SanyoFWS-X16DI Instruction Manual

1. Overview

The SanyoFWS-16DI (SanyoFWS Flash Writing System for Xstormy16 with Debugger Interface) is a system for writing the flash ROM incorporated in the Xstormy16 series single-chip microcontroller via a debugger interface in a user's production process.

2. Components

- SanyoFWS-X16DI writer unit
- Writer unit firmware
- SanyoFWS.exe application
- SanyoFu.exe (for updating the writer unit firmware)

3. Writer Unit (SanyoFWS-X16DI)

The SanyoFWS-X16DI writer unit is a control unit that is used to program flash ROM via a communication line for the on-chip debugger.

3.1 Setting up the Writer Unit Operating Mode

The writer unit runs in 6 operating modes which are described below.

The operating mode is selected according to the states of the power-on time mode selector switch, START button, and CANCEL button.

1) Standard mode

   The target flash ROM is erased, programmed and read-protected online under control of a personal computer.

2) Standalone manual mode

   The target flash ROM is erased, programmed, and write- and read-protected manually using the START and CANCEL buttons in a standalone environment.

3) Standalone automatic mode

   The writing and communication status is automatically checked in a standalone environment and the flash ROM is then programmed and write- and read-protected.

4) Download mode

The write data to be used in the standalone manual or standalone automatic mode is downloaded from a personal computer into the flash ROM in the writer unit.

5) Unit ID setup mode

The unit ID (see SanyoFWS Online Help) is set up so that no duplicate IDs occur when two or more writer units are connected in the standard or download mode.

6) Firmware update mode

The mode for updating the writer unit's firmware.

This mode is used when it is necessary to update the firmware of the writer unit as the result of the upgrade of the SanyoFWS system.

3.2 Configuration

The SanyoFWS-X16DI has three configurations.

- Standard
- Standalone manual
- Standalone automatic

3.2.1 Standard Configuration

The writer unit and the personal computer are connected by a USB. They are controlled by the SanyoFWS, which can perform the following operations on the flash ROM in the target unit:

1) Erase
2) Write
3) Write + read protection
4) Read protection
5) Blank check
6) Verify
7) Read protection check

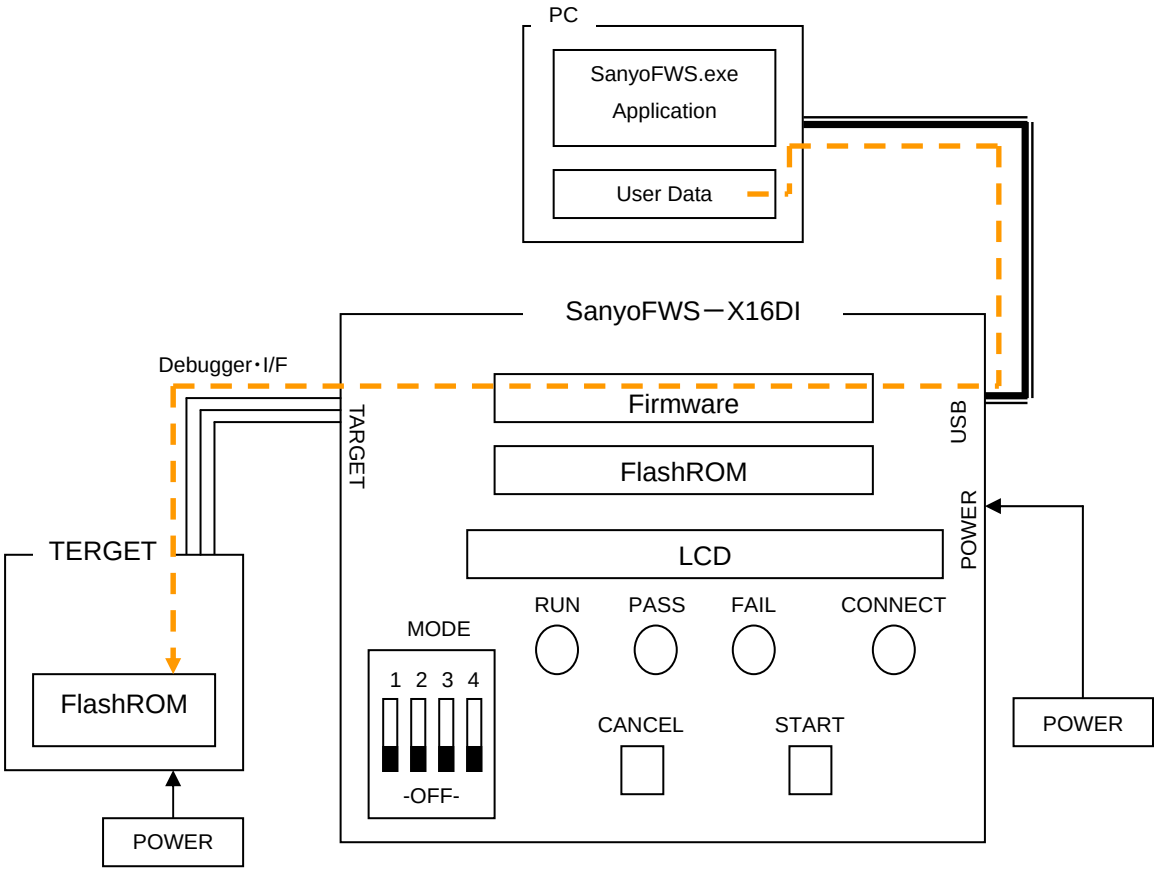


Figure 3.2.1 Standard Configuration Block Diagram

3.2.2 Standalone Manual Configuration

Writing is carried out by the writer unit alone and no personal computer is required in this configuration.

The user data is downloaded into the flash ROM of the writer unit in the download mode. Writing the user data is carried out by the operator connecting the target Debugger-I/F lines (3 lines), powering on the target single-chip microcontroller, and then pressing the START button.

When writing is completed, PASS or FAIL LED turns on and SUCCESS or ERROR is displayed on the LCD.

The operator can take the following actions in the standalone manual mode:

1) Write
2) Write + Read protection

Downloading and setup for read protection of the data are specified from a personal computer via USB using SanyoFWS.

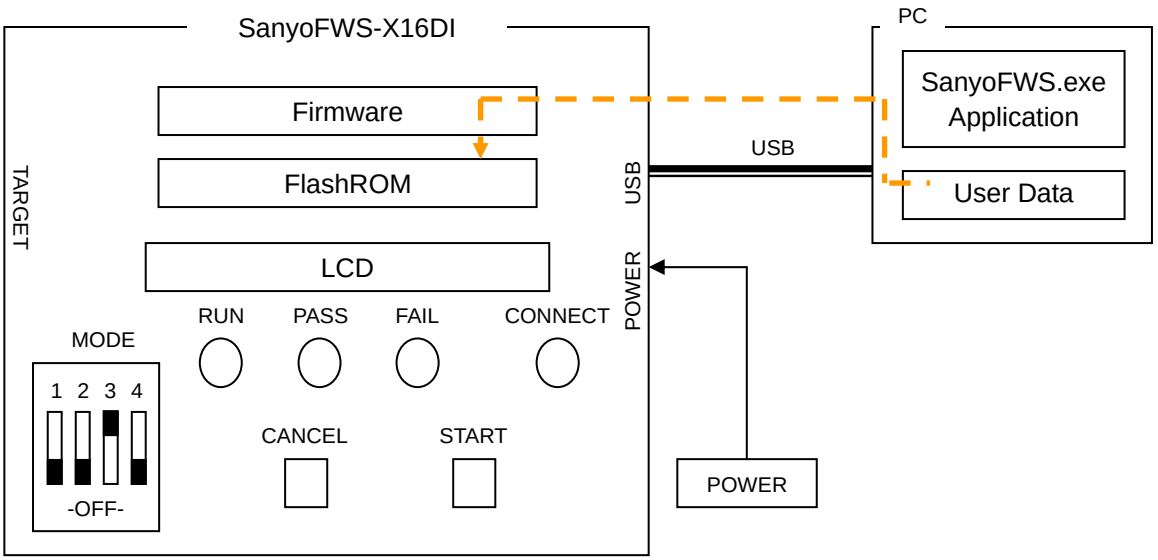


Figure 3.2.2.1 Standalone Manual Mode Block Diagram A (Data Download)

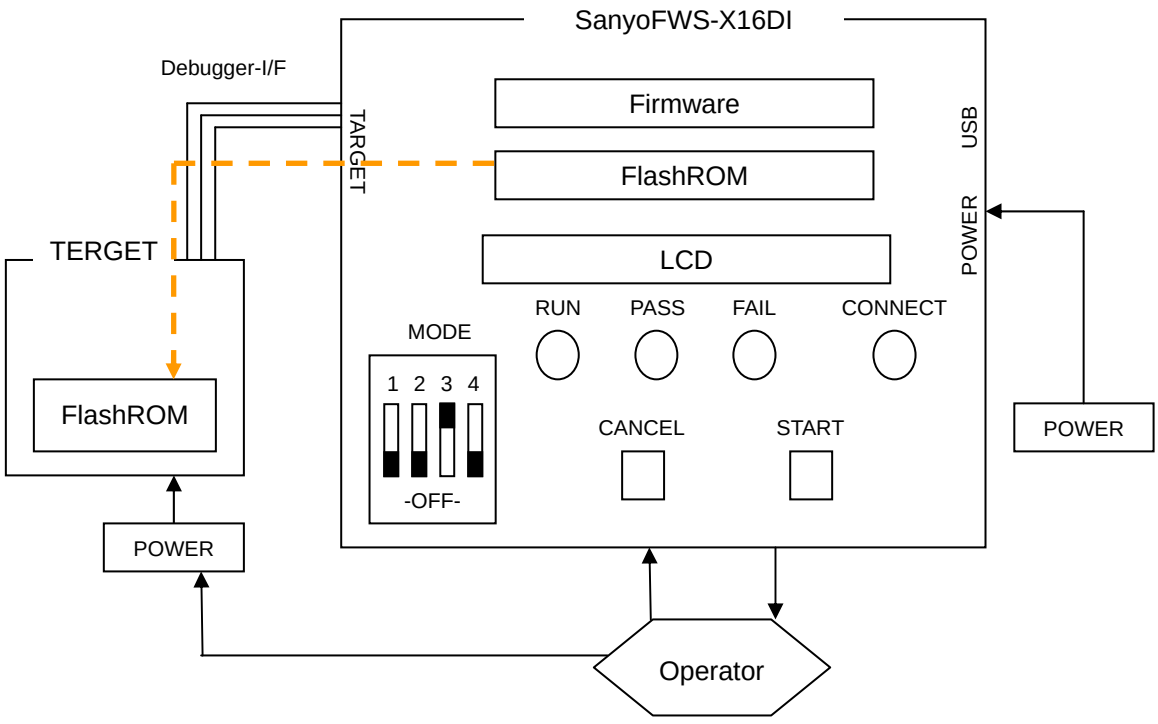


Figure 3.2.2.2 Standalone Manual Mode Block diagram B (Write)

3.2.3 Standalone Automatic Configuration

Writing is carried out by the ROM writer unit alone and no personal computer is required in this configuration.

The user data is downloaded into the flash ROM of the writer unit in the download mode. Writing the user data is carried out by the operator connecting the target Debugger-I/F lines (3 lines), powering on the target single-chip microcontroller. Writing operation starts automatically by detecting power on of the Target.

When writing is completed, PASS or FAIL LED turns on and SUCCESS or ERROR is displayed on the LCD.

The operator can take the following actions in the standalone automatic mode:

1) Write
2) Write + Read protection

Downloading and setup for read protection of the data are specified from a personal computer via USB using SanyoFWS.

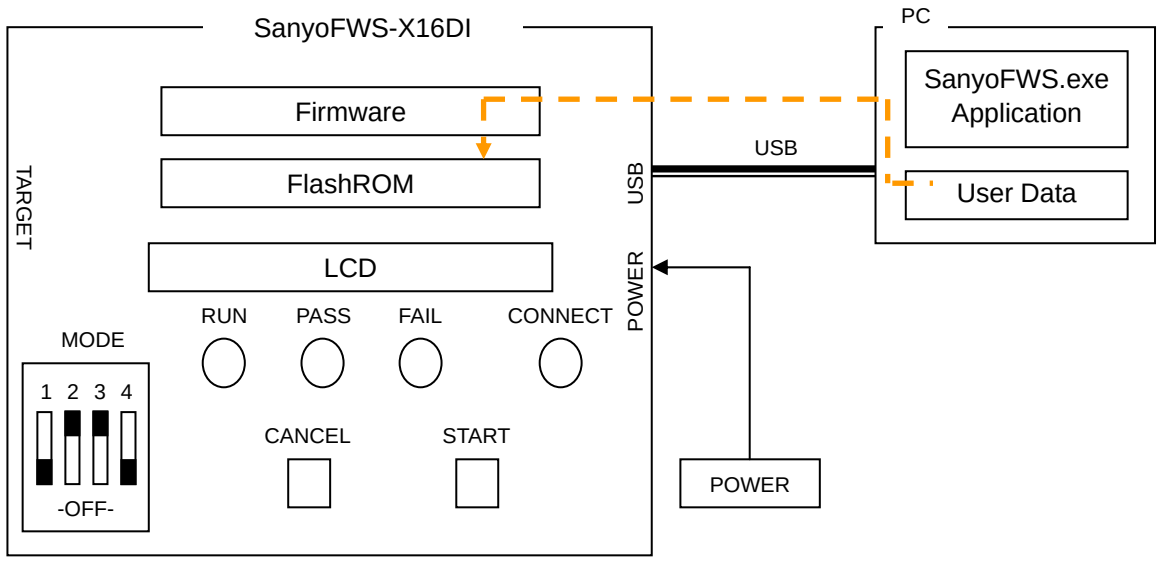


Figure 3.2.3.1 Standalone Automatic Mode Block Diagram A (Data Download)

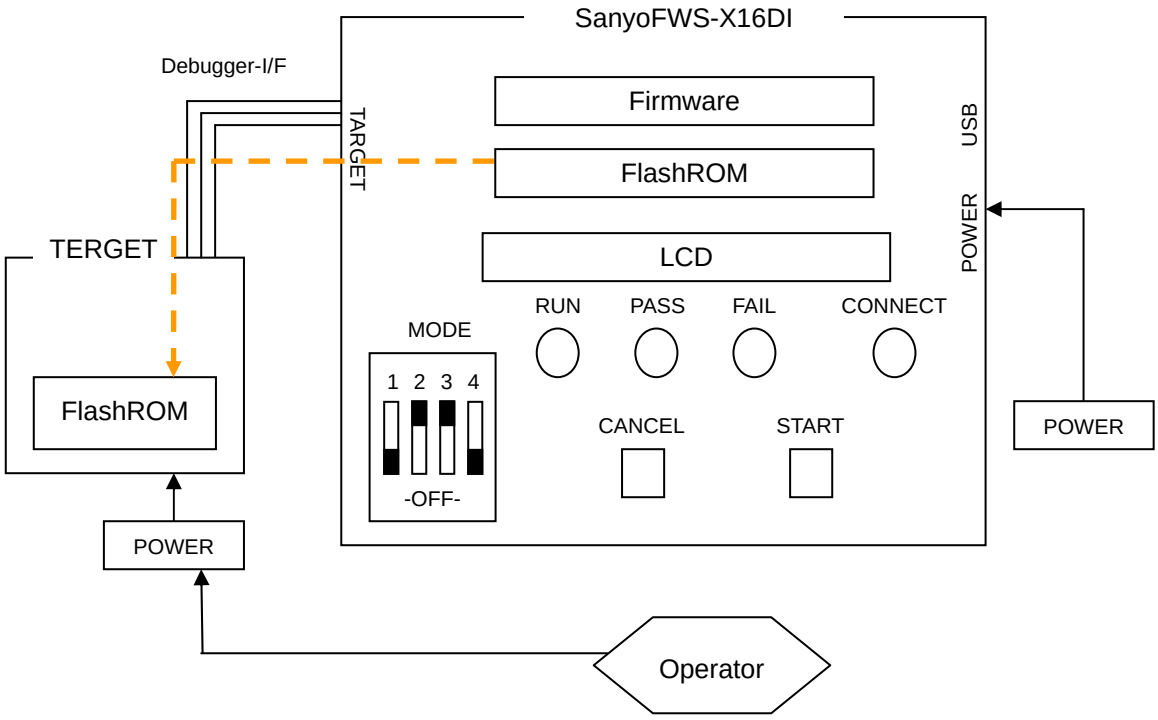


Figure 3.2.3.2 Standalone Automatic Mode Block Diagram B (Write)

3.3 Device Driver

Windows will ask you to install a device driver when you start SanyoFWS in the firmware update, standard, or download mode on a personal computer for the first time.

In the firmware update mode, install the device driver specifying the directory:

C:¥Program Files¥***SanyoLSI¥SanyoFWS***¥UpdFirm

In the standard mode or download mode, install the device driver specifying the directory:

C:¥Program Files¥***SanyoLSI¥SanyoFWS***¥DevDrv

Note: "C:¥Program Files¥***SanyoLSI¥SanyoFWS***¥" is the default name of the directory in which SanyoFWS is installed.

4. Updating the Firmware

4.1 Startup Procedure

SanyoFWS will start in the firmware update mode when you turn on power while holding down the START button after setting the mode switches as follows: 4 = OFF, 3 = OFF, 2 = OFF, 1 = OFF

In this case, nothing appears on the LCD and only the RUN indicator flashes at short intervals.

Hold down the START button until you recognize that RUN indicator is flashing, then release the START button.

4.2 Operating Procedure

On the personal computer, choose

[Start Menu] → [SanyoFWS Flash-micro Writing System] → [Firmware Update]

and follow the instructions on the screen to update the firmware.

After completing the update, power off the writer unit temporarily.

4.3 Cautions

Do not connect the debugger interface (3-wire cable) when starting SanyoFWS in the firmware update mode. These signals are unstable in the firmware update mode and unexpected signals may be sent to the device that is connected.

The data that is downloaded for standalone configuration is deleted after the update. Be sure to download the write data after you updated the firmware.

5. Unit ID Setup Mode

5.1 Startup Procedure

Set the mode switch 4 to OFF, switch 3 to OFF, switch 2 to OFF, and 1 to OFF and turn on power while holding down the CANCEL button, and SanyoFWS will start in the unit ID setup mode. Release the CANCEL button after SanyoFWS is started. The initial mode value is AUTO.

On the LCD panel, the first line shows "SET-UID" and the version number of the firmware, and the second line indicates the current unit ID.

The LEDs, on the other hand, indicate the RUN, PASS, FAIL, and CONNECT conditions as binary numbers (BIT3 = RUN, BIT2 = PASSSS, BIT1 = FAIL, BIT0 = CONNECT); the four LEDs flash when AUTO is selected.

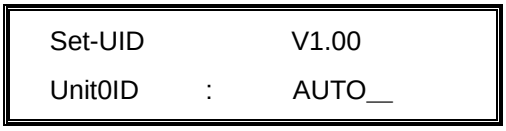


Figure 5.1 Sample LCD Display in Unit ID Setup Mode

5.2 Operating Procedure

The unit ID can be incremented and decremented by one with the START button and CANCEL button, respectively, so that 17 choices (unit IDs 0 to F and AUTO) can be selected. AUTO refers to the mode in which a free unit ID is automatically assigned when SanyoFWS starts. After completing the setup, turn off the writer unit temporarily so that the settings are established.

5.3 LCD Display

The current unit ID is shown.

5.4 LED Display

The current unit ID is displayed as a binary number (BIT3 = RUN, BIT2 = PASS, BIT1 = FAIL, BIT0 = CONNECT). Four LEDs flash when AUTO is selected.

6. Standard Mode

6.1 Startup Procedure

Set the mode switch 4 to OFF, switch 3 to OFF, switch 2 to OFF, and 1 to OFF and turn on power, and SanyoFWS will start in the standard mode.

On the LCD panel, the first line shows "Standard" and the version number of the firmware, and the second line indicates the current unit ID.

6.2 Operating Procedure

On the personal computer, choose

[Start Menu]→[SanyoFWS Flash-micro Writing System]→[SanyoFWS]

See Online Help for the SanyoFWS operating procedure.

6.3 LCD Display

The LCD indicates the current processing while SanyoFWS is running. If an error occurs, the LCD display indicates the contents of the error.

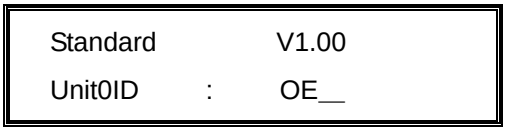


Figure 6.3.1 Sample LCD Display at Power-on Time (Standard Mode)



Figure 6.3.2 Sample LCD Display at SanyoFWS Start Time (Standard Mode)

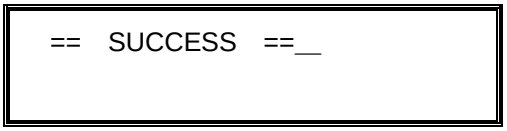


Figure 6.3.3 Sample LCD Display at Normal Termination Time (Standard Mode)

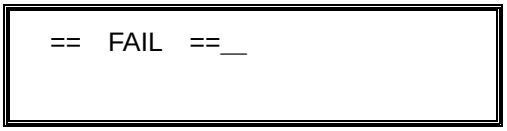


Figure 6.3.4 Sample LCD Display at Abnormal Termination Time (Standard Mode)



Figure 6.3.5 Sample LCD Display after SanyoFWS is Stopped (Standard Mode)

6.4 LED Display

The “CONNECT” LED is flashing if the communication between the target single-chip microcontroller and the debugger interface is not ready. The LED stays on when the communication gets ready.

"RUN" LED: Stays on while SanyoFWS is running. Turned off when SanyoFWS terminates normally or in error.

"PASS" LED: Turns on when an operation such as write terminates normally and turns off when the next operation starts. The LED turns off when the SanyoFWS program is stopped.

"FAIL" LED: Turns on when an error occurs during execution, a communication-related error occurs on the debugger interface, or an error that is related to flash ROM manipulation occurs. The LED turns off when the next program operation starts or the SanyoFWS program is stopped.

"CONNECT" LED: Turns on when a communication is established between the target single-chip microcontroller and the debugger interface and flashes otherwise. If the power to the target is turned on and off by the power control signal from the writer unit, no communication is established and "CONNECTED" flashes before an operation is started because the target power is off. When the operation start, power is turned on and the LED switches on. If you are turning on and off power manually, power is already on before an operation is started and the CONNECTED LED turns on when a communication is established, so that you can check this LED to determine if the power supply and the interface are connected properly.

7. Download Mode

7.1 Startup Procedure

Set the mode switches to either one of the following settings:

1) "4 = OFF, 3 = ON, 2 = OFF, 1 = OFF"
2) "4 = OFF, 3 = ON, 2 = ON, 1 = OFF"

Then, turn on power while holding down the CANCEL button, and SanyoFWS will start in the download mode. Release the CANCEL button after SanyoFWS is started.

On the LCD panel, the first line shows "Download" and the version number of the firmware, and the second line indicates the current unit ID.

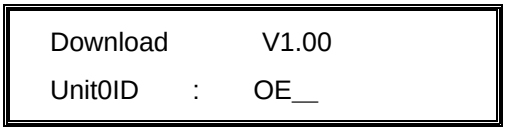


Figure 7.1.1 Sample LCD Display at Power-on Time (Download Mode)

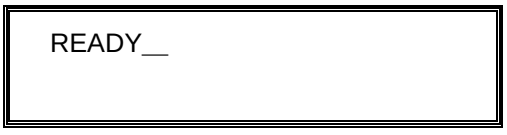


Figure 7.1.2 Sample LCD Display at SanyoFWS Start Time (Download Mode)

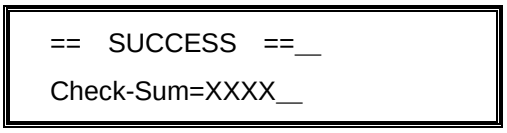


Figure 7.1.3 Sample LCD Display at Normal Termination (Download Mode)

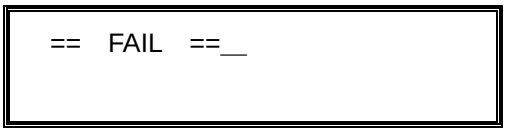


Figure 7.1.4 Sample LCD Display at Abnormal Termination (Download Mode)



Figure 7.1.5 Sample LCD Display after SanyoFWS is Stopped (Download Mode)

7.2 Operating Procedure

The operating procedure and LCD/LED displays are identical to those for the standard mode except the two points listed below. See Chapter 6, Standard Mode, for details.

1) The destination is not the single-chip microcontroller connected to the debugger interface but the flash ROM in the SanyoFWS-X16DI Flash ROM.
2) The "CONNECT" LED is always on.

The data that is written in this mode is written into the single-chip microcontroller in the standalone mode. If read protection is set up in this mode, read-protection is also set up when data is written in the standalone mode.

7.3 Check Sum

The SanyoFWS window shows the check sum of the write data. The same value is shown on the LCD at the end of a write operation in the download mode and at the start of standalone mode processing. Consequently, the check sum can be used to identify the version of the data or to make sure which product data is written in an environment in which one writer unit is used for two or more products.

8. Standalone Manual Mode

8.1 Startup Procedure

Set the mode switch 4 to OFF, switch 3 to ON, switch 2 to OFF, and 1 to OFF and turn on power, and SanyoFWS will start in the standalone manual mode.

On the LCD panel, the first line shows "Manual" and the version number of the firmware, and the second line indicates the check sum value of the write data (see Section 7.3, Check Sum").

8.2 Operating Procedure

Pressing the START button starts a write operation. If an error occurs during the write, press the CANCEL button to clear the error. Otherwise, you could not proceed with the next write operation.

8.3 LCD Display

The LCD indicates the current processing while SanyoFWS is running. If an error occurs, the LCD display indicates the contents of the error.

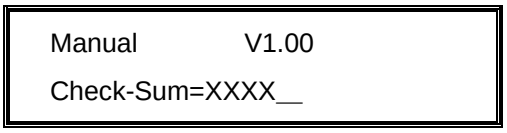


Figure 8.3.1 1 Sample LCD Display at Power-on Time (Standalone Manual Mode)

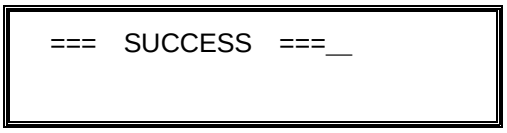


Figure 8.3.2 Sample LCD Display at Normal Termination (Standalone Manual Mode)

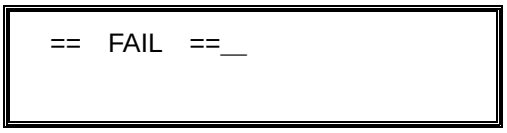


Figure 8.3.3 Sample LCD Display at Abnormal Termination (Standalone Manual Mode)

8.4 LED Display

"RUN" LED: Stays on while SanyoFWS is writing. Turned off when SanyoFWS terminates normally or in error.

"PASS" LED: Turns on when the write operation terminates normally and off at the beginning of the next write operation.

"FAIL" LED: Flashes when an error occurs during execution or when a communication-related error occurs on the debugger interface. It stays on when an error that is related to flash ROM manipulation occurs. The LED is turned off by pressing the CANCEL button.

"CONNECT"LED: Turns on when a communication is established between the target single-chip microcontroller and the debugger interface and flashes otherwise. If the power to the target is turned on and off by the power control signal from the writer unit, no communication is established and "CONNECTED" flashes before an operation is started because the target power is off. When the operation start, power is turned on and the LED switches on. If you are turning on and off power manually, power is already on before an operation is started and the CONNECTED LED turns on when a communication is established, so that you can check this LED to determine if the power supply and the interface are connected properly.

9. Standalone Automatic Mode

9.1 Startup Procedure

Set the mode switch 4 to OFF, switch 3 to ON, switch 2 to ON, and switch 1 to OFF, and SanyoFWS will start in the standalone automatic mode.

On the LCD panel, the first line shows "Automatic" and the version number of the firmware, and the second line indicates the check sum value of the write data (see Section 7.3, Check Sum").

9.2 Operating Procedure

SanyoFWS automatically starts a write operation when it detects that the target single-chip microcontroller is turned on via the power lines in the debugger interface cable. After the write operation ends, SanyoFWS starts the next write operation when it detects that the power is turned off temporarily and on again. If an error occurs during a write operation, its error status is and remains indicated on the LCD and LEDs until power is turned off. Note that the error display is automatically cleared once power is turned off.

9.3 LCD Display

The LCD indicates the current processing while SanyoFWS is running. If an error occurs, the LCD display indicates the contents of the error.

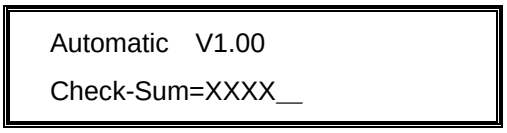


Figure 9.3.1 Sample LCD Display at Power-on Time (Standalone Automatic Mode)

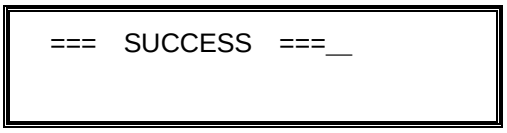


Figure 9.3.2 Sample LCD Display at Normal Termination (Standalone Automatic Mode)

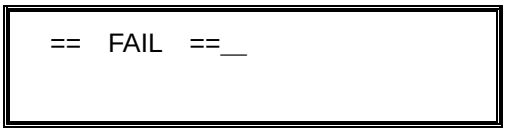


Figure 9.3.3 Sample LCD Display at Abnormal Termination (Standalone Automatic Mode)

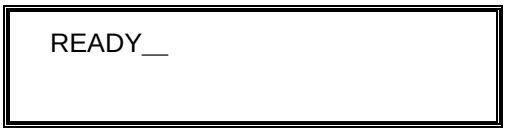


Figure 9.3.4 Sample LCD Display when Single-chip Microcontroller Power is Turned Off after Writing (Standalone Automatic Mode)

9.4 LED Display

"RUN" LED: Stays on while SanyoFWS is writing. Turned off when SanyoFWS terminates normally or in error.

"PASS" LED: Turns on when the write operation terminates normally and off when power is turned off.

"FAIL" LED: Flashes when an error occurs during execution or when a communication-related error occurs on the debugger interface. It stays on when an error that is related to flash ROM manipulation occurs. The LED is turned off when power is turned off.

"CONNECT"LED: Turns on when a communication is established between the target single-chip microcontroller and the debugger interface and flashes otherwise. If power is off, no communication is established and this indicator flashes.

If the connection with the interface and the power-on state of the target single-chip microcontroller continue for 0.5 second or longer, SanyoFWS starts a write operation.

9.5 Detecting the Presence of Power

SanyoFWS recognizes that power is turned on or off when the power-on or -off state continues for 0.5 second or longer. Make sure that the power supply power-on and -off sequence get stabilized within this period.

10. Behavior of the Single-chip Microcontroller before Data Writing

The single-chip microcontroller starts executing the program in flash ROM when it is powered on and its reset state is released. The SanyoFWS-X16DI stops the operation of the single-chip microcontroller at the beginning of an operation such as write via the debugger interface, so that the microcontroller cannot not execute the program during and after the write operation (until power is turned on again). The program, however, is executed during the period from power-on to the beginning of the write operation.

When writing a single-chip microcontroller embedded in a unit, it is necessary to take measures so that this program execution performed before the write operation will not cause damage to the peripheral circuits. Some of recommended countermeasures are given below.

(1) Stop supplying power to or disable peripheral circuits that may cause problems during the write period.

(2) Keep the reset signal to the single-chip microcontroller on while the write operation is in progress.