RP4.2-BM21

Radio Replacement &
Steering Wheel Control Interface
for Select CAN-Bus BMW Vehicles

Introduction & Features

The RP4.2-BM21 interface allows the replacement of a factory radio in select BMW vehicles. Using this interface will retain factory features such as: steering wheel controls (SWC), iDrive controls and warning chimes (including rear park assist and front collision detection). Use of this interface also allows you to program two radio functions to each SWC button by using short press long press dual command functionality. The RP4.2-BM21 also provides data bus driven outputs such as data driven accessory power, vehicle speed signal (VSS), illumination, reverse and parking brake.

Important Notes

1. The factory warning chimes are audible either through the factory door speaker or through a separate speaker in the upper dash. In the event disconnecting the radio results in the vehicle loosing the chimes, there are two ways to retain them. The RP4.2-BM21 must either be connected to the vehicle's hands free speaker in the driver side under dash, (using the supplied harness) or connected to the supplied speaker. The speaker can then be routed and mounted where desired.
2. The RadioPRO App is located on the PAC website (www.pac-audio.com) in the product description section of the RP4.2-BM21. This app will allow you to configure the user interface options, update product firmware and read the current hardware and firmware versions of the RP4.2-BM21 module. See page 5 for more information about this app.

Wiring Connection Chart

Interface Connector 1

Red	Accessory Output (10 amp)
Yellow	12v+ **
Black	Ground

** BMW's power management system causes the constant power wire behind the radio to drop out after the key has been removed for 30 mins. It may be necessary to run a new 12v constant wire from the battery to the aftermarket radio.

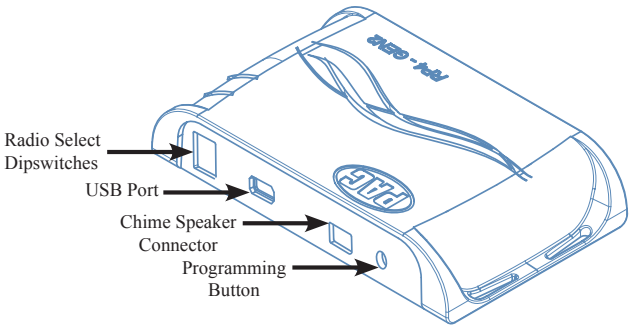
Interface Connector 2

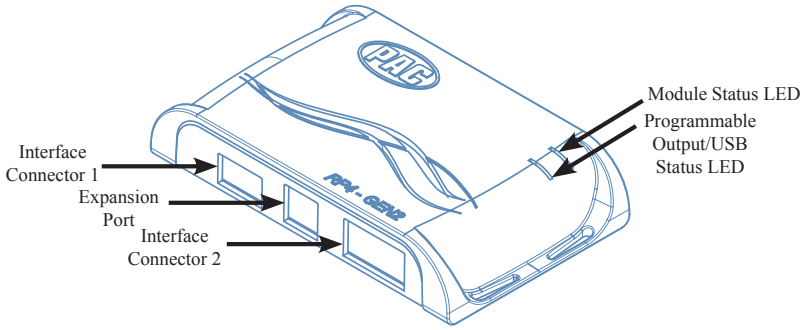
3.5mm Jack	SWC Output
Pink	MS-CAN + Input
Pink/Black	MS-CAN - Input
Blue/Yellow	SWC Output
Red/White	12v+ Programmable Output
Orange/White	Illumination Output
Pink	Vehicle Speed Signal Output
Violet/White	Reverse Output
White/Black	HS-CAN + Input (Not Used)
White/Red	HS-CAN - Input (Not Used)
Light Green	Parking Brake Output (-)
Blue/White	Amp Turn On Input
Brown	SWC Config - (See Install Note 4 on Page 2)

Vehicle Connector

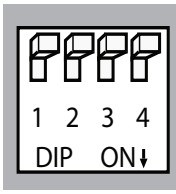
Yellow	+12v **
Black	Ground
Orange/White	Dimmer
Blue/White	Amp Turn On Input
White	Front L + input
White / Black	Front L - input
Grey	Front R + input
Grey / Black	Front R - input
Green	Rear L + input
Green / Black	Rear L - input
Purple	Rear R + input
Purple / Black	Rear R - input

Module Layout





Installation Steps



SET RADIO DIPSWITCHES (ON = DOWN)

Alpine	JVC	Kenwood	Clarion	Pioneer/Other	Sony	Fusion
1	2	1 & 2	3	1, 2, & 3	4	1 & 4

Other = Advent, BOYO, Dual, Lightning Audio, Rockford Fosgate, Visteon

1. **The radio select dipswitches on the side of the interface must be adjusted to the proper radio setting before plugging the interface into the vehicle.**
2. Find a constant power source. BMW's power management system causes the constant power wire behind the radio to drop out after the key has been removed for 30 mins. This is OK for our module but not for the aftermarket radio. For your convenience we have added a 16ft 16AWG constant power wire to the kit so that you can run constant power from the battery to the aftermarket radio. The battery in BMW vehicles is normally located in the trunk area. Be sure to route this wire away from any moving parts that may pierce or cut the wire.
3. Installation of the chime speaker (if required). If the vehicle has the factory telematics system (Bluetooth) you can use the RP4.2-BM21-SPK-HAR to use the factory speaker mounted in the drivers kick panel to retain the factory warning chimes. Simply disconnect the factory 3 pin connector from the speaker and connect the 3 pin connector from the RP4.2-BM21-SPK-HAR, connect the other side (2 pin connector) to the RP4.2-BM21. If the vehicle does not come with the factory telematics system then you will need to use the included speaker to retain the factory warning chimes.
4. If the vehicle has the HVAC recirculation button located on the steering wheel, and you wish to retain that feature, the brown wire in the Interface's connector 2 will need to be connected to constant +12v prior to connecting the module to the vehicle. The Brown wire will come in the package disconnected which will default that button to control the aftermarket radio, and not the HVAC.
5. Make all connections as described in the connection chart on page 1. **Vehicles without a factory amplifier:** Cut the RCA ends off of the speaker wires and connect the aftermarket radio's front and rear speaker wires to the vehicle connector. **Vehicles with a factory amplifier:** Connect the RCA cables from the vehicle connector to the aftermarket radio's front and rear pre-amp outputs.
6. Connect the SWC wire to the aftermarket radio (aftermarket radio must support a wired remote input).
7. Once all connections have been made, plug the interface into the vehicle.
8. If you wish to reassign functions to the SWC, utilize short press long press dual command functionality, or assign the programmable 12v output to a SWC button, follow the optional programming instructions on the next page.

Steering Wheel Controls

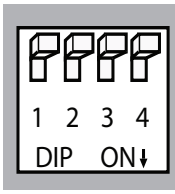
Default Steering Wheel Control Programming

IMPORTANT! The interface comes pre-programmed for all of the vehicles factory SWC functions and does not require programming unless you wish to re-assign the SWC functions, utilize short press long press dual command functionality or assign the programmable 12v output to a SWC button. The SWC can always be restored to default settings by pressing and releasing the program button on the side of the interface once and waiting 7 seconds for the LED to flash 3 times.

In addition, there are 5 of the controls on the steering wheel that are mirrored to the iDrive controller. For instance the "+" button on the steering wheel will do the same function as the "Up" button on the iDrive controller. Keep in mind that if one of these mirrored steering wheel control buttons is re-assigned to another function it will also change the corresponding iDrive function. See Below for a list of the functions that are mirrored between the steering wheel and the iDrive controller.

Mirrored Functions	
Steering Wheel	**iDrive Controller**
Volume +	Up
Volume -	Down
Track +	Right
Track -	Left
Source/Diamond	Select

Steering Wheel Controls (cont.)



SET RADIO DIPSWITCHES (ON = DOWN)

Alpine	JVC	Kenwood	Clarion	Pioneer/Other	Sony	Fusion
1	2	1 & 2	3	1, 2, & 3	4	1 & 4

Other = Advent, BOYO, Dual, Lightning Audio, Rockford Fosgate, Visteon

Default SWC Button Assignments

	Alpine	JVC	Kenwood	Clarion	Pioneer	Sony	Fusion
Volume +	Volume +	Volume +	Volume +	Volume +	Volume +	Volume +	Volume +
Volume -	Volume -	Volume -	Volume -	Volume -	Volume -	Volume -	Volume -
Source/Diamond	Source	Source	Source	Source	Source	Source	Source
Track +	Track +	Track +	Track +	Search +	Track +	Track +	Track +
Track -	Track -	Track -	Track -	Search -	Track -	Track -	Track -
Star/Recirculation	Preset +	Band/Disc+	Disc/FM +	Band	Preset +	Preset +	Audio
Voice	Mute	Mute	Mute	Mute	Mute	Mute	Mute
Phone Answer	Receive	Receive	Off Hook	Send/End	Answer	Answer/End	Power
iDrive Knob							
Up	Volume +	Volume +	Volume +	Volume +	Volume +	Volume +	Volume +
Down	Volume -	Volume -	Volume -	Volume -	Volume -	Volume -	Volume -
Right	Track +	Track +	Track +	Search +	Track +	Track +	Track +
Left	Track -	Track -	Track -	Search -	Track -	Track -	Track -
Select	Source	Source	Source	Source	Source	Source	Source
iDrive Buttons							
BACK	N/P	N/P	N/P	N/P	N/P	N/P	N/P
OPTION	N/P	N/P	N/P	N/P	N/P	N/P	N/P
CD	N/P	N/P	N/P	N/P	N/P	N/P	N/P
RADIO	N/P	N/P	N/P	N/P	N/P	N/P	N/P
MENU	N/P	N/P	N/P	N/P	N/P	N/P	N/P
TEL	N/P	N/P	N/P	N/P	N/P	N/P	N/P
NAV	N/P	N/P	N/P	N/P	N/P	N/P	N/P

Optional Steering Wheel Control Programming

If you wish to re-assign the SWC functions, utilize short press long press dual command functionality, or assign the programmable 12v output to a SWC button, the interface must be programmed in the specific order shown in the chart on page 4. If you come across a function in the chart that your steering wheel does not have, or you do not want to program, press and release the programming button on the side of the interface to skip that function. The LED will flash off and on confirming that you have successfully skipped that function and are ready to proceed to the next one.

Short Press Long Press Dual Command Functionality
This feature allows you to assign two aftermarket radio functions to each of the vehicle's SWC buttons. It can be used with as many of the buttons as the user likes, or none at all. When this functionality is implemented, quickly pressing and releasing a SWC button will initiate the short press command while pressing and holding a SWC button for longer than two seconds will initiate the long press command. Please note that no long press commands are programmed by default. If you wish to assign dual command functionality to the SWC please follow the programming steps on the next page.

Programmable 12v Output
The Red/White wire on the interface can be programmed via the RadioPRO app to provide a pulsed or latched 12v output which can then be assigned to any of the vehicle's factory SWC buttons. When assigned, the factory SWC button will activate the pulsed or latched output to control external accessories. Please refer to page 5 for more details on how to use the app to set this feature.

Steering Wheel Controls (cont.)

Optional SWC Programming Procedure

1. Turn the key to the ignition position.
2. Press and release programming button on the side of the interface. The Status LED will turn green.
3. Within 7 seconds, press the button that is to be learned on the steering wheel. The LED will turn red when the button is pressed.
   At this point you have two options:
   - **A. For short press functionality:** Release the button within 1.5 seconds. The LED will turn back on.
   - **B. For long press functionality:** Hold the button until the LED starts blinking. Release the button and the LED will go back to solid.
4. If you need to program more buttons, repeat step 3 for each additional audio function on the steering wheel.
5. If you come across a function in the chart that your steering wheel does not have, or you do not want to program, press and release the program button on the side of the interface to skip that function.
6. Once programming is completed, wait seven seconds. The LED will flash three times indicating end of programming.
7. Test the interface for proper functionality. Whenever a SWC is pressed the LED on the interface should blink. If any function does not work, repeat the programming steps

Optional Programming Order

	Alpine	JVC	Kenwood	Clarion	Other*	Pioneer	Sony	Fusion
1	Volume +	Volume +	Volume +	Volume +	Volume +	Volume +	Volume +	Volume +
2	Volume -	Volume -	Volume -	Volume -	Volume -	Volume -	Volume -	Volume -
3	Mute	Mute	Mute	Mute	Mute	Mute	Mute	Mute
4	Preset +	Source	Source	Source	Preset +	Preset +	Preset +	Source
5	Preset -	Track +	Play	Search +	Preset -	Preset -	Preset -	Track +
6	Source	Track -	Track +	Search -	Source	Source	Source	Track -
7	Track +	Band/Disc +	Track -	Band	Track +	Track +	Track +	Audio
8	Track -	Preset/Disc -	Disc/FM +	Send/End	Track -	Track -	Track -	Power
9	Power	Select	Disc/AM -	Send	Band	Band	Band	12v+ Output
10	Enter/Play	Attenuation	Answer	End	N/A	Phone Menu	Reject Call/Source (Bluetooth equipped radios only)	
11	Band/Program	Phone Receive	Voice Dial	12v+ Output	12v+ Output	Answer Call	Answer/End Call	
12	Receive	Phone Reject	On Hook			End Call	12v+ Output	
13	End	Voice Dial	Off Hook			VR		
14	VR	Power	Mute (Multimedia units only)			12v+ Output		
15	12v+ Output	12v+ Output	Preset +					
16			12v+ Output					

*Other = Advent, Boyo, Dual, Lightning Audio, Rockford Fosgate, & Visteon

Testing & Verification

1. Turn the ignition on. The LED on the interface will turn on & the +12v accessory wire will turn on.
2. Turn on the radio & check balance & fade. (Premium systems may not fade.)
3. Verify that all SWC are functioning properly. The LED will flash whenever a SWC button is pressed, even if a function is not assigned to the button.
4. Verify that the programmable 12v+ output is functioning as intended.
5. The LED & radio will turn off when the ignition is turned off.

Restoring Factory Settings

You can restore the interface to factory default settings by pressing and holding the programming button on the side of the module until the status LED starts blinking red. Once the LED starts blinking red, release the button. You must release the button while the LED is blinking red in order to perform the reset.

This reset will restore the following settings to their factory defaults:

- SWC Mapping
- Programmable 12v+ Output (Latched)
- Parking Brake Output Settings
- Factory Warning Chime Volume (High)

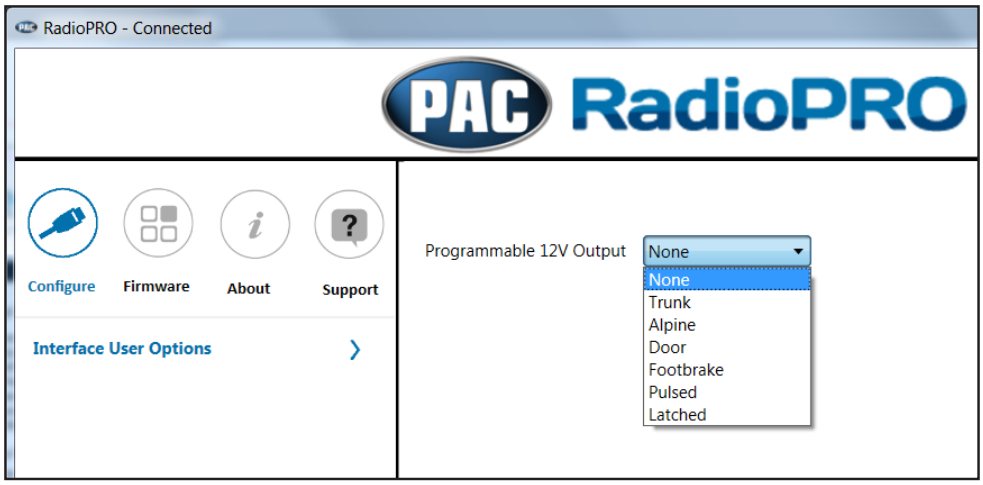
RadioPRO App

Use of the RadioPRO App in BMW allows you to do the following:

- Configure user interface options such as:
  - Red/White wire output behavior
  - Aftermarket radio parking brake sequencing
  - Adjust warning chime volume level
- Update product firmware
- Read firmware/hardware versions
- Access product user manuals

Programmable Red/White Wire

The Red/White wire can be programmed to do a pulsed or latched trigger that is controlled by a user assigned steering wheel control button, or it can be set to provide an output when triggered by the vehicles foot brake, door or trunk. The module will need to be connected to the vehicle so that the App is able to see what options are available from the specific vehicle. Once connected, select User Interface Options then set the behavior of the Red/White wire using the drop down menu. PLEASE NOTE: Available triggers depend on what info is available on the vehicles data bus. Restoring factory settings on the module will default this wires output back to a latched SWC trigger.



Trunk - This selection will provide a 12v+ output on the Red/White wire whenever the CAN-Bus is active and the trunk is opened.

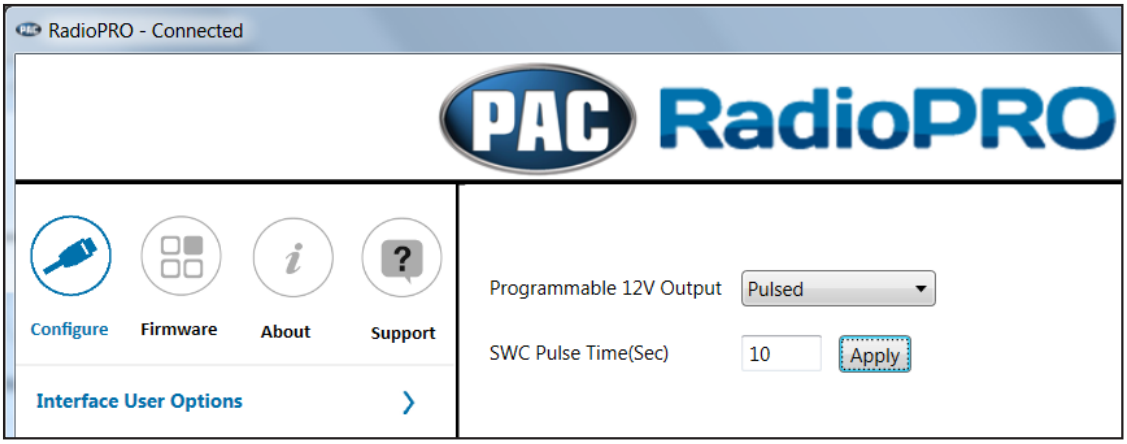
Alpine - If you select the “Alpine” setting on the drop down menu, the Red/White wire will then work in conjunction with the parking brake output to produce the necessary sequencing for settings menu access. This sequencing is based on the actual parking brake, meaning to produce this sequence you have to engage the parking brake in the vehicle. If you would like to manually do the necessary foot brake/parking brake sequencing for Alpine, select the “Foot Brake” setting (if available) and the red/white wire will output a 12v+ signal whenever the CAN-Bus is active and the foot brake is pressed.

Door - This selection will provide a 12v+ output on the red/white wire whenever the CAN-Bus is active and any door on the vehicle is opened.

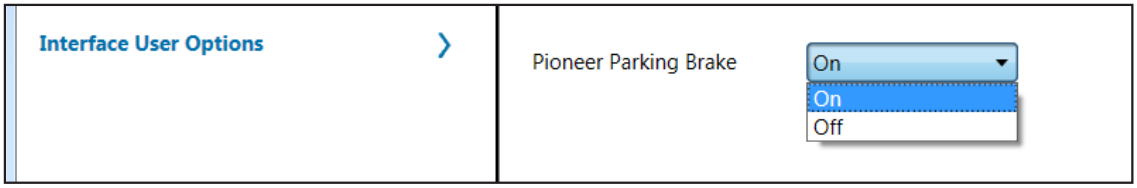
Footbrake - This selection will provide a 12v+ output on the red/white wire whenever the CAN-Bus is active and the foot brake is pressed.

Latched - This selection will provide a latched 12v+ output that can be tied to any of the vehicles SWC. This means that when you press the assigned SWC, the Red/White wire will turn on and remain on until the assigned SWC is pressed again or the ignition is turned off.

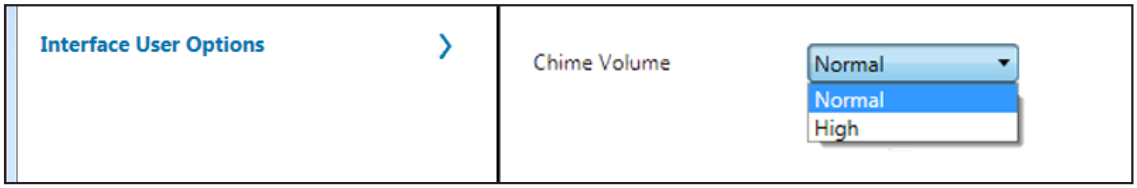
RadioPRO App (cont.)



Pulsed - This selection will provide a user programmable timed 12v+ output that can be tied to any of the vehicle's SWC. This means that when you press the assigned SWC, the red/white wire will pulse for the pre-programmed user time. The range for pulse time is 100 milliseconds - 25.5 seconds (.1-25.5).



Pioneer Parking Brake - Turning this feature on will make the parking brake output produce the necessary sequencing for settings menu access. This sequencing is based on the actual parking brake, meaning to produce this sequence you have to engage the parking brake in the vehicle. If you would like to manually do the necessary parking brake sequencing for Pioneer, simply leave this feature off. Restoring factory settings on the module will default this setting back to off.



Chime Volume - Changing this feature will either raise or lower the volume of the warning chimes through the speaker. If changing from Normal to High then the volume will get louder. If changing from High to Normal then the level will get softer. Keep in mind that this volume level will effect the rear park assist chimes and the front collision detection.

Product Updates (Firmware)

Firmware Updates

The RadioPRO app will also allow you to update the interface with new firmware as it becomes available. Please visit www.pac-audio.com or contact our tech support department to see if there is a firmware update for your interface.