, park lamps, puddle lamps (rear, incl. license plate), and pick-up truck cargo bed lighting (typically integrated into the CHMSL). Exterior lighting components include, as optional vehicle and market-dependent content: illuminated SECURICODE™ keypad, illuminated door handles, puddle lamps (side) and signature/decorative LED lamps.

Turn signals, horn chirps, and mirror fold behaviors for lock and unlock feedback are explained at a high level in Appendix II.

Interior illuminated components include, as standard equipment: courtesy lamps, IP & overhead console switches/buttons, instrument cluster pointers and backlighting, and door trim switches/buttons. Interior illuminated components include, as optional vehicle and market-dependent content: ambient lighting (of various vehicle locations), illuminated scuff plates, door lock LED status symbols (officially "night lock indicator"), windshield heads-up display, combiner heads-up display, engine stop/start button (incl. backlit text and flashing LED), instrument cluster displays and centerstack displays.

2.4 Passive Entry Passive Start

PEPS (Passive Entry, Passive Start) replaces the keyed ignition with a keyfob and Push-to-Start button on the instrument panel.

There are subtle behavioral differences in Welcome Farewell when the vehicle is equipped with PEPS. To enter the Vehicle Unlock event, the customer can just touch the inboard section of the exterior door handle to unlock the vehicle as long as a valid keyfob is found by the BCM. During any of the other Welcome events, PEPS may interrupt the Welcome screen in the instrument cluster to display ignition state-specific messages to alert the customer of the current ignition status.

3.0 WELCOME STRATEGY OPERATIONAL DESCRIPTION

The Welcome Strategy is divided into a sequence of seven events: Remote Start, Approach Detection, Vehicle Unlock, Vehicle Ingress, Settled in Seat, Ignition On & Powertrain Off, and Ignition On & Powertrain On. Within each event, the Welcome Strategy controls elements of exterior and interior lighting as well as interior illumination. Transition between events is triggered by a customer action, such as unlocking a door, opening or closing a door or starting the vehicle.

3.1 Remote Start Event (*if equipped*)

The Remote Start feature enables the customer to start the vehicle from a significant distance via the keyfob. To activate the system, the customer must press the Lock button once followed by the Remote Start button twice. Once activated, the vehicle will remain started for a customer configurable timeframe and can be cancelled by pressing the Remote Start button again. This feature is not available in all markets.

During the entire time Remote Start is active, the ignition is considered OFF. For a keyed vehicle, the key must be inserted and turned to RUN in order to enter the Ignition ON & Powertrain ON event and to shift out of Park. For a PEPS vehicle, the keyfob must be inside the vehicle and the Push-to-Start button pressed while the brake is depressed in order to accomplish the same transition.

3.2 Approach Detection Event (*if equipped*)

The Approach Detection feature extends the “welcome” experience further, providing a thoughtful response to the driver as he/she comes within 2.7 meters (9 feet) of the vehicle with the key fob, if the vehicle is so equipped. During this sequence, all external lamps and features (except headlamps) illuminate, fading on over a 3-second gradual ramp-up (except signature LEDs). The interior cabin remains OFF except for courtesy lamps and the door lock status symbols (if equipped), which illuminate.

This feature dismisses after 25 seconds, and only re-activates if the keyfob exceeds the 2.7 meter range and then re-enters the 2.7 meter proximity “window” again.

3.3 Vehicle Unlock Event

The Vehicle Unlock event represents the typical unlock sequence a customer will perform to gain access into their vehicle, and is similar to the BCM feature called Illuminated Entry. All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

3.2 Vehicle Ingress Event

The Vehicle Ingress event represents the occurrence where a customer opens a door and enters the cabin of the vehicle. It is similar to the BCM feature called Courtesy Lighting. All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

3.3 Settled In Seat Event

Settled In Seat is similar to the BCM feature called Courtesy Lighting Delay, and represents the occurrence where the driver has closed the door after entering the cabin. All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

3.4 Ignition ON & Powertrain OFF Event

The Ignition ON & Powertrain OFF event captures the behavior of any powertrain-type vehicle in the Ford family, whether gasoline, diesel, hybrid, or battery-electric (BEV). In this state, the driver has:

- Non-PEPS: Inserted the ignition key, turned the key to ON/RUN, and not turned the key through to START.
- PEPS: Pressed engine start/stop button (with keyfob in vehicle) but does not depress brake pedal simultaneously.

In other words, the driver has made no attempt to activate the powertrain on the vehicle. During this phase, various telltales will illuminate on the cluster, and some will remain active (such as check-engine) that would otherwise extinguish during the powertrain ON condition outlined in section 3.5.

During this phase, it is important to note that the driver will have full control over some exterior lighting, courtesy lighting and most interior illumination features, so some state behaviors outlined in the state matrix are provided this caveat. Their behaviors may differ from the prescribed behavior as a result. See also FMVSS 101 for more details.

All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

3.5 Ignition ON & Powertrain ON Event

The Ignition ON & Powertrain ON event captures the behavior of any powertrain-type vehicle in the Ford family, whether gasoline, diesel, hybrid, or battery-electric (BEV). In this state, the driver has:

- Non-PEPS: Inserted the ignition key, turned the key through to START, then allowed it to spring-back to the ON/RUN position.
- PEPS: Pressed engine start/stop button (with keyfob in vehicle) and brake pedal simultaneously.

In other words, the driver has made an attempt to activate the powertrain on the vehicle. During this phase, various telltales will illuminate on the cluster, and only those indicating true faults will remain active (such as check-engine, TPMS, etc.) while all others extinguish after a lamp prove-out period.

During this phase, it is important to note that the driver will have full control over some exterior lighting, courtesy lighting and most interior illumination features, so some state behaviors outlined in the state matrix are provided this caveat. Their behaviors may differ from the prescribed behavior as a result. See also FMVSS 101 for more details.

All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

4.0 FAREWELL STRATEGY OPERATIONAL DESCRIPTION

The Farewell Strategy is divided into a sequence of six events as the customer completes the driving experience including: Powertrain Turned Off, Media Accessory Delay, Exit Vehicle/Vehicle Egress, Courtesy Lighting Delay, Security Locking, and Locking Confirmation. Within each event, the Farewell Strategy controls elements of exterior and interior lighting as well as interior illumination. Transition between events is triggered by a customer action; i.e. removing the ignition key, opening or closing a door or locking the vehicle.

4.1 Powertrain Turned Off

Powertrain Turned Off is similar to the BCM feature called Illuminated Exit, and represents the occurrence where the driver has turned off the powertrain, but has not yet opened any doors to exit the vehicle. All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

4.2 Media Accessory Delay

Media Accessory Delay state represents the occurrence where the driver has turned off the powertrain, but has not yet opened any doors to exit the vehicle, *and the previous state has expired* (see 4.1). This permits the driver the courtesy of additional interior illumination during the extended functionality period of the radio and other controls; any active controls will be illuminated as a guide to the customer. All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

4.3 Exit Vehicle/Vehicle Egress

Exit Vehicle/Vehicle Egress is similar to the BCM feature called Courtesy Lighting, and represents the occurrence where the driver opens the door to exit the vehicle. All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

4.4 Courtesy Lighting Delay

Courtesy lighting delay represents the occurrence where the driver has shut all body doors after exiting the vehicle. For reduced complexity, it is identical to the Welcome state “Settled In Seat”. All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

4.5 Security Locking

Security Locking represents the typical occurrence where the driver locks the vehicle after exiting, and is similar to the BCM feature called Locking Feedback Lighting. All event details and component statuses of this state are outlined in the state matrix; see Appendix I for complete details.

4.6 Locking Confirmation

The Locking Confirmation event is similar to the BCM feature called Locking Feedback Horn, and represents the occurrence where the customer presses the lock button twice to ensure they've locked the vehicle properly. Since some locking behaviors (horn chirps, light flashes, etc.) can vary regionally, complete details are outlined in Appendix II for feedback behaviors.

5.0 WELCOME FAREWELL OPERATIONAL ANAMOLIES

5.1 Lincoln Welcome Farewell Strategy (“Lincoln Embrace”)

The Lincoln Experience Welcome Farewell strategy, also known as “Lincoln Embrace” is a unique specification not covered in this document. This specification's behaviors do not apply to Lincoln Motor Company products.

5.2 Factory and Transport Car Modes

If the vehicle is in Factory or Transport Car Mode, certain features behave differently during Welcome/Farewell to minimize energy use from the battery. Several Welcome-Farewell states may be disabled, or shortened as a result. Ensure any vehicles audited for Welcome-Farewell conformance are not in Factory or Transport Car Mode during testing.

5.3 Electronic Display Screens

The Welcome and Farewell Screens that are shown in the centerstack display as called out in Appendix I are left to the discretion of the HMI Design and broader Design Studio teams. Any animations presented must be identical for Welcome and Farewell if door triggered, due to the “mirrored” nature of the sequence, and the vehicle's inability to detect whether an occupant is truly entering or exiting the vehicle.

5.4 Police Dark Car Mode

Police Dark Car mode is a configurable feature in the BCM, primarily for police vehicles, which disables all interior and exterior lighting as well interior illumination during Welcome and Farewell. When configured to Dark Car Mode, the BCM disables the Illuminated Entry, Courtesy Lighting, Courtesy Lighting Delay and Illuminated Exit features. Therefore, all Parklamps, Puddle Lamps, Courtesy Lamps, Ambient Lighting and interior illumination will be OFF during Welcome and Farewell.

6.0 ASSESSMENT CRITERIA

6.1 GREEN ASSESSMENT

Vehicle fully aligned with Welcome-Farewell state matrix.

OR

Meets state matrix except for 3 or fewer minor failures.

6.2 RED ASSESSMENT

4 or greater minor failures

OR

1 or greater major failures

6.3 MINOR VS. MAJOR FAILURES

Designation of minor or major failures is ultimately at the discretion of Vehicle Harmony's S.M.E. for Welcome Farewell.

Major failures have a significant visual or auditory impact that erodes showroom consistency in the Ford/Lincoln fleet. These are also failures that would make the welcome/farewell experience worse for the customer. Examples include:

- 1) Animations that trigger at the wrong state, are far too long or short, or aren't available.
- 2) Incorrect locking feedback, such as too many/few turn signal flashes, and incorrect number of horn chirps.
- 3) Courtesy lamps that do not illuminate.
- 4) Ambient lighting that illuminates in the wrong color.
- 5) Missing states, such as illuminated exit, courtesy lighting, etc.

Minor failures have a less obvious impact on the experience, and may only be picked up on by experts. The impact on the welcome/farewell experience may be inconsequential, slightly negative, or positive. Examples include:

- 1) A non-vehicle-control switch that doesn't illuminate.
- 2) Ambient lighting that remains illuminated slightly longer than expected.
- 3) Components which remain illuminated during media accessory delay unnecessarily.

APPENDIX I - WELCOME FAREWELL STATE MATRICIES

State Matrices are available at the following link and are provided as an attachment to this specification.

<https://comm.extsp.ford.com/sites/InteriorHarmony/Core%20Harmony1/Forms/AllItems.aspx?RootFolder=%2Fsites%2FInteriorHarmony%2FCore%20Harmony1%2FSpecifications%2FRQT%2D002004%2D021878%20DNA%20Welcome%20Farewell%20Strategy>

APPENDIX II – DNA LOCK/UNLOCK CUSTOMER FEEDBACK

1.0 APPENDIX II: LOCK/UNLOCK FEEDBACK

1.1 Document Intent

This appendix covers the intended DNA lock/unlock vehicle-to-customer feedback under a variety of scenarios. It includes and is limited to the following components:

- Turn Signal Indicator Flashing (all applicable lenses on vehicle body)
- Mirror Fold/Unfold Behavior
- Horn Chirp Behavior

The feedback behaviors are, in summary:

Feedback Types		
Feedback	Visual	Audible
Momentary	Turn Signal Flash	Chirps
Permanent/Continuous	Mirror fold	-

This specification is not exhaustive; it does not cover all possible permutations and combinations of locking behavior, nor does it consider all available components. This document's intent is to cover the high frequency usage lock/unlock strategy. The Body Security team captures all possible combinations in their feature specifications.

For the purposes of program behavior auditing, only those locking requests outlined in the chart in section 1.6 which utilize the PEPs door handle or remote keyfob as the enabler are considered DNA-level behaviors. Any other method of locking the vehicle outlined in the chart (SecuriCode keypad, key cylinder, etc.) are considered specification-level behaviors.

1.2 Locking State Terminology

Hereafter lists the different vehicle lock states, and a brief explanation of each:

- **Unlocked:** At least one body door can be opened using an exterior or interior door handle without triggering an alarm or changing lock state.
- **Central Locked:** The most common type of vehicle lock state. All body doors are locked; i.e., the exterior door handles are disabled, but the interior door handles still function. A customer outside the vehicle can action the door handle, but not gain access. A customer inside the vehicle can action the interior door handle, change lock state (to unlocked) and exit the vehicle.
- **Double Locked:** Less common type of vehicle lock state. Frequently seen in European-market vehicles, but not permitted in the U.S. and some other markets. All body doors are locked; i.e., the exterior AND interior door handles are disabled. A customer outside the

vehicle cannot gain access by actioning the door handle. A customer inside the vehicle cannot exit the vehicle by actioning the door handle.

1.3 Flasher Feedback Timing

Turn signal flashing, hereafter known as “flashers” or “flasher feedback”, has timing which varies depending on state request. Specifically, a:

- **LOCK request:** Flashers turn ON for 250 milliseconds, and turn OFF for 250 milliseconds before subsequent flashes, as required. This is referred to in the state charts as a “short flash”.
- **UNLOCK request:** Flashers turn ON for 750 milliseconds, and turn OFF for 250 milliseconds before subsequent flashes, as required. This is referred to in the state charts as a “long flash”.

1.4 Quiet Market Designation (QM)

Quiet market designation indicates those regions where horn or sounder chirps are unacceptable noise pollution. In compliance with local ordinances, quiet market Ford Motor Company products provide either no audible feedback upon locking, or defeatable audible feedback (typically disabled through the instrument cluster menu).

Quiet Market Regions: EU*

Non-Quiet Market Regions: FNA, SA, AP, MEA

*The quiet market classification is based on regional experts’ feedback, competitor benchmarking, and customers’ expectations based on historical implementation.

1.5 Understanding “Slam Lock” versus “Slam Lock Protect”

“Slam Lock” is the ability to lock the vehicle while a body door is ajar. Conversely, “Slam Lock Protect” does not permit vehicle lock while a body door is open. For “Slam Lock Protect” equipped vehicles, all body doors must be closed before a lock request will be permitted.

The “Slam Lock” versus “Slam Lock Protect” market classification is based on regional experts’ feedback and customers’ expectations based on historical implementation.

Slam Lock regions: NA

Slam Lock Protect regions: EU, SA, AP, MEA

The Body Security team captures the various details about the Slam Lock & Slam Lock Protect Feature in their specification.

1.6 DNA Locking Feedback Behavior State Chart

Scenario	Customer Action	Flasher Feedback	Horn Feedback	Mirror Fold/Unfold Feedback
Lock Request ^{2,3}	1 st lock request	1 short flash	No sound	Mirrors Fold, if previously unfolded
	2 lock requests within 3 seconds -CENTRAL LOCK	2 short flashes	1 chirp ¹	
	2 lock requests within 3 seconds -CENTRAL LOCK -QUIET MARKET	2 short flashes	No sound	
	2 lock requests within 3 seconds -DOUBLE LOCK	3 short flashes	1 chirp ¹	
	2 lock requests within 3 seconds -DOUBLE LOCK -QUIET MARKET	3 short flashes	No sound	
Unlock Request ²	1 st unlock request	1 long flash	No sound	Mirrors unfold, if previously folded
	2 unlock requests within 3 seconds			
Door Ajar & Lock Request ^{2,3}	1 st lock request -SLAM LOCK ENABLED	No flash	No sound	No action
	1 st lock request -SLAM LOCK PROTECT ENABLED		2 chirps	
	2 lock requests within 3 seconds -SLAM LOCK ENABLED -SLAM LOCK PROTECT ENABLED		2 chirps	

Superscript Notation Legend:

- 1: Horn chirp only occurs when using remote. All other exterior lock components will not cause horn chirp.
- 2: This chart only covers locking requests for exterior components, i.e. PEPS door handles, exposed key cylinder, remote key fob, or SecuriCode™ keypad. It does not cover interior door lock switch use.
- 3: Neither the PEPS feature nor the SecuriCode™ keypad will acknowledge a lock request if the requesting door is ajar.

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Dataset Name: DET021878-1	Dataset Description: Welcome Farewell state matrix	Dataset Attachment File Name: WelcomeFarewellMarch15,2017(1).pdf
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[illegible][illegible]

Body Module Feature Description	Illuminated Exit	Media Accessory Delay	Courtesy Lighting	Courtesy Lighting Delay	Locking Feedback Lighting	Locking Feedback Horn
Event:	Powertrain Turned Off	Media Accessory Delay	Exit Vehicle/ Vehicle Egress	Courtesy Lighting Delay	Security Locking	Locking Confirmation
Dataset Name: D Welcome Farewell	Ignition transition from RUN to OFF All doors are closed Headlamp Switch Status: OFF or AUTO	Conclusion of "Illuminated Exit" phase. No door opened during "Illuminated Exit" phase. Headlamp Switch Status: OFF or AUTO	Any Door/Liftgate/Lift Glass Ajar Headlamp Switch Status: OFF or AUTO	All Doors/Liftgate/Lift Glass Closed Headlamp Switch Status: OFF or AUTO	Perform the following actions once within three seconds with all doors closed (as equipped): Rotate key to lock position in exterior, exposed lock tumbler ⁸ OR Press keyfob lock button OR Touch PEPS lock sensor (door handle) OR Press 7-8 and 9-0 buttons simultaneously on external SECURICODE™ keypad Headlamp Switch Status: OFF or AUTO	Perform the following actions twice within three seconds with all doors closed (as equipped): Rotate key to lock position in exterior, exposed lock tumbler ⁸ OR Press keyfob lock button OR Touch PEPS lock sensor (door handle) Headlamp Switch Status: OFF or AUTO
	Event Duration:	25 seconds	9 minutes, 35 seconds	25 seconds and 10 minute battery saver ³	25 seconds	No time dependency
Event Interrupt:	Ignition transition to ON with footbrake depressed. RESULT: Go to "Ignition ON, Powertrain Systems Active" state. -OR- Door/Liftgate/Lift Glass is opened RESULT: Go to "Exit Vehicle/Vehicle Egress" state. -OR- Lock vehicle using keyfob or exterior door handle. RESULT: Go to "Security Locking State."	Ignition transition to ON with footbrake depressed. RESULT: Go to "Ignition ON, Powertrain Systems Active" state. -OR- Door/Liftgate/Lift Glass is opened RESULT: Go to "Exit Vehicle/Vehicle Egress" state. -OR- Lock vehicle using keyfob or exterior door handle. RESULT: Go to "Security Locking State."	Ignition transition to ON with footbrake depressed. RESULT: Go to "Ignition ON, Powertrain Systems Active" state. -OR- All Doors/Liftgate/Lift Glass closed RESULT: Go to "Courtesy Lighting Delay" state. ¹⁴	Ignition transition to ON with footbrake depressed. RESULT: Go to "Ignition ON, Powertrain Systems Active" state. -OR- Door/Liftgate/Lift Glass is opened RESULT: Go to "Exit Vehicle/Vehicle Egress" state. -OR- Lock vehicle using keyfob or exterior door handle. RESULT: Go to "Security Locking State."	Unlock vehicle (w/keyfob, keypad, lock cylinder, door handle) RESULT: Go to "Vehicle Unlock" state. -OR- Door/Liftgate/Lift Glass is opened RESULT: Go to "Vehicle Ingress/Courtesy Lighting" state. Alarm may sound if equipped.	Unlock vehicle (w/keyfob, keypad, lock cylinder, door handle) RESULT: Go to "Vehicle Unlock" state. -OR- Door/Liftgate/Lift Glass is opened RESULT: Go to "Vehicle Ingress/Courtesy Lighting" state. Alarm may sound if equipped.

Front Illumination	Park/Lamps	ON	OFF	ON	ON	OFF	OFF
	Signature/Decorative Lamps ⁴	ON PARK	OFF	ON PARK	ON PARK	OFF	OFF
	Headlamps	OFF	OFF	OFF	OFF	OFF	OFF

Rear Illumination	Puddle area rear (license plate)	ON	OFF	ON	ON	OFF	OFF
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Supplementary Illumination	Pick-up truck bed light	OFF	OFF	ON ¹⁹	ON	OFF ¹⁹	OFF
	Illuminated Door Handles	OFF	OFF	ON ¹⁹	ON	OFF ¹⁹	OFF
	Puddle area side	OFF	OFF	ON ¹⁹	ON	OFF ¹⁹	OFF

Courtesy Lighting	Courtesy Lamps (white non-colored lighting incl. dome/map lights, and footwell lighting as equipped)	ON ¹⁹ (Fade 3 sec)	OFF ¹⁹ (Fade 5 sec)	ON ¹⁹ (Fade 3 sec)	ON	OFF ¹⁹ (Fade 5 sec)	OFF
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Ambient Lighting	Ambient Lighting ²	ON ¹²	OFF	ON ^{5,19} (Fade 3 sec)	ON ¹²	OFF ¹² (Fade 5 sec)	OFF
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Dimmable Backlighting	Switch/Button Illumination for the following vehicle zones: -Instrument Panel -Overhead Console -Door Panel -Engine Push-to Start ¹³ -Illuminated Halo Ring	ON ⁴	OFF ^{5,19}	ON ⁴	ON ⁴	OFF ¹⁹	OFF ¹⁹
	Switch/Button Illumination for the following vehicle zones: -Liftgate Surface -Cargo area controls (power folding seats, etc.)	OFF	OFF	ON (Only if any door open for up to 10 minutes)	OFF	OFF	OFF
	Headlamp Switch	ON ¹⁸	ON ¹⁸	ON ¹⁸	ON ¹⁸	OFF	OFF
	Instrument Cluster Backlighting / Gauges and/or Acrylic Rings	ON ⁴	OFF	ON ⁴	ON ⁴	OFF	OFF
	Instrument Cluster Pointers	OFF	OFF	OFF	OFF	OFF	OFF

Vehicle Displays	Windshield Heads up Display	OFF ⁶ (Fade-Out Animation)	OFF	OFF	OFF	OFF	OFF
	Instrument Cluster Display	ON ⁵	OFF	ON (Farewell Screen) ^{5, 6, 17}	ON (Farewell Screen) ^{5, 6, 17}	OFF ⁴	OFF ⁴
	Centerstack Display	ON ⁴	ON ^{1,9}	ON (Farewell Screen) ^{5, 6, 17}	ON (Farewell Screen) ^{5, 6, 17}	OFF	OFF
	2nd Row Display(s)	ON ^{1,20}	ON ^{1,10,20}	OFF (Farewell Screen) ^{5, 6, 17,20}	OFF	OFF	OFF
	Combiner Heads up Display	ON (Farewell Screen) ^{5, 6, 17}	OFF ¹¹	0 - 5 sec.: OFF (Screen retracts) ¹⁵ 5 - 25 sec.: OFF (Screen retracted)	OFF (Screen retracted) ¹⁵	OFF	OFF

Other	Illuminated SECURICODE™ keypad	OFF	OFF	ON ¹⁹	ON	OFF ¹⁹	OFF
	Illuminated Scoff Plates	OFF	OFF	ON ¹⁹ (Fade 3 sec)	OFF	OFF	OFF
	Night Lock Indicator ¹⁶	ON (for any locked doors)	ON (for any locked doors)	ON (for any locked doors)	ON (for any locked doors)	ON	ON
	DNA Lock/Unlock Customer Feedback Including: -Turn Signal Indicators -Horn Chirps -Mirror Folding Behavior	See Appendix II	See Appendix II	See Appendix II	See Appendix II	See Appendix II	See Appendix II
	Engine Stop/Start Button Status LED	ON ⁷	ON ⁷	ON ⁷	ON ⁷	OFF	OFF

1. Open.
2. Ambient light feature content, i.e. dimming capability and color selection, may vary program by program.
3. 25 second timer for Park/Lamps and Interior Illumination; 10 minute timer for puddle lamps, courtesy lamps and Ambient Lighting features
4. Consult local market restrictions/requirements for more details. Local market restrictions/requirements supersede Welcome-Farewell requirements.
5. Maintain user selected brightness level. If no signal available, use last known signal. SWITCHES ONLY: If HLS status = PARK or ON, switches must illuminate (as triggered by such cases as user input, autolamp delay, ambient light level, etc).
6. Product specific animations ("Built Ford Tough", Blue Oval, etc.) not to exceed 2.2 seconds in duration.
7. Deceased by PTS Ignition Switch DNA. Steady on if footbrake is depressed.
8. For PEPS equipped vehicles, this external tumbler will be hidden behind a decorative cover, and therefore is not considered "exposed."
9. Functional ownership group (HMI) may dictate messages be broadcast on instrument cluster during this time, i.e. perimeter/central alarm warning messages.
10. If vehicle is equipped with extended power play functionality, and radio is turned on during this phase, radio-related controls and displays will be illuminated. If dimming signal is absent for less than 5 seconds when the system is activated, use last known value. If dimming level is not published for greater than 5 seconds when extended power play is activated, use "Live" = Twilight 4 and Dimming_LVL = Night 12" as the dimming level.
11. Retract at completion of state 1 state is permitted to time out (i.e., no door opened). If state terminates early, retract at opening of driver's door, battery saver mode activated (10 minute timer) or successful locking attempt, whichever occurs first.
12. Illuminate to customer preferred intensity always if dimming capability provided. If no dimming functionality available, illuminate to maximum brightness condition for ign = ON, and transition to "barely discernible" level during ign=ON states. Barely discernible is a jury evaluated intensity in accordance with FMVSS req.

16. If so equipped. For ignition states # ON, illumination will be for the specific state period or 5 minutes, whichever occurs last, except for one scenario.
16.1. Courtesy lighting delay (time carried forward from courtesy lighting phase).
17. Only display Farewell screen once, at first opportunity, unless vehicle times out between states. If time-out occurs then Welcome screen at start of next state. Trigger off front doors only.
18. This control's backlighting must be ON regardless of headlamp status/illumination strategy as part of "searchable" illumination. See General Illumination Dimming specification for more details.
19. Any item with this superscript is currently limited to 0.7 second fade on, and 1.7 second fade off due to overhead console fade time limits; future want is 3s ON and 5s OFF configuration, when feasible.
20. Display will stay OFF if user turned off screen previously (persistent state). If screen is turned off by user BEFORE farewell screen would display, screen will not display farewell animation or screen at the correct trigger point. It shall remain OFF.

Dataset Name:DET021878-1 **Dataset Description:**Welcome Farewell state matrix **Dataset Attachment File Name:**
WelcomeFarewellMarch15,2017(1).pdf

Requirement - Verification Links:
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Acceptance Criteria:

Classification:

DVM Grouping:

Data Needed: Signal verification

Recipient CPSCs:

- 000600-Vehicle Electrical/Electronic Subsystem
- 002004-Harmony
- 010523-Switches - Rear End Trim
- 010905-Mirror Electronic Controls
- 011016-Switches - Front Seat
- 011017-Switches - Rear Seat
- 011109-Power Window Electronics
- 011116-Switch Pack - Front Door
- 011117-Switch Pack - Rear Door
- 011207-Floor Console Switches
- 011211-Rear Console Switches
- 011214-Overhead Console
- 011220-Switch Pack - Instrument Panel
- 011221-Switches - Overhead
- 011414-Power Liftgate / Trunk Module and Electronics
- 011415-Sliding Door Module and Electronics
- 012901-Module - Overhead Complete
- 012902-Module - Overhead Console
- 050703-Gear Shift Module (GSM)
- 070501-Automatic / Automated Manual Selector Assembly
- 070502-Auto Trans External Controls/Electrical/Electronic
- 110602-Steering Wheel Mounted Switches
- 120402-Mechanical Control Head
- 120403-Electronic Climate Control Unit
- 120406-Rear AC Control Module
- 130100-Instrument Cluster Subsystem
- 130101-Driver Information Module (Instrument Cluster)
- 131300-Parking or Reversing Aid Subsystem
- 132401-Head-Up Display Unit
- 150101-Infotainment Head Unit
- 150102-Center Stack Display
- 150109-Electronic Finish Panel
- 150701-Rear Seat Entertainment
- 170200-Interior Lighting Subsystem
- 170202-Lighting - Interior
- 170207-Lighting - Instrument Panel (IP) & Consoles
- 170208-Lighting - Ambient
- 170500-Lighting Switches Subsystem
- 170501-Master Lighting Switchpack
- 180300-Electrical Distribution Switches Subsystem

191000-Multiple Function Electronic Control Subsystem

191203-Exterior Switch Pack / Keypad

Recommended Milestone: PEC,FEC

Ride Along (Yes = Requesting data from another persons test): No

Sample Size: 1

Verification Usage: DV

Group Number:

Sequence Number:

VERIFICATION TYPE		
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Owner: Prescott,Jennifer-JPRESCO2 (jpresco2)

Verification Method Status: Released

Test Types: 6-General Standards

Test Site: Lab

Prototype Type: HIL_(HW-in-Loop)

Owning CPSC: 002004

Location Facility: APTL: Allen Park Test Labs

Legacy DVM: DVM-3338-51/1;1-00.20-L-12995

Operating Condition:

Sample Preparation:

Design Specific Info:

DVM Comments:



TEST METHOD

TITLE: Welcome Farewell and Lincoln Embrace Verification Testing. **TestMethod #:** 00.20-L-12995

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1.0 PURPOSE / GOAL OF TEST

- 1.1 This Test Method is a generic method for executing component level testing of DNA Welcome-Farewell (for Ford-branded products) and Lincoln Embrace (for Lincoln branded products). This test is designed to be performed without use of a prototype vehicle.
- 1.2 COMMONALITY. This test can be used to qualify components throughout the world. The test may be conducted at any location having the necessary equipment and facilities.

2.0 INSTRUMENTATION

- 2.1 All test measurement equipment must be calibrated and maintained per FAP03-015, Control, Calibration, and Maintenance of Measurement and Test Equipment.
- 2.2 All applicable safety guidelines and procedures must be followed.

Global Standards

Printed copies are uncontrolled.



TEST METHOD

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2.3 Tests conducted at the component level require either a complete vehicle electrical breadboard (hereafter “breadboard”) or hardware-in-the-loop signal testing board (hereafter “HIL board”) to conduct test.

2.3.1 Breadboard Description and Identification:

Breadboards are built after VP builds commence, approximately 2-4 weeks post-VP start. Breadboard availability will vary based on scope of program (MCA programs will establish breadboards sooner than all-new programs). Breadboards have an owner, an engineer who monitors part and wiring harness integrity and captures/socializes issues seen with board operation. The owner also performs select tests by operating various inputs (such as checking headlamp functionality by turning headlamp switch). The breadboard is owned by VEV; the engineer also works for VEV. Breadboards are best identified by their use of physical parts and wiring harnesses, rather than the less production-intent HIL board. The breadboard is essentially a complete automobile without sheet metal or any trim. Operation of any component can only be checked visually, though CAN-logs can be provided by the breadboard owner if requested.



Photo 1: Picture of a breadboard set-up. Note use of production-intent components.



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2.3.2 HIL Board Description and Identification:

HIL boards are constructed over a longer timeframe than breadboards, and are typically started slightly after FDJ, taking 4-6 weeks to complete. Unlike the breadboard which uses physical production components in its construction, the HIL board uses modules and automated signals to check system functionality. The HIL board is a far more sophisticated tool than the breadboard for checking functionality, such as for Welcome-Farewell and Lincoln Embrace.

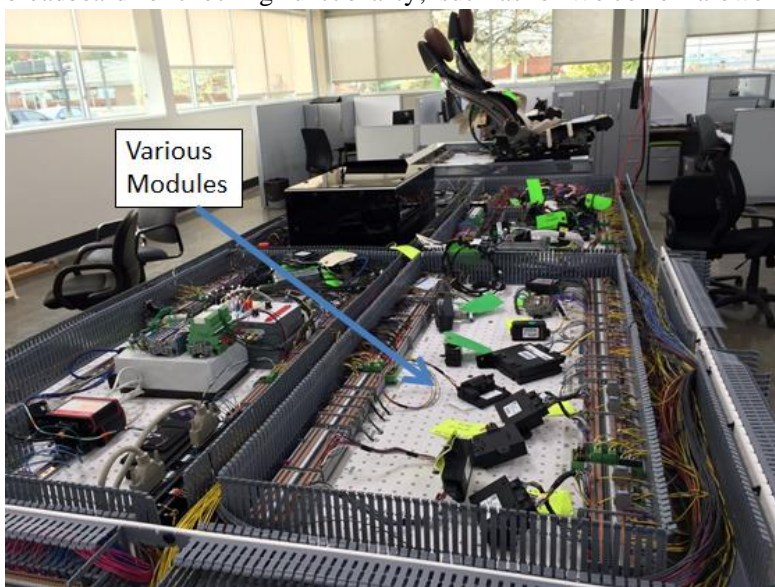


Photo 2: HIL testing board, only utilizing physical components where absolutely required.

All modules in a HIL board have their signal wiring hooked up to control busses, not vehicle harnesses (as in a breadboard). These busses feed back to a main computer. The computer is capable of simulating human input via series of 12V signals sent into the HIL board, and can monitor system responses as well. In this way, the system is capable of checking exacting behavior for ramp-ups, ramp-downs, durations, and other features of components throughout the vehicle, making it invaluable for Welcome-Farewell and Lincoln Embrace evaluation. Comparing to the breadboard headlamp operation example, the HIL board would apply 12V across the BCM input pin for the headlamp switch (to simulate headlamp switch movement) and then monitor output behavior at the LDM, the lighting module that controls headlamp power. If the HIL board records 12V output at the LDM, the system interprets this as: "Customer turned switch to turn on headlamps, and headlamps turned on."

The HIL board is capable of running complex simulations completely autonomously. A HIL board owner, like a breadboard owner, runs these tests. However, the HIL board tests involve no physical labor (unlike a breadboard which requires manual actuation of switches, buttons, and



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levers) and processes tests autonomously once the operator creates the correct program in his/her terminal. The programs are created based on education from the feature owners, such as Vehicle Harmony for Welcome-Farewell & Embrace, or the transmission team for shift patterns.

3.0 EQUIPMENT AND FACILITIES

3.1 Either HIL board or breadboard, provided by VEV. HIL testing is performed autonomously. No additional equipment needed for HIL board testing.

3.2 BREADBOARD TESTING ONLY:

The following components are recommended to facilitate testing:

- 1) A large cardboard box (~1 foot by 1 foot) with one side cut out, and with a small viewing window (~3"x3") must be provided to cover components and view illumination behavior in a semi-dark space.
- 2) At least one assistant to assist with switch actuation.
- 3) Printed Welcome-Farewell or Lincoln Embrace state matrix, plus additional notepad for behavioral notes.

4.0 SAMPLE PREPARATION

4.1 **HIL BOARD TESTING:** For component level tests, Vehicle Harmony engineer must ensure that HIL board, if available, is used in lieu of breadboard for evaluation. Harmony engineer must establish contact with HIL team at FDJ to ensure HIL team is aligned on correct version of Welcome-Farewell or Lincoln-Embrace specification to use for automated tests. Harmony engineer must answer any logic-related questions for Welcome-Farewell or Lincoln Embrace that the HIL team may raise.

4.2 **BREADBOARD TESTING:** If breadboard must be used (due to minor program status or lack of funding), Vehicle Harmony engineer must note pedigree of all affected components for diagnostic purposes. Some components may be out of date and incorrectly programmed at breadboard. Harmony engineer should record software levels for each affected component (cluster, ECP, GSM, etc.) for diagnostic purposes, and in case of a test failure to aid with diagnosis.

5.0 PROCEDURE STEPS

5.1 Testing with HIL Board

5.1.1 Establish which Welcome-Farewell or Lincoln-Embrace related components vehicle program is equipped with. Welcome-Farewell and Lincoln Embrace is an *as-equipped* feature. Ensure VH engineer's understanding of expected equipment and tester's understanding of feature content are aligned. There should be no gaps in equipment for testing. For example, if program is



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equipped with illuminated running boards, ensure test board will validate illuminated running board behavior.

- 5.1.2 Align on correct behavior for each component. Share correct version of Welcome-Farewell and Lincoln Embrace with operator. Operator will then take this state chart and produce programs based on its exacting details.
- 5.1.3 Testing results are usually produced ~1 month before VP build. Based on those results, board operator will produce a list of eTracker issues for failures (example: dome lamps do not turn on at door open). Vehicle Harmony engineer will understand and align on each eTracker result with the operator. If behavioral inconsistency is considered acceptable, operator and VH engineer will close eTracker line item. If inconsistency is considered unacceptable, VH engineer will update program healthchart and contact D&R to begin/lead resolution workstream.
- 5.1.4 Corrections to discrepancies should be validated at the HIL board as needed. HIL operator will assist with software updates and re-testing as needed.
- 5.1.5 VH engineer must lead resolution of all Welcome-Farewell and Lincoln Embrace related issues. In the event that issues are not resolved by start of VP, issues may need to be converted into AIMs issues to be tracked by program. Testing is not completed until all issues are closed, either fixed or agreed upon as acceptable behaviors.

5.2 Testing with Breadboard

- 5.2.1 Establish which Welcome-Farewell or Lincoln-Embrace related components vehicle program is equipped with. Welcome-Farewell and Lincoln Embrace is an *as-equipped* feature. Ensure understanding of expected equipment and breadboard's available content are aligned. There should be no gaps in equipment for testing. For example, if program is equipped with illuminated running boards, ensure breadboard will validate illuminated running board behavior. If required components are not available for breadboard (late part availability, etc.), document discrepancy and create work plan to test these features at a later date.
- 5.2.2 Coordinate an appropriate time with the breadboard owner to perform review. Typically 2-4 hours is required for a vehicle-level evaluation. Obtain at least 1 assistant to help actuate required switches for review.
- 5.2.3 At review, perform the following procedure to test Welcome-Farewell or Lincoln Embrace. Steps are broken up sequentially, with operator 1 (OP1) and operator 2 (OP2) outlined.
 - 1) OP1: Align cardboard box over affected component to be evaluated. Ensure majority of light is blocked when box is seated over component. Part should be sufficiently dark to simulate dusk/dark condition.
 - 2) OP2: Perform required steps to establish state transition in Welcome-Farewell or Lincoln Embrace. For example, to enter illuminated entry state, lock vehicle with keyfob, then unlock but do not actuate any door handles. OP2 must also start stop watch at beginning of state,



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announcing state start, and announcing when state should end (i.e., 25 seconds, 10 minutes, etc.)

3) OP1: Observe and record behavior of affected component (headlamp, dome lamp, etc). Use printed state matrix as a guide.

4) OP1: Re-align box to next component.

5) OP2: Repeat step 2.

6) OP1: Repeat step 3.

7) Repeat steps 4-7 as needed until all components are assessed. Some efficiencies may be gained if components can be reviewed quickly in room ambient conditions without cardboard box cover. In those instances, attempt to review as many controls as possible at once.

5.2.4 Based on testing results, VH engineer must assess, like in HIL board testing, whether behavior is acceptable or not. For unacceptable concerns, VH engineer must raise AIMs issue and lead effort to correct concern with component D&R.

5.2.5 Corrections to discrepancies should be validated at the breadboard as needed. VH engineer will need to coordinate software updates and re-testing as needed with VEV board owner and part D&R.

5.2.6 Testing is not completed until all issues are closed, either fixed or agreed upon as acceptable behaviors.

6.0 GENERAL INSTRUCTION/SUPPLEMENTAL INFORMATION

7.0 DATA GENERATED & FORMATTING OF PRESENTATION

7.1 Section 5 explains the required data collection (test results). Information should be assembled into an excel matrix for tracking issues until completed.

8.0 REFERENCES

8.1 FAP03-179, Developing Corporate Engineering Test Procedures.

9.0 APPENDIX/ATTACHMENT