OZD FIP G3
Using Fipway Network and Fipio Bus with Hirschmann transceivers

07/2011
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Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

⚠️ The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

❗️ This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠️ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠️ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.
CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, can result in equipment damage.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.
About the Book

At a Glance

Document Scope

This manual describes the setup of Fipway network and Fipio bus hardware used with OZD FIP G3 transceivers.

Validity Note

This document is valid from Unity Pro version 6.0.

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User Comments

We welcome your comments about this document. You can reach us by e-mail at techcomm@schneider-electric.com.
Introduction to OZD FIP G3 transceivers

General introduction to the OZD FIP G3

General

This document describes the characteristics and setup of Fipio and Fipway control systems based on OZD FIP G3 fiber optic transceivers manufactured by HIRSCHMANN.

L'OZD FIP G3 enables the conversion of an electrical FIP interface to 2 fiber optic FIP interfaces and vice versa.

The transceivers can be integrated into an existing bus or network. The OZD FIP G3 transceiver can also be used to create a FIPIO field bus or a complete FIPWAY network with a bus or ring topology.

These transceivers are particularly suitable for use in applications distributed over large areas or which are subject to harsh electrical environments:

- large public buildings,
- large industrial sites,
- water treatment and distribution,
- transport infrastructures, etc.

NOTE: Improved overall availability of the installation wiring.

In addition, the connection of transceivers in a redundant ring topology improves the availability of all the installation wiring: if a link between two transceivers breaks, transmission is automatically switched to the second link.

This document presents the various possible architectures, connection of the various devices and the configuration and initialization procedure to be followed in setting up the devices.
Network topology rules

Subject of this Chapter
This chapter enables you to create your desired topologies in the light of those topologies which are possible given the technical specifications of OZD FIP G3 transceivers.

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Standard topologies: bus and ring

General

We distinguish between two types of standard topologies: bus and ring.

In a ring type network configuration, each OZD is connected by fiber optic link to two other OZDs.

In a bus type network configuration (equivalent to an open ring network), the OZDs positioned at either end of the bus are each linked to a single other OZD. Unused fiber optic ports must be closed using an optic fiber.

Each fiber optic link between 2 OZDs is bidirectional (one fiber for each direction of transmission). The advantage of the ring configuration is that it provides fiber optic media redundancy: the information is still broadcast in its entirety even if an optical fiber or cable is not working (the ring is automatically reconfigured in the bus). At least one of the devices should be connected to the electrical port of each OZD FIP.

The maximum length "L" for fiber optic transit must be observed. If it is the maximum length between the OZD of the extremities for the bus, then for a ring configuration (which must, by default, operate as a bus) the maximum length to be considered is the total circumference of the ring. For a linear topology system (such as a tunnel) the maximum distance covered by the ring is therefore half of that covered by the bus.

Topological restrictions

At least one of the devices must be connected to the electrical port of each OZD FIP. Where this is not possible, a “repeater” subgroup (see page 39) must be installed.
The table below presents the general characteristics:

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<td>Max. number of devices on the electrical segment</td>
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<td>Maximum optical distance between two OZD FIPs (see page 16)</td>
<td>1,500 m for 32 OZD FIPs</td>
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<td>2 km if the ring or the bus has less than 22 OZD FIPs</td>
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<td>3 km for 2 OZD FIPs</td>
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Special topologies

General

In field bus architectures (Fipio), it is possible to link up (electrically) two rings or two buses or one fiber optic bus and one ring, so as to integrate twice as many OZDs.

At one location, a single OZD from each ring (or bus) is linked to the second ring (or bus) by its electrical port. The electrical segment common to both halves can also be used by the Fipio devices, and has the same limitations as the other segments.

It is however prohibited to link two OZDs from the same ring (or the same bus) via their electrical ports.

It is prohibited to loop together both rings or both buses in order to create a global ring.

Illustration:

To ensure availability, it is advisable to configure redundant power supplies for the two OZDs on this common segment and to concentrate the segment in a cabinet.

A topology comprising two rings in series

Illustration:
A topology comprising two fiber optic buses in series

Illustration:

A topology comprising 2 OZD FIPs mounted with an electrical repeater

In cases where the distance separating the two OZD FIPs is too great, it is possible to perform an optical repeater function (without any device on the electrical port) using two OZD FIP G3s whose electrical ports are interconnected.

Illustration:
Topology rules

Topology restrictions

General
Three maximum limits must be observed simultaneously in all systems using OZD FIP G3s; they are relative to the number of OZDs per bus or ring, to the length of each fiber optic and electrical link, and, finally, the fiber optic transit length. These limits are valid for both FIPIO and FIPWAY architectures.

1) The maximum number of OZDs per ring or bus
The maximum length of each fiber optic link is between 3 km and 1.5 km according to the number of OZD FIPs in the ring or bus, as specified in the following calculation chart:

Example: As the chart shows, for a structure composed of 10 OZD FIPs there is a maximum of 9 fiber optic segments available each having a maximum unit length of 2.6 km.

2) Maximum length of the fiber optic topology
An OZDFIPG3 can be considered equivalent to a fiber optic segment with a specified transit time. This transit time can be assigned a length equivalent to that of a fiber optic segment.

A OZD FIP can participate in network exchanges in two ways:
- as a fiber optic/fiber optic transceiver,
- as a fiber optic/electrical transceiver (the transmitter or the receiver is positioned on the electrical port).

In the first case, the frames only pass through the OZD FIP from one fiber optic port to reach its other fiber optic port. The OZDFIPG3 can be modeled on an optical fiber whose length is equivalent to 40 m.
In the second case, the frames only pass through the OZD FIP from one fiber optic port to reach its other fiber optic port. The OZDFIPG3 can be modeled on an optical fiber whose length is equivalent to 500 m.

**Terminology:**

Let:

- \( N_1 \) the number of transits from one fiber optic port to another fiber optic port of the segment in the architecture considered,
- \( N_2 \) the number of transits from one fiber optic port to an electrical port of a frame in the architecture considered.

The maximum possible length of the bus or ring can be determined using this formula:

\[
L_{\text{max}}(\text{km}) = 22 - (0.04 \times N_1) - (0.5 \times N_2)
\]

- **Dimensioning of a standard architecture (ring or bus):**
  
  An example of how to validate an architecture:
  Consider a ring comprising 32 OZD FIPs
  \( N_1 = 30 \); \( N_2 = 2 \) => \( L_{\text{max}} = 19.8 \text{km} \)
  
  The table (see page 13) shows that no fiber optic segment can exceed 1.5Km.

- **Dimensioning a special Fipio architecture (2 buses or 2 rings):**
  
  The formula is the same, except that:
  
  - \( N_1 \) must be evaluated to take account of the eventuality of a fiber optic link breaking in one of the rings.
  - \( N_2 \) must integrate two extra fiber optic/electrical transitions.
  
  An example of how to validate a special architecture:
  Consider two rings interconnected in series comprising 32 OZD FIPs and 10 OZD FIPs respectively
  \( N_1 = 40 \); \( N_2 = 4 \) => \( L_{\text{max}} = 18.4 \text{km} \)
  
  No fiber optic segment (see page 16) can exceed 1500m on the ring with 32 OZD FIPs and 8 fiber optic segments can cover up to 2600m in the ring with 10 OZD FIPs.

3) **Maximum topologies on the electrical segments**

From port 1 (electrical) of each OZDFIPG3 of version SV04/PV05 or later, it is possible to connect the devices to an electrical segment less than or equal to 100m in length.

It is possible to connect a maximum of 16 devices on this electrical segment.

**NOTE:** At least one of the devices should be connected to the electrical port of each OZD FIP. Where this is not possible, a "repeater" subgroup (see page 39) must be installed.
Topology rules
Possible types of architecture

Subject of this Chapter

This chapter presents loop architectures with Fipio and Fipway. This topology ensures availability of the wiring in the event of an optical fiber being broken. It is also possible to create architectures on a line.

In this case:
- the distance characteristics are identical,
- the same products can be connected,
- breaking of an optical fiber causes communication to stop between the two segments created as a result.

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Types of architecture

Fipio Architecture

Description

Example of a Fipio architecture:

Most Schneider products which operate on the Fipio bus can be connected to the OZD FIP G3 transceiver:

- As Fipio manager devices:
  - Series 7: TSX 67455, TSX 87455, PMX 87455, PCX 87455 processors (version V5.6 or later), programmed using the X-TEL V6 software workshop.
  - Premium (PL7): processors with an integrated FPIO link - TSX P5753 and TSX P57823, or PCX P57 353 (version V3.0 or later) programmed using PL7 version V3.0 or later.
  - Premium (Unity Pro): processors with an integrated FPIO link - TSX P5754 and TSX PCI57 354 programmed with Unity Pro (version V2.0 or later).

- As Fipio bus agent devices:
  - TBX equipped with an LEP 020 or LEP 030 communication module,
  - PC equipped with a TSX FPC 10 ISA card or FPP20 PCMCIA card,
  - Momentum,
  - Micro TSX 372 and Premium TSX/PMX/PCX 57/PCI 57 equipped with a TSX FPP 10 card,
• Third-party devices which comply with the standard Fipio profiles defined in the FipConnect connection program,
• Advantys STB (for PL7 Pro) compliant with standard Fipio profiles,
• Advantys STB, Altivar, Fipio/AS-i Gateway, Inductel, Lexium, Magelis (for Unity Pro) compliant with standard Fipio profiles.

**NOTE:** TSX FP ACC6 and TSX FP ACC8M repeaters are not compatible with architectures using OZD FIP G3 transceivers.

**NOTE:** Fipio configurations in WorldFip mode are excluded from these architectures.
Fipway Architecture

Description

Example of a Fipway architecture:

A large number of Schneider products which operate on the Fipway network can be connected to the OZD FIP G3 transceiver:

- TSX Micro 372+ PLCs, equipped with a TSX FPP OZD 200 or TSX FPP 200 card.
- Premium PMX/PCX/PCX 57 PLCs (programmed using PL7) and Premium TSX P57+54 and TSX PCI57 354 PLCs (programmed using Unity Pro), equipped with a TSX FPP OZD 200 or TSX FPP 200 card.
- PC with a slot for a type III PCMCIA card: communication is performed by the TSX FPP 20 card.
- PC with an ISA bus: communication is performed by the TSX FPC 10 ISA card, and a special driver (see page 48), supplied with the TSX FPP OZD 200 or TSX FPP 200 card, must be installed in addition to the standard driver.

**NOTE:** On a single Fipway network created with an OZD FIP G3 transceiver, use of the TSX FPP OZD 200 card is mandatory, as it is on electrical or optical branches.

**NOTE:** Special architectures (see page 14) are prohibited.

For a PC used on FIPWAY, install the driver using the TLXLFFPCOZD diskette supplied with the TSXFPP200 PCMCIA card with the kit reference TSX FPP OZD 200 or TSX FPP 200. The address of the PC station cannot be 0 or 1.

**NOTE:** TSX FP ACC6 and TSX FP ACC8M repeaters are not compatible with architectures using OZD FIP G3 transceivers.
Backup architecture on Fipio bus

Description

Example of a Backup architecture on Fipio bus:

- Maximum length of each loop: 20 km.
- Maximum number of fiber optic transceivers per loop: 32.
- Maximum number of connected Fipio devices: 16.
- Maximum length of each electrical segment: 100 m.
- The manager devices are TSX 67 455 or TSX 87 455 Series 7 PLCs, versions V 5.6 and later.
- The agent devices are from the following list:
  - Series 7: TBX range equipped with an LEP 030
  - PC equipped with a TSX FPC 10 ISA bus module.
Warm Standby architecture on the Fipio bus

Description

Illustration:

Normal and backup PLCs should be installed on two consecutive OZD FIPs. A redundant power supply configuration should be used for both these OZD FIPs. The first of these two PLCs to power up takes control of the application, the other PLC acts as a Warm Standby.
Using Fipio and Fipway architectures together

Description

A PLC which has a dual Fipio manager and Fipway attachment can be connected simultaneously to two fiber optic architectures.

Example:

The connectivity limits for each network are identical to those for Fipio (see page 20) and Fipway (see page 22) architectures.
Connecting a PLC station

Description

The TSX FPP OZD 200 and TSX FPP 200 are only intended for connecting PLCs. To connect a PC, use the TSXFPP20 or TSXFPC10 cards and modify certain parameters using the "INHIBBA" utility.

This utility is supplied on a diskette ref. TLXLFPCOZD sold with the TSX FPP OZD 200 or TSX FPP 200 under the kit reference TSXFPOZD200. The "INHIBBA" utility is executed on request from the client (not automatically on starting up the PC). In particular, it allows the bus arbitrator function to be inhibited on devices with an address other than 0 or 1. Only PLC stations should be bus arbitrators, and they must be associated with a station address (PC) which is other than 0 or 1.

PL7 or Supervision software PC applications can be used.
Subject of this Chapter

This chapter presents the various characteristics and connections for the transceiver.

The characteristics of the transceivers are also given in the technical documentation supplied by Hirschmann (ref. 933 847-901).

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The OZD FIP G3 transceiver

Technical characteristics

Physical description

OZD FIP G3:

- Overall dimensions: 39.5 mm x 110 mm x 73.2 mm.
- Weight: ≈ 0.5 kg.
- Ambient temperature: 0 °C to 60 °C.
- Degree of protection: IP 40.

Fiber optic communication characteristics:

- Maximum distance between fiber optic interfaces: 3000m with 50/125 or 62.5/125 optical fiber.
- Topology (see page 19).
- Compatible with 50/125 or 62.5/125 multimode optical fibers.
- Connectors conform to BFOC/2.5 or ST® standards.
- Wiring in a redundant ring causes automatic switching from one line to the other in the event of a break.
- Max. number of transceivers which can be connected per Fipio Bus is 32.
- Max. number of transceivers which can be connected per Fipway network is 20.
- Transmission speed: 1 Mbit/s.

Electrical characteristics:

- 24V DC or 48V DC power supply, with the possibility of a redundant power supply:
  - 24 V: ± 20 % 150 mA,
  - 48 V: ±10 % 85 mA,
- Conforms to the FIP standard.
- EMI protection,
- Noise emission: conforms to EN55011 Class B standard
- Noise immunity: conforms to EN61060-4-2 5 Standard.
Mounting and connections

Description

The OZD FIP G3 transceiver is mounted on a 35 mm DIN rail. There must be sufficient access for the electrical and fiber optic connections:

Connecting the fiber optic links

"Transmission" connection connected at the opposite end of the fiber optic link to a "Reception" connection.

"Reception" connected at the opposite end of the fiber optic link to a "Transmission" connection.

NOTE: A transmission port must be connected to a reception port, with no restriction on the port number.
Connection of the power supplies and alarm:

The module is grounded by connecting the screw terminal on the front of the transceiver.

Connection of the Fip link:

The TSX FP CA cable can be used via the TSX FP ACC12 connector on the 9-pin SUB-D connector of the transceiver.

Example of connecting one power supply:

Example of connecting two power supplies in redundant configuration:
Displays

Description of LEDs

Description of front panel of the transceiver:

Summary of the displays:

<table>
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<tr>
<th>LED Type</th>
<th>Status</th>
<th>Explanation</th>
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<tr>
<td>&quot;System&quot; LED</td>
<td>Green</td>
<td>Normal operation</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>No data received by port 2 and/or port 3</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No voltage or an internal fault</td>
</tr>
<tr>
<td>Port 1 (electrical)</td>
<td>Green</td>
<td>Channel active</td>
</tr>
<tr>
<td></td>
<td>Orange</td>
<td>Channel inactive for more than 500ms</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Channel temporarily inactive</td>
</tr>
<tr>
<td>Port 2 and Port 3 (fiber optic)</td>
<td>Green</td>
<td>Channel active</td>
</tr>
<tr>
<td></td>
<td>Orange</td>
<td>Channel inactive for more than 500ms</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Channel temporarily inactive</td>
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When there is no bus or network manager, all the LEDs light up (Port 1, 2, 3 orange, and system red). Each LED lights up automatically when a silence is detected on the corresponding port (reception side).
Behavior on faults

Description

The LEDs and the alarm relay indicate the following faults:

- power supply fault,
- time-outs exceeded on the Fip communication
- time-outs exceeded or echo on the fiber optic transmissions.
Hardware Installation

Subject of this Chapter

This chapter describes the hardware installation for the OZD FIP G3 for use with control devices and fiber optic networks, etc.

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<tr>
<td>Startup of an installation using OZD FIP G3s</td>
<td>40</td>
</tr>
</tbody>
</table>
Connecting and mounting devices on electrical segments

General rules and connection accessories

The electrical link between each OZDFIPG3 transceiver and the control system devices is comparable to a mini segment, with the following restrictions:

- the segment length is limited to 100 m,
- a maximum of 16 devices are linked to a transceiver,
- the mini segment accesses a single fiber optic transceiver.

To make connection easier and ensure that each node operates correctly, the following elements should be used:

- TSX FP CA cable,
- a TSX FP ACC7 line terminator for both ends of each mini segment,
- a TSX FP ACC12 (insulated) or TSX FP ACC2 connector for the transceiver connections, on the TBX BL P01 or TBX and Momentum remote I/Os,
- a TSX LES 65 terminal block for connecting TSX and PMX processors,
- a TSX FP ACC4 tap used with the TSX FP CG 010/030 PCMCIA card connection cable. These accessories are designed for the connecting PLCs and PCs which support TSX FPP10 and TSX FPP OZD 200 cards.

The TSX DR FPW and TSX DR FIP reference manuals give detailed information on the mounting conditions, which are the same for this application.
Mounting examples

Illustration:

The TSX FP ACC12, equipped with TSX ACC7 line terminator is the correct accessory for connecting the OZD FIP G3 unit.
Illustration:

TSX FP ACC4 equipped with TSX ACC7 line terminator

OZD FIP G3

TSX FP ACC12 equipped with TSX ACC7 line terminator

Optical fiber
System aspects linked to installation of the fiber optic network

Redundant ring topology

The maximum distance between two consecutive transceivers (that is, those connected to the same fiber optic section) must be observed, whatever the project configuration (there is no minimum distance to be observed).

This is achieved by alternate wiring of the fiber optic links when one or more sections is too long. See the diagram below.

Examples:
- Transceiver No. 6 is linked to transceivers No. 4 and No. 5.
- Transceiver No. 1 is linked to transceivers No. 2 and No. 3.
Non-redundant linear topology

Illustration:

NOTE: Loop back the transmission and reception of the "free" fiber optic port using a fiber optic jumper.
Fiber optic repeater using an OZD FIP G3

Description

In exceptional cases where no device is connected, or able to be connected, to the electrical port of a OZD FIP (transceiver 2), a repeater function must be performed. This involves adding a second OZD FIP (2’) transceiver and connecting the two ports 1 by an electrical segment comprising a TSX FPC Axx cable segment equipped with two TSX FPC ACC12 connectors and two TSX FP ACC7 resistance adapters.
Hardware Installation

Startup of an installation using OZD FIP G3s

Description

- This procedure describes how to perform a problem-free start up of an installation using OZDFIPG3 transceivers. It allows you to have full control of the system and avoids potential problems of repeater blockage.
- To guarantee the general startup of a complete installation, simply ensure that the last device you power up is the FIPIO master PLC or the FIPWAY bus arbitrator station.

If this is not possible:
- Power up all the activated devices that are connected to Ports 1 (electrical) of the OZD FIPs (PLCs, agents, remote I/Os, variable speed controllers).
- Then power up the OZD FIPs of the installation at the same time or, if there is no central control, start by powering up the devices furthest away from the bus manager (FIPIO) or the bus arbitrator (FIPWAY) and move progressively in.
Subject of this Chapter

This chapter describes the software setup for the Fipio bus and the Fipway network used with PLCs.

What’s in this Chapter?

This chapter contains the following topics:

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<tr>
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</tr>
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General

Communication Parameters

The use of OZD FIP G3 transceivers requires the modification of specific communication parameters. This modification depends on the architecture of the installation.

The following parameters must be modified:

- **Slot time TR (Turnaround Time):** This is the minimum time between transmission of the last byte of a frame and transmission of the first byte of the next frame.
- **Basic time T0 (Silence time):** This is the maximum time between transmission of the last byte of a frame and transmission of the first byte of the next frame.
- **Propagation Delay Time:** This indicates the transfer time for a request and the associated response.
Fipio Architecture with a Premium Bus Arbitrator PLC

Description

The description below is for Unity Pro. However, the procedure is identical with PL7.

NOTE: The operating modes and procedures are described in volume 2 of the TLX DS COM PL7 xx manual.

The adaptation is carried out when the manager PLC is configured.

Double-clicking on the representation of the FIPIO connector on the processor opens a window showing the structure of the FIPIO bus.
Clicking with the right mouse button displays a shortcut menu entitled "Bus properties":

- **"General" tab of Bus properties:**

In the "General" tab, you must set the length of the FiPIO bus. The default value is 1km:

![Bus properties dialog box]

**NOTE:** It is essential to set the bus length to 7 km whatever the actual length of the optical fiber.

The propagation delay time will then be assigned the correct value.
● "Expert" tab of Bus properties:
The "Expert" tab is used to access the manual adjustment mode for T0 and TR:

![Bus properties]

The configuration must then be confirmed.

NOTE: It is essential to set T0 = 255 μs and TR = 30 μs for all configurations. The bandwidth values are not to be modified.

⚠️ WARNING

UNEXPECTED APPLICATION BEHAVIOR
Before changing the Expert tab parameters, switch off all connected devices. Switch them on again only after downloading the new application to the PLC.
After changing the Expert tab parameters and downloading the new application to the PLC, switch off and then switch on all connected devices.
Failure to follow these instructions can result in death, serious injury, or equipment damage.
Software setup

Fipio architecture with a Series 7 bus arbitrator

Description

The adaptation is carried when the manager PLC is configured. The user sets up the X-TEL V6 software workshop. The modifications are made using the X-TEL-CONF tool via a hidden window which can be accessed by simultaneously pressing the <Control> <Alt> and <P> keys from the Remote Devices Configuration window (See basic software tools manual).

The following parameters must be modified to have the same values for all sizes of application covered in this chapter:

- **Turnaround Time**: replace the initial value of 10 microseconds with 30 microseconds.
- **Basic Time: T0**: replace the initial value of 90 microseconds with 255 microseconds.
- **Propagation Delay Time**: replace the initial value of 0 microseconds with 100 microseconds.
- **Message Handling Rate**: this is set at 20 Kbit/s if no particular parameter is entered. This parameter, along with the Turnaround Time and the Propagation Delay Time, is used by X-TEL to generate the macrocycle on the Fipio bus. The values for setting the Message Handling Rate are given in the next section.

Initialization of the PLC is completed by a short sequence of operations listed in the appendix.

![Global Parameters](image-url)
Setting the message handling rate

Case No. 1:
The agent stations are mainly TBX or Momentum distributed I/O blocks.

<table>
<thead>
<tr>
<th>Number of stations</th>
<th>0 to 10</th>
<th>11 to 15</th>
<th>16 to 20</th>
<th>21 to 30</th>
<th>31 to 35</th>
<th>36 to 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message handling rate (Kbit/s) (*)</td>
<td>20</td>
<td>20</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>

Case No. 2:
The agent stations are mainly Micro or Premium PLCs.

<table>
<thead>
<tr>
<th>Number of stations</th>
<th>0 to 10</th>
<th>11 to 15</th>
<th>16 to 20</th>
<th>21 to 27</th>
<th>28 to 34</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message handling rate (Kbit/s) (*)</td>
<td>20</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

* Value to be defined in the X-TEL screen

NOTE: The declaration of FIP variables is taken into account when at least one Fipio device has been defined in the remote I/O screen.

The declaration of the stations is spread over the various processor tasks. See Chapter 6: "Performance".

Variables which have been previously modified in X-TEL-CONF are used by the MPSBA OFB.

Only one configuration (instance) of this OFB is necessary for the modification of the Fipio parameters. No programming is necessary for the operation of this OFB. You simply need to instantiate it for it to run implicitly and automatically.

NOTE: There must be only one MPSBA instance in the application.
Fipway Architecture

Operating Principle

Communication via a Fipway network using OZD FIP G3 transceivers is a simplified version of electrical bus type Fipway networks:
- architecture limited to 32 stations,
- procedure for automatic election of the bus arbitrator restricted to stations with addresses 0 and 1. For this reason, the presence of at least one of these stations is necessary for the network to operate,
- message exchange with routing,
- production/consumption of common words or shared table,
- the telegram service is not available.

Installing the PLCs

NOTE: Fipway communication requires the use of a type III PCMCIA card, reference TSX FPP OZD 200, in all the PLC stations.

This card supports all the service modifications of a Fipway network with OZD FIP G3 transceivers.

The operating modes and procedures are described in Fipway Premium/Atrium (see Premium and Atrium using Unity Pro, Asynchronous Serial Link, User Manual) manual. The operating modes and procedures are the same as those for the card reference TSX FPP 20.

NOTE: Notes on configuration:
- Telegram handling cannot be selected in the configuration screen.
- The FIP physical layer must be selected.
- The language objects associated with communication are those of the stations with addresses 0 to 31.

Installing a PC with an ISA bus

NOTE: Fipway communication is performed using the TSX FPC 10 card and requires the installation of a special driver, supplied on floppy disk reference TLX LF FPC OZD 10.

- Install the driver supplied with the TSX FPC 10 card following the instructions in the TSX DM FPC 10M manual.
- Insert the floppy disk supplied with the TSX FPP 20 card (Fipway FPC 10 Card Setup (OZD FIP G3), reference TLX LF FPC 10).
- Follow the instructions in the "readme.txt" file

This operation adapts the driver for the specific requirements of the Fipway network with fiber optic transceivers and disables its "bus arbitrator" capacity.
Fault management

Description

When an optical fiber is connected or disconnected from one of the OZD transceivers, a transient fault may be indicated for all the transceivers. It is therefore advisable to filter the monitoring of the alarm relays (1 second) for each application program and to consider only those relays to be active which have been open for more than 1 second.
Subject of this Chapter

This chapter presents the performance of Fipio and Fipway architectures.

What’s in this Chapter?

This chapter contains the following topics:

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<td>Fipway architecture</td>
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</table>
Fipio architecture with a Series 7 bus arbitrator PLC

Description

The macrocycle of exchanges on Fipio is generated automatically by the X-TEL tool when the applications are created.

The creation of fiber optic ring architectures also requires certain parameters to be entered by the programmer.

The strategy for optimizing performance is based on the priority of periodic variable exchanges (e.g.: reading remote inputs).

The declaration of distributed stations (TBX, Momentum, Micro, etc.) is spread over the various tasks in the program to the extent that the macrocycle generator allows.

The following tables specify the recommended optimum distribution:

Agent stations which are mainly TBX or Momentum:

<table>
<thead>
<tr>
<th>Number of stations</th>
<th>Min. value of cycles in ms</th>
<th>Stations declared in &quot;Fast&quot;</th>
<th>Stations declared in &quot;Mast&quot;</th>
<th>Stations declared in &quot;AUX0&quot;</th>
<th>Stations declared in &quot;AUX1&quot;</th>
<th>Message handling rate in Kbit/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 to 10</td>
<td>Fast = 20</td>
<td>2</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Mast = 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 to 15</td>
<td>Fast = 40</td>
<td>7</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Mast = 160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 to 20</td>
<td>Fast = 40</td>
<td>10</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Mast = 160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 to 30</td>
<td>Fast = 40</td>
<td>10</td>
<td>16</td>
<td>4</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Mast = 200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUX0 = 240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 to 35</td>
<td>Fast = 40</td>
<td>10</td>
<td>19</td>
<td>6</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Mast = 240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUX0 = 320</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 to 39</td>
<td>Fast = 40</td>
<td>10</td>
<td>14</td>
<td>15</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Mast = 240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUX0 = 320</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Interpretation:

For a configuration of 19 stations, it is necessary to declare:

- a FAST task with 9 stations, the scan cycle being at least 40 ms,
- a MAST task with 10 stations, the scan cycle being at least 160 ms,
The message handling rate is thus 20 Kbit/s, that is around 20 messages of 90 bytes per second.

**NOTE:** If a problem arises with generation of the macrocycle during configuration, it is advisable to increase the time of the MAST or FAST task rather than modify the distribution suggested in the above table.

Priority should be given to agents handling a large number of message exchanges (CCX, Premium) in the slower tasks (AUX).

Agent stations which are mainly TBX or Momentum:

<table>
<thead>
<tr>
<th>Number of stations</th>
<th>Min. value of cycles in ms</th>
<th>Stations declared in &quot;Fast&quot;</th>
<th>Stations declared in &quot;Mast&quot;</th>
<th>Stations declared in &quot;AUX0&quot;</th>
<th>Stations declared in &quot;AUX1&quot;</th>
<th>Message handling rate in Kbit/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 10</td>
<td>Fast = 40</td>
<td>4</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Fast = 20 Mast = 80</td>
<td>2</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>11 to 15</td>
<td>Fast = 40 Mast = 160</td>
<td>7</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>16 to 20</td>
<td>Fast = 40 Mast = 200 AUX0 = 240</td>
<td>7</td>
<td>18</td>
<td>5</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>21 to 27</td>
<td>Fast = 40 Mast = 200 AUX0 = 320</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>28 to 34</td>
<td>Fast = 50 Mast = 200 AUX0 = 250 AUX1 = 300</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>13</td>
</tr>
</tbody>
</table>

**Interpretation:**

For a configuration of 19 stations, it is necessary to declare:

- a FAST task with 7 stations, the scan cycle being at least 40 ms,
- a MAST task with 8 stations, the scan cycle being at least 200 ms,
- an AUX0 task with 4 stations, the scan cycle being at least 240 ms.

The message handling rate is thus 10 Kbit/s, that is around 10 messages of 90 bytes per second.
Fipway architecture

Description

In order to ensure guaranteed timing of exchanges between stations, the macrocycle is predefined for each module or Fipway integrated link.

Common words service (COM): updating of 32 common words every 40 ms (4 words per station).

All configurations comprising between 2 and 32 stations have identical performances:

- common words service (COM): updating of 32 common words every 40 ms (4 words per station),
- UNI-TE message handling service: the useful data transfer rate is 250 kbit/s, or approximately 230 messages of 128 bytes per second. A PLC station can send or receive 2 messages for each master task cycle (for an average value of 50 ms). A PC can send or receive up to 20 messages per second.
Appendices

Initialization of a TSX 67/87 or PMX 87 Fipio bus arbitrator PLC

Description

The following sequence is an example of a sequence executed at each instance of a PLC power up. It must be entered in the application without the modification of constant values.

This example applies to simple and Back-up 240 architectures. In the latter case, the programmer uses the sequence for each PLC.

NB/MAX text block: 3/64

The initialization sequence must be executed when a cold start is performed before processing the complete application program.

<table>
<thead>
<tr>
<th>No.</th>
<th>Symbol</th>
<th>Local Network</th>
<th>Type: Address Mode</th>
<th>Table Address</th>
<th>Length</th>
<th>A</th>
<th>T</th>
<th>M</th>
<th>L</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>.....</td>
<td>Local CPL</td>
<td>W5200</td>
<td>28</td>
<td>H&quot;FF63&quot;</td>
<td>16</td>
<td></td>
<td>H&quot;0083&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Appendices

General flow chart to be followed:

```
Cold start

Initialization sequence

B 207 = 1

No

Application program

End
```

**NOTE:** The "Initialization sequence" block should be written in an SR subroutine to be called by the main program upon startup.

Series 7 PLC - Modification of the values of TO and Tr:

**Initialization of the transmission table of the TXT0 block:**

```
B300

B301

B302

B307

Operate 0 → W5240
```

```
B300

Operate H3006 → W5214

Operate H10 → W5216

Operate H11 → W5217

Operate H12 → W5218

Operate H13 → W5219

Operate 255 → W5220

Write TO = 255 microseconds
```
Parameter $Tr = 30$

B207: Modifications successfully completed
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