

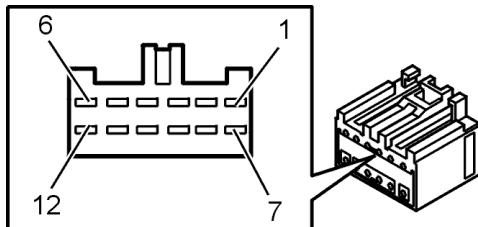
Signal specification, audio control module

Connecting the breakout box and checking the ground terminal

Caution! Before taking readings, the breakout box must be connected and the ground terminal must be checked. See [Checking the ground terminals](#) .

Definitions

DC voltage in volts (V)	Ulow = Voltage near 0 V
	Ubat = Battery voltage



The audio control module, green connector

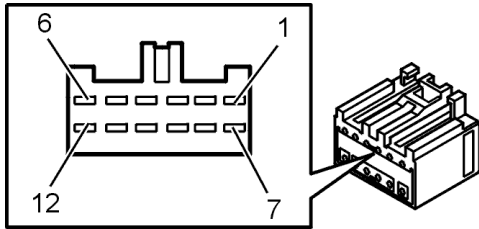
Note! The connectors on the adapter cable must be correctly colored to correspond to the signal table.

Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
A1	#15	30 supply	Ubat	-
A2	#16	15 supply	Ubat	-
A3	#17	-	-	-
A4	#18	-	-	-
A5	#19	-	-	-
A6	#20	-	-	-
A7	#21	CANH	Digital signal 2-3 V	-
A8	#22	CANL	Digital signal 2-3 V	-
A9	#23	Power supply, aerial amplifier	11 V	-
A10	#24	Audio channel (+), centre loudspeaker	Alternating current at sound in centre loudspeaker	-
A11	#25	Audio channel (-), centre loudspeaker	Alternating current at sound in centre loudspeaker	-
A12	#26	Ground	Ulow	-

Audio control module (AUM)/External amplifier to loudspeakers, gray connector

Note! The connectors on the adapter cable must be correctly colored to correspond to the



signal table.

Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
B1	#1	Audio channel (+), loudspeaker left front	AC voltage (to pin 2) when sound in the left front loudspeakers	-
B2	#2	Audio channel (-), loudspeaker left front	AC voltage (to pin 1) when sound in the left front loudspeakers	-
B3	#3	-	-	-
B4	#4	-	-	-
B5	#5	Audio channel (+), loudspeaker right front	Alternating current (to pin 6) when sound in the right front loudspeakers	-
B6	#6	Audio channel (-), loudspeaker right front	Alternating current (to pin 5) when sound in the right front loudspeakers	-
B7	#7	Audio channel (+), loudspeaker left rear	Alternating current (to pin 8) when sound in the left rear loudspeakers	-
B8	#8	Audio channel (-), loudspeaker left rear	Alternating current (to pin 7) when sound in the left rear loudspeakers	-
B9	#9	-	-	-
B10	#10	-	-	-
B11	#11	Audio channel (+), loudspeaker right rear	Alternating current (to pin 12) when sound in the right rear loudspeakers	-
B12	#12	Audio channel (-), loudspeaker right rear	Alternating current (to pin 11) when sound in the right rear loudspeakers	-

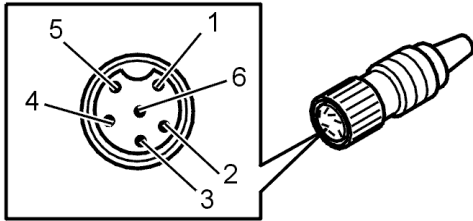
Audio control module (to aerial)

Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

Control module	Breakout box	Signal type	Ignition on	Other

terminal	terminal			
C1	#45	Aerial signal, head aerial	Analogue signal	-
C2	#46	Power supply and aerial signal, sub aerial	Analogue signal	The aerial signal is retained over DC

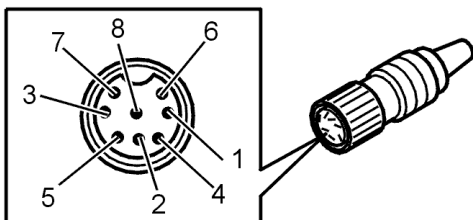
Audio control module (cable between the audio module and the amplifier)



Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#).

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
D1	#42	Audio channel, loudspeaker left front	Alternating current when sound at front left loudspeaker	-
D2	#43	Audio channel, loudspeaker right front	Alternating current when sound at front right loudspeaker	-
D3	#44	Audio channel, loudspeaker right rear	Alternating current when sound at right rear loudspeaker	-
D4	#45	Signal ground, audio channel	Ulow	-
D5	#46	Audio channel, loudspeaker left rear	Alternating current when sound at left rear loudspeaker	-
D6	#47	Control signal (off / on) amplifier	?	-

Audio control module (cable between the audio module and the CD changer/navigation unit)



Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#).

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
E1	#16	Clock signal to audio unit	Digital signal	-
E2	#17	Signal ground, sound	Ulow	-

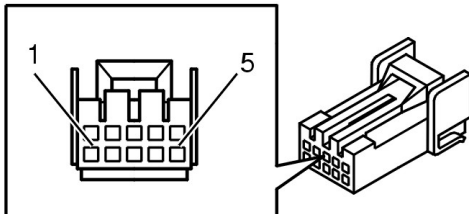
E3	#18	15 supply	Ubat	-
E4	#19	Data signal to audio unit	Digital signal	-
E5	#20	Busy signal to audio unit	Digital signal	-
E6	#21	Left audio channel	Alternating current when there is sound to the loudspeaker	-
E7	#22	Right audio channel	Alternating current when there is sound to the loudspeaker	-
E8	#23	Voice guide channel	Alternating current when there is sound to the loudspeaker	-
H		Screen ground, cable to audio unit	Ulow	-

External amplifier

Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

Control module terminal	Signal type	Ignition on	Other
F1	30 supply	Ubat	-
F2	Ground	Ulow	-

10CD changer



Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

Control module terminal	Signal type	Ignition on	Other
G1	30 supply	Ubat	-
G2	Ground	Ulow	-
G3			
G4			
G5			

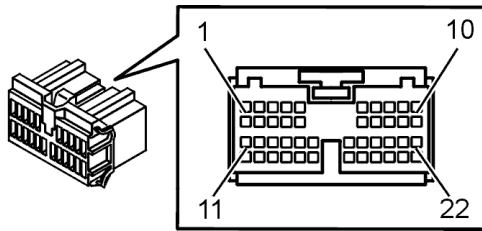
Signal specification, RTI

Connecting the breakout box and checking the ground terminal

Note! Before taking readings, the breakout box must be connected and the ground terminal must be checked. See [Checking ground terminals](#) .

Definitions

DC voltage in volts (V)	Ulow = Voltage near V
	Ubat = Battery voltage



RTI control module

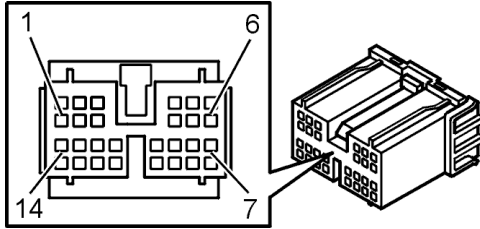
Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

The RTI control module terminals A1-A22 correspond to terminals #1-#22 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
A1	#1	30-supply (power supply from battery)	Ubat	-
A2	#2	-	-	-
A3	#3	-	-	-
A4	#4	-	-	-
A5	#5	-	-	-
A6	#6	-	-	-
A7	#7	Signal (+) with map information from the CD-ROM changer	Digital signal	$V_H=0.68 \pm 0.2 \text{ V}$, $V_L=0.5 \pm 0.1 \text{ V}$
A8	#8	-	-	-
A9	#9	-	-	-
A10	#10	CANH signal	$U = 2-3 \text{ V}$	-
A11	#11	Ground (Measured to battery negative terminal)	Ulow	-
A12	#12	-	-	-
A13	#13	-	-	-
A14	#14	-	-	-
A15	#15	-	-	-
A16	#16	-	-	-
A17	#17	-	-	-
A18	#18	-	-	-
A19	#19	Signal (-) with map information from the CD-ROM changer	Digital signal	$V_H=0.68 \pm 0.2 \text{ V}$, $V_L=0.5 \pm 0.1 \text{ V}$

A20	#20	Screen ground, signal cables to CD-ROM changer	Ulow	-
A21	#21	-	-	-
A22	#22	CANL signal	U = 2-3 V	-

RTI control module (to TV receiver)

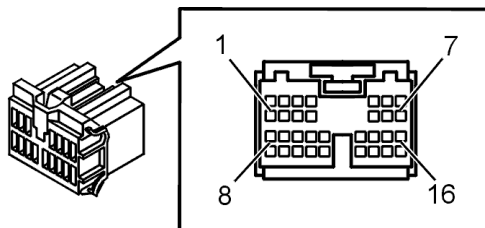


Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

The RTI control module terminals B1-B14 correspond to terminals #43-#56 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
B1	#43	Video signal, TV	Analogue signal	1 V p-p +/- 0.2 V
B2	#44	Synchronizing signal, TV	Digital signal	0-5 V
B3	#45	-	-	-
B4	#46	-	-	-
B5	#47	-	-	-
B6	#48	30 supply	Ubat	-
B7	#49	Signal ground, TV signals	Ulow	-
B8	#50	Screen ground, TV signals	Ulow	-
B9	#51	-	-	-
B10	#52	-	-	-
B11	#53	Signal, remote control TV	Digital signal	33.3 kHz carrier wave when the remote control is pressed
B12	#54	-	-	-
B13	#55	Ground (Measured to battery negative terminal)	Ulow	-
B14	#56	-	-	-

RTI control module (to display)

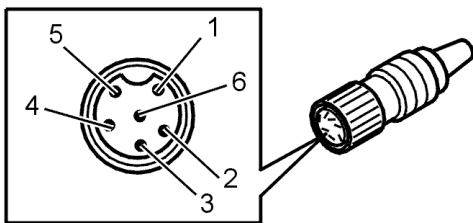


Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

The RTI control module terminals C1-C16 correspond to terminals #25-#40 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
C1	#25	Colour signal (red), screen	Analogue signal when red colour is displayed	0.714 V p-p
C2	#26	Colour signal (blue), screen	Analogue signal when blue colour is displayed	0.714 V p-p
C3	#27	Screen ground, video signals	Ulow	-
C4	#28	-	-	-
C5	#29	-	-	-
C6	#30	-	-	-
C7	#31	-	-	-
C8	#32	Colour signal (green), display	Analogue signal when green colour is displayed	0.714 V p-p
C9	#33	Composite synch, display	Analogue signal	0-5 V
C10	#34	Screen ground, cable to the screen	Ulow	-
C11	#35	Signal, display remote control	Digital signal	38 kHz carrier wave when the remote control is pressed
C12	#36	Serial bus to the display	Digital signal	Half duplex, start-stop synchronizing, 2400 BPS
C13	#37	-	-	-
C14	#38	Video signal to display	Analogue signal	1 V p-p +/- 0.2 V
C15	#39	-	-	-
C16	#40	-	-	-

RTI control module (to CD-ROM changer)



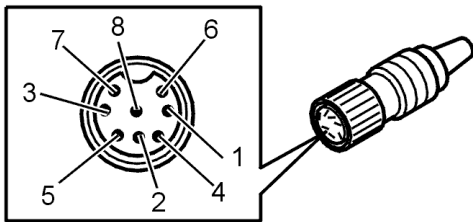
Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#).

The RTI control module terminals D1-D6 correspond to terminals #42-#47 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
D1	#42	Clock signal from CD-ROM changer	Digital signal	Melbus protocol

D2	#43	Data signal from the CD ROM changer	Digital signal	Melbus protocol
D3	#44	-	-	-
D4	#45	Busy signal from CD-ROM changer	Digital signal	Melbus protocol
D5	#46	15 supply	Ubat	-
D6	#47	-	-	-
H		Screen ground, cable to the CD-ROM changer	Ulow	-

RTI control module (to audio unit)

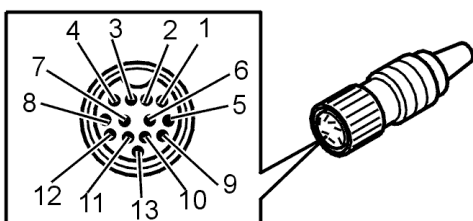


Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

The RTI control module terminals E1-E8 correspond to terminal #16-#23 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
E1	#16	Clock signal to audio unit	Digital signal	Melbus protocol
E2	#17	Signal ground, sound	Ulow	-
E3	#18	15 supply	Ubat	-
E4	#19	Data signal to audio unit	Digital signal	Melbus protocol
E5	#20	Busy signal to audio unit	Digital signal	Melbus protocol
E6	#21	Left audio channel	Alternating current on sound to loudspeakers	150 mV rms +/- 38 mV (1 kHz 30% mod)
E7	#22	Right audio channel	Alternating current on sound to loudspeakers	150 mV rms +/- 38 mV (1 kHz 30% mod)
E8	#23	Voice guide channel	Alternating current on sound to loudspeakers (for voice guidance)	150 mV rms +/- 38 mV (1 kHz 30% mod)
H		Screen ground, cable to audio unit	Ulow	-

RTI control module (to TV receiver)

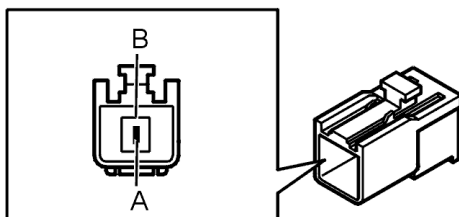


Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

The RTI control module terminals F1-F13 correspond to terminals #1-#13 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
F1	#1	Signal ground	Ulow	-
F2	#2	Left audio channel	Alternating current when there is sound to the loudspeaker	150 mV rms +/- 38 mV (1 kHz 30% mod)
F3	#3	-	-	-
F4	#4	Right audio channel	Alternating current when there is sound to the loudspeaker	150 mV rms +/- 38 mV (1 kHz 30% mod)
F5	#5	-	-	-
F6	#6	Voice guide channel	Alternating current when there is sound to the loudspeaker (during voice guidance)	150 mV rms +/- 38 mV (1 kHz 30% mod)
F7	#7	-	-	-
F8	#8	-	-	-
F9	#9	-	-	-
F10	#10	15 supply	Ubat	-
F11	#11	Busy signal to TV receiver	Digital signal	Melbus protocol
F12	#12	Clock signal to TV receiver	Digital signal	Melbus protocol
F13	#13	Data signal to TV receiver	Digital signal	Melbus protocol
H		Screen ground, cable to TV receiver	Ulow	-

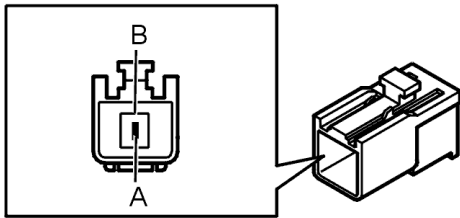
RTI control module (to GPS antenna, gray connector)



Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

Control module terminal	Signal type	Ignition on	Other
G1 (A)	Power supply and GPS signal	Analogue signal	Supply 5 V (DC), signal 1.575 GHz
G2 (B)	Screen ground	Ulow	-

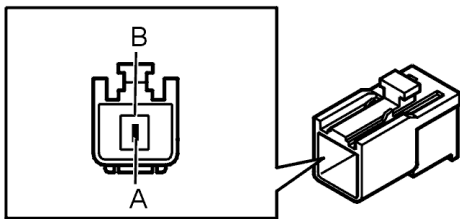
RTI control module (to TMC (FM-MPX) antenna, brown connector)



Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#).

Control module terminal	Signal type	Ignition on	Other
H1 (A)	Antenna signal	Analogue signal	-
H2 (B)	Screen ground	Ulow	-

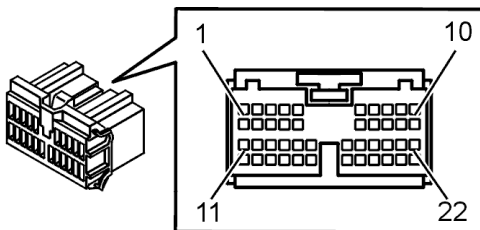
RTI control module (to FM-MPX antenna, green connector)



Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#).

Control module terminal	Signal type	Ignition on	Other
I1 (A)	Antenna signal	Analogue signal	-
I2 (A)	Screen ground	Ulow	-

Display (to RTI control module and "chassis")



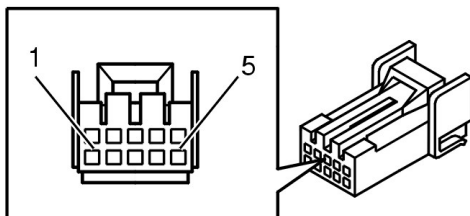
Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#).

Display terminals J1-J22 correspond to terminals #1-#22 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
J1	#1	Colour signal (red), screen	Analogue signal when red colour is displayed	0.714 V p-p
J2	#2	Colour signal (green), display	Analogue signal when green colour is displayed	0.714 V p-p
J3	#3	Colour signal (blue), screen	Analogue signal when blue colour is displayed	0.714 V p-p
J4	#4	Synchronizing signal, TV	Digital signal	0-5 V
J5	#5	Screen ground, video signals	Ubat	-

J6	#6	Signal, display remote control	Digital signal	38 kHz carrier wave when the remote control is pressed
J7	#7	-	-	-
J8	#8	Screen ground, cable to the screen	Ulow	-
J9	#9	Video signal to display	Analogue signal	1 V p-p +/- 0.2 V
J10	#10	-	-	-
J11	#11	30-supply (power supply from battery)	Ubat	-
J12	#12	30-supply (power supply from battery)	Ubat	-
J13	#13	15 supply	Ubat	-
J14	#14	-	-	-
J15	#15	Ground (Measured to battery negative terminal)	Ulow	-
J16	#16	Ground (Measured to battery negative terminal)	Ulow	-
J17	#17	-	-	-
J18	#18	Serial bus from the control module	Digital signal	Half duplex, start-stop synchronizing, 2400 BPS
J19	#19	-	-	-
J20	#20	-	-	-
J21	#21	-	-	-
J22	#22	-	-	-

CD-ROM changer (to RTI control module and "chassis")



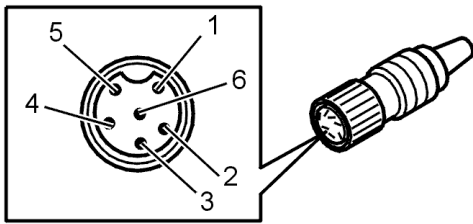
Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

CD-ROM changer terminals K1-K5 correspond to #26-#30 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
K1	#26	Ground (Measured to battery negative terminal)	Ulow	-
K2	#27	30-supply (power supply)	Ubat	-

		from battery)		
K3	#28	Signal (+) with map information from the CD-ROM changer	Digital signal	$V_H=0.68 \pm 0.2 \text{ V}$ $V_L=0.5 \pm 0.1 \text{ V}$
K4	#29	Screen ground, signal cables to CD-ROM changer	Ulow	-
K5	#30	Signal (-) with map information from the CD-ROM changer	Digital signal	$V_H=0.68 \pm 0.2 \text{ V}$ $V_L=0.5 \pm 0.1 \text{ V}$

CD-ROM changer (to RTI control module)

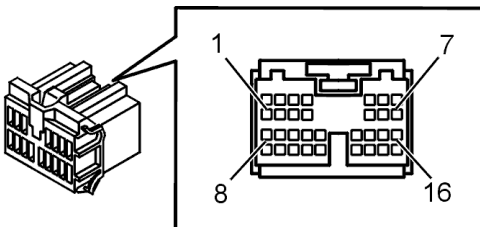


Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#).

CD-ROM changer terminals L1-L6 correspond to #26-#31 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
L1	#26	Clock signal from the CD-ROM changer	Digital signal	Melbus protocol
L2	#27	Data signal from CD-ROM changer	Digital signal	Melbus protocol
L3	#28	-	-	-
L4	#29	Busy signal from the CD-ROM changer	Digital signal	Melbus protocol
L5	#30	15 supply	Ubat	-
L6	#31	-	-	-
H		Screen ground, cable to CD-ROM changer	Ulow	-

TV receiver (to RTI control module)

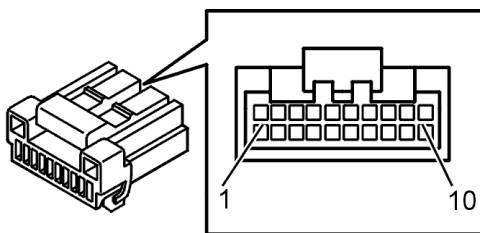


Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#).

TV receiver terminals M1-M16 correspond to terminals #25-#40 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
M1	#25	Video signal, TV	Analogue signal	1 V p-p $\pm 0.2 \text{ V}$
M2	#26	Synchronizing signal, TV	Digital signal	0-5 V
M3	#27	-	-	-

M4	#28	-	-	-
M5	#29	-	-	-
M6	#30	-	-	-
M7	#31	30 supply	Ubat	-
M8	#32	Signal ground, TV signals	Ulow	-
M9	#33	Screen ground, TV signals	Ulow	-
M10	#34	-	-	-
M11	#35	-	-	-
M12	#36	-	-	-
M13	#37	Signal, remote control TV	Digital signal	33.3 kHz carrier wave when the remote control is pressed
M14	#38	-	-	-
M15	#39	Ground (Measured to battery negative terminal)	Ulow	-
M16	#40	-	-	-



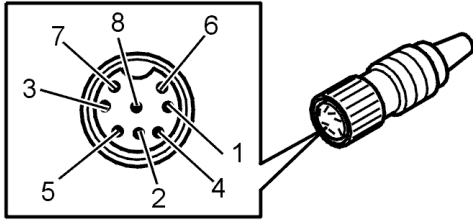
TV receiver (to reverse camera and video)

Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

TV receiver terminals N1-N10 correspond to #47-#56 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
N1	#47	-	-	-
N2	#48	Power supply, rear camera	Ubat	-
N3	#49	Video signal, rear camera	-	-
N4	#50	Video signal ground, rear camera	Ulow	-
N5	#51	Video signal	-	-
N6	#52	Signal ground, video signals	Ulow	-
N7	#53	Left audio channel	Alternating current when there is sound to the loudspeaker	150 mV rms +/- 38 mV (1 kHz 30% mod)
N8	#54	Right audio channel	Alternating current when there is sound to	150 mV rms +/- 38 mV

			the loudspeaker	(1 kHz 30% mod)
N9	#55	signal ground, audio	Ulow	-
N10	#56	-	-	-



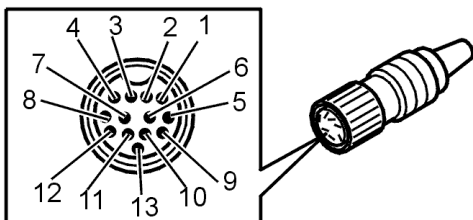
TV receiver (to RTI control module)

Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

TV receiver terminals O1-O8 correspond to terminals #16-#23 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
O1	#16	Clock signal to TV receiver	Digital signal	Melbus protocol
O2	#17	Signal ground, sound	Ulow	-
O3	#18	15 supply	Ubat	-
O4	#19	Data signal to TV receiver	Digital signal	Melbus protocol
O5	#20	Busy signal to TV receiver	Digital signal	Melbus protocol
O6	#21	Left audio channel	Alternating current when there is sound to the loudspeaker	150 mV rms +/- 38 mV (1 kHz 30% mod)
O7	#22	Right audio channel	Alternating current when there is sound to the loudspeaker	150 mV rms +/- 38 mV (1 kHz 30% mod)
O8	#23	Voice guide channel	Alternating current when there is sound to the loudspeaker (during voice guidance)	-
H		Screen ground, cable to audio unit	Ulow	-

TV receiver (to CD player)



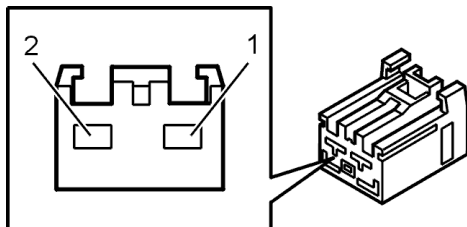
Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

TV receiver terminals P1-P13 correspond to terminals #1-#13 on the breakout box.

Control module terminal	Breakout box terminal	Signal type	Ignition on	Other
P1	#1	signal ground	Ulow	-

P2	#2	Left audio channel	Alternating current when there is sound to the loudspeaker	150 mV rms +/- 38 mV (1 kHz 30% mod)
P3	#3	-	-	-
P4	#4	Right audio channel	Alternating current when there is sound to the loudspeaker	150 mV rms +/- 38 mV (1 kHz 30% mod)
P5	#5	-	-	-
P6	#6	Voice guide channel	Alternating current when there is sound to the loudspeaker (during voice guidance)	-
P7	#7	-	-	-
P8	#8	-	-	-
P9	#9	-	-	-
P10	#10	15 supply	Ubat	-
P11	#11	Busy signal to TV receiver	Digital signal	Melbus protocol
P12	#12	Clock signal to TV receiver	Digital signal	Melbus protocol
P13	#13	Data signal to TV receiver	Digital signal	Melbus protocol
H		Screen ground, cable to TV receiver	Ulow	-

TV receiver (to TV tuner A)



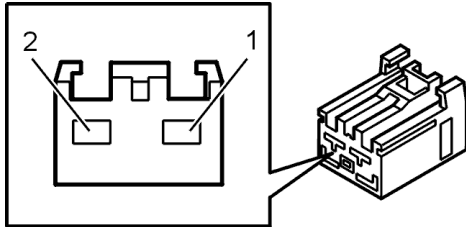
Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .

Control module terminal	Signal type	Ignition on	Other
Q1	Power supply and signal	Analogue signal	The antenna signal is retained over DC EU: 48.5 -87.75 MHz 175.25 -229.75 MHz 471.25 -855.25 MHz JPN: 91.25 -103.75 MHz 175.25 -217.25 MHz 471.25 - 765.25 MHz
Q2	Power supply and signal	Analogue signal	The antenna signal is retained over DC EU: 48.5 -87.75 MHz

			175.25 -229.75 MHz 471.25 -855.25 MHz JPN: 91.25 -103.75 MHz 175.25 -217.25 MHz 471.25 - 765.25 MHz
H	Screen ground	Ulow	-

TV receiver (to TV tuner B)

Before taking any readings, see [Connecting the breakout box and checking the ground terminal](#) .



Control module terminal	Signal type	Ignition on	Other
R1	Power supply and signal	Analogue signal	The antenna signal is retained over DC EU: 48.5 -87.75 MHz 175.25 -229.75 MHz 471.25 -855.25 MHz JPN: 91.25 -103.75 MHz 175.25 -217.25 MHz 471.25 - 765.25 MHz
R2	Power supply and signal	Analogue signal	The antenna signal is retained over DC EU: 48.5 -87.75 MHz 175.25 -229.75 MHz 471.25 -855.25 MHz JPN: 91.25 -103.75 MHz 175.25 -217.25 MHz 471.25 - 765.25 MHz
H	Screen ground	Ulow	-