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1988 FORD Mustang OEM Service and Repair Workshop Manual

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Remote Audio Controls

The steering wheel switches can control some audio system functions. The steering wheel switch consists of multi-button switches that operate various audio system controls.

SYNC™ System Overview

NOTE

Refer to the Owner Literature for additional details of the SYNC system.

NOTE

It may be necessary on occasion to carry out a master reset of the SYNC system for correct operation. Accumulated data uploaded from devices may corrupt the SYNC software and resetting the SYNC system clears this data to allow normal operation of the SYNC system.

The SYNC system is a hands-free communication and entertainment system and provides the following functions:

- Send and receive phone calls via a paired Bluetooth-enabled phone
- Send and receive text messages via a paired Bluetooth-enabled phone
- Connect media devices (such as an iPod®, USB (universal serial bus) device, or Bluetooth-enabled audio device to play audio files
- Initiate a 911 Assist or emergency assistance call if the airbags deploy
- Provide Vehicle Health Reports
- Provide a vehicle Wi-Fi hotspot (if equipped, cellular subscription required)
- Control smart devices using the cellular connection via an app (similar to using Alexa™ or Siri™)
- Provide feedback to Ford about some of the SYNC relates systems
- Provide over the air software updates

Not all SYNC system features are supported with every phone/device.

- The vehicle owner can schedule the systems to update wirelessly. The vehicle cannot be started or driven during the update process. The update does not occur unless a time is specified in the settings. Refer to the Owner Literature for details to update the vehicle wirelessly.

Media files that do not have DRM (digital rights management) protection or are not properly formatted on the device, cannot be played on the SYNC system.

Two USB (universal serial bus) ports in the media hub allow connection and playback of portable media devices and SYNC software updates. The media hub provides standard 5 volt power and charging of portable devices.

SYNC AppLink

The SYNC AppLink supports devices with third party installed applications capable of outside control by voice command, the steering wheel switches, the audio control panel or the display unit. These devices must be paired with SYNC Bluetooth and some devices require a USB (universal serial bus) connection.

Voice Command

The SYNC voice command capability reduces or eliminates physical interaction with certain vehicle functions or portable device controls. When SYNC is prompted by the steering wheel switch, it responds with a tone or audible response (depending on the SYNC setting) in the audio system. SYNC uses the voice microphone to listen to the driver command and control the vehicle function or portable device.

A wake word can also be used to activate the SYNC system.

Text-To-Speech Feature

The SYNC text-to-speech feature converts text information to speech and broadcasts it through the audio system. Text messages with sender information, media titles, and other information can be read and broadcast through the audio system, helping users maintain driving focus.

Emergency Assistance (911 Assist)

The emergency assistance feature (911 Assist) calls for help in an event where the airbags deploy. This feature must be previously enabled and requires a paired cellular phone to connect with emergency services. If activated by an airbag deployment, the system plays a message in the vehicle indicating an emergency call is about to be placed. If not canceled, it dials the emergency response number and plays a pre-recorded message for the emergency response operator. After the message plays, the vehicle occupant(s) can talk with the operator to give their location and personal information.

Compass

Information from the GPS (global positioning system) determines the vehicle compass heading. The compass heading displays in the IPC (instrument panel cluster) message center or the display unit.

Navigation System (if equipped)

NOTE

It may be necessary on occasion to carry out a master reset of the SYNC system for correct operation. Accumulated data uploaded from devices may corrupt the SYNC software and resetting the SYNC system

- using phone maps and navigation.

NOTE

Make sure the appropriate device manufacturer USB (universal serial bus) cable is used for correct Android Auto™ and Apple CarPlay™ operation.

Android Auto™ and Apple CarPlay™ disable some SYNC features. Most Android Auto™ or Apple CarPlay™ features use mobile data.

FordPass (if equipped)

NOTE

The FordPass system (when activated) provides remote connectivity through the FordPass mobile phone application. It can monitor certain vehicle systems and carry out vehicle functions such as:

- reading the fuel level and odometer.
- receiving remote alerts and notifications.
- carrying out or scheduling remote starts (if enabled through the IPC (instrument panel cluster)).
- using the vehicle locator.
- vehicle lock/unlock control and vehicle lock/unlock status.

Vehicle Wi-Fi Hotspot (if equipped)

The Wi-Fi hotspot feature allows up to 8 devices to connect to high speed internet access. The network name, password, enable/disable and other settings for the Wi-Fi Hotspot feature are accessed using the settings menu on the display unit (touchscreen).

Over The Air Updates (if equipped)

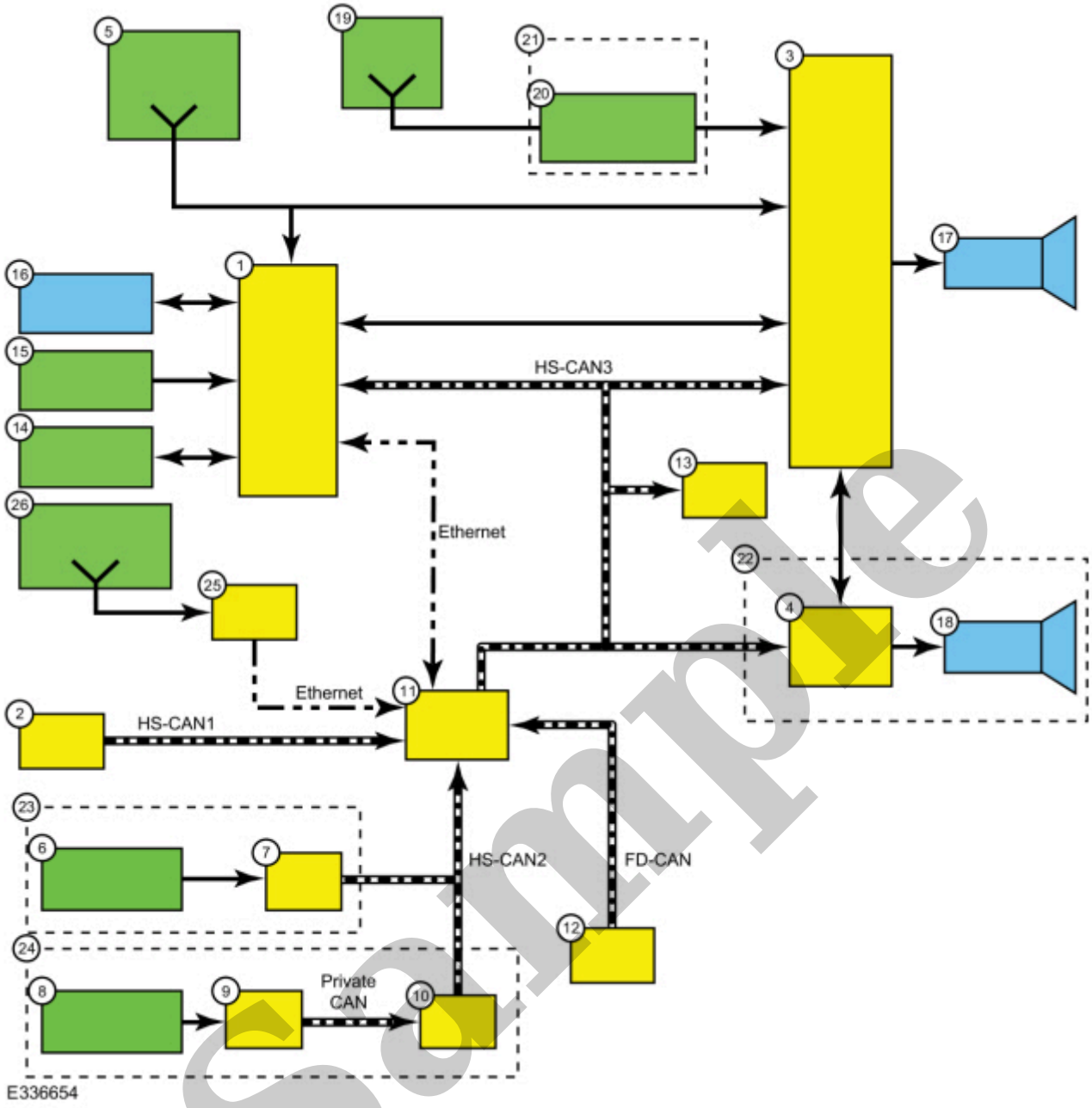
NOTE

Refer to the Owner Literature for additional details of the Over The Air update feature.

The vehicle can be set to receive updates automatically or scheduled to update at a set time. This feature updates the software configuration of modules. For detailed information of the Over The Air feature,

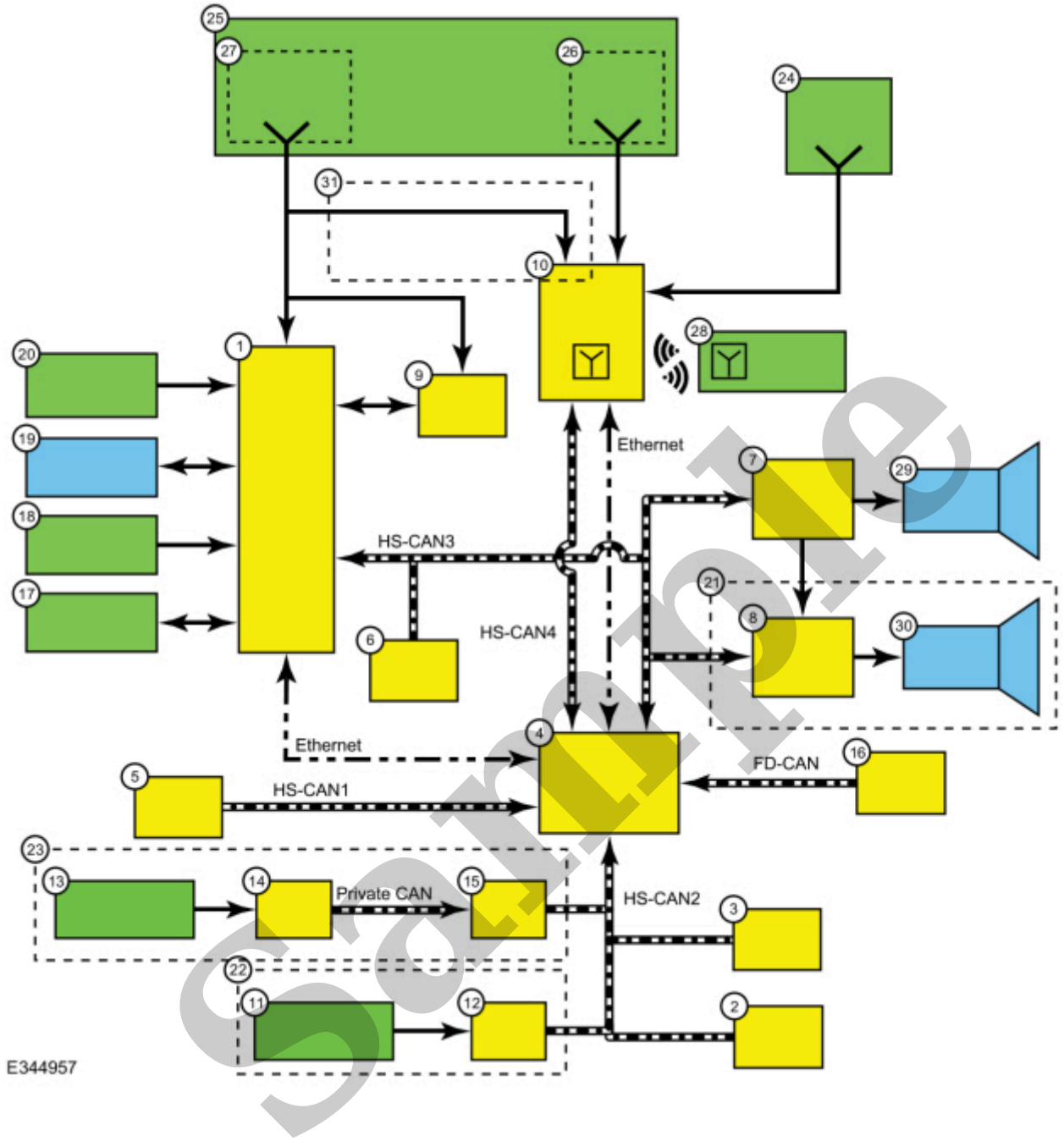
Refer to: Module Configuration - System Operation and Component Description

(418-01B Module Configuration - Vehicles With: Over-the-Air (OTA) Programming, Description and Operation).



Item	Description
1	APIM (SYNC module)
2	BCM (body control module)
3	ACM (audio front control module)
4	DSP (audio digital signal processing module)
5	Satellite/ GPS (global positioning system) Antenna

SYNC™ System



Item	Description
1	APIM (SYNC module)
2	ABS (anti-lock brake system) Module
3	RCM (restraints control module)
4	GWM (gateway module A)

26	Secondary Cellular Antenna
27	Satellite/ GPS (global positioning system) Antenna
28	Bluetooth Device
29	Speakers
30	Speakers
31	SYNC 4 Low

Network Message Chart

ACM (audio front control module) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Battery saver status	BCM (body control module)	Disables the functionality of the ACM (audio front control module) due to the load shedding feature.
Chime controls	IPC (instrument panel cluster)	Controls the priority, characteristics, volume, and speaker output of the warning chime tones played through the audio system speakers.
Chime source	IPC (instrument panel cluster)	Sets the audio system or IPC (instrument panel cluster) as the source for the chime tones.
Ignition status	BCM (body control module)	Indicates the ignition mode.
MyKey Belt-Minder audio mute	IPC (instrument panel cluster)	Mutes speaker output so the Belt-Minder tone can be more easily heard.
MyKey volume limit status	IPC (instrument panel cluster)	Limits the maximum audio system volume when a MyKey restricted key is in use.
Satellite radio request signals	APIM (SYNC module)	Carries out various satellite radio functions using the touchscreen.

Illumination dimming level	BCM (body control module)	Controls the backlight intensity.
MyKey volume limit status	IPC (instrument panel cluster)	Limits the maximum audio system volume when a MyKey restricted key is in use.
Navigation rolling wheel count and direction	ABS (anti-lock brake system) module	Provides more accurate vehicle position tracking when the GPS (global positioning system) signal is temporarily unavailable.
Steering wheel switch status	SCCM (steering column control module) / SECM (steering effort control module)	Indicates the button press status of the steering wheel switches.
Vehicle configuration data	BCM (body control module)	Verifies vehicle configuration data such as the VIN (vehicle identification number) and system module configuration.
Vehicle speed	PCM (powertrain control module)	Used for navigation functionality.

DSP (audio digital signal processing module) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Chime controls	IPC (instrument panel cluster)	Controls the priority, characteristics, volume, and speaker output of the warning chime tones played through the audio system speakers.
Chime source	IPC (instrument panel cluster)	Sets the audio system or IPC (instrument panel cluster) as the source for the chime tones.
Ignition status	BCM (body control module)	Indicates the ignition mode.
MyKey Belt-Minder audio mute	IPC (instrument panel cluster)	Mutes speaker output so the Belt-Minder tone can be more easily heard.

data and carry out other diagnostic functions for the ACM (audio front control module) via the vehicle DLC (data link connector) .

The ACM (audio front control module) is powered at all times and uses the ignition status message to control the on/off mode. The accessory delay feature is controlled by an ignition status message from the BCM (body control module) .

The ACM (audio front control module) also receives data from the audio control panel via the APIM (SYNC module) over the CAN (controller area network) . Vehicles equipped with a 15 inch center display are not equipped with an audio control panel. All of the audio controls are accessed using the touchscreen.

The ACM (audio front control module) uses various inputs such as radio waves and audio signals, conditions, amplifies and converts them to an analog audio signal. This signal can be amplified internally and sent directly to the speakers, or transmitted to a separate amplifier and speaker system.

The ACM (audio front control module) uses the BCM (body control module) ignition status message to temporarily mute audio output during engine cranking. This prevents the normal voltage spikes during engine cranking from producing popping noises in the audio system.

The ACM (audio front control module) (or the DSP (audio digital signal processing module) if equipped with 12 or 14 speakers) receives vehicle speed information from the PCM (powertrain control module) over the CAN (controller area network) to adapt the volume based on the different vehicle speeds.

AM (amplitude modulation) / FM (frequency modulation) / DAB (digital audio broadcasting) Radio

When the AM (amplitude modulation) / FM (frequency modulation) mode is selected, the radio amplifies radio waves sent from the antenna. It then selects the requested frequency, converts and amplifies the content. These fluctuating audio signals are output as AC (alternating current) output voltage to power the speakers or as an input to a separate amplifier.

If equipped with High Definition (HD) radio capability, the radio automatically detects and plays back the improved sound quality and multiple programs of HD broadcasts. HD-equipped radios use the existing standard AM (amplitude modulation) / FM (frequency modulation) antenna for signal reception. If a concern only exists for the HD radio feature, refer to the troubleshooting guide within the Owner Literature.

If equipped with DAB (digital audio broadcasting) capability, the radio can provide improved sound quality and multiple programs of digital broadcasts.

DAB (digital audio broadcasting) -equipped radios are not available in North America.

Satellite Radio (if equipped)

Satellite signals collected by the satellite radio antenna can be selected and played back over the audio system. The satellite antenna sends satellite radio and GPS (global positioning system) data through the satellite radio cable to a splitter (integrated into the cable). The satellite radio signals are separated by the splitter and sent to the satellite radio receiver within the ACM (audio front control module) .

The steering wheel switches contain a series of resistors. Each steering wheel audio function switch has a specific resistance value. The SCCM (steering column control module) and switch assembly are connected in a voltage divider circuit. The voltage drop over an internal SCCM (steering column control module) resistor is changed by the different audio switch function resistances. The SCCM (steering column control module) monitors the voltage drop across its internal resistor to determine which steering wheel switch is pressed. The SCCM (steering column control module) transmits the steering wheel switch inputs over the CAN (controller area network) to the ACM (audio front control module) , to control audio functions.

Remote Audio Controls - Vehicles With Adaptive Steering

The steering wheel switches contain a series of resistors. Each steering wheel audio function switch has a specific resistance value. The SECM (steering effort control module) and switch assembly are connected in a voltage divider circuit. The voltage drop over an internal SECM (steering effort control module) resistor is changed by the different audio switch function resistances. The SECM (steering effort control module) monitors the voltage drop across its internal resistor to determine which steering wheel switch is pressed. The SECM (steering effort control module) transmits the steering wheel switch inputs over a private CAN (controller area network) to the SASM (steering angle sensor module) which relays the message over the HS-CAN (high-speed controller area network) to the ACM (audio front control module) , to control audio functions.

SYNC System

NOTE

Refer to the Owner Literature for additional details of the SYNC system.

The APIM (SYNC module) contains the SYNC software. The SYNC system connects various inputs over Bluetooth or USB (universal serial bus) connections to the car audio system. The SYNC system allows driver control of a phone, media device, and vehicle systems (navigation and climate control for example).

The APIM (SYNC module) is powered at all times and uses the BCM (body control module) ignition status message to control the on/off mode. The accessory delay feature is controlled by an ignition status message from the BCM (body control module) .

SYNC Inputs

- USB (universal serial bus) - media players or flash drives
- Bluetooth - phones or media players
- Display unit and audio control panel switches
- Steering wheel switches
- Voice microphone input