



# System Operation Manual of SHINKO Communication unit CMC

**K44-2127**

**Revision 0**

**Nov. 2, 2000**

The information furnished herein by **SHINKO ELECTRIC CO., LTD.** is proprietary and confidential to **SHINKO ELECTRIC CO., LTD.** personnel and is not to be duplicated, published, or disclosed to any third party in whole or in part without permission from **SHINKO ELECTRIC CO., LTD.**

Copyright © 2000 **SHINKO ELECTRIC CO., LTD.** ALL RIGHTS RESERVED.

Unpublished rights reserved under the copyright laws of the United States.

The information contained herein is provided pursuant to the terms of a License, Non-disclosure and/or Confidentiality Agreement and constitutes and contains valuable proprietary information and trade secrets of **SHINKO ELECTRIC CO., LTD.**, embodying substantial creative efforts and confidential information, ideas, and expressions.

Accordingly, strict compliance with the terms and conditions of the governing Agreement, including, without limitation, all restrictions on use and disclosure, is required as a condition to the use of the information contained herein.

Except as may be permitted in the applicable agreement, the information herein may not be reproduced or disclosed in whole or in part.

#### Restricted Rights Legend

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph <c> (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7013.

SHINKO ELECTRIC CO., LTD.  
100 Takegahana, Ise city,  
Mie prefecture,  
516-8550, Japan  
Telephone: +81-596-36-2335  
Facsimile: +81-596-36-2162

**Revision Note**

#	Revision	Month/Day/Year	Contents	Author
#1	Rev.0	November. 2, 2000	The first edition	Mitsuyoshi KURODA

# Contents

1.	<i>Introduction</i>	<b>1</b>
1.1.	<b>Construction of the documents</b>	<b>1</b>
1.2.	<b>Application</b>	<b>1</b>
1.3.	<b>Related Rules, Laws</b>	<b>1</b>
1.4.	<b>Abbreviations</b>	<b>1</b>
2.	<i>Safety</i>	<b>2</b>
2.1.	<b>Alert Boxes</b>	<b>2</b>
2.1.1.	General	2
2.1.2.	Definitions of DANGER, WARNING and CAUTION	2
2.1.3.	Precautions on use	3
2.1.4.	Storage	4
2.1.5.	Installation	4
2.1.6.	Maintenance and Inspection	5
3.	<i>Outline of Communication Unit CMC</i>	<b>6</b>
3.1.	<b>Overview</b>	<b>6</b>
3.2.	<b>CMC configuration</b>	<b>6</b>
3.3.	<b>Function of each unit</b>	<b>9</b>
3.3.1.	CMC-BC (Communication Modem Controller : Base Controller)	9
3.3.2.	CMC-BM(Communication Modem Controller : Base Modem)	9
3.3.3.	CMC-TR(Communication Modem Controller : TRansformer)	9
3.4.	<b>FCC standard</b>	<b>14</b>
4.	<i>Specification</i>	<b>15</b>
4.1.	<b>CMC-BC</b>	<b>15</b>
4.2.	<b>CMC-BM</b>	<b>15</b>
4.3.	<b>CMC-TR</b>	<b>15</b>
5.	<i>Error process</i>	<b>16</b>

## 1. Introduction

### 1.1. Construction of the documents

The documents of the communication units CMC are as follows.

Kind of document	Name of the document	# of documents
Operation manual	Communication unit CMC Operation Manual	K44-2127

### 1.2. Application

This document describes the operation of communication unit for transport system, OHT, OHS, etc.

### 1.3. Related Rules, Laws

(1) FCC Part15 Subpart C

### 1.4. Abbreviations

- (1) CMC : **C**ommunication **M**odem **C**ontroller
- (2) CMC-BM: **C**ommunication **M**odem **C**ontroller : **B**ase **M**odem
- (3) CMC-BC: **C**ommunication **M**odem **C**ontroller : **B**ase **C**ontroller
- (4) CMC-TR: **C**ommunication **M**odem **C**ontroller : **T**Ransformer
- (5) COM : **C**Ommunication **M**odem


## 2. Safety


### 2.1. Alert Boxes


#### 2.1.1. General

- (1) Read and understand fully this manual and attached documents before operating the products.
- (2) Engage specialists in electrical and mechanical works.
- (3) Don't improve the product by yourselves.
- (4) Be sufficiently proficient with the equipment, the relevant safety knowledge and the precautions prior to using this product.  
In the content of this "Safety Precautions", items which need to be alert shall be classified into "DANGER", "WARNING" and "CAUTION".

#### 2.1.2. Definitions of DANGER, WARNING and CAUTION

 **DANGER:** An imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING:** A potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION:** A potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

[Note 1]










Medium degree of injuries or light injuries refers to injuries, e.g., burns and electric shock, which do not require hospitalization or prolonged hospital visit by the victims. As material losses refers to expanded losses pertaining to the damage of property and equipment.

[Note 2]





Depending on the situation, the events described under "WARNING" may also result in severe outcome. In either case, make sure that the advice is followed.

After reading, make sure this information shall be kept at places where it can always be read by users.






2.1.3.Precautions on use

 DANGER	
	<p>Follow the following advice strictly to avoid electric shock or burns.</p> <p>1. Don't enter the operation area of the vehicle. Work on the ladder may collide to the vehicle and may cause injury.</p>
	<p>2. Don't touch the vehicle on the track when Power Supply Panel output the power.</p>
	<p>3. Don't touch the moving parts of the vehicle while it is in operation. Doing so may cause injuries.</p>
	<p>4. Only those who received training for maintenance and teaching can do maintenance and teaching.</p>
	<p>5. Make sure the earth terminals for the relate equipment shall be grounded. Not doing so may cause electric shock.</p>
	<p>6. Don't break the cable, impose excessive stress, place heavy weights, or pinch it between items. Doing so may cause electric shock.</p>
 WARNING	
	<p>1. Don't use the equipment at locations where water, corrosive atmosphere, or flammable gas is present, or beside flammable items. Doing so may cause life and fails.</p>

### 2.1.4.Storage





	 PROHIBITION
	1. Don't store the equipment at locations where it is subject to rain, ater hazardous gas or liquid.
	 MANDATORY ACTION
	1. Store the equipment at locations in not subjected to sunshine. Store it at predetermined relative humidity and temperature. 0 degrees C. - 50 degrees C., 90% RH and below, no dew.

### 2.1.5.Installation

	 WARNING
	1. Don't climb on top of the equipment or place heavy items on it. Doing so may cause injuries.
	2. Don't block the air inlet and outlet ports or allow foreign particles to enter them. Doing so may cause fire.
	3. Follow the installation direction strictly as it is so design for dissipation of heat, fails or fire.
	4. Don't hit the equipment with strong impact. Doing so may cause equipment fails.



2.1.6.Maintenance and Inspection

	 <b>PROHIBITION</b>
	<p>1. Don't engage non-specialist technicians to disassemble and repair the equipment.</p>
	 <b>DANGER</b>
	<p>1. Before servicing CMC-BC , CMC-BM , CMC-TR , always shut off the power supply.                  If the communication signals are overlaid onto the non-conductive power line, also shut off the power source of the non-conductive power line before starting maintenance on CMC-BM and CMC-TR.                  Not doing so may cause electric shock.</p>

### 3. Outline of Communication Unit CMC

#### 3.1. Overview

The communication unit CMC (**C**ommunication **M**odem **C**ontroller) is used for the communication between the ground Vehicle Controller and several vehicles in the conveyance system made by Shinko Electric Co., Ltd.

The communication signals are overlaid onto the power line for non-conductive power supply to the vehicles. In some systems, a separate signal lines may be used.

CMC meet the requirements of FCC Part15 Subpart C. The FCC ID is as follows.

FCC ID of CMC: OPO199909010003

It modulates the signals sent from the Vehicle controller and transmits the modulated signals to the vehicles. It also demodulates the signals sent from the vehicles and transmits them to the Vehicle controller.

The communication method in use is FSK ( frequency shift keying).

The communication frequencies 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

#### 3.2. CMC configuration

Figures 1 to 3 show the basic configuration of CMC.

CMC consists of the following units.

(1)CMC-BC (**C**ommunication **M**odem **C**ontroller : **B**ase **C**ontroller)

- Printed circuit NBV-BC
- DC power supply (5V)
- Case

(2)CMC-BM (**C**ommunication **M**odem **C**ontroller : **B**ase **M**odem)

- Printed circuit BV-BM2
- DC power supply (24V , 5V , ± 12V)
- Case

(3)CMC-TR(**C**ommunication **M**odem **C**ontroller : **T**Ransformer)

- Communication transformer ( transmission, reception )
- Case

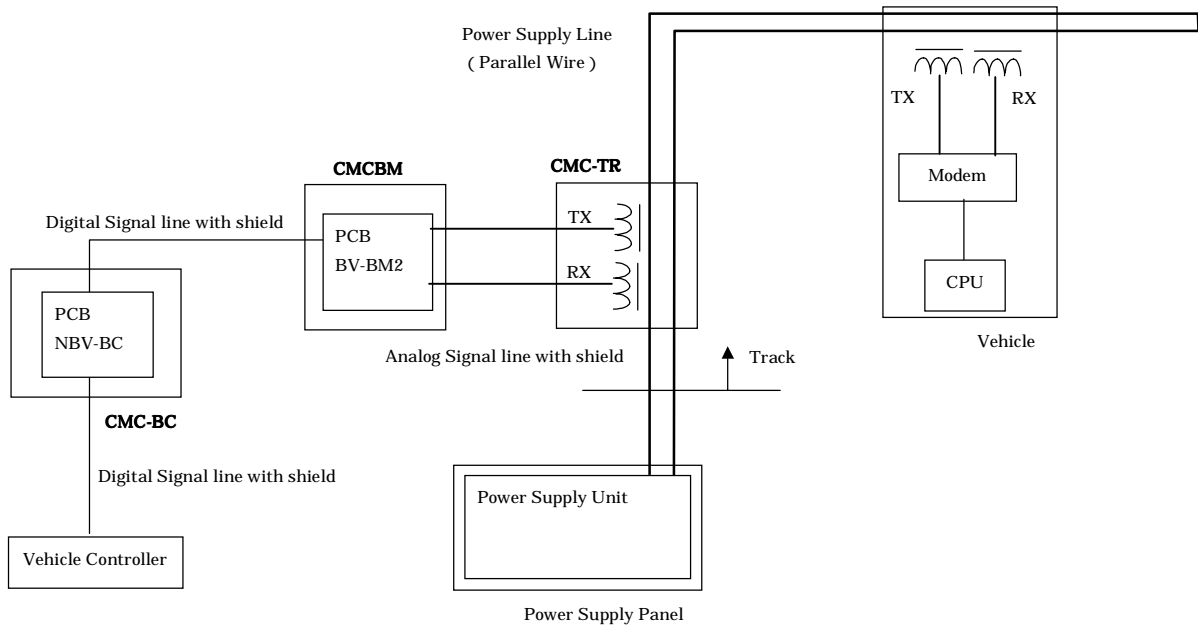


Fig. 1 Basic configuration of CMC

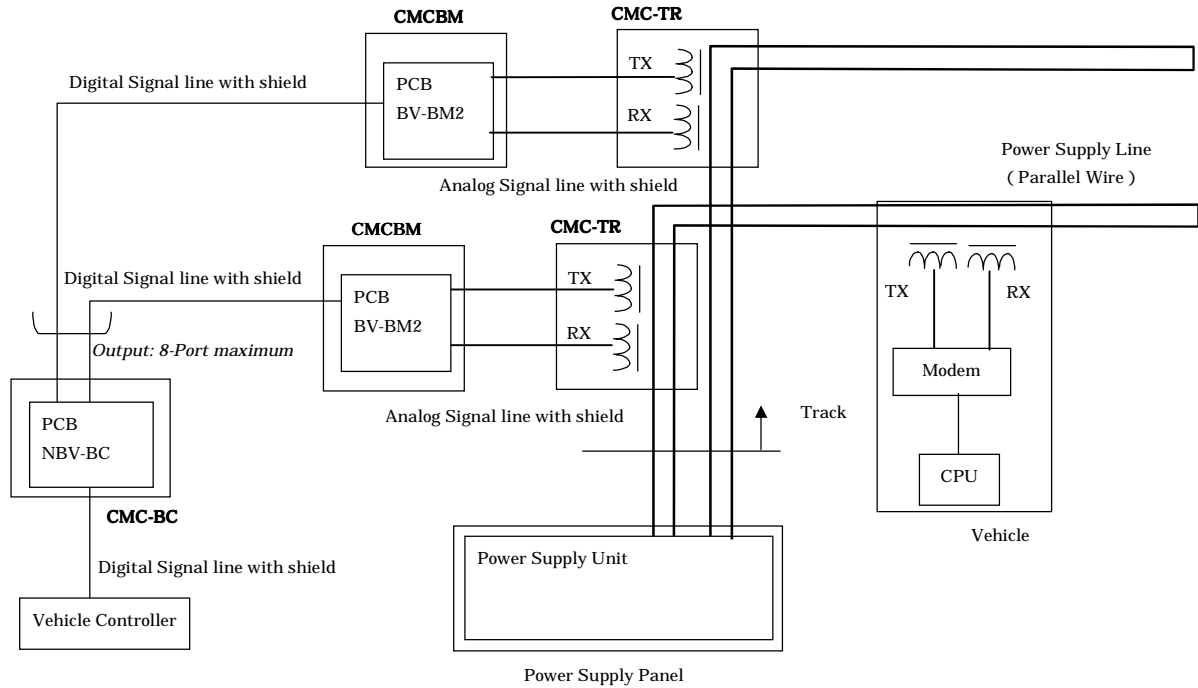


Fig. 2 Modified CMC configuration Example 1

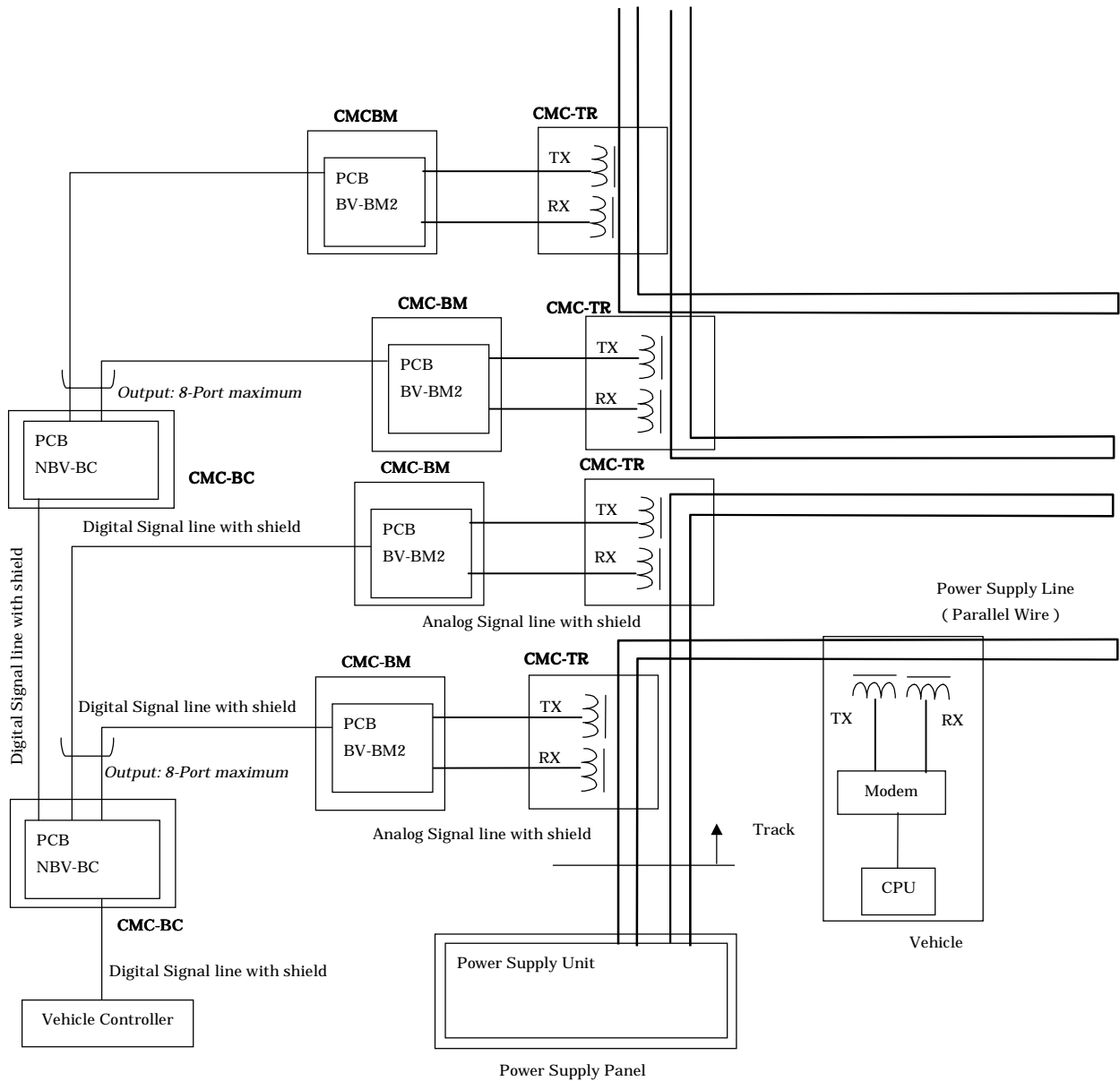


Fig. 3 Modified CMC configuration Example 2

### 3.3. Function of each unit

#### 3.3.1.CMC-BC (Communication Modem Controller : Base Controller)

This is an interface unit to handle the signals from/to the Vehicle controller. It also serves as the multiplexer for several CMC-BM units.

CMC-BC can work in two different modes, master mode and slave mode. It allows the user to use the multiple units according to the scale of the conveyance system.

The CMC-BC unit may vary in its outward form depending on the conveyance system. However, the internal configuration is common. Figure 4 shows the block diagram of CMC-BC.

Figure 5 shows the outward form of the CMC-BC's main printed circuit board NBV-BC. Figure 6 shows for example the outward form of the CMC-BC unit.

#### 3.3.2.CMC-BM(Communication Modem Controller : Base Modem)

This is a modem unit to handle the signals from/to several vehicles.

It incorporates a driver that modulates the digital signals sent from CMC-BC to analog signals and overlay the converted signals onto the non-conductive power line or signal line.

It also demodulates the analog signals sent from the vehicles to digital signals and transmit them to CMC-BC.

The CMC-BM unit may vary in its outward form depending on the conveyance system. However, the internal configuration is common. Figure 4 shows the block diagram of CMC-BM.

Figure 7 shows the outline form of the CMC-BM's main printed circuit board BV-BM2. Figure 8 shows for example the outline form of the CMC-BM unit.

#### 3.3.3.CMC-TR(Communication Modem Controller : TRansformer)

The transmission transformer overlays the signals from CMC-BM onto the non-conductive power line or signal line.

The reception transformer receives the signals from vehicles overlaid in the non-conductive power line or signal line.

Figure 9 shows the outer forms of the transformers.

FCC ID: OPO199909010003

Block diagram

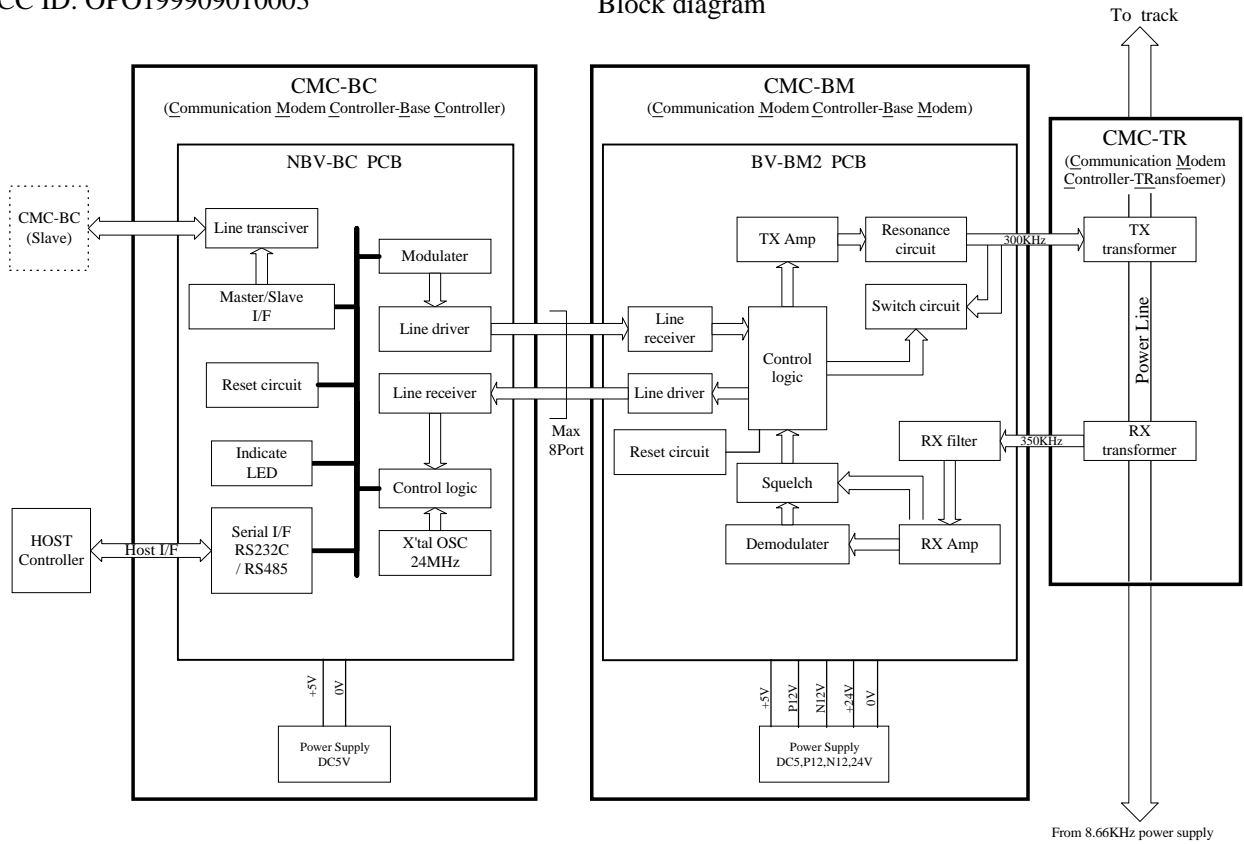


Fig. 4 The block diagram of CMC

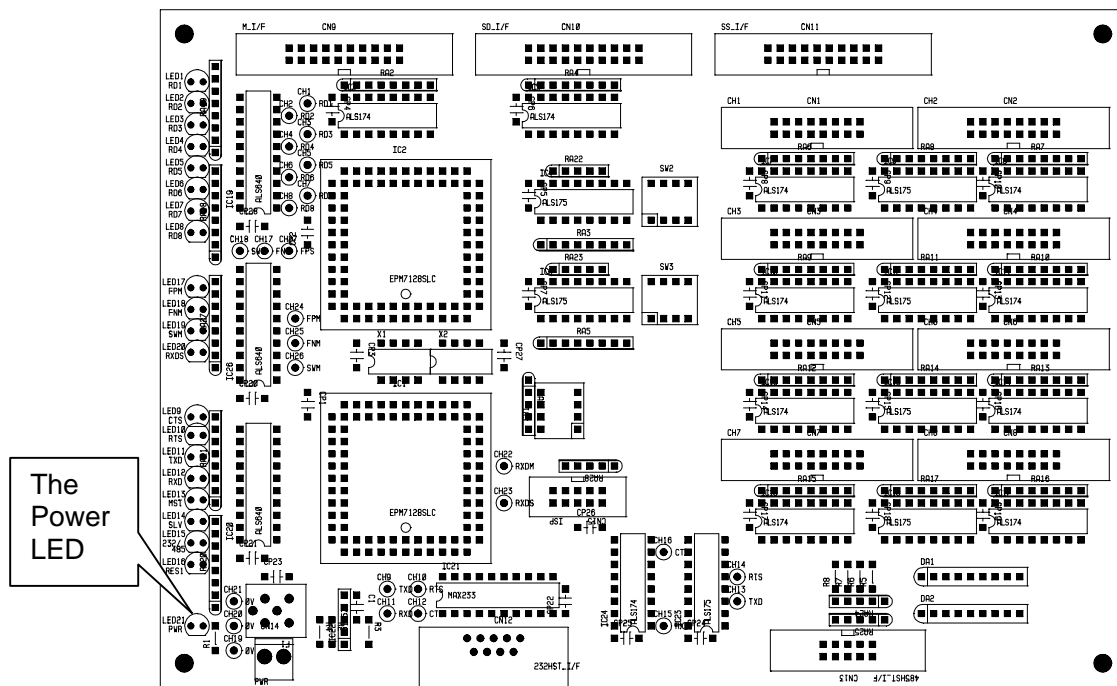


Fig. 5 Outward form of the CMC-BC's main printed circuit board NBV-BC

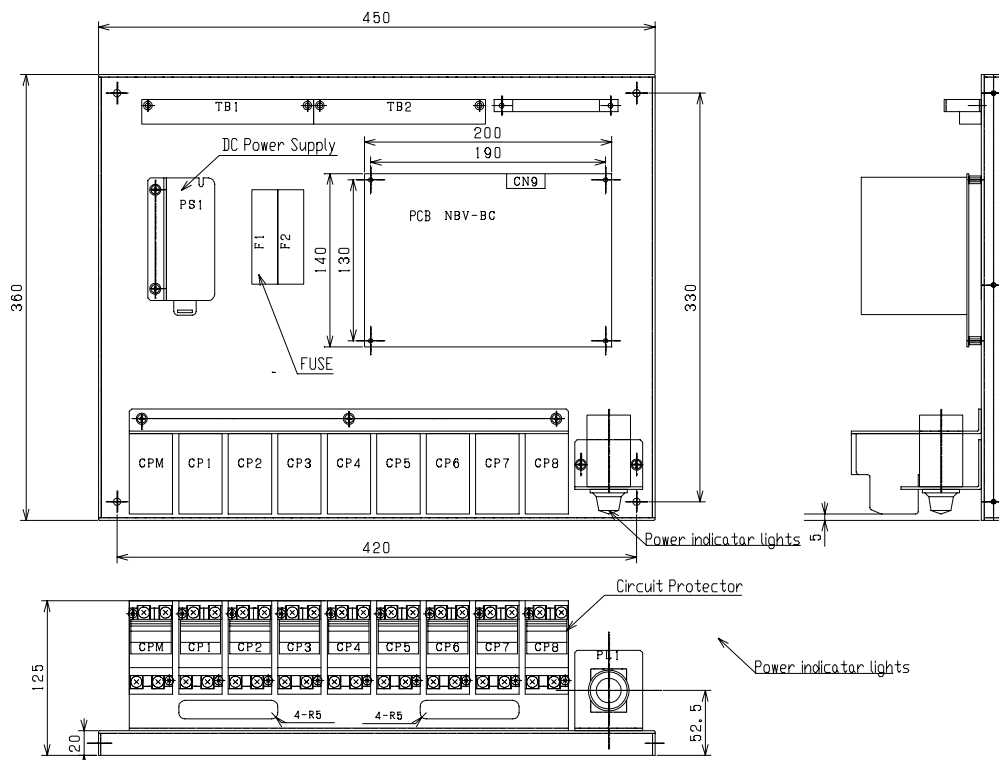


Fig. 6 For example the outward form of the CMC-BC unit

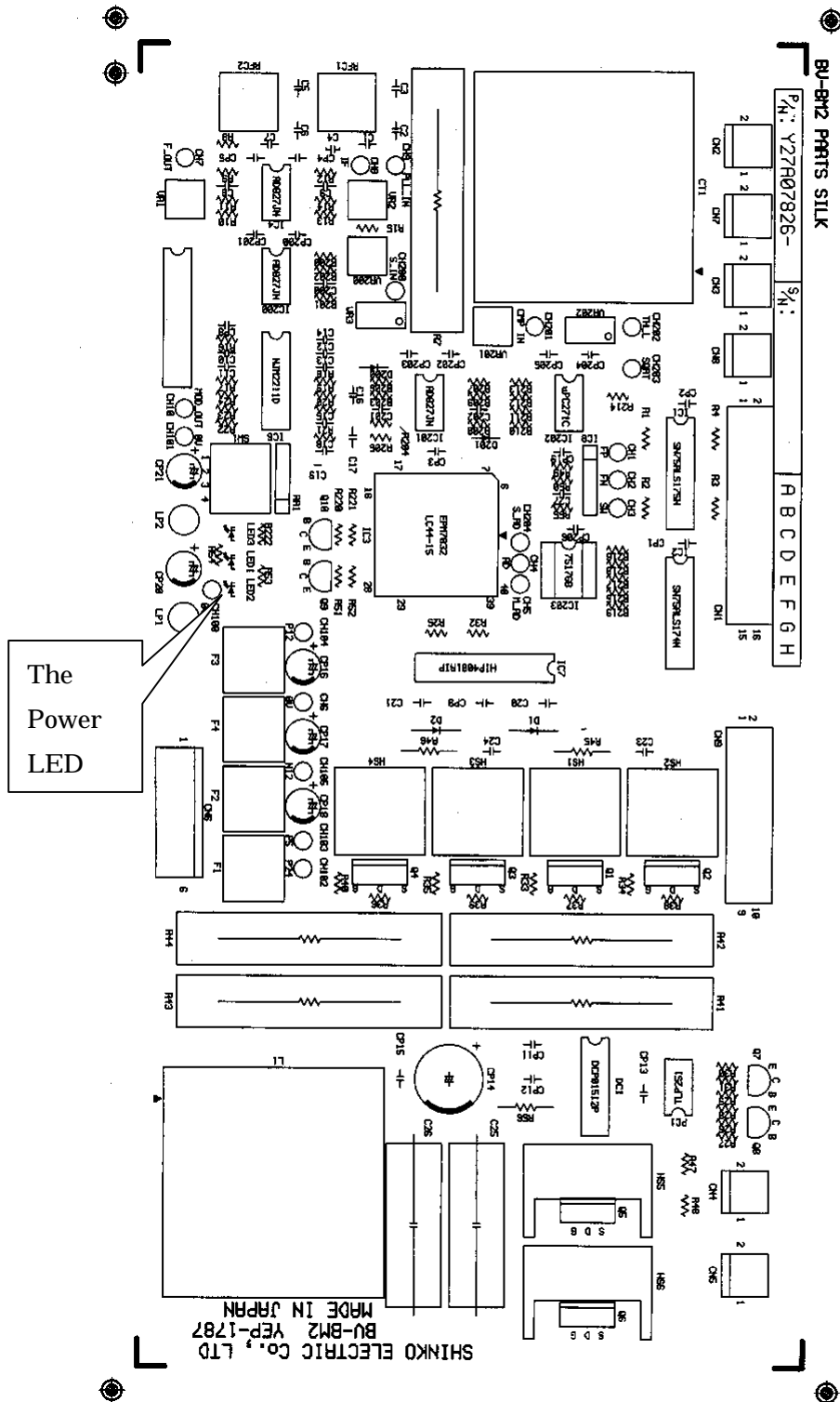


Fig. 7 The outline form of the CMC-BM's main printed circuit board BV-BM2



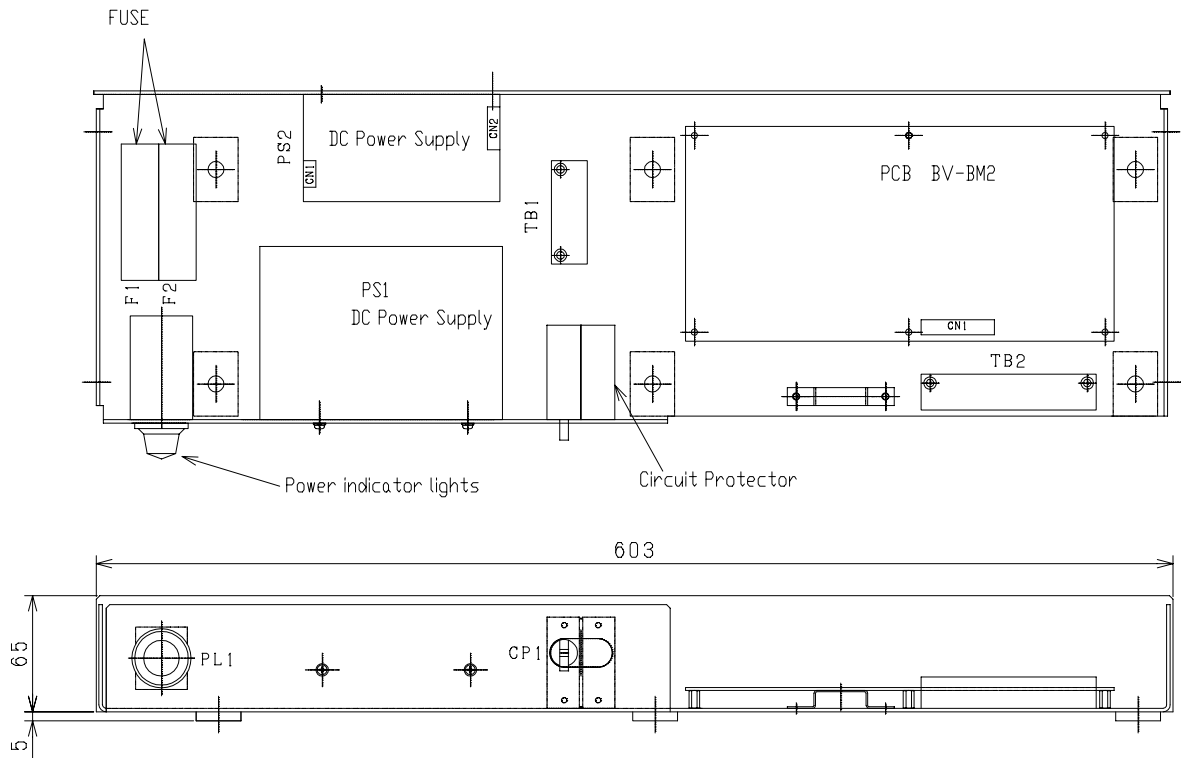


Fig. 8 For example the outline form of the CMC-BM unit

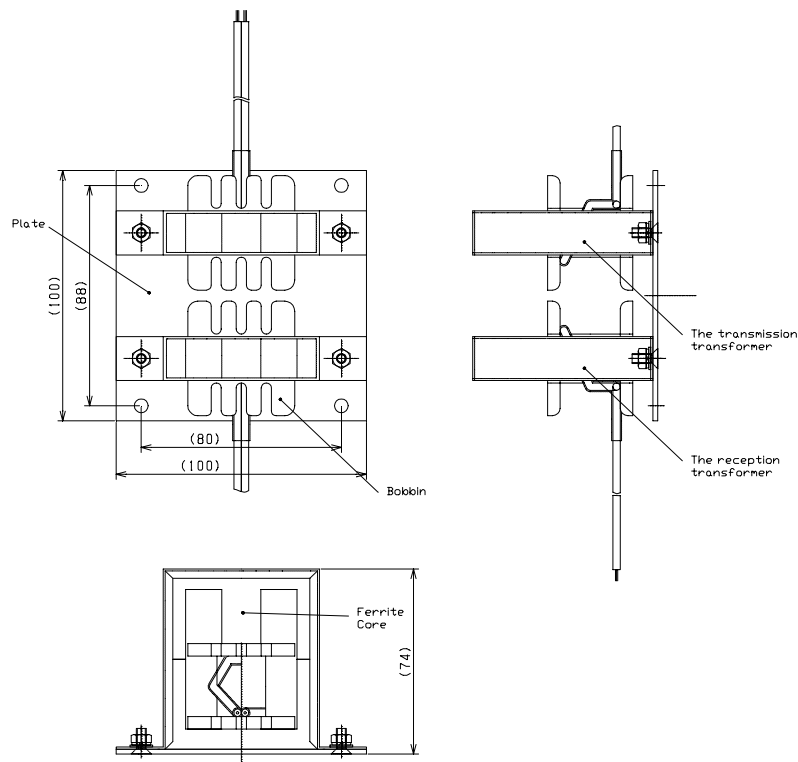


Fig. 9 The outer forms of the transformers

### 3.4. FCC standard

The transmission assembly in the communication unit CMC meets FCC Part15 Subpart C as the intentional radiator.

FCC ID of CMC : OPO199909010003

[Note.1]

The FCC certificate position may vary because different case materials and shapes are adopted for different customers.

#### NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

#### FCC WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## 4. Specification

Communication speed: Vehicle controller - Vehicle 19.2 kbps (MAX 38.4 kbps)  
 Communication method: FSK

### 4.1. CMC-BC

Unit name	CMC-BC
Manufacturer	SHINKO ELECTRIC CO., LTD.
Weight	Approx. 10 kgf *Case materials and shape vary with the system
Size	453mm (W) x 363 mm (L) x 160 mm (H) *Case materials and shape vary with the system
Power consumption	10W
Input 1	200V AC 1 or 100V AC 1 50/60Hz
Input 2	Vehicle controller CMC-BC RS232C/RS485
Output 1	CMC-BC CMC-BM RS485 8 ports max.
Output 2	CMC-BC CMC-BC RS485 1 port
Output 3	CMC-BC CMC-BM 200V AC 1 or 100V AC 1 50/60Hz

### 4.2. CMC-BM

Unit name	CMC-BM
Manufacturer	SHINKO ELECTRIC CO., LTD.
Weight	Approx.10kgf *Case materials and shape vary with the system
Size	603 mm (W) x 187.5 mm (L) x 70 mm (H) *Case materials and shape vary with the system
Power consumption	20W
Input 1	CMC-BC CMC-BM 200V AC 1 or 100V AC 1 50/60Hz
Input 2	CMC-BC CMC-BM RS485
Input 3	CMC-TR CMC-BM Analog signal 4 ports max.
Output 1	CMC-BM CMC-TR Analog signal 2 ports max.

### 4.3. CMC-TR

Unit name	CMC-TR
Manufacturer	SHINKO ELECTRIC CO., LTD.
Weight	Approx. 5 kgf *Case materials and shape vary with the system
Size	150 mm (W) x 150 mm (L) x 110 mm (H) *Case materials and shape vary with the system
Power consumption	MAX 1W *When communication signal transmitted through the non-conductive power line
Input 1	CMC-BM CMC-TR Analog signal
Output 1	CMC-TR CMC-BM Analog signal

## 5. Error process

### [Note.1]

Before servicing CMC-BC , CMC-BM , CMC-TR , always shut off the power supply.

### [Note.2]

If the communication signals are overlaid onto the non-conductive power line, also shut off the power source of the non-conductive power line before starting maintenance on CMC-BM and CMC-TR.

### <Communication error trouble shooting>

Vehicle Controller issues a communication error

