

Product Lifecycle Management

Lifecycle Solution



Team **TERASAKI**

TERATEC LTD.

L i f e c y c l e

Lifecycle Solution flow

Installation and Start-up

Wiring work, adjustment, commissioning

Periodic inspection

Early detection of aged deterioration and defects by regular inspection

Spare parts supply

Sale of parts required for replacement and spares

Repair

Repair of defective sections and replacement of parts

Renewal & retrofitting

Carried out at the end of the durable life of the system and equipment. Modification, adjustment and verification tests as required.

Ongoing development of our products and systems to meet current and future requirements.

- Environmental technology.
- Implementation of monitoring and control technology.

DATA BASE

Service diagnosis

Connect to the ship service data base and propose appropriate services based on service history



Solution

Service operation

SHIP SERVICE DATABASE

Ship service management data

Ship name / Ship type / Shipyard /
Ship No. / Year of building / Ship Owner /
Technical Manager etc.

Product technical data

Final documents, drawings /
Modification drawings etc.

Device and equipment technical data

Control and monitoring equipment /
Main equipment; ACB etc.

Data from visiting and servicing the ship

Service report / Inspection repair history /
Parts replacement history

Access to
DATABASE

Lifecycle support

Service diagnosis

We provide diagnosis to propose appropriate service using the device and equipment technical data for long-term safe operation.

Remote technical support

We continue to provide troubleshooting, parts supply, replacement support, etc. remotely for emergency cases until the failure is resolved.

Lifecycle management

We propose necessary inspection, parts supply, replacement and retrofit based on lifecycle taking into consideration life span and usage period of the products when the ship is in dock

[TERATEC]

Search past data of target ship

[TERATEC]

Search detailed product information of target ship

Access

Ship service DATABASE

[Global Service Network]

We provide services from our hubs around the world.

Service provision

Customer

Service diagnosis / Lifecycle management

We perform product diagnosis then recommend the appropriate service

Remote technical support

We also provide remote technical support in the event of any product problems or failure

Customer

As professionals who deal with power distribution control, we demonstrate our technical capabilities in every field site in the world.

Basic stance on service

[High Technology]

Response from engineers familiar with specialized fields such as periodic inspection, repair and retrofit etc.

[Providing Security]

We work with manufacturers to provide lifecycle services.

[Reliable Price]

By directly affiliating with the manufacturer, we provide lifecycle services at a reliable low price.

[Respond to requests from all over the world]

We serve a wide area of the world from our bases around the globe.

- 1 Our motto is "safety", "security", and "peace of mind" and we provide high quality services from the customer's perspective.
- 2 We are committed to safe work and zero electrical accidents with respect for people, things, and property.
- 3 We are a service company directly affiliated with the manufacturer, and as new products are developed, we will continue to provide optimal services.
- 4 Centering on Teratec as the control center, overseas and domestic service companies directly affiliated with the manufacturer will cooperate to provide global service support.

Contribution to SDGs

- Our technology of shipboard electrical equipment inspection and maintenance provides retrofit and renewal of equipment and devices.
By doing so through various service works, we contribute to the prevention of accidents and improvement of electrical energy efficiency.
- We will continue to secure and develop professional human resources who support high technology and service quality.

Lifecycle Solution — Our services line up —

- 1 All products, systems and equipment have a limited lifespan.
● Deterioration of the product itself through use ● Production discontinuation of parts used
We carry out periodic inspections and maintenance to extend the life of the equipment by early detection and replacement of defective parts. In addition, in preparation for long-term use, we propose modification work including retrofitting to new models.
- 2 When visiting a ship, we carry out work with the motto of safety and security based on the environment onboard the ship. Along with the service report, we give you accurate maintenance advice.
- 3 We have a database of product drawings, documents, and service history for each ship. We propose a service plan based on any discontinued model information and years elapsed.
- 4 Utilizing the abundant knowledge and experience that we have built up, we are actively working to expand remote maintenance services and are striving to further improve lifecycle services.

S E R V I C E M E N U

1 Medium Voltage System Periodic Inspection

2 Low Voltage System Periodic Inspection



- We take advantage of regular inspection periods to inspect existing products in an efficient and systematic manner. As specialists in power distribution and control systems and equipment, we replace aging parts for major components. We also offer a variety of product lifecycle solutions to reduce the risk of ACB (Air Circuit Breaker), PMS (Power Management System) and AMS (Alarm Monitoring System) failures.
- In order to enable continued systems operation, we propose maintenance plans that deliver reductions in total maintenance costs and extend product life.

3 Onboard Repair of Medium Voltage System

4 Onboard Repair of Low Voltage System

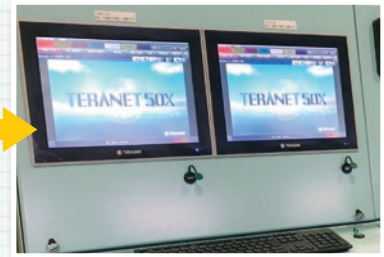
- Utilizing maintenance data, experienced engineers give advice on solving various problems. Remote troubleshooting also supported.
- In the event of an emergency, we dispatch an engineer to promptly repair and give advice by making full use of our well-honed five senses and abundant experience and knowledge.



5

System Renewal

In order to extend the service life and improve the functionality of vessels, we propose the renewal of the installed systems in consideration of the efficient products life cycle. As a result, ■Maintenance cost reduction
■Stable supply of parts can be expected.



PMS Renewal

Example) PMS (In case that existing type is GAC-5C)

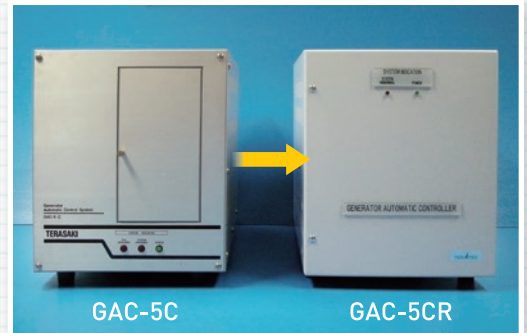
Features : GAC-5CR is compatible with GAC-5C by making dimensions and mounting dimensions exactly same as GAC-5C. Therefore, there is no need to modify the peripheral circuit and replacement work is possible in a shortest time.



GAC-5C



GAC-5CR



GAC-5C

GAC-5CR

Onboard Data Platform TMIP (TERASAKI Marine Information Platform)

Utilize data with just one additional device



Integrated control & monitoring system
TERNET 50X



Ship classification certified computer
Marine computer

TMIP is a system that collects and save various data on board and provides the data to each application. Contributes to data utilization and efficiency of work on board.

- Provides a TMIP for data collection just by adding one PC
- A data logger that has been approved by a classification society is composed of hardware

6

ACB, MCCB Retrofit

Especially ACB is the heart of the low-voltage power distribution system and is an important device that should ensure safety and security.

- If the existing ACB is a discontinued model, we select the most suitable current type of ACB according to the specification of existing ACB and carry out the retrofit.
- As the basis of retrofit, instead of replacing the entire switchboard, we utilize the existing equipment in the switchboard. We contribute to effective use of resources.
- We perform the same retrofit for new MCCB (Molded Case Circuit Breaker) for critical circuits with large capacitance.



7 Various modification

If a specification change is required such as an increase of the load on the ship, addition of alarm points and so on, we will propose the optimum modification plan to meet the requirements. We pay close attention to the ship schedule and carry out planned and efficient modification work.



8 Total commissioning of power distribution and control system

We provide total commissioning services on board in collaboration with other system manufacturers.



9 Overhaul of landed ACB

We carry out disassembly, maintenance, replacement of internal parts and operation test at Teratec factory.

Working

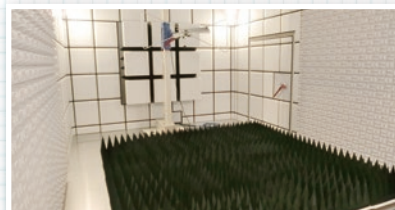


Test



Evaluation and testing

We carry out electrical tests, mechanical function tests and EMC tests to check the condition of products and parts. At our headquarters (Terasaki Japan) we can perform quantitative evaluations using an anechoic chamber or a shielded room.



10 Spare parts supply

We supply all Terasaki products and parts, as well as parts from other companies.



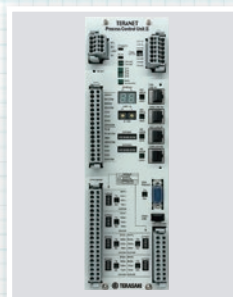
Various ACB parts



Marine Computer II



Multi Functional Synchronizer



Process Control Unit II

11 Crew training

- We provide you with "Training of medium voltage electrical equipment for engineers". This training is based on the STCW Convention, adopted in 2010 as amended and issued in January 2012.

〈Training center〉



[Training menu line-up]

- STCW - Compliant courses
- Product training courses
- General training courses
- On-board training courses

- You can also carry out training on basic knowledge of Terasaki products and product operation.

Teratec is engaged in product lifecycle related service business for the products of Terasaki Electric Co., Ltd. (Terasaki).

SERVICED PRODUCTS

Terasaki's medium / low voltage distribution control system

<Main product group>

Medium / Low Voltage System

Engine Control Console (ECC)

Main Switchboard (MSB)

- Generator Panel
- Synchronizing Panel
- Feeder Panel

Emergency Switchboard (ESB)

Group Starter Panel (GSP)

Integrated Control Monitoring System (AMS, WE series, TERANET)

**Air Circuit Breaker (ACB)
Molded Case Circuit Breaker (MCCB)**

Generator Automatic Control System (PMS, GAC series)

Auxiliary Machine Automation System (GS series)

CONTACT TEL (Rep.)

• TEL. +81-6-7634-7531

Request for quotation

• Lifecycle Technical Sales Dept. (LCTS Dept.) TEL. +81-6-7634-7533
Marine Sales Group : shipeng@teratec.co.jp Parts Supply Group : elparts@teratec.co.jp

Inquiries of service request and failure

• Lifecycle Field Service Dept. (LCFS Dept.) TEL. +81-6-7634-7535

TERATEC LTD.

TERATEC LTD 7-2-10 Kamihigashi, Hirano-ku, Osaka, 547-0002, Japan
<https://www.teratec.co.jp>