CORELIS

TAP Multiplexer

TAP Multiplexer
TAP Signal Switching Pod

User's Manual

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Preface

PRINTING HISTORY

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition is published.

A software code may be printed before the date; this indicates the version of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one to one correspondence between product updates and manual updates.

Revision A, June 2007
Revision B, February 2011

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Table of Contents

List of Figures

List of Tables

Chapter 1
Product Overview

Introduction

The TAP Multiplexer module is an add-on accessory that contains electro-mechanical relays for switching between a Corelis boundary-scan controller and a third party emulation controller. The TAP Multiplexer is operated under host software control and provides electrical switching of all the TAP signals. It is compatible with the various Corelis boundary-scan controllers and ScanTAP intelligent modules and is mostly used when integrating the Corelis boundary-scan test tools with other emulator hardware such as the Macraigor usb2Demon. By coupling the power of the ScanExpress boundary-scan tools with that of an emulator, a complete and integrated solution is now available that offers the best advantages of both boundary-scan and functional test methodologies.

Boundary-scan (JTAG) operates as the complementary companion to functional testing. Boundary-scan is the preferred solution for testing areas of printed circuit board assemblies that are difficult to access due to physical space constraints and lack of physical access, which is often due to fine pitch components such as Ball Grid Array (BGA) devices. The functional tests are executed at the processor speed and may be able to detect board level faults such as a cold solder joint between the processor and a memory pin that boundary-scan will not. Additionally, the functional tests may check non-boundary-scan compatible portions of the unit under test (UUT) such as UARTs, ADCs, DACs, and I2C peripherals.

The TAP Multiplexer utilizes electro-mechanical relays to physically disconnect and isolate the TAP signals so that they do not interfere with each other. The TAP Multiplexer module is shown in Figure 1-1.

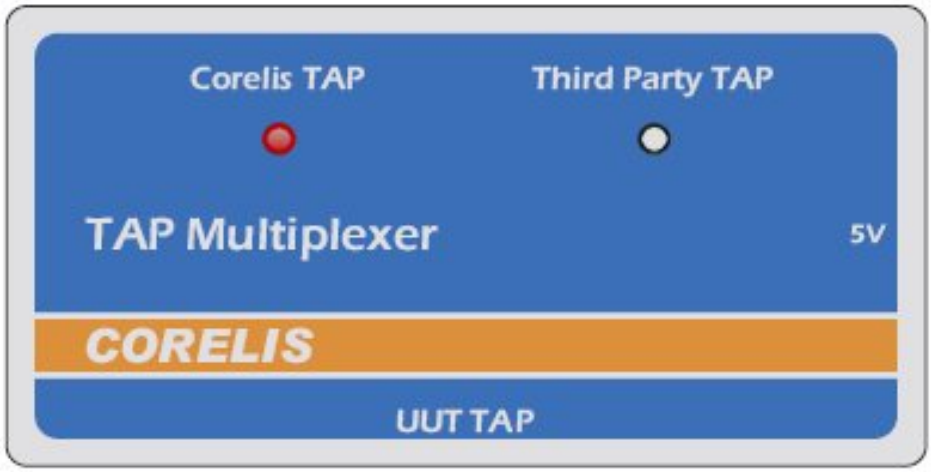

Figure 1-1. TAP Multiplexer Module (Top View)

The following TAP Multiplexer versions are currently available from Corelis:

- 14-pin TI, Corelis P/N 10394
- 16-pin PowerPC, Corelis P/N 10395
- 20-pin ARM, Corelis P/N 10396

TAP Multiplexer Specifications

Corelis Controller Interface

Host Connector	20-pin header, AMP part no. 1761607-7 or equivalent
Host Cable	20-pin to 20-pin (12”), Corelis P/N 15312-2

Third Party and UUT TAP Interfaces (14-pin) TI Version

TAP Connector	14-pin header, AMP part no. 1761607-5 or equivalent
Mating TAP Connector	14-pin IDC (flat cable), 3M part no. 3421-6614 or equivalent
TAP Cable	14-pin to 14-pin (12”), Corelis P/N 15443

Third Party and UUT TAP Interfaces (16-pin) PowerPC Version

TAP Connector	16-pin header, AMP part no. 1761607-6 or equivalent
Mating TAP Connector	16-pin IDC (flat cable), 3M part no. 3421-6616 or equivalent
TAP Cable	16-pin to 16-pin (12”), Corelis P/N 15444

Third Party and UUT TAP Interfaces (20-pin) ARM Version

TAP Connector	20-pin header, AMP part no. 1761607-7 or equivalent
Mating TAP Connector	20-pin IDC (flat cable), 3M part no. 3421-6620 or equivalent
TAP Cable	20-pin to 20-pin (12”), Corelis P/N 15312-2

Physical

Enclosure Dimensions	4.0 inches × 2.0 inches × 1.0 inches (± 0.25 inches)

Power Requirements

Power can either by provided by a Corelis Intelligent Pod (such as a ScanTAP-4 or ScanTAP-8) or an optional external 5V power supply. An internal circuit automatically senses if the external 5V supply is plugged in, otherwise the TAP Multiplexer draws its power (approximately 25mA) from the Corelis ScanTAP pod.

Operating Environment

Temperature	0°C to 55°C
Relative Humidity	10% to 90%, non condensing

Storage Environment

Temperature	-40°C to 85°C

Chapter 2
TAP Multiplexer Installation and Usage

When you receive the TAP Multiplexer product it should contain the following items:

- TAP Multiplexer Module (14, 16 or 20-pin version)
- Corelis TAP Cable, 20-pin to 20-pin Cable (12 inch), Corelis P/N 15312-2
- Third Party and UUT TAP Interface Cables (14, 16 or 20-pin) matching the TAP Multiplexer Module
- 5V Power Supply

Please ensure that all materials listed are present and free from visible damage or defects before proceeding. If anything appears to be missing or damaged, contact Corelis at the number listed on the title page immediately.

NOTE: The actual hardware shipped with the TAP Multiplexer may vary depending on the customer order.

The Corelis TAP Multiplexer module connects to the Corelis boundary-scan controller or Corelis ScanTAP family of intelligent pods (ScanTAP-4, ScanTAP-8) through a 20-pin flat ribbon cable. No external power supply is required if the ScanTAP family is used, those pods are able to supply it. The connections between the components in a typical boundary-scan and functional test system are shown below in Figure 2-1.

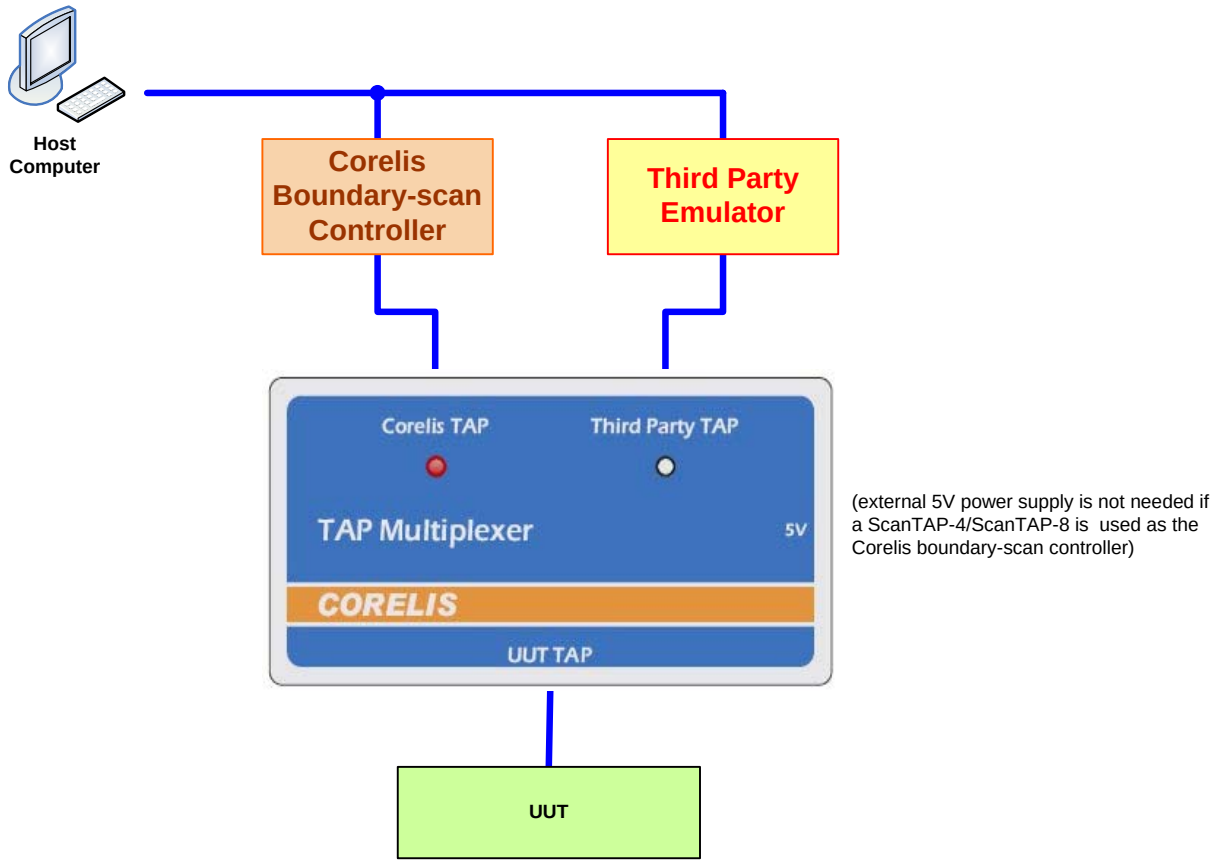

Figure 2-1. TAP Multiplexer Connection Diagram

There are three connectors on the TAP Multiplexer. The connector marked **Corelis TAP** connects to the Corelis boundary-scan controller or ScanTAP pod. The connector marked **Third Party TAP** connects to the emulator hardware used for the functional testing. The connector marked **UUT TAP** connects to the target unit under test (UUT).

The TAP Multiplexer was designed to directly support the pinout of the standard UUT TAP connectors and the third party emulator hardware with 1:1 cables.

Connecting to the Corelis Boundary-scan Controller

The Corelis TAP Multiplexer module connects to the Corelis boundary-scan controller or ScanTAP family of intelligent pods (ScanTAP-4, ScanTAP-8) through a 20-pin flat ribbon cable. The top view of the 20-pin host connector (0.100" x 0.100" spacing) is shown in Figure 2-2 below.

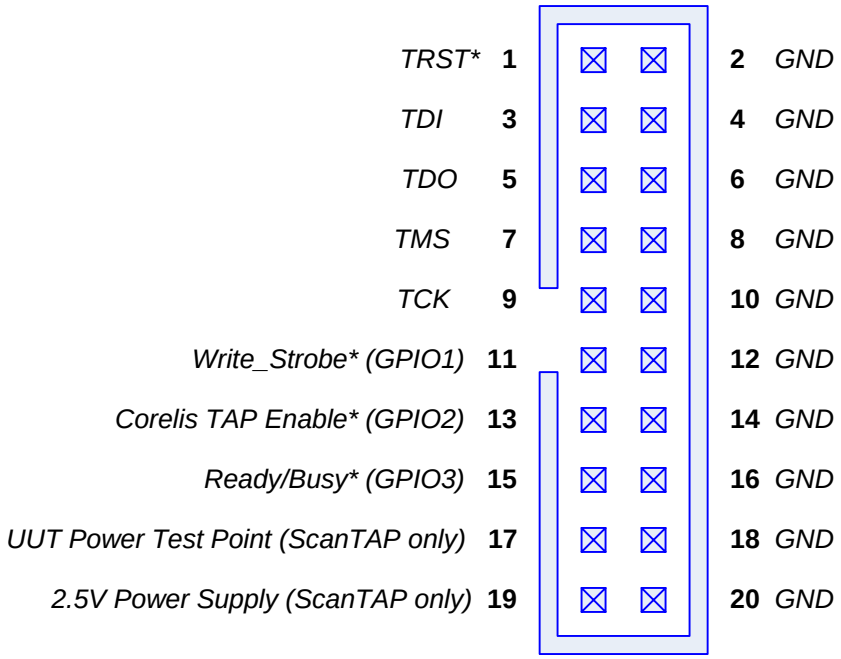

Figure 2-2. 20-Pin Corelis TAP Host Connector (top view)

Pin 13 (GPIO2) on the Corelis TAP connector is used to control the TAP Multiplexer selection. If GPIO2 is low '0', then the Corelis TAP is enabled. If GPIO2 is high '1', then the third party emulator TAP is enabled. The GPIO2 pin on the TAP Multiplexer has an internal pullup so that if the pin is floating or the Corelis TAP cable is not connected, then the third party TAP is enabled by default.

Connecting to the Target

The TAP Multiplexer connects to the third party emulator TAP and UUT TAP via 1:1 flat cables. The following tables show the connector pinouts.

14-pin (TI) Version Connector Pinout

UUT Pin	UUT Signal Name	Corelis TAP Pin (GPIO2 = '0')	Third Party TAP Pin (GPIO2 = '1')
1	TMS	7	1
2	TRST*	1	2
3	TDI	3	3
4	TDIS	N.C.	4
5	TVD	N.C.	5
6	KEY	N.C.	N.C.
7	TDO	5	7
8	GND	8	8
9	RTCK	N.C.	9
10	GND	10	10
11	TCK	9	11
12	GND	12	12
13	EMU0	11 (GPIO1)	13
14	EMU1	13 (GPIO3)	14

Table 2-1. 14-pin Connector (TI) Pinout

16-pin (Power PC) Version Connector Pinout

UUT Pin	UUT Signal Name	Corelis TAP Pin (GPIO2 = '0')	Third Party TAP Pin (GPIO2 = '1')
1	TDO	5	1
2	QACK	N.C.	2
3	TDI	3	3
4	TRST*	1	4
5	STOP	N.C.	5
6	VCC Target	N.C.	6
7	TCK	9	7
8	CKSTP_IN	N.C.	8
9	TMS	7	9
10	N.C. (not used)	N.C.	N.C.
11	SRESET	11 (GPIO1)	11
12	GND	12	12
13	HRESET	13 (GPIO3)	13
14	N.C. (reserved)	N.C.	N.C.
15	CKSTP_OUT	N.C.	15
16	GND	16	16

Table 2-2. 16-pin Connector (PowerPC) Pinout

20-pin (ARM) Version Connector Pinout

UUT Pin	UUT Signal Name	Corelis TAP Pin (GPIO2 = '0')	Third Party TAP Pin (GPIO2 = '1')
1	VTREF	N.C.	1
2	VSUPPLY	N.C.	2
3	TRST*	1	3
4	GND	4	4
5	TDI	3	5
6	GND	6	6
7	TMS	7	7
8	GND	8	8
9	TCK	9	9
10	GND	10	10
11	RTCK	N.C.	11
12	GND	12	12
13	TDO	5	13
14	GND	14	14
15	SRST*	N.C.	15
16	GND	16	16
17	DBGRQ	15 (GPIO3)	17
18	GND	N.C.	18
19	DBGACK	11 (GPIO1)	19
20	GND	N.C.	20

Table 2-3. 20-pin Connector (ARM) Pinout

Switching Between TAPs

The TAP Multiplexer defaults to the Third Party TAP unless the Corelis TAP is specifically enabled by driving GPIO2 (parallel IO bit 1, pin 13 on the Corelis TAP connector) low.

To set up the parallel I/O to enable the Corelis TAP, go to the ScanExpress Runner main window. Select ***Parallel I/O*** from the ***Setup*** menu as shown in Figure 2-3***.***

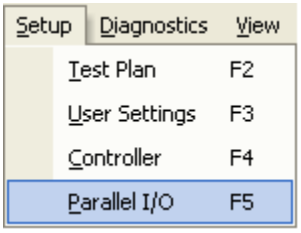

Figure 2-3. ScanExpress Runner Setup Menu

Check the box labeled "***Set Initial Hex Value to:***" and enter the hex value "***0xFFFD"*** into the text field. Configure the rest of the settings as shown in Figure 2-4. Please note that it is necessary to wait a short amount of time (~10 ms) once the GPIO2 signal has been set for the relays to activate.

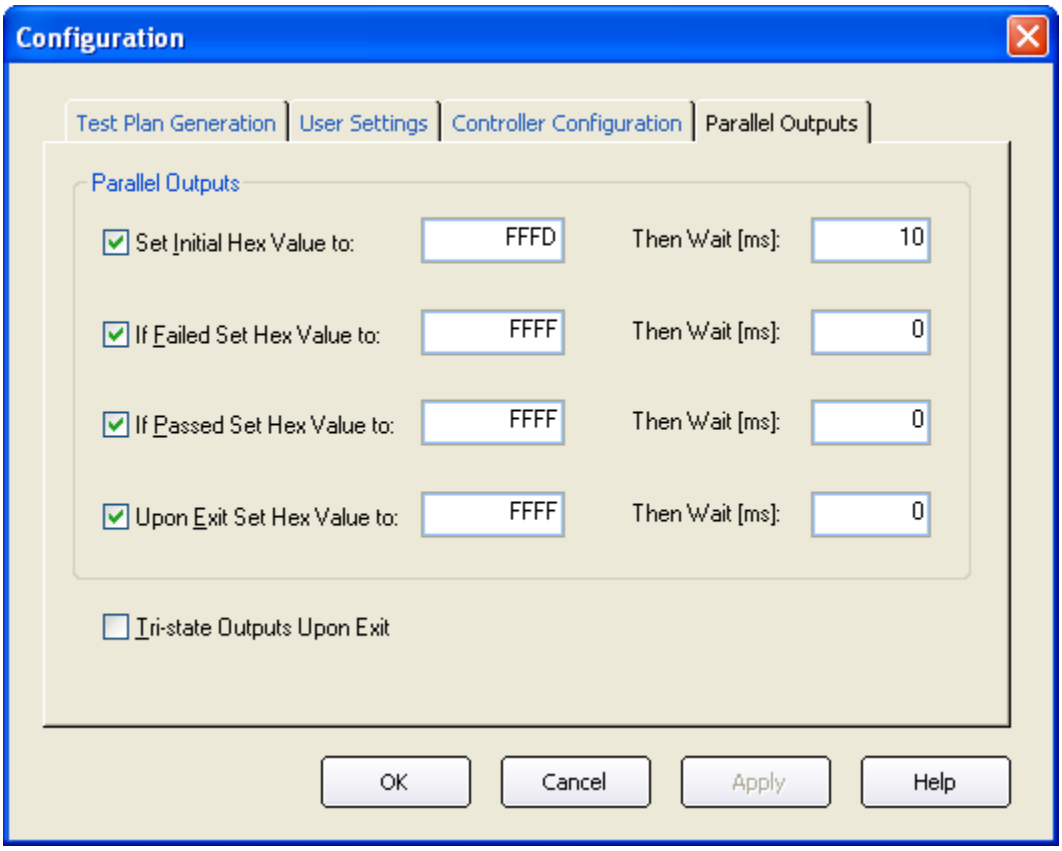

Figure 2-4. ScanExpress Runner Parallel Output Configuration Dialog

TAP Multiplexer LEDs

The red LEDs on the top cover of the TAP Multiplexer will illuminate to indicate which relays are active. The LED labeled "Corelis TAP" indicates the 20-pin Corelis TAP is active (Figure 2-5). The LED labeled "Third Party TAP" indicates that the other TAP is active (Figure 2-6).

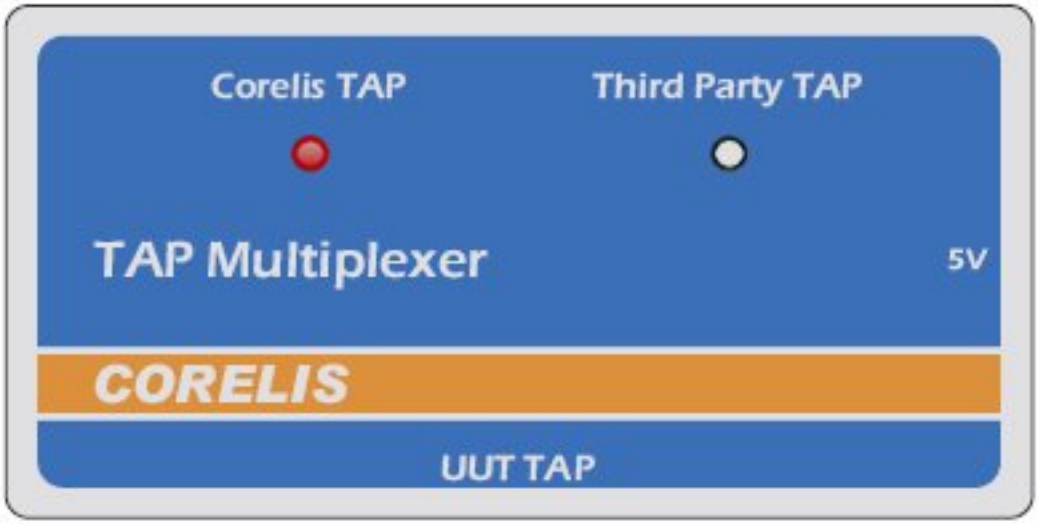

Figure 2-5. Corelis TAP Enabled

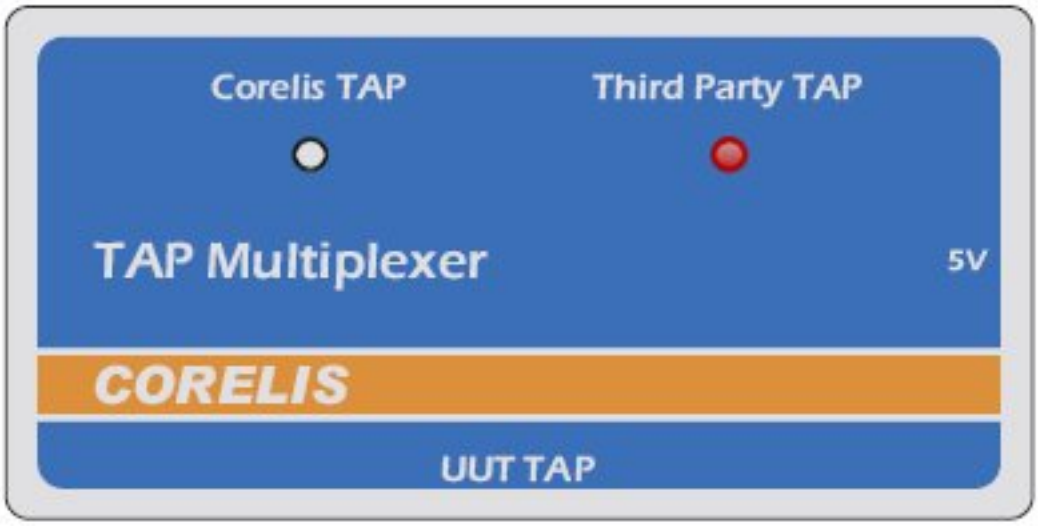

Figure 2-6. Third Party TAP Enabled

If neither LED is illuminated, the TAP Multiplexer is not receiving power, either from a Corelis ScanTAP-4 or ScanTAP-8 boundary-scan controller or an external 5V power supply.