

***303A-011A CMOS /BIPOLAR P/T ADAPTER***

---

***Operator's Manual***

981-0045-007

March 1989

*Data I/O Corporation warrants to the original purchaser of the product described by this manual that the product was fully functional to the extent of its specification at the time of shipment from the factory. Data I/O further certifies that the equipment used to test the product was calibrated to standards that are traceable to the national bureau of standards as appropriate. Data I/O has made every attempt to ensure that the information in this document is accurate and complete. However, Data I/O assumes no liability for errors, or for any damages that result from use of this document or the equipment which it accompanies.*

**ORDERING INFORMATION**

When ordering this manual, use Part Number 981-0045-007, which applies to Engineering Part Number 716-0045-007 and up. The 303A- 011A P/T adapter must be used with the LogicPak V04 (950-1942- 006) or later.

Data I/O® is a registered trademark of Data I/O Corporation.  
LogicPak™ is a trademark of Data I/O Corporation.

Copyright 1989, Data I/O Corporation. All rights reserved.  
Printed in the United States of America.

# SAFETY SUMMARY

General safety information for operating personnel is contained in this summary. In addition, specific WARNINGS and CAUTIONS appear throughout this manual where they apply and are not included in this summary.

## DEFINITIONS

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

CAUTION statements identify conditions or practices that could result in damage to equipment or other property.

## SYMBOLS

$V \sim$  This symbol stands for V AC. For example,  $120 V \sim = 120 V AC$ .

## GROUNDING THE PRODUCT

The product is grounded through the grounding conductor of the power cord. To avoid electric shock, plug the power cord into a properly wired and grounded receptacle only. Grounding this equipment is essential for safe operation.

## POWER CORD

Use only the power cord specified for your equipment.

## SERVICING

To reduce the risk of electric shock, do not perform any servicing other than that described in this manual.

## FUSE REPLACEMENT

For continued protection against the possibility of fire, replace only with a fuse of the specified voltage, current and type ratings.



# INTRODUCTION

## CAUTION

---

***If your 303A-011A P/T adapter is at Version 1 (V1), to update to Version 2 (V2) or higher, you must have both the firmware provided in the 953-0045 Firmware Update Kit and the new daughter board (701-2138-001) provided in the 951-0043 Hardware Update Kit. Once both kits have been successfully installed, your adapter is at V2 or up. Version 1 (V1) firmware will not work with the 701-2138 daughter board.***

If your 303A-011A P/T adapter is at Version 2 (V2) or later, you do not need the 951-0043 Hardware Update Kit.

This manual contains adapter-specific information pertaining to the 303A-011A CMOS Bipolar P/T adapter. The following information is presented:

Specifications - This section provides the physical specifications of the 303A-011A P/T adapter.

- Adapter-Specific Operating Information - This section contains operating or procedural information specific to the 303A-011A P/T adapters.

## NOTE

***This document contains adapter-specific information: operating characteristics unique to the 303A-011A. The LogicPak Operator's manual, the maintenance manual, and your programmer manual provide all basic operation information; refer to these manuals for operation, maintenance and programming information. If you would like to order the new LogicPak Operator's manual or the Maintenance manual, call your local representative.***

## OVERVIEW

The 303A-011A CMOS Bipolar P/T (Programming/Testing) adapter consists of three zero-insertion force sockets with interface circuitry and EPROMs (erasable, programmable read-only memory) mounted in a metal frame; see the following figure. The P/T adapter is used with the Data I/O 303A LogicPak to match programming electronics to the specific devices you are using. The 303A-011A P/T adapter supports the devices listed in the table in the accompanying User Notes (984-0045). Any hardware and firmware unique to the 303A-011A programmable logic devices are resident in the P/T adapter; all other necessary hardware and firmware are in the LogicPak or in the programmer.

In addition to the verify and functional test routine options available in all Data I/O P/T adapters, the 303A-011A provides an automatic device continuity check. This automatic check detects if there is a loose or broken connection in the socket and that the device is properly inserted. The continuity test is automatically performed at the beginning of a device-related operation such as load, program or verify. (This function can also be disabled; refer to the section on Adapter-Specific Operating Information.)

### NOTE

*The 303A-011A P/T adapter must be used with the LogicPak V4 (950-1942-006) or later.*

## SPECIFICATIONS

The P/T adapter receives its power from the LogicPak and the programmer power supplies. Programming waveforms are generated from programmer supplies using the digital-to-analog converters (DAC). Controlling firmware is located on a circuit board in the P/T adapter.

- Altitude (operating): sea level to 3 km (10,000 ft)
- Humidity (operating): 90% maximum (noncondensing)
- Temperature (operating): 5 to 45°C (41 to 113°F)
- Temperature (storage): -40 to 70°C (-40 to 158°F)
- Weight: 0.425 kg. (15 oz.)
- Dimensions: 16.6 x 12.3 x 3.93 cm. (6.54 x 4.84 x 1.55 in.)

## FIELD APPLICATIONS SUPPORT

Data I/O has field applications engineers throughout the world. They can provide additional information about interfacing Data I/O products with other systems and answer questions about your equipment. Please call one of the numbers listed below for the number of your local service center.

In the U.S.: (800) 247-5700  
(except for Washington State, call (206) 881-6444)  
Data I/O Canada: (416) 678-0761  
Data I/O Europe: 011-31-20-6622-866  
Data I/O Japan: 001-81-3-432-6991  
All other locations: (206) 881-6444

## WARRANTY

The 303A-011A P/T adapter is warranted against defects in materials and workmanship. The warranty period of one year begins when you receive the equipment; the warranty card included with the shipment explains the length and conditions of the warranty. For warranty service, contact your nearest Data I/O service center.

## SERVICE

Data I/O maintains service centers throughout the world, each staffed with factory-trained technicians to provide prompt, quality service. This includes not only repairs, but calibration of all Data I/O products. Please call one of the numbers listed above for the number of your local service center.

## COMPATIBILITY

### Programmer

The 303A-011A P/T adapter will work with the following Data I/O programmers only:

- 29A, minimum 16K RAM
- 29B, minimum 16K RAM
- System 19, minimum 16K RAM

### NOTE

*The 303A-011A P/T adapter will not work with the 100A programmer.*

## Adapter

The 303A-011A, version 2 (V2) and up, P/T adapter is no longer directly compatible with the PALASM design adapter. If you developed a design on the PALASM adapter and want to use the design with the 303A-011A P/T adapter, you must:

1. Upload the JEDEC file from the PALASM adapter to a host (PC).
2. Clear RAM by pressing **SELECT A 4 START**.
3. Install the 303A-011A P/T adapter on the programmer.
4. Download the JEDEC file from the host to the 303A-011A.



## ADAPTER-SPECIFIC OPERATING INFORMATION

### Security Fuse

When programming a device, the state of the security fuse is read. If the security fuse is already blown, the programming operation will be aborted and error 39 will result. Not all devices have this capability.

### Register Preload

In some devices that normally have the register preload feature, after their security fuse has been blown, these devices no longer have the register preload capability. These devices are identified in the User Notes, document number 984-0045.

### Logic Fingerprint Test Limitations

It is important that you recognize when devices are programmed with Logic Fingerprint Test Limitations and that the Logic Fingerprint test will reject them. These devices can still be tested by using structured test vectors.

**NOTE**

*Some devices do not support Logic Fingerprint because of hardware limitations; error 7A will result. These devices are identified in the User Notes, document number 984-0045. Refer to the Error Code table in this manual for a description of this and all error codes particular to the 303A-011A P/T adapter.*

## MMI and National Semiconductor Devices - Auto Preset

The 303A-011A P/T adapter has an added feature which greatly improves Logic Fingerprint testing of MMI and National Semiconductor registered PALs with pinout codes less than 30. It contains a routine which automatically presets the registers in the PAL prior to the Logic Fingerprint test.

If you program the security fuse on these devices, the device registers will auto-preset to a different state after the security fuse is blown. This will result in a different Logic Fingerprint test sum than the one "learned" from a master device with the security fuse intact. If you have devices in which the security fuse has been blown, you will need to generate another Logic Fingerprint test-sum for these programmed parts to be checked against. This second Logic Fingerprint test-sum can then be recorded for future manual entry or stored in a JEDEC format file. Refer to your LogicPak manual for more information on Logic Fingerprint test limitations.

### NOTE

*Because of hardware differences between the 303A-001 and the 303A-011A P/T adapters, Logic Fingerprints will need to be "re-learned" on the 303A-011A for all devices that were once fingerprinted on the 303A-001 P/T adapter.*

## Continuity Check

Previously, it was possible to program devices in a socket that had a loose or broken connection; and only after a verify test could the programming error be detected. It is possible that the device could not be programmed again to the desired pattern. The continuity test verifies before programming begins that the device is making proper contact with the socket pins and that the data from the master device will be correctly transferred. When you receive the 303A-011A P/T adapter, the continuity check function is enabled; and each time you power up, the continuity check will be enabled.

By using Select Code E2 from the programmer front panel, you can disable the automatic continuity check. When E2 is selected, you may then change the continuity option by selecting:

- 0=Enabled
- 1=Disabled

### NOTE

*If there is a continuity error, or if a device is incorrectly inserted into the socket, continuity error 3B will result. Refer to the Error Code table in this manual for a description of this and all error codes particular to the 303A-011A P/T adapter.*

## RAM Capacity

To use the 303A-011A P/T adapter, the programmer must have a minimum of 16K RAM. The following table shows the RAM sizes and the maximum number of test vectors that each can accommodate.

RAM Size	Maximum Number of Vectors
16K RAM (minimum)	256
64K RAM	1792
128K RAM	3840
256K RAM	7936
1MB	9999

## Electronic Signature

An electronic signature is used to prohibit programming a device using the wrong family and pinout codes. Upon power up, the electronic signature is enabled but is only checked on devices that support it (see the Error Code section in this manual for errors particular to the electronic signature function).

## 303A-011A RAM LOCATION

### Receive JEDEC Data

This command (see the LogicPak Operator's manual for definitions) prepares the programmer to receive JEDEC data from a peripheral device via the serial port. When errors occur because the serial port is not receiving proper data in the JEDEC format; you can determine the field in which the error occurred by examining data RAM location 3C09 for the 303A-011A P/T adapter and data RAM location 0408 for the other P/T adapters. Refer to page 5-28 in the LogicPak manual for the procedure to examine data RAM.

#### NOTE

*Make a note on page 5-28 in your LogicPak Operator's manual that the data RAM location is different when using the 303A-011A P/T adapter. Wherever the data RAM location is indicated as 0408, for the 303A-011A P/T adapter only, it should be 3C09.*

The transmission checksum computed by the LogicPak may be found by examining data RAM locations 3C05 and 3C06. On page 5-29 in the LogicPak manual, note that for all other P/T adapters, the data RAM location is 405 and 406.

## ERROR CODES

The following table lists error codes particular to the 303A-011A P/T adapter. A complete list of error codes common to all P/T adapters and programmers is found in the LogicPak Operator's manual, 981-0142, Appendix A.

### ERROR CODES

Code	Name	Description	Corrective Action
A2	Electronic Signature Error	This error results when the inserted device lacks an electronic signature, or the electronic signature read from the device does not correspond to the selected family/pinout code.	Enter the correct family/pinout code.
3A	Defective Device Error	Device does not meet manufacturer's specifications	Remove device and try another device.
3B	Continuity Error	Device is incorrectly inserted in the socket or there is a loose or broken connection.	Reinsert the device and make sure the pins are making contact.
39	Security Fuse Error	Security fuse blown.	Remove device and try another device.
7A	Logic Fingerprint Error.	Logic Fingerprint not allowed for this device.	Set number of fingerprint cycles to zero.
7B	Buried Register Error	Proper sequencing not followed when entering vectors.	"Buried Register Preload not fully implemented at this time."
7C	Illegal Fuse Data	One or more fuse states in Data RAM are illegal for the particular device selected.	Correct fuse data in RAM to meet manufacturer's requirements.
7D	Cannot Erase Device	Failure to erase electrically erasable (EE) device.	Remove device and try another device.
7E	Test Vectors Not Supported	Vectors are present in RAM and a load, program, or verify operation is performed with functional test enabled on a device which does not support vectors.	Disable functional test

## Display Configuration Number - E F

When you use the procedure on page 5-36 of the LogicPak Operator's manual to display the configuration number, the 29A/B Front Panel Display will show:

XXXX VX.X

*XXXX is a 4-digit configuration number and VX.X is the version of firmware resident in the 303A-011A P/T adapter.*

### NOTE

*Because of display limitations, the System 19 only shows the configuration number.*

## EDITING DEVICES WITH OVER 10,000 FUSES

### Fuse Pattern

The 303A-011A P/T adapter supports devices containing more than 10,000 fuses (cells). (See the User Note for identification of these devices.) When one of these devices is being programmed, the fuse pattern display will be different and the fuse editor will prompt you to enter either a five-digit (terminal mode) or six-digit (front panel mode) number instead of a four digit number.

In the LogicPak Operator's manual, when a fuse display is shown, the fuse number column on the left will show 5-digit fuse numbers, instead of four.

### Fuse Editor

#### FRONT PANEL MODE

When you use the fuse editor (EE) from the front panel, the display will show 6-digits, instead of four. This will accommodate the increased number of fuses in the new devices.

#### NOTE

*Because of display limitations, you cannot perform the EE (Edit Fuse Pattern) function for the larger devices when using the System 19. You may still edit the fuse pattern by entering terminal mode.*

#### TERMINAL MODE

When using the fuse editor in the terminal mode, you will be prompted for a 5-digit number. Also, any fuse number will be displayed in the 5-digit format.

### JEDEC Format

The fuse address in the "L" field will be shown as a 5-digit decimal number, instead of four.

## **DOWNLOADING JEDEC FILES FOR DEVICES WITH MORE THAN 12,000 FUSES**

If the JEDEC file contains a fill fuse RAM command [F1\* or F0\*] and you are transmitting at 9600 baud, then an I/O overrun error may occur. To prevent this, the host must be able to interpret CNTRL- S (stop transmission) and CNTRL-Q (resume transmission) when transmitted by the programmer. When the programmer receives F1\* or F0\*, it transmits a CNTRL-S to halt transmission while fuse RAM is filled. When fuse RAM has been filled, then the programmer transmits a CNTRL-Q to the host which then resumes transmission of the JEDEC file. If your host is unable to interpret CNTRL-S and CNTRL-Q, then reduce the baud rate to 4800 and the I/O overrun error will be prevented.

