

SERVICE MANUAL

GYROCOMPASS TG-8000

SG12-SE003

Mar. 21, 2013

TOKYO KEIKI INC

This service manual is the updated version of following service manual ;

SERVICE MANUAL GYROCOMPASS TG-8000
SG04-SJ001/SE001 (Jan. 16, 2004)

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1. Specifications

1.1 Catalogue



Gyrocompass

TG-8000/8500

TG-8000/8500 is designed based on our previous TG model which has been installed on more than 8000 ships, keeping its high reliability, enhanced follow-up performance and interfacing features for equipment.

The TG-8000 is designed for standard IMO ship application whereas the TG-8500 is designed for High-Speed Craft application.



Features

- Suitable for speeds of up to 70knots (TG-8500)
- Fast follow-up rate (maximum 75°/s)
- Fast serial data output (IEC61162-2)
- Interfaces with external heading sensor.
- Minimal system components for dual gyro system for space saving & installation cost.
- Startup-timer function

TG-8000 : IMO regulated vessels

IMO A424 (XI) ISO 8728

TG-8500 : High Speed Craft

IMO A821 (19) ISO 16328 HSC

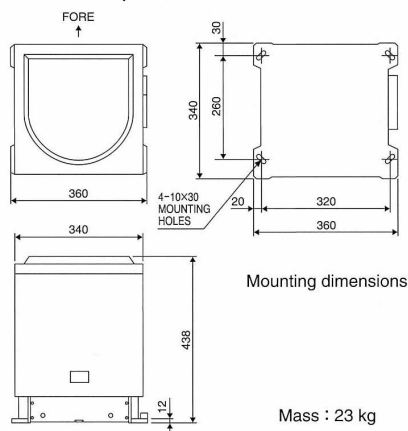


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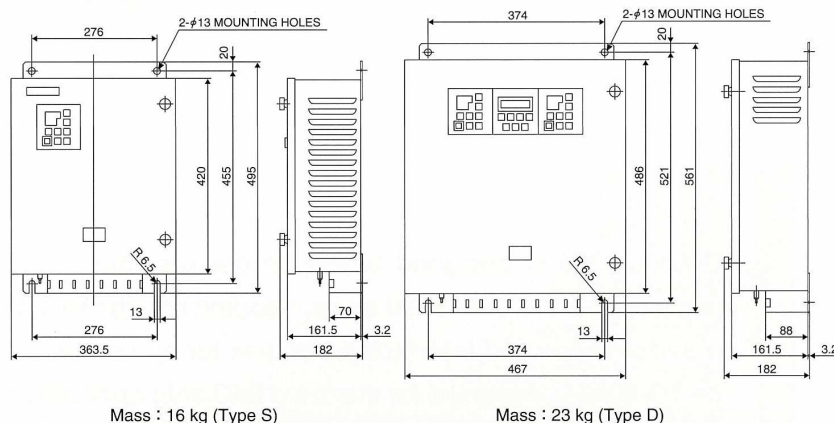
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Configurations

Master compass



Control unit



Mass : 23 kg (Type D)

Specifications

General Specifications

Power Supply

Main Power Supply : AC100/110/115/220 V 1 ϕ 50/60 Hz

Emergency Power Supply : DC24 V

Power Consumption

Starting : 140 VA

Operating : 70 VA

Repeaters : 150 VA 1/6 $^\circ$ 3 ϕ 9 Ports

Output Signal

: DC24 V Stepper, 9 Repeaters (include Auto Pilot)

: IEC61162-1ed.2 or IEC61162-2

5 ports (include Auto Pilot)

: Rate of turn -5 V $\sim$ +5 V/30 $^\circ$ / min

-10 V $\sim$ +10 V/120 $^\circ$ or 300 $^\circ$ /min

3 ports

: Dry Contact (Operation, Alarm)

Input Signal

: Speed : 200 or 400 pulses/nm (Dry contact)

: IEC61162-1ed.2

: Position (GPS) : IEC61162-1ed.2

: External Heading Input : IEC61162-1ed.2 or IEC61162-2

: Dry Contact (Alarm Ack, Buzzer Stop)

Performance Specifications

Settling Accuracy

Settling Time : Less than 4 hours

Settling Point Error : Less than $\pm 0.3^\circ$

RSM Value : Less than 0.1°

Repeatability : Less than $\pm 0.2^\circ$

Accuracy on Scorsby Table

: Less than $\pm 0.5^\circ$

Master-compass follow up rate

: Maximum 75 $^\circ$ /s

Accuracy Under Environmental Variation

: Less than $\pm 0.5^\circ$ (Condition : ISO8728 / ISO16328)

Environmental Conditions

Permissible Roll and Pitch angle : $\pm 45^\circ$

Design and specifications are subject to change without prior notice, and without any obligation on the part of the manufacturer.



CAUTION

Before operating this equipment, you should first thoroughly read the operator's manual.

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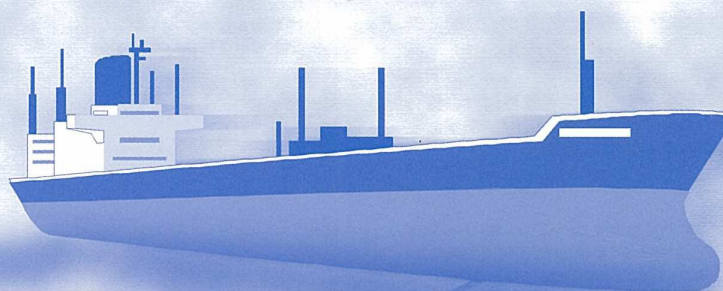
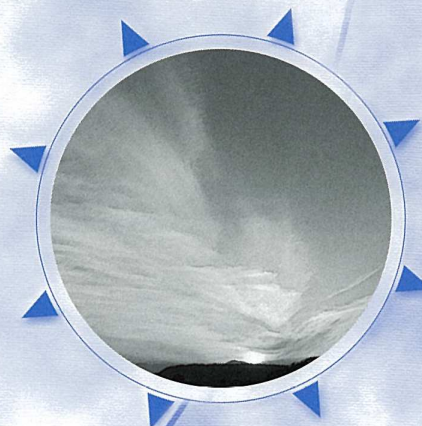
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ACCESSORIES

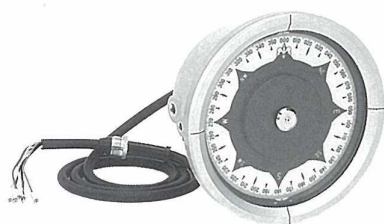
ジャイロコンパス
アクセサリカタログ



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レピータコンパス

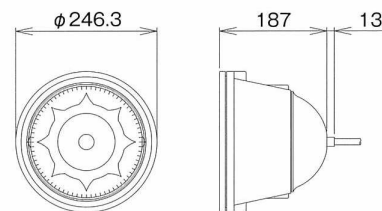
Repeater compass



マスタコンパスからの信号で正確に方位を示します。各種の保持器に取り付けて使用します。
(キャブタイヤケーブル1.8m付)

This repeater compass, which can be mounted on various holders, accurately indicates bearings by using signals sent by the master compass.
(1.8m cabtyre cable included.)

標準形レピータ：質量5.0kg
Standard type repeater: Mass. 5.0kg



オープンスケールレピータ

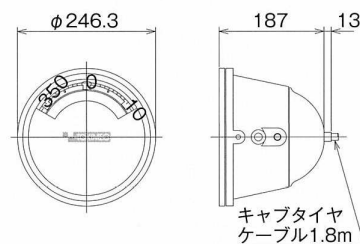
Open scale repeater



操舵専用のレピータで、カード目盛が見やすいように5倍に拡大されています。
(キャブタイヤケーブル1.8m付)

This repeater is exclusively designed for use in steering. The card scale is magnified five times to assure easy reading.
(1.8m cabtyre cable included.)

レピータ（オープンスケール）：質量5.0kg
Open scale type repeater: Mass. 5.0kg



BB形レピータ保持器

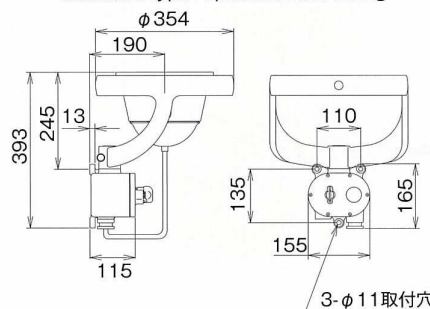
Type BB repeater holder



壁掛形で操舵室の壁に取り付けて操船や物標の方位測定に用います。

Used for steering and for measuring target bearings.
The light interception plate is available to ensure easy reading of the repeater compass.

標準形レピータ用：質量8.0kg
Standard type repeater: Mass. 8.0kg



MB形レピータ保持器

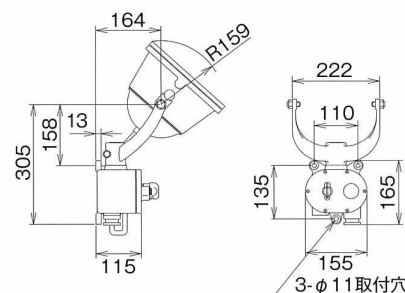
Type MB repeater holder



レピータコンパスが見やすいように傾斜して取り付けられ主として操舵用に用います。

In order to provide for easy reading, the repeater compass can be mounted on this holder at an angle. It is used mostly in steering.

標準形レピータ用：質量5.0kg
Standard type repeater: Mass. 5.0kg



BH形レピータスタンド

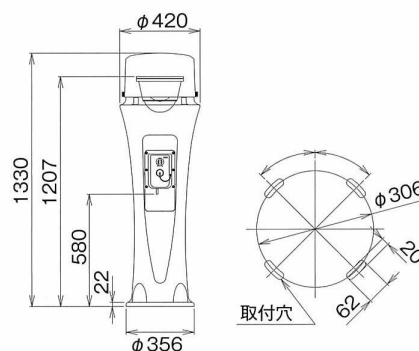
Type BH repeater stand



室外用レピータコンパスを取り付け、天体や物標の方位を測定するのに用います。主として甲板上に設置します

A repeater compass designed for outdoor use is mounted on this stand and used for measuring the bearings of heavenly bodies, targets and so on. In most cases, the stand is installed on deck.

標準形レピータ用：質量25.0kg
Standard type repeater: Mass. 25.0kg

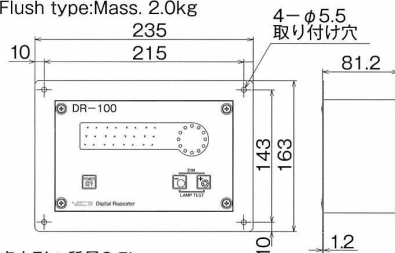


デジタルレピータ

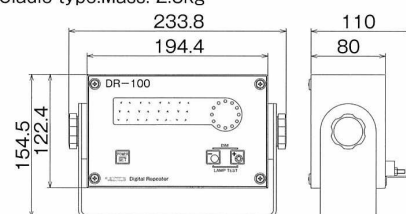
Digital repeater



埋込形：質量2.0kg
Flush type: Mass. 2.0kg



卓上形：質量2.5kg
Cradle type: Mass. 2.5kg



- ・船首方位をデジタル表示します。
ジャイロコンパスからのレピータ信号により、船首方位をデジタルで表示します。デジタル表示は0.1度単位です。(000.0~359.9) また、1/10度単位でターンレートをLED表示しますので旋回の状態なども明確にわかります。
- ・ジャイロコンパスとの接続は容易です。
ジャイロコンパスとの接続は従来のレピータと変わらず容易です。
- ・設置場所を選びません。
コンパクトであらゆる場所に設置でき、ブリッジのほか船長室や海図室、また機関制御室、舵機室などに適しています。

・ Gives ship's heading on digital indicator

The digital repeater clearly displays ship's heading or the digital indicator by using the repeater signal from the gyrocompass. In addition to the digital display given in increments of 0.1 degree (from 000°-359°), it also offers an LED display, which presents rate of turn. As a result, the ship's turning direction can be easily understood.

・ Easy connection with gyrocompass

Connection with the gyrocompass is just as easy as with any conventional repeater.

・ Can be installed just about anywhere

Decidedly compact in design, this digital repeater enables installation almost anywhere on the ship-not just on the bridge, but also in the captain's cabin, chart room, engine control room, steering room, and so on.

壁掛形もあります。 Bulkhead type is available.

	入 力	出 力
デジタルレピータ DR-100	1) 90Xシンクロ信号 2) 1/6° ステップ信号 3) 1Xシンクロ信号	1) IEC61162-1/-1ed2/-2 2) TOKIMECフォーマット(RS422) *3回路まで出力可能
デジタルレピータ DR-110	1) NMEA0183 2) IEC61162-1/-1ed2/-2 3) TOKIMECフォーマット	1) IEC61162-1ed2 2) IEC61162-2 *2回路まで出力可能
方位信号変換器 HC-01	1) 90Xシンクロ信号 2) 1/6° ステップ信号 3) 1Xシンクロ信号	1) IEC61162-1/-1ed2/-2 2) TOKIMECフォーマット(RS422) *3回路まで出力可能

	Input	Output
Digital repeater DR-100	1) 90X Synchro signal 2) 1/6° Step signal 3) 1X Synchro signal	1) IEC61162-1/-1ed2/-2 2) TOKIMEC Format (RS422) *Possible to 3 circuits
Digital repeater DR-110	1) NMEA0183 2) IEC61162-1/-1ed2/-2 3) TOKIMEC Format	1) IEC61162-1ed2 2) IEC61162-2 *Possible to 2 circuits
Bearing signal converter HC-01	1) 90X Synchro signal 2) 1/6° Step signal 3) 1X Synchro signal	1) IEC61162-1/-1ed2/-2 2) TOKIMEC Format (RS422) *Possible to 3 circuits

アジマスサークル

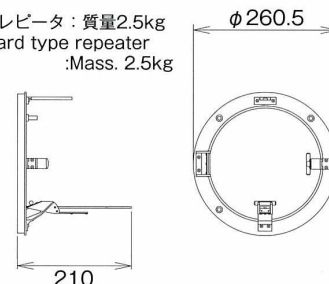
Azimuth circle



レピータコンパスに取り付け、正確な天体の方位や物標の方位測定に用います。方位測定用(BH形、BB形)のレピータがないときは不要です。

The azimuth circle is attached to a repeater compass and is used to accurately measure the bearings of celestial bodies, targets and so on. The azimuth circle is not necessary when repeaters (types BH and BB) for measuring bearing are not used.

標準形レピータ：質量2.5kg
Standard type repeater
:Mass. 2.5kg



回頭角速度計

Rate of turn indicator



ジャイロコンパスによって検出される船の旋回角度信号を、アナログ指示計に表示します。極めて微小の回頭角速度を表示することができますので、狭水路・輻湊する海域での操船に役立ちます。

・ 指示計

レンジスケール 最大±30°/分
スケールの長さ ±120mm

・ 入力信号 (ジャイロコンパス)

ターンレート信号

This equipment displays an analog indicator by using the turning signal from the gyrocompass. Because it can indicate a very small rate of turn, it is most useful for ship maneuvering in narrow channels and congested areas.

Complies fully with IMO performance standards.

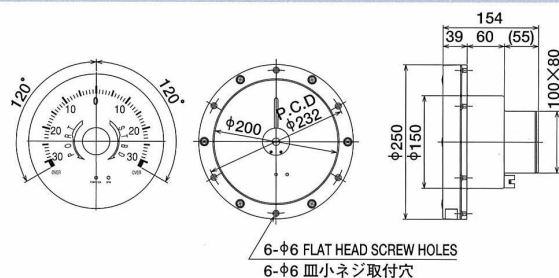
・ Indicator

Range scale ±30°/min. MAX.
Scale length ±120mm

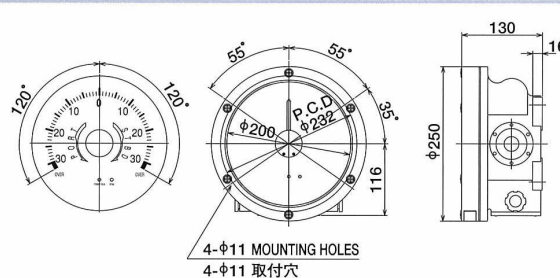
・ Input signal from gyrocompass

Signal from rate of turn

埋込形：質量5.0kg Flush type: Mass. 5.0kg



壁掛形：質量6.0kg Bulkhead type: Mass. 6.0kg



コースレコーダ

Course recorder

日時とその時のコースが記録でき、オートパイロットの動作状態の確認やコースの記録に有利です。記録紙1本で、約30日の記録ができます。

This course recorder notes the day, hour and course at any desired time. In addition to enhancing course recording operations, adoption of this recorder is also advantageous in confirming the operating condition of the autopilot. One roll of recording paper lasts approximately 30 days.

タイプ	ジャイロコンパスからの入力信号
CR-1	70Vステップモータ
CR-2	35Vステップモータ
CR-3	90Xシンクロモータ
CR-4	24Vステップモータ

Type	Input signal from gyrocompass
CR-1	70V Step motor
CR-2	35V Step motor
CR-3	90X Synchro motor
CR-4	24V Step motor

デュアルチャンネルレコーダ

Dual channel recorder

- 針路と操舵角を同時に記録しますのでオートパイロットの最適調整ができ省エネ操船ができます。
- 大きさ、取付寸法が、コースレコーダと同一ですので就航船での換装工事も簡単です。
- 記録紙の紙送り、時計のゼンマイ巻、記録用インクの補充などの必要がありません。

- Ship's course and rudder angle, vital parameters of navigation, are recorded simultaneously. These data are then used for making optimal steering adjustments.
- Two types of compact unit are available-wall mount and flush mount. Because the dual channel recorder is the same size as conventional course recorders, installation on existing ships is very easy.
- A new automatic driving mechanism is employed for advancing the recording paper. The recording process does not require recording ink.

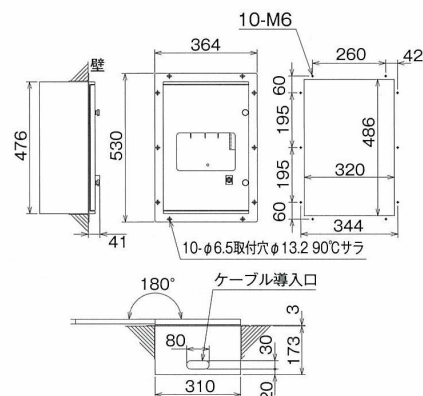
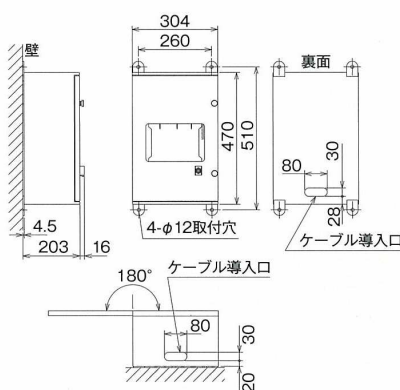


壁掛形：質量24kg
Bulkhead type: Mass. 24kg

埋込形：質量26kg
Flush type: Mass. 26kg

タイプ	ジャイロコンパスからの入力信号
DCR-10	70Vステップモータ
DCR-20	35Vステップモータ
DCR-30	90Xシンクロモータ
DCR-40	24Vステップモータ

Type	Input signal from gyrocompass
DCR-10	70V Step motor
DCR-20	35V Step motor
DCR-30	90X Synchro motor
DCR-40	24V Step motor



製品の仕様およびデザインは改良等のため予告なく変更する場合があります。
Design and specifications are subject to change without prior notice, and without any obligation on the part of the manufacturer.



ご注意

ご使用の際は取扱説明書をよく読みの上、正しく安全にお使いください。

CAUTION: Before operating this equipment, you should first thoroughly read the operation manual.

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2009年6月作成 June 2009 Cat. No.1355-1-JE-2-RG

1.2 Models

Models		Different PWB of CONTROL UNIT	Output signal port		
			Step signal $1/6^\circ$ 、 3ϕ	Serial signal IEC61162-1 Ed.2 or IEC61162-2	Rate of turn signal $\pm 5V/30^\circ$ /min, $\pm 10V/120^\circ$ /min or $\pm 10V/300^\circ$ /min
1	Type S (Single)	MIFC	9	5	3
		SIFC	4	10	
3	Type D (Dual)	MCOIF	9	5	
4		SCOIF	4	10	

↑ Type S = MASTER COMPASS × 1 (Single)

↑ Type D = MASTER COMPASS × 2 (Dual)

Fig. 1-1 TG-8000 models and output signal port

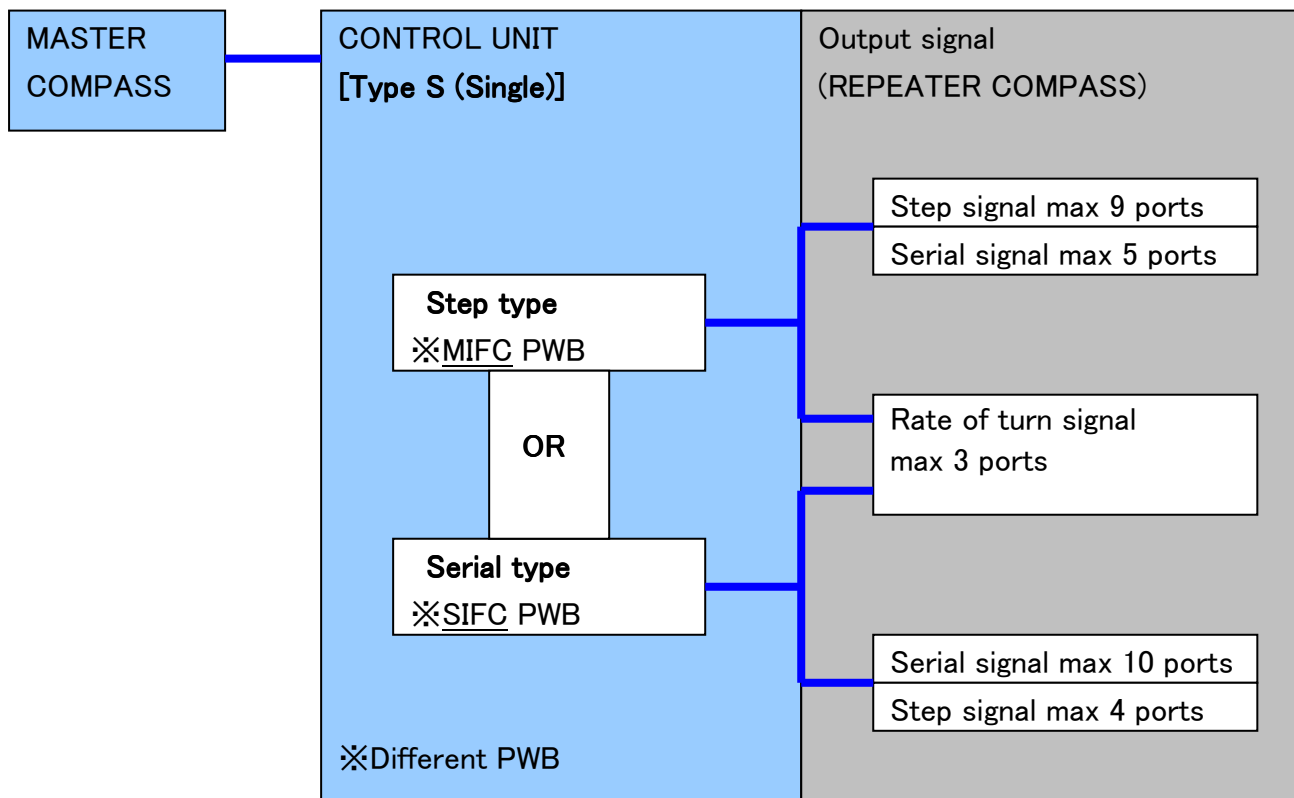


Fig. 1-2 Type S (Single) output signal

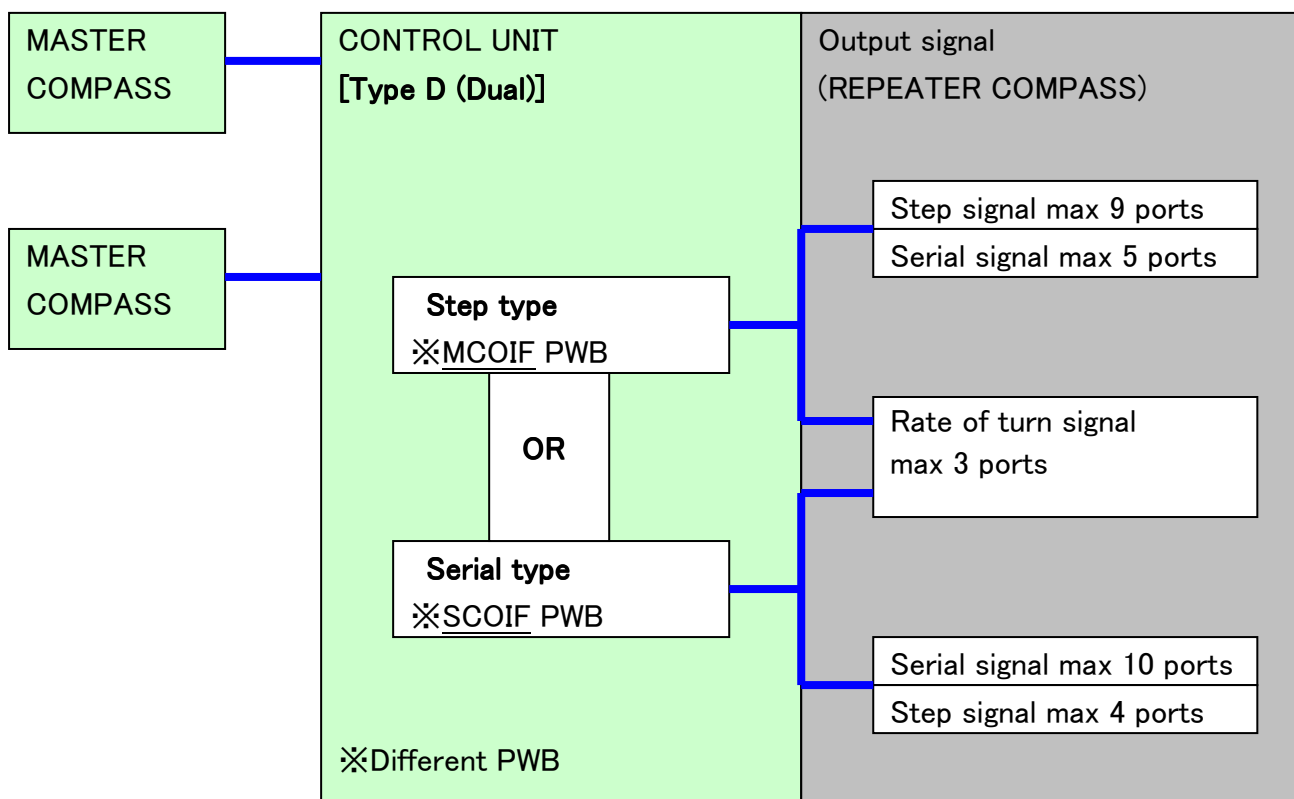


Fig. 1-3 Type D (Dual) output signal

1.3 Basic specifications

GYRO COMPASS BASIC SPECIFICATIONS ジャイロコンパス 基本仕様

ACCURACY

精度

	IMO RECOMMENDATION IMO 推奨値	AT ψ : 35°(EX. TOKYO) ψ : 35°(東京)での規格値	TG-8000
SETTLING TIME 静定時間	WITHIN 6(SIX) HOURS 6時間以内	WITHIN 6(SIX) HOURS 6時間以内	WITHIN 3(THREE) HOURS 3時間以内 *1
SETTLE POINT ERROR 静止点誤差	LESS THAN $\pm 0.75^\circ \times (1 / \cos \psi)$ 以下	LESS THAN $\pm 0.9^\circ$ 以下	LESS THAN $\pm 0.3^\circ$ 以下
RMS VALUE OF THE DIFFERENCES 指度の標準偏差	LESS THAN $0.25^\circ \times (1 / \cos \psi)$ 以下	LESS THAN 0.3° 以下	LESS THAN 0.1° 以下
REPEATABILITY OF SETTLE POINT ERROR 静止点の再現性	LESS THAN $\pm 0.25^\circ \times (1 / \cos \psi)$ 以下	LESS THAN $\pm 0.3^\circ$ 以下	LESS THAN $\pm 0.2^\circ$ 以下
ERROR DUE TO THE SHIP ROLLING, PITCHING AND YAWING 動揺誤差	LESS THAN $\pm 1.0^\circ \times (1 / \cos \psi)$ 以下	LESS THAN $\pm 1.2^\circ$ 以下	LESS THAN $\pm 0.5^\circ$ 以下
SETTLE POINT ERROR UNDER GENERAL CONDITIONS 環境変化に対する精度	LESS THAN $\pm 1.0^\circ \times (1 / \cos \psi)$ 以下	LESS THAN $\pm 1.2^\circ$ 以下	LESS THAN $\pm 0.5^\circ$ 以下

AGREEMENT STANDARD: ISO 8728

ψ : LATITUDE 緯度

*1 : START FROM HEADING 船首方位起動時

GENERAL SPECIFICATIONS

一般仕様

AMBIENT TEMPERATURE 温度範囲	MASTER COMPASS マスターコンパス	+50℃ ～ -10℃			
	REPEATER レピータ	+60℃ ～ -20℃			
FOLLOW-UP SPEED 追従速度		MAX. 最大	75° /s		
GIMBAL FREEDOM ジンバル傾斜自由度		±45°	FOR BOTH ROLLING AND PITCHING ロールおよびピッチ共		
RANGE OF SPEED ERROR CORRECTION (AUTO/MANUAL) 速度誤差修正範囲（自動／手動）		0-50 knots / LATITUDE (0° ～ 70°) ノット/ 緯度			
MAIN POWER SUPPLY VOLTAGE 主電源電圧		AC POWER MAX. 290VA			
POWER SUPPLY FOR BACK-UP VOLTAGE バックアップ電源電圧		DC24V			
VOLTAGE FLUCTUATION 電圧変動		AC±10%, DC-20%～+30%			
FREQUENCY VARIATION 周波数変動		±5%			
POWER CONSUMPTION 消費電力	MASTER COMPASS マスターコンパス	START 起動時	WITHIN 以内	140VA	[x 2]
		ORDINARY 定常時	WITHIN 以内	70VA	[x 2]
	REPEATER レピータ	WITHIN 以内	150VA	ALL REPEATERS 全レピータ	

AGREEMENT STANDARD: ISO 8728

TYPE D : [x 2]

INPUT SIGNAL SPECIFICATIONS

入力信号仕様

SENSOR センサー	TYPE OF SIGNAL 信号種類	*1 PROTOCOL プロトコル	SENTENCE センテンス
GPS	IEC61162-1 / IEC61162-1 Ed.2	A	Refer to input signal sentence. 入力信号センテンスを参照ください。
SPEED LOG *2 スピードログ	IEC61162-1 / IEC61162-1 Ed.2	A	Refer to input signal sentence. 入力信号センテンスを参照ください。
SPEED LOG *2 スピードログ	DRY CONTACT 接点	-	200 or 400 Pulses/n mile 5V / 5mA

*1: Refer to type of protocol.

プロトコル種類を参照ください。

*2: Input either signal or both signal.

いずれか一方又は両方の信号を入力してください。

TYPE OF PROTOCOL

プロトコルの種類

	A
BAUD RATE ボーレート	4800 bps
DATA BITS データ数	8 bits
PARITY パリティ	none
STOP BITS ストップビット	1
TRANSMIT FREQ. 転送レート	1 s

INPUT SIGNAL SENTENCE

入力信号センテンス

GPS	DATA NO.1 \$--RMC,x,x,A,x,x,a,x,x,b,x,x,x,x,x,x,x,E *hh<CR><LF> MAGNETIC VARIATION(deg): 磁気偏差値(度) DATA NO.2 \$--GGA,x,xx,x,N,xx,x,E,x,~*hh<CR><LF> LAT.:緯度 GPSQI:GPS性能指標 \$--GLL,xxxx,xx,N,xxxx,xx,E~*hh<CR><LF> LAT.:緯度 NOTE: GGA sentence is high priority. 備考: GGAセンテンスを優先して受信します。 DATA NO.3 \$--VTG,xxx,x,T,xxx,x,M,xx,x,N,xx,x,K*hh<CR><LF> SPEED:速度(knots) COURSE(deg),MAGNETIC:コース(度)、磁気 COURSE(deg),TRUE:コース(度)、真方位 NOTE: Both a course (magnetism) and a course (true direction) data are required to identify. 備考: コース(磁気)及びコース(真方位)両方のデータが無いと、受信できません。
SPEED LOG スピードログ	DATA NO.1 \$--VBW,x,x,x,x,A,x,x,x,x,A~*hh<CR><LF> SPEED:速力(knots) STATUS:状態 GROUND SPEED:対地速度(knots) WATER SPEED:対水速度(knots) NOTE: Ground speed is high priority. 備考: 対地速度を優先して受信します。

OUTPUT SIGNAL SPECIFICATIONS

出力信号仕様

CIRCUIT 回路数	TYPE OF SIGNAL 信号種類	*1 PROTOCOL プロトコル	SENTENCE センテンス
SELECTED COMPASS 選択されているコンパス	DC24V STEP 1/6°	-	-
SELECTED COMPASS *2 選択されているコンパス	IEC61162-1 Ed.2 / IEC61162-2	A / B	Refer to output signal sentence. 出力信号センテンスを参照ください。
GYRO COMPASS ONLY ジャイロコンパス固定	IEC61162-1 Ed.2 / IEC61162-2	A / B	Refer to output signal sentence. 出力信号センテンスを参照ください。
MAGNETIC COMPASS ONLY 磁気コンパス固定	IEC61162-1 Ed.2 / IEC61162-2	A / B	Refer to output signal sentence. 出力信号センテンスを参照ください。

*1: Refer to type of protocol.
プロトコル種類を参照ください。

*2: Type of signal and protocol can be selected for each circuit. (Refer to wiring diagram)
信号種類とプロトコルは各回路ごとに選択可能です。(詳細は結線図を参照願います。)

NOTE: Refer to wiring diagram about the number of circuits.

備考: 回路数については機器間結線図を参照願います。

TYPE OF PROTOCOL

プロトコルの種類

	A	B
BAUD RATE ボーレート	4800 bps	38400 bps
DATA BITS データ数	8 bits	8 bits
PARITY パリティ	none	none
STOP BITS ストップビット	1	1
TRANSMIT FREQ. 転送レート	1 s	20 ms

OUTPUT SIGNAL SENTENCE

出力信号センテンス

(Based on IEC61162) (IEC61162に準拠)

GYRO COMPASS ジャイロコンパス	DATA NO.1 \$HEHDT,xxx.x,T*hh<CR><LF> TRUE BEARING(deg):真方位(度) DATA NO.2 \$HEROT,xxx.x,A*hh<CR><LF> RATE OF TURN (deg/min) - :PORT :回頭角速度(度/分) - :左旋回 NOTE: Talker id change to "TI"(\$TIROT...) from "HE" is available when connected rate of turn indicator. 備考: 回頭角速度計が接続されている場合、トーカーIDを"TI"(\$TIROT...)へ切替可能です。
MAGNETIC COMPASS 磁気コンパス	DATA NO.1 \$HCHDT,xxx.x,T*hh<CR><LF> TRUE BEARING(deg):真方位(度) DATA NO.2 \$HCHDG,xxx.x,xx.x,a,xx.x,ahh<CR><LF> MAGNETIC VARIATION(deg):磁気偏差(度) E/W MAGNETIC DEVIATION(deg):磁気自差(度) E/W MAGNETIC HEADING(deg):磁気方位(度)

DRY CONTACT OUTPUT SPECIFICATIONS

接点出力仕様

SIGNAL TITLE 信号名称	CIRCUITS 回路数	CONTACT CAPACITY 接点容量	REMARKS 備考
GYRO RUNNING ジャイロコンパス運転中	1 [2]	24V/1A	
HDM RUNNING HDM 運転中	1	24V/1A	
HEADING DIFFERENCE ALARM 偏差警報	1	24V/1A	FUNCTION ALARM 機能警報
OFFCOURSE ALARM オフコース警報	1	24V/1A	FUNCTION ALARM 機能警報
GYRO ALARM ジャイロ警報	1 [2]	24V/1A	SYSTEM ALARM システム警報
HDM ALARM HDM警報	1	24V/1A	SYSTEM ALARM システム警報

TYPE D : [2]

ANALOG OUTPUT SPECIFICATIONS

アナログ出力仕様

CONTACT CAPACITY
2mA/circuit

ROT ANALOG OUTPUT SIGNAL 回頭角速度アナログ出力信号		RATE OF TURN OUTPUT CIRCUITS 回頭角速度回路数 3			
- : PORT - : 左旋回	TURN RATE 旋回レート	*1	±30° /min	±120° /min	±300° /min
	OUTPUT VOLTAGE 出力電圧	DATA データ	±5VDC	±10VDC	±10VDC
		SCALE OVER スケールオーバー	±5VDC	±5VDC	±5VDC

*1: Output signal is available to select one of three turn rates.

いずれかの旋回レートを選択することができます。

1.4 Unit location

Mounting location of each unit (Type S [Single])

One example of the mounting location is show below.

Refer to the finished plan maintained in the ship.

- Mounting location of the master compass, operation panel, power supply and control unit.
(In case of PR-6000 automatic steering system.)

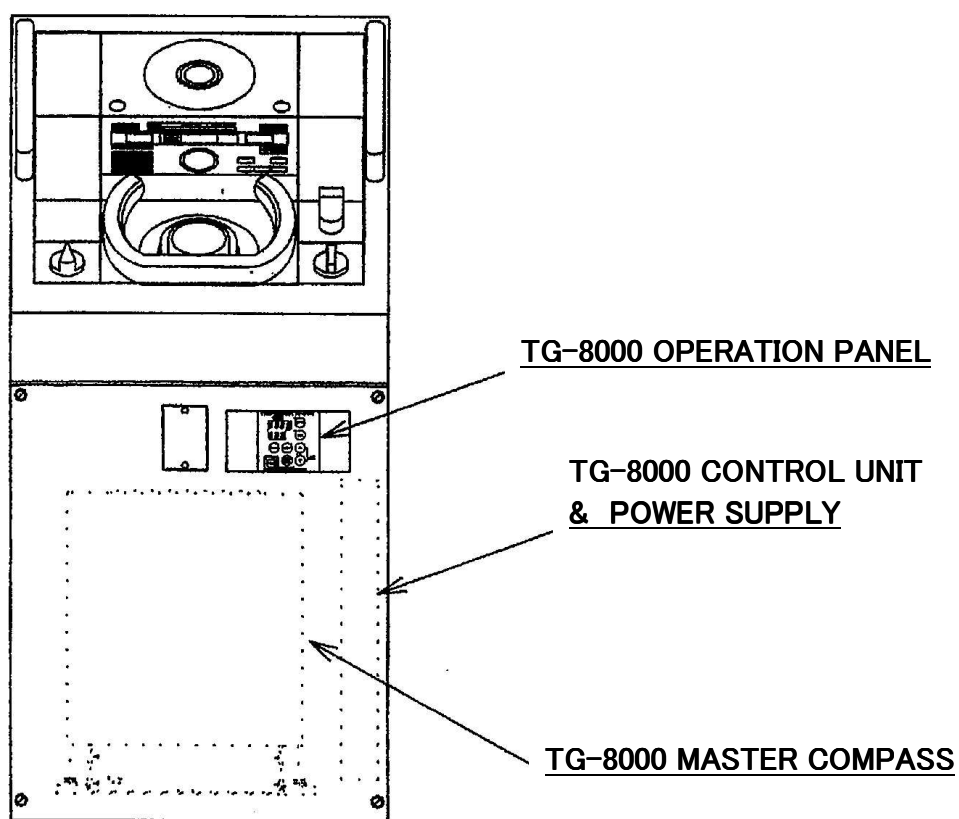


Fig. 1-4 Type S (Single) unit location

Mounting location of each unit (Type D [Dual])

One example of the mounting location is show below.

Refer to the finished plan maintained in the ship.

- Mounting location of the master compass, operation panel, power supply and control unit.
(In case of PR-6000 automatic steering system.)

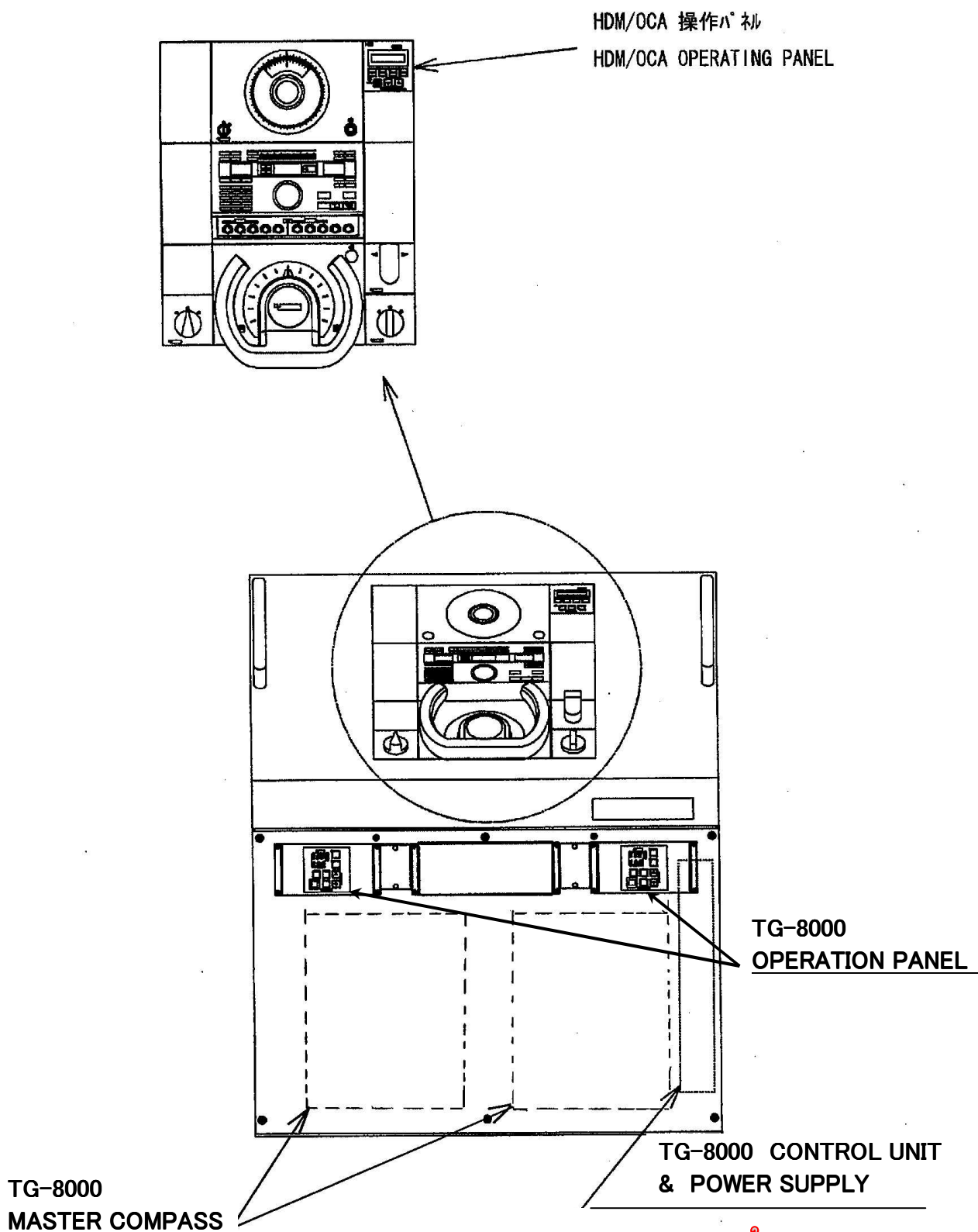
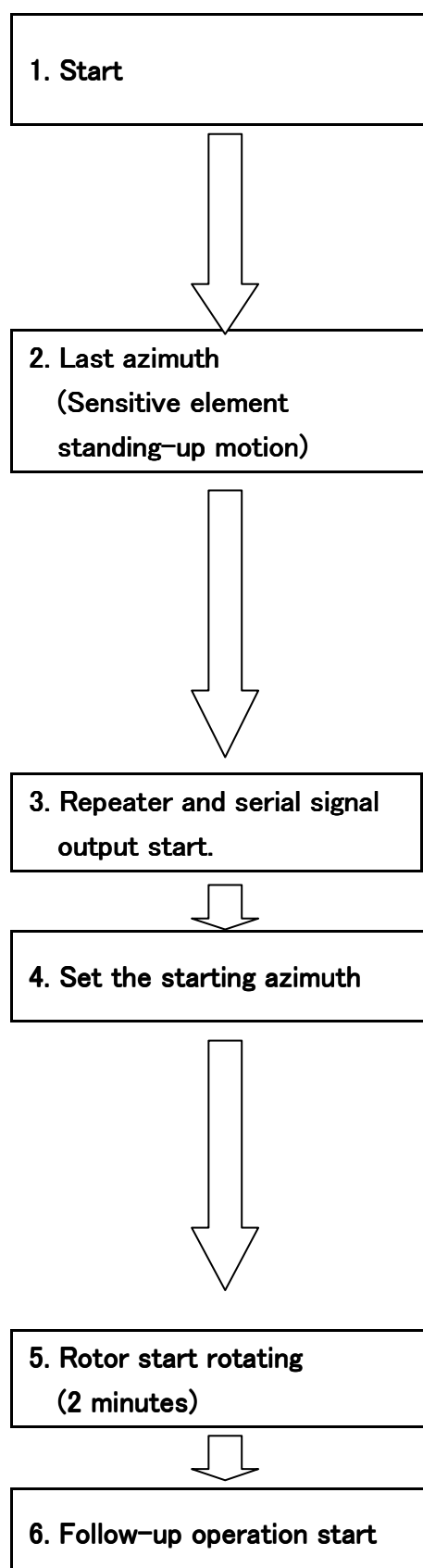


Fig. 1-5 Type D (Dual) unit location

2. Operation

2.1 Start and running.

* Refer to Fig. 2-1.



Turn on POWER switch on the operation panel.

System software version number of the control unit and the master compass are indicated on DATA DISPLAY⑧ in Fig. 2-1.

Note:

- In case system is programmed for “timer start”, set the departure time from the operation panel.

Wait for the phantom ring turning for 360° clockwise.

Note:

- If rotor in the sensitive element is rotating, system will put the breaks on the rotor (about 4 minutes max). During breaking, it is notified by flickering on LED⑪(GYRO) in Fig. 2-1. When rotor stops, LED⑪(GYRO) will be on constantly.
- The standing-up motion of the sensitive element continues for approximately about 1minutes (Maximum 30 minutes for TG-8500).

Set the starting azimuth by pushing 「▲」 or 「▼」. Initiate the system by pushing 「ACK/ENT」.

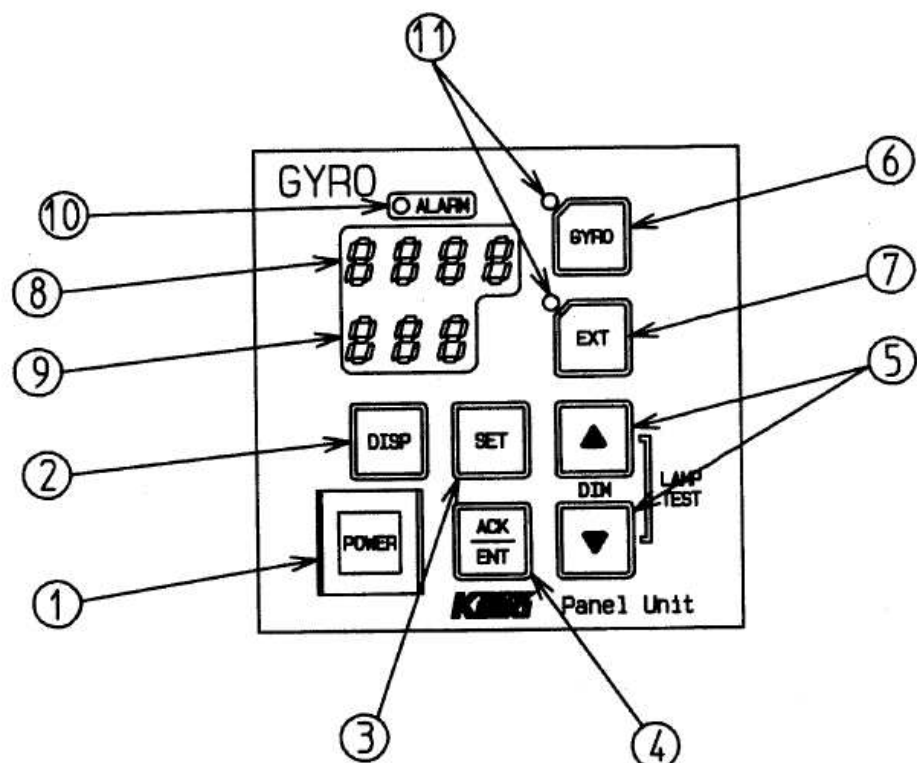
The DATA DISPLAY⑧ on Fig. 2-1 indicates the Gyro true bearing and the phantom ring physically turns to the entered starting azimuth as a starting point.

Note:

- If 「ACK/ENT」 is not pushed, this system automatically proceeds to the next sequence after 3 minutes.

The rotor starts to rotate and then it reaches to the max. speed in approx. 2 minutes.

The follow-up of the Gyro bearing system starts and the north-seeking motion starts.



- | | |
|--|--|
| ① 電源スイッチ (POWER)
POWER SWITCH | ⑥ システム選択スイッチ (GYRO)
SYSTEM SELECT SWITCH (GYRO) |
| ② DISPスイッチ
DISP SWITCH | ⑦ システム選択スイッチ (EXT.)
SYSTEM SELECT SWITCH (EXT.) |
| ③ SETスイッチ
SET SWITCH | ⑧ データ表示部
DATA DISPLAY |
| ④ ACK/ENTスイッチ
ACK/ENT SWITCH | ⑨ モード表示部
MODE DISPLAY |
| ⑤ $\Delta \nabla$ スイッチ
$\Delta \nabla$ SWITCH | ⑩ 警報表示灯
ALARM INDICATOR |
| | ⑪ システム選択表示灯
SYSTEM SELECT INDICATOR |

Fig. 2-1 TG-8000 operation panel

2.2 Sensitive element control (start-up sequence)

This section describes briefly how sensitive element is controlled and its start-up sequence. It also describes the difference between normal mode and test mode “b”.

* Refer to Fig. 2-2 thru Fig. 2-4.

1. Turn on the power switch. (Operation Panel).



Normal mode start
(Press just **POWER**.)



Test mode “b” start
(Press **DISP**+**SET** on then turn on the **POWER**.)
(Test mode “b” requires to press **DISP**, **SET** and **POWER** at the same time.)



The brake is applied to the rotor until it stops.
It takes 8~240 seconds.

2. Last azimuth finding motion starts.

- Phantom ring rotates clockwise until it finds the zero-cross point.
- Phantom ring rotates to the azimuth angle that was measured at last time.



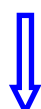
0 second.

3. Sensitive Element (S/E) stand up. (First control)

- MCC PWB measures the relative angle between the S/E and the horizontal ring by using the hall sensors of HRZC PWB. ⇒ “Line A” in Fig. 2-2.
- MCC PWB make the S/E to rotate the DST thru HRZC PWB so that S/E become parallel to the Horizontal ring reference.



10 seconds
(Normal mode)



60 seconds
(Test mode “b”)

4. S/E stand up. (Second control)

- In addition to the measurement by “Line A”, MCC PWB measures the rotor position in S/E by using the pick up coil (X) of S/E. ⇒ “Line B” in Fig. 2-2.
- MCC PWB make the S/E to rotate the DST thru HRZC PWB so that air bubble of rotor level gauge become almost the center.



50~162 seconds. Until **ENT** key is pressed
(Operation Panel).

5. S/E rotor start rotating



120 seconds.

6. Follow-up start of horizontal and azimuth (setting start).

- Measures stop monitoring of “Line A”.
Measures uses only the “Line B”.
- MCC PWB measures the rotor position in S/E by using the pick up coil (X) of S/E. ⇒ “Line B”
- MCC PWB make the S/E to rotate the DST thru HRZC PWB so that air bubble of rotor level gauge become almost the center.

During this stage, VR1/VR2 of HRZC PWB does not perform any function.

Keep continue stop 4.
Without rotating the rotor in the S/E.



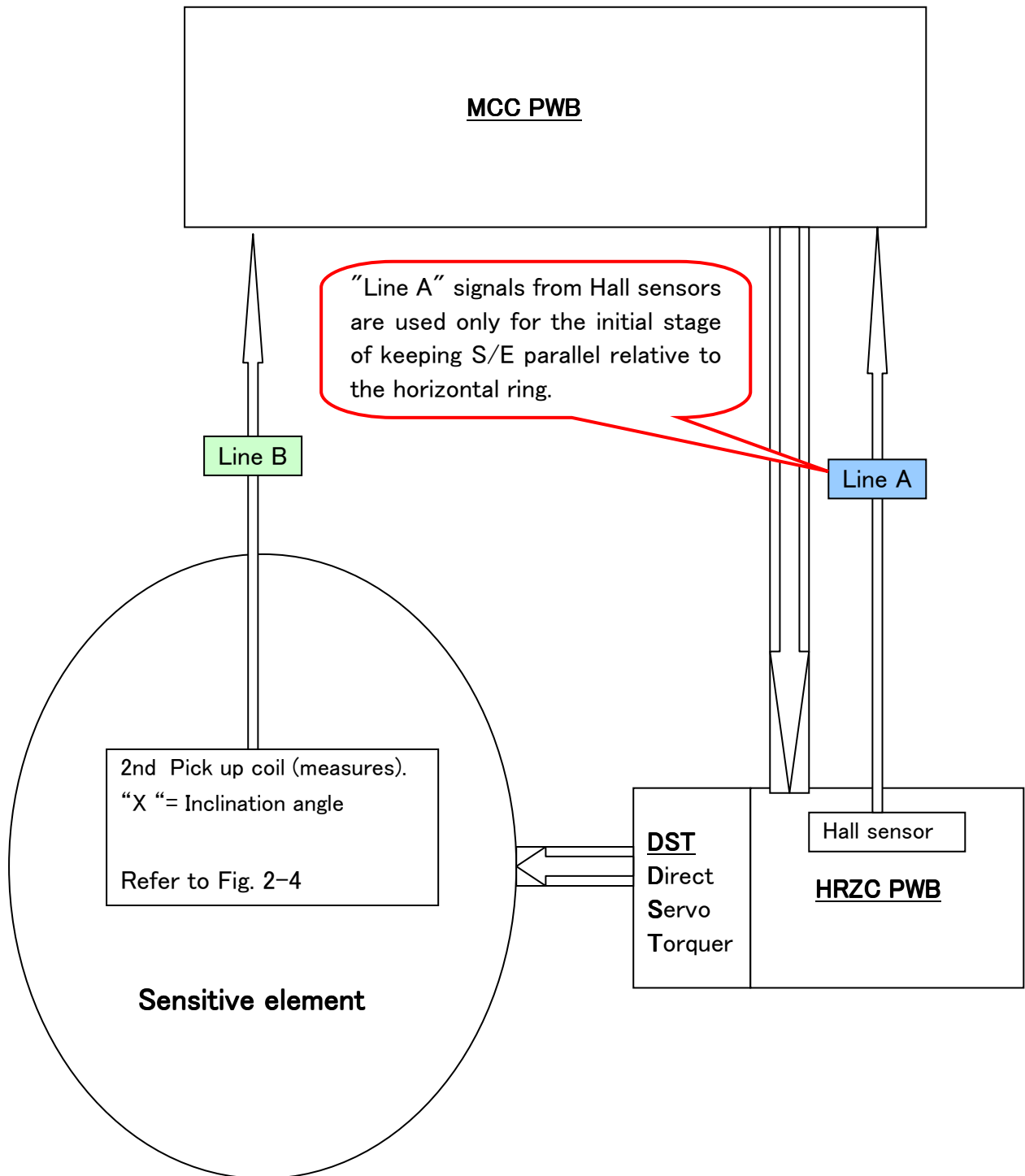


Fig. 2-2 Sensitive element control flow

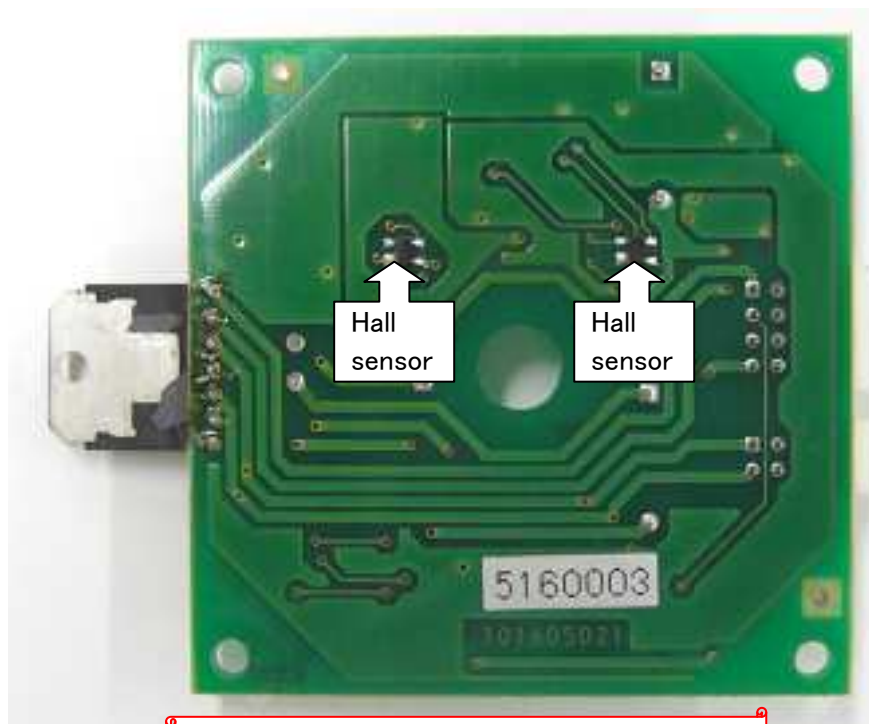


Fig. 2-3 HRZC PWB and Hall sensors

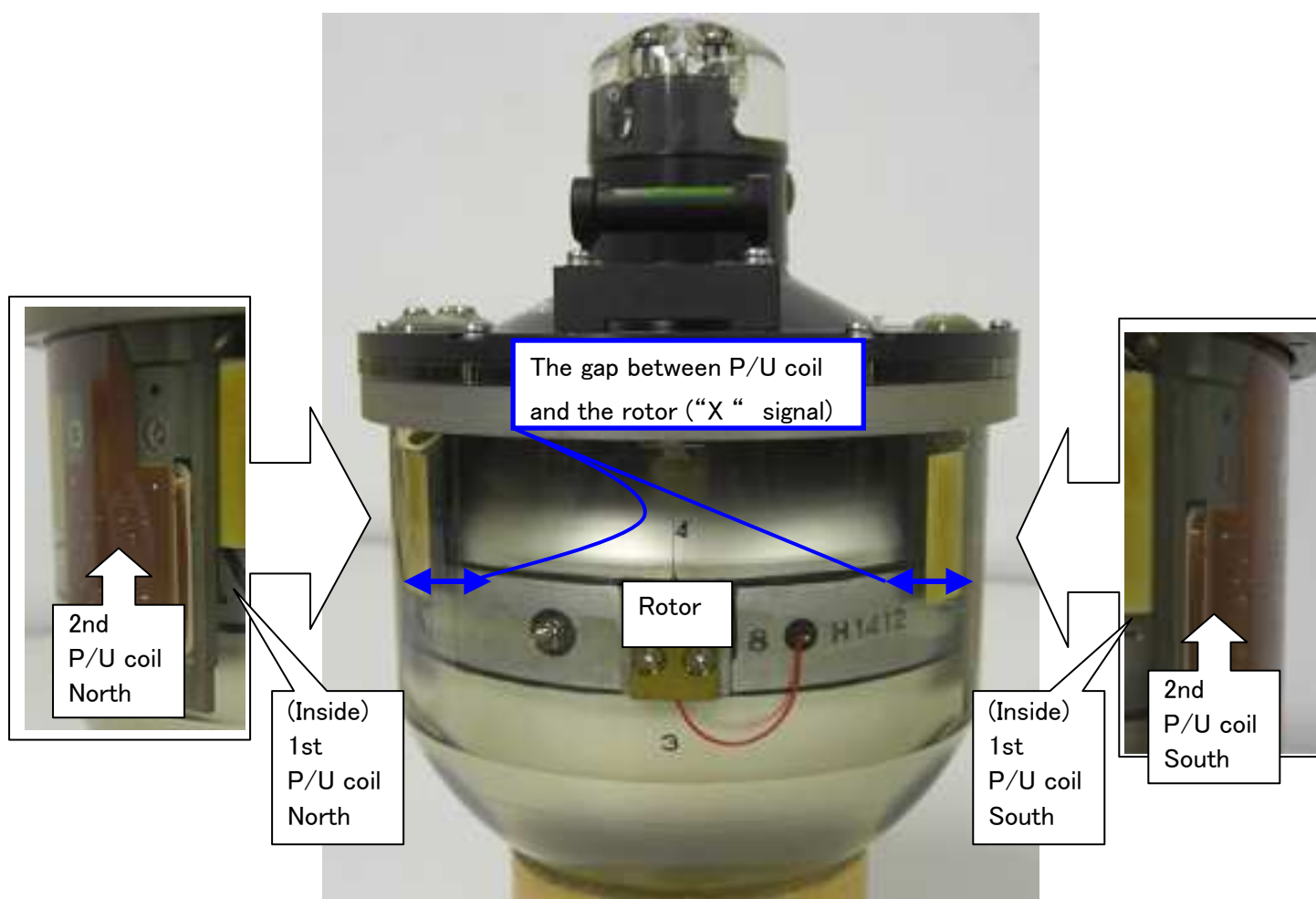
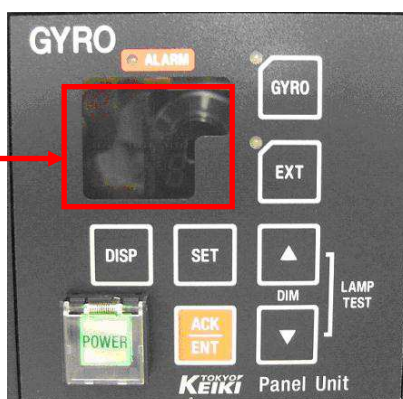


Fig. 2-4 Sensitive element and P/U coil

2.3 TG-8000 operating panel (Indicated data)

Press **DISP**



1. True bearing 1: ...※ a

S.S.G or S.S.E or GYt

S.S.G = Steering. Sensor. Gyro-compass
S.S.E = Steering. Sensor. External sensor
GYt = Gyro-compass tru e bearing (dual)

2. True bearing 2: ...※ a

ESt or GYt

ESt = External Sensor tru e bearing
GYt = Gyro-compass tru e bearing

3. Master compass bearing:

C.P.S

C.P.S = Compass

4. Latitude: ...※ b

LA.n or LA.S

LA.n = Latitude. North
LA.S = Latitude. South

5. Ship's speed: ...※ c

G.Sd or H.Sd or L.Sd or S.Sd

G.Sd = Gps. Speed
H.Sd = Hand. Speed
L.Sd = Log. Speed
S.Sd = Serial. Log Speed

6. Rate of turn: ...※ d

rt.

rt. = Rate. of turn

7. Alarm content:

Err

Err = Error

Fig. 2-5 Data and mode display

※ a Steering sensor selection

To select the gyro-compass, push the **GYRO** with pressing **ACK/ENT**.

To select the external heading sensor, push the **EXT** with pressing **ACK/ENT**.

※ b Setting of latitude input

First press **SET**, then select either "GPS"(GPS) or "GYro"(GYRO) by pushing **▲** or **▼**. Enter the selection by pushing **ACK/ENT**.

When "H.Sd"(MANUAL) was selected, as the latitude is displayed in the data indicator, set the latitude by pushing **▲** or **▼** and push again **ACK/ENT**.

Hereafter calculated latitude by ship's speed and the true bearing is indicated by using the manually entered latitude.

※ c Setting of ship's speed input

Push **SET**, and select one of the following modes; "G.Sd" (GPS), "H.Sd"(MANUAL), "L.Sd"(LOG PULSE), or "S.Sd" (LOG SERIAL) by **▲** or **▼**. Enter the selection by pushing **ACK/ENT**.

When "H.Sd"(MANUAL)" was selected, ship's speed is indicated in the data display. Then, set ship's speed by pushing **▲** or **▼**, and push again **ACK/ENT**.

※ d Setting of the "rate of turn filter constant"

When the "rate of turn filter constant" is changed, push **SET**. Select the "filter constant" by pushing **▲** or **▼**. The "filter constant" can be set to 0.5, 1 or 2 through 10 in 2 seconds step. Enter the selection by pushing **ACK/ENT**.

2.4 Service mode

2.4.1 Test mode “b”

Purpose

- Stop the spinning of sensitive element rotor for the preparation of various test and adjustment.
 - Wait until the phantom ring to rotate 360 degrees. Wait up to 4 minutes until the complete rotor stoppage in the sensitive element.
- Step and serial signal output check.

Operation

<Step and serial signal output check.>

- Press **DISP**+**SET** on the operating panel, and press **POWER**.
- Last azimuth (the card rotate for 360 degrees.)
- Set 0/90/180/270° by **▲**/**▼** then press **ACK/ENT**
 - Step signals reception machinery (repeater compass) should follow-up within $\pm 0.5^\circ$.
 - Equipment which receive serial signals from the GYRO should follow-up the azimuth within $\pm 0.5^\circ$
- Press **POWER** switch to turn off.

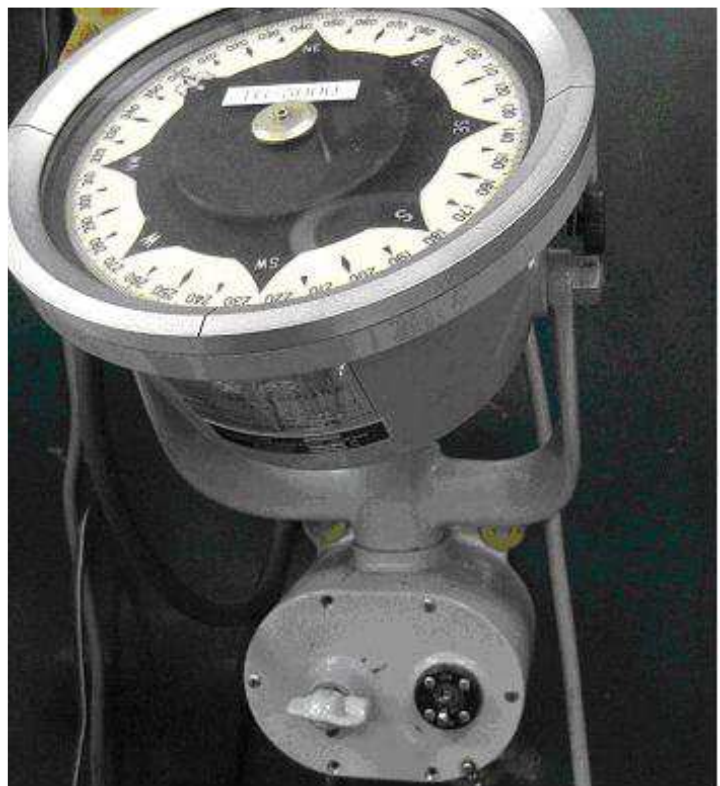


Fig. 2-6 Operating panel and repeater compass

2.4.2 ROTI mode

Purpose

- ROTI signal output check.

Operation

- Press **ACK/ENT**+**▼** on the operating panel at the same time, then turn on the **POWER**
- Last azimuth (Phantom ring turns for 360° .)
- Press **SET** , Set to 0° /min , P/S 20° /min by **▲**/**▼**, then press **ACK/ENT**.
 - Output signals should follow-up within 0 ± 0.5 deg/min, P/S 18.5~21.5 deg/min.
- Press **POWER** switch to turn off.

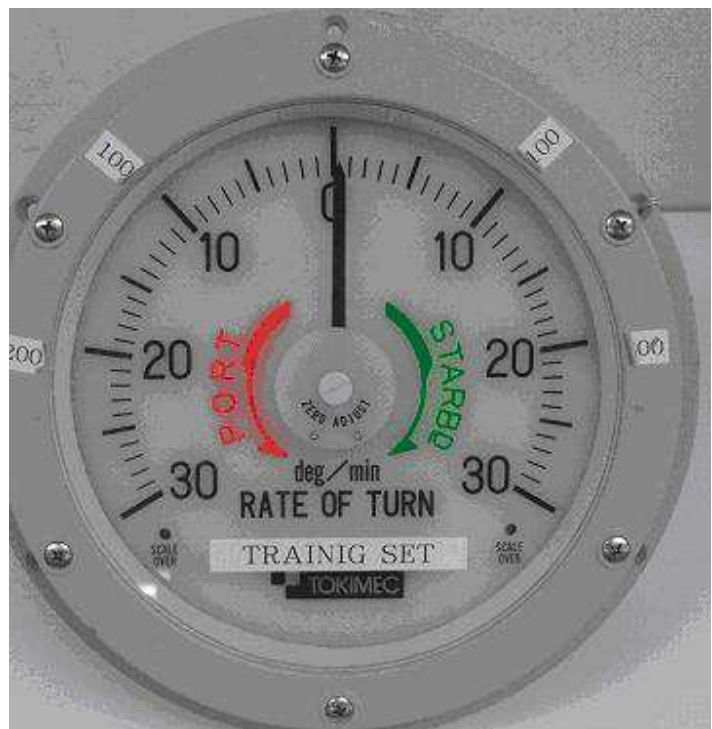


Fig. 2-7 Operating panel and rate of turn indicator (ROTI)

2.4.3 Test mode “a”

Purpose

- Zero-cross bearing set.

Note : When hole on a MCC PWB support frame, the corner of ZRCR PWB plate and a pin are on a straight line, MCC PWB display must be 0° .

If the MCC PWB display is not 0° , do the test mode “a”.

Operation

- Rotate the Phantom ring until the hole, the corner and the pin are on a straight line as shown in the picture.
- Press **DISP**+**SET**+**▲** on the operating panel at the same time, then turn on the **POWER**
- Last azimuth (Phantom ring turns for 360° .)
- Press **ACK/ENT**
- Press **POWER** switch to turn off.

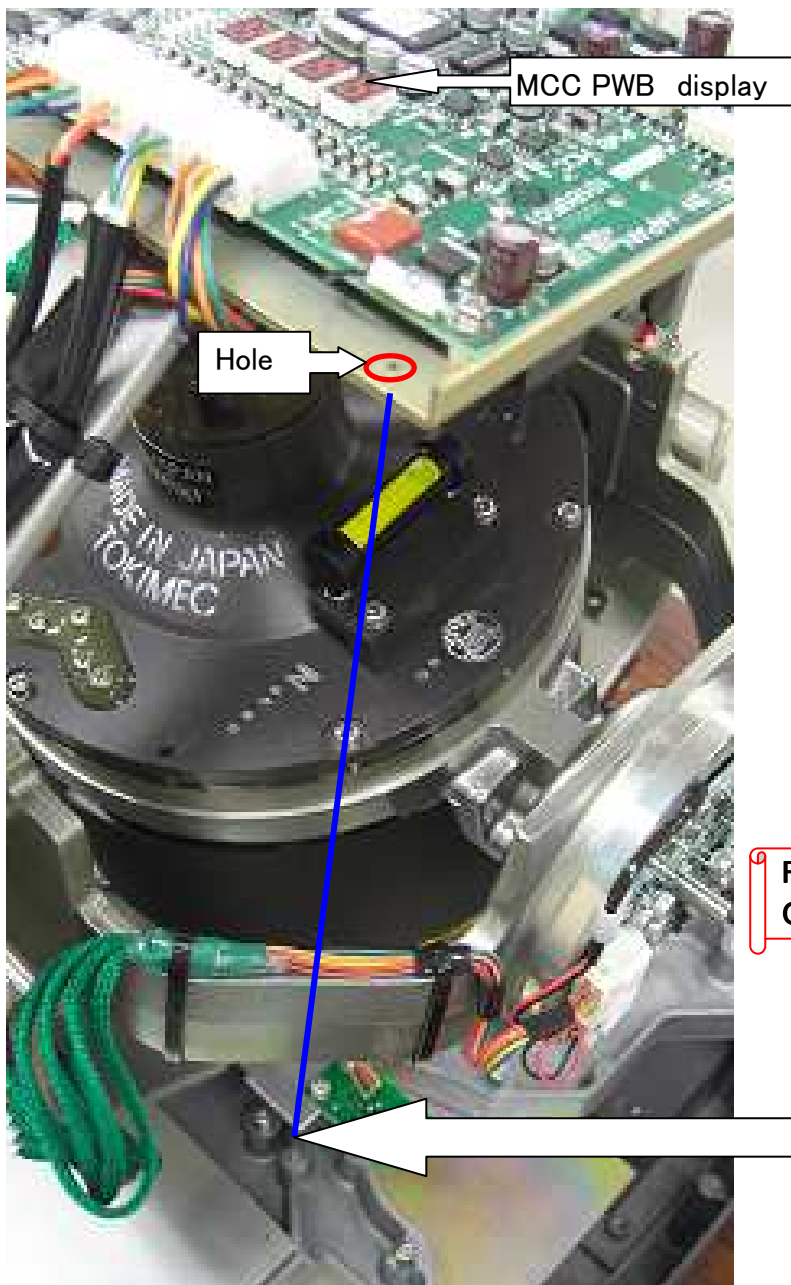
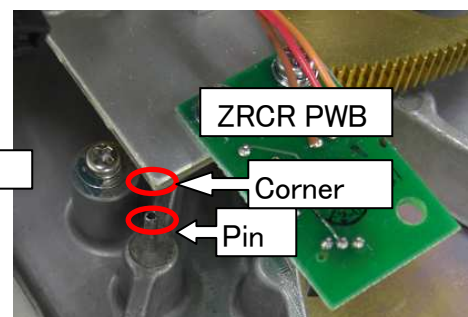


Fig. 2-8
Operating panel and zero-cross bearing.



2.4.4 Serial type repeater adjustment mode

RPCC PWB (serial type repeater)

* It has been already adjusted at factory before shipment. Accordingly, it does not required to adjust the RPCC PWB. However, it is required to adjust if this PWB, ZRCR PWB or step motor was replaced.

Measuring point : Card

Standard : $\pm 0.2^\circ$

Adjustment method : Start gyro compass system with TEST MODE "b".

: Set the bearing of master compass to 0° .

At this time, adjust with below instruction, DIGSW and DIPSW to make the indication of repeater compass card to be the standard value.

Adjustment : DIGSW : S2 DIPSW : only use S1 – 7 bit

* Range of adjustment is $\pm 1.5^\circ$

Set DIGSW to the value of 0.1° unit and DIPSW to the "polarity" (ON : minus).

Example : Case of the true bearing of master compass 0° , the indicated bearing of repeater, 1° . :

DIGSW "A" DIPSW "ON" in case of setting -1.0° .

After setting the amended value at 0° , confirm the deviation at each bearings by rotating the master compass for 45° by 45° , then confirm that each deviations become less than $\pm 0.2^\circ$.

In case each deviations is not less than $\pm 0.2^\circ$, change the setting of above switches and set again to distribute the deviation of each bearings.

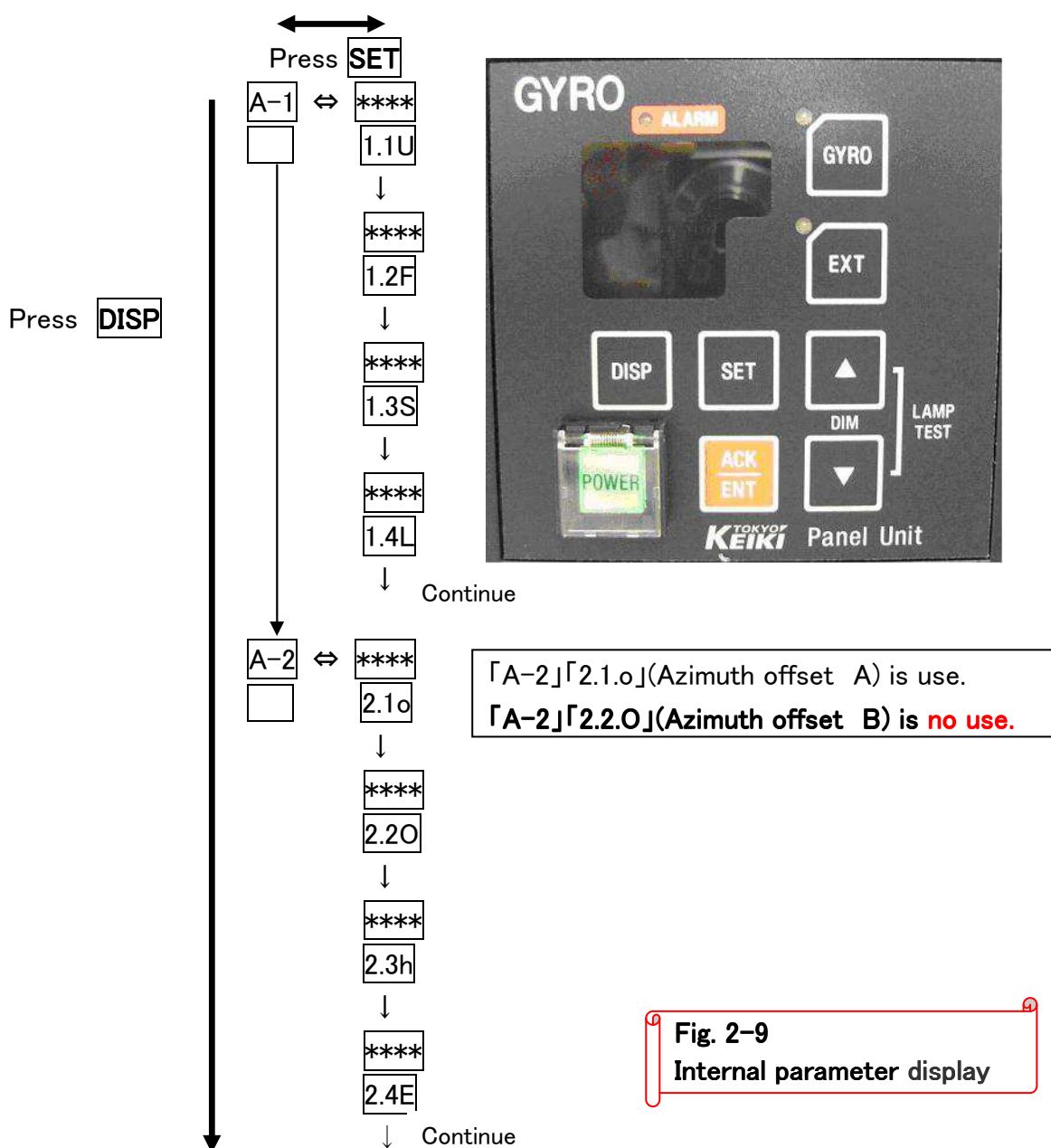
2.4.5 Internal parameter mode

Purpose

- When sensitive element is replaced, DAMPING GAIN and θ OFFSET parameters must be entered from the operation panel.
- Internal parameter check.

Operation

- Press **POWER** switch to turn on.
- Press **SET** & **ACK/ENT** at the same time for more than 3 seconds.
(Internal parameter mode)
- Push **DISP** and **SET** and change it.



- In order to change the parameter, press ▲ or ▼ and **ACK/ENT**.
- In order to get out of internal parameter mode, press **SET** & **ACK/ENT** at the same time for more than 3 seconds.

2.4.6 Alarm history mode

Purpose

- Alarm history check.

Operation

- Press **POWER** switch to turn on.
- Press **SET** & **ACK/ENT** at the same time for more than 3 seconds.
(Internal parameter mode)
- After displaying 「A-1」, Press **DISP** button 2 times.
- After displaying 「A-3」, Press **SET** button 1 times.
- After displaying 「Err」, Press **▲**.

↓ 「3.1E」

- After displaying 「2011」 (Year), Press **▲**.
- ↓ 「3.1E」

- After displaying 「0217」 (month / day), Press **▲**.
- ↓ 「3.1E」

- After displaying 「0912」 (Hour / Error code), Press **▲**.
- ↓ 「3.1E」

Example

Record more than ten (10) most recent errors.

Rotor tilting angle is abnormal.

- Press **SET** & **ACK/ENT** at the same time for more than 3 seconds in order to set out of Alarm history mode.



Fig. 2-10 Alarm history display

3. Setting

3.1 Dip switch and Jumper

3.1.1 Mastercompass

PWB	Name	Standard setting	Function	Details
Mcc pwb	NO.1	[OFF]	[V1.00]Don't touch	
			[V1.00A~]Master compass type	[OFF] : Standard [ON] : HSC
	NO.2	[OFF]	[V1.00]Don't touch	
			[V1.00A~]Display of master compass type	[ON]:In a standard type case, it is displayed as "Std." In a HSC type case, it is displayed as "HIGH."(LED on mcc PWB)
	NO.3	[OFF]	Rate limiter	[ON] : Rotation of Master compass is stopped at the turning rate more than 30°/sec. [OFF] :With no rate limiter
			[V1.00]Don't touch	
	NO.4	[OFF]	[V1.00A~]Startup sequence	Standard[ON]:leveling time is 2 minutes. HSC [ON]: Special sequence for dumping test.
	NO.5	[OFF]	[~V1.00A]Don't touch	
			[V1.03~]MS-8800 use Acceleration error revision operation confirmation	[ON] : An acceleration error revision operation confirmation mode [OFF] : Normal movement
	NO.6	[OFF]	[V1.00]Display of master compass type	[ON]:In a standard type case, it is displayed as "Std." In a HSC type case, it is displayed as "HIGH."(LED on mcc PWB)
			[V1.00A~]Don't touch	
	NO.7	[OFF]	[V1.00]Startup sequence	Standard[ON]: leveling time is 2 minutes. HSC [ON]: Special sequence for dumping test.
	NO.8	[OFF]	[V1.00b~]Master compass installation	[ON]: Master compass is installed reversely 180 degrees.
			[V1.00]Master compass type	[OFF] : Standard [ON] : HSC
	J7 (RESET)	OPEN	[V1.00A~]Don't touch CPU reset	This jumper is used when resetting "CPU."
	J8 (FLASH)	SHORT	Software install	OPEN:When the software is installed, open this jumper.
	VR1	—	Phase adjustment of a p/u signal.	Note:A damage will be given to a circuit if software is installed while this jumper has been short. "φ" "θ", and "x" pick up signals of "Sensitive element" are correctly changed into "DC voltage." Note:You should adjust, when "Sensitive element" is replaced.

PWB	Name	Standard setting	Function	Details
Smcc pwb	J5	OPEN	"Step motor signal controller" reset.	This jumper is used when resetting "step motor signal controll IC"
Hrzc pwb Same TG-6000	RV1	—	"Hunting stops" adjustment of sensitive element	VR1 and VR2 are very delicate variable resistors and fragile. By turning the dial beyond the limits(stop point), VR1 and VR2 will be damaged and HRZC PWB will be broken. Extreme caution must be paid to touch and turn the dial. keep the dial in a middle position unless absolutely necessary.
	RV2	—	"Level" adjustment of sensitive element	
Inverter pwb Same TG-6000	JP1	SHORT	"Over-current limit" set	Don't touch
	JP2	OPEN		
	JP3	OPEN		
	JP4	OPEN		
	JP5	(OPEN)	"Over-current limit" change time.	Don't touch 10169537 07 or Before : OPEN 10169537 08 or After : -----(No jumper)
	JP6	OPEN	"Roter power supply" output	Don't touch
	JP7	SHORT		
	JP8	SHORT	"Over-current limit" change time.	10169537 07 or Before : OPEN 10169537 08 or After : SHORT
	VR1	—	Use to adjust output voltage. Adjust to AC100Vrms $\pm 2V_{rms}$ (AC110V $\pm 2V_{avg}$).	

3.1.2 Type S/D (Control box)

PWB	Name	Standard setting	Function	Details
Scc pwb	SW1 NO.1	[OFF]	Control box type	[OFF] : Type S/D [ON] : Type I
	SW1 NO.2	[OFF]	Master compass type	[OFF] : Standard type [ON] : HSC type
	SW1 NO.3	[OFF]	Control box type	[OFF] : Type S [ON] : Type D(dual gyro)
	SW1 NO.4	[OFF]	No.2 gyro or not	[OFF] : No [ON] : Yes
	SW1 NO.5	[OFF]	Don't touch	
	SW1 NO.6	[OFF]	Don't touch	
	SW1 NO.7	[OFF]	Serial signal output	[OFF] : IEC61162-2 [ON] : Tokyo keiki format
	SW1 NO.8	[OFF]	Alarm output setup	[OFF] : All alarm output [ON] : Only power fail
	SW2 NO.1	[OFF]	Data output setting for collecting	NO1.[ON] NO2.[OFF] : New monitor output NO1.[ON] NO2.[ON] : No output
	SW2 NO.2	[OFF]		
	SW2 NO.3	[OFF]	[~V1.00A]Test mode	NO3.[OFF] NO4.[OFF] : Normal mode NO3.[OFF] NO4.[ON] : Test mode "a" NO3.[ON] NO4.[ON] : Test mode "ROTI"
	SW2 NO.4	[OFF]		
	SW2 NO.3	[OFF]	[V1.01~V1.03]Don't touch	
			[V1.04~]MS-8800 use	[OFF] : Standard type [ON] : MS-8800 use
	SW2 NO.4	[OFF]	[V1.01~]Don't touch	
	SW2 NO.5	[OFF]	Serial signal transmit frequency	NO5.[OFF] NO6.[OFF] : 1sec NO5.[ON] NO6.[OFF] : 200msec
	SW2 NO.6	[OFF]	IEC61162-1 ed.2	NO5.[ON] NO6.[ON] : Invalid(1sec)
	SW2 NO.7	[OFF]	Warning mask setting	[OFF] : No warning mask [ON] : Control power supply abnormally non-volatilization memory abnormality does not display it
	SW2 NO.8	[OFF]	[~V1.04]Test mode (Driving test use)	[OFF] : Standard [ON] : Test mode
			[V1.06~]System information point of contact output	[OFF] : Disable [ON] : Enable
	SW3 NO.1	[OFF]	Timer startup	[OFF] : No [ON] : Yes
	SW3 NO.2	[OFF]	Talker ID of "ROT" sentence	[OFF] : "HE" [ON] : "TI"
	SW3 NO.3	[OFF]	Rate of turn scale	NO3.[OFF] NO4.[OFF] : Max 30.0deg./min. NO3.[ON] NO4.[OFF] : Max 120.0deg./min.
	SW3 NO.4	[OFF]		NO3.[OFF] NO4.[ON] : Max 300.0deg./min. NO3.[ON] NO4.[ON] : Don't setting
	SW3 NO.5	[OFF]	Ban or permission of "ROT" sentence output	Valid at the time of external sensor(standard) selection [OFF] : Disable [ON] : Enable
	SW3 NO.6	[OFF]	[~V1.01A]Don't touch	
			[V1.01~]For GC80/85 or not	[OFF] : No [ON] : Yes("GC-80/85" is displayed at the time of starting.)
	SW3 NO.7	[OFF]	Don't touch	
	SW3 NO.8	[OFF]	[~V1.03]Don't touch	
			[V1.04~]Buzzer stop signal output	[OFF] : Disable [ON] : Enable

PWB	Name	Standard setting	Function	Details
Scc pwb	SW4 NO.1	[OFF]	[~V1.06]LOG(serial) baud rate of transmission	[ON] : 38400 bps ([OFF]: SW4-2,3)
		[OFF]	[V1.10~]Don't touch	
	SW4 NO.2	[OFF]	[~V1.06]LOG(serial) baud rate of transmission	[ON] : 9600 bps ([OFF]: SW4-1,3)
		[OFF]	[V1.10~]Don't touch	
	SW4 NO.3	[OFF]	[V1.12~]AGI-80 connection presence	[OFF] : AGI-80 connection nothing [ON] : AGI-80 connection existence
		[ON]	[~V1.06]LOG(serial) baud rate of transmission	[ON] : 4800 bps ([OFF]: SW4-1,2)
		[OFF]	[V1.10~]Don't touch	
	SW4 NO.4	[OFF]	[V1.12~]"HDG" sentence output	[OFF] : Disable [ON] : Enable
		[OFF]	[~V1.06]LOG(serial) baud rate of receive	[ON] : 38400 bps ([OFF]: SW4-5,6)
		[OFF]	[V1.10~]Don't touch	
		[OFF]	[V1.12~]Main power supply abnormality (E-1) Filter	[OFF] : 300msec [ON] : 2sec
	SW4 NO.5	[OFF]	[~V1.06]LOG(serial) baud rate of receive	[ON] : 9600 bps ([OFF]: SW4-4,6)
		[OFF]	[V1.10~]Don't touch	
	SW4 NO.6	[ON]	[~V1.06]LOG(serial) baud rate of receive	[ON] : 4800 bps ([OFF]: SW4-4,5)
		[OFF]	[V1.10~]Don't touch	
	J5 (RESET)	OPEN	CPU reset	This jumper is used when resetting "CPU."
(FLASH)	J6	SHORT	Software install	Open: When the software is installed of SCCpwb, open this jumper. Note: [Type S] Be sure to set "MIFC(J10) or SIFC(J17)pwb" to "OPEN". Note: [Type D] Be sure to set "MCOIF(J25 and J26) or SCOIF(J25 and J26)pwb" to "OPEN". Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J7 (1TX)	3-4 SHORT	Output serial signal chosen	Output port: GTERMpwb TB2 "1TX" 3-4 Short: IEC-61162-2 or TOKIMEC version 5-6 Short: IEC-61162-1 ed.2 1-2 Short: It is not used. Note: It is one that it can choose. Don't short two or more.
	J8 (2TX)	3-4 SHORT	Output serial signal chosen	Output port: GTERMpwb TB2 "2TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 Note: It is one that it can choose. Don't short two.

PWB	Name	Standard setting	Function	Details
Scc pwb	J9 (ALCN)	3-4 SHORT	Alarm contact output	Output port: GTERMpwb TB1 "ALCN" 3-4 Short: Alarm "OPEN" Normal "CLOSES" 1-2 Short: Alarm "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.
	J10 (RNCN)	1-2 SHORT	Running contact output	Output port: GTERMpwb TB1 "RNCN" 1-2 Short: Running "CLOSES" Normal "OPEN" 3-4 Short: Running "OPEN" Normal "CLOSES" Note: It is one that it can choose. Don't short two.
	J11 (DC/DC)	3-4 SHORT	Use to select dc-dc converter earth.(Do not change setting)	
	J7		"Over-current limit" set	Don't touch
	J8	OPEN	"Over-current limit" change time	Don't touch
Gpower Pwb	J9	1-2 SHORT	Power supply alarm setup (Now only "1-2 short" can choose.)	1-2 Short: "Main power supply alarm" and "DC power supply alarm" are separately. 3-4 Short: "Main power supply alarm" and "DC power supply alarm" are one alarm. Note: It is one that it can choose. Don't short two.
	J10	1-2 SHORT	Power supply alarm setup (Now only "1-2 short" can choose.)	1-2 Short: "Main power supply alarm" and "DC power supply alarm" are separately. 3-4 Short: "Main power supply alarm" and "DC power supply alarm" are one alarm. Note: It is one that it can choose. Don't short two.
	TB3—TB4		Main power supply voltage setup	OPEN: 220v AC SHORT: 100v/110v/115v AC
	VR1	-	Use to adjust voltage for master compass.Adjust to dc24v ±2v	
	VR2	-	Use to adjust over current value.(Do not change setting) (For master compass power supply)	
Gterm pwb	VR3	-	Use to adjust over current value.(Do not change setting) (For master compass power supply)	
	TB3—TB4		Dual gyro system or not	SHORT: Single gyro OPEN: Dual gyro

3.1.3 Type S (Control box)

PWB	Name	Standard setting	Function	Details
Mifc pwb	J4 (3TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "3TX" 3-4 Short: IEC-61162-1 ed2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J5 (4TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "4TX" 3-4 Short: IEC-61162-1 ed2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J6 (5TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "5TX" 3-4 Short: IEC-61162-1 ed2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J7 (GTX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "GTX" 3-4 Short: IEC-61162-1 ed2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: The true heading information on "Gyro-compass" is outputted regardless of a system change. (with HDM or EHS unit) However, when a "standard external heading sensor" is connected, the true direction of the selected sensor is outputted. Note: It is one that it can choose. Don't short two.
	J8 (IEC2)	SHORT	Type setup	Short: Standard Open: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J9 (IEC1)	SHORT	Type setup	Short: Standard Open: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J10 (WR/EXT)	SHORT	Software install or internal communication	Open: When the software is installed of SCCpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J11 (LOG)	1-2 SHORT	LOG contact signal chosen	Input port: GTERMpwb TB1 "SL" 1-2 Short: 200 pulses/n mile 3-4 Short: 400 pulses/n mile Note: It is one that it can choose. Don't short two.
	J12 (ROT)	1-2 SHORT	"rate of turn" Analog signal level selection.	Output port: GTERMpwb TB1 "1RT~3RT" 1-2 Short: Output voltage 0v to $\pm 5v$ DC or 0v to $\pm 10v$ DC 3-4 Short: Output voltage 0v to $\pm 5v$ DC or 0v to $\pm 10v$ DC Note: It is one that it can choose. Don't short two.

PWB	Name	Standard setting	Function	Details
Mifc pwb	J13 (SSEL)	1-2 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "5TX" 1-2 Short: The signal set up by "J6" is outputted. 3-4 Short: The true heading information on "Gyro-compass" is outputted regardless of a system change. (with HDM or EHS unit) Note: When a "standard external heading sensor" is connected, the true direction of the selected sensor is outputted. Note: It is one that it can choose. Don't short two.
	J14 (GPSPOL)	1-2 SHORT	Polarity of the "GPS" signal setting	Input port: GTERMpwb TB1 "GRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J15 (LOGPOL)	1-2 SHORT	Polarity of the "LOG" signal setting	Input port: GTERMpwb TB1 "LRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J16 (ESPOL)	1-2 SHORT	Polarity of the "external heading sensor" signal setting	Input port: GTERMpwb TB1 "ESRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J17 (RXD3SEL)	1-2 SHORT	The receiving port of CPU in SCCpwb is chosen	1-2 Short: An option serial signal is received. 3-4 Short: "GPS" serial signal(38400bps only) is received.(Reservation) Note: It is one that it can choose. Don't short two.
	J18 (ST1)	1-2 SHORT	An output port setup of "GTERM pwb" (Change all of 3 jumpers.) simultaneously	Output port: GTERMpwb TB2 "ST1/OPRX+" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST1) 3-4 Short: Serial signal receive.(OPTION) (OPRX+) Note: It is one that it can choose. Don't short two.
	J19 (ST2)	1-2 SHORT	An output port setup of "GTERM pwb" (Change all of 3 jumpers.) simultaneously	Output port: GTERMpwb TB2 "ST2/OPRX-" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST2) 3-4 Short: Serial signal receive.(OPTION) (OPRX-) Note: It is one that it can choose. Don't short two.

PWB	Name	Standard setting	Function	Details
Mifc pwb	J20 (ST3)	1-2 SHORT	An output port setup of "GTERM pwb" (Change all of 3 jumpers.) simultaneously	Output port: GTERMpwb TB2 "ST2/OPRXC" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST3) 3-4 Short: Serial signal receive.(OPTION) (OPRXC) Note: It is one that it can choose. Don't short two.
	VR1	-	Gain adjustment of "rate of turn."	The gain of a "rate of turn" analog signal is adjusted. In "±30 degrees/min", it adjusts to "±5v ±0.33v DC.
	VR2	-	Off set adjustment of "rate of turn."	The off set of a "rate of turn" analog signal is adjusted. In "±0 degrees/min", it adjusts to "0v ±80mv DC.
	J6 (3TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "3TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
Sifc pwb	J7 (4TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "4TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J8 (5TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "5TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J9 (6TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "6TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J10 (7TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "7TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J11 (8TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "8TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.

PWB	Name	Standard setting	Function	Details
Sific pwb	J12 (9TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB1 "9TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J13 (10TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB1 "10TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J14 (GTX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "GTX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: The true heading information on "Gyro-compass" is outputted regardless of a system change. (with HDM or EHS unit) However, when a "standard external heading sensor" is connected, the true direction of the selected sensor is outputted. Note: It is one that it can choose. Don't short two.
	J15 (IEC2)	SHORT	Type setup	Short: Standard Open: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J16 (IEC1)	SHORT	Type setup	Short: Standard Open: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J17 (WR/EXT)	SHORT	Software install or internal communication	Open: When the software is installed of SCCpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J18 (ROT)	1-2 SHORT	"Rate of turn" Analog signal level selection.	Output port: GTERMpwb TB1 "1RT~3RT" 1-2 Short: Output voltage 0v to $\pm 5v$ DC or 0v to $\pm 10v$ DC 3-4 Short: Output voltage 0v to $\pm 5v$ DC or 0v to $\pm 10v$ DC Note: It is one that it can choose. Don't short two.
	J19 (LOG)	1-2 SHORT	LOG contact signal chosen	Input port: GTERMpwb TB1 "SL" 1-2 Short: 200 pulses/n mile 3-4 Short: 400 pulses/n mile Note: It is one that it can choose. Don't short two.

PWB	Name	Standard setting	Function	Details
Sfc pwb	J20 (GPSPOL)	1-2 SHORT	Polarity of the "GPS" signal setting	Input port: GTERMpwb TB1 "GRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J21 (LOGPOL)	1-2 SHORT	Polarity of the "LOG" signal setting	Input port: GTERMpwb TB1 "LRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J22 (ESPOL)	1-2 SHORT	Polarity of the "external heading sensor" signal setting	Input port: GTERMpwb TB1 "ESRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J23 (RXD3SEL)	1-2 SHORT	The receiving port of CPU in SCCpwb is chosen	1-2 Short: An option serial signal is received. 3-4 Short: "GPS" serial signal(38400bps only) is received.(Reservation) Note: It is one that it can choose. Don't short two.
	J24 (SSEL)	1-2 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "5TX" 1-2 Short: The signal set up by "J6" is outputted. 3-4 Short: The true heading information on "Gyro-compass" is outputted regardless of a system change. (with HDM or EHS unit) Note: When a "standard external heading sensor" is connected, the true direction of the selected sensor is outputted. Note: It is one that it can choose. Don't short two.
	J25 (ST1)	1-2 SHORT	An output port setup of "GTERM pwb" (Change all of 3 jumpers simultaneously.)	Output port: GTERMpwb TB2 "ST1/OPRX+" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST1) 3-4 Short: Serial signal receive.(OPTION) (OPRX+) Note: It is one that it can choose. Don't short two.
	J26 (ST2)	1-2 SHORT	An output port setup of "GTERM pwb" (Change all of 3 jumpers simultaneously.)	Output port: GTERMpwb TB2 "ST2/OPRX-" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST2) 3-4 Short: Serial signal receive.(OPTION) (OPRX-) Note: It is one that it can choose. Don't short two.
	J27 (ST3)	1-2 SHORT	An output port setup of "GTERM pwb" (Change all of 3 jumpers simultaneously.)	Output port: GTERMpwb TB2 "ST2/OPRXC" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST3) 3-4 Short: Serial signal receive.(OPTION) (OPRXC) Note: It is one that it can choose. Don't short two.

PWB	Name	Standard setting	Function	Details
Sific pwb	VR1	-	Gain adjustment of "rate of turn."	The gain of a "rate of turn" analog signal is adjusted. In " ± 30 degrees/min", it adjusts to " $\pm 5v \pm 0.33v$ DC.
	VR2	-	Off set adjustment of "rate of turn."	The off set of a "rate of turn" analog signal is adjusted. In " ± 0 degrees/min", it adjusts to " $0v \pm 80mv$ DC.

3.1.4 Type D (Control box)

PWB	NO.	Standard setting		Function	Details	
		SW1	NO.1		NO1.[OFF] NO2.[OFF] : Non	NO1.[ON] NO2.[OFF] : External sensor connection
Mcoif pwb		SW1	NO.2	External sensor connection	NO1.[OFF] NO2.[ON] : Mag. System connection(back	NO1.[ON] NO2.[ON] : Ext. System connection(back up)
		SW1	NO.3	Automatic system change	[OFF] : No	[ON] : Yes
		SW1	NO.4	Don't touch		
		SW1	NO.5	[~V1.01]Don't touch		
				[V1.02~]ACK contact output of HDM. (200ms)	Output port: DTERMpwb TB21 "MRNCN"	
					[OFF] : Running contact output of HDM. (Refer to J38)	
					[ON] : ACK contact output of HDM, When all alarms of HDM have been ACK.	
		SW1	NO.6	[~V1.02]Don't touch		
				[V1.03~]HDM detection condition	[OFF] : Only in AUTO	[ON] : All steerage mode
		SW1	NO.7	Don't touch		
		SW1	NO.8	Don't touch		
	J15 (3TX)		3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "3TX"	
					3-4 Short: IEC-61162-1 ed.2	
					1-2 Short: IEC-61162-2 or TOKIMEC version	
					Note: It is one that it can choose. Don't short two.	
	J16 (4TX)		3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "4TX"	
					3-4 Short: IEC-61162-1 ed.2	
					1-2 Short: IEC-61162-2 or TOKIMEC version	
					Note: It is one that it can choose. Don't short two.	
	J17 (5TX)		3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "5TX"	
					3-4 Short: IEC-61162-1 ed.2	
					1-2 Short: IEC-61162-2 or TOKIMEC version	
					Note: It is one that it can choose. Don't short two.	
	J18 (IEC2)		SHORT	Type setup	Short: Standard	
					Open: With an external heading sensor. (with HDM or EHS unit)	Type M or E
	J19 (IEC1)		SHORT	Type setup	Short: Standard	
					Open: With an external heading sensor. (with HDM or EHS unit)	Type M or E

PWB	NO.	Standard setting	Function	Details
Mcoif pwb	J20 (G1TX)	3-4 SHORT	Output serial signal chosen.	Output port: DTERMpwb TB21 "G1-1TX" and TB21 "G1-2TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: The true heading information on "NO.1 Gyro-compass" is outputted regardless of a system change.
	J21 (G2TX)	3-4 SHORT	Output serial signal chosen.	Output port: DTERMpwb TB21 "G2-1TX" and TB21 "G2-2TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: The true heading information on "NO.1 Gyro-compass" is outputted regardless of a system change.
	J22 (GPSPOL)	1-2 SHORT	Polarity of the "GPS" signal setting	Input port: GTERMpwb TB1 "GRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J23 (LOGPOL)	1-2 SHORT	Polarity of the "LOG" signal setting	Input port: GTERMpwb TB1 "LRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J24 (RXD3SEL)	1-2 SHORT	The receiving port of CPU in SCCpwb is chosen	1-2 Short: An option serial signal is received. 3-4 Short: The serial signal outputted from SCCIFpwb is received. 5-6: Short: "GPS" serial signal(38400bps only) is received.(Reservation) Note: It is one that it can choose. Don't short two or more.
	J25 (1WR/EXT)	SHORT	Software install or internal communication with "NO.1 Gyro-compass"	Open : When the software is installed of SCCpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J26 (2WR/EXT)	SHORT	Software install or internal communication with "NO.2 Gyro-compass"	Open : When the software is installed of SCCpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.

PWB	NO.	Standard setting	Function	Details
Mcoif pwb	J27 (LOG)	1-2 SHORT	LOG contact signal chosen	Input port: GTERMpwb TB1 "SL" 1-2 Short: 200 pulses/n mile 3-4 Short: 400 pulses/n mile Note: It is one that it can choose. Don't short two.
	J28 (ROT)	1-2 SHORT	"Rate of turn" Analog signal level selection.	Output port: GTERMpwb TB1 "1IRT~3RT" 1-2 Short: Output voltage 0v to $\pm 5v$ DC or 0v to $\pm 10v$ DC 3-4 Short: Output voltage 0v to $\pm 5v$ DC or 0v to $\pm 10v$ DC Note: It is one that it can choose. Don't short two.
	J29 (ESPOL)	1-2 SHORT	Polarity of the "external heading sensor" signal setting	Input port: GTERMpwb TB1 "ESRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J30 (MWR/EXT)	SHORT	Software install or internal communication with "MCOIF"	Open: When the software is installed of MCOIF-pwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J31 (FLASH)	SHORT	Software install	Open: When the software is installed of MCOIF-pwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J32 (RESET)	OPEN	CPU reset	This jumper is used when resetting "CPU."
	J33 (ESSEL1)	1-2 SHORT	Type setup	1-2 Short: Standard(The serial signal of a standard external direction sensor is received, and the signal is sent to "NO.1 Gyro-compass".) 3-4 Short: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J34 (ESSEL2)	1-2 SHORT	Type setup	1-2 Short: Standard(The serial signal of a standard external direction sensor is received, and the signal is sent to "NO.2 Gyro-compass".) 3-4 Short: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J35 (ESSEL3)	1-2 SHORT	Type setup	1-2 Short: Standard(The serial signal of a standard external direction sensor is received, and the signal is receive from "external heading sensor".) 3-4 Short: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J36 (ESSEL4)	1-2 SHORT	Type setup	1-2 Short: Standard(The serial signal of a standard external direction sensor is received, and the signal is receive from "external heading sensor".) 3-4 Short: With an external heading sensor. (with HDM or EHS unit) Type M or E

PWB	NO.	Standard setting	Function	Details
Mcoif pwb	J37 (MALCN)	3-4 SHORT	Alarm contact output of HDM	Output port: DTERMpwb TB21 "MALCN" 3-4 Short: Alarm "OPEN" Normal "CLOSES" 1-2 Short: Alarm "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.
	J38 (MRNCN)	1-2 SHORT	Running contact output of HDM	Output port: DTERMpwb TB21 "MRNCN" 3-4 Short: Running "OPEN" Normal "CLOSES" 1-2 Short: Running "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.
	J39 (DFCN)	3-4 SHORT	Deference alarm contact output of HDM	Output port: DTERMpwb TB21 "DFCN" 3-4 Short: Alarm "OPEN" Normal "CLOSES" 1-2 Short: Alarm "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.
	J40 (OCACN)	3-4 SHORT	Off course alarm contact output	Output port: DTERMpwb TB21 "OCACN" 3-4 Short: Alarm "OPEN" Normal "CLOSES" 1-2 Short: Alarm "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.
	J41 (ST1)	1-2 SHORT	An output port setup of "GTERM pwb"	Output port: GTERMpwb TB2 "ST1/OPRX+" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST1) 3-4 Short: Serial signal receive.(OPTION) (OPRX+) Note: It is one that it can choose. Don't short two.
	J42 (ST2)	1-2 SHORT	An output port setup of "GTERM pwb"	Output port: GTERMpwb TB2 "ST2/OPRX-" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST2) 3-4 Short: Serial signal receive.(OPTION) (OPRX-) Note: It is one that it can choose. Don't short two.
	J43 (ST3)	1-2 SHORT	An output port setup of "GTERM pwb"	Output port: GTERMpwb TB2 "ST2/OPRXC" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST3) 3-4 Short: Serial signal receive.(OPTION) (OPRXC) Note: It is one that it can choose. Don't short two.
	VR1		Gain adjustment of "rate of turn."	The gain of a "rate of turn" analog signal is adjusted. In " ± 30 degrees/min ", it adjusts to " $\pm 5v \pm 0.33v$ DC.
	VR2		Off set adjustment of "rate of turn."	The off set of a "rate of turn" analog signal is adjusted. In " ± 0 degrees/min ", it adjusts to " $0v \pm 80mv$ DC.

PWB	NO.	Standard setting		Function	Details	
		SW1	NO.1		NO1.[OFF] NO2.[OFF] : Non	NO1.[ON] NO2.[OFF] : External sensor connection
Scoif pwb	SW1	NO.2	[OFF]	External sensor connection	NO1.[OFF] NO2.[ON] : Mag. System connection(back	NO1.[ON] NO2.[ON] :Ext. System connection(back up)
	SW1	NO.3	[OFF]	Automatic system change	[OFF] : no	[ON] : yes
	SW1	NO.4	[OFF]	Don't touch		
	SW1	NO.5	[OFF]	[~V1.01]Don't touch		
				[V1.02~]ACK contact output of HDM. (200ms)	Output port: DTERMpwb TB21 "MRNCON"	
					[OFF] : Running contact output of HDM. (Refer to J38)	
					[ON] : ACK contact output of HDM, When all alarms of HDM have been ACK.	
	SW1	NO.6	[OFF]	[~V1.02]Don't touch		
	SW1	NO.7	[OFF]	[V1.03~]HDM detection condition	[OFF] : Only in AUTO [ON] : all steerage mode	
	SW1	NO.8	[OFF]	Don't touch		
				Debugging	Don't touch	
	J15 (3TX)		3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "3TX"	
					3-4 Short: IEC-61162-1 ed.2	
					1-2 Short: IEC-61162-2 or TOKIMEC version	
					Note: It is one that it can choose. Don't short two.	
	J16 (4TX)		3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "4TX"	
					3-4 Short: IEC-61162-1 ed.2	
					1-2 Short: IEC-61162-2 or TOKIMEC version	
					Note: It is one that it can choose. Don't short two.	
	J17 (5TX)		3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "5TX"	
					3-4 Short: IEC-61162-1 ed.2	
					1-2 Short: IEC-61162-2 or TOKIMEC version	
					Note: It is one that it can choose. Don't short two.	
	J18 (IEC2)		SHORT	Type setup	Short: Standard	
					Open: With an external heading sensor. (with HDM or EHS unit) Type M or E	
	J19 (IEC1)		SHORT	Type setup	Short: Standard	
					Open: With an external heading sensor. (with HDM or EHS unit) Type M or E	

PWB	NO.	Standard setting	Function	Details
Scoif pwb	J20 (G1TX)	3-4 SHORT	Output serial signal chosen.	Output port: DTERMpwb TB21 "G1-1TX" and TB21 "G1-2TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: The true heading information on "NO.1 Gyro-compass" is outputted regardless of a system change.
	J21 (G2TX)	3-4 SHORT	Output serial signal chosen.	Output port: DTERMpwb TB21 "G2-1TX" and TB21 "G2-2TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: The true heading information on "NO.1 Gyro-compass" is outputted regardless of a system change.
	J22 (GPSPOL)	1-2 SHORT	Polarity of the "GPS" signal setting	Input port: GTERMpwb TB1 "GRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J23 (LOGPOL)	1-2 SHORT	Polarity of the "LOG" signal setting	Input port: GTERMpwb TB1 "LRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J24 (RXD3SEL)	1-2 SHORT	The receiving port of CPU in SCCpwb is chosen	1-2 Short: An option serial signal is received. 3-4 Short: The serial signal outputted from SCCIFpwb is received. 5-6: Short: "GPS" serial signal(38400bps only) is received.(Reservation) Note: It is one that it can choose. Don't short two or more.
	J25 (1WR/EXT)	SHORT	Software install or internal communication with "NO.1 Gyro-compass"	Open : When the software is installed of SCCpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J26 (2WR/EXT)	SHORT	Software install or internal communication with "NO.2 Gyro-compass"	Open : When the software is installed of SCCpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.

PWB	NO.	Standard setting	Function	Details
Scoif pwb	J27 (LOG)	1-2 SHORT	LOG contact signal chosen	Input port: GTERMpwb TB1 "SL" 1-2 Short: 200 pulses/n mile 3-4 Short: 400 pulses/n mile Note: It is one that it can choose. Don't short two.
	J28 (ROT)	1-2 SHORT	"Rate of turn" Analog signal level selection.	Output port: GTERMpwb TB1 "1IRT~3RT" 1-2 Short: Output voltage 0v to $\pm 5v$ DC or 0v to $\pm 10v$ DC 3-4 Short: Output voltage 0v to $\pm 5v$ DC or 0v to $\pm 10v$ DC Note: It is one that it can choose. Don't short two.
	J29 (ESPOL)	1-2 SHORT	Polarity of the "external heading sensor" signal setting	Input port: GTERMpwb TB1 "ESRX" 1-2 Short: Standard 3-4 Short: Polarity is carried out reversely. Note: When a signal cannot be received by "1-2 short", it is set as "3-4 short." Note: It is one that it can choose. Don't short two.
	J30 (MWR/EXT)	SHORT	Software install or internal communication with "SCOIF"	Open: When the software is installed of SCOIFpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J31 (FLASH)	SHORT	Software install	Open: When the software is installed of SCOIFpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J32 (RESET)	OPEN	CPU reset	This jumper is used when resetting "CPU."
	J33 (ESSEL1)	1-2 SHORT	Type setup	1-2 Short: Standard(The serial signal of a standard external direction sensor is received, and the signal is sent to "NO.1 Gyro-compass") 3-4 Short: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J34 (ESSEL2)	1-2 SHORT	Type setup	1-2 Short: Standard(The serial signal of a standard external direction sensor is received, and the signal is sent to "NO.2 Gyro-compass") 3-4 Short: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J35 (ESSEL3)	1-2 SHORT	Type setup	1-2 Short: Standard(The serial signal of a standard external direction sensor is received, and the signal is receive from "external heading sensor") 3-4 Short: With an external heading sensor. (with HDM or EHS unit) Type M or E
	J36 (ESSEL4)	1-2 SHORT	Type setup	1-2 Short: Standard(The serial signal of a standard external direction sensor is received, and the signal is receive from "external heading sensor") 3-4 Short: With an external heading sensor. (with HDM or EHS unit) Type M or E

PWB	NO.	Standard setting	Function	Details
Scoif pwb	J37 (6TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "6TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J38 (7TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "7TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J39 (8TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB2 "8TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J40 (9TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB1 "9TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J41 (10TX)	3-4 SHORT	Output serial signal chosen.	Output port: GTERMpwb TB1 "10TX" 3-4 Short: IEC-61162-1 ed.2 1-2 Short: IEC-61162-2 or TOKIMEC version Note: It is one that it can choose. Don't short two.
	J42 (MALCN)	3-4 SHORT	Alarm contact output of HDM	Output port: DTERMpwb TB21 "MALCN" 3-4 Short: Alarm "OPEN" Normal "CLOSES" 1-2 Short: Alarm "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.
	J43 (MRNCN)	1-2 SHORT	Running contact output of HDM	Output port: DTERMpwb TB21 "MRNCN" 3-4 Short: Running "OPEN" Normal "CLOSES" 1-2 Short: Running "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.

PWB	NO.	Standard setting	Function	Details
Scoif pwb	J44 (DFCN)	3-4 SHORT	Deference alarm contact output of HDM	Output port: DTERMpwb TB21 "DFCN" 3-4 Short: Alarm "OPEN" Normal "CLOSES" 1-2 Short: Alarm "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.
	J45 (OCACN)	3-4 SHORT	Off course alarm contact output	Output port: DTERMpwb TB21 "OCACN" 3-4 Short: Alarm "OPEN" Normal "CLOSES" 1-2 Short: Alarm "CLOSES" Normal "OPEN" Note: It is one that it can choose. Don't short two.
	J46 (ST1)	1-2 SHORT	An output port setup of "GTERM pwb"	Output port: GTERMpwb TB2 "ST1/OPRX+" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST1) 3-4 Short: Serial signal receive.(OPTION) (OPRX+) Note: It is one that it can choose. Don't short two.
	J47 (ST2)	1-2 SHORT	An output port setup of "GTERM pwb"	Output port: GTERMpwb TB2 "ST2/OPRX-" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST2) 3-4 Short: Serial signal receive.(OPTION) (OPRX-) Note: It is one that it can choose. Don't short two.
	J48 (ST3)	1-2 SHORT	An output port setup of "GTERM pwb"	Output port: GTERMpwb TB2 "ST2/OPRXC" 1-2 Short: The step signal for "Step signal type repeater" is outputted. (ST3) 3-4 Short: Serial signal receive.(OPTION) (OPRXC) Note: It is one that it can choose. Don't short two.
	VR1	-	Gain adjustment of "rate of turn."	The gain of a "rate of turn" analog signal is adjusted. In "±30 degrees/min", it adjusts to "±5v ±0.33v DC.
	VR2	-	Off set adjustment of "rate of turn."	The off set of a "rate of turn" analog signal is adjusted. In "±0 degrees/min.", it adjusts to "0v ±80mv DC.
	SW1 NO.1	[OFF]	HDM function	[OFF] : Yes [ON] : No
	SW1 NO.2	[OFF]	OCA function	[OFF] : No [ON] : Yes
	SW1 NO.3	[OFF]	External sensor connection	NO3.[OFF] NO4.[OFF] : Non NO3.[ON] NO4.[OFF] : External sensor connection
Pcc pwb	SW1 NO.4	[OFF]		NO3.[OFF] NO4.[ON] : Mag. System connection(back NO3.[ON] NO4.[ON] : Ext. System connection(back up)
	SW1 NO.5	[OFF]	Input of steering mode information	[OFF] : Serial signal [ON] : Dry contact
	SW1 NO.6	[OFF]	For GC80/85 or not	[OFF] : No [ON] : Yes("GC-80/85" is displayed at the time of starting.)
	SW1 NO.7	[OFF]	[~V1.01]Don't touch	
			[V1.02~]MS-8800 use	[OFF] : Standard type [ON] : MS-8800 use
	SW1 NO.8	[OFF]	[~V1.01]Don't touch	
			[V1.02~]OCA special specifications	[OFF] : Standard type [ON] : OCA special specifications
	J4 (RESET)	OPEN	CUP reset	This jumper is used when resetting "CPU."
	J5 (FLASH)	SHORT	Software install	Open: When the software is installed of PCCpwb, open this jumper. Note: A damage will be given to a circuit if software is installed while this jumper has been short.
	J6 (POWER)	OPEN	"Power supply" switch	Short: Power "ON." (Power supply switch" pass.)

3.1.5 Repeater compass (Serial type)

PWB	Name	Standard setting	Function	Details
Rpcc pwb	SW1 NO.1	[OFF]	Setup of a receive format	NO.1[OFF] NO.2[OFF] NO.3[OFF] : 20msec(IEC-2)
	SW1 NO.2	[OFF]		NO.1[OFF] NO.2[ON] NO.3[OFF] : 200msec(IEC-1)
	SW1 NO.3	[OFF]		NO.1[OFF] NO.2[OFF] NO.3[ON] : TK format
	SW1 NO.4	[OFF]	Don't touch	
	SW1 NO.5	[OFF]	Don't touch	
	SW1 NO.6	[OFF]	Repeater type	[OFF] : Standard [ON] : Steering repeater
	SW1 NO.7	-	Polarity of offset	[OFF] : + [ON] : - (A value is inputted with the digital switch S2.)
	SW1 NO.8	[ON]	Software update	[OFF] : At the time of software update [ON] : usual operation
	SW2	Offset value		
	SW3 NO.1	[OFF]	Don't touch	
	SW3 NO.2	[OFF]	Don't touch	
	SW3 NO.3	[OFF]	Don't touch	
	SW3 NO.4	[OFF]	Don't touch	
	SW3 NO.5	[OFF]	Don't touch	
	SW3 NO.6	[OFF]	Don't touch	
	SW3 NO.7	[OFF]	Don't touch	
	SW3 NO.8	[OFF]	Don't touch	

3.1.6 Serial distributor (Nsd pwb)Jumper setting when “TG8” side silk is used

1. Input circuit (1st circuit)	
Set the serial signal TG-8000 side IEC-61162-1 ed.2 (4800bps). (Refer the Jumper setting Gyro compass TG-8000 side.)	
Serial signal input Silk (TG8) terminal board	
IIEC1+	Serial Signal RS-422 (H) : TG-8000 *TX+ Terminal Connection
IIEC1-	Serial Signal RS-422 (L) : TG-8000 *TX- Terminal Connection
IIEC1C	Serial Signal RS-422 (Signal GND) : TG-8000 *TSC Terminal Connection
① Setting when receives by Conversion IC	
Jumper	
Name	Setting
E20	3-4 short
E21	3-4 short
E22	3-4 short
E1	3-4 short
② Setting when receives by current loop	
Jumper	
Name	Setting
E20	1-2 short
E21	1-2 short
E22	1-2 short
E1	1-2 short
2. Input circuit (2nd circuit)	
Set the serial signal TG-8000 side IEC-61162-2 (38400bps). (Refer the Jumper setting Gyro compass TG-8000 side.)	
Serial signal input Silk (TG8) terminal board	
IIEC2+	Serial Signal RS-422 (H) : TG-8000 *TX+ Terminal Connection
IIEC2-	Serial Signal RS-422 (L) : TG-8000 *TX- Terminal Connection
IIEC2C	Serial Signal RS-422 (Signal GND) : TG-8000 *TSC Terminal Connection
① Setting when receives by Conversion IC	
Jumper	
Name	Setting
E23	3-4 short
E24	3-4 short
E25	3-4 short
E2	1-2 short
* Caution !	
② Setting when receives by current loop	
Jumper	
Name	Setting
E23	1-2 short
E24	1-2 short
E25	1-2 short
E2	3-4 short
* Caution !	

3. Output circuit (1st circuit)			② Output setting IEC61162-2 (38400bps)			③ Output setting NMEA0183 (4800bps)		
① Output setting IEC61162-1 ed2 (RS-422:4800bps)						Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		
Serial signal input terminal board			Serial signal input terminal board			Serial signal input terminal board		
Silk (TG8)			Silk (TG8)			Silk (TG8)		
11TX+ Serial Signal RS-422 Output (H)			11TX+ Serial Signal RS-422 Output (H)			11TX+ Serial Signal NMEA0183 (H)		
11TX- Serial Signal RS-422 Output (L)			11TX- Serial Signal RS-422 Output (L)			11TX- Unconnected		
11TSC Serial Signal RS-422 (Signal GND)			11TSC Serial Signal RS-422 (Signal GND)			11TSC Serial Signal NMEA (L: Signal GND)		
Jumper			Jumper			Jumper		
Name Setting			Name Setting			Name Setting		
E3 3-4 short			E3 1-2 short			E3 3-4 short		
E11 3-4 short			E11 1-2 short			E11 1-2 short		
② Output setting IEC61162-2 (38400bps)						③ Output setting NMEA0183 (4800bps)		
Serial signal input terminal board			Serial signal input terminal board			Serial signal input terminal board		
Silk (TG8)			Silk (TG8)			Silk (TG8)		
12TX+ Serial Signal RS-422 Output (H)			12TX+ Serial Signal RS-422 Output (H)			12TX+ Serial Signal NMEA0183 (H)		
12TX- Serial Signal RS-422 Output (L)			12TX- Serial Signal RS-422 Output (L)			12TX- Unconnected		
12TSC Serial Signal RS-422 (Signal GND)			12TSC Serial Signal RS-422 (Signal GND)			12TSC Serial Signal NMEA (L: Signal GND)		
Jumper			Jumper			Jumper		
Name Setting			Name Setting			Name Setting		
E4 3-4 short			E4 1-2 short			E4 3-4 short		
E12 3-4 short			E12 1-2 short			E12 1-2 short		
③ Output setting NMEA0183 (4800bps)						Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		

4. Output circuit (2nd circuit)			② Output setting IEC61162-2 (38400bps)			③ Output setting NMEA0183 (4800bps)		
① Output setting IEC61162-1 ed2 (RS-422:4800bps)						Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		
Serial signal input terminal board			Serial signal input terminal board			Serial signal input terminal board		
Silk (TG8)			Silk (TG8)			Silk (TG8)		
12TX+ Serial Signal RS-422 Output (H)			12TX+ Serial Signal RS-422 Output (H)			12TX+ Serial Signal NMEA0183 (H)		
12TX- Serial Signal RS-422 Output (L)			12TX- Serial Signal RS-422 Output (L)			12TX- Unconnected		
12TSC Serial Signal RS-422 (Signal GND)			12TSC Serial Signal RS-422 (Signal GND)			12TSC Serial Signal NMEA (L: Signal GND)		
Jumper			Jumper			Jumper		
Name Setting			Name Setting			Name Setting		
E3 3-4 short			E3 1-2 short			E3 3-4 short		
E11 3-4 short			E11 1-2 short			E11 1-2 short		
② Output setting IEC61162-2 (38400bps)						③ Output setting NMEA0183 (4800bps)		
Serial signal input terminal board			Serial signal input terminal board			Serial signal input terminal board		
Silk (TG8)			Silk (TG8)			Silk (TG8)		
13TX+ Serial Signal RS-422 Output (H)			13TX+ Serial Signal RS-422 Output (H)			13TX+ Serial Signal NMEA0183 (H)		
13TX- Serial Signal RS-422 Output (L)			13TX- Serial Signal RS-422 Output (L)			13TX- Unconnected		
13TSC Serial Signal RS-422 (Signal GND)			13TSC Serial Signal RS-422 (Signal GND)			13TSC Serial Signal NMEA (L: Signal GND)		
Jumper			Jumper			Jumper		
Name Setting			Name Setting			Name Setting		
E5 3-4 short			E5 1-2 short			E5 3-4 short		
E13 3-4 short			E13 1-2 short			E13 1-2 short		
③ Output setting NMEA0183 (4800bps)						Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		

5. Output circuit (3rd circuit)			② Output setting IEC61162-2 (38400bps)			③ Output setting NMEA0183 (4800bps)		
① Output setting IEC61162-1 ed2 (RS-422:4800bps)						Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		
Serial signal input terminal board			Serial signal input terminal board			Serial signal input terminal board		
Silk (TG8)			Silk (TG8)			Silk (TG8)		
13TX+ Serial Signal RS-422 Output (H)			13TX+ Serial Signal RS-422 Output (H)			13TX+ Serial Signal NMEA0183 (H)		
13TX- Serial Signal RS-422 Output (L)			13TX- Serial Signal RS-422 Output (L)			13TX- Unconnected		
13TSC Serial Signal RS-422 (Signal GND)			13TSC Serial Signal RS-422 (Signal GND)			13TSC Serial Signal NMEA (L: Signal GND)		
Jumper			Jumper			Jumper		
Name Setting			Name Setting			Name Setting		
E5 3-4 short			E5 1-2 short			E5 3-4 short		
E13 3-4 short			E13 1-2 short			E13 1-2 short		
③ Output setting NMEA0183 (4800bps)						Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		

6. Output circuit (4th circuit)			② Output setting IEC61162-2 (38400bps)			③ Output setting NMEA0183 (4800bps)		
① Output setting IEC61162-1 ed2 (RS-422:4800bps)						Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		
Serial signal input terminal board			Serial signal input terminal board			Serial signal input terminal board		
Silk (TG8)			Silk (TG8)			Silk (TG8)		
14TX+ Serial Signal RS-422 Output (H)			14TX+ Serial Signal RS-422 Output (H)			14TX+ Serial Signal NMEA0183 (H)		
14TX- Serial Signal RS-422 Output (L)			14TX- Serial Signal RS-422 Output (L)			14TX- Unconnected		
14TSC Serial Signal RS-422 (Signal GND)			14TSC Serial Signal RS-422 (Signal GND)			14TSC Serial Signal NMEA (L: Signal GND)		
Jumper			Jumper			Jumper		
Name Setting			Name Setting			Name Setting		
E6 3-4 short			E6 1-2 short			E6 3-4 short		
E14 3-4 short			E14 1-2 short			E14 1-2 short		
③ Output setting NMEA0183 (4800bps)						Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		

7. Output circuit (5th circuit)		② Output setting IEC61162-2 (38400bps)		③ Output setting NMEA0183 (4800bps)	
① Output setting IEC61162-1 ed2 (RS-422: 4800bps)				Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.	
Serial signal input terminal board		Serial signal input terminal board		Serial signal input terminal board	
Silk (TG8)		Silk (TG8)		Silk (TG8)	
15TX+ Serial Signal RS-422 Output (H)		15TX+ Serial Signal RS-422 Output (H)		15TX+ Serial Signal NMEA0183 (H)	
15TX- Serial Signal RS-422 Output (L)		15TX- Serial Signal RS-422 Output (L)		15TX- Unconnected	
15TSC Serial Signal RS-422 (Signal GND)		15TSC Serial Signal RS-422 (Signal GND)		15TSC Serial Signal NMEA (L: Signal GND)	
Jumper		Jumper		Jumper	
Name Setting		Name Setting		Name Setting	
E7 3-4 short		E7 1-2 short		E7 3-4 short	
E15 3-4 short		E15 1-2 short		E15 1-2 short	
8. Output circuit (6th circuit)		② Output setting IEC61162-2 (38400bps)		③ Output setting NMEA0183 (4800bps)	
① Output setting IEC61162-1 ed2 (RS-422: 4800bps)				Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.	
Serial signal input terminal board		Serial signal input terminal board		Serial signal input terminal board	
Silk (TG8)		Silk (TG8)		Silk (TG8)	
16TX+ Serial Signal RS-422 Output (H)		16TX+ Serial Signal RS-422 Output (H)		16TX+ Serial Signal NMEA0183 (H)	
16TX- Serial Signal RS-422 Output (L)		16TX- Serial Signal RS-422 Output (L)		16TX- Unconnected	
16TSC Serial Signal RS-422 (Signal GND)		16TSC Serial Signal RS-422 (Signal GND)		16TSC Serial Signal NMEA (L: Signal GND)	
Jumper		Jumper		Jumper	
Name Setting		Name Setting		Name Setting	
E8 3-4 short		E8 1-2 short		E8 3-4 short	
E16 3-4 short		E16 1-2 short		E16 1-2 short	
9. Output circuit (7th circuit)		② Output setting IEC61162-2 (38400bps)		③ Output setting NMEA0183 (4800bps)	
① Output setting IEC61162-1 ed2 (RS-422: 4800bps)				Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.	
Serial signal input terminal board		Serial signal input terminal board		Serial signal input terminal board	
Silk (TG8)		Silk (TG8)		Silk (TG8)	
17TX+ Serial Signal RS-422 Output (H)		17TX+ Serial Signal RS-422 Output (H)		17TX+ Serial Signal NMEA0183 (H)	
17TX- Serial Signal RS-422 Output (L)		17TX- Serial Signal RS-422 Output (L)		17TX- Unconnected	
17TSC Serial Signal RS-422 (Signal GND)		17TSC Serial Signal RS-422 (Signal GND)		17TSC Serial Signal NMEA (L: Signal GND)	
Jumper		Jumper		Jumper	
Name Setting		Name Setting		Name Setting	
E9 3-4 short		E9 1-2 short		E9 3-4 short	
E17 3-4 short		E17 1-2 short		E17 1-2 short	
10. Output circuit (8th circuit)		② Output setting IEC61162-2 (38400bps)		③ Output setting NMEA0183 (4800bps)	
① Output setting IEC61162-1 ed2 (RS-422: 4800bps)				Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.	
Serial signal input terminal board		Serial signal input terminal board		Serial signal input terminal board	
Silk (TG8)		Silk (TG8)		Silk (TG8)	
18TX+ Serial Signal RS-422 Output (H)		18TX+ Serial Signal RS-422 Output (H)		18TX+ Serial Signal NMEA0183 (H)	
18TX- Serial Signal RS-422 Output (L)		18TX- Serial Signal RS-422 Output (L)		18TX- Unconnected	
18TSC Serial Signal RS-422 (Signal GND)		18TSC Serial Signal RS-422 (Signal GND)		18TSC Serial Signal NMEA (L: Signal GND)	
Jumper		Jumper		Jumper	
Name Setting		Name Setting		Name Setting	
E10 3-4 short		E10 1-2 short		E10 3-4 short	
E18 3-4 short		E18 3-4 short		E18 1-2 short	

3.1.7 Serial distributor (Nsd pwb)Jumper setting when

1. Input circuit (1st circuit) Case : Gyro compass TG-6000		* Caution !	
Serial signal input terminal board		Silk (TG6)	
		NRXH Serial Signal RS-422 (H) : TG-6000 *RNH Terminal Connection	
		NRXL Serial Signal RS-422 (L) : TG-6000 *RNL Terminal Connection	
		NRXS Serial Signal RS-422 (Signal GND) : TG-6000 *RNS Terminal Connection	
① Setting when receives by Conversion IC			
Jumper		Name Setting	
		E20 3-4 short	
		E21 3-4 short	
		E22 3-4 short	
		E1 3-4 short	
② Setting when receives by current loop			
Jumper		Name Setting	
		E20 1-2 short	
		E21 1-2 short	
		E22 1-2 short	
		E1 1-2 short	
2. Input circuit (1st circuit) Case : Gyro compass TG-8000		* Caution !	
Set the serial signal TG-8000 side IEC-61162-1 ed2 (4800bps)			
(Refer the Jumper setting Gyro compass TG-8000 side.)			
Serial signal input terminal board		Silk (TG6)	
		NRXH Serial Signal RS-422 (H) : TG-8000 *TX+ Terminal Connection	
		NRXL Serial Signal RS-422 (L) : TG-8000 *TX- Terminal Connection	
		NRXS Serial Signal RS-422 (Signal GND) : TG-8000 *TSC Terminal Connection	
① Setting when receives by Conversion IC			
Jumper		Name Setting	
		E20 3-4 short	
		E21 3-4 short	
		E22 3-4 short	
		E1 3-4 short	
② Setting when receives by current loop			
Jumper		Name Setting	
		E20 1-2 short	
		E21 1-2 short	
		E22 1-2 short	
		E1 1-2 short	

"TG6" side silk is used

3. Output circuit (1st circuit)		① Output setting IEC61162-1 ed2 (RS-422:4800bps)	
② Output setting NMEA0183 (4800bps)		② Output setting NMEA0183 (4800bps)	
Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.	
Serial signal input terminal board		Silk (TG6)	
		3RNH Serial Signal RS-422 Output(H)	
		3RNL Serial Signal RS-422 Output(L)	
		3RNS Serial Signal RS-422 (Signal GND)	
Jumper		Name Setting	
		E3 3-4 short	
		E11 3-4 short	
4. Output circuit (2nd circuit)		① Output setting IEC61162-1 ed2 (RS-422:4800bps)	
② Output setting NMEA0183 (4800bps)		② Output setting NMEA0183 (4800bps)	
Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.	
Serial signal input terminal board		Silk (TG6)	
		4RNH Serial Signal RS-422 Output(H)	
		4RNL Serial Signal RS-422 Output(L)	
		4RNS Serial Signal RS-422 (Signal GND)	
Jumper		Name Setting	
		E4 3-4 short	
		E12 3-4 short	
5. Output circuit (3rd circuit)		① Output setting IEC61162-1 ed2 (RS-422:4800bps)	
② Output setting NMEA0183 (4800bps)		② Output setting NMEA0183 (4800bps)	
Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.	
Serial signal input terminal board		Silk (TG6)	
		5RNH Serial Signal RS-422 Output(H)	
		5RNL Serial Signal RS-422 Output(L)	
		5RNS Serial Signal RS-422 (Signal GND)	
Jumper		Name Setting	
		E5 3-4 short	
		E13 3-4 short	
6. Output circuit (4th circuit)		① Output setting IEC61162-1 ed2 (RS-422:4800bps)	
② Output setting NMEA0183 (4800bps)		② Output setting NMEA0183 (4800bps)	
Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.		Caution: Set to ① when an electric specification of the reception circuit of the connection destination is RS-422.	
Serial signal input terminal board		Silk (TG6)	
		6RNH Serial Signal RS-422 Output(H)	
		6RNL Serial Signal RS-422 Output(L)	
		6RNS Serial Signal RS-422 (Signal GND)	
Jumper		Name Setting	
		E6 3-4 short	
		E14 3-4 short	

7. Output circuit (5th circuit)															
(1) Output setting IEC61162-1 ed2 (RS-422: 4800bps).															
Serial signal input terminal board	Silk (TG6) <table><tr><td>7RNH</td><td>Serial Signal RS-422 Output (H)</td></tr><tr><td>7RNL</td><td>Serial Signal RS-422 Output (L)</td></tr><tr><td>7RNS</td><td>Serial Signal RS-422 (Signal GND)</td></tr></table>	7RNH	Serial Signal RS-422 Output (H)	7RNL	Serial Signal RS-422 Output (L)	7RNS	Serial Signal RS-422 (Signal GND)	Serial signal input terminal board	Silk (TG6) <table><tr><td>7RNH</td><td>Serial Signal NMEA0183 (H)</td></tr><tr><td>7RNL</td><td>Unconnected</td></tr><tr><td>7RNS</td><td>Serial Signal NMEA (L: Signal GND)</td></tr></table>	7RNH	Serial Signal NMEA0183 (H)	7RNL	Unconnected	7RNS	Serial Signal NMEA (L: Signal GND)
7RNH	Serial Signal RS-422 Output (H)														
7RNL	Serial Signal RS-422 Output (L)														
7RNS	Serial Signal RS-422 (Signal GND)														
7RNH	Serial Signal NMEA0183 (H)														
7RNL	Unconnected														
7RNS	Serial Signal NMEA (L: Signal GND)														
Jumper	<table><tr><td>Name</td><td>Setting</td></tr><tr><td>E7</td><td>3-4 short</td></tr><tr><td>E15</td><td>3-4 short</td></tr></table>	Name	Setting	E7	3-4 short	E15	3-4 short	Jumper	<table><tr><td>Name</td><td>Setting</td></tr><tr><td>E7</td><td>3-4 short</td></tr><tr><td>E15</td><td>1-2 short</td></tr></table>	Name	Setting	E7	3-4 short	E15	1-2 short
Name	Setting														
E7	3-4 short														
E15	3-4 short														
Name	Setting														
E7	3-4 short														
E15	1-2 short														
8. Output circuit (6th circuit)															
(1) Output setting IEC61162-1 ed2 (RS-422: 4800bps).															
Serial signal input terminal board	Silk (TG6) <table><tr><td>8RNH</td><td>Serial Signal RS-422 Output (H)</td></tr><tr><td>8RNL</td><td>Serial Signal RS-422 Output (L)</td></tr><tr><td>8RNS</td><td>Serial Signal RS-422 (Signal GND)</td></tr></table>	8RNH	Serial Signal RS-422 Output (H)	8RNL	Serial Signal RS-422 Output (L)	8RNS	Serial Signal RS-422 (Signal GND)	Serial signal input terminal board	Silk (TG6) <table><tr><td>8RNH</td><td>Serial Signal NMEA0183 (H)</td></tr><tr><td>8RNL</td><td>Unconnected</td></tr><tr><td>8RNS</td><td>Serial Signal NMEA (L: Signal GND)</td></tr></table>	8RNH	Serial Signal NMEA0183 (H)	8RNL	Unconnected	8RNS	Serial Signal NMEA (L: Signal GND)
8RNH	Serial Signal RS-422 Output (H)														
8RNL	Serial Signal RS-422 Output (L)														
8RNS	Serial Signal RS-422 (Signal GND)														
8RNH	Serial Signal NMEA0183 (H)														
8RNL	Unconnected														
8RNS	Serial Signal NMEA (L: Signal GND)														
Jumper	<table><tr><td>Name</td><td>Setting</td></tr><tr><td>E8</td><td>3-4 short</td></tr><tr><td>E16</td><td>3-4 short</td></tr></table>	Name	Setting	E8	3-4 short	E16	3-4 short	Jumper	<table><tr><td>Name</td><td>Setting</td></tr><tr><td>E8</td><td>3-4 short</td></tr><tr><td>E16</td><td>1-2 short</td></tr></table>	Name	Setting	E8	3-4 short	E16	1-2 short
Name	Setting														
E8	3-4 short														
E16	3-4 short														
Name	Setting														
E8	3-4 short														
E16	1-2 short														
9. Output circuit (7th circuit)															
(1) Output setting IEC61162-1 ed2 (RS-422: 4800bps).															
Serial signal input terminal board	Silk (TG6) <table><tr><td>9RNH</td><td>Serial Signal RS-422 Output (H)</td></tr><tr><td>9RNL</td><td>Serial Signal RS-422 Output (L)</td></tr><tr><td>9RNS</td><td>Serial Signal RS-422 (Signal GND)</td></tr></table>	9RNH	Serial Signal RS-422 Output (H)	9RNL	Serial Signal RS-422 Output (L)	9RNS	Serial Signal RS-422 (Signal GND)	Serial signal input terminal board	Silk (TG6) <table><tr><td>9RNH</td><td>Serial Signal NMEA0183 (H)</td></tr><tr><td>9RNL</td><td>Unconnected</td></tr><tr><td>9RNS</td><td>Serial Signal NMEA (L: Signal GND)</td></tr></table>	9RNH	Serial Signal NMEA0183 (H)	9RNL	Unconnected	9RNS	Serial Signal NMEA (L: Signal GND)
9RNH	Serial Signal RS-422 Output (H)														
9RNL	Serial Signal RS-422 Output (L)														
9RNS	Serial Signal RS-422 (Signal GND)														
9RNH	Serial Signal NMEA0183 (H)														
9RNL	Unconnected														
9RNS	Serial Signal NMEA (L: Signal GND)														
Jumper	<table><tr><td>Name</td><td>Setting</td></tr><tr><td>E9</td><td>3-4 short</td></tr><tr><td>E17</td><td>3-4 short</td></tr></table>	Name	Setting	E9	3-4 short	E17	3-4 short	Jumper	<table><tr><td>Name</td><td>Setting</td></tr><tr><td>E9</td><td>3-4 short</td></tr><tr><td>E17</td><td>1-2 short</td></tr></table>	Name	Setting	E9	3-4 short	E17	1-2 short
Name	Setting														
E9	3-4 short														
E17	3-4 short														
Name	Setting														
E9	3-4 short														
E17	1-2 short														
10. Output circuit (8th circuit)															
(1) Output setting IEC61162-1 ed2 (RS-422: 4800bps).															
Serial signal input terminal board	Silk (TG6) <table><tr><td>10RNH</td><td>Serial Signal RS-422 Output (H)</td></tr><tr><td>10RNL</td><td>Serial Signal RS-422 Output (L)</td></tr><tr><td>10RNS</td><td>Serial Signal RS-422 (Signal GND)</td></tr></table>	10RNH	Serial Signal RS-422 Output (H)	10RNL	Serial Signal RS-422 Output (L)	10RNS	Serial Signal RS-422 (Signal GND)	Serial signal input terminal board	Silk (TG6) <table><tr><td>10RNH</td><td>Serial Signal NMEA0183 (H)</td></tr><tr><td>10RNL</td><td>Unconnected</td></tr><tr><td>10RNS</td><td>Serial Signal NMEA (L: Signal GND)</td></tr></table>	10RNH	Serial Signal NMEA0183 (H)	10RNL	Unconnected	10RNS	Serial Signal NMEA (L: Signal GND)
10RNH	Serial Signal RS-422 Output (H)														
10RNL	Serial Signal RS-422 Output (L)														
10RNS	Serial Signal RS-422 (Signal GND)														
10RNH	Serial Signal NMEA0183 (H)														
10RNL	Unconnected														
10RNS	Serial Signal NMEA (L: Signal GND)														
Jumper	<table><tr><td>Name</td><td>Setting</td></tr><tr><td>E10</td><td>3-4 short</td></tr><tr><td>E18</td><td>3-4 short</td></tr></table>	Name	Setting	E10	3-4 short	E18	3-4 short	Jumper	<table><tr><td>Name</td><td>Setting</td></tr><tr><td>E10</td><td>3-4 short</td></tr><tr><td>E18</td><td>1-2 short</td></tr></table>	Name	Setting	E10	3-4 short	E18	1-2 short
Name	Setting														
E10	3-4 short														
E18	3-4 short														
Name	Setting														
E10	3-4 short														
E18	1-2 short														

3.2 Internal parameter

Block	3Digit LED display	Parameter	Default value	Range	Unit
A-1	1.1.U	Damping gain ratio	1.00	0.50 ~ 2.00	%
	1.2.F	Bearing servo gain ratio	1.00	0.50 ~ 2.00	%
	1.3.S	Horizontal servo gain ratio	1.00	0.50 ~ 2.00	%
	1.4.u	Leveling servo gain ratio	1.00	0.50 ~ 2.00	%
	1.5.L	(ϕ) phi offset	0.00	-3.00 ~ 3.00	deg.
	1.6.t	(θ) Theta offset	0.00	-3.00 ~ 3.00	deg.
	1.7.G	X signal pickup gain	2.32	2.00 ~ 5.00	v/deg.
	1.8.c	Ks/H	1.477	1.000 ~ 2.000	
	1.9.r	Maximum rate of turn	0.00	-	deg./sec
	1.A.F	Maximum deviation of bearing servo	0.00	-	deg.
	1.b.S	Maximum deviation of horizontal servo	0.00	-	deg.
A-2	2.1.o	Bearing offset A (for correction of fixed error)	0.00	0.0 ~ 359.9	deg.
	*2 2.2.O	Bearing offset B (for correction of temporary error)	0.0	0.0 ~ 359.9	deg.
	2.3.h	Zero-cross bearing	345.3	0.0 ~ 359.9	deg.
	2.4.E	Zero-cross error allowance	2.0	0.0 ~ 5.0	deg.
	2.5.y	Year	-	2000 ~ 2099	
	2.6.N	Month and day	-	-	
	2.7.t	Hour and minute	-	-	
	2.8.d	Total working days	-	-	
	2.9.G	Display/setting of GPS connection	-	bE or Non	
	2.A.L	Display/setting of LOG connection	-	bE or Non	
	2.b.S	Display/setting of LOG(serial) connection	-	bE or Non	
	2.c.t	Display/setting of "GGA" performance index is ignored or evaluated.	-	bE or Non	
	*1 2.d.o	Analog output offset for rate of turn	0.00	-1.60~1.60	deg./min
	2.e.F	Filter time constant for rate of turn	2.00	0.5~10.0	sec
	2.F.G	Analog output gain for rate of turn	1.00	0.900~1.00	-
A-3	3.1.E	Alarm (error)	-	-	
	3.2.n	Occurred number of zero-cross error	-	-	
	3.3.H	Maximum zero-cross error	-	-	
	3.4.y	Occurred year of zero-cross error	-	-	
	3.5.N	Occurred month/day of zero-cross error	-	-	
	3.6.t	Occurred hour/minute of zero-cross error	-	-	
	3.7.n	Occured number of encoder error	-	-	
	3.8.r	Occured number of reset with WATCH DOG TIMER	-	-	
A-4	4.1.C	GPS serial data character length	8	8 or 7	
	4.2.P	GPS serial data parity bit	Non	Non, Even,Odd	
	4.3.S	GPS serial data stop bits	1	1 or 2	
A-5	5.1.C	LOG serial data character length	8	8 or 7	
	5.2.P	LOG serial data parity bit	Non	Non, Even,Odd	
	5.3.S	LOG serial data stop bits	1	1 or 2	
A-6	6.1.t	[V1.00] Master compass type	Std	Std or Hsc	
	6.1.C	[V1.01~] External Sensor(standard) serial data character length	8	8 or 7	
	6.2.u	[V1.00] SCC software version number	-	-	
	6.2.P	[V1.01~] External Sensor(standard) serial data parity bit	Non	Non, Even,Odd	
	6.3.u	[V1.00] MCC software version number	-	-	
	6.3.S	[V1.01~] External Sensor(standard) serial data stop bits	1	1 or 2	
A-7	7.1.t	[V1.00] For the confirmation of extension memu(serial signal)	-	-	
		[V1.01~] Master compass type	Std	Std or Hsc	
	7.2.S	[V1.00] Filter of speed error correction	on	on or off	
	7.2.u	[V1.01~] SCC software version number	-	-	
	7.3.u	[V1.01~] MCC software version number	-	-	
A-8	8.1.t	[V1.01~] For the confirmation of extension memu(serial signal)	-	-	
	8.2.S	[V1.01~] Filter of speed error correction	on	on or off	
	8.3.L	[V1.10~] Rotor tilting angle monitor	-	-	deg.
	8.4.t	[V1.12~] Master compasses temperature	-	-25~75.0	°C

*1: The maximum value is 5% of the maximum analog output for rate of turn.
(32 deg./min:1.6deg./min、 130deg./min:6.5deg./min、 320deg./min:16.0deg./min、)

*2: This value is cleared at the time of zero crossing pin passage and a power supply OFF.

4. Troubleshooting

4.1 Alarm code list

Alarm code	Alarm content	Detailed code	Possible cause	
E-1	Main power is abnormal	1	When the main power (AC power source) is lost.	0
E-2	Power is abnormal	2	Power supply unit in the control box becomes over current.	0
		3	Power supply unit in the control box becomes over voltage.	0
		4	24R is lost.	2
E-3	Inverter is abnormal	5	Inverter in the master compass becomes over current.	0
		6	Inverter in the master compass becomes over voltage.	0
E-4 *1	Control power is abnormal	7	+12.5V is abnormal.	0
		8	-12.5V is abnormal.	0
		9	+10V is abnormal.	0
		10	-10V is abnormal.	0
E-5 *1	Rotor current is abnormal	11	Gyro rotor current is abnormal.	2
E-6	Rotor tilting angle is abnormal	12	Rotor tilting angle is abnormal.	2
E-7 *1	Servo loop is abnormal	13	Horizontal servo loop is abnormal.	2
		15	Rate limit is abnormal.	2
E-8	Zero cross is abnormal	37	Zero cross azimuth angle sensor is abnormal.	2
E-9 *1	Memory is abnormal	16	Memory is abnormal	0
		17	Memory is abnormal	0
		18	Memory is abnormal	0
		19	Memory is abnormal	0
		20	Memory is abnormal	0
E-A	Communication error (1)	21	Communication error (MCC→SCC).	2
		23	MCC is reset.	2
E-b *1	Communication error (2)	22	Communication error (SCC→MCC).	0
		24	SCC is reset.	0
E-c	GPS communication off	25	When GPS system is stopped or serial signal from GPS is cut.(timeout is 15 sec.)	1
E-d	GPS data abnormal	26	GPS latitude data abnormal.(timeout is 17 sec.)	1
		27	GPS speed data abnormal.(timeout is 17 sec.)	1
E-E	MAG/EHS communication off	33	When MAG/EHS system is stopped or serial signal from MAG/EHS is cut.(timeout is 15 sec.)	0
E-F	MAG/EHS data abnormal	34	EHS data abnormal.(timeout is 17 sec.)	0
E-L	EXT. sensor communication off	30	When EXT. sensor system is stopped or serial signal from EXT. sensor is cut.(timeout is 15 sec.)	0
E-n	EXT. sensor data abnormal	31	EXT. sensor data abnormal.(timeout is 17 sec.) Bearing field abnormality	0
		32	EXT. sensor data abnormal.(timeout is 17 sec.) Magnetic variation field abnormality	0
E-P	LOG(serial) communication off	28	When LOG(serial) system is stopped or serial signal from LOG(serial) is cut.(timeout is 15 sec.)	1
E-U	LOG(serial) data abnormal	29	LOG(serial) data abnormal.(timeout is 17 sec.)	1
E-u *1	LOG(contact) data abnormal	38	LOG(contact) is abnormal.	0
E-G	Master bearing is abnormal	36	When compensation of the bearing by the encorder signal is not completed.	2
E-r	E5V is lost	35	E5V(power supply of serial signal) is lost.	2

*1: Now, this alarm code is not displayed to customer.

GYRO true bearing status to PR-6000.("\$PTKM" sentence)

"0": GYRO error has not occurred.

"1": There are possibility that GYRO error(less than 5°) maybe happening. PR-6000's alarm "E03.4" occurs.

"2": There are possibility that GYRO error(more than 5°) maybe happening. PR-6000's alarm "E03.3" occurs.

4.2 Troubles countermeasures

Operational status of this system is always monitored by the on-board CPU. In this chapter, countermeasures are shown for each abnormality item (refer to alarm code).

When checking the system, pay full attention to avoid electric shock, and never try to perform such items that are not written in these checking items because it may result in the second hazard.

* Note 1 *

Whenever fuse or printed circuit is replaced, or when connection is checked, disconnect the applied power supply cable from the originated distribution panel.

(GPOWER pwb is still operating even when the power supply switch of the control unit was turned off.)

* Note 2 *

When the primary of the GPOWER pwb is measured by an oscilloscope, perform it after isolated the power supply of the oscilloscope from the power supply of the gyrocompass.

It may cause damage the GPOWER pwb without this isolation.

Alarm code (Detailed code)	Alarm condition	Countermeasures
E-1 (1) Main power supply abnormality	This alarm is generated when the main power supply (100 V / 110 V / 115 V / 220 V AC) dropped lower than -10 %. At this time, the gyrocompass continues operation by automatically switched to the emergency power supply (24 V DC).	(1) Check the fuse F101/F201 of the control unit. If it has blown, check the operation after replaced the fuse. If the fuse is blown again, perform the item (2), and replace GPOWER pwb if it was OK. (2) Confirm that the voltage applied to TB101 AC1.2/TB201 2AC1.2 on the external terminal board of the control unit is within 100 V/110V/115V /220VAC±10 %. (3) Check the connection (harness) from GPOWER pwb (J6) to GTERM pwb (J6). Check the connector inserting state from GTERM pwb (J4) to SCC pwb (J4). (4) Replace GPOWER pwb if above (1), (2) and (3) are normal. Replace SCC pwb if abnormality still generated after replaced GPOWER pwb. When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-2 (2) Power supply abnormality Master compass power supply over current abnormality	Power supply applying to the master compass is stopped when the current of the power supply to the master pass exceed 4.5 A since then. Pay full attention because the power supply unit is in operating state.	(1) When the master compass is operating regardless of the over current alarm generation, check the connection (harness) from GPOWER pwb (J6) to GTERM pwb (J6)/DTERM pwb (J8), and check the connector inserting state from GTERM pwb (J4)/DTERM pwb (J4) to SCC pwb (J4). Replace GPOWER pwb if no problem in the connection. Replace SCC pwb if abnormality still generated after GPOWER pwb replaced. (2) Turn "OFF" the power switch when the over current alarm generated and the master compass stopped, and remove GTERM pwb TB3 N+-- of the control unit applying the power supply to the master compass. Then turn "ON" the power switch and confirm an alarm code. (When the automatic steering system is integrated, remove GTERM pwb (J11)/DTERM pwb (J11). Then turn "ON" the power switch and confirm the alarm code.) At this time, although an alarm code "E-3, A" is generated, neglect it. (3) There is possibility of malfunction in the master compass side if the alarm code "E-2" is not generated in the above (2). In this case, refer to "Alarm code E-3 Inverter abnormality" explained later. (4) Replace the power supply unit GPOWER pwb if the alarm code "E-2" is generated again in the above (2). Replace SCC pwb if abnormality still generated after GPOWER pwb replaced. When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-2 (3) Power supply abnormality Master compass power supply over voltage abnormality	The abnormality is defined when the power supply voltage to the master compass exceeds 24 V DC + 30 % and the main power supply is switched to the emergency power supply. Although the switched emergency power supply voltage exceeds 24 V DC + 30 %, the system is operated successively by the emergency power supply, "abnormality of the power supply over voltage" is alarmed by the control unit. At this time, try to recover to the normal voltage as it may result in system malfunction. When this alarm is generated, alarm code "E-2", detailed code "3" and "E-1" outputs are produced.	(1) Stop applying of the main power supply and start the gyrocompass by the emergency power supply. At this time confirm that "E-2" is not generated. Although "E-1" is generated, neglect it. (2) Check the emergency power supply voltage when alarm code "E-2", detailed code "3" is generated in the above (1). Perform the following (4) when the emergency power supply voltage is less than 24 V DC + 30 %. (3) Check the main power supply applying state from the ship power supply when alarm code "E-2, detailed code "3" is not generated in the above (1). (100 / 110 / 115 / 220 V AC±10 %) Perform the following (4) if no problem in the main power supply. (4) Check the connection (harness) from GPOWER pwb (J6) to GTERM pwb (J6)/DTERM pwb (J8), and check the connector inserting state from GTERM pwb (J4) to SCC pwb (J4). Replace GPOWER pwb if no problem in the connection. Replace SCC pwb when abnormality still generated after GPOWER pwb replaced. When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-2 (4) Power supply abnormality Repeater power supply abnormality	This alarm is generated when the power supply for the repeater (24 V DC) dropped or was lost.	(1) Turn "ON" the power switch after removed GTERM pwb (J5) in the control unit. (2) Confirm that the voltage between 5-7 pin of GPOWER pwb (J5) is within 24 V DC, +30 % / - 20 %. (3) Replace GPOWER pwb of the control unit when the voltage is abnormal in the above (2). (4) Confirm that a jumper exists between TB3-TB4 of GTERM pwb in the control unit when the voltage is normal in the above (2). And check the fuse (F15). If it has blown, confirm the operation after replaced it. Replace MIFC/SIFC/MCOIF/SCOIF pwb if it has blown again. (5) Replace SCC pwb when it is not improved after performed the above (4). When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-3 (5) Inverter abnormality Over current abnormality	Power supply applying to the rotor and each pwb in the master compass is stopped when the input current of the power supply to the INVERTER pwb exceed 4.5 A since then. Pay full attention because the main power supply is in operating state.	(1) When the master compass is operating although the inverter over current alarm is generated, confirm the connection from MTTRM pwb (TB2 AL2/ALC) to GTERM pwb (TB1 AL2/ALC)/DTERM pwb (TB2 AL2/ALC). (If the automatic steering system is integrated, confirm the connection (harness) from MTTRM pwb (J2) to GTERM pwb (J12)/DTERM pwb (J12). Confirm the inserting state from GTERM pwb (J4) /DTERM pwb (J4) to SCC pwb (J4). Replace INVERTER pwb when no problem in the connection. Replace SCC pwb when abnormality still generated even if INVERTER pwb replaced. When the SCC pwb is replaced, do not forget to change the parameters stored in the non-volatile memory. (2) If the inverter over current abnormality alarm was generated and the master compass stopped, turn "OFF" the power switch, and then after removed INVERTER pwb connector "CN4" in the master compass, turn "ON" the power switch again. At this time, confirm that four LEDs (D26, D29, D34 and D35) in the INVERTER pwb are lit. (3) If they are not lit in the above (2), check if the fuse F1 in the INVERTER pwb has blown. If it has not blown, replace the inverter unit. (4) If the LEDs are lit in the above (2) and the output voltage is not abnormal, turn "OFF" the power switch. After 20 minutes elapsed, check the connection from the transformer CN4 on the phantom ring of the master compass to T1 and the sensitive element. Specially, carefully check the connection related to the connector "8" and "M" in the sensitive element. (5) If the connection is not abnormal in the connection in the above (4), measure resistance between "8" and "M" after removed the sensitive element connector, and replace the sensitive element if the value is not within 44±5 ohms.

Alarm code (Detailed code)	Alarm condition	Countermeasures
E-3 (6) Inverter abnormality Over voltage abnormality	The power supply applying to the rotor and each pwb in the master compass is stopped if the output voltage (100 V AC rms) of INVERTER pwb exceeds 150 V. Pay full attention because the power supply unit is in operating state.	(1) When the master compass is operating although the inverter over current alarm is generated, confirm the connection from MTTRM pwb (TB2 AL1/ALC) to GTERM pwb (TB1 AL1/ALC)/DTERM pwb (TB2 AL2/ALC). If the automatic steering system is integrated, confirm the connection (harness) from MTTRM pwb (J12) to GTERM pwb (J12)/DTERM pwb (J12). Confirm the inserting state from GTERM pwb(J4)/DTERM pwb (J4) to SCC pwb (J4). Replace INVERTER pwb when no problem in the connection. Replace SCC pwb when abnormality still generated even if INVERTER pwb replaced. When the SCC pwb is replaced, do not forget to change the parameters stored in the non-volatile memory. (2) Re-start with the variable resistor VR1 of voltage adjustment for the INVERTER pwb placing in MIN (CCW max) when the inverter over voltage alarm was generated and the master compass stopped. At this time, adjust the output voltage to 100 V AC rms by slowly turning clockwise the VR1. After this adjustment, confirm that the alarm is not generated when restarted several times. (3) Replace INVERTER pwb when the over voltage alarm was generated in the above (2).
E-4 (7) Master compass control power supply abnormality +12.5 V DC abnormality	This alarm is generated when the voltage "+12.5 V DC" in MCC pwb fluctuates more than ± 30 %.	(1) Turn "OFF" the power switch, and remove the other connectors than "J5" of MCC pwb, then turn "ON" the power switch and check the voltage between MCC pwb "TP1(COM)" and "Cathode of D15". (+12.5 V) (2) Replace MCC pwb if the voltage is not abnormal in the above (1). (3) Turn "OFF" the power switch if the voltage is abnormal in the above (1), and turn "ON" the power switch again after removed MCC pwb PJ5. Then confirm that the voltage between "7" and "8" of the transformer T1 mounted on the phantom ring is around 13 V AC rms. (4) Check the output voltage of INVERTER pwb if the voltage between "7" and "8" of T1 is abnormal in the above (3). (The voltage between "6" and "7" of INVERTER pwb connector CN4 should be 100 V AC rms.) If the output voltage of INVERTER pwb is abnormal, adjust the output voltage (by INVERTER pwb VR1). Replace the transformer T1 when the output voltage cannot be adjusted. (5) Replace MCC pwb when the voltage between "7" and "8" of T1 is not abnormal in the above (3).
E-4 (8) Master compass control power supply abnormality -12.5 V DC abnormality	This alarm is generated when the voltage "-12.5 V DC" in MCC pwb fluctuates more than ± 30 %.	(1) Turn "OFF" the power switch, and remove the other connectors than "J5" of MCC pwb, then turn "ON" the power switch and check the voltage between MCC pwb "TP1(COM)" and "Cathode of D18". (-12.5 V) (2) Replace MCC pwb if the voltage is not abnormal in the above (1). (3) Turn "OFF" the power switch if the voltage is abnormal in the above (1), and turn "ON" the power switch again after removed MCC pwb PJ5. Then confirm that the voltage between "8" and "9" of the transformer T1 mounted on the phantom ring is around 13 V AC rms. (4) Check the output voltage of INVERTER pwb if the voltage between "8" and "9" of T1 is abnormal in the above (3). (The voltage between "6" and "7" of INVERTER pwb connector CN4 should be 100 V AC rms.) If the output voltage of INVERTER pwb is abnormal, adjust the output voltage (by INVERTER pwb VR1). Replace the transformer T1 when the output voltage cannot be adjusted. (5) Replace MCC pwb when the voltage between "8" and "9" of T1 is not abnormal in the above (3).
E-4 (9) Master compass control power supply abnormality +10.0 V DC abnormality	This alarm is generated when the voltage "+10.0 V DC" in MCC pwb fluctuates more than ± 10 %.	(1) Turn "OFF" the power switch, and remove the other connectors than "J5" of MCC pwb, then turn "ON" the power switch and check the voltage between MCC pwb "TP1(COM)" and "TP23". (+10 V) (2) Replace MCC pwb if the voltage is not abnormal in the above (1). (3) Check the voltage between "TP1(COM)" and "Cathode of D15". (+12.5 V) (4) Replace MCC pwb if the voltage is not abnormal in the above (3). (5) Turn "OFF" the power switch if the voltage is abnormal in the above (3), and turn "ON" the power switch again after removed MCC pwb PJ5. Then confirm that the voltage between "7" and "8" of the transformer T1 mounted on the phantom ring is around 13 V AC rms. (6) Check the output voltage of the inverter if the voltage between "7" and "8" of T1 is abnormal in the above (5). (The voltage between "6" and "7" of INVERTER pwb connector CN4 should be 100 V AC rms.) If the output voltage of the inverter is abnormal, adjust the output voltage (by INVERTER pwb VR1). Replace the transformer T1 when the output voltage cannot be adjusted. (7) Replace MCC pwb when the voltage between "7" and "8" of T1 is not abnormal in the above (5).

Alarm code (Detailed code)	Alarm condition	Countermeasures
E-4 (10) Master compass control power supply abnormality -100 V DC abnormality	This alarm is generated when the voltage “-10.0 V DC” in MCC pwb fluctuates more than $\pm 10\%$.	(1) Turn “OFF” the power switch, and remove the other connectors than “J5” connector of MCC pwb, then turn “ON” the power switch and check the voltage between MCC pwb “TP1(COM)” and “TP24” : (-10 V) (2) Replace MCC pwb if the voltage is not abnormal in the above (1). (3) Check the voltage between “TP1(COM)” and “Cathode of D18” : (-12.5 V) (4) Replace MCC pwb if the voltage is not abnormal in the above (3). (5) Turn “OFF” the power switch if the voltage is abnormal in the above (3), and turn “ON” the power switch again after removed MCC pwb PU5. Then confirm that the voltage between “g” and “g” of the transformer T1 mounted on the phantom ring is around 13 V AC rms. (6) Check the output voltage of the inverter between “j” and “g” of T1 is abnormal in the above (5). (The voltage between “g” and “j” of INVERTER pwb connector CN4 should be 100 V AC rms.) If the output voltage of the inverter is abnormal, adjust the output voltage (by INVERTER pwb VR1). Replace the transformer T1 when the output voltage cannot be adjusted. (7) Replace MCC pwb when the voltage between “j” and “g” of T1 is not abnormal in the above (5).
E-5 (11) Sensitive element rotor current abnormality	This alarm is generated when the rotor current (190 mA) fluctuates more than $\pm 30\%$. Monitoring of this alarm starts after 2 minutes since the follow-up started.	(1) While the system is running, check the voltage and frequency between “5” and “6” of the terminal board (left side) on the phantom ring. (100 V AC ± 2 V / 400 Hz ± 2 Hz) Adjust the voltage by INVERTER pwb trimmer VR1 if it exceeded the range. (2) Replace INVERTER pwb if the frequency exceeded the range in the above (1). (3) Turn “OFF” the power switch if no problem in the above (1). After 20 minutes elapsed, check the connection from the inverter unit, the transformer T1 on the phantom ring and the sensitive element. Specially, carefully check the connection related to the connector between “8” and “M” in the sensitive element. (4) If no problem in the connection in the above (3), measure resistance between “8” and “M” after removed the sensitive element connector. (Resistance value: 45 ± 3 ohms) Replace the sensitive element if the value exceeds the range. (5) If it was no problem up to the above (4), replace MCC pwb after turned “OFF” the power switch.
E-6 (12) Sensitive element inclination abnormality	This alarm is generated when the inclination (more than 1.5 deg.) has very rarely occurred in the sensitive element due to the north-seeking action, ship's rapid speed up / down or turning action. Monitoring of this alarm starts after 2 hours since starting. This abnormality state may be generated because the sensitive element cannot be controlled when the above-mentioned control voltage abnormality or rotor current abnormality has been generated in the master compass.	(1) Perform checking according to the above-mentioned “E-4 Master compass control power supply abnormality” and “E-5 sensitive element rotor current abnormality”. If no problem, turn “OFF” the power switch and leave the system as it is for more than 20 minutes. (2) Check contact state of the sensitive element connector and the connection from the sensitive element to MCC pwb. (3) Check the connection between HRZC pwb and MCC pwb. (4) Check DST resistance value after removed HRZC pwb connector PU2. (23 ± 20 ohms) (5) Replace the sensitive element if not improved in the countermeasures (1) through (4). (6) Replace MCC pwb if not improved in the countermeasure (5). (7) Replace HRZC pwb if not improved in the countermeasure (6). When replaced HRZC pwb, adjust HRZC pwb again according to Chapter 5.
E-7 (13) Horizontal servo abnormality (This alarm is not detected for the moment.)	This alarm is generated when the servo difference in the horizontal servo loop exceeded 1.0 degree. Start the system again because it caused the master compass stop when this abnormality is generated.	This abnormality is generated due to malfunction of the horizontal servo loop. Accordingly, perform checking and taking countermeasures according to “E-6 Inclination abnormality”.
E-7 (15) Rate limiter abnormality	The master compass has a function to limit the maximum follow-up turning speed. The setting of DIPSW on MCC pwb makes it valid. The maximum turning speed (rate limit value) by DIPSW is 10 degree / sec. This function is provided only for testing. Note: Do not perform the setting usually. Usually, turn “OFF” MCC pwb DIPSW SW1-3. When “rate limit” is set, this alarm is generated when the larger turn rate than the turn rate which can be followed is applied (when struck by wave), and it stops the master compass. This alarm state continues until the restarting. Turn “OFF” the power switch once, and start it again.	Confirm that MCC pwb DIPSW SW1-3 has been “OFF”.

Alarm code (Detailed code)	Alarm condition	Countermeasures
E-8 (37) Zero cross abnormality	Zero cross angle (master compass reference angle) is detected by "photo interrupter" mounted on the ZRCR pwb and "pin" mounted on the upper bracket. Zero cross angle is detected as initial bearing setting during the last azimuth operation. During the system is running, the zero cross angle is set every time the photo interrupter passed through the zero cross pin. This alarm is generated when the zero cross pin has not been detected even after 3 rotations by the phantom ring in the last azimuth operation. However, during system running, this alarm is not generated even when the photo interrupter cannot detect the cross pin (when the zero cross pin was lost due to some reason or ZRCR pwb becomes abnormal).	(1) After turned "ON" the power switch, confirm that MCC pwb "DS3(LED)" goes lit at the moment when the photo interrupter passed through the zero cross pin. (2) Turn "OFF" the power switch when LED was not lit in the above (1), and confirm the mounting of the cross pin and ZRCR pwb. Specially pay attention to their relative positions. Confirm that the pin height matches photo interrupter detector. Also check the harness contact between ZRCR pwb and MCC pwb connector (J3). (3) Replace MCC pwb if no problem in the above (2). (4) Replace ZRCR pwb if not improved in the above (3).
	Zero cross width is defined as the variation between the zero cross angle set when the photo interrupter passed through the zero cross pin and the accumulated relative bearing angle until passed the pin when the system running. This alarm is generated when this zero cross width exceeds the set zero cross width by the extended menu (A-2 2.4 E).	(1) Confirm the mounting of the cross pin and ZRCR pwb. Also check the harness contact between ZRCR pwb and MCC pwb connector (J3). (2) Confirm the connection of communication line from MCC pwb (J2) to SMCC pwb (J1). Specially, confirm the contact resistance between the slip-ring and the brush, and looseness of the "screw" used for the brush connection.
E-9 (16) Non-volatile memory abnormality	This alarm is generated when writable memory area went null.	Replace SCC pwb. When replaced SCC pwb or IOIF pwb, make setting of each parameter again. (Contact to TOKYO KEIKI service station when it is not clear.)
E-9 (17) Non-volatile memory abnormality	When "checksum" does not match during reading "internal data 1" at starting time (Whether "checksum" is checked or not is automatically decided, i.e. it is checked if the data has "checksum" and not checked if no "checksum").	
E-9 (18) Non-volatile memory abnormality	When "checksum" does not match during reading "internal data 2" at starting time (Whether "checksum" is checked or not is automatically decided, i.e. it is checked if the data has "checksum" and not checked if no "checksum").	
E-9 (19) Non-volatile memory abnormality	When "checksum" does not match during reading "internal data 3" at starting time (Whether "checksum" is checked or not is automatically decided, i.e. it is checked if the data has "checksum" and not checked if no "checksum").	
E-9 (20) Non-volatile memory abnormality	When "tag" of the non-volatile memory does not match at starting time.	
E-A (21) Communication abnormality MCC→ SCC	This alarm is generated when communication from the master compass to the control unit (from MCC pwb (CPU) to SCC pwb (CPU)) has broken for more than 5 seconds.	(1) Check the connection from the master compass MTTRM pwb MR+ / MR- to the control unit GTERM pwb (TB1 MR+ / DTERM pwb (TB21 MR+)). When the automatic steering system is integrated, check the connection (harness) from the master compass MTTRM pwb (J12) to GTERM pwb (J12)/DTERM pwb (J12). (2) Check the communication line connection from MCC pwb (J2: 3 and 4 pin) to SMCC pwb (J1: 3 and 4 pin). Specially, confirm the contact resistance between the slip-ring and the brush, and looseness of the "screw" used for the brush connection. (Terminal name: M and B) (3) Check the connector contact between the control unit GTERM pwb (J4)/DTERM pwb (J4) and SCC pwb (J4). (4) Replace MCC pwb and SMCC pwb if the above (1) through (3) are not abnormal. (5) Replace SCC pwb if the alarm was not recovered after performed the above (1) through (4). When the SCC pwb is replaced, do not forget to change the parameters stored in the non-volatile memory.
E-A (23) MCC(CPU) reset	This alarm is generated when abnormality was generated in the control power supply 5 V DC of MCC pwb (CPU) in the master compass and the CPU was reset. When this alarm is generated, the system starts to operate from the starting sequence.	When this alarm is generated, confirm the source power supply 5 V DC (between TP1(COM) and TP2) applied to "CPU" of MCC pwb. As this 5 V DC is produced by the control power supply, check and take necessary countermeasures according to "E-4 Master compass control power supply abnormality".

Alarm code (Detailed code)	Alarm condition	Countermeasures
E-b (22) Communication abnormality SCC→ MCC	This alarm is generated when communication from the control unit to the master compass (from SCC pwb (CPU) to MCC pwb (CPU)) has broken for more than 5 seconds.	(1) Confirm whether SCC pwb is operating or not. It is decided that it is operating when even one LED is lit on SCC pwb. (2) It is decided that SCC pwb is not operating when all LEDs on SCC pwb are extinguished. At this time, confirm that the voltage between GTERM pwb (J5)/DTERM pwb (J7) "9" and "10" is 24 V DC (+30 % -20 %). (3) If the voltage is abnormal in the above (2), confirm the connection from GPOWER pwb (J5) to GTERM pwb (J5)/DTERM pwb (J7), and if the voltage is normal, replace GPOWER pwb of the power supply unit. (4) If the voltage is normal in the above (2), check the fuse on GTERM pwb (F16)/DTERM pwb (F19) pwb. If it has blown, confirm the operation after replaced the fuse. If the fuse has blown again, replace SCC pwb. When replaced SCC pwb, do not forget to change the parameters stored in the non-volatile memory. (5) When it is decided that SCC pwb is operating in the above (1), confirm the connection from the master compass MTTM pwb MT+ / MT- to the control unit GTERM/DTERM pwb TB1 MT+ / TB21 MT+-. (When the automatic steering system is integrated, confirm the connection (harness) from the master compass MTTM pwb (J12) to GTERM pwb (J12). (6) Confirm the communication line connection from MCC pwb (J2: 3 and 5 pin) to SMCC pwb (J1: 3 and 5 pin). Specially, confirm the contact resistance between the slip-ring and the brush, and looseness of the "screw" used for the brush connection. (Terminal name: M, H) (7) Confirm the connector contact from the control unit GTERM pwb (J4) to SCC pwb (J4). (8) Replace MCC pwb and SMCC pwb if the above (5) through (7) are not abnormal. (9) Replace SCC pwb if the alarm was not recovered after performed the above (5) through (8). When the SCC pwb is replaced, do not forget to change the parameters stored in the non-volatile memory.
E-b (24) SCC(CPU) reset	This alarm is generated when abnormality is generated in the control power supply 5 V DC of the control unit SCC pwb (CPU), and the CPU was reset.	(1) Confirm whether SCC pwb is operating or not. It is decided that it is operating when even one LED is lit on SCC pwb. (2) It is decided that SCC pwb is not operating when all LEDs on SCC pwb are extinguished. At this time, confirm that the voltage between GTERM pwb (J5)/DTERM pwb (J7) pwb connector "9" and "10" is 24 V DC (+30 % -20 %). (3) If the voltage is abnormal in the above (2), confirm the connection from GPOWER pwb(J7) to GTERM pwb (J5)/DTERM pwb (J7). Replace GPOWER pwb if the connection is normal. (4) If the voltage is normal in the above (2), confirm the fuse on GTERM pwb (F16)/DTERM pwb (F19) pwb in the control unit. If it has blown, confirm the operation after replaced the fuse. If the fuse has blown again, replace SCC pwb. When replaced SCC pwb, do not forget to change the parameters stored in the non-volatile memory.
E-c (25) GPS communication break	This alarm is generated when the serial signal from the GPS has broken successively for 15 seconds. This alarm is generated only when the latitude / ship speed information input system was set to "GPS" on the operating panel. And also it is not generated when "A-2 2.9.G: No connection to GPS" was set.	(1) Confirm that the GPS is operating properly. At this time, by using a protocol analyzer or the like, confirm the serial signal data output from the GPS. (2) Confirm the connection between GTERM pwb TB1 GRX+ / GRX- in the control unit and the GPS. Also confirm after inversely connected GTERM pwb TB1 GRX+ and GRX-. (3) Confirm after changed the setting of MIFC(J14)/SIFC(J20)/MCOIF(J22)/MCOIF(J22) pwb jumper in the control unit. When the signal cannot be received, confirm after inversely connected GTERM pwb TB1 GRX+ and GRX-. (4) Confirm that "GPS communication format" in the extended menu "A-4" matches the format set in the GPS. (5) Replace MIFC/SIFC/MCOIF pwb when it was not improved by the above (1) through (4). Replace each SCC pwb when it was not improved after replaced MIFC/SIFC/MCOIF pwb. When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory. Note : The recovering condition of this alarm is following two. 1. When the serial signal from the GPS has been recovered. 2. When the latitude / ship speed information input system was changed to other than the GPS and the true bearing (displayed with blinking) was determined. While this alarm is generated, the latitude / ship speed data immediately before this abnormality occurred are retained. The speed error correction is performed based on these data until this alarm condition is removed.

Alarm code (Detailed code)	Alarm condition	Countermeasures
E-d (26)		Take the similar countermeasures to "E-c GPS communication break".
GPS data abnormality Latitude data abnormality	It is alarmed when the following abnormality is generated in the serial signal data from the GPS. This alarm is generated only when the latitude information input system was set to "GPS" on the operating panel. And also it is not generated when the extended menu "A-2.8.G: No connection to GPS" was set. (1) When GPS performance index of "GGA" received "0" more than 10 times successively. (However, it is not alarmed when "A-7.7.3.G: Performance index check" was set to "OFF".) (2) When latitude value is "null field". (3) When both of "GGA" and "GGL" cannot be received successively for more than 17 seconds. (4) "Checksum" of data did not match. (Whether "checksum" is checked or not is automatically decided, i.e. it is checked if the data has "checksum" and not checked if no "checksum".) Note "GGA" sentence data is received at priority when both of "GGA" and "GGL" sentences are inputted where "GPS" was selected for the latitude information input system. However, "GGL" sentence is automatically received when "GGA" sentence was lost for more than 3 seconds. Then "GGA" sentence is immediately received when "GGA" sentence was recovered.	
E-d (27) GPS data abnormality Ship speed data abnormality	It is alarmed when the following abnormality is generated in the serial signal data from the GPS. This alarm is generated only when the ship speed information input system was set to "GPS" on the operating panel. And also it is not generated when the extended menu "A-2.9.G: No connection to GPS" was set. (1) When "VTG" was not received for more than 17 seconds. (2) When ship speed value was "null field". (3) "Checksum" of data did not match. (Whether "checksum" is checked or not is automatically decided, i.e. it is checked if the data has "checksum" and not checked if no "checksum".)	
E-E (33) External heading sensor unit (HDM / EHS / MAG) communication break	This alarm is generated when the serial signal from the external heading sensor unit (HDM / EHS / MAG) has broken for more than 15 seconds successively. This alarm is generated only when TG-8000 series was set with the external heading sensor unit (HDM / EHS / MAG). This setting is performed by DIPSW (SCC pwb SW1 5 and 6 bit).	(1) Confirm that the external heading sensor unit (HDM / EHS / MAG) is operating properly. (2) Check the connection and its contact between the GTERM pwb (J7) in the control unit and EMCC pwb(J7) of the external heading sensor unit (HDM / EHS / MAG). (3) Confirm after changed the setting of MIFC/SIFC pwb jumper "ESPOL (MIFC:J16, SIFC:J22)". Confirm that "3" and "4" of MCOIF / SCOIF pwb jumper "ESSEL1 through 4 (MCOIF pwb: J33 / 34 / 35 / 36, SCOIF pwb: J33 / 34 / 35 / 36)" are shorted. (4) Confirm that MIFC / SIFC pwb jumper "WR / EXT (MIFC pwb: J10 and SIFC pwb: J17) are shorted. (Also confirm its contact state.) Confirm that MCOIF / SCOIF pwb jumper "1WR / EXT, 2WR / EXT (MCOIF pwb: J25, 26 and SCOIF pwb: J25, 26) are shorted. (Also confirm its contact state.) (5) Replace MIFC/SIFC/MCOIF/SCOIF pwb if it was not improved by the above (1) through (4). Replace SCC pwb when it was not improved after replaced MIFC/SIFC/MCOIF/SCOIF pwb. when the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-F (34) External heading sensor unit (HDM / EHS / MAG) data abnormality	This alarm is generated when the serial signal cannot be received properly from the external heading sensor unit (HDM / EHS / MAG) for more than 17 seconds successively. This alarm is generated only when TG-8000 series was set with the external heading sensor unit (HDM / EHS / MAG). This setting is performed by DIPSW (SCC pwb SW1 5 and 6 bit).	Take the similar countermeasures to "E-E External heading sensor unit (HDM / EHS / MAG) communication break.

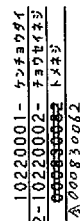
Alarm code (Detailed code)	Alarm condition	Countermeasures
E-L (30) Standard external heading sensor communication break	This alarm is generated when the serial signal from the standard external heading sensor unit has broken for more than 15 seconds successively. This alarm is generated only when TG-8000 series was set with the standard external heading sensor unit. This setting is performed by DIPSW (SCC pwb / ICIF pwb SW1 5 and 6 bit).	(1) Confirm that the connected external heading sensor is operating properly. At this time, by using a protocol analyzer or the like, confirm the output signal data from the external heading sensor. (2) Confirm that "1" and "2" of MCOIF / SCOIF pwb jumper ESSEL1 through 4 (MCOIF pwb: J33 / 34 / 35 / 36, SCOIF pwb: J33 / 34 / 35 / 36)" are shorted. (3) Confirm the connection between GTERM pwb TB1 ESRX+ / ESRX- in the control unit and the external heading sensor. Also confirm after inversely connected GTERM pwb TB1 ESRX+ / ESRX-. (4) Confirm after changed the setting of MFC / SIFC pwb jumper "ESPOL (MFC pwb: J16, SIFC pwb: J22)" in the control unit. Confirm after inversely connected GTERM pwb TB1 ESRX+ / ESRX- if it cannot be received. Confirm after changed the setting of MCOIF / SCOIF pwb jumper "ESPOL (MCOIF pwb: J29, SCOIF pwb: J29)" in the control unit. Confirm after inversely connected GTERM pwb TB1 ESRX+ / ESRX- if it cannot be received. (5) Confirm that MFC / SIFC pwb jumpers "WR / EXT (MFC pwb: J10, SIFC pwb: J17)" are shorted. (Also confirm its contact state.) (6) Confirm that MCOIF / SCOIF pwb jumpers "MWR / EXT (MCOIF pwb: J30, SCOIF pwb: J30)" are shorted. (Also confirm its contact state.) (7) Confirm that the extended menu "A-6, Standard external heading sensor communication format" matches the external heading sensor format. (8) Replace MFC / SIFC pwb if it was not improved by the above (1) through (5). Replace SCC pwb if it was not improved after replaced MFC / SIFC pwb. When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-n (31) Standard external heading sensor communication data abnormality E-P (28) LOG communication break	This alarm is generated when the serial signal from the standard external heading sensor unit cannot be received properly for more than 17 seconds successively. This alarm is generated only when TG-8000 series was set with the standard external heading sensor unit. This setting is performed by DIPSW (SCC pwb SW1 5 and 6 bit). This alarm is generated when the serial signal from the LOG has broken for 15 seconds successively. This alarm is generated only when the ship speed was set to obtain from the LOG (serial signal). This alarm is not generated when the extended menu "A-2 2. A. S: No LOG (serial signal)" was set.	Take the similar countermeasures to "E-L Standard external heading sensor unit communication break". (1) Confirm that LOG is operating properly. At this time, by using a protocol analyzer or the like, confirm the output signal data from the GPS. (2) Confirm the connection between GTERM pwb TB1 LRX+ / LRX- in the control unit and the LOG. Confirm after inversely connected GTERM pwb TB1 LRX+ / LRX-. (3) Confirm after changed the setting of MFC / SIFC pwb jumper "LOGPOL (MFC pwb: J15, SIFC pwb: J21)" in the control unit. Confirm after inversely connected GTERM pwb TB1 LRX+ / LRX- if it cannot be received. Confirm after changed the setting of MCOIF / SCOIF pwb jumper "LOGPOL (MCOIF pwb: J23, SCOIF pwb: J23)" in the control unit. Confirm after inversely connected GTERM pwb TB1 LRX+ / LRX- if it cannot be received. (4) Confirm that the extended menu "A-5 LOG communication format" matches the format set for the LOG. (5) Replace MFC/SIFC/MCOIF/MCOIF pwb if it was not improved by the above (1) through (4). Replace SCC pwb if it was not improved after replaced MFC/SIFC/MCOIF/MCOIF pwb. When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-U (29) LOG data abnormality	This alarm is generated when the following abnormality is generated in the serial signal data from the LOG. This alarm is generated only when the ship speed information input system was set to "LOG serial signal". Also it is not generated when the extended menu "A-2 2.A.S: No LOG (serial signal)" was set. (1) When both of the speed over ground status and the speed over water status are invalid. (2) When both of the speed over ground value and the speed over water value are "null field". (3) When "VBW" cannot be received for more than 17 seconds successively. (4) When data "checksum" did not match. (Whether "checksum" is checked or not is automatically decided, i.e. it is checked if the data has "checksum" and not checked if no "checksum".)	Take the similar countermeasures to "E-P LOG communication break". (1) Confirm that the LOG is operation properly. If it is operating properly, confirm the LOG output pulse (contact) movement by an oscilloscope, tester or the like. If possible, confirm that the gyrocompass can receive the speed properly when pulses (contact) corresponding to a constant ship speed are outputted in LOG test mode. (2) Confirm the connection between GTERM pwb TB1 SL+ / SL- in the control unit and the LOG. (3) Confirm the contact of MFC (J11)/SIFC (J19)/MCOIF (J27)/MCOIF (J27) pwb jumper "LOG" in the control unit. (4) Confirm that MFC/SIFC/MCOIF/MCOIF pwb LED DS1 is blinking during the ship speed input. Replace MFC/SIFC/MCOIF/MCOIF pwb if it was not blinking. Replace SCC pwb if it was not improved after replaced MFC/SIFC/MCOIF/MCOIF pwb. When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-u (38) LOG pulse abnormality	This alarm is generated when the time interval of the output pulse (contact) from the LOG changed suddenly more than 3 times. It is treated as an alarm condition because sudden speed change does not occur while the ship is normally operated. This alarm is generated only when the ship speed information input system was set to "LOG pulse". Also it is not generated when the extended menu "A-2 2.9.L: No LOG connection" was set.	

Alarm code (Detailed code)	Alarm condition	Countermeasures
E-G (36) Encoder abnormality	This alarm is generated when such state that the difference between the master compass bearing and the bearing obtained by the encoder is more than 3 degrees, has continued for more than 3 seconds.	(1) Confirm the connection from the master compass MTTRM pwb EA+/-, EB+/- to the control unit GTERM pwb TB1 EA+/-, EB+/-. (When the automatic steering system is integrated, confirm the connection (harness) from the master compass MTTRM pwb(J12) to GTERM pwb (J12). (2) Confirm the connection from MCC pwb (J2) to SMCC pwb (J1). Specially, confirm the contact resistance between the slip-ring and the brush, and looseness of the "screw" used for the brush connection. (3) Confirm that the master compass step motor is operating smoothly, and the encoder unit is operating properly. If possible, confirm that the 90 degree phase shifted wave form is observed by connected an oscilloscope to MTTRM pwb EA+/- and EB+/- of the master compass. Replace ENCC pwb if the wave form is abnormal. (4) Confirm the connector inserting state from GTERM pwb (connector J4) to SCC pwb (J4). (5) Replace SCC pwb if no problem in the above (1) through (4). When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
E-r (35) Communication system power supply abnormality (E5V abnormality)	This alarm is generated when the power supply for the communication system control circuit was lost (or dropped).	(1) Confirm after removed all serial signal cables connected to GTERM pwb. (2) Replace MFC/SFC/MCOIF/MCOIF pwb if abnormality continued after performed the above (1). (3) Replace SCC pwb if it was not improved after performed the above (1) and (2). When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
Repeater abnormality	When no repeater is operating. Note The signal output to the repeater compass starts after the master compass completed the last azimuth operation.	(1) Confirm that the voltage between GTERM pwb TB2 STx5 and STx4 (Comm.) is 24 V DC ± 4 V. Replace GPOWER if the value exceeds the range. (2) Check GTERM pwb fuse F5 if no problem in the above (1). Confirm after replaced it if it has blown. Replace MFC/SFC/MCOIF/MCOIF pwb if it has blown again. (3) Replace SCC pwb if it was not improved after performed the above (1) and (2). When the SCC pwb was replaced, do not forget to change the parameters stored in the non-volatile memory.
	When one or more repeater compasses are not operating. Note The signal output to the repeater compass starts after the master compass completed the last azimuth operation.	Confirm the fuse on the GTERM pwb circuit connected to the not-working repeater compass. Refer to the separate circuit drawings for the relationship between the fuse and GTERM pwb connecting terminal to the repeater compass.
	When serial signal type repeater is not operating. Note The signal output to the repeater compass starts after the master compass completed the last azimuth operation.	The signal output to the repeater compass starts after the master compass completed the last azimuth operation. (1) Confirm that card illumination is blinking by maximizing illumination intensity of the repeater compass. (2) When the card illumination is blinking, there is possibility that the serial signal specifications applying to the repeater do not match the receiving serial signal specifications of the internal RPCC pwb in the repeater. Check the DIPSW setting of the gyrocompass side, jumper setting and DIPSW setting of the repeater side.

5. Parts

5.1 Master Compass (Main Parts)

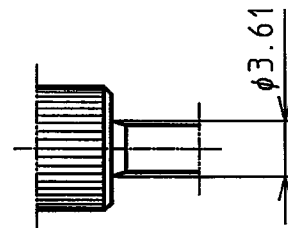
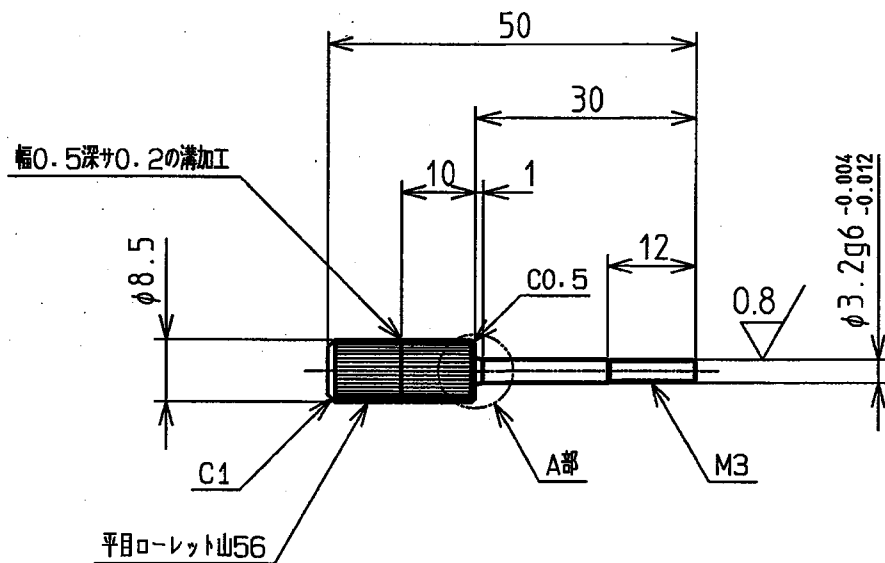
Page No.	Name				Parts No.	Remarks
5-2	Master Compass				10189000	
5-3		Sensitive element			10229409(H)	
5-4				Screw guide pin (A)	11002595	<u>Tool</u> (Thin: 3.2mm)
5-5				Screw guide pin (B)	11002596	<u>Tool</u> (Fat: 3.4mm)
5-6		Horizontal ring Ass'y			10189056	
5-7			Mounting ring Ass'y		10169102	
5-8			Flexible wire		10169706	
5-9			Damper oil		10160162	Horizontal ring damper (10cc)
5-10			Hrzc pwb		10169503	Need insulation separator (tube). 20565709 Q' ty:1
5-11		Binnacle Ass'y			10189040	
5-12			Shock absorber Ass'y		10189048	
5-13			Lower base plate Ass'y		10189043	
5-14				Inverter Ass'y	10169109	Includes insulation separators (tube).
5-15				Inverter pwb	10169537	Need following insulation separators (tube). 20565708 Q' ty:3 / 20565709 Q' ty:8
5-16				Mttrm pwb	10189509	
5-17			Upper base plate Ass'y		10189042	
5-18				Brush (3)	10239379	
5-19				Brush (4)	10239380	
5-20				Step motor Ass'y	10189045	
5-21				Step motor	10189046	
5-22				Belt	10160030	
5-23				Encoder Ass'y	10189090	
5-24				Smcc pwb	10189503	
5-25			Phantom ring Ass'y		10189041	
5-26				Transformer	10037788	
5-27				Slip ring	10169260	
5-28				Reray pwb	10230227	
5-29				Mcc pwb	10189501	
5-30				Zrcr pwb Ass'y	10189091	



1. 上部容器にフロート組立を取付けた懸吊線を組み込む。

2. 電図8、10をハーメチックシールピン(8はN線、10はS線)にハンダ付けする。
3. ビックアップ調整を行う。(X、φ、θ信号電位的等位置調整)(シリコン油 50C、S中)
ビックアップ調整容器(水平レベル50° 時)
 $\phi_{ns} \pm 6mV$ $\phi_{ms} \pm 20mV$ $X \pm 25mV$
 $\theta_{ns} \pm 3mV$ $\phi_{ms} \pm 10mV$
4. 上調整窓(含フロッタ)を洗浄する。(ガソリン)
5. ビックアップ取付ネジ部、ゆるみ止め処理を行う。
6. 下調整窓を取付ける。
7. シリコン油(1.7万 $\pm$ 500C、S)を上調整窓のハーメチック(2ピン)の下まで充填する。
初0.7~0.8Kg 追加のいない事を確認。
8. ケース内空気を完全に抜くこと。(0.1~0.3mmHg程度にて行うこと)

[illegible]



A部詳細図 (S=2/1)

打ち抜きの普通許容差 / JIS B 0408-B

長さ寸法の普通許容差 / JIS B 0405-m

6.3 / (0.8 /)

基準寸法の区分	基準寸法の区分					
	6以下	6を超え 30以下	30を超え 120以下	120を超え 400以下	400を超え 1000以下	1000を超え 2000以下
許容差	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2

利用歴		
Z		

変更訂正	△	-	-						
	△	-	-						
	△	-	-						
	△	-	-						
	△	-	-						
	△	-	-						

製	図	設	計	検	図	承	認
△	△	△	△	△	△	△	△

材	SUS303-BG	質	
質		量	kg

記	事	日	付	理由	変更訂正項目	番号	処置者	適	用

名	アンナインジ (A)
称	

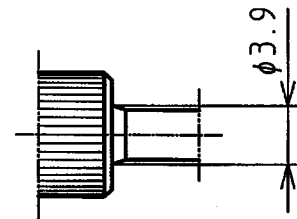
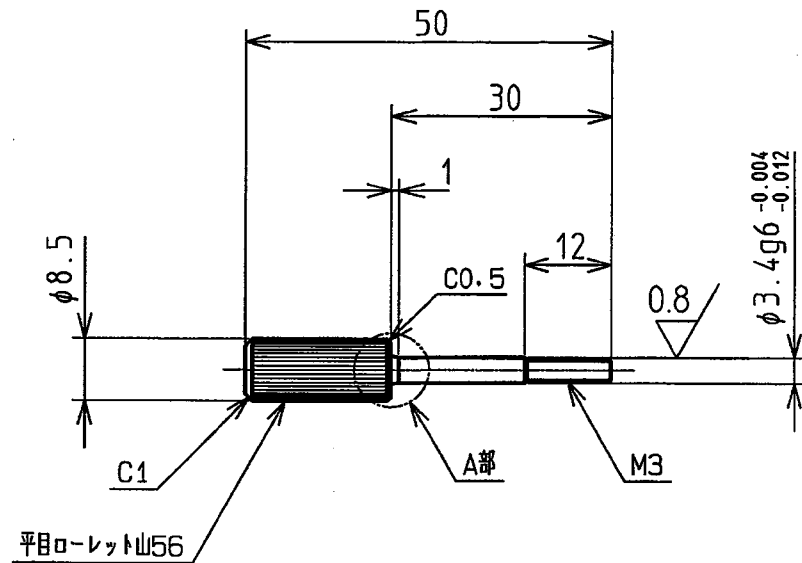
TOKIMEC
株式会社 トキメック



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日
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1 : 1
2007-10-15

サイズ
A

図番
1.1.0.0.2.5.9.5.0.1/1



A部詳細図 (S=2/1)

打ち抜き普通許容差 / JIS B 0408-B

長さ寸法の普通許容差 / JIS B 0405-m

基準寸法の区分	基準寸法の区分					
	6以下	6を超え 30以下	30を超え 120以下	120を超え 400以下	400を超え 1000以下	1000を超え 2000以下
許容差	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2

利用歴		
Z		

変更訂正	△	-	-						
	△	-	-						
	△	-	-						
	△	-	-						
	△	-	-						
	△	-	-						
マーク	日	付	理由	変更訂正項目	番号	処置者	適用		

記事	TG系鋭部組込治具

製	図	設	計	検	図	承	認
△	△	△	△	△	△	△	△

材	SUS303-BG	質	
質		量	kg

名	アンナインジ (B)
称	

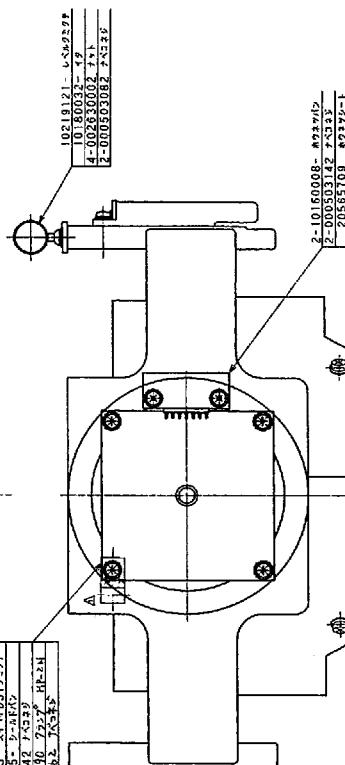
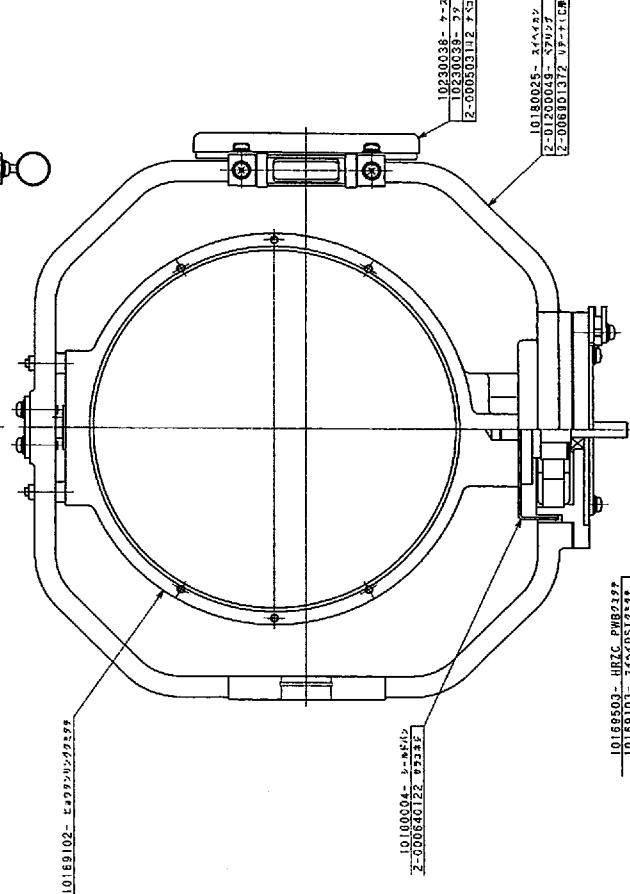
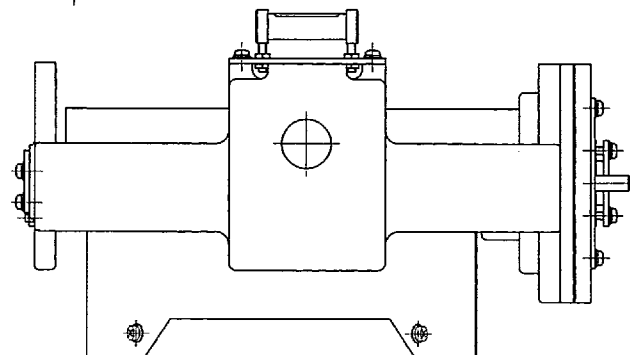
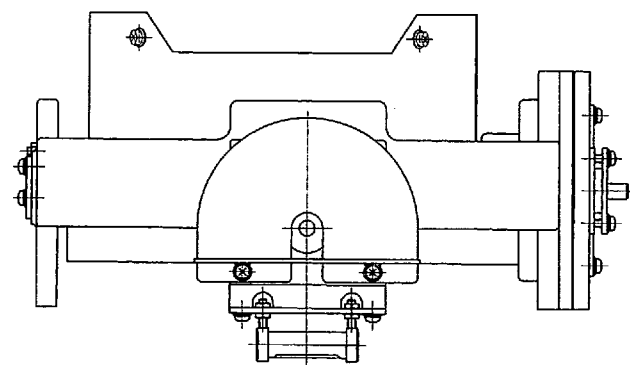
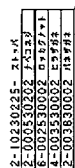
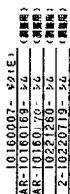
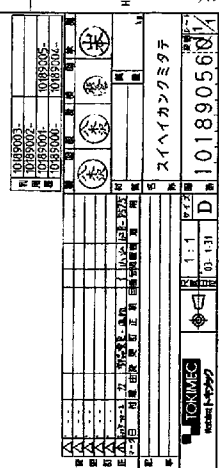
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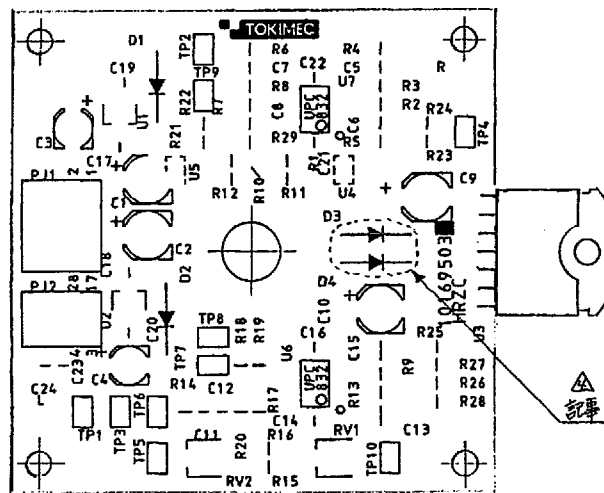
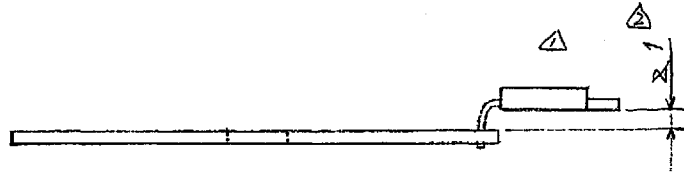
尺度 1 : 1
日付 2007-10-15

サイズ 図
A 番

1.1.0.0.2.5.9.6.0 1/1



バリエーション	図面番号	日付	内容
-0004	05	2006.06.13	記事追加
-0005	06	2011.05.09	U3取付寸法指示追加



記事参照 (スプリング線によるシールド)

* U3 の取付は、治具も使用すること。(治具NO. YJ-1007)

* U4, U5 は半田面に取付のこと。

* R25, R26 は取付不要

△ * D1~D4 は半田付け後のリードの長さを 1mm 以下に成る様カットする。

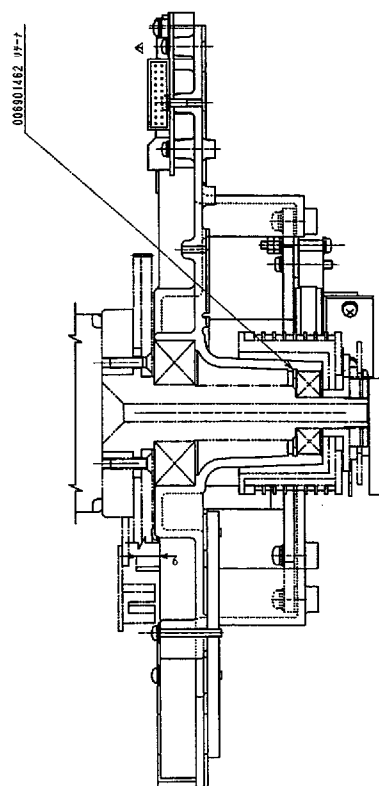
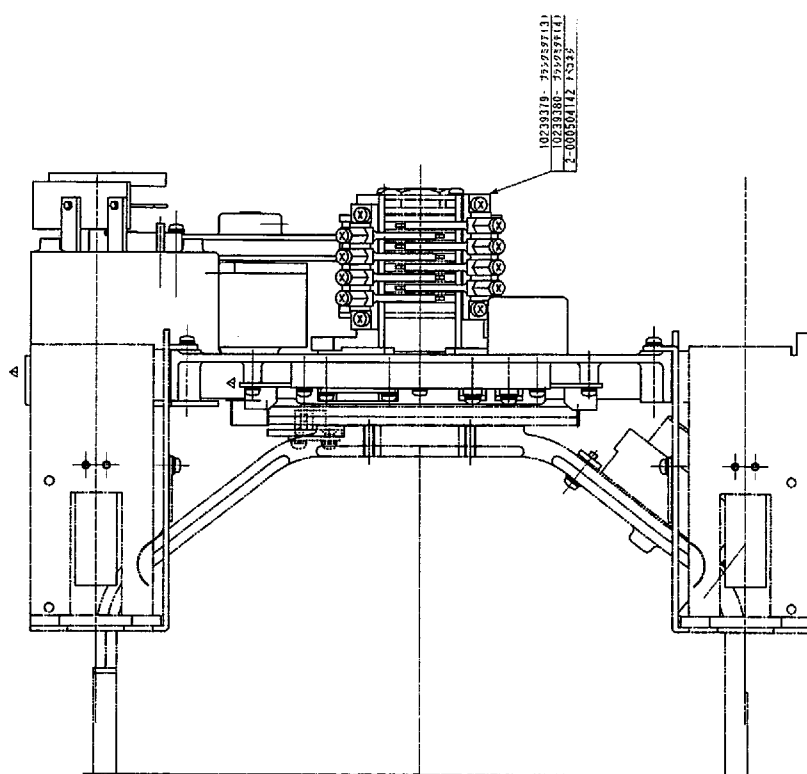
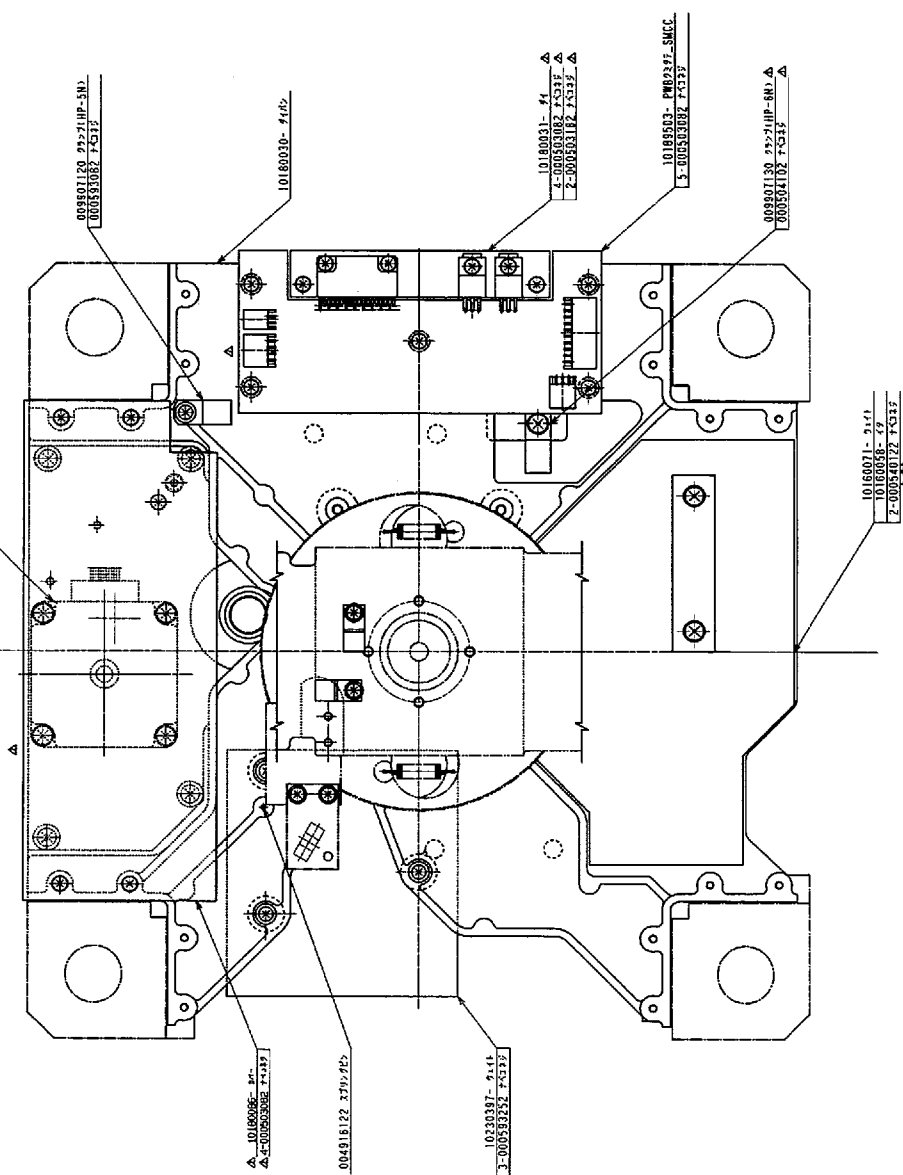
△ * D3, D4 はスモークセン(1-00008569-0000, TAD8)を取り付けのこと。

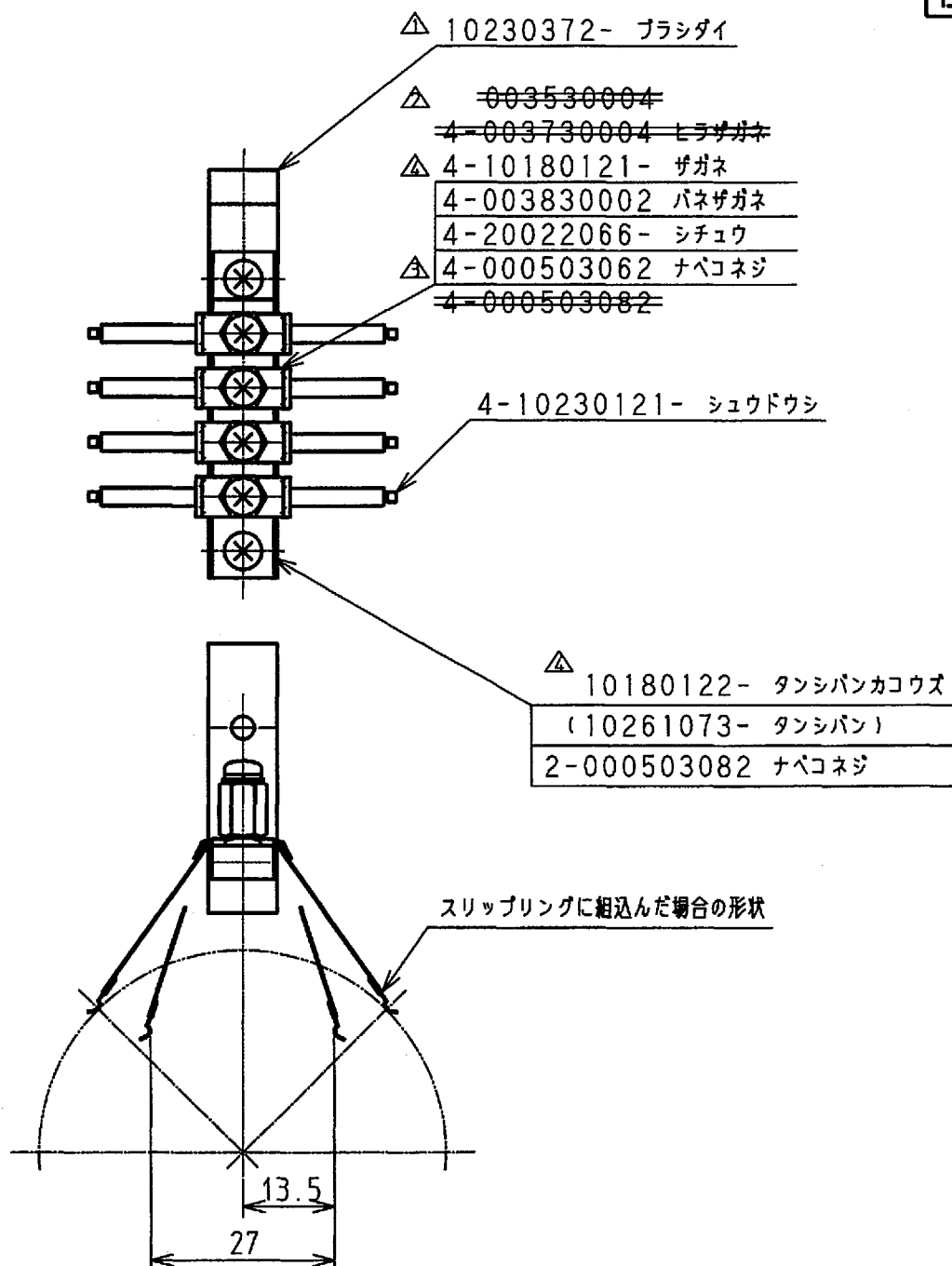
3- 1- 1- 2-	変更	訂正	記事					製 図	設 計	検 図	承 認
	△	2011-5-9	記事追加	6	秋山	6JB-10722					
	△	2006-6-13	記事追加	5	関根	6JB-642d.					
	△	02-8-9	U3 取付寸法指示訂正	4	秋山	6JB-3902					
△	01-9-28	U3 取付寸法指示	3	関根	6JB-3531	材 質		質 量	kg		
	76-2-20	R17 定数変更 240K → 120K	2	三浦		材 質		質 量	kg		
	マーク	日 付	理 由	変 更 訂 正 項 目	番 号	処 置 者	適 用				
	TG6000							名 称			HRZC PWB 組立
								図 番			10169503
								変 更			1/1
								シ ー ト			1/1



1. 防振座は本図が4対となる。
部品個数は1対分を記入してある。
2. 本組立図は、10169209—ボウシンザクミタと
同一である。

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[illegible]



利用歴	
Z_10189042-	

変更訂正	△	-	-						製	図	設	計	検	図	承	認
2-1-	△	-	-													
	△	2006-6-12		部品追加変更	4	八木沢	6JB-6428									
	△	97-6-9		部品変更	3	八木沢	6JB-0609									
	△	95-10-17		部品変更	2	八木沢										
	△	92-6-3		部品変更	1	八木沢										
	マ-ク	日	付	理由	変更訂正項目番号	処置者	適用									
記事																

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1:1

'91.12.11

サイズ

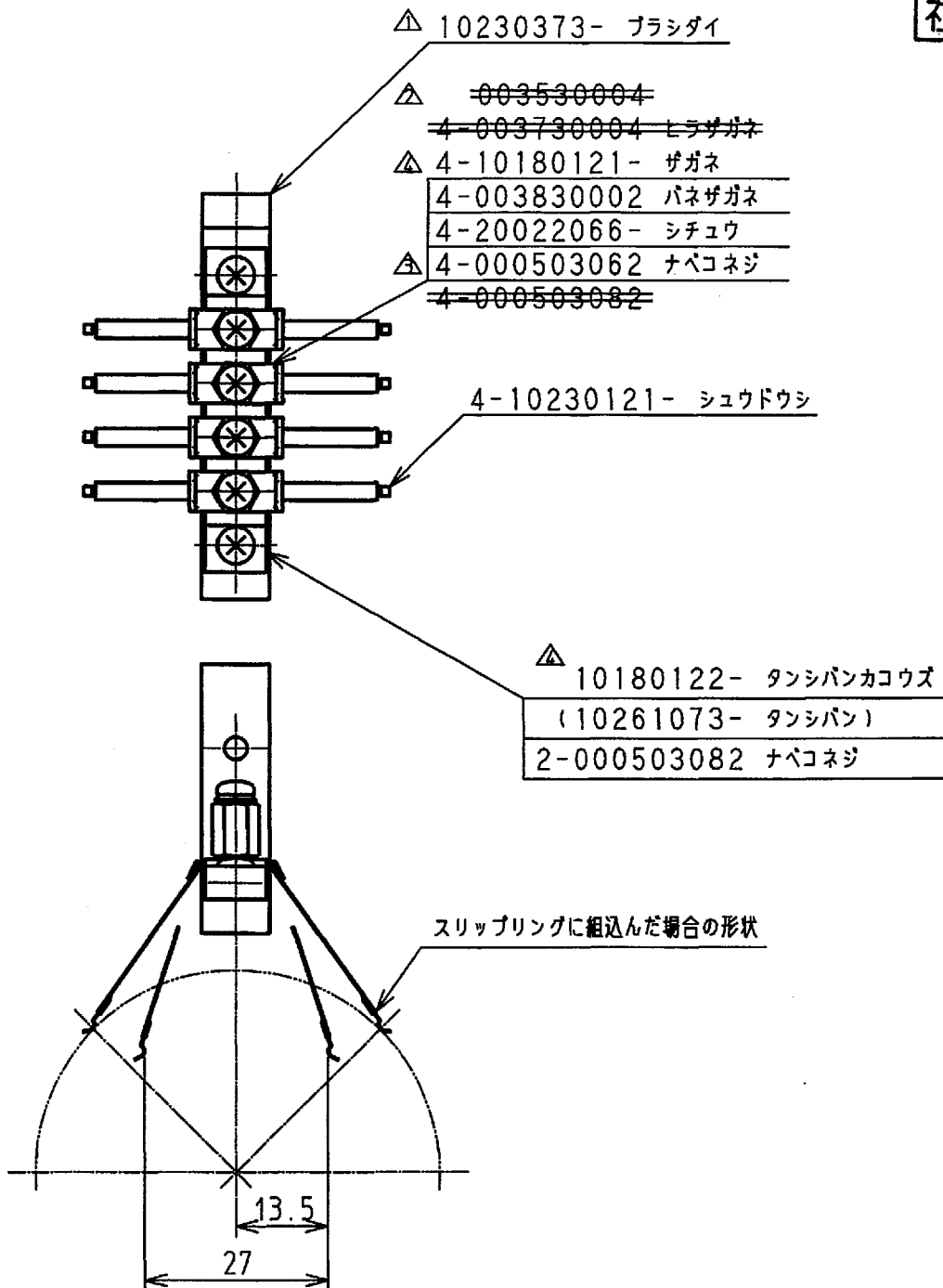
A

図番

102393794

変番

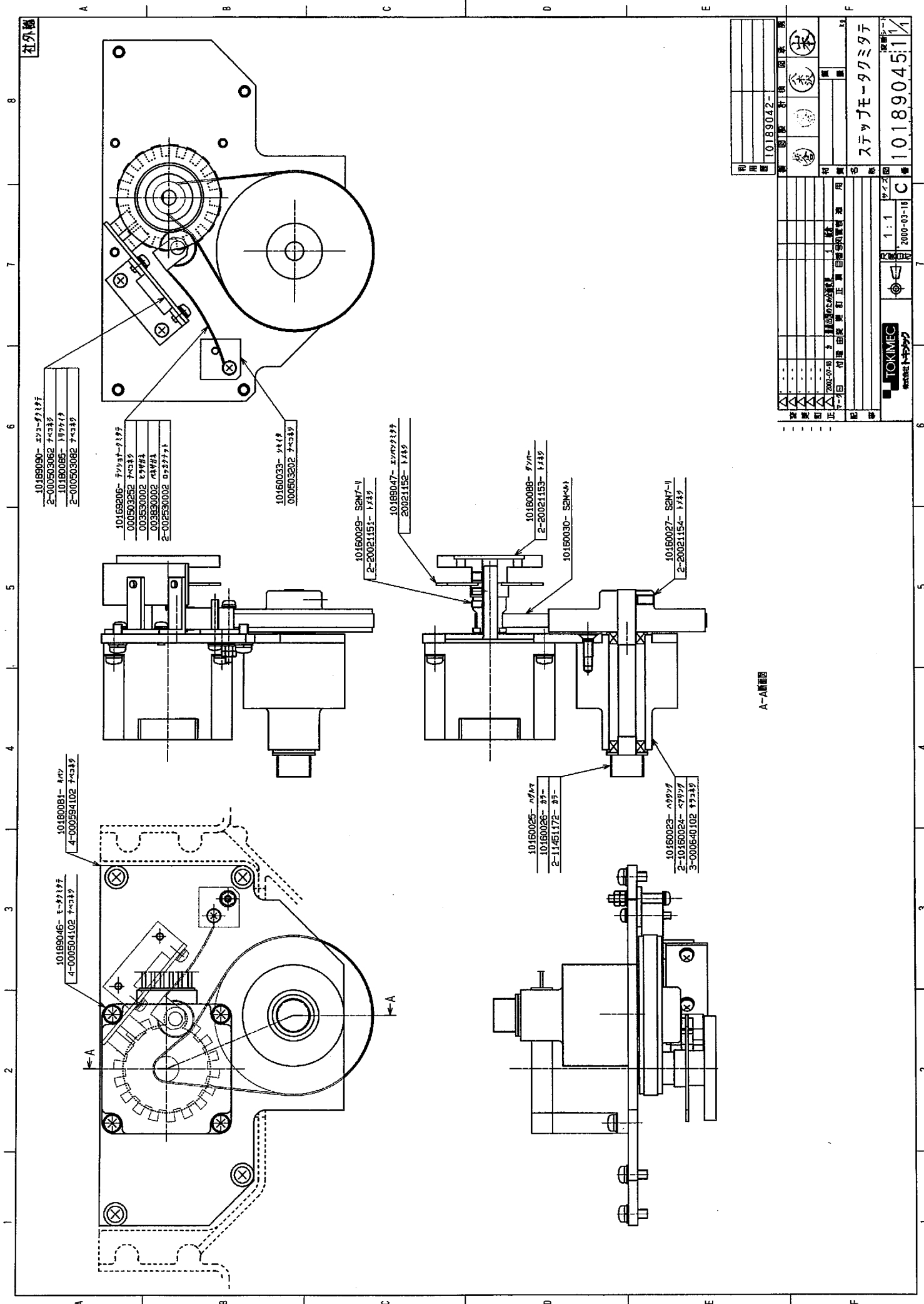
1/1

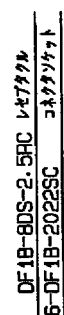


利用歴		
	Z_10189042-	

2-1-

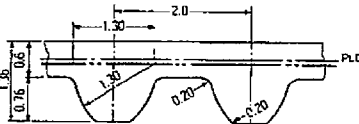
変更訂正	△	- -							製	図	設	計	検	図	承	認				
	△	- -							材	質	量	kg	名	称	図	番				
	△	2006- 6-12	部品追加変更	4	入木沢	6JB-6428	6	木澤									6	木澤	板倉	登元
	△	' 97- 6- 9	部品変更	3	入木沢	6JB-0609														
	△	' 95-10-17	部品変更	2	入木沢															
△	' 92- 6- 3	部品変更	1	村林																
マーク日付理由変更訂正項目番号処置者適用																				
記事										ブラシクミタテ(4)										
 株式会社 トキメック											尺度 1 : 1 '91.12.11		サイズ A		図番 102393804		変番 1/1			



[illegible]

名 称 バンド-STS-V (ベルト)
 型式番号 60 S2M 260 (130T)
 メーカー バンドー化学株式会社

表1 ベルト断面寸法と呼称

種類	S2M
ベルトピッチ	2.0mm
PLD	0.254mm
ベルトの 標準寸法 (mm)	
呼 称 例	B 40 S 2M 160 ———— ベルト呼び長さ (mm) ———— ベルト形 ———— スーパートルク ———— ベルト幅 (mm) × 10 ———— ベルト

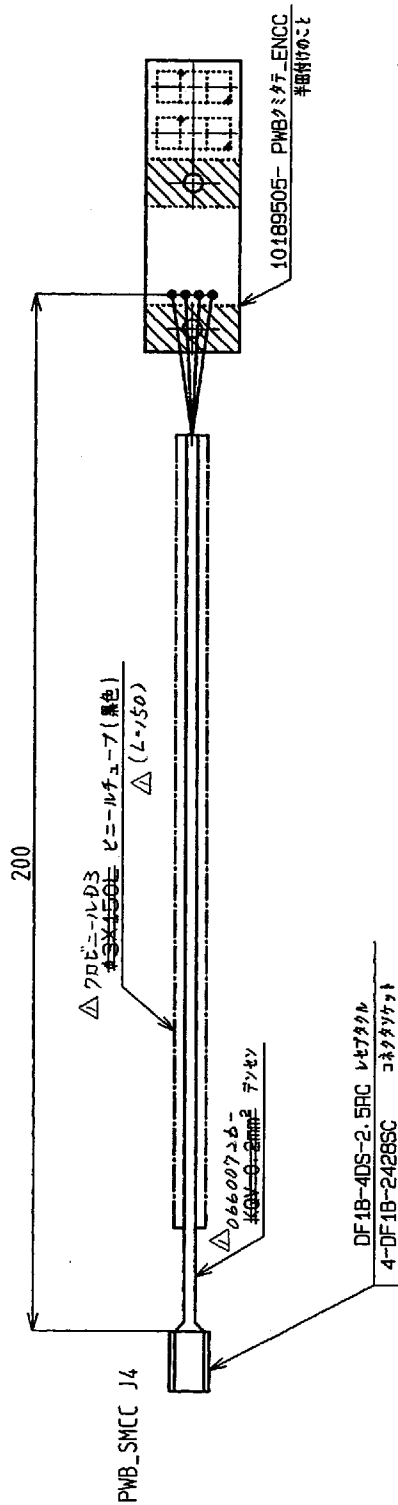
又は、

名 称 スーパートルクタイミングベルト (ベルト)
 型式番号 B60 S2M 260 (130T)
 メーカー ミツ星ベルト株式会社

利用歴	
	10169108-

△				材質 MATERIAL	製図 DWN	設計 CHG	検図 CHK	承認 APPD	
△				ネオプレン + ガラス繊維	  				
△				記事 NOTE					
△									
△									
MARK	日付 DATE	変更項目 REVISION	NO.	SIGN	名称 TITLE S 2 M ベルト				
 株式会社トキメック TOKIMEC INC.					尺度 SCALE 1:1 日付 DATE '94. 4.12	SIZE A	図 番 DRAWING NO. 1 0 1 6	0 0 3 0 0	SHEET 1/1

社外組



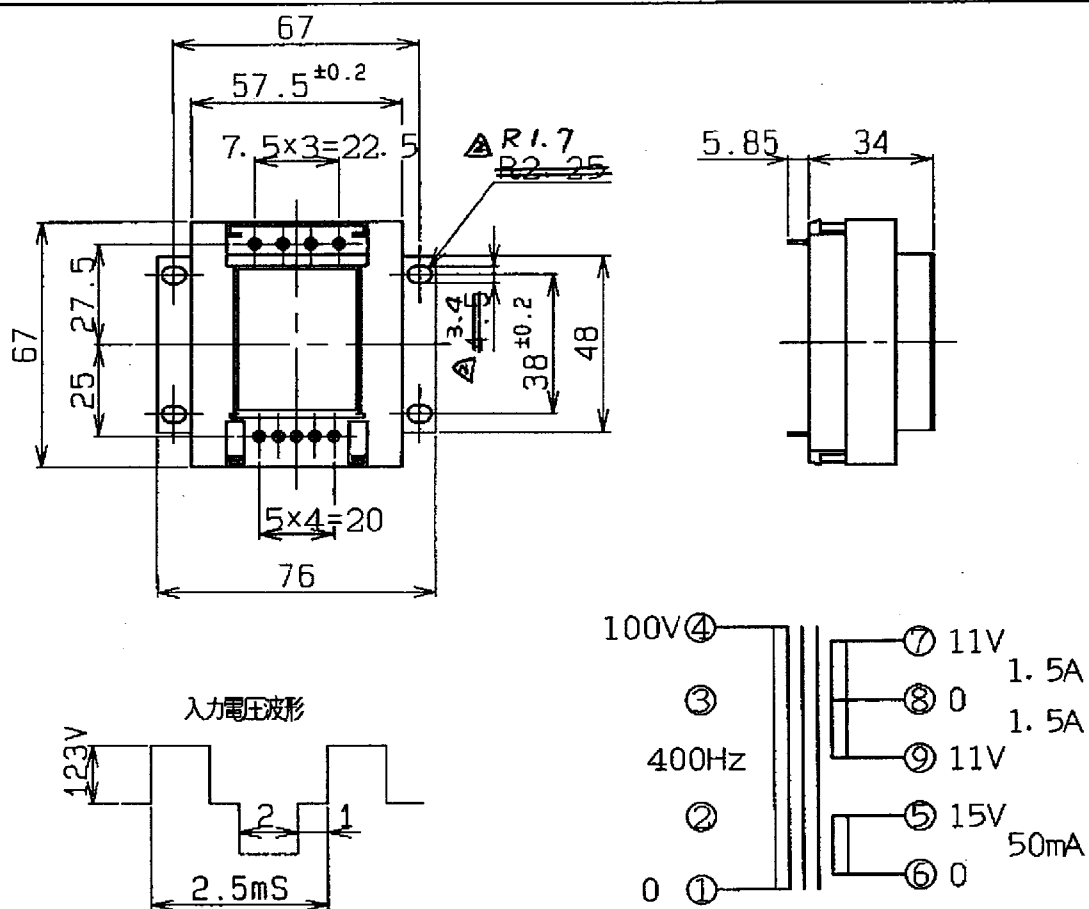
発	番	線色	線種	備考
SMCC J4-1	ENCC TH1	7ヶ	#04-0-2mm ²	Δ 0.18
SMCC J4-2	ENCC TH2	7ヶ	UL1007 10026	
SMCC J4-3	ENCC TH3	Δ 1ヶ		
SMCC J4-4	ENCC TH4	Δ		

利用	10189045-	型	図	計	検	図	承	取
変	更	訂	正	マ	タ	タ	タ	タ
記	SMCC PWB - ENCC PWB	材	名	質	量	kg		
部		材	名	質	量	kg		
インコーダクミタテ								
10189090								
101								

TOKIMEC
株式会社トキメック

図 1 : 1
2002-11-15

サイズ B

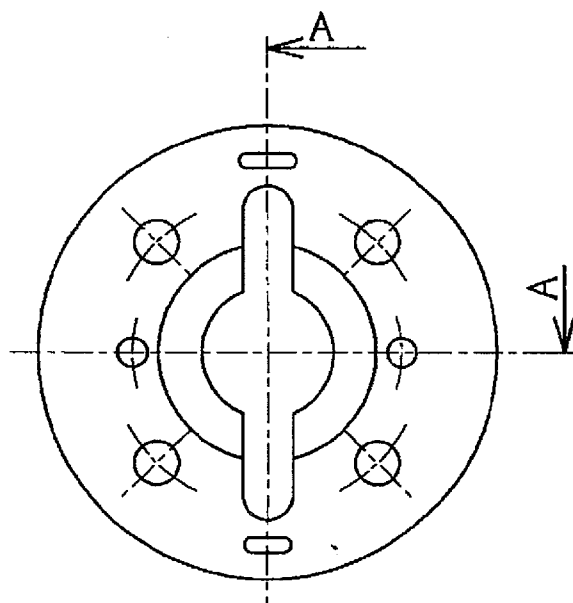
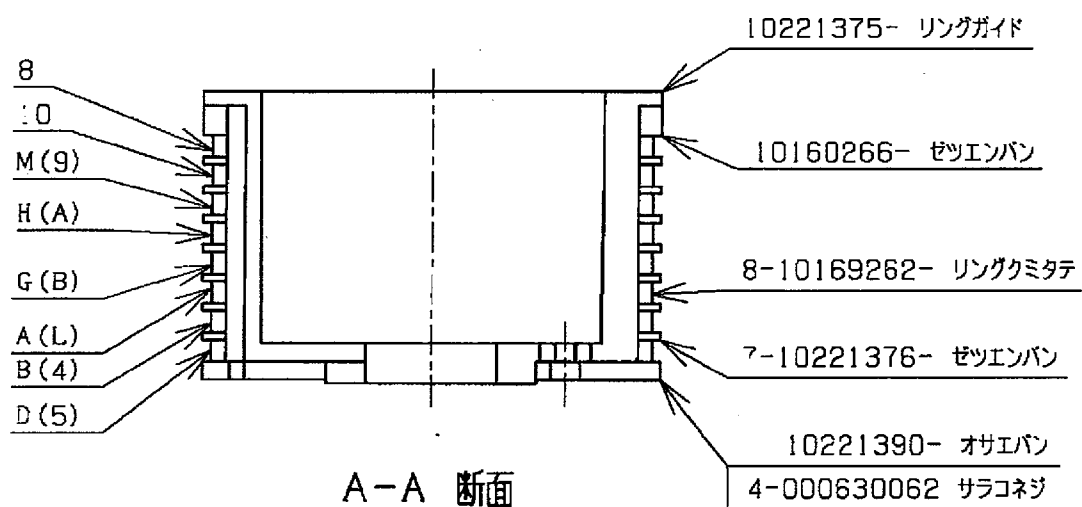


メーカー：(株)タムラ製作所

仕様

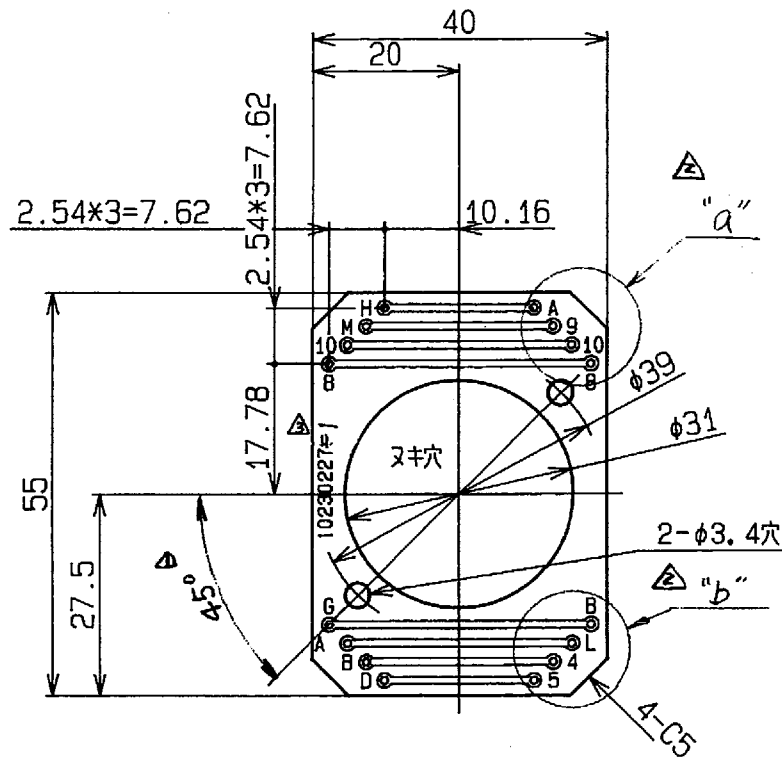
1. 入力 : AC100V RMS 400Hz 矩形波 (波形参照)
2. 出力 : AC11V RMS 1.5A×2 MAX (回路参照)
AC15V RMS 50mA MAX
3. 電圧偏差 : 5%以下
4. 電圧変動 : 10%以下
5. 使用温度 : -20℃~+80℃
6. 温度上昇 : 40℃以下
7. 絶縁耐圧 : 1.5KV 50Hz 1分間 (1次/2次巻線間, 1次巻線/鉄心間)
500V 50Hz 1分間 (2次巻線間, 2次巻線/鉄心間)
8. 絶縁抵抗 : DC500V 100MΩ以上 (巻線間, 巻線/鉄心間)
9. 耐湿, 耐食処理
10. 表示 : 図番, ピン番号

△				材質 MATERIAL	鋼 DWN	計 CHG	機 CHK	認 APPD
△						秋元	木沢	村林
△				部 NOTE				
△	95.4.19	寸法変更	Z	関所	品 TITLE デングントランス			
△	95.2.7	大幅変更, 全面書き	1	入札				
MARK	日付 DATE	変更項目 REVISION	NO	SIGN	図番 DRAWING NO.			SHEET
					尺度 SCALE 1:2 日付 DATE '94.5.18	A 100377882		1/1



利用歴		

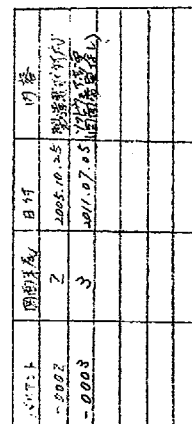
変更訂正		-	-					製 図	設 計	検 図	承 認
		-	-						⑧ 余	⑧ 村	⑧ 村
		-	-					材 質		質 量	kg
		-	-					名 称	スリップリング		
		-	-					図 番	101692600		
記 事	(280) + ポリジナル							変 番		シ ート	
TOKIMEC 株式会社トキメック		⑧		尺 度 日付	1 : 1 98- 8-31	サ イ ズ A	変 番		シ ート		1 / 1



スリホール穴径 $\phi 0.9$ ただし、"a"、"b"部は、 $\phi 1.2$
 パターン幅 1.0
 文字はパターンにて作成のこと

t=1.6

変更訂正	2000.5.9	図番サマ22	ハ本尺	利用歴	日付	組立	図番	利用者
	26.11.5	穴径変更 6.3b-D239	ハ本尺	写図	製図	設計	検図	承認
	91.10.14	寸法追加	ハ本尺					
	日付	理由	変更訂正項目	番号	処置者	適用工号		
治工具	記			材質	FR-4		質量	
	事			サイス	A	名称	チュウケイPWB	
株式会社 東京計器				平成 2 . 8 . 15 完成	図番	1 . 0 . 2 . 3	0 . 2 . 2 . 7	母

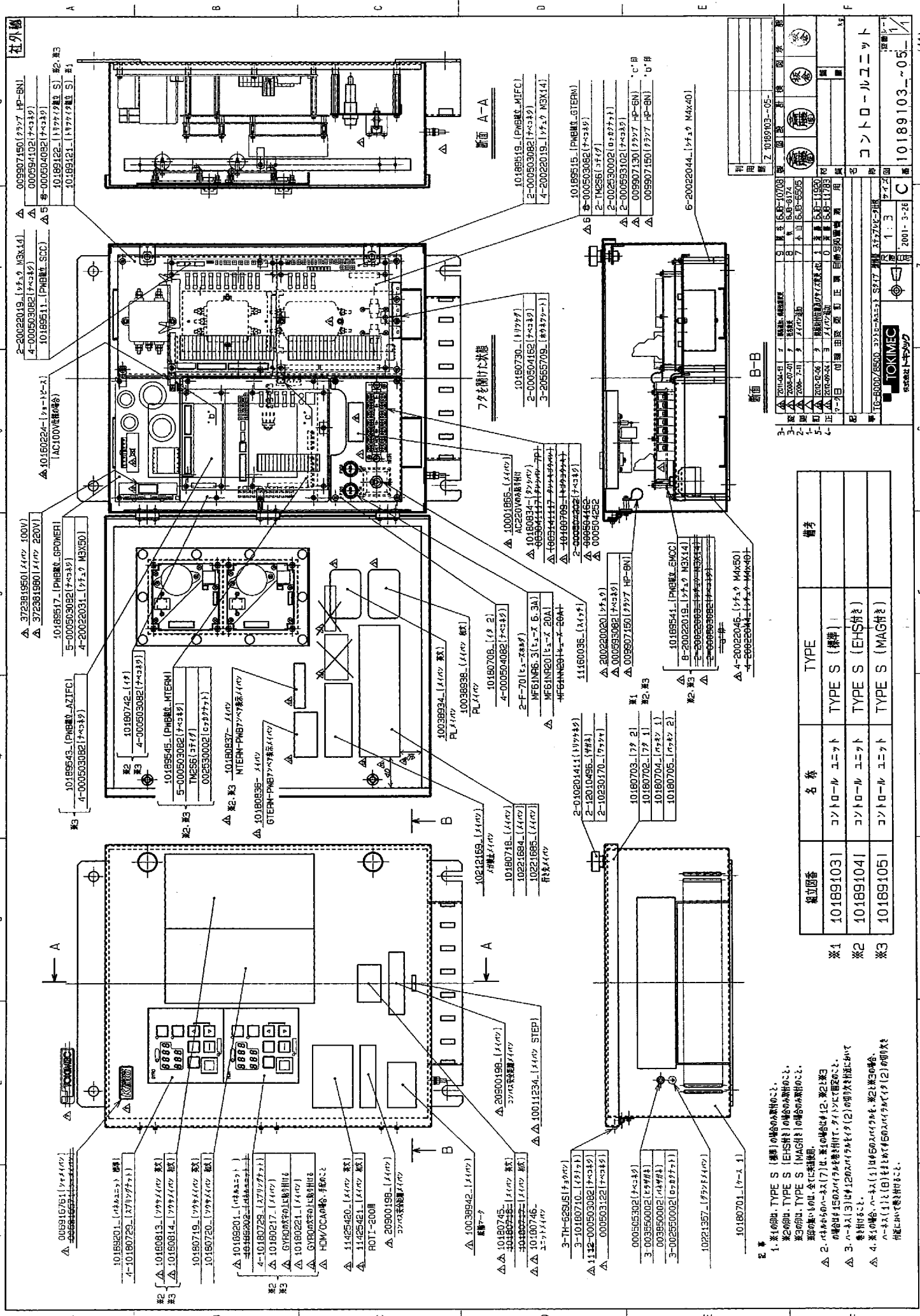


 TOKIMEC 株式会社 トキメック		 点検項目	2005-02-24	サイズ	B
品番 MCC dwd	型番 TS-8000シリーズ TS8000A	用途 付理 由 変 型 正 具 目 標 号 知 照 通 用	数量 2	納入 2005-02-24	発注 2005-02-24
製造 町正	検査 町正	検査 町正	検査 町正	検査 町正	検査 町正

1. 本プリント基板組立にあたって部品図番・型名は図面表（図番10189501-）を参照のこと。
2. ロットメイハンを取ること。
3. レセプタクル（型名 DSP01-002-43069）はJ8に取付けのこと。

5.2 Control unit (Main Parts)

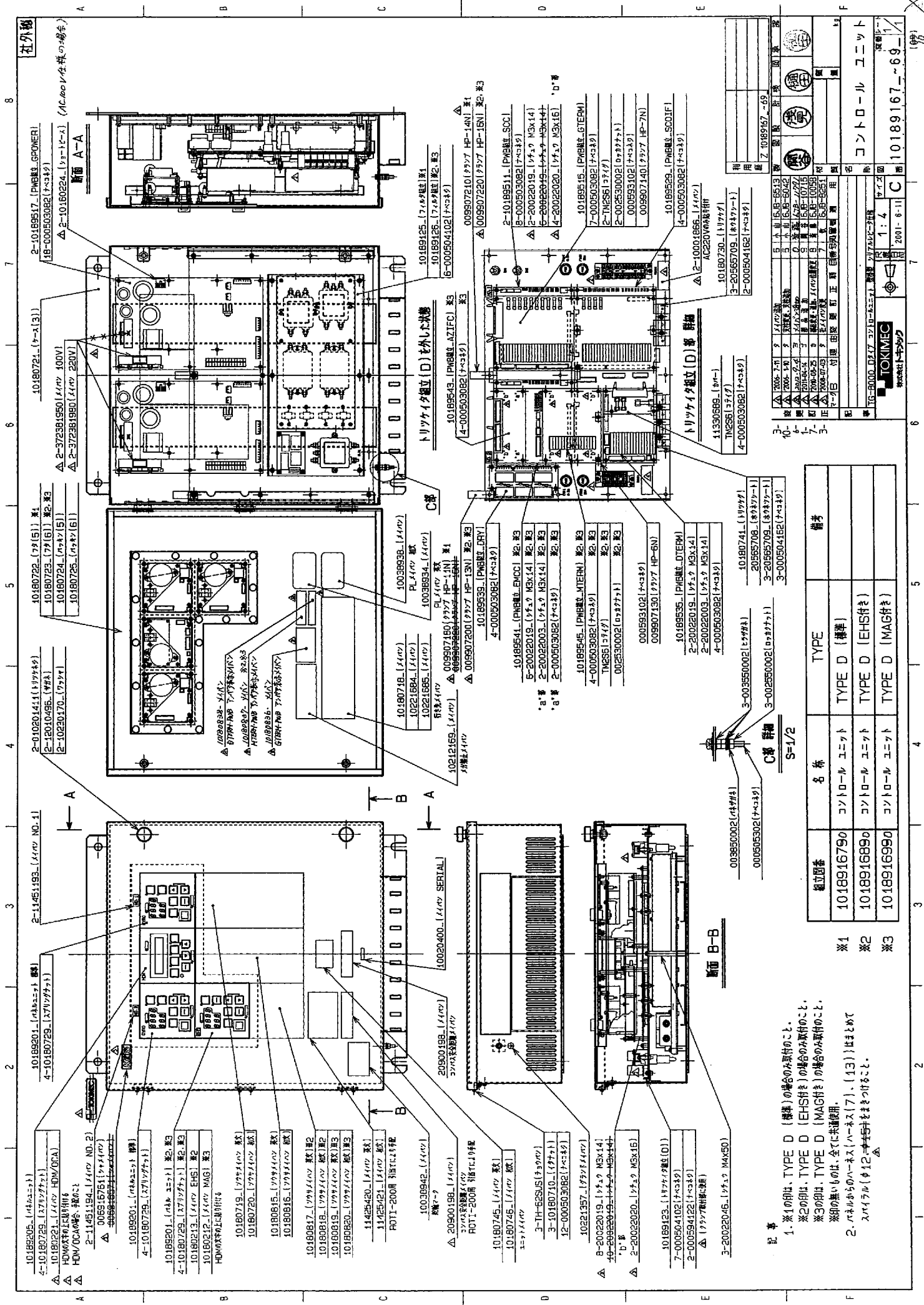
Page No.	Name		Parts No.	Remarks
5-32	Control unit Type S (Step type)		10189105	
5-33	Control unit Type S (Serial type)		10189163	
5-34	Control unit Type D (Step type)		10189111	
5-35	Control unit Type D (Serial type)		10189169	
5-36		Panel Ass'y	10189201	Standard
5-37		Scc pwb	10189511	Standard
5-38		Gpower pwb	10189517	Standard
5-39		Gterm pwb	10189515	Standard
5-40		Mifc pwb	10189519	With Type S (Step type)
5-41		Sifc pwb	10189513	With Type S (Serial type)
5-42		Mcoif pwb	10189537	With Type D (Step type)
5-43		Scoif pwb	10189529	With Type D (Serial type)
5-44		Panel Ass'y	10189205	With Type D
5-45		Dterm pwb	10189535	With Type D
5-46		Dry pwb	10189539	With Type D
5-47		Pry pwb	10189551	With Type D
5-48	Spare parts (Type S)		10990070	Master Compass & Repeater compass
5-49	Spare parts (Type D)		10990071	Master Compass & Repeater compass



組立図番	名称	TYPE	備考
※1 10189103I	コントロール ユニット	TYPE S (標準)	
※2 10189104I	コントロール ユニット	TYPE S (EH仕様)	
※3 10189105I	コントロール ユニット	TYPE S (MAG仕様)	

2. 10189103I, TYPE S (標準) の場合のみ取付可。
 ※2の部は、TYPE S (EH仕様) の場合のみ取付可。
 ※3の部は、TYPE S (MAG仕様) の場合のみ取付可。
 組立図の部は、必ず取付可。
 △ 2. 10189103I (7) は、※1の場合のみ、※2, ※3の場合のみ、15のサイズに取付可。タイプは標準。
 △ 3. 10189103I (3) は、12のサイズに取付可。タイプは標準。
 ※4. 10189103I (1) は、15のサイズに取付可。タイプは標準。
 △ 4. 10189103I (1) は、15のサイズに取付可。タイプは標準。
 付注に必ず取付可。

利用	断	7	10189103-05	図	表
3-1	断	7	10189103-05	図	表
3-2	断	7	10189103-05	図	表
3-3	断	7	10189103-05	図	表
3-4	断	7	10189103-05	図	表
3-5	断	7	10189103-05	図	表
3-6	断	7	10189103-05	図	表
3-7	断	7	10189103-05	図	表
3-8	断	7	10189103-05	図	表
3-9	断	7	10189103-05	図	表
3-10	断	7	10189103-05	図	表
3-11	断	7	10189103-05	図	表
3-12	断	7	10189103-05	図	表
3-13	断	7	10189103-05	図	表
3-14	断	7	10189103-05	図	表
3-15	断	7	10189103-05	図	表
3-16	断	7	10189103-05	図	表
3-17	断	7	10189103-05	図	表
3-18	断	7	10189103-05	図	表
3-19	断	7	10189103-05	図	表
3-20	断	7	10189103-05	図	表
3-21	断	7	10189103-05	図	表
3-22	断	7	10189103-05	図	表
3-23	断	7	10189103-05	図	表
3-24	断	7	10189103-05	図	表
3-25	断	7	10189103-05	図	表
3-26	断	7	10189103-05	図	表
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3-30	断	7	10189103-05	図	表
3-31	断	7	10189103-05	図	表
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3-92	断	7	10189103-05	図	表
3-93	断	7	10189103-05	図	表
3-94	断	7	10189103-05	図	表
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3-97	断	7	10189103-05	図	表
3-98	断	7	10189103-05	図	表
3-99	断	7	10189103-05	図	表
3-100	断	7	10189103-05	図	表



1. ※1の印は、TYPE D (標準) の場合のみ取付のこと。
 ※2の印は、TYPE D (EHS付き) の場合のみ取付のこと。
 ※3の印は、TYPE D (MAG付き) の場合のみ取付のこと。
 ※印の無いものは、全てに共通使用。
 2. パネルからのパネルス(ハネス) (13) は、必ず
 入付口(φ12) まで引き出すこと。

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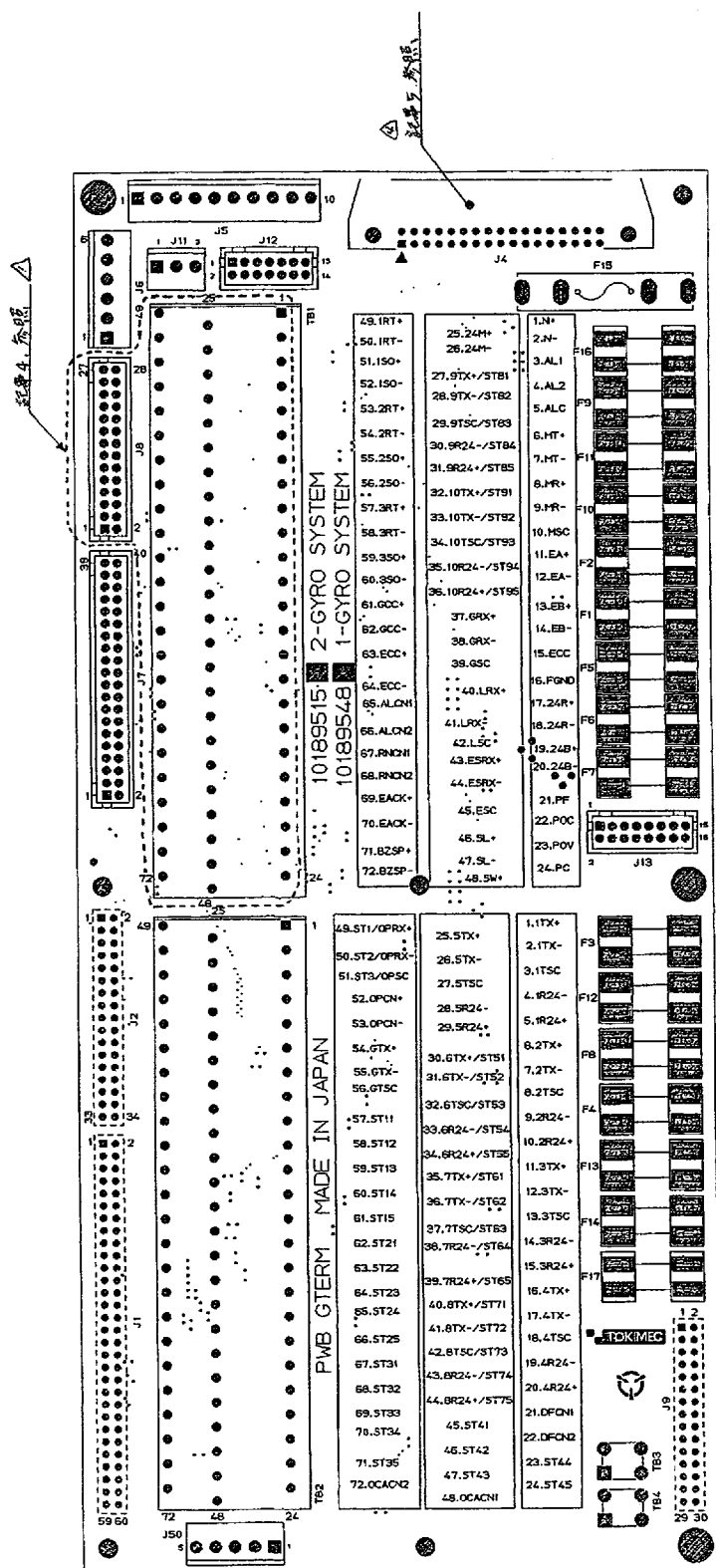
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組立図番	名称	TYPE	備考
1018916790	コントロールユニット	TYPE D (標準)	※1
1018916890	コントロールユニット	TYPE D (EHS付き)	※2
1018916990	コントロールユニット	TYPE D (MAG付き)	※3



部品の図(3.1.7図)

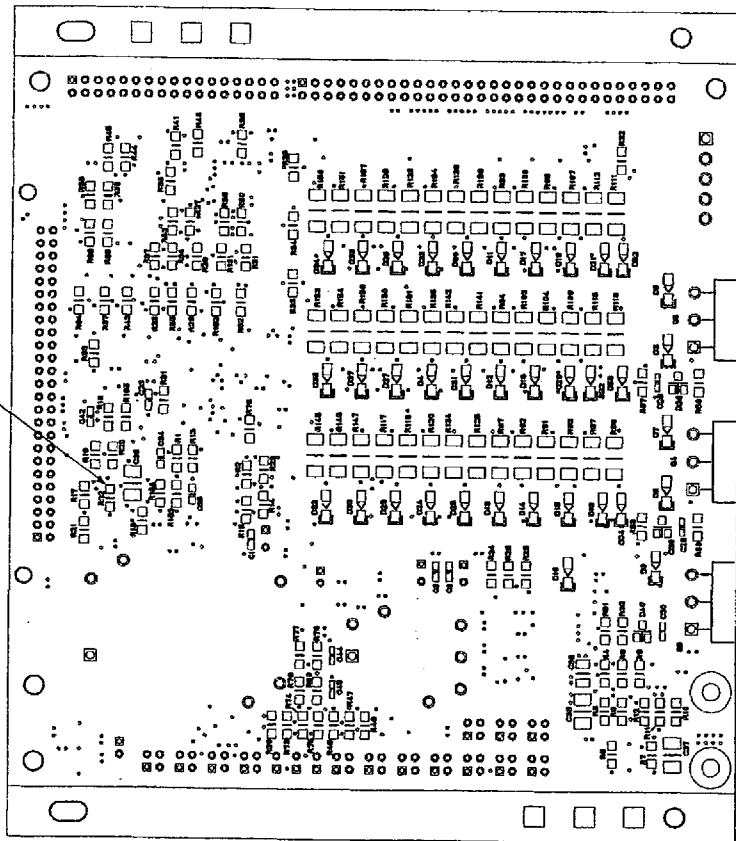
[illegible]

利用歴7

△	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
△	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
△	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
△	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
△	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
△	1	2	3	4	5	6	7																																																																																													

華

1. 本プリン・基板組立にあたって部品図番・型名は図面表（図番10189515-1）を参照のこと。
2. [△]プリン・基板組立図番[△]半導体捺印[△]は、（図番1018951500図）
品番P17420 は、
3. ロットメイハンを要すること。
[△]J78
4. 点検部（181、~~182~~）と面側の部品足はカットすること。
5. コナワJ734は、ツェップナジ（図番58601333-）を適用し、半田印から除去すること。（200所）



背面図(図7)

品名	部品番号	日付	内容
△	0002	02	PCB移行
△	0002	03	2004.04.11 PCB移行(100000)
△	0002	04	2007.10.10 PCB移行(100000)

記事

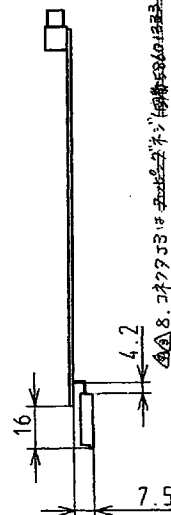
1. 本プリント基板組立にあたって部品図番・型名は図面表(図番10189519-)を参照のこと。

△ 各パーツの組立順序は組立指示書に従ってください。

3. ロットメイハンをする。

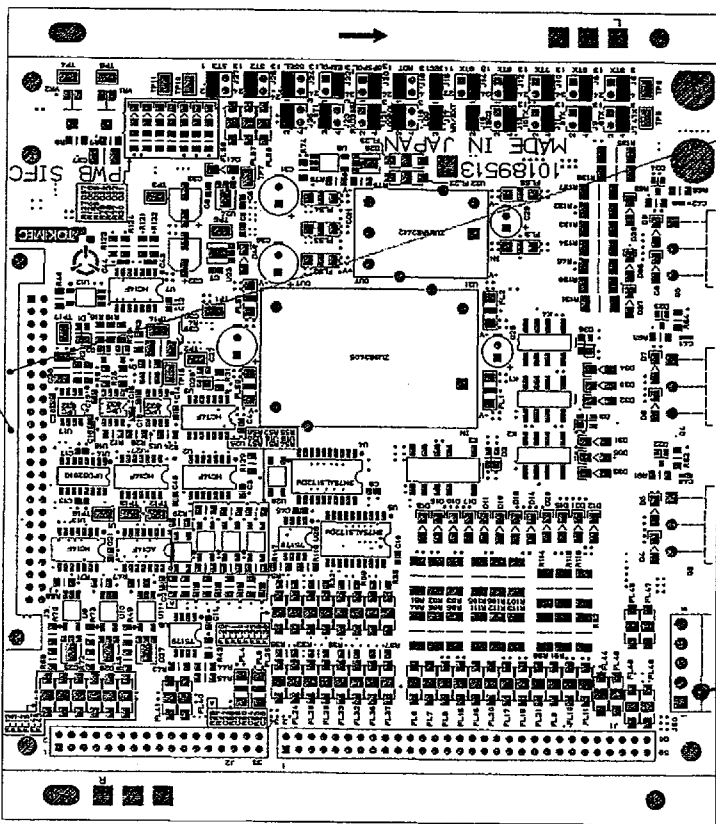
4. レセアタクル(型名 DSP01-002-43069)は上の位置に取り付けのこと。(黒)

5. Q3-Q5は下図のように足を曲げて取り付けること。



△ 6. R22 取付け位置 △ 7. 組立位置表"2"といた(R22削除)PWBは"JSD"にマージして"JSD"にマージすること。

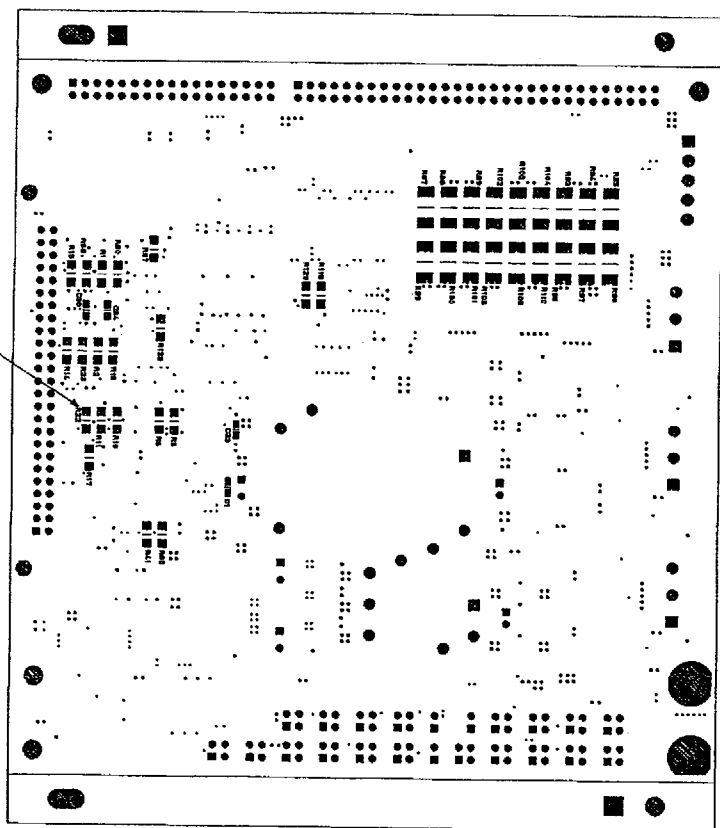
利用履歴	7
製造国	日本
設計者	関根 元
承認者	関根 元
材料	FR4
重量	kg
名称	PWBクミタテ_MIFC
図番	10189519
サイズ	B
日付	2003-02-10
作成者	TOKIMEC
検査者	株式トキメック



部品面(シ17図)

△記事参照

2-000526142 ナベコネジ
2-005726002 エラザサネ
2-003826002 バネザサネ
2-002526002 ロウワナト

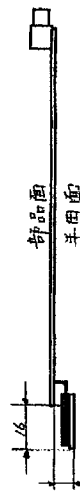


半田直佐(1744)

小川7-2	國部集尾	日付	内容
- 0002	02	—	PDM 検討
- 0002	03	2007.08.11	7-2C-17-12 追加(10000基)
- 0002	04	2007.10.10	9-1C-17-12 変更

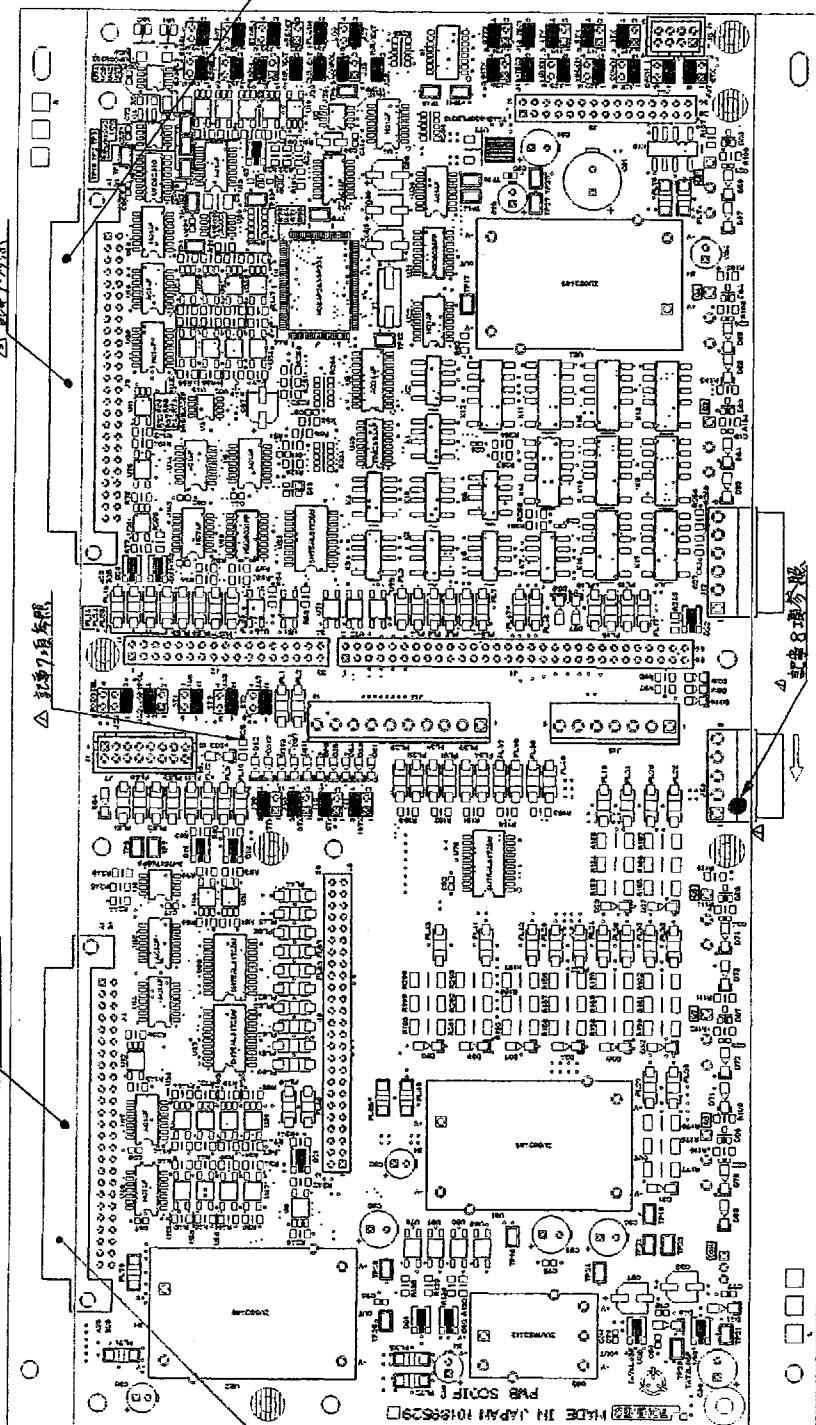
事記

1. 本プリント基板組立にあたって部品図番・型名は図面表(図番10189513-1)を参照のこと。
2. ~~図番10189513-1~~基板組立図番末尾を捺印すること。
3. ロットメイハンを貼ること。
4. レセプタクル(型名 DSP01-002-430G9)は上図の位置に取り付けのこと。(黒)
5. Q3~Q5は下図のように足を曲げて取り付けること。



△ 6 R22 取付不要 △ 7 組立簡便 末尾"2"と1(R22前除) pwb 付"JSD"にマズ、7にて"愚マク"する。

[illegible]

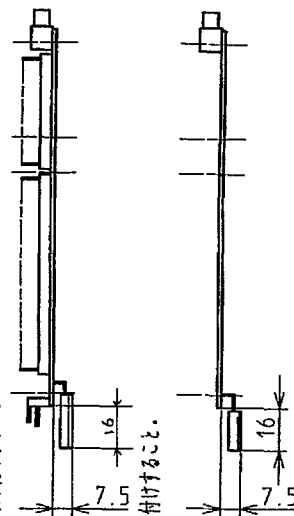


2-000526142 ナコネジ
2-003726002 5754.4
2-003826002 1841.4
2-002526002 1775.1

2-000526142 7P303E
2-003726002 5754E
2-003826002 1P303E
2-003526002 7P303E

101

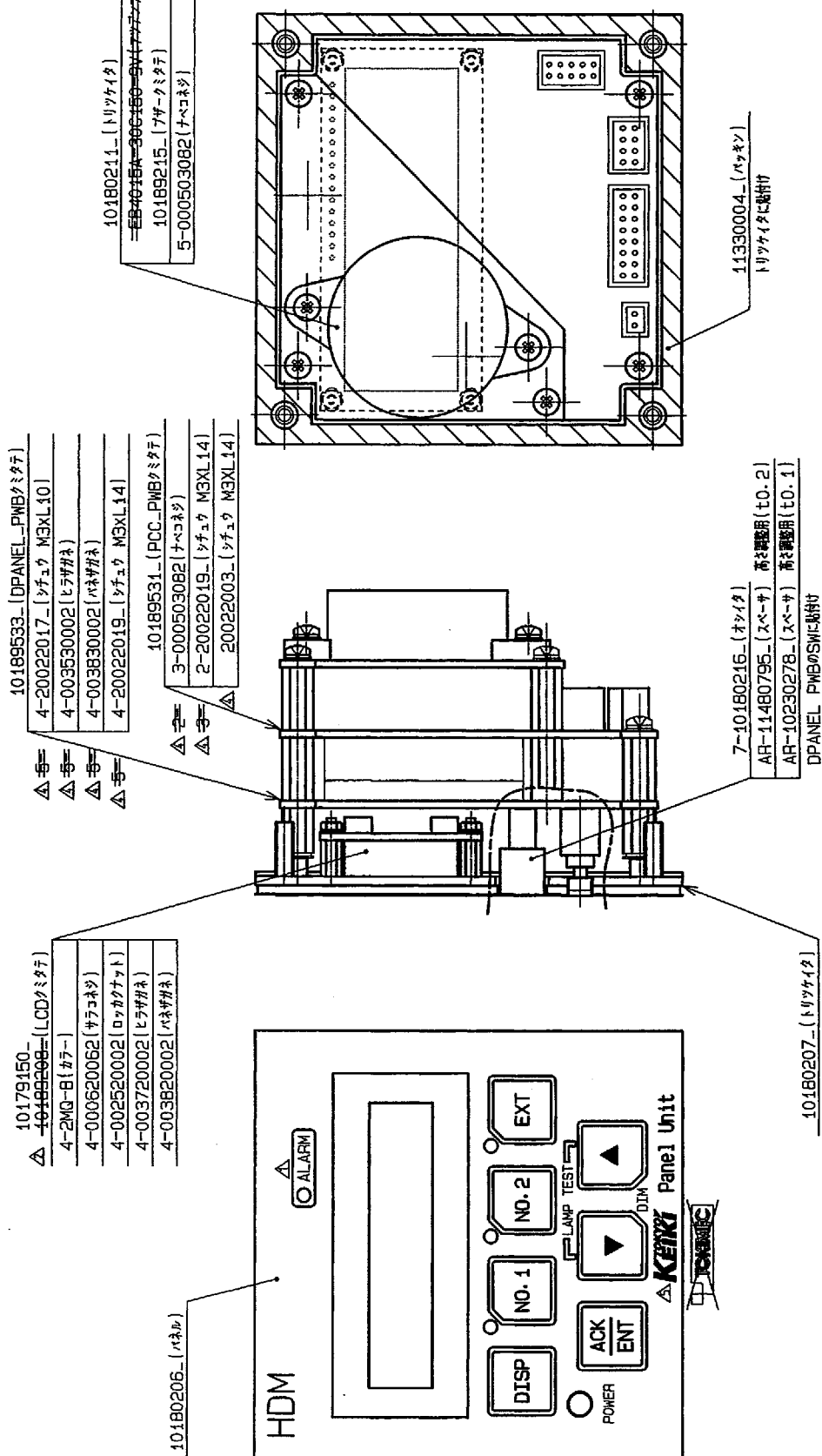
1. 本プリント基板組立にあたって部品図番（型名は図面表（図番10189529-1）を参照のこと。
②-2-1）と基板組立図番末尾を捺印するでせ。
3. ロットメイハンを貼ること。
4. レzeptakul（型名 DSP01-002-430G9）は上図の位置に取り付けのこと。（黒）
5. Q3-Q8は下図のように足を曲げて取り付けること。
- 
6. D89は下図のように足を曲げて取り付けること。



（国ノ子國ノ子）

- ☒ 7. R26 取付不要
- ☒ 8. 粗立面剥離とことした(R26削除)publは”J50”にマシブに“ご愚考”ある。
- ☒ 9. コネクターの4本は~~ボルトナットで固定する~~使用し、并用部から固定する。(各コネクタ 2箇所ずつ)

[illegible]

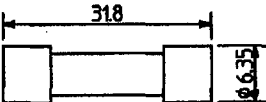
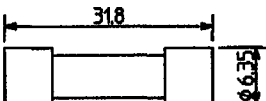
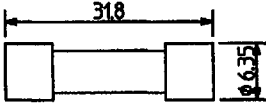
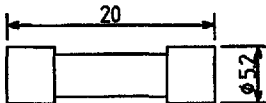
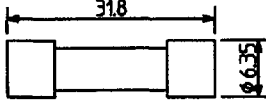
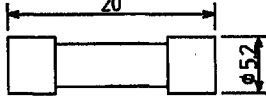


1-1	△	2008-06-12	タ	社名変更、他	4	異名	6JB-8148	製	図	股	計	便	図	承	図	勝
1-7-1	△	2004-07-06	コ	部品変更、機能改良	3	異名	6JB-5032	製	図	股	計	便	図	承	図	勝
1-7-2	△	2004-07-09	タ	メーカー名変更	2	異名	6JB-4684	製	図	股	計	便	図	承	図	勝
1-7-3	△	2003-02-06	タ	LCDパネル変更	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-4	△	2002-12-12	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-5	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-6	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-7	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-8	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-9	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-10	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-11	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-12	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-13	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-14	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-15	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-16	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-17	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-18	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-19	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-20	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-21	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-22	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-23	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-24	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-25	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-26	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝
1-7-27	△	2002-10-17	タ	デザイン変更により全面特	-	異名	1種~	製	図	股	計	便	図	承	図	勝

Z-B16

BOX NO.

1/1

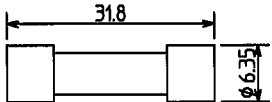
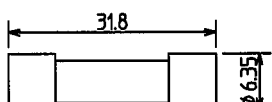
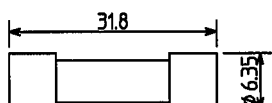
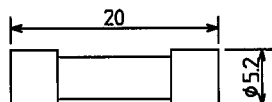
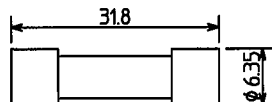
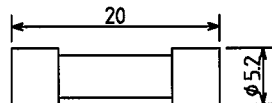
SHIP NO.	SPARE PARTS LIST FOR		U S E			SETS PER VESSEL
	GYROCOMPASS TG-8000/8500 ジャイロコンパス TG-8000/8500 TYPE S					
ITEM	NAME OF PART	OUTLINE	QUANTITY			REMARKS
			WORKING PER SET	PER VESS.	SPARE	
		FOR MASTER COMPASS マスタコンパス用				
B-1	FUSE ヒューズ		1	1	2	250V 12A 100386160
		FOR CONTROL UNIT 制御ユニット用				
B-2	FUSE ヒューズ		1	1	2	250V 20A MF61NR20
B-3	FUSE ヒューズ		1	1	2	250V 6.3A MF61NR6.3
		FOR GYRO TERMINAL BOARD ジャイロターミナルボード用				
B-4	FUSE ヒューズ		14	14	28	125V 1A 102209230
B-5	FUSE ヒューズ		1	1	2	250V 15A MF61NR15
B-6	FUSE ヒューズ		2	2	4	250V 3.15A MF51NN3.15
MFR'S NAME		TOKIMEC INC.		DWG.NO.		109900704
ADDRESS		〒144-8551 16-46 MINAMI-KAMATA 2-chome OTA-KU, TOKYO, JAPAN		TELEPHONE		03-3737-8611
				TELEFAX		03-3737-8663

Z-B17

BOX NO.

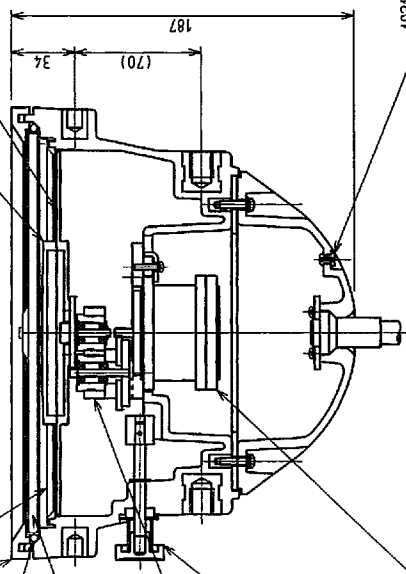
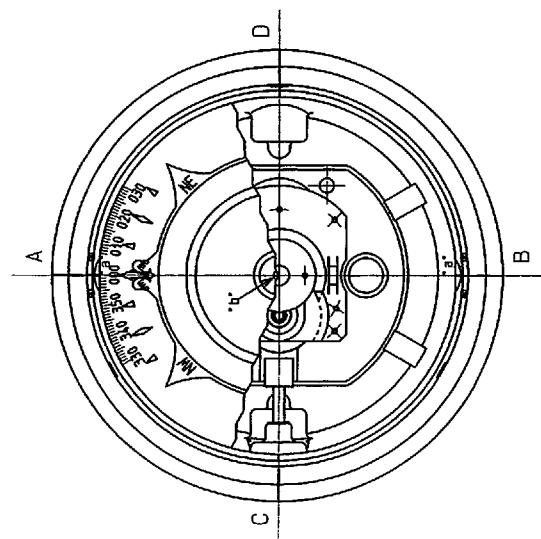
1/1

2-017

SHIP NO.		SPARE PARTS LIST FOR		U S E			SETS PER VESSEL	
		GYROCOMPASS TG-8000/8500 ジャイロコンパス TG-8000/8500 TYPE D						
ITEM	NAME OF PART	OUTLINE	QUANTITY			REMARKS		
			WORKING		SPARE			
			PER SET	PER VESS.				
		FOR MASTER COMPASS マスタコンパス用						
B-1	FUSE ヒューズ		2	2	4	250V 12A 10038616-		
		FOR CONTROL UNIT 制御ユニット用						
B-2	FUSE ヒューズ		2	2	4	250V 20A MF61NR20		
B-3	FUSE ヒューズ		2	2	4	250V 6.3A MF61NR6.3		
		FOR GYRO TERMINAL BOARD ジャイロターミナルボード用						
B-4	FUSE ヒューズ		15	15	30	125V 1A 10220923-		
B-5	FUSE ヒューズ		2	2	4	250V 15A MF61NR15		
B-6	FUSE ヒューズ		4	4	8	250V 3.15A MF51NN3.15		
MFR'S NAME		TOKYO KEIKI INC.		DWG.NO.		109900713		
ADDRESS		〒144-8551 16-46 MINAMI-KAMATA 2-chome OTA-KU, TOKYO, JAPAN		TELEPHONE		03-3737-8611		
				TELEFAX		03-3737-8663		

5.3 Repeater compass & Rate of turn indicator (Main Parts)

Page No.	Name			Parts No.	Remarks
5-51	Repeater compass (Step type)			10359095	
5-52		Internal mechanism Ass'y		10219643	
5-53		Step motor		10359095	
5-54	Junction box (Step type)			10029109	
5-55		Resistor		10020403	
5-56	BH stand (Step type)			10019382	
5-57		Panel Ass'y		10019392	
5-58		Resistor Ass'y		10019413	
5-59	Repeater compass (Serial type)			10189451	
5-60		Internal mechanism Ass'y		10189455	
5-61			Zrcr pwb Ass'y	10189476	
5-62		Step motor		10189459	
5-63		Rpcc pwb		10189549	
5-64	Junction box (Serial type)			10029111	
5-65		Resistor		20031511	
5-66	BH stand (Serial type)			10019383	
5-67		Panel Ass'y		10019393	
5-68	Rate of turn indicator dimmer (ROTI-300/310)			16269072	
5-69	Spare parts (Repeater compass)			10169940	
5-70	Spare parts (Rate of turn indicator: ROTI-300)			10990159	
5-71	Spare parts (Rate of turn indicator: ROTI-310)			10990205	



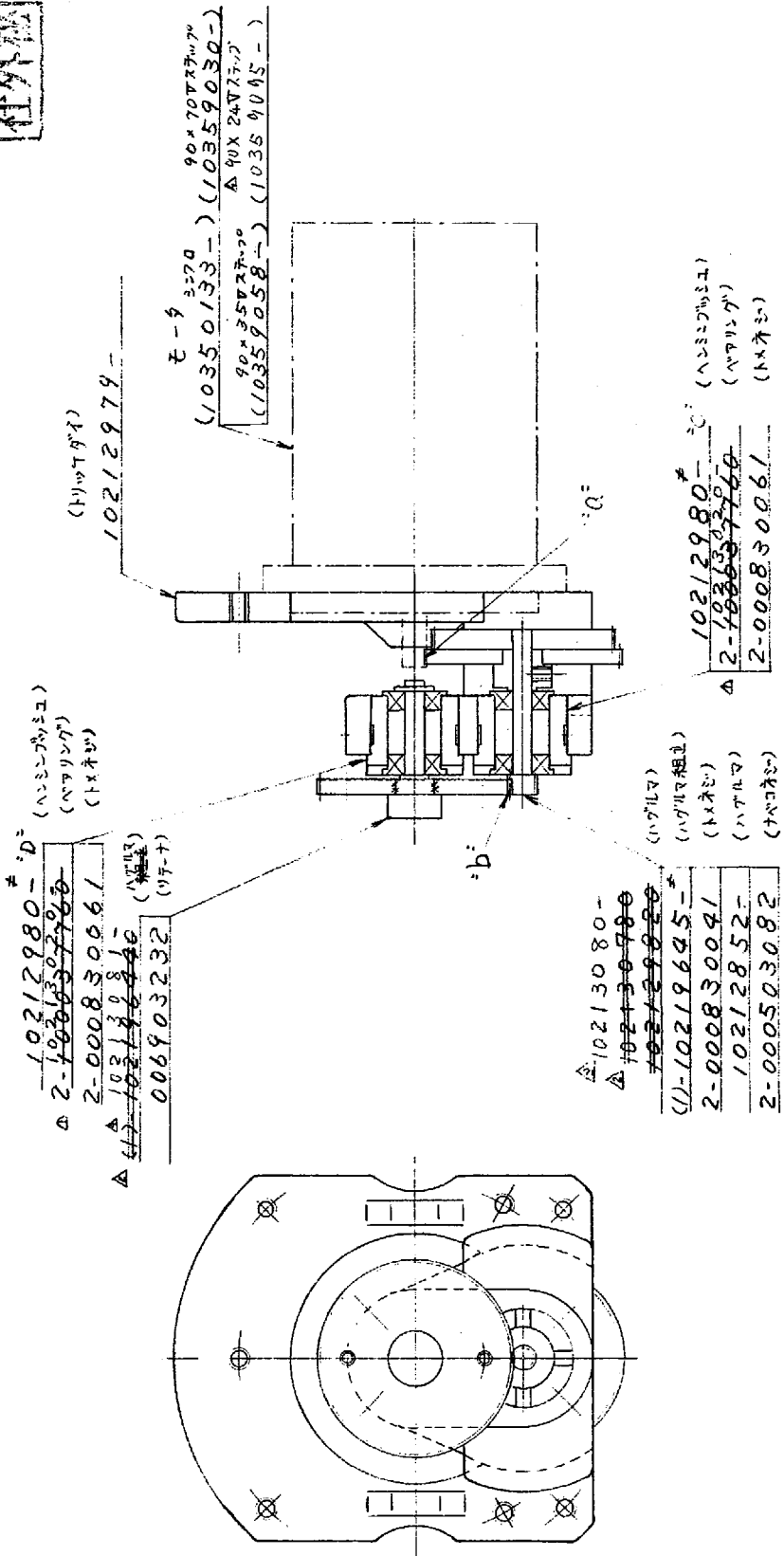
	シンクロ又は ステップモータ	ラップ	テープ巻き方式	ハーネス	メカニカル				
					機構	社名	シンクロ/ステップ	JG仕様	コンパニオン
102196875 ₇ (70V ステップモータ)	10359030 ₇ [ステップモータ]	1000/4344 ₇	10219560 ₇ 10219556 ₇ (77V型)	10219501 ₇	JG用 △ 10219567 ₇ 10219568 ₇ 10219569 ₇ 10219570 ₇ 10219571 ₇ 10219572 ₇ 10219573 ₇ 10219574 ₇ 10219575 ₇ 10219576 ₇ 10219577 ₇ 10219578 ₇ 10219579 ₇ 10219580 ₇ 10219581 ₇ 10219582 ₇ 10219583 ₇ 10219584 ₇ 10219585 ₇ 10219586 ₇ 10219587 ₇ 10219588 ₇ 10219589 ₇ 10219590 ₇ 10219591 ₇ 10219592 ₇ 10219593 ₇ 10219594 ₇ 10219595 ₇ 10219596 ₇ 10219597 ₇ 10219598 ₇ 10219599 ₇ 10219600 ₇ 10219601 ₇ 10219602 ₇ 10219603 ₇ 10219604 ₇ 10219605 ₇ 10219606 ₇ 10219607 ₇ 10219608 ₇ 10219609 ₇ 10219610 ₇ 10219611 ₇ 10219612 ₇ 10219613 ₇ 10219614 ₇ 10219615 ₇ 10219616 ₇ 10219617 ₇ 10219618 ₇ 10219619 ₇ 10219620 ₇ 10219621 ₇ 10219622 ₇ 10219623 ₇ 10219624 ₇ 10219625 ₇ 10219626 ₇ 10219627 ₇ 10219628 ₇ 10219629 ₇ 10219630 ₇ 10219631 ₇ 10219632 ₇ 10219633 ₇ 10219634 ₇ 10219635 ₇ 10219636 ₇ 10219637 ₇ 10219638 ₇ 10219639 ₇ 10219640 ₇ 10219641 ₇ 10219642 ₇ 10219643 ₇ 10219644 ₇ 10219645 ₇ 10219646 ₇ 10219647 ₇ 10219648 ₇ 10219649 ₇ 10219650 ₇ 10219651 ₇ 10219652 ₇ 10219653 ₇ 10219654 ₇ 10219655 ₇ 10219656 ₇ 10219657 ₇ 10219658 ₇ 10219659 ₇ 10219660 ₇ 10219661 ₇ 10219662 ₇ 10219663 ₇ 10219664 ₇ 10219665 ₇ 10219666 ₇ 10219667 ₇ 10219668 ₇ 10219669 ₇ 10219670 ₇ 10219671 ₇ 10219672 ₇ 10219673 ₇ 10219674 ₇ 10219675 ₇ 10219676 ₇ 10219677 ₇ 10219678 ₇ 10219679 ₇ 10219680 ₇ 10219681 ₇ 10219682 ₇ 10219683 ₇ 10219684 ₇ 10219685 ₇ 10219686 ₇ 10219687 ₇ 10219688 ₇ 10219689 ₇ 10219690 ₇ 10219691 ₇ 10219692 ₇ 10219693 ₇ 10219694 ₇ 10219695 ₇ 10219696 ₇ 10219697 ₇ 10219698 ₇ 10219699 ₇ 10219700 ₇ 10219701 ₇ 10219702 ₇ 10219703 ₇ 10219704 ₇ 10219705 ₇ 10219706 ₇ 10219707 ₇ 10219708 ₇ 10219709 ₇ 10219710 ₇ 10219711 ₇ 10219712 ₇ 10219713 ₇ 10219714 ₇ 10219715 ₇ 10219716 ₇ 10219717 ₇ 10219718 ₇ 10219719 ₇ 10219720 ₇ 10219721 ₇ 10219722 ₇ 10219723 ₇ 10219724 ₇ 10219725 ₇ 10219726 ₇ 10219727 ₇ 10219728 ₇ 10219729 ₇ 10219730 ₇ 10219731 ₇ 10219732 ₇ 10219733 ₇ 10219734 ₇ 10219735 ₇ 10219736 ₇ 10219737 ₇ 10219738 ₇ 10219739 ₇ 10219740 ₇ 10219741 ₇ 10219742 ₇ 10219743 ₇ 10219744 ₇ 10219745 ₇ 10219746 ₇ 10219747 ₇ 10219748 ₇ 10219749 ₇ 10219750 ₇ 10219751 ₇ 10219752 ₇ 10219753 ₇ 10219754 ₇ 10219755 ₇ 10219756 ₇ 10219757 ₇ 10219758 ₇ 10219759 ₇ 10219760 ₇ 10219761 ₇ 10219762 ₇ 10219763 ₇ 10219764 ₇ 10219765 ₇ 10219766 ₇ 10219767 ₇ 10219768 ₇ 10219769 ₇ 10219770 ₇ 10219771 ₇ 10219772 ₇ 10219773 ₇ 10219774 ₇ 10219775 ₇ 10219776 ₇ 10219777 ₇ 10219778 ₇ 10219779 ₇ 10219780 ₇ 10219781 ₇ 10219782 ₇ 10219783 ₇ 10219784 ₇ 10219785 ₇ 10219786 ₇ 10219787 ₇ 10219788 ₇ 102				

 TOKIMEC 株式会社トキメック	 1 : 2 1897-10-20	サイズ C	10219687-90- 11
正 印 用 紙	付 録 用 紙	正 印 用 紙	正 印 用 紙
2006-1-5 2006-2-7 2006-3-6 2006-4-13 2006-5-10 2006-6-10 2006-7-10 2006-8-10 2006-9-10 2006-10-10 2006-11-10 2006-12-10 2007-1-10 2007-2-10 2007-3-10 2007-4-10 2007-5-10 2007-6-10 2007-7-10 2007-8-10 2007-9-10 2007-10-10 2007-11-10 2007-12-10 2008-1-10 2008-2-10 2008-3-10 2008-4-10 2008-5-10 2008-6-10 2008-7-10 2008-8-10 2008-9-10 2008-10-10 2008-11-10 2008-12-10 2009-1-10 2009-2-10 2009-3-10 2009-4-10 2009-5-10 2009-6-10 2009-7-10 2009-8-10 2009-9-10 2009-10-10 2009-11-10 2009-12-10 2010-1-10 2010-2-10 2010-3-10 2010-4-10 2010-5-10 2010-6-10 2010-7-10 2010-8-10 2010-9-10 2010-10-10 2010-11-10 2010-12-10 2011-1-10 2011-2-10 2011-3-10 2011-4-10 2011-5-10 2011-6-10 2011-7-10 2011-8-10 2011-9-10 2011-10-10 2011-11-10 2011-12-10 2012-1-10 2012-2-10 2012-3-10 2012-4-10 2012-5-10 2012-6-10 2012-7-10 2012-8-10 2012-9-10 2012-10-10 2012-11-10 2012-12-10 2013-1-10 2013-2-10 2013-3-10 2013-4-10 2013-5-10 2013-6-10 2013-7-10 2013-8-10 2013-9-10 2013-10-10 2013-11-10 2013-12-10 2014-1-10 2014-2-10 2014-3-10 2014-4-10 2014-5-10 2014-6-10 2014-7-10 2014-8-10 2014-9-10 2014-10-10 2014-11-10 2014-12-10 2015-1-10 2015-2-10 2015-3-10 2015-4-10 2015-5-10 2015-6-10 2015-7-10 2015-8-10 2015-9-10 2015-10-10 2015-11-10 2015-12-10 2016-1-10 2016-2-10 2016-3-10 2016-4-10 2016-5-10 2016-6-10 2016-7-10 2016-8-10 2016-9-10 2016-10-10 2016-11-10 2016-12-10 2017-1-10 2017-2-10 2017-3-10 2017-4-10 2017-5-10 2017-6-10 2017-7-10 2017-8-10 2017-9-10 2017-10-10 2017-11-10 2017-12-10 2018-1-10 2018-2-10 2018-3-10 2018-4-10 2018-5-10 2018-6-10 2018-7-10 2018-8-10 2018-9-10 2018-10-10 2018-11-10 2018-12-10 2019-1-10 2019-2-10 2019-3-10 2019-4-10 2019-5-10 2019-6-10 2019-7-10 2019-8-10 2019-9-10 2019-10-10 2019-11-10 2019-12-10 2020-1-10 2020-2-10 2020-3-10 2020-4-10 2020-5-10 2020-6-10 2020-7-10 2020-8-10 2020-9-10 2020-10-10 2020-11-10 2020-12-10 2021-1-10 2021-2-10 2021-3-10 2021-4-10 2021-5-10 2021-6-10 2021-7-10 2021-8-10 2021-9-10 2021-10-10 2021-11-10 2021-12-10 2022-1-10 2022-2-10 2022-3-10 2022-4-10 2022-5-10 2022-6-10 2022-7-10 2022-8-10 2022-9-10 2022-10-10 2022-11-10 2022-12-10 2023-1-10 2023-2-10 2023-3-10 2023-4-10 2023-5-10 2023-6-10 2023-7-10 2023-8-10 2023-9-10 2023-10-10 2023-11-10 2023-12-10 2024-1-10 2024-2-10 2024-3-10 2024-4-10 2024-5-10 2024-6-10 2024-7-10 2024-8-10 2024-9-10 2024-10-10 2024-11-10 2024-12-10 2025-1-10 2025-2-10 2025-3-10 2025-4-10 2025-5-10 2025-6-10 2025-7-10 2025-8-10 2025-9-10 2025-10-10 2025-11-10 2025-12-10 2026-1-10 2026-2-10 2026-3-10 2026-4-10 2026-5-10 2026-6-10 2026-7-10 2026-8-10 2026-9-10 2026-10-10 2026-11-10 2026-12-10 2027-1-10 2027-2-10 2027-3-10 2027-4-10 2027-5-10 2027-6-10 2027-7-10 2027-8-10 2027-9-10 2027-10-10 2027-11-10 2027-12-10 2028-1-10 2028-2-10 			

記事

1. キェツキタの基線 “a” は、ワクの基線 AとBを基線上に超えること。
許容誤差 $0.17(0.1)^{\circ}$ 以内
2. ガスマシタの許容誤差 “b” は、ワクの基線 A,B及び CとDを基線上に超えること。
許容誤差 $0.17(0.1)^{\circ}$ 以内
3. カーブ目盛と基線 “a” の許容誤差は 0.2° 以内

社外図



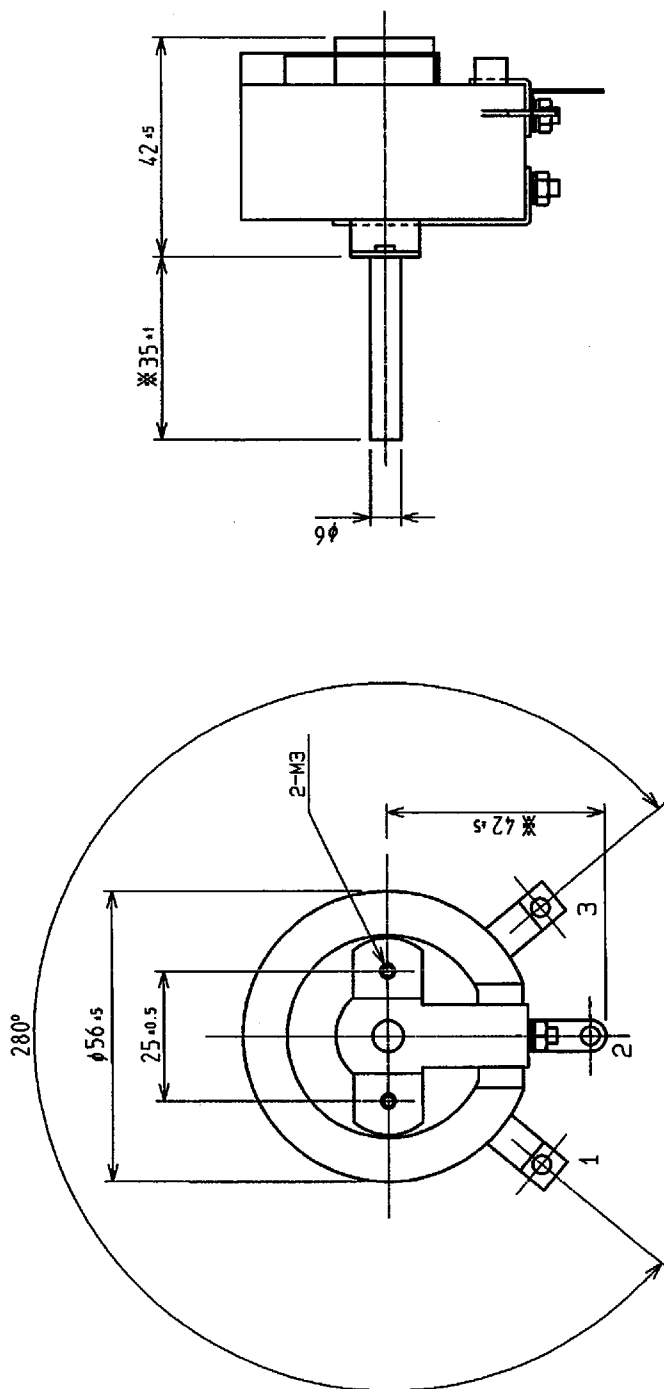
歯車軸台調整

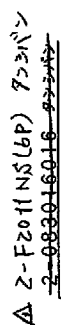
1. a 部調整
各モータ取付けた状態に、
C=偏心アッシを回転させて最小ギャップとなり様調整
C=を固定する。
2. b 部調整
D=偏心アッシを回転させて最小ギャップとなり様調整
D=を固定する。

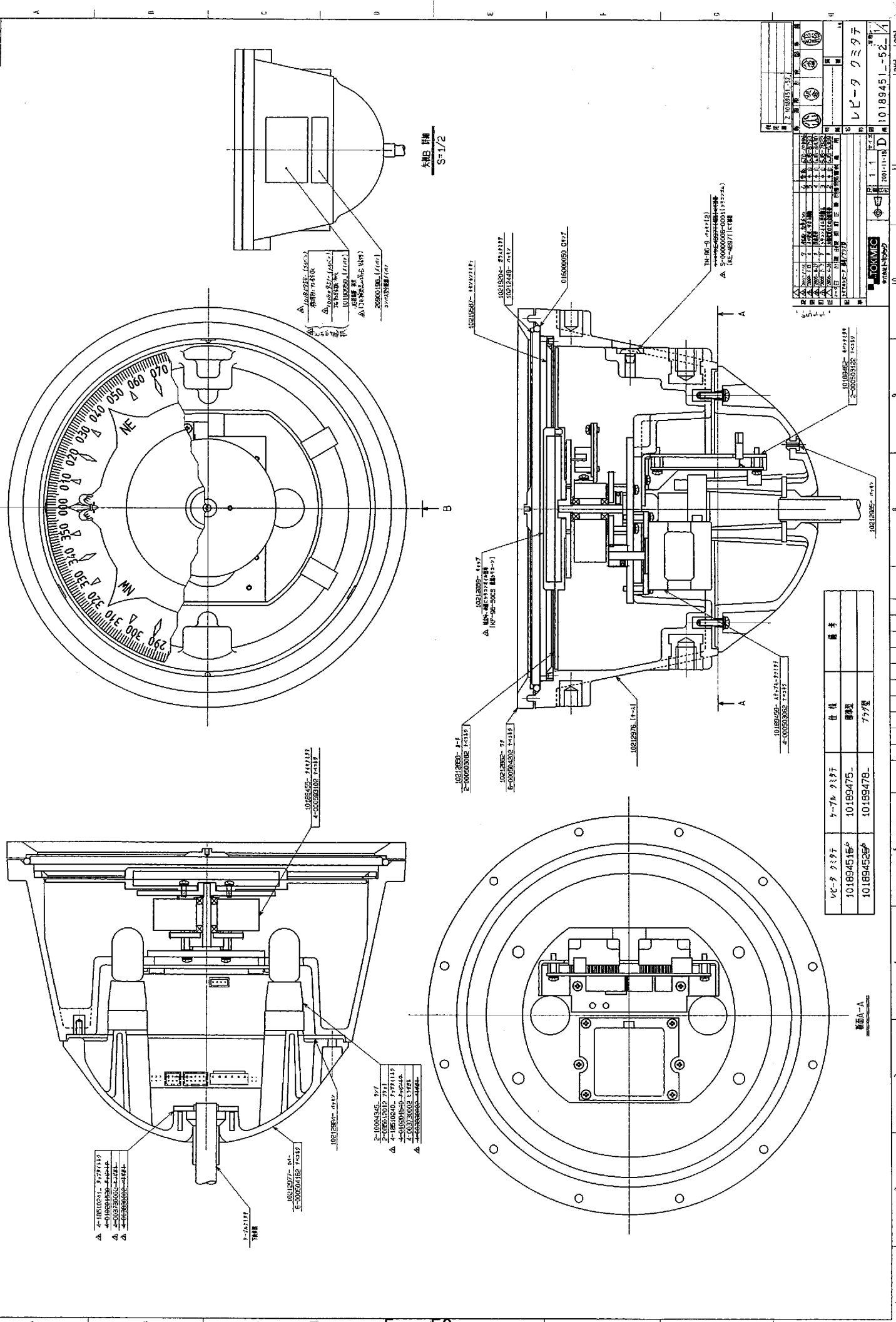
利用部	日付	組立	設計	検査	所用書
材料	4. 長さ	5. 長さ	6. 長さ	7. 長さ	8. 長さ
訂	9. 長さ	10. 長さ	11. 長さ	12. 長さ	13. 長さ
正	14. 長さ	15. 長さ	16. 長さ	17. 長さ	18. 長さ
製	19. 長さ	20. 長さ	21. 長さ	22. 長さ	23. 長さ
組	24. 長さ	25. 長さ	26. 長さ	27. 長さ	28. 長さ
工	29. 長さ	30. 長さ	31. 長さ	32. 長さ	33. 長さ
具	34. 長さ	35. 長さ	36. 長さ	37. 長さ	38. 長さ

東京計器

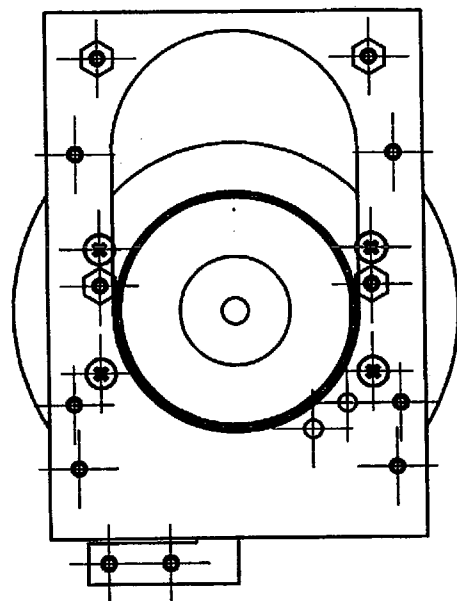
10212980



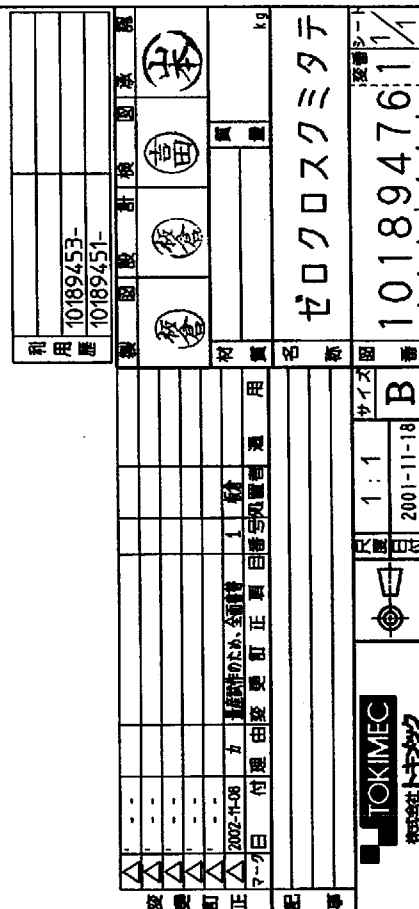
[illegible]



機種名	機種番号	仕様	備考
10189451	10189475	10189475	
10189452	10189476	10189476	
10189453	10189477	10189477	
10189454	10189478	10189478	
10189455	10189479	10189479	
10189456	10189480	10189480	
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10189458	10189482	10189482	
10189459	10189483	10189483	
10189460	10189484	10189484	
10189461	10189485	10189485	
10189462	10189486	10189486	
10189463	10189487	10189487	
10189464	10189488	10189488	
10189465	10189489	10189489	
10189466	10189490	10189490	
10189467	10189491	10189491	
10189468	10189492	10189492	
10189469	10189493	10189493	
10189470	10189494	10189494	
10189471	10189495	10189495	
10189472	10189496	10189496	
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10189474	10189498	10189498	
10189475	10189499	10189499	
10189476	10189500	10189500	

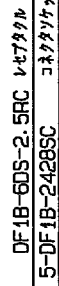


 TOKIMEC 株式会社 トキメック 〒400-0292 静岡県浜松市東区堀田1-1-1		 尺貫法	1 : 1 2001-11-18	サイズ B
寸法 全長 110mm 全幅 11mm 全高 11mm 全重 11g				
材質 鋼材				
重量 11g				
用途 測定用				
製造 日本				
販売 日本				
保証 日本				
備考 日本				

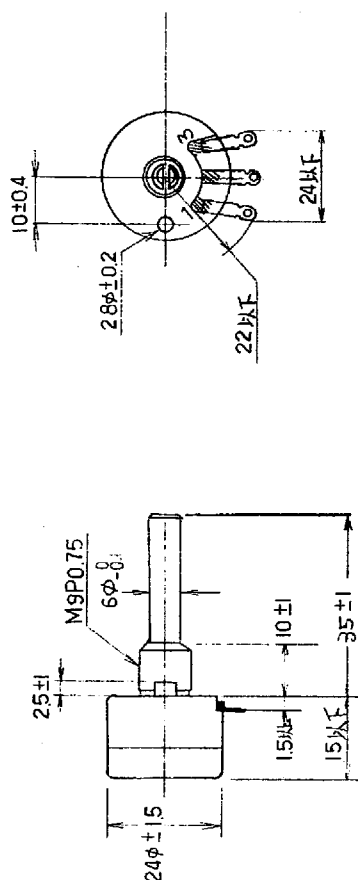


発	著	録色	録理	備考
PPCC J5-1	ZRCR TH1	7カ	KGV-0.2mm ²	7/0.18 9 ヲ4スト
PPCC J5-2	ZRCR TH2	7カ	↓	7
PPCC J5-3	ZRCR TH3	7カ	↓	7

△ 物理物の色は光に依る。



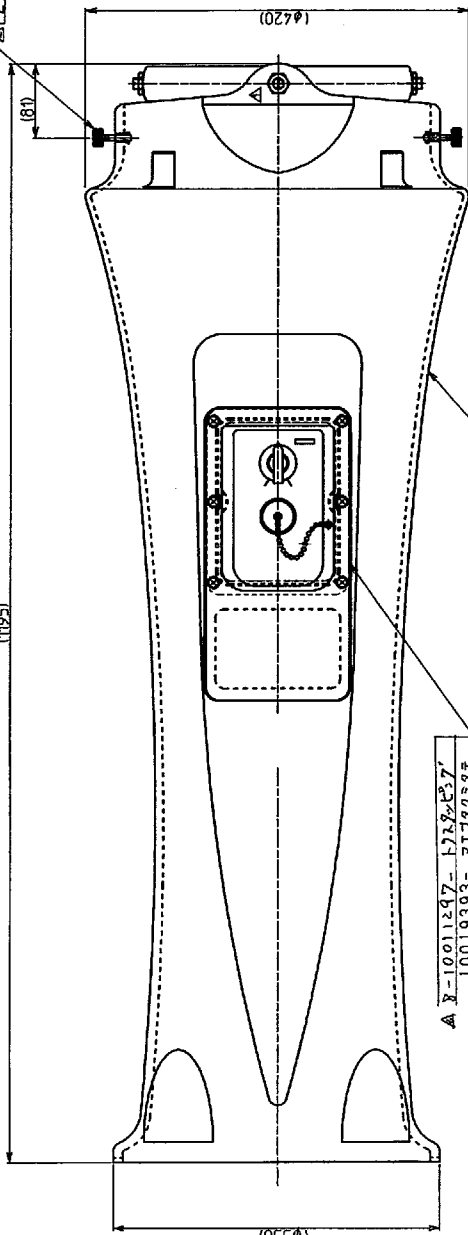
TOKIMEC
株式会社 トキメック

[illegible][illegible]

社外製

10011220- カン
2-10010879- ナット
2-10011230- トナリジ

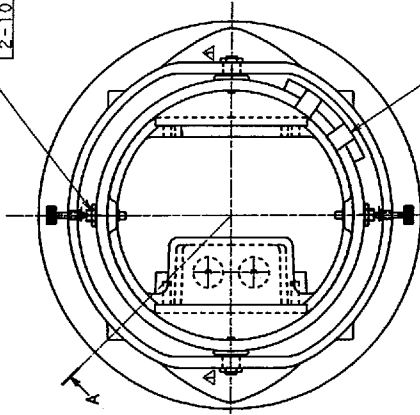
11095



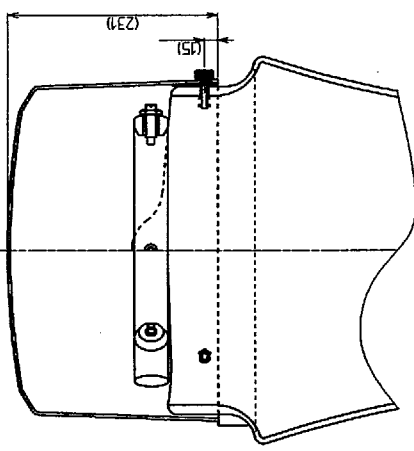
△ 2-10011247- トナリジ
10019393- ナット
10011219- ナット
6-00056020- ナット
6-00376002- ナット
△ 2-10011234- トナリジ

△ 2-10011279- カン
△ 2-10010879- ナット
△ 2-10011288- トナリジ
△ 2-10010923- ナット
△ 2-10011279- カン
△ 2-10010879- ナット
△ 2-10011288- トナリジ
△ 2-10010923- ナット

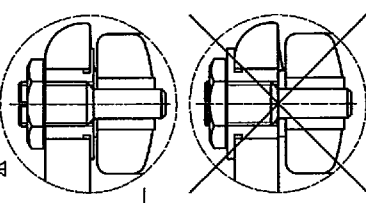
4-003520802- ナット
ナットをナットで固定。
ナットをナットで固定。



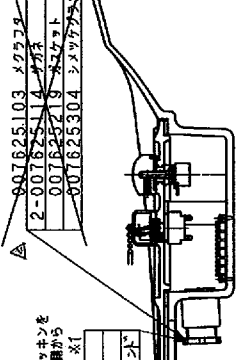
△ 2-10011279- カン
△ 2-10010879- ナット
△ 2-10011288- トナリジ
△ 2-10010923- ナット
△ 2-10011279- カン
△ 2-10010879- ナット
△ 2-10011288- トナリジ
△ 2-10010923- ナット



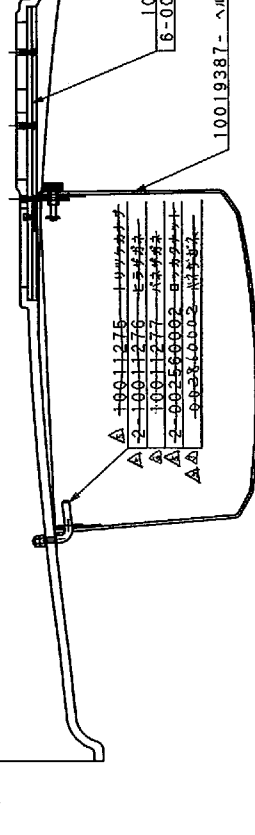
A-A 断面



△ 2-10011279- カン
△ 2-10010879- ナット
△ 2-10011288- トナリジ
△ 2-10010923- ナット
△ 2-10011279- カン
△ 2-10010879- ナット
△ 2-10011288- トナリジ
△ 2-10010923- ナット

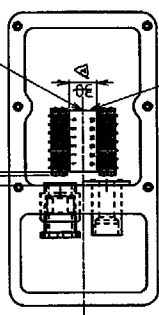


10019397- カン
6-000504122- ナット



△ 2-10011275- ナット
△ 2-10011276- ナット
△ 10011277- ナット
△ 2-00256002- ナット
△ 2-00256002- ナット

△ 10011280- ナット
ナットをナットで固定。
ナットをナットで固定。

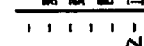


ボックス内蔵部品 △ 10011280- ナット

△ ※1 10011279は カンとナットで固定。
ナットをナットで固定。

利用部	2-10011230- トナリジ
製造部	2-10011230- トナリジ
検査部	2-10011230- トナリジ
組立部	2-10011230- トナリジ
出荷部	2-10011230- トナリジ
倉庫部	2-10011230- トナリジ
販売部	2-10011230- トナリジ
総務部	2-10011230- トナリジ
経理部	2-10011230- トナリジ
人事部	2-10011230- トナリジ
管理部	2-10011230- トナリジ
その他	2-10011230- トナリジ

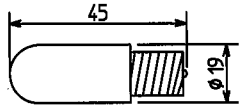
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規格	10019383
数量	10019383
単位	10019383
納入期	10019383
納入先	10019383
納入日	10019383
納入場所	10019383
納入担当者	10019383
納入連絡先	10019383
納入備考	10019383



10019393	1/1
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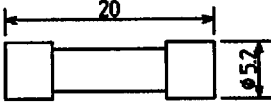
Z-K02

BOX NO. _____

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL			
	REPEATER COMPASS レピータコンパス	STEERING SYSTEM 操舵装置				
ITEM	NAME OF PART	OUTLINE	QUANTITY			REMARKS
			WORKING		SPARE	
			PER SET	PER VESS.		
K-1	LAMP ランプ		2		10	45V 5W E12/15 10004345-
MFR'S NAME		TOKYO KEIKI INC.	DWG.NO.		101699400	
ADDRESS		〒144-8551 16-46 MINAMI-KAMATA 2-chome OTA-KU, TOKYO, JAPAN	TELEPHONE		03-3737-8611	
			TELEFAX		03-3737-8663	

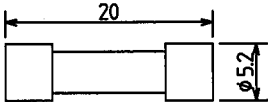
Z-K36

BOX NO. _____

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL			
	ROTI-300 RATE OF TURN INDICATOR 回頭角速度計	GYRO COMPASS ジャイロコンパス				
ITEM	NAME OF PART	OUTLINE	QUANTITY			REMARKS
			WORKING		SPARE	
			PER SET	PER VESS.		
K-1	FUSE ヒューズ		2	4	8	AC125V 1A F-7142
MFR'S NAME		TOKIMEC INC.	DWG.NO.		109901590	
ADDRESS		〒144-8551 16-46 MINAMI-KAMATA 2-chome OTA-KU, TOKYO, JAPAN	TELEPHONE		03-3737-8611	
			TELEFAX		03-3737-8663	

Z-K49

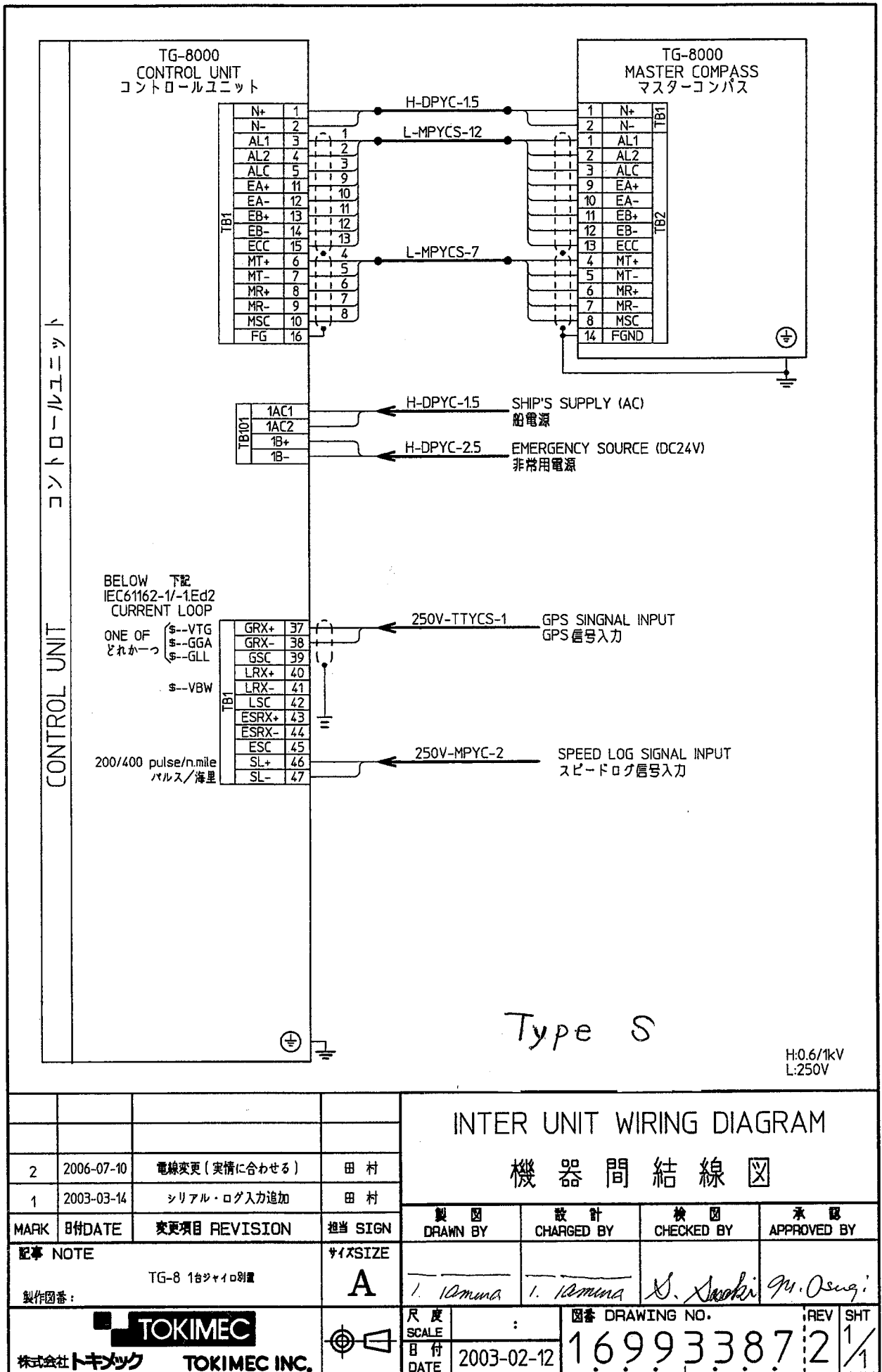
BOX NO. _____

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL			
	ROTI-310 RATE OF TURN INDICATOR 回頭角速度計	GYRO COMPASS ジャイロコンパス				
ITEM	NAME OF PART	OUTLINE	QUANTITY			REMARKS
			WORKING		SPARE	
			PER SET	PER VESS.		
K-1	FUSE ヒューズ		2	2	4	AC250V 1.0A FN20C-250V1A
MFR'S NAME	TOKYO KEIKI INC.		DWG.NO.		109902050	
ADDRESS	〒144-8551 16-46 MINAMI-KAMATA 2-chome OTA-KU, TOKYO, JAPAN		TELEPHONE		03-3737-8611	
			TELEFAX		03-3737-8663	

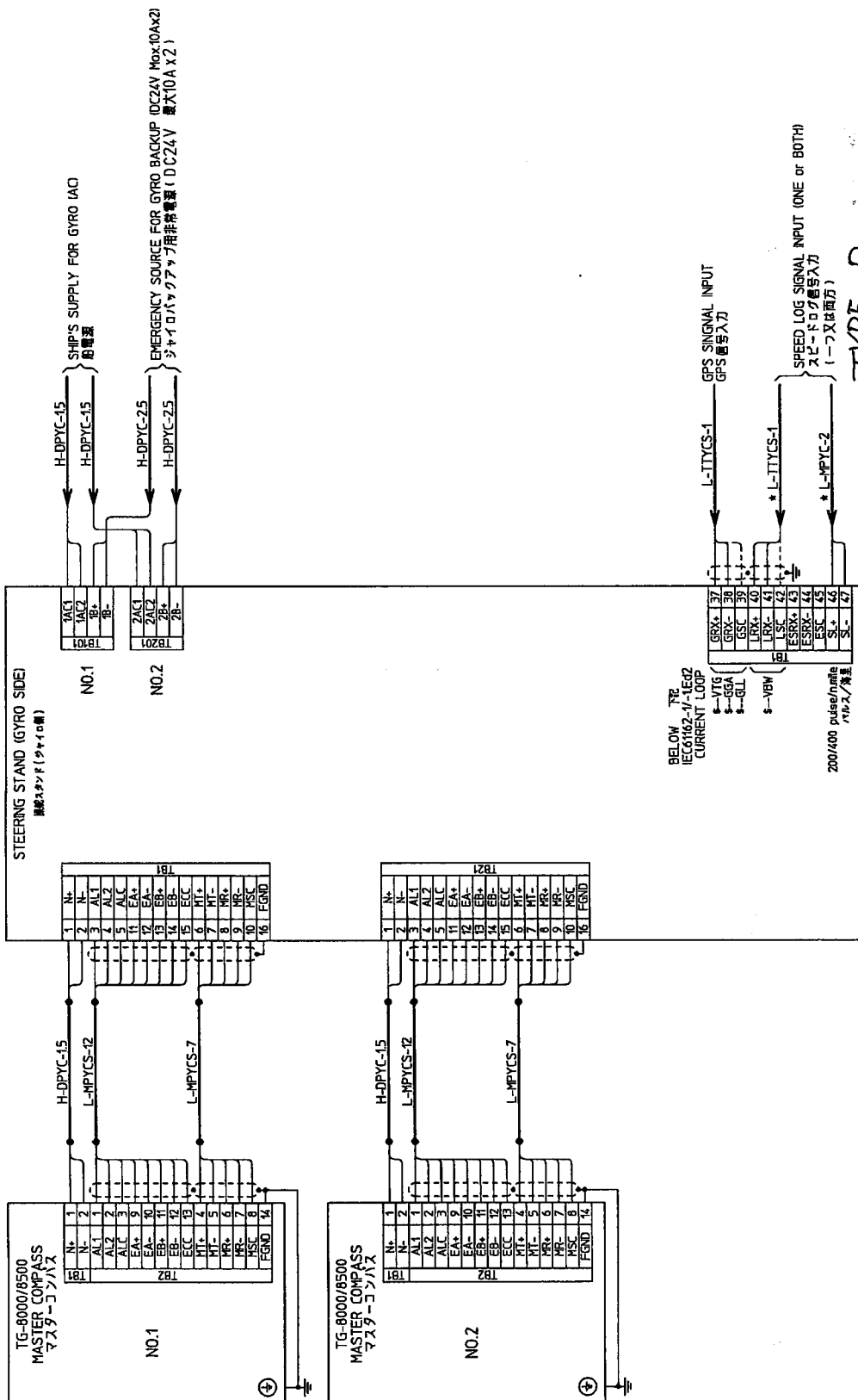
6. Circuit

6.1 Wiring diagram

Page No.	Name	Drawing No.	Remarks
6-2	Inter unit wiring diagram Type S	16993387	Master Compass & Control unit
6-3	Inter unit wiring diagram Type D	16993614	Master Compass & Control unit
6-4	Inter unit wiring diagram Type S/D (Step type)	16993845	Control unit
6-5	Inter unit wiring diagram Type S/D (Serial type)	16993952	Control unit
6-6	Master Compass internal wiring diagram	10189601	
6-7	Control unit internal wiring diagram Type S	10189620	
6-8	Control unit internal wiring diagram Type D	10189621	



				INTER UNIT WIRING DIAGRAM			
				機器間結線図			
2	2006-07-10	電線変更 (実情に合わせる)	田村	製図 DRAWN BY	設計 CHARGED BY	検図 CHECKED BY	承認 APPROVED BY
1	2003-03-14	シリアル・ログ入力追加	田村				
MARK	DATE	変更項目	REVISION	担当	SIGN		
記事 NOTE				サイズ			
TG-8 1台ジャイロ別置				A			
製作図番:				1. Iamuna			
 TOKIMEC 株式会社 トキメック TOKIMEC INC.				尺 度 SCALE	:	図番 DRAWING NO.	REV SHT
				日 付 DATE	2003-02-12	16993387	2 1/1

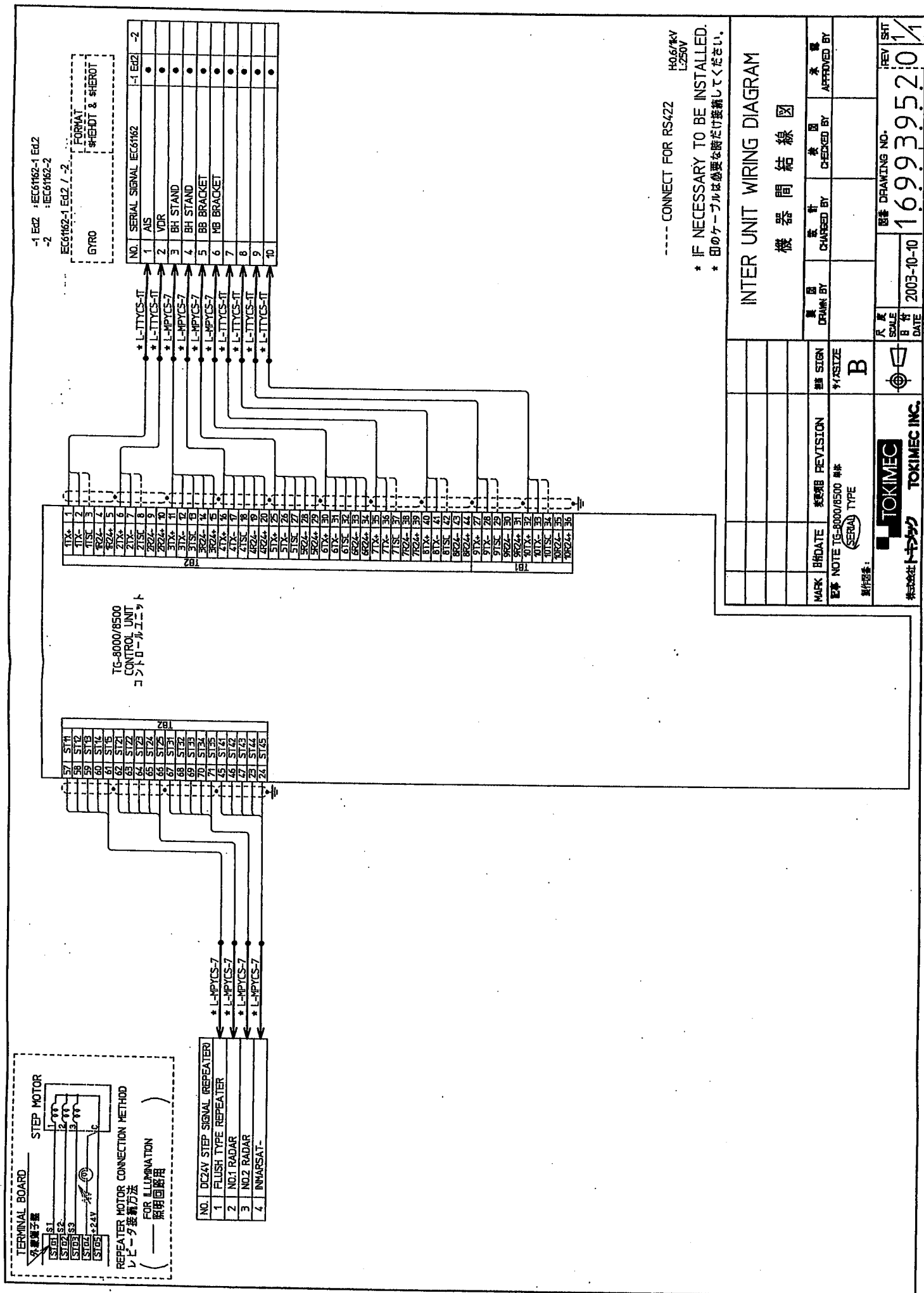


-----CONNECT FOR RS422

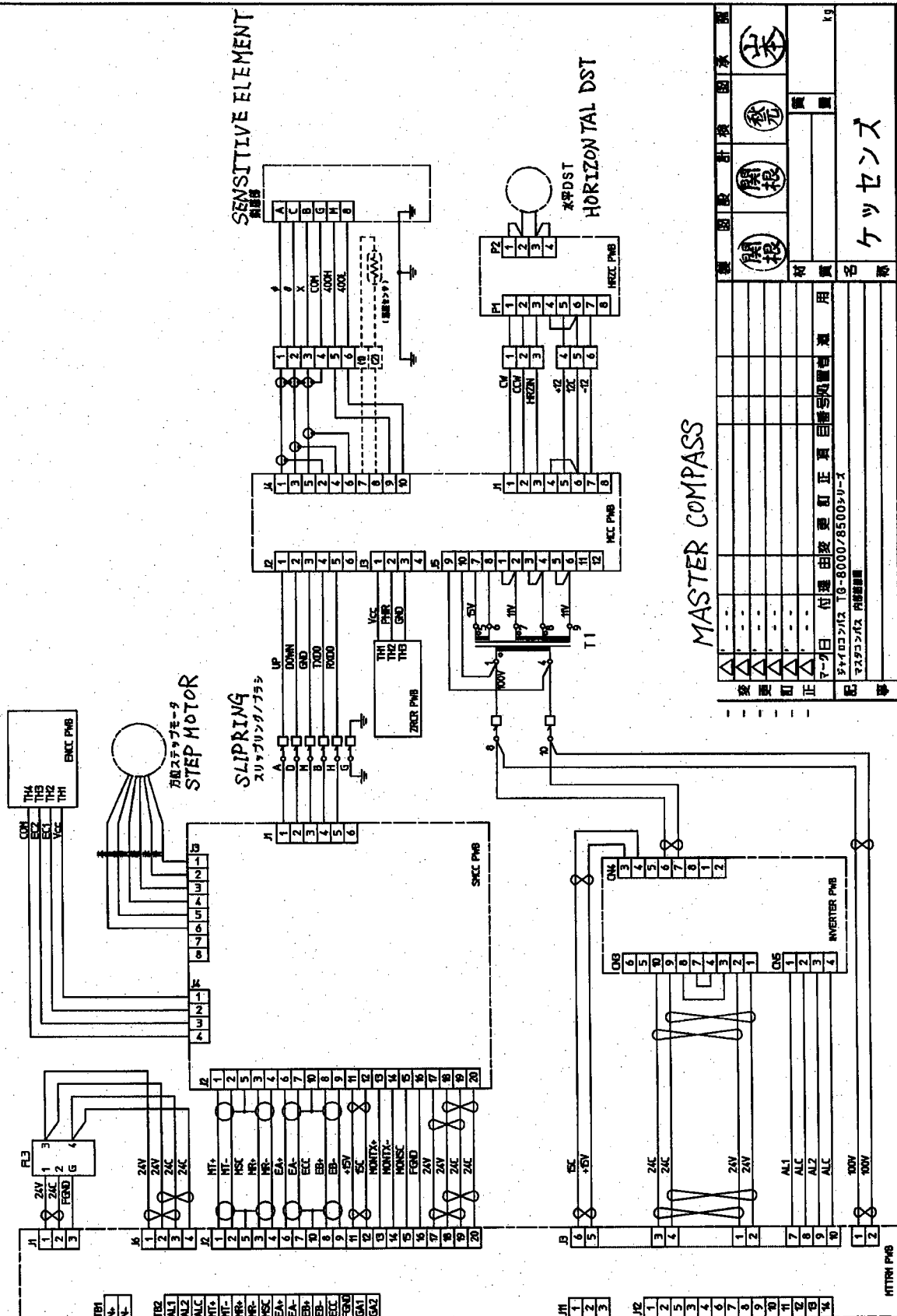
- * IF NECESSARY TO BE INSTALLED.
- * 印のケーブルは必要を踏だけ接続してください。

CAUTION 注意

- DO NOT MESSER SHIP'S CABLING WITH EQUIPMENT CONNECTED.
この装置はメカ設備をしてはならない。
- IT IS ESSENTIAL THAT CONDUCTORS ARE GROUPED IN SEPARATE CABLES AS SHOWN
図に示したように 別れて巻かれたケーブルは船体上必ず分厘して接続してください。
- SINCE THE SPRING-PRESSURE TYPE TERMINAL BOARDS FOR GYROCOMPASS ARE APPLIED FOR CABLE CONNECTIONS,
DO NOT CONNECT PLURAL WIRES TO ONE TERMINAL.
ジャイロ用端子盤の入出力用ケーブルは圧力式端子盤を使用していますので、一端子に複数の線を接続しないでください。

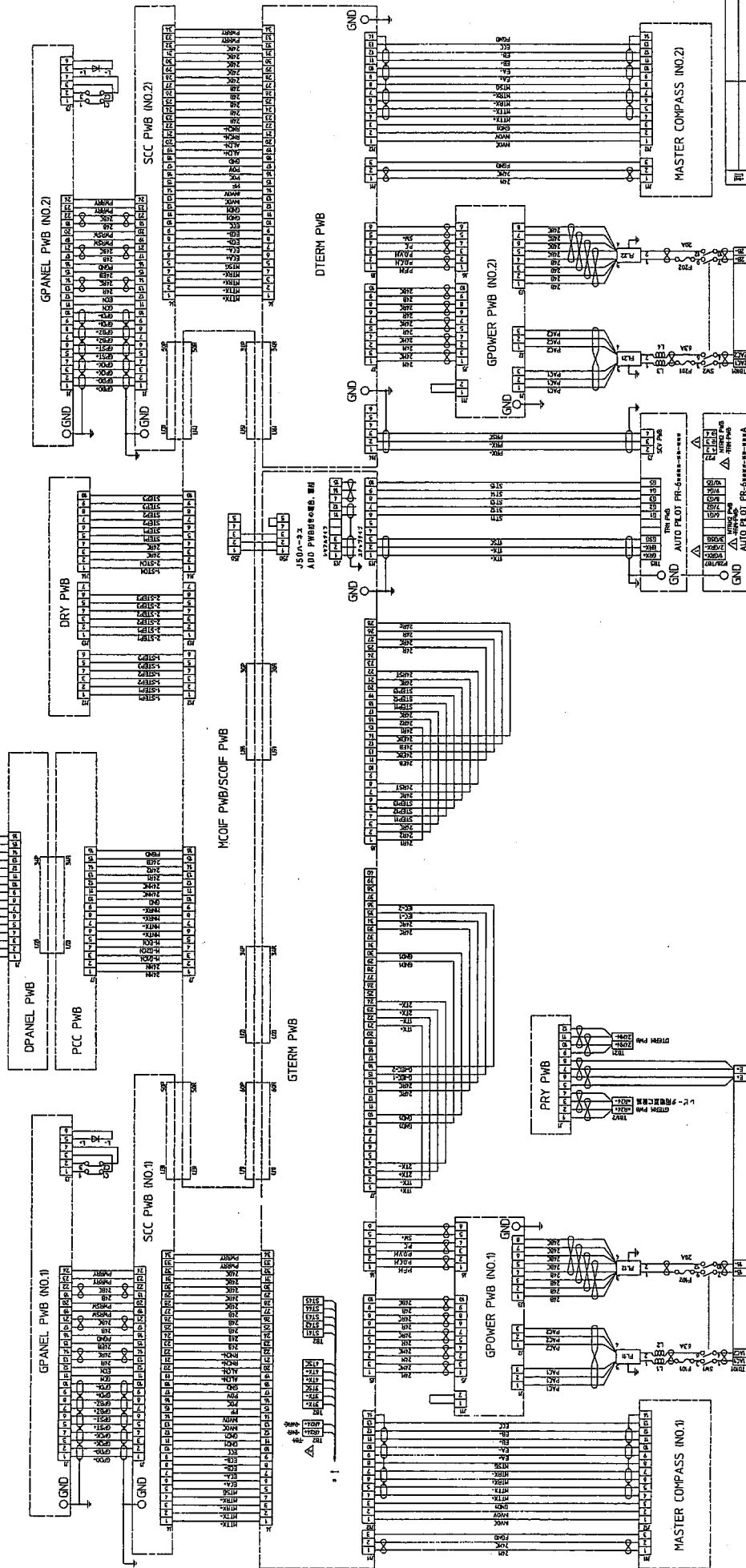
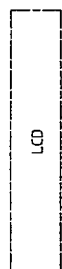


図面/台数 1/1 実寸 1/1 寸法



製造国		日本
設計者		秋元
検定者		秋元
承認者		秋元
材料		kg
重量		
名称		ケッセンズ
用途		付通 由受 訂正 項 自番 号 風 置 通 用
型式		タイプコッパス T8-8000/850000-1
記号		マスコッパス 内部線番
製造年		2002-07-01
製造所		秋元
製造番号		101896011
製造国		日本

GPANEL PWBのJ3ハーネスは、図1となっている場合あり、(初期出荷品)
GPOWER PWBのJ1ハーネスは無い場合あり、(初期出荷品)

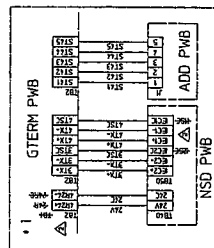


CONTROL UNIT TYPE D

TYPE
G

[illegible]

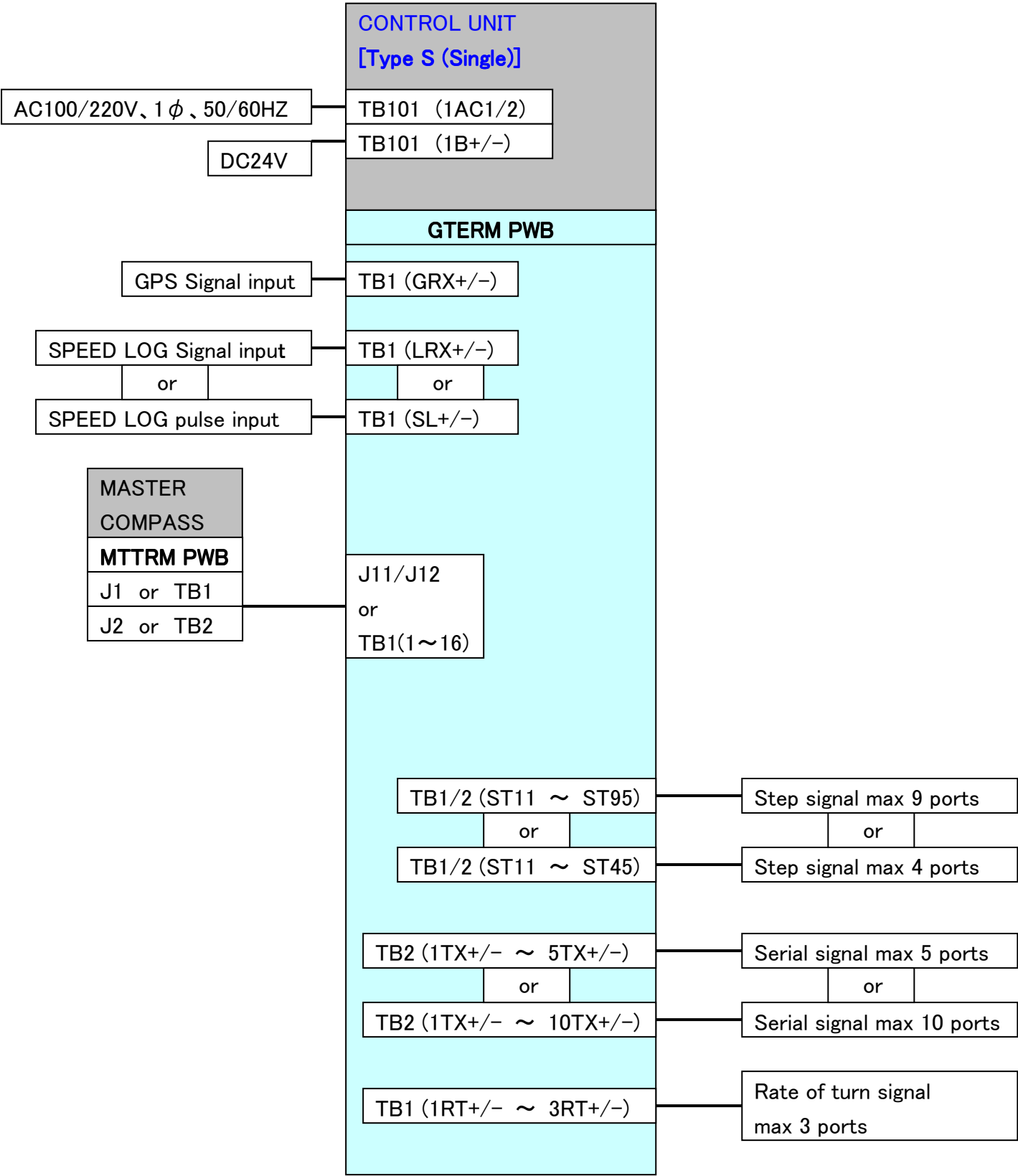
ステップ番号8回増設 ADD PWB
シリアル番号6回増設 NSD PWB
ADD PWB/NSD PWB併設不可



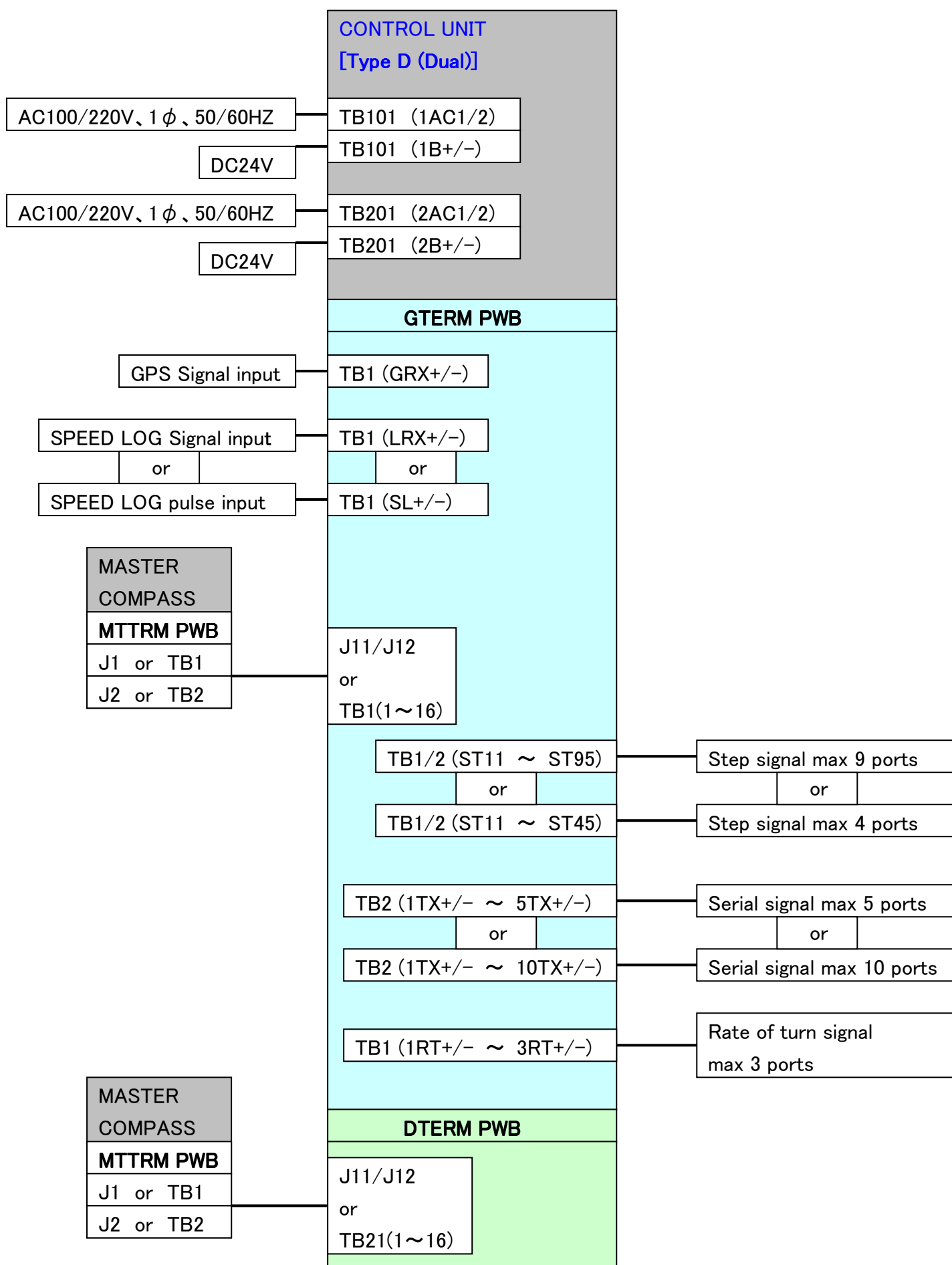
6.2 Block diagram

Page No.	Name	Drawing No.	Remarks
6-10	Inter unit block diagram Type S		Master Compass & Control unit
6-11	Inter unit block diagram Type D		Master Compass & Control unit
6-12	System block diagram Type S		Master Compass & Control unit
6-13	System block diagram Type D		Master Compass & Control unit
6-14	Master compass system block diagram		
6-15	Control unit system block diagram Type S (Step type)		
6-16	Control unit system block diagram Type S (Serial type)		
6-17~19	Control unit system block diagram Type D (Step type)		
6-20~22	Control unit system block diagram Type D (Serial type)		

Inter unit block diagram (1/2)



Inter unit block diagram (2/2)



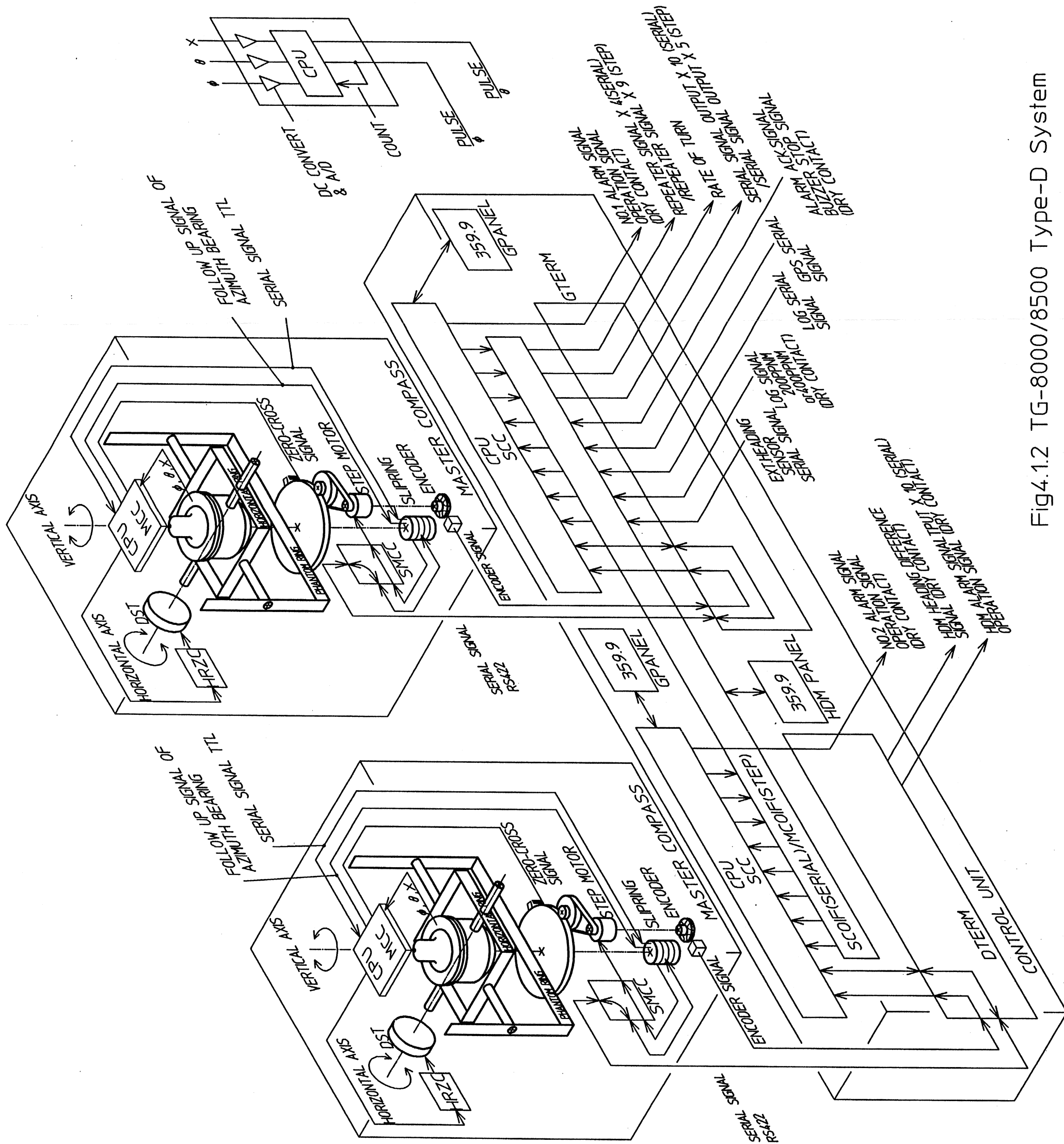


Fig4.1.2 TG-8000/8500 Type-D System

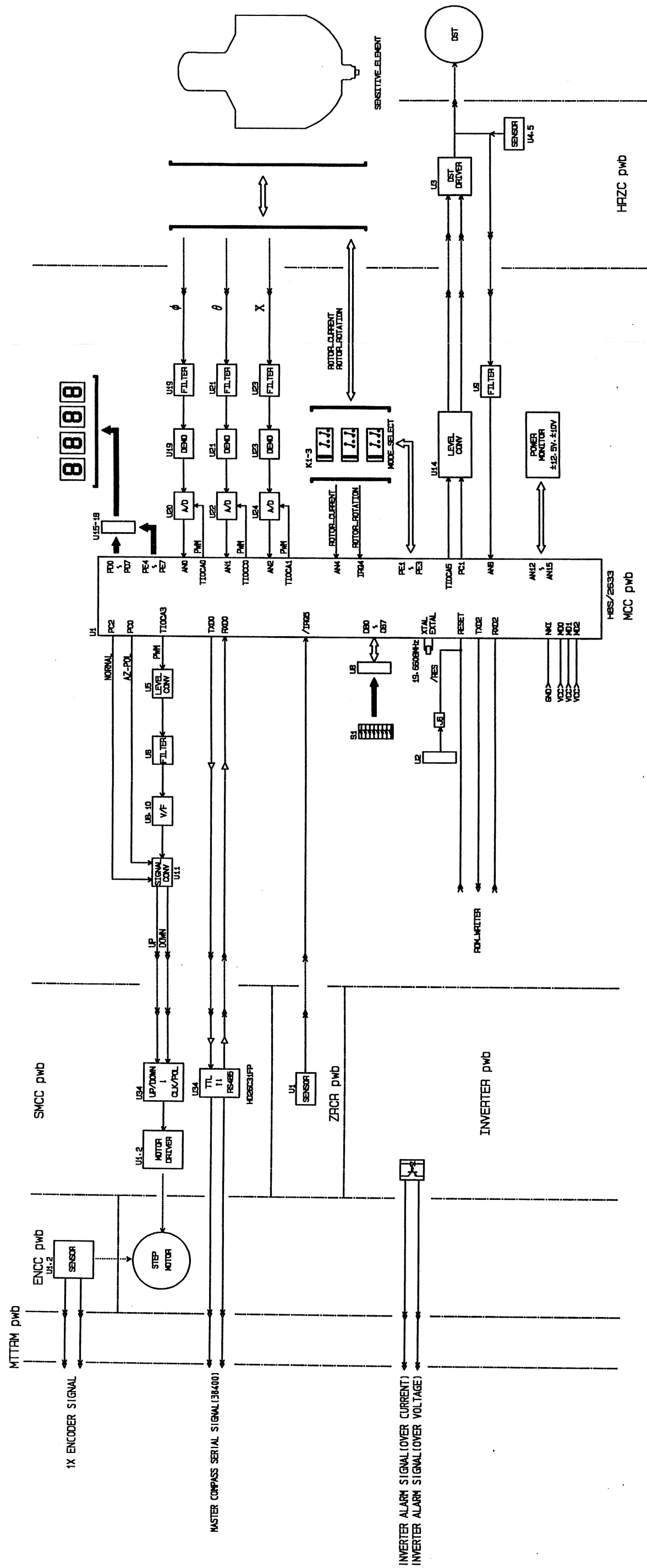


Fig. 4.18
 TG-8000/8500 MASTER_COMPASS
 GC 80/85 MASTER_COMPASS
 System block diagram

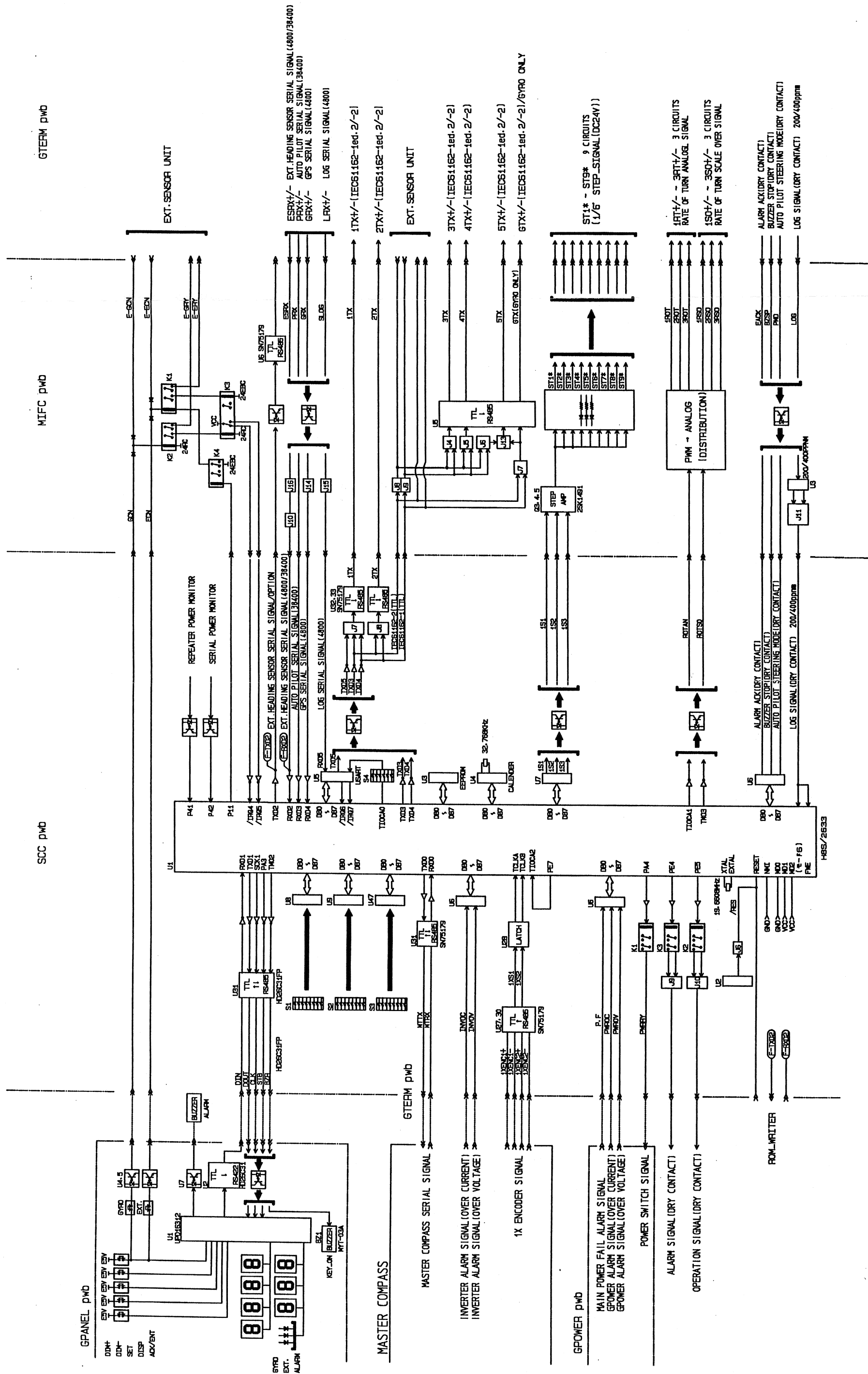


Fig. 4.20.1 TG-8000/8500 TYPE S (STEP)
System block diagram

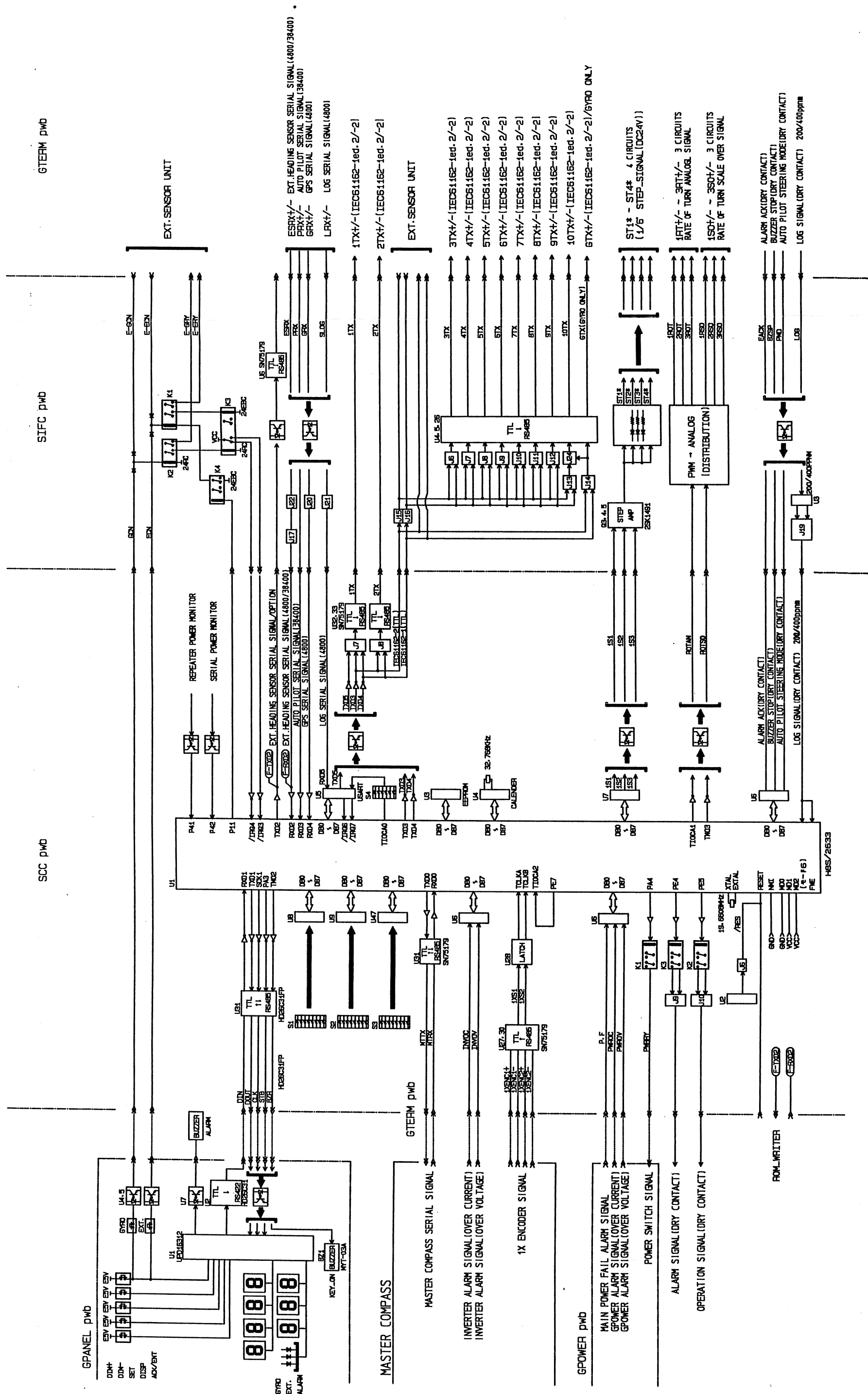


Fig. 4.20.2 TG-8000/8500 TYPE S(SERIAL)
GC 80/85 TYPE S
System block diagram

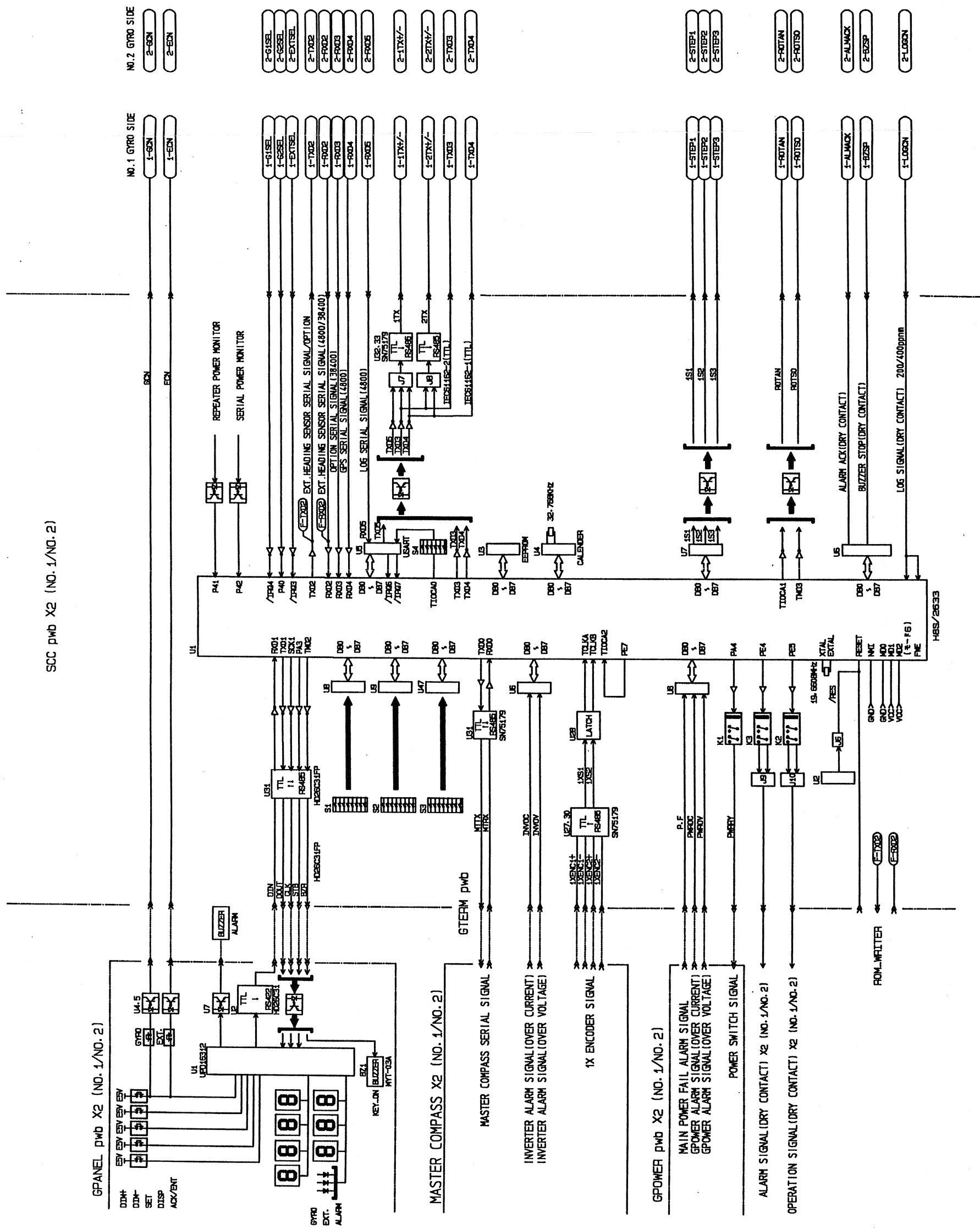


Fig. 4.21.1 1/3 TG-8000/8500 TYPE D(STEP) (1/3)
System block diagram

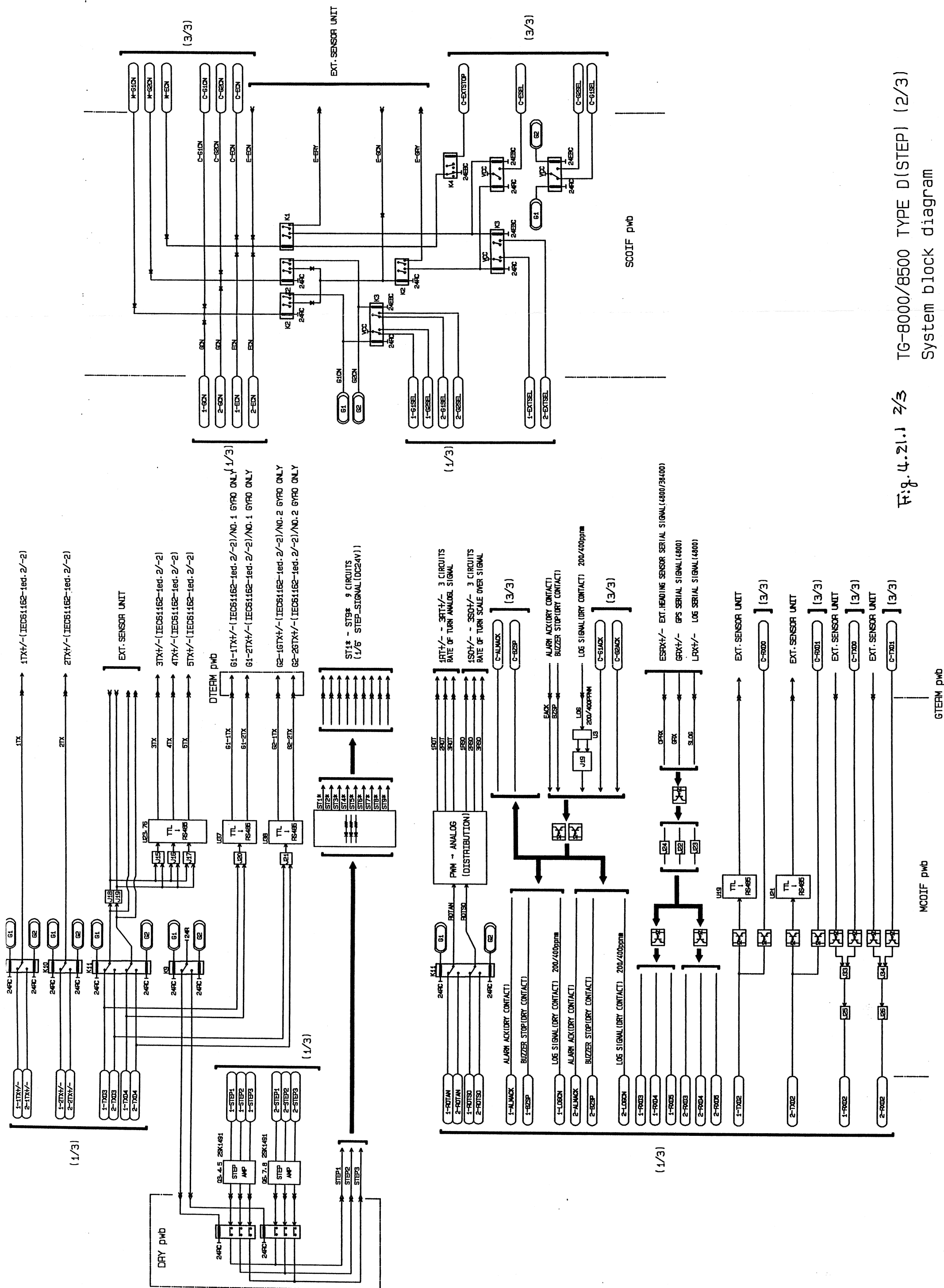


Fig. 4.21.1 2/3 TG-8000/8500 TYPE D (STEP) (2/3)
System block diagram

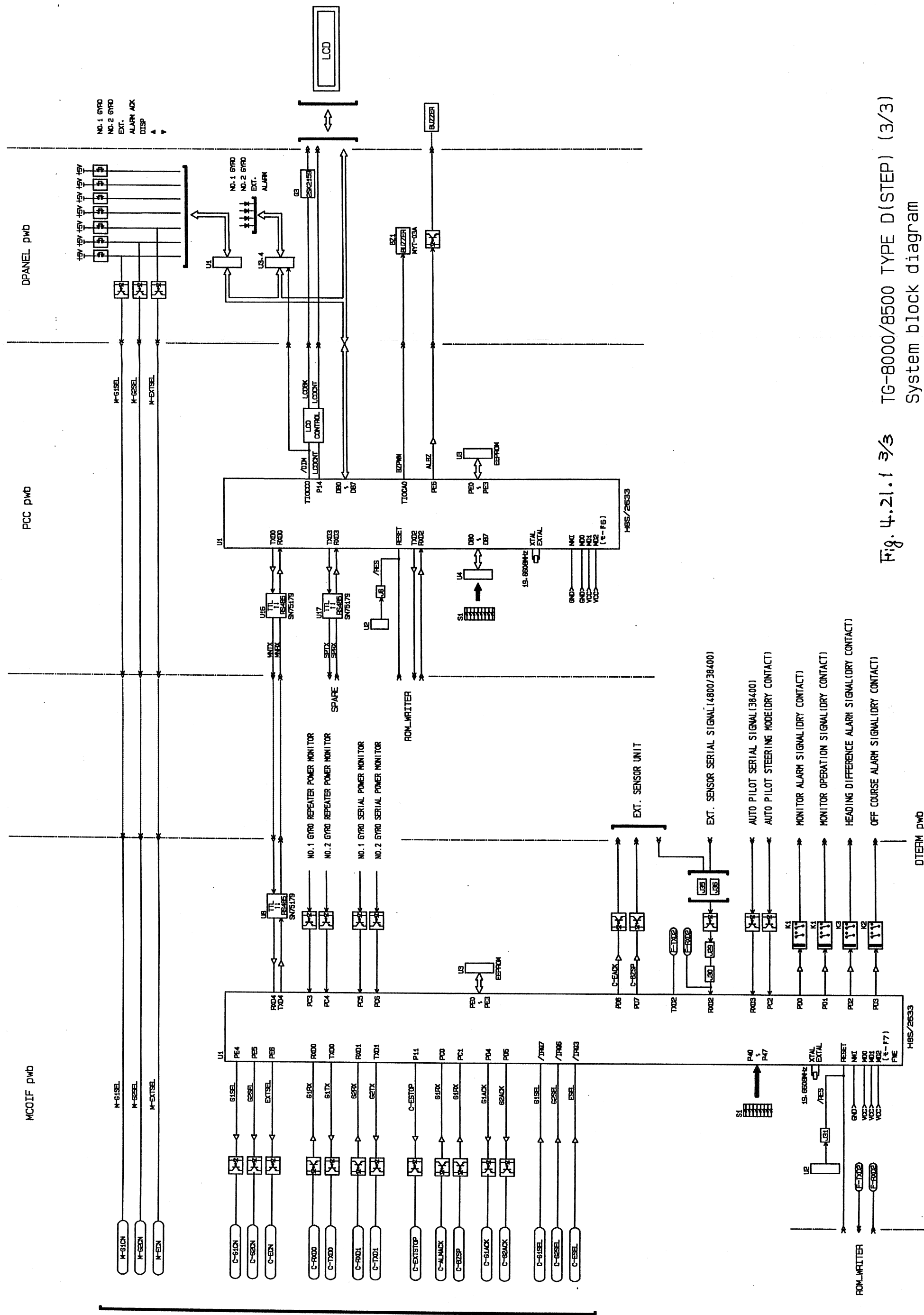


Fig. 4.21.1 3/3 TG-8000/8500 TYPE D (STEP) (3/3)
System block diagram

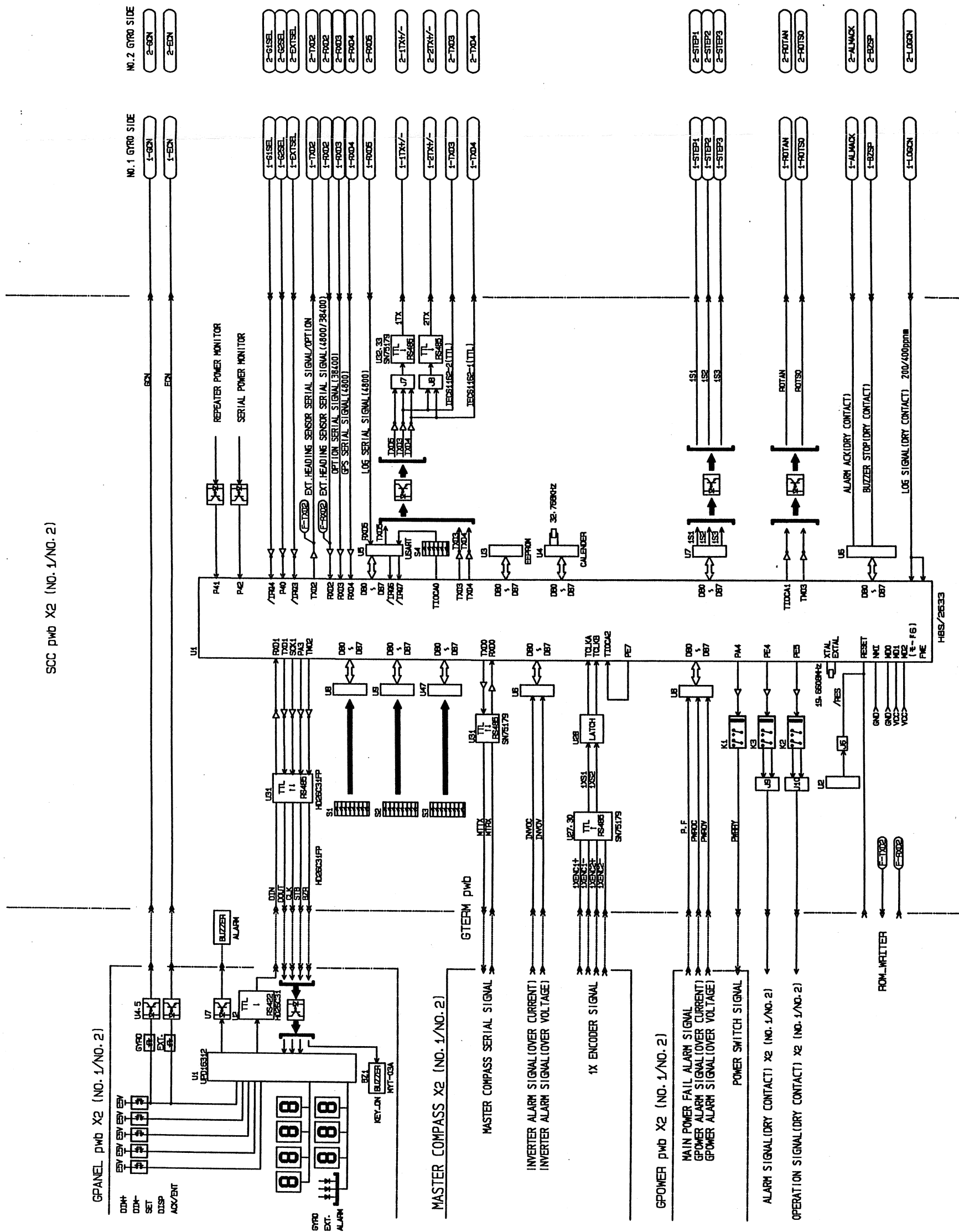


Fig. 4.21.2 1/3 TG-8000/8500 TYPE D(SERIAL) (1/3)
GC 80/85 TYPE D (1/3)
System block diagram

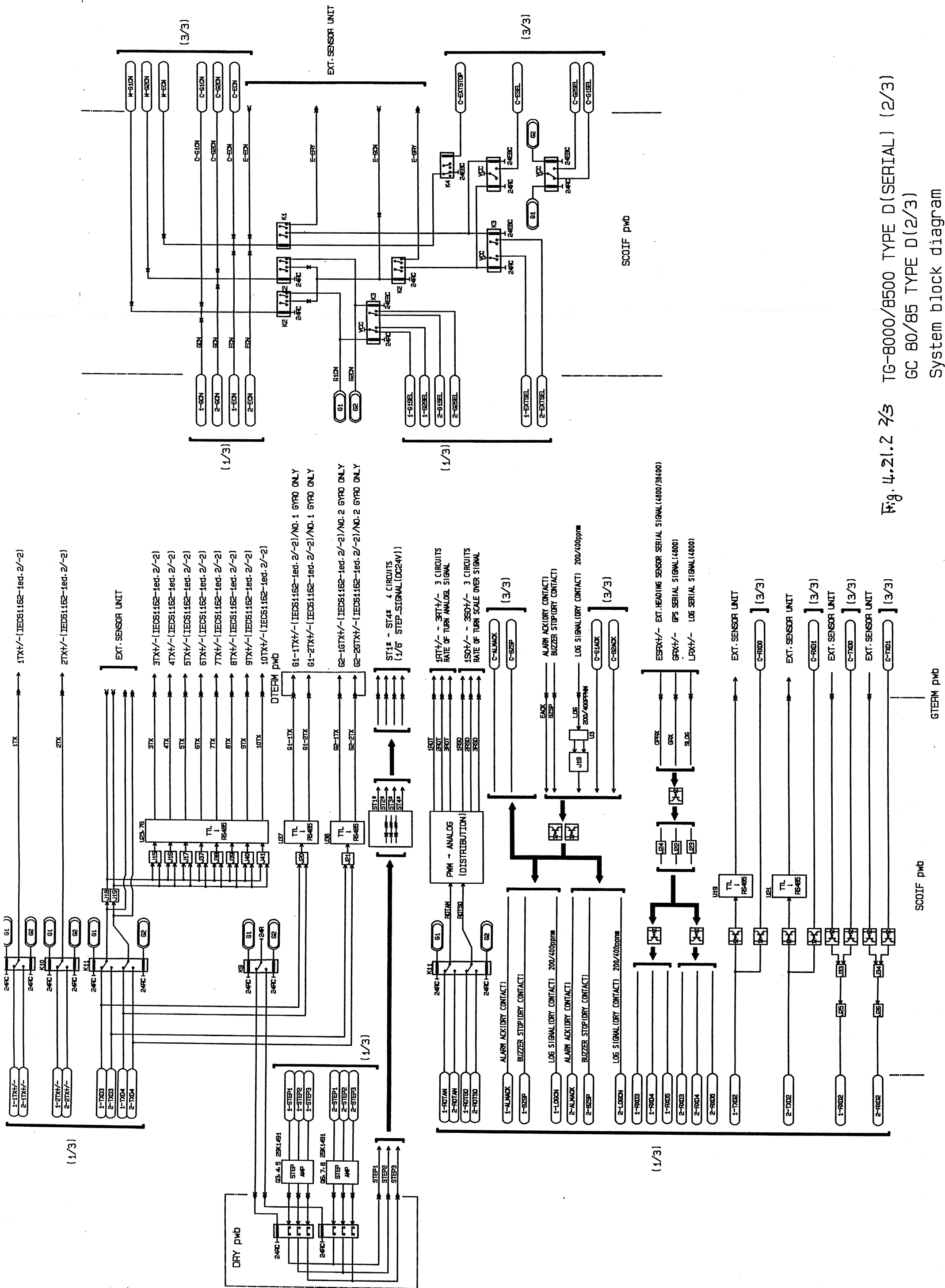


Fig. 4.21.2 2/3 TG-8000/8500 TYPE D(SERIAL) (2/3)
GC 80/85 TYPE D(2/3)
System block diagram

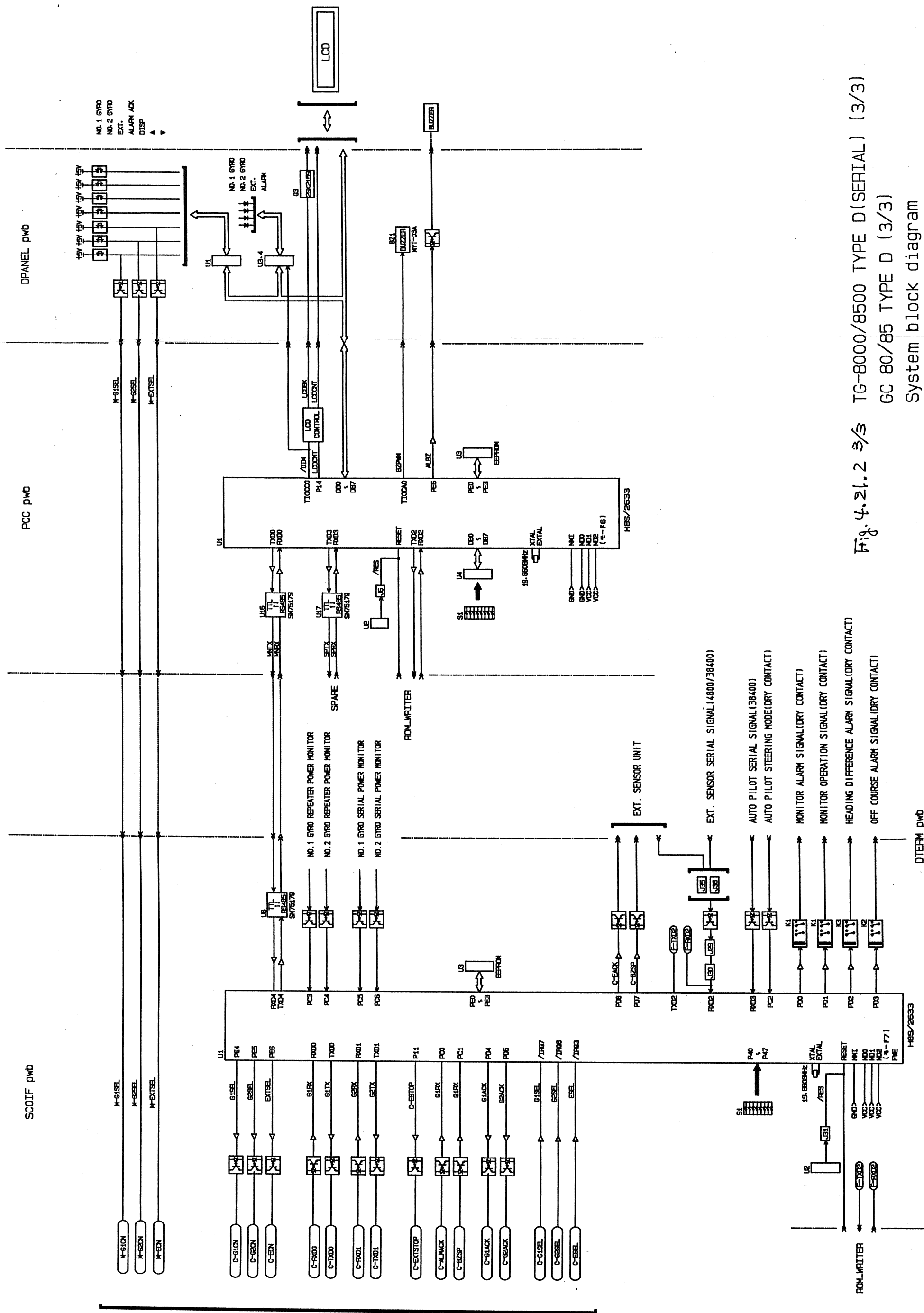


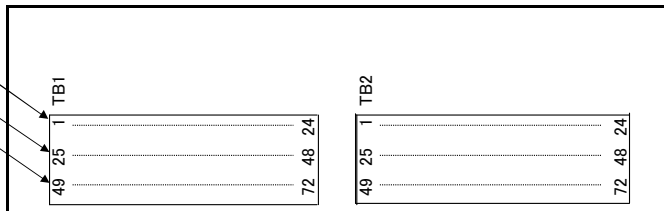
Fig. 4.21.2 3/3 TG-8000/8500 TYPE D (SERIAL) (3/3)
GC 80/85 TYPE D (3/3)
System block diagram

6.3 Terminal board

Page No.	Name	Drawing No.	Remarks
6-24	Gtern pwb connection Type S		
6-25	Gtern pwb connection Type D		
6-26	Dtern pwb connection Type D		

(1) GTERM pwb connection (Type S)

upper terminal board
middle terminal board
lower terminal board



TB1 terminal board			middle			lower		
pin no	name	details	pin no	name	details	pin no	name	lower
49	IRT+	Rate of turn analog signal output	25	24M+	Ext. power supply input (no connection)	1	N+	Master compass power supply(d24v)
50	IRT-	Rate of turn signal common	26	24M-	Ext. power supply input (no connection)	2	N-	Master compass power supply(d24v)
51	ISO+	Rate of turn scale over signal output	27	9TX+/ST81	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	3	AL1	Master compass inverter alarm(over current)
52	ISO-	Rate of turn signal common	28	9TX-/ST82	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	4	AL2	Master compass inverter alarm(over voltage)
53	2RT+	Rate of turn analog signal output	29	9TSC/ST83	Step signal(open drain signal)/Serial signal common	5	ALC	Master compass inverter alarm(common)
54	2RT-	Rate of turn signal common	30	9R24+/ST84	Step signal(d24v)/Serial repeater power supply(d24v)	6	MT+	Control unit → master compass serial signal(RS485)
55	2SO+	Rate of turn scale over signal output	31	9R24-/ST85	Step signal(d24v)/Serial repeater power supply(d24v)	7	MT-	Control unit → master compass serial signal(RS485)
56	2SO-	Rate of turn signal common	32	10TX+/ST91	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	8	MR+	Master compass → control unit serial signal(RS485)
57	3RT+	Rate of turn analog signal output	33	10TX-/ST92	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	9	MR-	Master compass → control unit serial signal(RS485)
58	3RT-	Rate of turn signal common	34	10TSC/ST93	Step signal(open drain signal)/Serial signal common	10	MSC	Serial signal common
59	3SO+	Rate of turn scale over signal output	35	10R24+/ST94	Step signal(d24v)/Serial repeater power supply(d24v)	11	EA+	Master compass encoder signal(A phase +)(RS485)
60	3SO-	Rate of turn signal common	36	10R24-/ST95	Step signal(d24v)/Serial repeater power supply(d24v)	12	EA-	Master compass encoder signal(A phase -)(RS485)
61	GCC+	Sensor select signal input(gyro select)	37	GRX+	GPS serial signal input	13	EB+	Master compass encoder signal(B phase +)(RS485)
62	GCC-	Sensor select signal input(gyro select)	38	GRX-	GPS serial signal input	14	EB-	Master compass encoder signal(B phase -)(RS485)
63	ECO+	Sensor select signal input(Ext.sensor select)	39	GSC	GPS serial signal common	15	ECC	Master compass encoder signal(common)
64	ECO-	Sensor select signal input(Ext.sensor select)	40	LRX+	LOG serial signal input	16	FG	Earth
65	ALCN1	Alarm contact signal output	41	LRX-	LOG serial signal input	17	24R+	Ext. power supply input (no connection)
66	ALCN2	Alarm contact signal output	42	LSC	LOG serial signal common	18	24R-	Ext. power supply input (no connection)
67	RNCN1	Running contact signal output	43	ESRX+	Ext.sensor serial signal input	19	24B+	Ext. power supply input (no connection)
68	RNCN2	Running contact signal output	44	ESRX-	Ext.sensor serial signal input	20	24B-	Ext. power supply input (no connection)
69	EACK+	External acknowledge signal input	45	ESC	Ext.sensor serial signal common	21	PF	Ext. power supply alarm input (no connection)
70	EACK-	External acknowledge signal input	46	SL+	LOG contact signal input	22	POC	Ext. power supply alarm input (no connection)
71	BZSP+	Buzzer stop signal input	47	SL-	LOG contact signal input	23	POV	Ext. power supply alarm input (no connection)
72	BZSP-	Buzzer stop signal input	48	SW+	Ext. power supply switch (no connection)	24	PC	Ext. power supply alarm input (no connection)

TB2 terminal board			middle			lower		
pin no	name	details	pin no	name	details	pin no	name	details
49	ST11/OPRX+	step signal / serial input(option)	25	5TX+	Serial signal output(IEC61162-1 ed.2/-2)	1	1TX+	Serial signal output(IEC61162-1 ed.2/-2)
50	ST2/OPRX-	step signal / serial input(option)	26	5TX-	Serial signal output(IEC61162-1 ed.2/-2)	2	1TX-	Serial signal output(IEC61162-1 ed.2/-2)
51	ST3/OPSC	step signal / serial input(option)	27	5TSC	Serial signal common	3	1TSC	Serial signal common
52	OPGN+	contact input(option)(not used)	28	5R24+	Serial repeater power supply(d24v)	4	1R24-	Serial repeater power supply(d24v)
53	OPGN-	contact input(option)(not used)	29	5R24+	Serial repeater power supply(d24v)	5	1R24+	Serial repeater power supply(d24v)
54	GTX+	Serial signal output(IEC61162-1 ed.2/-2)	30	6TX+/ST51	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	6	2TX+	Serial signal output(IEC61162-1 ed.2/-2)
55	GTX-	Serial signal output(IEC61162-1 ed.2/-2)	31	6TX-/ST52	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	7	2TX-	Serial signal output(IEC61162-1 ed.2/-2)
56	GTSC	Serial signal common	32	6TSC/ST53	Step signal(open drain signal)/Serial signal common	8	2TSC	Serial signal common
57	ST11	step signal(open drain signal)	33	6R24+/ST54	Step signal(d24v)/Serial repeater power supply(d24v)	9	2R24-	Serial repeater power supply(d24v)
58	ST12	step signal(open drain signal)	34	6R24-/ST55	Step signal(d24v)/Serial repeater power supply(d24v)	10	2R24+	Serial repeater power supply(d24v)
59	ST13	step signal(open drain signal)	35	7TX+/ST61	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	11	3TX+	Serial signal output(IEC61162-1 ed.2/-2)
60	ST14	step signal(d24v)	36	7TX-/ST62	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	12	3TX-	Serial signal output(IEC61162-1 ed.2/-2)
61	ST15	step signal(d24v)	37	7TSC/ST63	Step signal(open drain signal)/Serial signal common	13	3TSC	Serial signal common
62	ST21	step signal(open drain signal)	38	7R24+/ST64	Step signal(d24v)/Serial repeater power supply(d24v)	14	3R24-	Serial repeater power supply(d24v)
63	ST22	step signal(open drain signal)	39	7R24-/ST65	Step signal(d24v)/Serial repeater power supply(d24v)	15	3R24+	Serial repeater power supply(d24v)
64	ST23	step signal(open drain signal)	40	8TX+/ST71	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	16	4TX+	Serial signal output(IEC61162-1 ed.2/-2)
65	ST24	step signal(d24v)	41	8TX-/ST72	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	17	4TX-	Serial signal output(IEC61162-1 ed.2/-2)
66	ST25	step signal(d24v)	42	8TSC/ST73	Step signal(open drain signal)/Serial signal common	18	4TSC	Serial signal common
67	ST31	step signal(open drain signal)	43	8R24+/ST74	Step signal(d24v)/Serial repeater power supply(d24v)	19	4R24-	Serial repeater power supply(d24v)
68	ST32	step signal(open drain signal)	44	8R24-/ST75	Step signal(d24v)/Serial repeater power supply(d24v)	20	4R24+	Serial repeater power supply(d24v)
69	ST33	step signal(open drain signal)	45	ST41	step signal(d24v)/Serial repeater power supply(d24v)	21	DFCN1	Deviation alarm contact uputnot (HDM ues)
70	ST34	step signal(d24v)	46	ST42	step signal(d24v)	22	DFCN2	Deviation alarm contact uputnot (HDM ues)
71	ST35	step signal(d24v)	47	ST43	step signal(d24v)	23	ST44	step signal(d24v)
72	OACN2	Off course alarm contact uputnot (HDM/OCA ues)	48	OACN1	Off course alarm contact uputnot (HDM/OCA ues)	24	ST45	step signal(d24v)

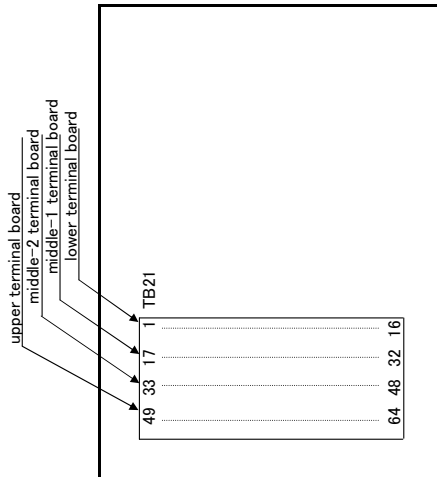
(2) GTERM pwb connection (Type D)

upper terminal board
middle terminal board
lower terminal board

upper			middle			lower		
pin no	name	details	pin no	name	details	pin no	name	lower
49	IRT+	Rate of turn analog signal output	25	24M+	Ext. power supply input (no connection)	1	N+	Master compass power supply(dc24v)
50	IRT-	Rate of turn signal common	26	24M-	Ext. power supply input (no connection)	2	N-	Master compass power supply(dc24v)
51	ISO+	Rate of turn scale over signal output	27	9TX+/ST81	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	3	AL1	Master compass inverter alarm(over current)
52	ISO-	Rate of turn signal common	28	9TX-/ST82	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	4	AL2	Master compass inverter alarm(over voltage)
53	2RT+	Rate of turn analog signal output	29	9TSC/ST83	Step signal(open drain signal)/Serial signal common	5	ALC	Master compass inverter alarm(common)
54	2RT-	Rate of turn signal common	30	9R24-/ST84	Step signal(dc24 common)/Serial repeater power supply(dc24common)	6	MT+	Control unit → master compass serial signal(RS485)
55	2SO+	Rate of turn scale over signal output	31	9R24+/ST85	Step signal(dc24v)/Serial repeater power supply(dc24v)	7	MT-	Control unit → master compass serial signal(RS485)
56	2SO-	Rate of turn signal common	32	10TX+/ST91	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	8	MR+	Master compass → control unit serial signal(RS485)
57	3RT+	Rate of turn analog signal output	33	10TX-/ST92	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	9	MR-	Master compass → control unit serial signal(RS485)
58	3RT-	Rate of turn signal common	34	10TSC/ST93	Step signal(open drain signal)/Serial signal common	10	MSC	Serial signal common
59	3SO+	Rate of turn scale over signal output	35	10R24-/ST94	Step signal(dc24 common)/Serial repeater power supply(dc24common)	11	EA+	Master compass encoder signal(A phase +)(RS485)
60	3SO-	Rate of turn signal common	36	10R24+/ST95	Step signal(dc24v)/Serial repeater power supply(dc24v)	12	EA-	Master compass encoder signal(A phase -)(RS485)
61	GOC+	not used	37	GRX+	GPS serial signal input	13	EB+	Master compass encoder signal(B phase +)(RS485)
62	GOC-	not used	38	GRX-	GPS serial signal input	14	EB-	Master compass encoder signal(B phase -)(RS485)
63	EOC+	not used	39	GSC	GPS serial signal common	15	EOC	Master compass encoder signal(common)
64	EOC-	not used	40	LRX+	LOG serial signal input	16	FG	Earth
65	ALCN1	Alarm contact signal output	41	LRX-	LOG serial signal input	17	24R+	Ext. power supply input (no connection)
66	ALCN2	Alarm contact signal output	42	LSC	LOG serial signal common	18	24R-	Ext. power supply input (no connection)
67	RNCN1	Running contact signal output	43	ESRX+	Ext.sensor serial signal input	19	24B+	Ext. power supply input (no connection)
68	RNCN2	Running contact signal output	44	ESRX-	Ext.sensor serial signal input	20	24B-	Ext. power supply input (no connection)
69	EACK+	External acknowledge signal input	45	ESC	Ext.sensor serial signal common	21	PF	Ext. power supply alarm input (no connection)
70	EACK-	External acknowledge signal input	46	SL+	LOG contact signal input	22	POC	Ext. power supply alarm input (no connection)
71	BZSP+	Buzzer stop signal input	47	SL-	LOG contact signal input	23	POV	Ext. power supply alarm input (no connection)
72	BZSP-	Buzzer stop signal input	48	SW+	Ext. power supply switch (no connection)	24	PC	Ext. power supply alarm input (no connection)

upper			middle			lower		
pin no	name	details	pin no	name	details	pin no	name	details
49	ST11/OPRX+	step signal / serial input(option)	25	5TX+	Serial signal output(IEC61162-1 ed.2/-2)	1	1TX+	Serial signal output(IEC61162-1 ed.2/-2)
50	ST2/OPRX-	step signal / serial input(option)	26	5TX-	Serial signal output(IEC61162-1 ed.2/-2)	2	1TX-	Serial signal common
51	ST3/OPSC	step signal / serial input(option)	27	5TSC	Serial signal common	3	1TSC	Serial signal common
52	OPON+	contact input(option)(not used)	28	5R24+	Serial repeater power supply(dc24v)	4	1R24+	Serial repeater power supply(dc24common)
53	OPON-	contact input(option)(not used)	29	5R24-	Serial repeater power supply(dc24v)	5	1R24-	Serial repeater power supply(dc24v)
54	GTX+	not used	30	6TX+/ST51	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	6	2TX+	Serial signal output(IEC61162-1 ed.2/-2)
55	GTX-	not used	31	6TX-/ST52	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	7	2TX-	Serial signal common
56	GTSC	not used	32	6TSC/ST53	Step signal(open drain signal)/Serial signal common	8	2TSC	Serial signal common
57	ST11	step signal(open drain signal)	33	6R24-/ST54	Step signal(dc24 common)/Serial repeater power supply(dc24common)	9	2R24-	Serial repeater power supply(dc24common)
58	ST12	step signal(open drain signal)	34	6R24+/ST55	Step signal(dc24v)/Serial repeater power supply(dc24v)	10	2R24+	Serial repeater power supply(dc24v)
59	ST13	step signal(open drain signal)	35	7TX+/ST61	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	11	3TX+	Serial signal output(IEC61162-1 ed.2/-2)
60	ST14	step signal(dc24 common)	36	7TX-/ST62	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	12	3TX-	Serial signal common
61	ST15	step signal(dc24v)	37	7TSC/ST63	Step signal(open drain signal)/Serial signal common	13	3TSC	Serial signal common
62	ST21	step signal(open drain signal)	38	7R24-/ST64	Step signal(dc24 common)/Serial repeater power supply(dc24common)	14	3R24-	Serial repeater power supply(dc24common)
63	ST22	step signal(open drain signal)	39	7R24+/ST65	Step signal(dc24v)/Serial repeater power supply(dc24v)	15	3R24+	Serial repeater power supply(dc24v)
64	ST23	step signal(open drain signal)	40	8TX+/ST71	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	16	4TX+	Serial signal output(IEC61162-1 ed.2/-2)
65	ST24	step signal(dc24 common)	41	8TX-/ST72	Step signal(open drain signal)/Serial signal output(IEC61162-1 ed.2/-2)	17	4TX-	Serial signal common
66	ST25	step signal(dc24v)	42	8TSC/ST73	Step signal(open drain signal)/Serial signal common	18	4TSC	Serial signal common
67	ST31	step signal(open drain signal)	43	8R24-/ST74	Step signal(dc24 common)/Serial repeater power supply(dc24common)	19	4R24-	Serial repeater power supply(dc24common)
68	ST32	step signal(open drain signal)	44	8R24+/ST75	Step signal(dc24v)/Serial repeater power supply(dc24v)	20	4R24+	Serial repeater power supply(dc24v)
69	ST33	step signal(open drain signal)	45	ST41	step signal(open drain signal)	21	DFCN1	not used
70	ST34	step signal(dc24 common)	46	ST42	step signal(open drain signal)	22	DFCN2	not used
71	ST35	step signal(dc24v)	47	ST43	step signal(open drain signal)	23	ST44	step signal(dc24 common)
72	OACN2	not used	48	OACN1	not used	24	ST45	step signal(dc24v)

(3) DTERM pwb connection (Type D)



TB21 terminal board

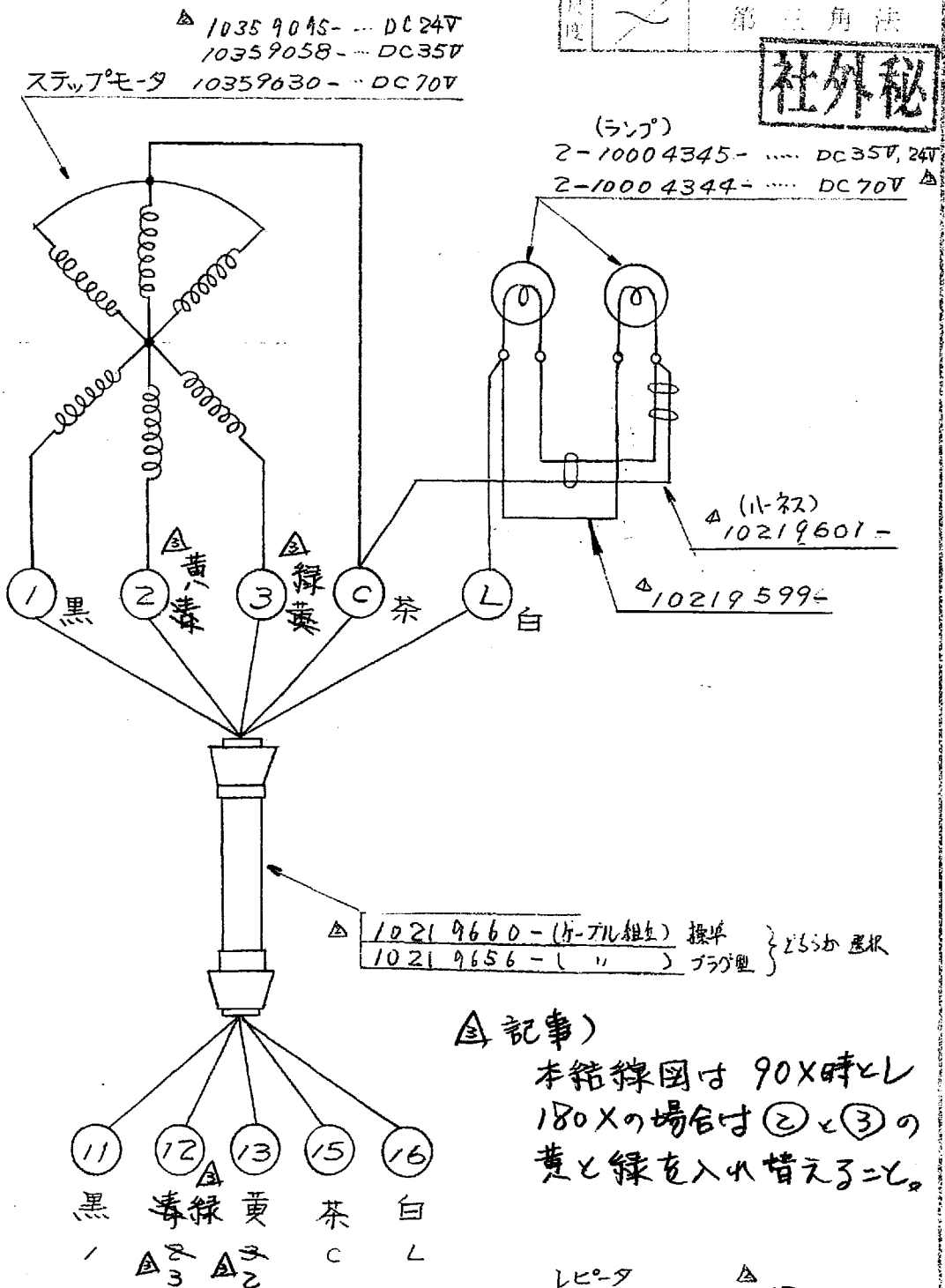
middle -1		lower	
pin no	name	pin no	name
17 24M+	Ext. power supply input (no connection)	1 N+	NO.2 Master compass power supply (dc24v)
18 24M-	Ext. power supply input (no connection)	2 N-	NO.2 Master compass power supply (dc24GND)
19 24R+	Ext. power supply input (no connection)	3 AL1	NO.2 Master compass inverter fail signal(over current)
20 24R-	Ext. power supply input (no connection)	4 AL2	NO.2 Master compass inverter fail signal(over voltage)
21 24B+	Ext. power supply input (no connection)	5 ALC	NO.2 Master compass inverter fail signal common
22 24B-	Ext. power supply input (no connection)	6 MT+	NO.2 Control unit → Master compass serila signal (RS485)
23 PF	Ext. power supply input (no connection)	7 MT-	NO.2 Control unit → Master compass serila signal (RS485)
24 POC	Ext. power supply input (no connection)	8 MR+	NO.2 Master compass serila signal → Control unit (RS485)
25 POV	Ext. power supply input (no connection)	9 MR-	NO.2 Master compass serila signal → Control unit (RS485)
26 PC	Ext. power supply input (no connection)	10 MSC	NO.2 Master compass → Control unit serial signal common
27 SW+	Ext. power supply input (no connection)	11 EA+	NO.2 Master compass encoder signal(A phase +)(RS485)
28 MDON+	Ext. power supply input (no connection)	12 EA-	NO.2 Master compass encoder signal(A phase -)(RS485)
29 MDON-	PR-6000 contact input(steering mode)	13 EB+	NO.2 Master compass encoder signal(B phase +)(RS485)
30 G1-ITX+	NO.1 GYRO Serial signal output(IEC61162-1 ed.2/-2)	14 EB-	NO.2 Master compass encoder signal(B phase -)(RS485)
31 G1-ITX-	NO.1 GYRO Serial signal output(IEC61162-1 ed.2/-2)	15 ECC	NO.2 Master compass encoder signal(common)
32 G1-ITSC	Serial signal common	16 FG	Earth

DTERM pwb

upper		middle -1 2	
pin no	name	pin no	name
49 DFCN1	Heading monitor contact output	33 G2-ITX+	NO.2 GYRO Serial signal output(IEC61162-1 ed.2/-2)
50 DFCN2	Heading monitor contact output	34 G2-ITX-	NO.2 GYRO Serial signal output(IEC61162-1 ed.2/-2)
51 OCAGN1	Off course alarm contact output	35 G2-ITSC	Serial signal common
52 OCAGN2	Off course alarm contact output	36 2ALCN1	NO.2 GYRO alarm contact output
53 MALCN1	Monitor alarm contact output	37 2ALCN2	NO.2 GYRO alarm contact output
54 MALCN2	Monitor alarm contact output	38 2RNCN1	NO.2 GYRO running contact output
55 MRNCN1	Monitor running contact output	39 2RNCN2	NO.2 GYRO running contact output
56 MRNCN2	Monitor running contact output	40 G1CC+	Sensor select contact input(NO.1 GYRO select)
57 G1-2TX+	NO.1 GYRO Serial signal output(IEC61162-1 ed.2/-2)	41 G1CC-	Sensor select contact input(NO.1 GYRO select)
58 G1-2TX-	NO.1 GYRO Serial signal output(IEC61162-1 ed.2/-2)	42 G2CC+	Sensor select contact input(NO.2 GYRO select)
59 G1-2TSC	Serial signal common	43 G2CC-	Sensor select contact input(NO.2 GYRO select)
60 G2-2TX+	NO.2 GYRO Serial signal output(IEC61162-1 ed.2/-2)	44 ECC+	Sensor select contact input(External sensor select)
61 G2-2TX-	NO.2 GYRO Serial signal output(IEC61162-1 ed.2/-2)	45 ECC-	Sensor select contact input(External sensor select)
62 G2-2TX+	Serial signal common	46 PRPX+	PR-6000 serila signal input
63 24MN+	not used	47 PRRX-	PR-6000 serila signal input
64 24MN-	not used	48 PRSC	PR-6000 serila signal common

6.4 Repeater compass & Rate of turn indicator (Wiring diagram)

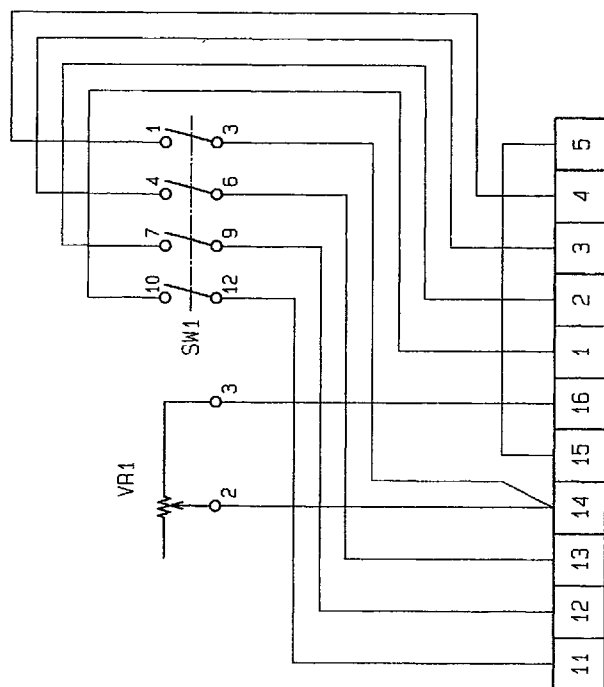
Page No.	Name	Drawing No.	Remarks
6-28	Repeater compass internal wiring diagram (Step type)	10219593	
6-29	Junction box & BH stand internal wiring diagram (Step type)	10029106	
6-30	Repeater compass internal wiring diagram (Serial type)	10189610	
6-31	Junction box & BH stand internal wiring diagram (Serial type)	10029113	
6-32	Rate of turn inter unit wiring diagram (ROTI-300)	10990147	Built-in Dimmer
6-33	Rate of turn inter unit wiring diagram (ROTI-300)	10990148	
6-34	Rate of turn inter unit wiring diagram (ROTI-310)	10990210	Built-in Dimmer
6-35	Rate of turn inter unit wiring diagram (ROTI-310)	10990211	



REPEATER COMPASS
(STEP TYPE)

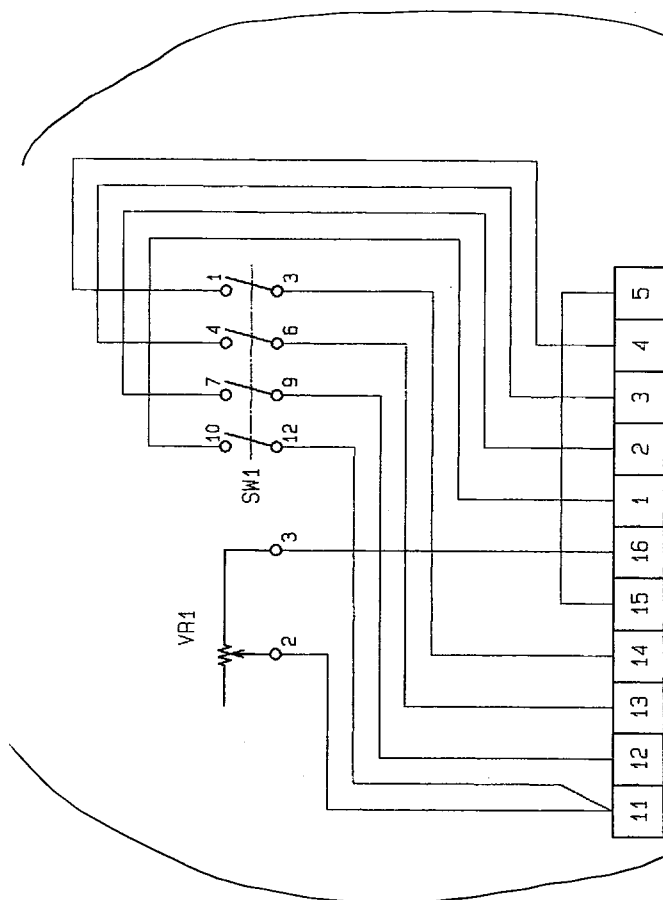
2008.8.7	△ 7	線色変更、電圧追加他	△ 小山	△ B-8374他
97.11.20	△	回路変更、軸	△ 小山	
50.11.20	△	ハ-ネズ四番変更	△ 小山	
理由	変更	変更	変更	変更

倉内	山田
A	ケッセンズ
102195932	



(ステップ用)

(STEP TYPE)



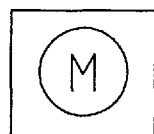
(シンク用)

(SYNCHRO TYPE)

REPEATER JUNCTION BOX

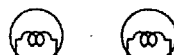
[illegible]

STEP MOTOR

BLUE
RED
YELLOW
BLACK
GREEN

J1 1 2 3 4 5 6

LAMP

24R LAMP SIG
24R LAMP SIG

J3 1 2 3 4 7 8 9 10

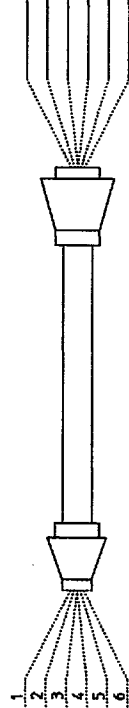
ZRCR PWB

VCC
OUT
GND

J5 1 2 3 4

RPCC PWB

J4 1 2 3 4 5 6

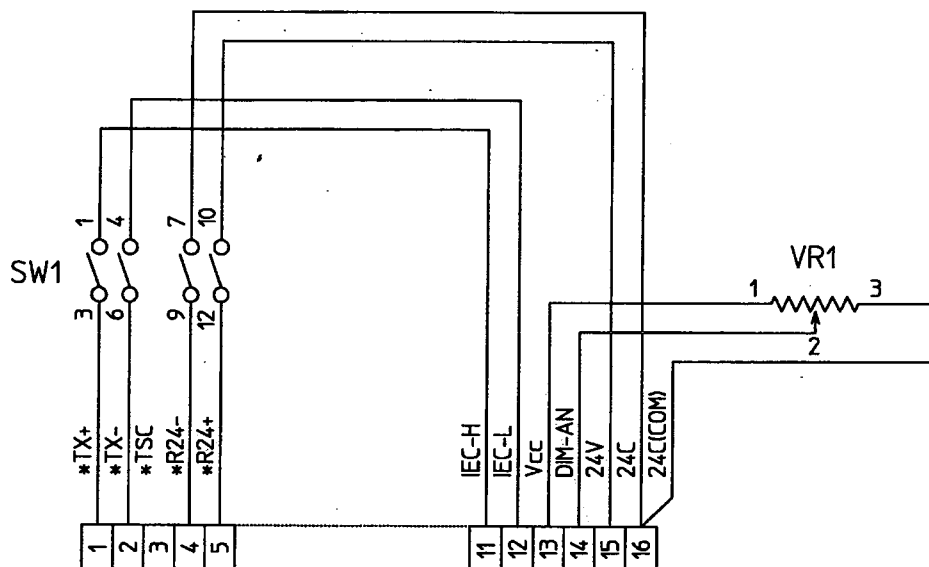
IEC-H 1
IEC-L 2
VCC 3
DMAN 4
24R 5
24RC 6

JUNCTION BOX

REPEATER COMPASS
(SERIAL TYPE)

利用歴	
	Σ 10189453-
	Σ 10189451-~52-

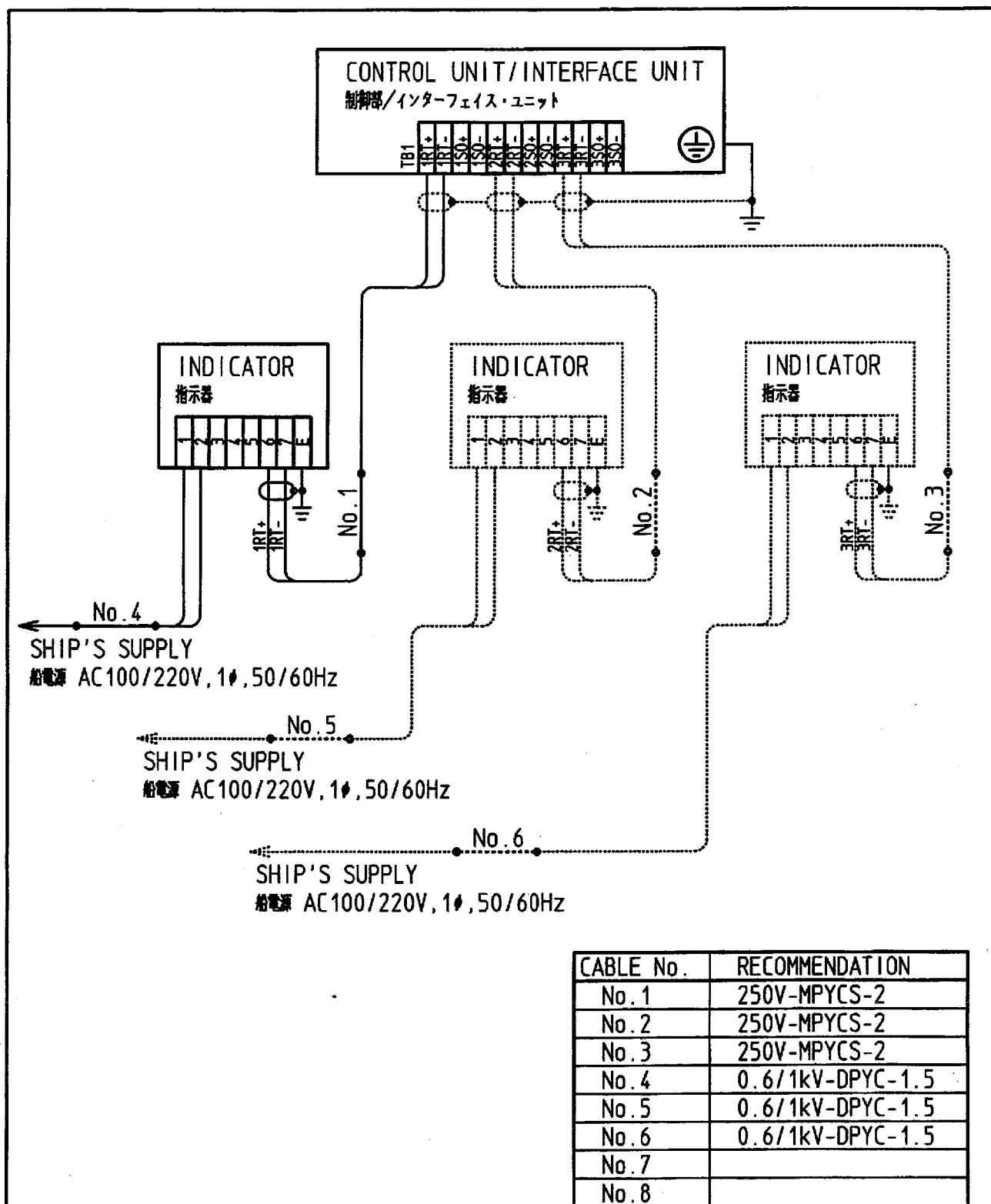
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	△	-	-							関	関	秋	秋	根	根	元	元		
	△	-	-																
	△	-	-																
	△	-	-																
	△	-	-																
記事	マーク	日	付	理由	変更訂正項目	番号	処置者	適用	材質	質量		kg		ケッセンズ					
	ジャイロコンパス TG-8000シリーズ																		
	REPEATER 内部結線図(シリアルタイプ)																		
 株式会社 トキメック										 尺 目付		サイズ A		図番 101896100		変番 1/1		シート 1/1	



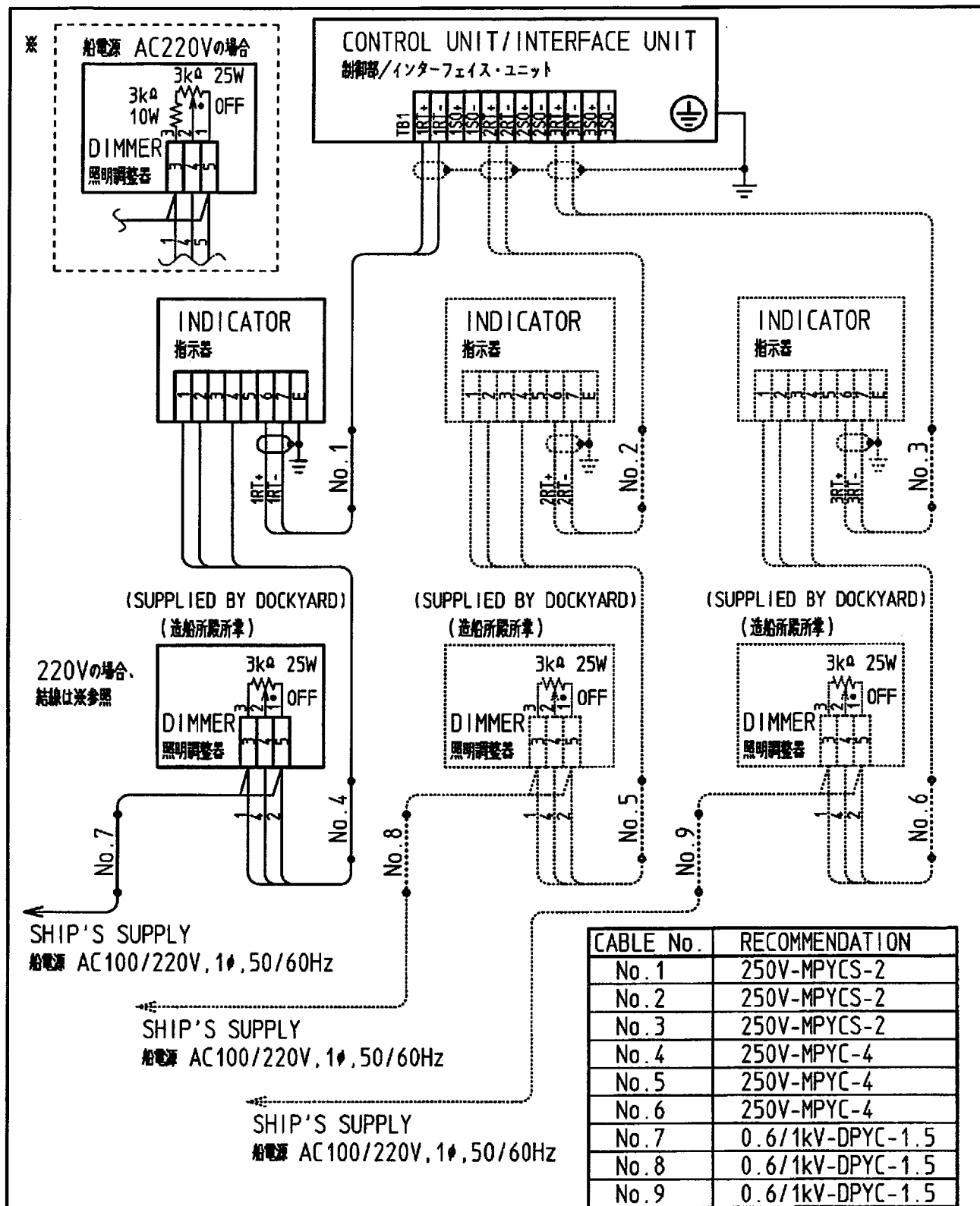
シリアルレピータ用

REPEATER JUNCTION BOX (SERIAL TYPE)

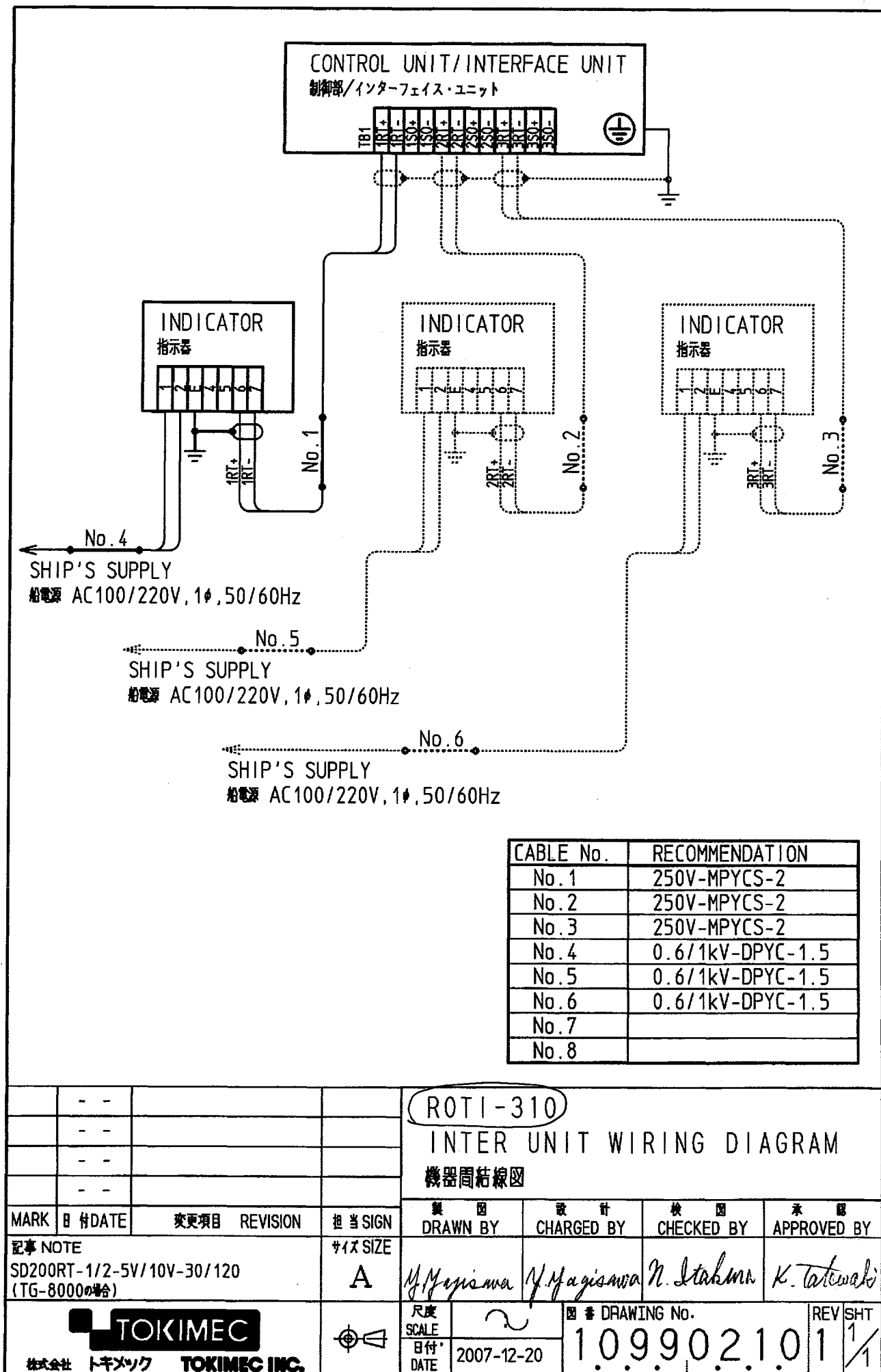
変更訂正	△	-	-						製	図	設	計	検	図	承	認				
	△	-	-																	
	△	-	-																	
	△	-	-																	
	△	-	-																	
記事	マーク	日	付	理由	変更訂正項目	番号	処置者	適用	材					質						
	シリアルレピータ 接続箱 内部接続図								質					量	kg					
									名	ケッセンズ										
株式会社 トキメック									尺 度 目 付		2002-11-14		サイズ A		図 番		1.0029.113.0		変番 1/1	

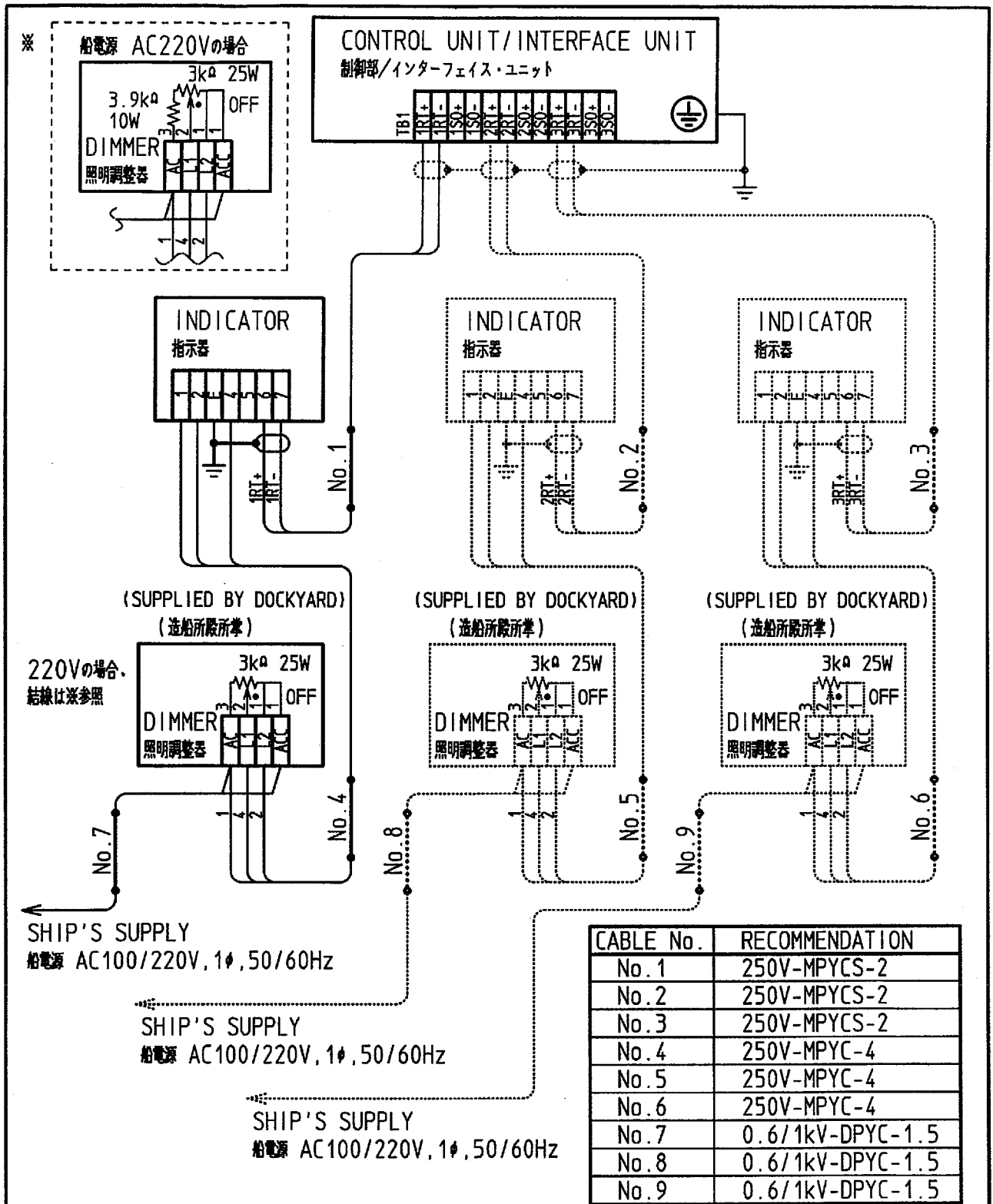


ROTI-300			
INTER UNIT WIRING DIAGRAM 機器間結線図			
MARK	DATE	変更項目 REVISION	担当 SIGN
記事 NOTE		サイズ SIZE	
TYPE SD200-13/23 (TG-8000の場合)		A	
製 図 DRAWN BY		設 計 CHARGED BY	
検 図 CHECKED BY		承 認 APPROVED BY	
株式会社 トキメック TOKIMEC INC.		尺 度 SCALE 日付 DATE	
2004-10-14		図 番 DRAWING No.	
109901471		REV SHT	
1/1		1/1	



				(ROT1-300)			
				INTER UNIT WIRING DIAGRAM			
				機器間結線図			
MARK	日付 DATE	変更項目 REVISION	担当 SIGN	製 図 DRAWN BY	設 計 CHARGED BY	検 査 CHECKED BY	承認 APPROVED BY
記事 NOTE			サイズ SIZE				
TYPE SL200-13/23 (TG-8000の場合)			A				
TYPE FL200-13/23 (TG-8000の場合)							
 株式会社 トキメック TOKIMEC INC.			 尺 度 SCALE 日付 DATE	 図 番 DRAWING No.		REV SHT	
				2004-10-14		1.0.9.9.0.1.4.8.2 1/1	





				ROTI-310 INTER UNIT WIRING DIAGRAM 機器間結線図				
MARK	DATE	変更項目	REVISION	担当 SIGN	製図 DRAWN BY	設計 CHARGED BY	検図 CHECKED BY	承認 APPROVED BY
記事 NOTE SL200RT-5V/10V-30/120(TG-8000の場合) FL200RT-5V/10V-30/120(TG-8000の場合)				サイズ SIZE A	図番 DRAWING No. 1.0.9.90.2.1.1			
TOKIMEC 株式会社 トキメック TOKIMEC INC.				尺度 SCALE 日付 DATE 2007-12-20	REV SHT 1/1			

GYROCOMPASS TG-8000

SERVICE MANUAL [Document No. SG12-SE003]

Mar. 21, 2013

TOKYO KEIKI INC.

2-16-46, MINAMI-KAMATA, OHTA-KU, TOKYO

144-8551, JAPAN

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