

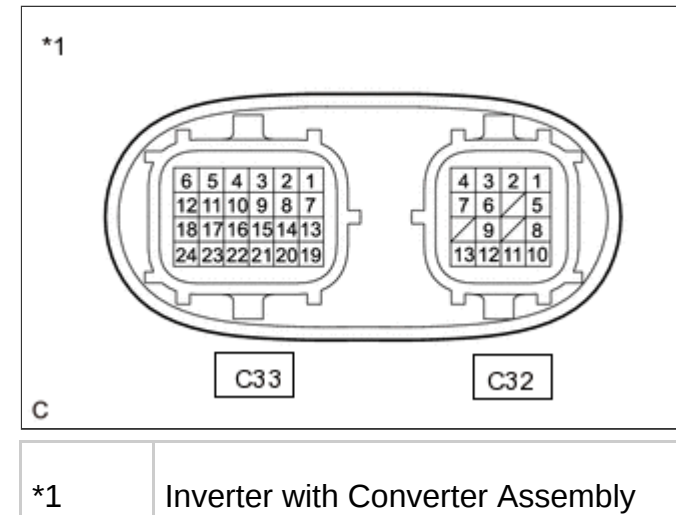
MOTOR GENERATOR CONTROL SYSTEM(for NICKEL METAL HYDRIDE BATTERY) TERMINALS OF ECU

1. Tip

Since the inverter with converter assembly uses waterproof connectors, the voltage and waveforms cannot be inspected directly. Standard voltage readings and waveforms are indicated for reference only.

Table 1. Inverter with Converter Assembly

Terminal No. (Symbol)	Wiring Color	Input/Output	Terminal Description	Condition	Standard Condition
C33-1 (CANH) - C33-24 (GND1)	GR - W-B	Input/Output	CAN communication signal	Power switch on (IG)	Pulse generation (Waveform 1)
C33-5 (+B2) - C33-24 (GND1)	R - W-B	Input	Motor generator control ECU (MG ECU) power source	Power switch on (IG)	11 to 14 V
C33-6 (+B) - C33-24	R - W-B	Input	Motor generator control ECU	Power switch on (IG)	11 to 14 V



Terminal No. (Symbol)	Wiring Color	Input/Output	Terminal Description	Condition	Standard Condition
(GND1)			(MG ECU) power source		
C33-7 (CANL) - C33-24 (GND1)	W - W-B	Input/Output	CAN communication signal	Power switch on (IG)	Pulse generation (Waveform 1)
C33-10 (GI) - C33-24 (GND1)	W - W-B	Input	Camshaft position sensor signal	Power switch on (READY), engine running	Pulse generation (Waveform 2)
C33-12 (IGCT) - C33-24 (GND1)	G - W-B	Input	Motor generator control ECU (MG ECU) power source	Power switch on (IG)	11 to 14 V
C33-17 (NE) - C33-24 (GND1)	L - W-B	Input	Crankshaft position sensor signal	Power switch on (READY), engine running	Pulse generation (Waveform 3)

Terminal No. (Symbol)	Wiring Color	Input/Output	Terminal Description	Condition	Standard Condition
C33-19 (HMCL) - C33-24 (GND1)	L - W-B	Input/Output	Communication signal	Power switch on (IG)	Pulse generation (Waveform 4)
C33-20 (HMCH) - C33-24 (GND1)	B - W-B	Input/Output	Communication signal	Power switch on (IG)	Pulse generation (Waveform 4)
C33-22 (HSDN) - C33-24 (GND1)	B - W-B	Input	MG shutdown signal	Power switch on (READY)	0 to 1 V
C32-1 (MSN) - C32-2 (MSNG)	GR - LG	Input	Motor resolver signal	Motor resolver running	Pulse generation (Waveform 5)
C32-3 (MCSG)	SB - BR	Input	Motor resolver signal	Motor resolver	Pulse generation

Terminal No. (Symbol)	Wiring Color	Input/Output	Terminal Description	Condition	Standard Condition
- C32-4 (MCS)				running	(Waveform 5)
C32-5 (MRF) - C32-6 (MRFG)	P - V	Output	Motor resolver reference signal	Motor resolver running	Pulse generation (Waveform 5)
C32-8 (GRF) - C32-9 (GRFG)	Y - L	Output	Generator resolver reference signal	Generator resolver running	Pulse generation (Waveform 6)
C32-10 (GSN) - C32-11 (GSNG)	G - W	Input	Generator resolver signal	Generator resolver running	Pulse generation (Waveform 6)
C32-12 (GCSG) - C32-13 (GCS)	B - R	Input	Generator resolver signal	Generator resolver running	Pulse generation (Waveform 6)

Terminal No. (Symbol)	Wiring Color	Input/Output	Terminal Description	Condition	Standard Condition
					6)

Note:

Do not measure the voltage or waveform on the sealed side of the inverter with converter assembly connector. Doing so may damage the connector because the connector is waterproof.

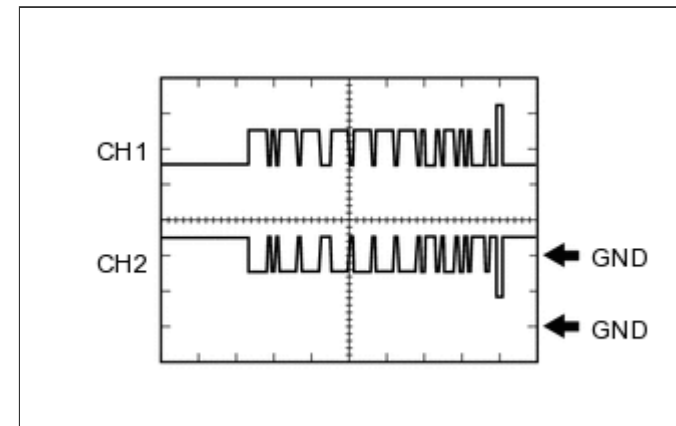
2. Oscilloscope waveforms

Tip

Oscilloscope waveforms shown in the illustrations are examples for reference only. Noise, chattering, etc. are not shown.

a. Waveform 1 (CAN communication signal)

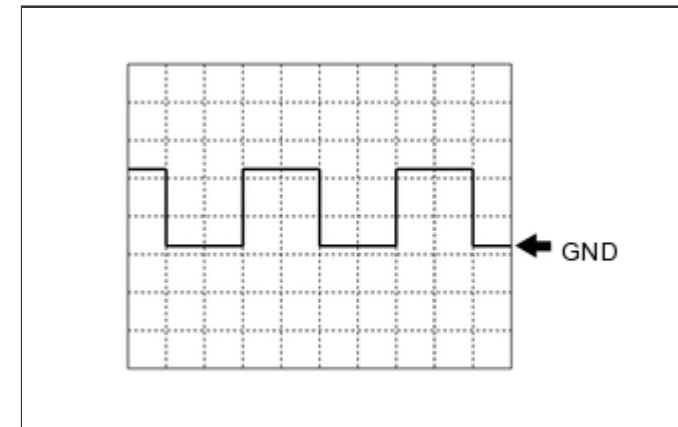
Item	Content
Terminal	CH1: C33-1 (CANH) - C33-24 (GND1) CH2: C33-7 (CANL) - C33-24 (GND1)
Equipment Setting	1 V/DIV., 50 μ s./DIV.



Item	Content
Condition	Power switch on (IG)

b. Waveform 2 (camshaft position sensor signal)

Item	Content
Terminal	C33-10 (GI) - C33-24 (GND1)
Equipment Setting	5 V/DIV., 20 ms./DIV.
Condition	Power switch on (READY), engine running



Tip

The wavelength becomes shorter as the engine speed increases.

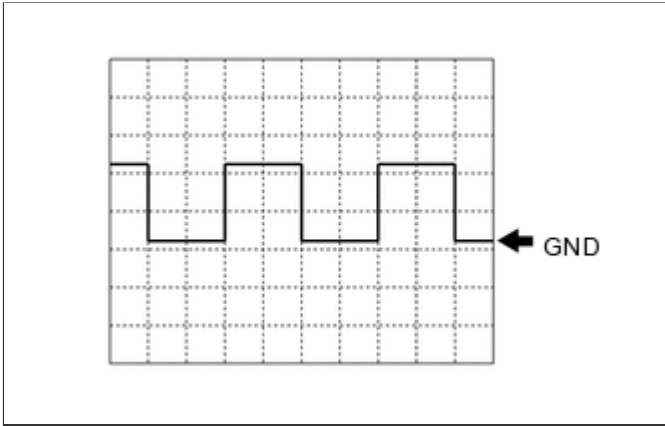
c. Waveform 3 (crankshaft position sensor signal)

Item	Content
Terminal	C33-17 (NE) - C33-24 (GND1)
Equipment Setting	5 V/DIV., 20 ms./DIV.

Item	Content
Condition	Power switch on (READY), engine running

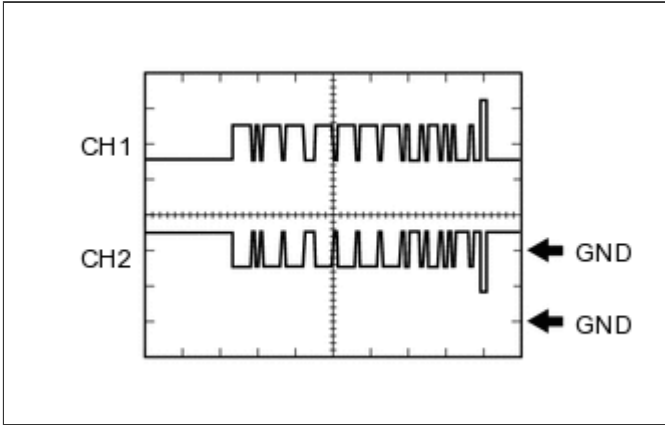
Tip

The wavelength becomes shorter as the engine speed increases.



d. Waveform 4 (communication signal)

Item	Content
Terminal	CH1: C33-19 (HMCL) - C33-24 (GND1) CH2: C33-20 (HMCH) - C33-24 (GND1)
Equipment Setting	1 V/DIV., 50 μ s./DIV.
Condition	Power switch on (IG)

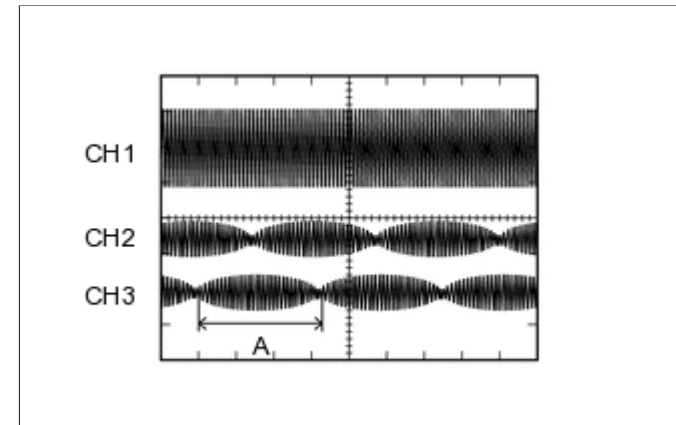


Tip

The waveform will vary depending on the content of the digital communication (digital signal).

e. Waveform 5 (motor resolver signal)

Item	Content
Terminal	CH1: C32-5 (MRF) - C32-6 (MRFG) CH2: C32-1 (MSN) - C32-2 (MSNG) CH3: C32-4 (MCS) - C32-3 (MCSG)
Equipment Setting	CH1: 10 V/DIV., 1 ms./DIV. CH2: 5 V/DIV., 1 ms./DIV. CH3: 5 V/DIV., 1 ms./DIV.
Condition	Motor resolver running



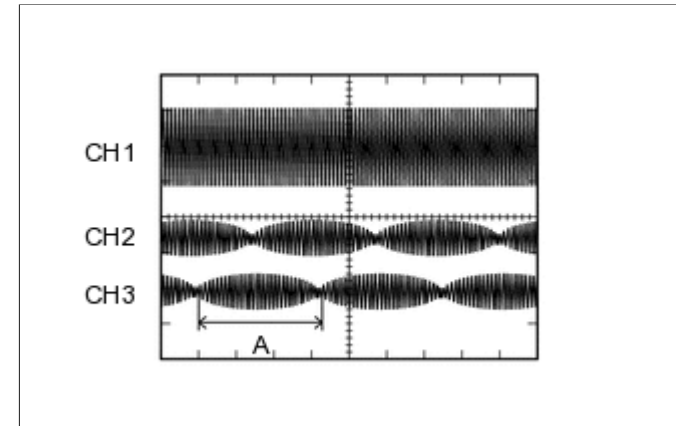
Tip

The width indicated by (A) becomes shorter as the rotor speed increases.

f. Waveform 6 (generator resolver signal)

Item	Content
Terminal	CH1: C32-8 (GRF) - C32-9

Item	Content
	(GRFG) CH2: C32-10 (GSN) - C32-11 (GSNG) CH3: C32-13 (GCS) - C32-12 (GCSG)
Equipment Setting	CH1: 10 V/DIV., 1 ms./DIV. CH2: 5 V/DIV., 1 ms./DIV. CH3: 5 V/DIV., 1 ms./DIV.
Condition	Generator resolver running



Tip

The width indicated by (A) becomes shorter as the rotor speed increases.