The F930GOT-BWD-E (hereafter called "GOT or F930GOT") is to be mounted on the face of a control panel or operations panel, and connected to the programming port (CPU port) or the communication port (communication port) of a PLC. Various devices can be monitored and PLC data changed via the GOT screens. Several display screens are built-in to the GOT, and additional personalized screens can be created by the user.  

1.1 Product Lists

### Product Name

- **Production Name**: F930GOT-BWD-E Graphic operation terminal main unit
- **Manual Number**: JY997D09101
- **Manual Name**: Description of specifications, wiring, and installation of F930GOT Series Graphic operation terminal (hardware)

### Description

Communication cable (GOT ↔ CPU port in FX, FX<sub>1</sub>, FX<sub>3</sub>, FX<sub>4</sub>, FX<sub>5</sub>, FX<sub>6</sub>, FX<sub>7</sub>, FX<sub>8</sub>, or FX<sub>9</sub> series PLC)

#### Communication cable (GOT ↔ CPU port in FX, FX<sub>1</sub>, FX<sub>3</sub>, FX<sub>4</sub>, FX<sub>5</sub>, FX<sub>6</sub>, FX<sub>7</sub>, FX<sub>8</sub>, or FX<sub>9</sub> series PLC)

- **Version**: F900-GOT and G900 Series for (for Windows) screen creation software.

#### Communication cable (GOT ↔ CPU port in FX, FX<sub>1</sub>, FX<sub>3</sub>, FX<sub>4</sub>, FX<sub>5</sub>, FX<sub>6</sub>, FX<sub>7</sub>, FX<sub>8</sub>, or FX<sub>9</sub> series PLC)

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- **Version**: F900-GOT and G900 Series for (for Windows) screen creation software.
1. Introduction

The F930GOT/BWD-E (hereafter called "GOT" or F930GOT) is to be mounted on the face of a control panel or operations panel, and connected to the programming port (CPU port) or the communication port (communication port) of a PLC. Various devices can be monitored and PLC data changed via the GOT screens. Several display screens are built-in to the GOT, and additional personalized screens can be created by the user.

1) The GOT can connect to MELSEC FX, A, QnA and Q PLCs as well as a host of third party manufactured units. Further information can be found in GOT-F900 Series Hardware Manual.

2) PLC user programs can be downloaded, uploaded and monitored using programming software GX-Developer or FX-PCS/WIN-E on a personal computer via the GOT. Further information can be found in the GOT-F900 Series Operation Manual.

3) The personal screens are created using the following software.

<table>
<thead>
<tr>
<th>Software Name</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT Designer2</td>
<td>SW</td>
</tr>
<tr>
<td>JY997D09101</td>
<td></td>
</tr>
<tr>
<td>FX-PCS/DU/WIN-E</td>
<td>SWF0PC-FXDU/WIN-E version 2.20 or later</td>
</tr>
</tbody>
</table>

Instructions on the Symbols Used in This Manual

1) Indicates that the identified danger WILL cause physical and property damage.

2) Indicates that the identified danger could POSSIBLY cause physical and property damage.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

Note: Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

Associated Manuals

<table>
<thead>
<tr>
<th>Manual Name</th>
<th>Manual Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F930GOT Series Operation Manual</td>
<td>JY992D96701</td>
<td>Describes the operation of the GOT, F930 Series graphic operation terminals, GT Designer and FX-PCS/DU/WIN-E.</td>
</tr>
<tr>
<td>F930GOT Series Hardware Manual (connection diagram)</td>
<td>JY992D96801</td>
<td>Describes the wiring and installation of the GOT, F930 Series graphic operation terminals.</td>
</tr>
<tr>
<td>GT Designer2 Version 1 Operating Manual (PDF file on CD-ROM included with product)</td>
<td>D5C-GOTR-P ACKE</td>
<td>Describes the specifications and setting of object functions in GT Designer2 (SWG-DG2-TDE).</td>
</tr>
<tr>
<td>GT Designer Operating Manual</td>
<td>Included with the screen creation software</td>
<td>Describes the operation of GT Designer (SWG-DG2-GTDPACK) and data transfer to the GOT series. (Refer to the help file)</td>
</tr>
<tr>
<td>FX-PCS/DU/WIN-E SOFTWARE MANUAL</td>
<td>JY992D86701</td>
<td>Describes the operation of FX-PCS/DU/WIN-E screen creation software.</td>
</tr>
</tbody>
</table>

Note:

- Do not lay signal cables near high voltage power cables or allow them to share the same trunking duct, otherwise, effects of noise or surge induction are likely to take place. Keep a safe distance of more than 100 mm from these wires.
- Operate touch switches on the display screen by hand.
- Do not use excessive force, or attempt operate them with hard or pointed objects.
- The tip of a screw driver, pen or similar object for example may break the screen.

Caution:

During abnormal communication (including cable breakages) when monitor is executed within the GOT, connection between the communication and programmable controller CPU is interrupted. It is then impossible to operate switches or devices in the PLC through the GOT. Communication and normal operation resumes when the system is correctly configured.

DO NOT configure emergency stop or safety features to operate through the GOT, and be sure that there is no adverse consequences in the event of a GOT - PLC communications malfunction.

1.2 Dimensions and Each Part Name

Dimensions: mm (inches)

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Panel Mounting (M3)</td>
</tr>
<tr>
<td>2)</td>
<td>Panel Mounting (M3)</td>
</tr>
<tr>
<td>3)</td>
<td>Panel Mounting (M3)</td>
</tr>
<tr>
<td>4)</td>
<td>Panel Mounting (M3)</td>
</tr>
</tbody>
</table>

1.3 Specifications

- No 57 ~ 150 Hz: 4.9 m/s² Acceleration, Shock Resistance 147m/s² Acceleration, 57 ~ 150 Hz: 9.8 m/s² Acceleration
- 10 ~ 57 Hz: 0.035 mm Half Amplitude
- 10 ~ 57 Hz: 0.057 mm Half Amplitude
- 10 ~ 57 Hz: 1.0 mm Half Amplitude

- Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.
1. Introduction

The F930GOT/BWD-E (hereafter called “GOT or F930GOT”) is to be mounted on the face of a control panel or operation panel, and connected to the programming port (CPU port) or the communication port (communication port) of a PLC. Various devices can be monitored and PLC data changed via the GOT screens. Several display screens are built-in to the GOT, and additional personalized screens can be created by the user.

1) The GOT can connect to MELSEC FX, A, Q and G PLCs as well as host of third party manufactured units. Further information can be found in GOT:F900 Series Hardware Manual.

2) PLC user programs can be downloaded, uploaded and monitored using programming software GX-Developer or FX-PCS/Win-E on a personal computer via the GOT. Further information can be found in the GOT:F900 Series Operation Manual.

3) The screens are created using the following software.

<table>
<thead>
<tr>
<th>Software Name</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT Designer2</td>
<td>SWIDCSC-GTDR-E (indicating version)</td>
</tr>
<tr>
<td>F930GOT/BWD-E</td>
<td>Version 2.0 or later</td>
</tr>
</tbody>
</table>

1.1 Product Lists

<table>
<thead>
<tr>
<th>Production Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F930GOT/BWD-E</td>
<td>Graphic operation terminal main unit</td>
</tr>
<tr>
<td>FX-50DU-CAB0</td>
<td>Communication cable (GOT ↔ CPU port in FX, FXs, FXn, FXx, FXxw, FXxw2 or FXxw3 series PLC)</td>
</tr>
<tr>
<td>FX-50DU-CAB0/E</td>
<td>The connector on the GOT side is wired straight. Cable length is 3m (9 ft).</td>
</tr>
<tr>
<td>FX-50DU-CAB0/M</td>
<td>Communication cable (GOT ↔ CPU port in FX, FXs, FXn, FXx, FXxw, FXxw2 or FXxw3 series PLC)</td>
</tr>
<tr>
<td>FX-40DU-CAB0</td>
<td>Communication cable (GOT ↔ CPU port in FX, FXs, FXn, FXx, FXxw, FXxw2 or FXxw3 series PLC)</td>
</tr>
<tr>
<td>FX-40DU-CAB0/M</td>
<td>The connector on the GOT side is wired straight. Cable length is 3m (9 ft).</td>
</tr>
<tr>
<td>FX-23CB2-1</td>
<td>Data exchange cable (GOT ↔ Personal computer &lt;9-pin D-sub&gt;)</td>
</tr>
<tr>
<td>FX-PCS/30PSC</td>
<td>Battery for Alarm history and current time data retention.</td>
</tr>
<tr>
<td>F930GOT/BWD-E</td>
<td>Backlight for F930GOT</td>
</tr>
</tbody>
</table>

Caution

During abnormal communication (including cable breakages) when monitor is executed within the GOT, communication between the GOT and programmable controller CPU is interrupted. It is then impossible to switch to other devices or switch to the PLC through the GOT. Communication and normal operation resumes when the GOT system is correctly configured. DO NOT configure emergency stop or safety features to operate through the GOT, and be sure that there is no adverse consequences in the event of a GOT - PLC communications malfunction.

Note:

- Do not lay signal cables near high voltage power cables or allow them to share the same trunking duct, otherwise, effects of noise or surge induction are likely to take place. Keep a safe distance of more than 100 mm between these wires.
- Operate touch switches on the display screen by hand. DO NOT use excessive force, or attempt operate them with hard or pointed objects. The tip of a screw driver, pen or similar object for example may break the screen.
2. Power Supply Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>F93/GOT-BWD-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply Voltage</td>
<td>24V DC, +10% -15%</td>
</tr>
<tr>
<td>Power Supply Ripple</td>
<td>200 mV or less</td>
</tr>
<tr>
<td>Current Consumption Ratings</td>
<td>200 mA at 24V DC (100 mA at 24 V DC when backlight is turned OFF)</td>
</tr>
<tr>
<td>Fuse</td>
<td>Built-in, FX2NC-32BL type lithium battery. (Approximately 3 years battery life)</td>
</tr>
<tr>
<td>Max. Allowable Momentary Power Supply Failure period</td>
<td>5 ms; 5 ms or less, the GOT will continue operation. If 5 ms or more, the GOT will shut down.</td>
</tr>
<tr>
<td>Battery</td>
<td>Correctly connect the battery for memory backup. Never charge, disassemble, heat, burn or short-circuit the battery. If the battery is handled in such a way, fire may be caused.</td>
</tr>
</tbody>
</table>

2.2 Power Supply Specifications

2) Inserting the GOT into the panel surface
Attach the packing seal to the GOT, and insert the GOT from the front face of the panel surface.

   a) Packing seal
   b) GOT
   c) Mounting slot

3) Fixing the GOT
Put hooks of the mounting brackets (supplied) in the mounting holes of the GOT. Tighten mounting bolts (supplied) until the GOT is securely fixed. Fix mounting bolts in all four positions, above and below the GOT.

   a) Clamping bolt
   b) Mounting bracket

2.3 Screen Hardware Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>F93/GOT-BWD-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Device</td>
<td>STN monochrome liquid crystal</td>
</tr>
<tr>
<td>Resolution</td>
<td>240 × 64 dots, 30 characters × 5 lines</td>
</tr>
<tr>
<td>Dot Pitch</td>
<td>0.47 mm (0.019&quot;) Horizontal × 0.47 mm (0.019&quot;) Vertical.</td>
</tr>
<tr>
<td>Effective Display Size</td>
<td>117 mm (4.61&quot;) × 42 mm (1.65&quot;) × 4 (4.4 inch) type</td>
</tr>
<tr>
<td>Number of colours</td>
<td>2 colours (White and Blue)</td>
</tr>
<tr>
<td>Life of liquid crystal</td>
<td>Approximately 50,000 hours (Operating temperature: 25 °C/77 °F)</td>
</tr>
<tr>
<td>Backlight</td>
<td>Cold cathode tube</td>
</tr>
<tr>
<td>Life of backlight</td>
<td>50,000 hours or more (Operating temperature: 25 °C/77 °F)</td>
</tr>
<tr>
<td>Touch Keys</td>
<td>Maximum 50 touch keys / screen, 15 × 4 matrix</td>
</tr>
<tr>
<td>Interface</td>
<td>RS-422</td>
</tr>
<tr>
<td>Number of Screens</td>
<td>User screen: 500 screens or less</td>
</tr>
<tr>
<td>User Memory</td>
<td>Flash memory 256 KB (built-in)</td>
</tr>
<tr>
<td>Warranty</td>
<td>Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties. For the detailed warranty, refer to the GOT-F900 Series HARDWARE MANUAL [CONNECTION].</td>
</tr>
</tbody>
</table>

3. Installation

Note:
- Do not mount the GOT in an environment that contains dust, soot corrosive or conducive dust, corrosive or flammable gas, or expose the unit to high temperatures, dew condensation, direct sunlight, rain, wind or impact and vibration. If the GOT is used in such a place, electrical shock, fire, malfunction, damages or deterioration may occur.
- Never drop cutting chips or electric wire chips into the ventilation window of the GOT when drilling screw holes or performing wiring. Such chips may cause fire, failure or malfunction.
- Turn off the power before securely connecting any cables. Poor connection may cause malfunction.

4. Power Supply Wiring

Caution:
Cut OFF all external phases of power before installation or wiring to avoid electric shock or serious damage to the product.

Note:
- The wire power supply using electric wires of 0.75 mm² or more so that voltage drop will not occur. Use M3 size crimp style terminal. Securely tighten crimp-style terminals with a torque of 0.5 – 0.8 Nm so that errors can be avoided.
- Insure correct termination of the DC power source, incorrect connection may result in unit failure or serious damage to the GOT.
- Attach a fuse of 2 A to the 24V DC power supply.
- Perform Class D (100G) or less) grounding with an electric wire of at least 1.25 mm². Never perform common grounding of the GOT and a strong power system.

4.1 Using Service Power Supply of PLC

<table>
<thead>
<tr>
<th>Grounding resistance</th>
<th>10Ω or less (class D)</th>
</tr>
</thead>
</table>

4.2 Using External Power Supply

<table>
<thead>
<tr>
<th>Grounding resistance</th>
<th>10Ω or less (class D)</th>
</tr>
</thead>
</table>

5. Maintenance

Cautions:
- Correctly connect the battery for memory backup. Never charge, disassemble, heat, burn or short-circuit the battery. If the battery is handled in such a way, fire may be caused.
- Always power OFF and remove the GOT from the panel before starting replacement of the backlight and battery if this is not the case, the backlight may be dropped and cause injury, or electrical shock may be sustained.
- Never disassemble or modify the GOT. Disassembly or modification may cause failure, malfunction or fire. For repair, please, contact a service representative.

Note:
- Turn OFF the power, before connecting/disconnecting cables.
- Connecting/disconnecting cables while the power is turned on will cause failure or malfunction.

5.1 Battery Replacement

When the battery voltage drops, a control device (system information) set by the screen design software turns OFF. The control device interlocks with an auxiliary relay in the PLC. It is recommended to provide a lamp while utilizing the output of the PLC so that voltage drop can be monitored outside the GOT.

For details of control devices, refer to the GOT-F900 Series Operation Manual.

Note:
- For approximately one month after the control device for battery voltage drop turns ON, the battery will back up the alarm history, sampling and the current time. When the control device (system information) turns OFF, replace the battery (FXnc-32BL) as soon as possible.
- The screen data is stored in the flash memory, therefore, the screen data will remain even after severe battery voltage loss.

5.1.1 Replacement Procedure

1) Turn OFF the power to the GOT and remove the battery holder cover.
2) Remove the existing battery from the battery holder, and disconnect.
3) Within 30 seconds, connect a new battery.
4) Insert the new battery into the battery holder, and attach the cover.

5.2 Backlight Replacement

Replace the backlight FXGT-30LTB using the following procedure.

Note: Removing Rear Panel

If the rear panel is pulled using an excessive force, the cable connecting the rear panel and the front panel may be disconnected or the PCB may be damaged. Be careful.

5.2.1 Replacement procedure

1) Make sure that the power of the GOT is turned OFF. Slowly remove the rear panel.
2) Disconnect the backlight connector (b).
3) While pushing the claw of the existing backlight (a), move it up in the direction A by approximately 10 mm.
4) Pull out the existing backlight (a) in the direction B.
5) Attach a new backlight FXGT-30LTB (b). Put it into the GOT by performing the steps 1) – 3) in the reverse order.

Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties. For the detailed warranty, refer to the GOT-F900 Series HARDWARE MANUAL [CONNECTION].

Manual number : JY992D95701
Manual revision : E
Date : Sep. 2008
2. Power Supply Specifications

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</tr>
<tr>
<td>Power Supply Ripple</td>
<td>230 mV or less</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>Ratings: 200 mA at 24 DC (100 mA at 24 V DC when backlight is turned OFF)</td>
</tr>
<tr>
<td>Fuse</td>
<td>Fuse built-in (impossible to change)</td>
</tr>
<tr>
<td>Max. Allowable Momentary Power Supply Failure period</td>
<td>4 s; 1 s less than 4 s, the GOT will continue operation. If 5 s or more, the GOT will shut down.</td>
</tr>
<tr>
<td>Battery</td>
<td>Built-in, F93×32BL type lithium battery. (Approximately 3 years battery life)</td>
</tr>
</tbody>
</table>

3. Installation

Note:
- Do not mount the GOT in an environment that contains dust, soot corrosive or conducive dust, corrosive or flammable gas, or expose the unit to high temperatures, dew condensation, direct sunlight, rain, wind or impact and vibration. If the GOT is used in such a place, electrical shock, fire, malfunction, damages or deterioration may occur.
- Never drop cutting chips or electric wire chips into the ventilation window of the GOT when drilling screw holes or performing wiring. Such chips may cause fire, failure or malfunction.
- Turn off the power before securely connecting any cables. Poor connection may cause malfunction.
- The GOT is designed to be mounted in a panel. Install it using the following procedure:
  1) Preparing the panel surface.
     On the panel surface, cut a rectangular mounting slot of the dimensions shown on the right. At this time, space of 10 mm is required at each of the top and bottom of the slot, inside the panel for metal fixtures as shown in "4) Dimensions required inside the panel for installation." It is imperative to completely avoid this symptom, as the liquid crystal display comprises of a great number of display elements, flickers may be observed depending on the display color.

Note:
- Bright dots (always lit) and dark dots (unlit) may appear on a liquid crystal display panel. It is impossible to completely avoid this symptom, as the liquid crystal display comprises of a great number of display elements. Flickers may be observed depending on the display color. Please note that these dots appear due to its characteristic and are not caused by product defect.
- When the same screen is displayed for a long time, an incidental color or partial discoloration is generated on the screen due to heat damage, and it may not disappear.
- Using the GOT Backlight OFF function can prolong the life of the backlight. For details on the Backlight OFF function, refer to the following. GOT-F900 Series OPERATION MANUAL/GOT-F900 Series OPERATION MANUAL [GT Designer2 Version]

4. Power Supply Wiring

Caution:
Cut OFF all external phases of power before installation or wiring to avoid electric shock or serious damage to the product.

Note:
- Wire the power supply using electric wires of 0.75 mm² or more so that voltage drop will not occur. Use M3 size crimp style terminal. Securely tighten crimp-style terminals with a torque of 0.5 – 0.8 Nm so that errors can be avoided.
- Insure correct termination of the DC power source, incorrect connection may result in unit failure or serious damage to the GOT.
- Attach a fuse of 2 A to the 24V DC power supply.
- Perform Class D (100V or less) grounding with an electric wire of at least 1.25 mm². Never perform common grounding of the GOT and a strong power system.

4.1 Using Service Power Supply of PLC

Grounding resistance 100Ω or less (class D)

4.2 Using External Power Supply

Grounding resistance 100Ω or less (class D)

5. Maintenance

Caution:
- Always power OFF and remove the GOT from the panel before starting replacement of the backlight and the battery. If this is not the case, the backlight may be dropped and cause injury, or electrical shock may be sustained.

5.1 Battery Replacement

When the battery voltage drops, a control device (system information) set by the screen design software turns ON. The control device interlocks with an auxiliary relay in the PLC. It is recommended to provide a lamp while utilizing the output of the PLC so that voltage drop can be monitored outside the GOT. For details of control devices, refer to the GOT-F900 Series Operation Manual.

Note:
- For approximately one month after the control device for battery voltage drop turns ON, the battery will back up the alarm history, sampling and the current time. When the control device (system information) turns ON, replace the battery (FX-ncc-32BL) as soon as possible. The screen data is stored in the flash memory, therefore, the screen data will remain even after severe battery voltage loss.

5.1.1 Replacement Procedure

1) Turn off the power to the GOT and remove the battery holder.
2) Remove the existing battery from the battery holder, and disconnect.
3) Within 30 seconds, connect a new battery.
4) Insert the new battery into the battery holder, and attach the cover.

5.2 Backlight Replacement

Replace the backlight F9GT-30LTB using the following procedure.

Note: Removing Rear Panel
If the rear panel is pulled using an excessive force, the cable connecting the rear panel and the front panel may be disconnected or the PCB may be damaged. Be careful.

5.2.1 Replacement procedure

1) Make sure that the power of the GOT is turned OFF. Slowly remove the rear panel.
2) Disconnect the backlight connector (b).
3) While pushing the claw of the existing backlight (a), move it up in the direction A by approximately 10 mm.
4) Pull out the existing backlight (a) in the direction B.
5) Attach a new backlight F9GT-30LTB (b). Put it into the GOT by performing the steps 1) – 3) in the reverse order.

Warranty
Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties. For the detailed warranty, refer to the GOT-F900 Series HARDWARE MANUAL [CONNECTION].

Manual number: JY992D95701
Manual revision: E
Date: Sep. 2008

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8316, JAPAN
HIMEJI WORKS: 140, CHIYODA-COH, HIMEJI-JAPAN
3. Installation

Note:
- Do not mount the GOT in an environment that contains dust, soot corrosive or conducive dust, corrosive or flammable gas, or expose the unit to high temperatures, dew condensation, direct sunlight, rain, wind or impact and vibration. If the GOT is used in such a place, electrical shock, fire, malfunction, damage or deterioration may occur.
- Never drop cutting chips or electric wire chips into the ventilation window of the GOT when drilling screw holes or performing wiring. Such may cause fire, failure or malfunction.
- Turn off the power before securely connecting any cables. Poor connection may cause malfunction.

The GOT is designed to be mounted in a panel. Install it using the following procedure:

1) Preparing the panel surface.
   - On the panel surface, cut a rectangular mounting slot of the dimensions shown on the right. At this time, space of 10 mm is required at each of the top and bottom of the slot, inside the panel for metal fixtures as shown in "4) Dimensions required inside the panel for installation".

2) Inserting the GOT into the panel surface.
   - Attach the packing seal to the GOT, and insert the GOT from the front face of the panel surface.
     a) Packing seal
     b) GOT
     c) Mounting slot

3) Fixing the GOT
   - Put hooks of the mounting brackets (supplied) in to the mounting holes of the GOT. Tighten mounting bolts (also supplied) until the GOT is securely fixed.
     - Fix mounting bolts in all four positions, above and below the GOT.
     a) Clamping bolt
     b) Mounting bracket

Note:
- Make sure to tighten the clamping bolts with a torque of 0.3 – 0.5 Nm.

4) Power Supply Wiring

Caution:
Cut OFF all external phases of power before installation or wiring to avoid electric shock or serious damage to the product.

Note:
- Wire the power supply using electric wires of 0.75 mm² or more so that voltage drop will not occur. Use M3 size crimp style terminal. Securely tighten crimp-style terminals with a torque of 0.5 – 0.8 Nm so that errors can be avoided.
- Insure correct termination of the DC power source, incorrect connection may result in unit failure or serious damage to the GOT.
- Attach a fuse of 2 A to the 24V DC power supply.
- Perform Class D (100 µA or less) grounding with an electric wire of at least 1.25 mm².
- Never perform common grounding of the GOT and a strong power system.

Warranty
Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors uncontrollable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties. For the detailed warranty, refer to the GOT-F900 Series HARDWARE MANUAL (CONNECTION).

Manual number : JY992D95701
Manual revision : E

Date : Sep. 2008

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BUILDINGS, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
HIMEJI WORKS : 840, CHIYODA CHO, HIMEJI, JAPAN

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2.2 Power Supply Specifications

- Power Supply Voltage: 24V DC, +10% -15%
- Power Supply Ripple: 200 mV or less
- Current Consumption Ratings: 200 mA at 24V DC

2.3 Screen Hardware Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>F93*GOT-BWD-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Device</td>
<td>STN monochrome liquid crystal</td>
</tr>
<tr>
<td>Resolution</td>
<td>240 × 64 dot, 30 characters × 5 lines</td>
</tr>
<tr>
<td>Dot Pitch</td>
<td>0.47 mm (0.019”) Horizontal × 0.47 mm (0.019”) Vertical.</td>
</tr>
<tr>
<td>Effective Display Size</td>
<td>117 mm (4.61”) × 42 mm (1.65”); 4 (4.4 inch) type</td>
</tr>
<tr>
<td>Number of Colours</td>
<td>2 colours (White and Blue)</td>
</tr>
<tr>
<td>Life of liquid crystal</td>
<td>Approximately 50,000 hours (Operate temperature: 25°C/77°F)</td>
</tr>
<tr>
<td>Backlight</td>
<td>Cold cathode tube</td>
</tr>
<tr>
<td>Life of Backlight</td>
<td>50,000 hours or more (Operate temperature: 25°C/77°F)</td>
</tr>
<tr>
<td>Touch Keys</td>
<td>Maximum 50 touch keys / screen, 15 × 4 matrix</td>
</tr>
<tr>
<td>Interface</td>
<td>RS-422, RS-232C</td>
</tr>
<tr>
<td>Number of Screens</td>
<td>User screen: 500 screens or less</td>
</tr>
<tr>
<td>System screen: Allocated screens No. 1001-1030.</td>
<td></td>
</tr>
<tr>
<td>User Memory</td>
<td>Flash memory 256 KB (built-in)</td>
</tr>
</tbody>
</table>

Note:
- Bright dots (always lit) and dark dots (unlit) may appear on a liquid crystal display panel. It is impossible to completely avoid this symptom, as the liquid crystal display comprises of a great number of display elements.
- Pickers may be observed depending on the display color.
- Please note that these dots appear due to its characteristic and are not caused by product defect.
- When the same screen is displayed for a long time, an incidental color or partial discoloration is generated on the screen due to heat damage, and it may disappear.
- Using the GOT Backlight OFF function can prolong the life of the backlight.
- For details on the Backlight OFF function, refer to the following: GOT-F900 Series OPERATION MANUAL/GOT-F900 Series OPERATION MANUAL [GT Designer2 Version]

5. Maintenance

Cautions:
- Correctly connect the battery for memory backup. Never charge, disassemble, heat, burn or short-circuit the battery. If the battery is handled in such a way, fire may be caused.
- Always power OFF and remove the GOT from the panel before starting replacement of the backlight. If this is not the case, the backlight may be damaged or cause injury, or electrical shock may be damaged.
- Never disassemble or modify the GOT. Disassembly or modification may cause failure, malfunction or fire. For repair, please, contact a service representative.

Note:
- Turn OFF the power, before connecting/disconnecting cables.
- Connecting/disconnecting cables while the power is turned on will cause failure or malfunction.

When repairing liquid crystal screen, please, contact a service representative.

5.1 Battery Replacement

When the battery voltage drops, a control device (system information) set by the screen design software turns ON. The control device interlocks with an auxiliary relay in the PLC. It is recommended to provide a lamp while utilizing the output of the PLC so that voltage drop can be monitored outside the GOT.

For details of control devices, refer to the GOT-F900 Series Operation Manual.

Note:
- For approximately one month after the control device for battery voltage drop turns ON, the battery will back up the alarm history, sampling and the current time. When the control device (system information) turns OFF, replace the battery (FXnc-32BL) as soon as possible.
- The screen data is stored in the flash memory, therefore, the screen data will remain even after severe battery voltage loss.

5.1.1 Replacement Procedure

1) Turn off the power to the GOT and remove the battery holder cover.
2) Remove the existing battery from the battery holder, and disconnect.
3) Within 30 seconds, connect a new battery.
4) Insert the new battery into the battery holder, and attach the cover.

5.2 Backlight Replacement

Replace the backlight F9GT-30LTB using the following procedure.

Note: Removing Rear Panel

If the rear panel is pulled using an excessive force, the cable connecting the rear panel and the front panel may be disconnected or the PCB may be damaged. Be careful.

5.2.1 Replacement procedure

1) Make sure that the power of the GOT is turned OFF. Slowly remove the rear panel.
2) Disconnect the backlight connector (b).
3) While pushing the claw of the existing backlight (a), move it up in the direction A by approximately 10 mm.
4) Pull out the existing backlight (a) in the direction B.
5) Attach a new backlight F9GT-30LTB (b). Put it into the GOT by performing the steps 1) – 3) in the reverse order.

---

5.2.2 Removing Rear Panel

Note:
1. Introduction

The F930GOT/BWD-E (hereafter called "GOT" or "F930GOT") is to be mounted on the face of a control panel or operations panel, and connected to the programming port (CPU port) or the communication port (communication port) of a PLC. Various devices can be monitored and PLC data changed via the GOT screens. Several display screens are built in to the GOT, and additional personalized screens can be created by the user.

1) The GOT can connect to MELSEC FX, A, QnA and Q PLCs as well as a host of third party manufactured units. Further information can be found in GOT/F900 Series Hardware Manual.

2) PLC user programs can be downloaded, uploaded and monitored using programming software GX-Developer or FX-PCS/WIN-E on a personal computer via the GOT. Further information can be found in the GOT-F900 Series Operation Manual.

3) The screen creations are created using the following software.

<table>
<thead>
<tr>
<th>Software Name</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>GT Designer2</td>
<td>SWC/DSC-GTD-E (2 indicates version)</td>
</tr>
<tr>
<td></td>
<td>SWC/DSC-GO-To-RACK (2 indicates version)</td>
</tr>
<tr>
<td></td>
<td>FXPCS-DU-WIN-E</td>
</tr>
<tr>
<td></td>
<td>GOTO/F900 Series (for Windows) screen creation software.</td>
</tr>
<tr>
<td></td>
<td>SWPC-FXDU-WIN-E version 2.20 or later</td>
</tr>
</tbody>
</table>

1.2 Dimensions and Each Part Name

Dimensions: 90 mm (inch) 3.55 inch

Weight: 0.3 kg (0.66 lbs)

Accessory: Mounting brackets, Tightening bolt (M3, 4 bolts), Packing seal for dust and water resistance

1.1 Product Lists

<table>
<thead>
<tr>
<th>Production Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F930GOT/BWD-E</td>
<td>Graphic operation terminal main unit</td>
</tr>
<tr>
<td>FX-50UD-CAB0</td>
<td>Communication cable (GOT &lt;-&gt; CPU port in FX, FX3, FX10, FX20, FX16 or FX26 series PLC) The connector on the GOT side is wired straight. Cable length is 3m (9 ft.10&quot;&quot;).</td>
</tr>
<tr>
<td>FX-50UD-CAB0EN</td>
<td>Communication cable (GOT &lt;-&gt; CPU port in FX, FX3, FX10, FX20, FX16 or FX26 series PLC) The connector on the GOT side is wired straight. Cable length is 3m (9 ft.10&quot;&quot;).</td>
</tr>
<tr>
<td>FX-50UD-CAB0-2M</td>
<td>Communication cable (GOT &lt;-&gt; CPU port in FX, FX3, FX10, FX20, FX16 or FX26 series PLC) The connector on the GOT side is wired straight. M = cable length. 1M: 1m (3' 3&quot;), 10M: 10m (32' 9&quot;), 20M: 20m (65' 7&quot;), 30M: 30m (98' 5&quot;&quot;)</td>
</tr>
<tr>
<td>FX-50UD-CAB0-2M</td>
<td>Communication cable (GOT &lt;-&gt; CPU port in FX, FX3, FX10, FX20, FX16 or FX26 series PLC) The connector on the GOT side is wired straight. M = cable length. 1M: 1m (3' 3&quot;), 10M: 10m (32' 9&quot;), 20M: 20m (65' 7&quot;), 30M: 30m (98' 5&quot;&quot;)</td>
</tr>
<tr>
<td>FX-40UD-CAB0</td>
<td>Communication cable (GOT &lt;-&gt; CPU port in FX, FX3, FX10, FX20, FX16 or FX26 series PLC) The connector on the GOT side is wired straight. Cable length is 3m (9 ft.10&quot;&quot;).</td>
</tr>
<tr>
<td>FX-40UD-CAB0-2M</td>
<td>Communication cable (GOT &lt;-&gt; CPU port in FX, FX3, FX10, FX20, FX16 or FX26 series PLC) The connector on the GOT side is wired straight. M = cable length. 1M: 1m (3' 3&quot;), 10M: 10m (32' 9&quot;), 20M: 20m (65' 7&quot;), 30M: 30m (98' 5&quot;&quot;)</td>
</tr>
<tr>
<td>DC/30R2</td>
<td>Communication cable (GOT &lt;-&gt; CPU port in QnA series PLC) The connector on the GOT side is wired straight. Cable length is 3m (9 ft.10&quot;&quot;).</td>
</tr>
<tr>
<td>FX-232CAB2</td>
<td>Data exchange cable (GOT &lt;-&gt; Personal computer &lt;9-pin D-sub&gt;)</td>
</tr>
<tr>
<td>TfcX-32BL</td>
<td>Battery for Alarm history and current time data retention.</td>
</tr>
<tr>
<td>F930GOT/30PSC</td>
<td>Transparent protection sheet for F930GOT (5 pieces)</td>
</tr>
<tr>
<td>F930GOT/30LB</td>
<td>Backlight for F930GOT</td>
</tr>
</tbody>
</table>

Vo. 1.2 Dimensions and Each Part Name

Specifications are subject to change without notice

** Indispensable manual

* Either manual is necessary.

Refer to the Programming manual (J) or relevant hardware manuals for details concerning the applicable PLC.

Guidelines for the Safety of the User and Protection of the GOT-F930GOT/BWD-E

This manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows:

a) Any engineer using the product associated with this manual, should be of a competent nature, trained and qualified to the local and national standards. These engineers should be fully aware of all aspects of safety with regards to automated equipment.

b) Any commissioning or service engineer must be of a competent nature, trained and qualified to the local and national standards.

c) All operators of the completed equipment should be trained to use that product in a safe and co-ordinated manner in compliance to established safety practices.

Note: The term ‘completed equipment’ refers to a third party constructed device which contains or uses the product associated with this manual.

Note’s on the Symbols Used in this Manual

At various times through this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of equipment.

1) Indicates that the identified danger WILL cause physical and property damage.

2) Indicates that the identified danger could POSSIBLY cause physical and property damage.

• Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

• All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

• Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

Associated Manuals

<table>
<thead>
<tr>
<th>Manual Name</th>
<th>Manual Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F930GOT Series</td>
<td>F930GOT/BWD-E</td>
<td>Installation Manual</td>
</tr>
<tr>
<td>GT Designer2</td>
<td>JY9YD07501</td>
<td>Describes the specifications, wiring, and installation of F930GOT Series graphic operation terminal (hardware)</td>
</tr>
<tr>
<td>GT Designer2</td>
<td>JY9YD07501</td>
<td>Describes the operation of the GOT 900 Series graphic operation terminals and GT Designer2</td>
</tr>
<tr>
<td>GT Designer2</td>
<td>JY9YD04701</td>
<td>Describes wiring and installation of the GOT 900 Series graphic operation terminals</td>
</tr>
<tr>
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</tr>
<tr>
<td>GT Designer2</td>
<td>JY9YD04901</td>
<td>Describes the operation of GT Designer2 (SWC/DSC-GTD-E) and data transfer to the GOT 900 Series</td>
</tr>
<tr>
<td>GT Designer2</td>
<td>JY9YD04901</td>
<td>Describes the specifications and setting of object functions in GT Designer2 (SWC/DSC-GTD-E)</td>
</tr>
<tr>
<td>GT Designer2</td>
<td>JY9YD04901</td>
<td>Describes the operation of GT Designer2 (SWC/DSC-GO-To-RACK) and data transfer to the GOT 900 Series. (Refer to the help file)</td>
</tr>
<tr>
<td>GT Designer2</td>
<td>JY9YD04901</td>
<td>Included with the screen creation software</td>
</tr>
<tr>
<td>GOTO/F900 Series</td>
<td>JY9YD04901</td>
<td>Describes the operation of the following FXPCS/DU-WIN/E software</td>
</tr>
</tbody>
</table>

Caution

During abnormal communication (including cable breaks) when monitor is executed within the GOT, communication between the GOT and the programmable controller CPU is interrupted. It is then impossible to operate switches or devices in the PLC through the GOT. Communication and normal operations use the GOT system when the system is correctly configured. DO NOT configure emergency stop or safety features to operate through the GOT, and be sure that there is no adverse consequences in the event of a GOT - PLC communications malfunction.

Note:

• Do not lay signal cables near high voltage power cables or allow them to share the same trunking duct. Otherwise, effects of noise or surge induction are likely to take place. Keep a safe distance of more than 150 mm from these wires.

• Operate touch switches on the display screen by hand. DO NOT use excessive force, or attempt operate them with hard or pointed objects. The tip of a screw driver, pen or similar object for example may break the screen.
2. Power Supply Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>F93/GOT-BWD-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply Voltage</td>
<td>24V DC, +10% ~ -15%</td>
</tr>
<tr>
<td>Power Supply Ripple</td>
<td>230 mA or less</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>Ratings: 200 mA at 24V DC (100 mA at 24V DC when backlight is turned OFF)</td>
</tr>
<tr>
<td>Fuse</td>
<td>Fuse built-in in GOT (impossible to change)</td>
</tr>
<tr>
<td>Max. Allowable Momentary Power Supply Failure period</td>
<td>4 s: If less than 5 s, the GOT will continue operation. If 5 s or more, the GOT will shut down.</td>
</tr>
<tr>
<td>Battery</td>
<td>Built-in, FX2NC-32BL type lithium battery. (Approximately 3 years battery life)</td>
</tr>
</tbody>
</table>

2.3 Screen Hardware Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>F93/GOT-BWD-E</th>
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</thead>
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<tr>
<td>Display Device</td>
<td>STN monochrome liquid crystal</td>
</tr>
<tr>
<td>Resolution</td>
<td>240 × 64 dots, 30 characters × 5 lines</td>
</tr>
<tr>
<td>Dot Pitch</td>
<td>0.47 mm (0.019&quot;) Horizontal × 0.47 mm (0.019&quot;) Vertical.</td>
</tr>
<tr>
<td>Effective Display Size</td>
<td>117 mm (4.6&quot;) × 42 mm (1.65&quot;) × 4 (4.4 inch) type</td>
</tr>
<tr>
<td>Number of Colours</td>
<td>2 colours (White and Blue)</td>
</tr>
<tr>
<td>Life of liquid crystal</td>
<td>Approximately 50,000 hours (Operating temperature: 25 °C/77 °F)</td>
</tr>
<tr>
<td>Backlight</td>
<td>Cold cathode tube</td>
</tr>
<tr>
<td>Life of Backlight</td>
<td>50,000 hours or more (Operating temperature: 25 °C/77 °F)</td>
</tr>
<tr>
<td>Touch Keys</td>
<td>Maximum 50 touch keys / screen, 15 × 4 matrix</td>
</tr>
<tr>
<td>Interface</td>
<td>RS-422, RS-232C, RS-232C through</td>
</tr>
<tr>
<td>Number of Screens</td>
<td>User screen: 500 screens or less System screen: Allocated screens No. 1001-1090.</td>
</tr>
<tr>
<td>User Memory</td>
<td>Flash memory 256 KB (built-in)</td>
</tr>
</tbody>
</table>

- Bright dots (always lit) and dark dots (unlit) may appear on a liquid crystal display panel. It is impossible to completely avoid this symptom, as the liquid crystal display comprises of a great number of display elements. Pickers may be observed depending on the display color. Please note that these dots appear due to its characteristic and are not caused by product defect.
- When the same screen is displayed for a long time, an incident color or partial discoloration is generated on the screen due to heat damage, and it may disappear.
- Using the GOT Backlight OFF function can prolong the life of the backlight. For details on the Backlight OFF function, refer to the following. GOT-F900 Series OPERATION MANUAL/GOT-F900 Series Operation Manual [GT Designer2 Version]

3. Installation

Caution:
- Do not mount the GOT in an environment that contains dust, soot corrosive or conducive dust, corrosive or flammable gas, or expose the unit to high temperatures, dew condensation, direct sunlight, rain, wind or impact and vibration. If the GOT is used in such a place, electrical shock, fire, malfunction, damages or deterioration may occur.
- Never cut dropping chips or electric wire chips into the ventilation window of the GOT when drilling screw holes or forming wiring. Such chips may cause fire, failure or malfunction.
- Turn off the power before securely connecting any cables. Poor connection may cause malfunction.

The GOT is designed to be mounted in a panel. Install it using the following procedure:

1) Preparing the panel surface:
- On the panel surface, cut a rectangular mounting slot of the dimensions shown on the right. At this time, space of 10 mm is required at each of the top and bottom of the slot, inside the panel for metal fixtures as shown in "4) Dimensions required inside the panel for installation." Note: Make sure that the thickness of the panel surface is no more than 5 mm (0.20")

2) Inserting the GOT into the panel surface:
- Attach the packing seal to the GOT, and insert the GOT from the front face of the panel surface.
  - a) Packing seal
  - b) GOT
  - c) Mounting slot

3) Fixing the GOT:
- Put hooks of the mounting brackets (supplied) in to the mounting holes of the GOT. Tighten mounting bolts (also supplied) until the GOT is securely fixed. Fix mounting bolts in all four positions, above and below the GOT.
  - a) Clamping bolt
  - b) Mounting bracket

4) Dimensions required inside the panel for installation:
- When installing the GOT, make sure that the inner dimensions shown on the right are available.
  - a) PLC connection cable
  - b) Packing seal

4. Power Supply Wiring

Caution:
- Wire the power supply using electric wires of 0.75 mm² or more so that voltage drop will not occur. Use M3 size crimp style terminal. Securely tighten crimp-style terminals with a torque of 0.5 ~ 0.8 Nm so that errors can be avoided.
- Ensure correct termination of the DC power source, incorrect connection may result in unit failure or serious damage to the GOT.
- Attach a fuse of 2 A to the 24V DC power supply.
- Perform Class D (100G) or less) grounding with an electric wire of at least 1.25 mm². Never perform common grounding of the GOT and a strong power system.

Note:
- Use an external power supply to provide 24V DC. (The service power supply of the programmable controller cannot be used.)
- Even if instantaneous power interruption of less than 5 ms occurs, the GOT continues to operate. When power interruption for a considerable period of time or voltage drop occurs, the GOT stops its operation. However, when the power supply is recovered, the GOT automatically restarts its operation. (The screen displayed just after recovery is determined by the working environment originally set)

4.1 Using Service Power Supply of PLC

<table>
<thead>
<tr>
<th>Grounding resistance 10Ω or less (class D)</th>
</tr>
</thead>
</table>

4.2 Using External Power Supply

<table>
<thead>
<tr>
<th>Grounding resistance 100Ω or less (class D)</th>
</tr>
</thead>
</table>

5. Maintenance

Cautions:
- Correctly connect the battery for memory backup. Never charge, disassemble, heat, burn or short-circuit the battery. If the battery is handled in such a way, fire may be caused.
- Always power OFF and remove the GOT from the panel before starting replacement of the backlight and battery if this is not the case, the backlight may be dropped and cause injury, or electrical shock may be caused.
- Never disassemble or modify the GOT. Disassembly or modification may cause failure, malfunction or fire. For repair, please, contact a service representative.

Note:
- Turn OFF the power, before connecting/disconnecting cables.
- Connecting/disconnecting cables while the power is turned on will cause failure or malfunction.

5.1 Battery Replacement

When the battery voltage drops, a control device (system information) set by the screen design software turns ON. The control device interlocks with an auxiliary relay in the PLC. It is recommended to provide a lamp while utilizing the output of the PLC so that voltage drop can be monitored outside the GOT. For details of control devices, refer to the GOT-F900 Series Operation Manual.

Note:
- For approximately one month after the control device for battery voltage drop turns ON, the battery will back up the alarm history, sampling and the current time. When the control device (system information) turns OFF, replace the battery (FX2NC-32BL) as soon as possible.

5.2 Backlight Replacement

Replace the backlight F90GT-30LTB using the following procedure.

1) Turn off the power to the GOT and remove the battery holder cover.
2) Remove the existing battery from the battery holder, and disconnect.
3) Within 30 seconds, connect a new battery.
4) Insert the new battery into the battery holder, and attach the cover.

5.2.1 Replacement Procedure

Caution:
- If the rear panel is pulled using an excessive force, the cable connecting the rear panel and the front panel may be disconnected or the PCB may be damaged. Be careful.

1) Make sure that the power of the GOT is turned OFF. Slowly remove the rear panel.
2) Disconnect the backlight connector (b).
3) While pushing the claw of the existing backlight (a), move it up in the direction A by approximately 10 mm.
4) Pull out the existing backlight (a) in the direction B.
5) Attach a new backlight F90GT-30LTB (b). Put it into the GOT by performing the steps 1) ~ 3) in the reverse order.

Warranty
Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; opportunity loss or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties. For the detailed warranty, refer to the GOT-F900 Series HARDWARE MANUAL [CONNECTION].

Manual number : JY9992D95701
Manual revision : E
Date : Sep. 2008