Modifications of CMC Unit Configuration

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1. Backgrounds

The communication unit CMC (Communication Modem Controller) is used for the communication between the ground Vehicle Controller and several vehicles in the conveyance system SELOHT made by Shinko Electric Co., Ltd.

The communication signals are overlaid onto the power line for non-conductive power supply to the vehicles. The CMC unit is installed in the Power Supply Panel of the non conductive power supply system due to the layout conveniences.

CMC as well as the vehicle (OHT) communication unit COM (COmmunication Modem) meet the requirements of FCC Part15 Subpart C. Their FCC ID's are as follows.

> CMC : OPO199909010001
> COM : OPO199909010002

Some modifications to the CMC configuration are planned to raise the communication accuracy as well as adopt the CMC units to other conveyance systems than SELOHT (e.g. OHS, OHT).

The modified CMC configuration will be notified for FCC Part15 Subpart C.

This report describes the above modifications to the CMC configuration.

2. Current CMC configuration(Already compliant to FCC Part 15 Subpart C)

Figure 1 shows the current CMC configuration.
CMC consists of the following units.
Printed circuit BV-BC, BV-BM2
Communication transformer (transmission, reception)
DC power supply (24V DC, 5V, ±12V)

CMC overlays the signals onto the non-conductive power line. The CMC unit is located inside the Power supply panel.

It modulates the signals from the Vehicle controller and sends them to the vehicles. It also demodulates the signals from the vehicles and sends them to the Vehicle controller.

The communication method is FSK (frequency shift keying method).
The communication frequencies in use are as follows.

From	To	Frequency
(1)Vehicle controller → Vehicles	:	285.7 kHz and 315.8 kHz
(2)Vehicles → Vehicle controller	:	342.9 kHz and 363.6 kHz

The main clock frequency used internally in the print circuit BV-BC is 24 MHz.

3. Modified CMC configuration

Figures 2 to 4 show the modified CMC configuration.

However, the modified CMC adopts the current specifications in the digital circuits, communication method, and communication frequencies. Only the configuration is modified.   FCC ID of CMC is as follows.

FCC ID of CMC : OPO199909010003

The major modifications are as follows.

① The CMC unit is located outside the Power Supply Panel.

② The CMC unit is divided into the following three units.

➤ CMC-BC （Interface for signals from Vehicle Controller. Multiplexer between CMC and BM）

➤ CMC-BM （Signal modulation/demodulation between Vehicle Controller and several vehicles）

➤ CMC-TR （Transformers overlaying signals onto the power or signal line and picking up the signals）

③ The print circuit board BV-BC is replaced with NBV-BC. However, these two have the same digital circuits. Only the number of output ports has been changed as follows.

➤ BV-BC (current):   6 output ports

➤ NBV-BC (new):   8 output ports

④ The unit now allows the user to transmit communication signals through a separate signal line instead of the current method, i.e. overlaying signals onto the non-conductive power line.

⑤ Figure 2 shows the basic CMC configuration.

⑥ Figure 3 shows one example of CMC configuration. In this configuration, one NBV-BC board handles the outputs to several BV-BM2 boards.

⑦ Figure 4 shows another example of CMC configuration. Also in this configuration, one NBV-BC board handles the outputs to several BV-BM2 boards. The NBV-BC boards can serve either as the master or as a slave. The number of NBV-BC boards is determined by the system scale.

Each separated unit of CMC (CMC-BC, CMC-BM, CMC-TR) are composed of the following components.

① CMC-BC (Communication Modem Controller : Base Controller)

➤ Print circuit NBV-BC

➤ DC power supply (5V)

➤ Case

② CMC-BM (Communication Modem Controller : Base Modem)

➤ Print circuit BV-BM2

➤ DC power supply (24V, 5V, ±12V)

➤ Case

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③ CMC-TR (**C**ommunication **M**odem **C**ontroller : **TR**ansformer)
> Communication transformer (transmission, reception)
> Case

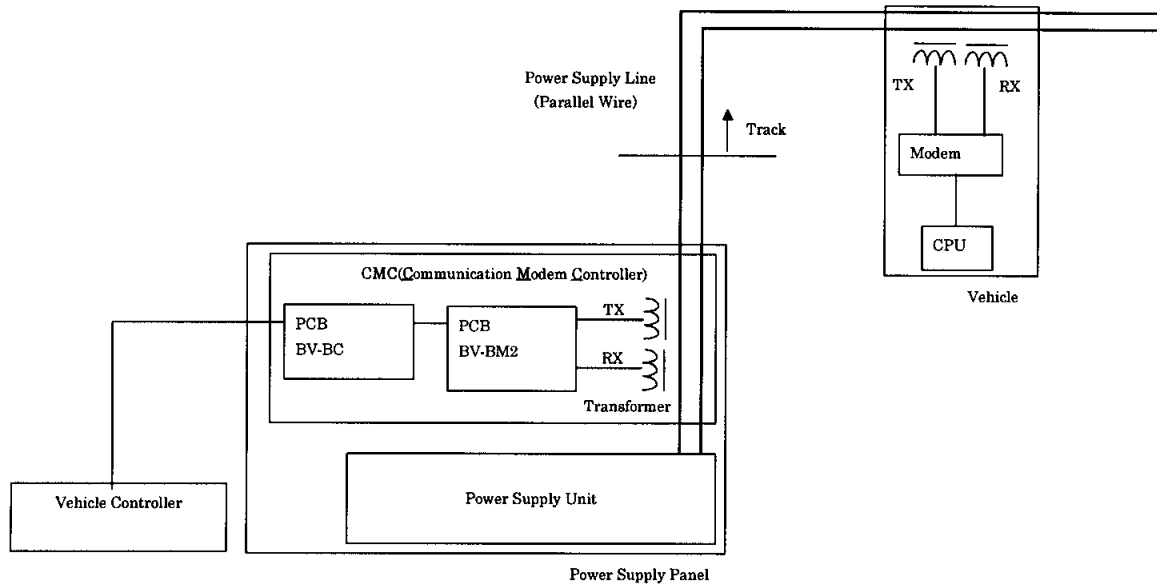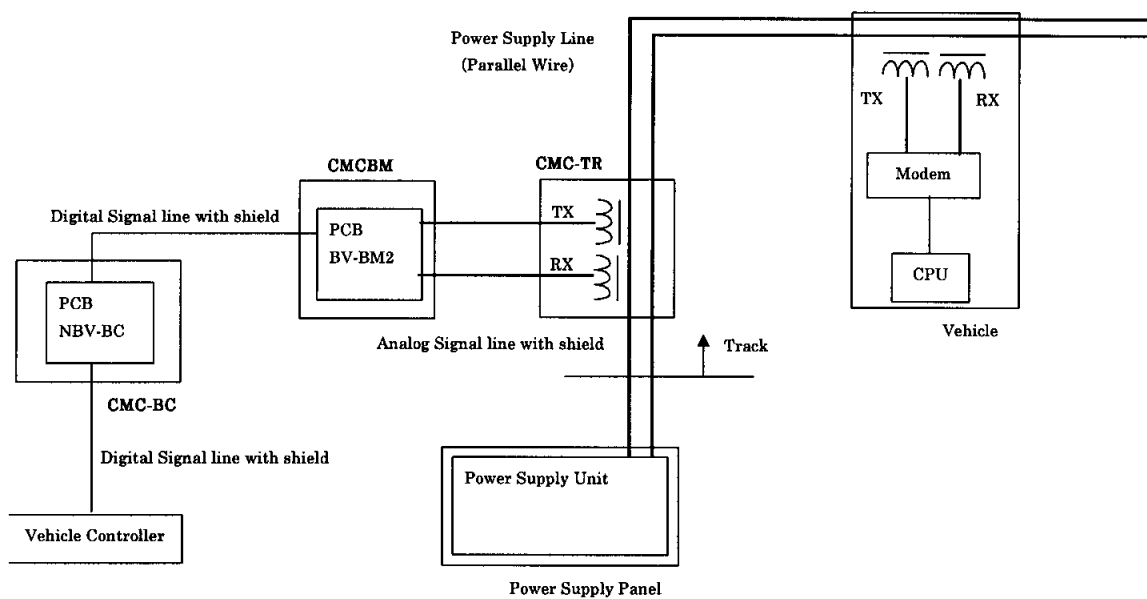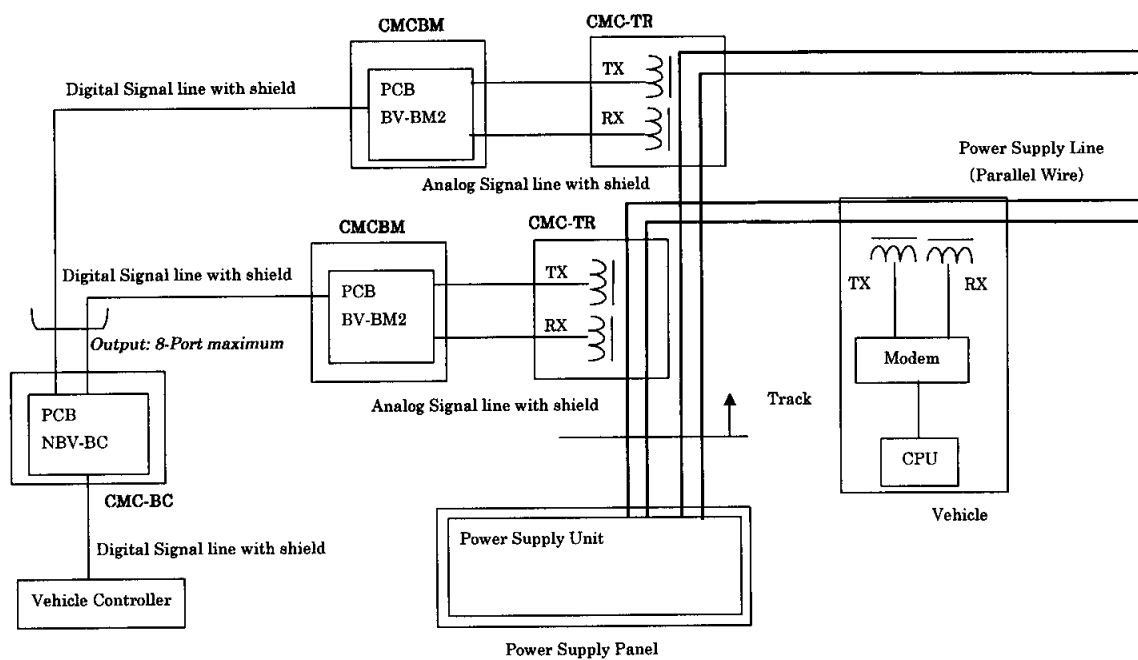**Fig. 1 Current CMC configuration (Already compliant to FCC Part 15 Subpart C)**

Fig. 2 Modified base CMC configuration

CMCBM

CMC-TR

Digital Signal line with shield

PCB
BV-BM2

TX

RX

Power Supply Line
(Parallel Wire)

Analog Signal line with shield

CMCBM

CMC-TR

Digital Signal line with shield

PCB
BV-BM2

TX

RX

TX   RX

Output: 8-Port maximum

Modem

PCB
NBV-BC

Analog Signal line with shield

Track

CPU

CMC-BC

Vehicle

Digital Signal line with shield

Power Supply Unit

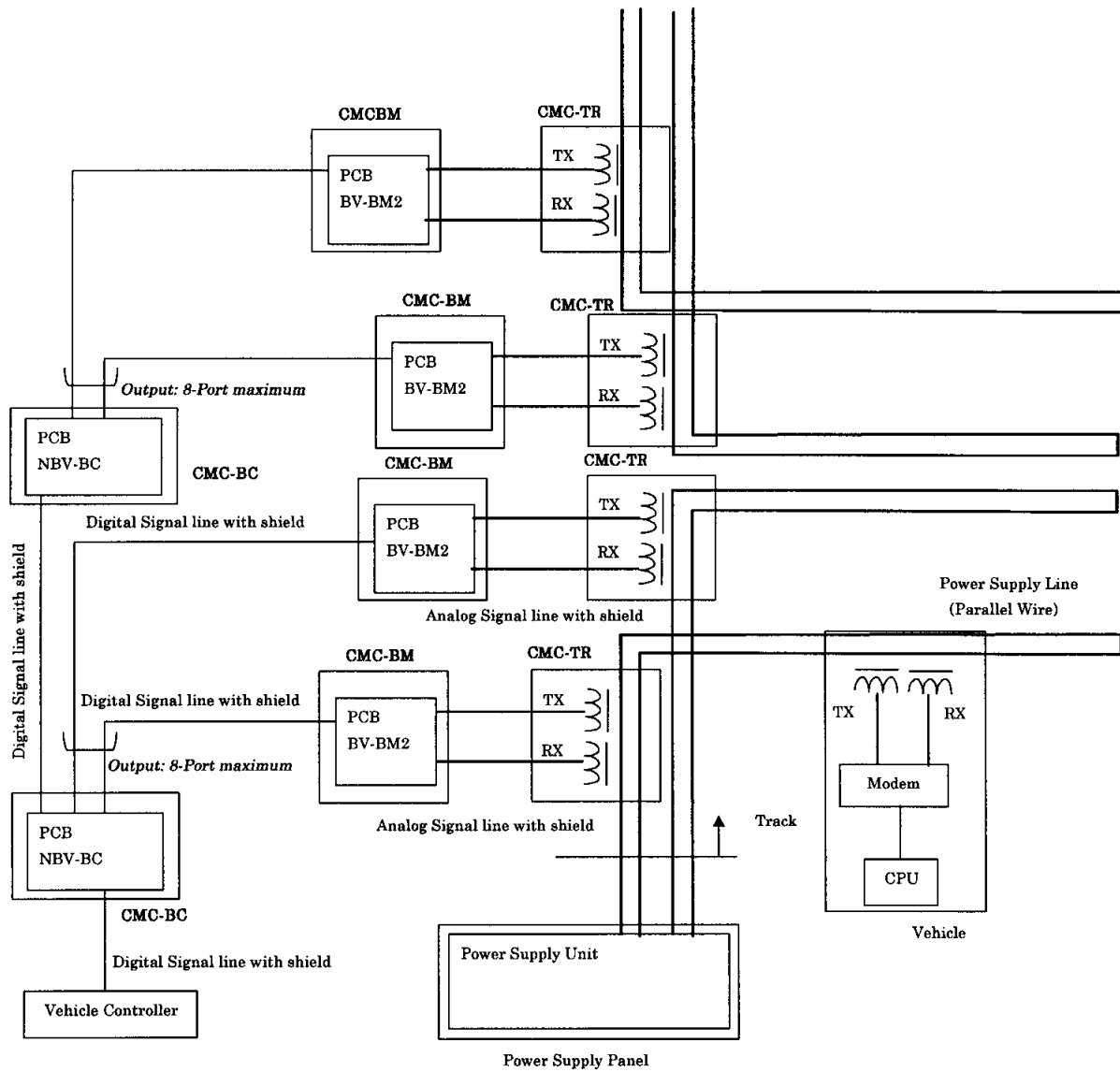Vehicle Controller

Power Supply Panel

Fig. 3 Modified CMC configuration Example 1

Fig. 4 Modified CMC configuration Example 2