

Titan ***Digital Analog Converter*** ***(DAC)*** *User Manual*



Proprietary Notice

This information is furnished for installation, operation, test and maintenance purposes. The information is proprietary in nature and should be treated accordingly. The data shall not be released or used, duplicated or disclosed, in whole or in part, for manufacture or procurement without the written permission of **Mars Labs**.

Copyright

This Technical Manual is copyright © 2016. All rights reserved. Brief excerpts may be made from this manual for technical purposes, as long as they are referenced.

Although this manual is believed to be correct at the time of publication, **Mars Labs**, its employees, or agents involved in the preparation and publication of this manual do not accept any form of liability for its contents or any consequences arising from its use. People using the information contained in this manual should apply, and rely upon, their own skill and judgement to a particular issue which they are considering.

Titan DAC User Manual v10.7
MNL 1006
November 2016

Table of Contents

Introduction

Furnished Accessories	4
Support	4
General Guidelines & Warnings	5

Operation

Front Panel	6
Panel Components	6
USB	6
COMM CPU	6
COMM POD	6
Power Connector	6
Block Diagram	7
COMM POD Power Options	8
DAC Output Modes	10

Interface

Analog Output (DB25)	12
Monitor Connector (DB9)	13
COMM Ports	13

Configuring the Titan DAC

14

Special Considerations for Thermocouples

17

Output Voltage

18

Delay

19

DAC Reconstruction Filter

Attenuation

19

Features & Specifications

Key Features	20
Specifications	20
DAC Nomenclature	21

Troubleshooting

22

Warranty & Repair

25

Notes & Known Issues

26

Introduction

The Titan Digital Analog Converter (DAC) module interfaces to the Titan series of Input Devices to provide a 16-channel analog output for monitoring and control applications.

This manual is intended to provide the user with an overview of the Titan DAC, with complete specifications, set up procedures and operation. It contains important safety information as well.

Furnished Accessories

The Titan DAC is typically shipped with the following items:

1. Titan DAC
2. Titan Power Adapter

A mating connector for the DAC Power Input may also be included, or it may be substituted for the Titan Power Adapter.

Support

Support for this product is available by contacting the factory during regular business hours (9am – 6pm EST) at 301-470-3278. Additional information can be found on our web site: <http://www.marslabs.com>

General Guidelines and Warnings

Electro-Static Discharge

Electro-Static Discharge (ESD) occurs when a static charge builds up on either yourself or the Titan hardware, and then you touch the Titan hardware. The static spark can be so small that you don't feel it, however, it can flaw a semiconductor. These flaws may generate an immediate failure, or, in most cases, cause a slight reduction in performance which will continue to degrade, eventually leading to failure of the hardware. When you feel a static shock, you are experiencing a minimum of 3,000 volts of electricity.

Even though the input connectors have protection to prevent ESD damage, it is good practice to always ground yourself and the Titan hardware while connecting and removing sensors.



Always use approved ESD handling procedures to prevent ESD damage.

Grounding Titans

In general, grounding the Titan hardware to the test vehicle or test structure will usually reduce noise pickup.

All of the analog inputs of the Titan hardware have a return path to ground. However, it is very important that each sensor have only one return path to avoid ground loops. When testing a vehicle, often the vehicle chassis and Titan can have very large ground imbalances of one or two volts. In such situations, ground the sensors to Titan and use differential inputs across the sensor. A totally floating input (like a 9-Volt battery) must have one side grounded at the point where used, either grounded to Titan or connected to the vehicle chassis ground via a resistor (e.g. 10K ohm).

If there is a possibility that a floating sensor may be occasionally grounded, install a 10K ohm resistor from the minus input to Titan ground. When the sensor is floating, the 10K ohm resistance will reference it to Titan ground, and when it is grounded, the resistor will allow the direct minus input wire to reference the remote chassis ground.



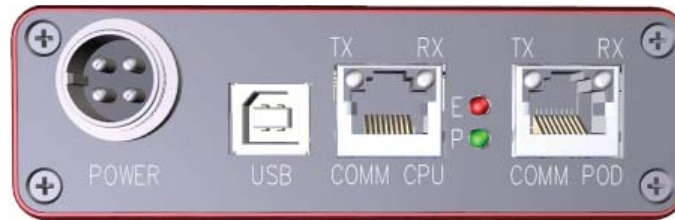
Specific Warnings

1. When using a power adapter with the Titan, always connect the adapter to the Titan before applying power. Never hot plug a Titan device under any circumstances - hot plugging may damage the device!

Operation

Front Panel

The Titan DAC front panel incorporates a USB port, two communication (COMM) ports, and a power connector:



Panel Components

USB

Provides the communications link to the host PC for the Titan Control Software (TCS) application.

COMM CPU

The communications link to a Titan CPU.

COMM POD

The communications link to a Titan Mini-Recorder.

Power Connector

A 4-pin connector is used to provide external power to the Titan DAC. If you are powering the Titan DAC from your own source instead of using the supplied power adapter, refer to the power connection label on the Titan DAC chassis for the pinout configuration.

NOTES:

1. The Titan DAC will not operate solely on USB power. External power must be applied.
2. The mating connector for 4-pin Auxiliary Power input is available from the following sources:

Mars Labs - P/N MLCON10227

Description: 4-Pin Female CB and HAM Radio Microphone Plug

Radio Shack - P/N 274-001

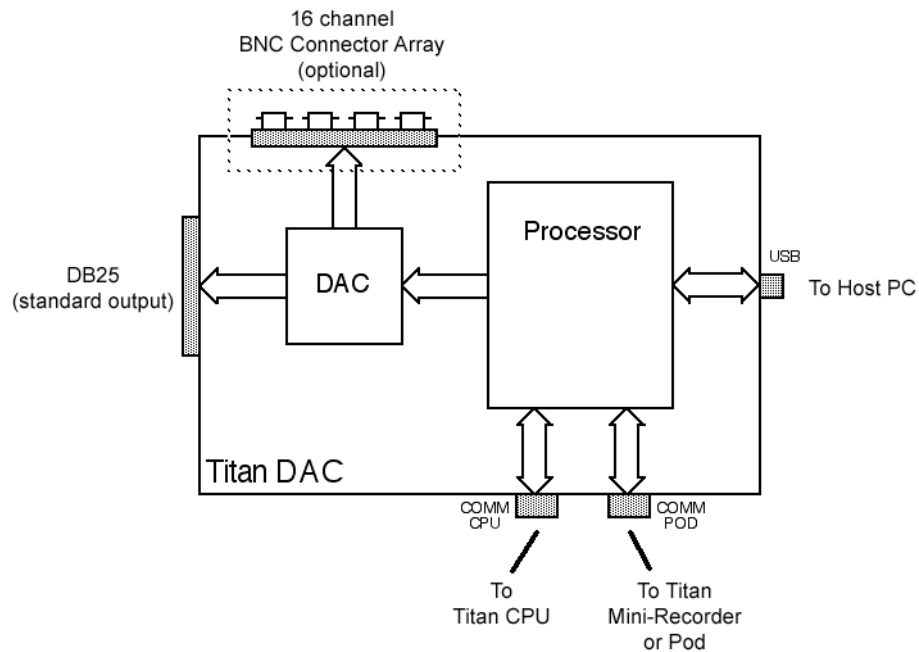
Description: 4-Pin Female CB and HAM Radio Microphone Plug

Westlake Electrical Supply - P/N T609B

Description: 4-Pin Inline Female Mobile Connector

Block Diagram

A block diagram of the Titan DAC is shown below.



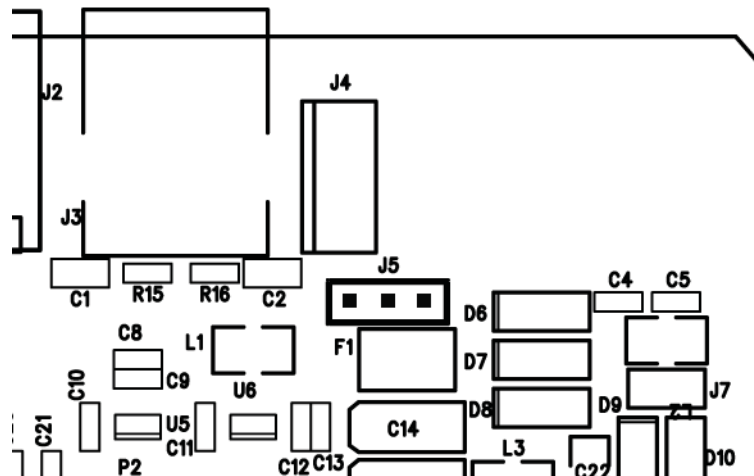
The DAC connects to a Titan Mini-Recorder, Pod, or Titan CPU, and allows the sensor data stream to pass through uninterrupted to the host PC. This data is also routed through a multiplexed DAC circuit where it is reconstructed into 16 individual analog channels. These 16-channels appear on a DB25 connector or (optionally) on a 16-channel BNC connector array located on the top panel.

Power Options

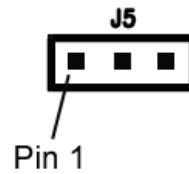
The Titan DAC has an internal jumper (J5) that configures the power for the COMM POD port. Three power configurations are available. The options are:

1. The COMM POD Port is powered from the front panel DAC Power connector. This configuration powers the connected Titan Input Device (Mini-Recorder or Pod) from the power source connected to the DAC Power connector. **This is the factory default configuration.**
2. The COMM POD port is powered from the Titan CPU. In this configuration, the DAC passes power from the Titan CPU Channel Multiplexer to the connected Titan Input Device.
3. The DAC does not provide a power connection to the COMM POD port. In this configuration, the Titan Input Device must be powered from a separate power source.

To reconfigure the power connection for the COMM POD port, remove all power and external connections. Relocate the DAC to an anti-static surface. Observing proper electrostatic precautions, remove the eight screws from the front and rear panels and set the screws aside. Remove the front and rear panels and bezels. Carefully slide the inner assembly out of the case and gently pry apart the top and bottom boards. The power jumper (J5) is located on the bottom board near the board edge with the COMM connectors:



To reconfigure the power for the COMM POD port, place a jumper on J5 as follows:



To provide power from the DAC Power connector, jumper pins 1 & 2

To provide power from the CPU, jumper pins 2 & 3.

To configure for no power, remove the jumper.

After completing the power configuration change, carefully reassemble the DAC by mating the top and bottom boards and then sliding the assembly into the case. Replace the front and rear panels and bezels, and then secure the assembly with the eight screws.

After reassembly, make a note on the case about the power option change.

DAC Output Mode

A DAC Output Mode command allows you to select the how the DAC output reacts when scanning is stopped. There are two options:

1. The DAC output remains at the last value when scanning is stopped. **This is the factory default configuration.**
2. The DAC output resets to zero when scanning is stopped.

The output mode is changed in TCS using the 'SET_DAC' command.

To change the output mode from the factory default to the 'reset to zero' mode:

1. Launch TCS
2. With the DAC powered on and connected via USB, connect to the DAC in TCS (function key F1 - Connect).
3. Open the Manual Command window (F10 - Manual Command) and enter the command:

```
SET_DAC_CLR 1 <enter>
```

The DAC should respond with an acknowledgement ("ACK").

The DAC Output mode is now in 'Reset to Zero' mode. The Output mode will persist through power cycling and remain in this mode until it is changed.

To revert to the factory default setting, enter the command:

```
SET_DAC_CLR 0 <enter>
```

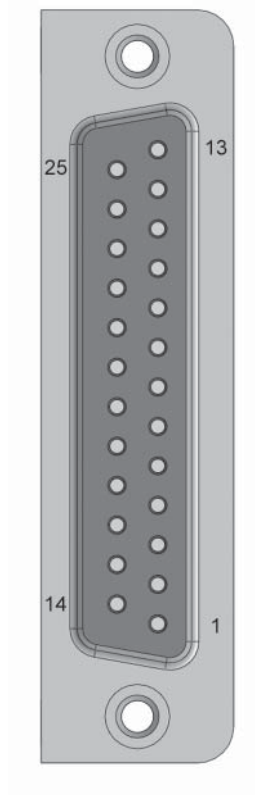
The DAC should respond with an acknowledgement ("ACK").

This page intentionally left blank

Interface

Analog Output (DB25):

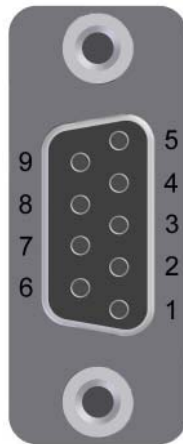
A DB25 connector provides the standard multi-channel output as follows:



<i>Pin Number</i>	<i>Function</i>
1	GND
2	CH1
3	CH3
4	CH5
5	CH7
6	CH9
7	CH11
8	CH13
9	CH15
10	GND
11	+5V
12	PANIC (not implemented)
13	GND
14	EXT_REF
15	CH2
16	CH4
17	CH6
18	CH8
19	CH10
20	CH12
21	CH14
22	CH16
23	EXT_REF
24	RELAY (dry contact closure)
25	RELAY

Monitor Connector (DB9):

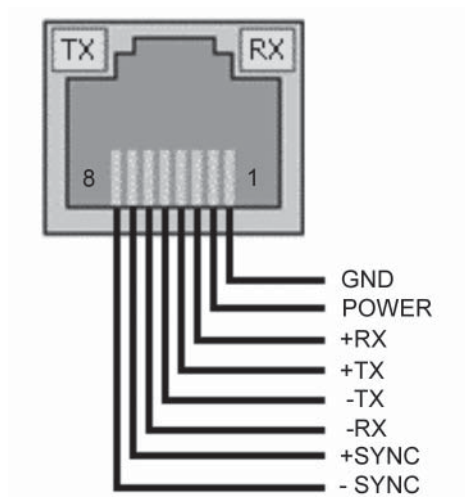
If the optional BNC Connector Output Array is specified, sixteen individual analog outputs appear on BNC jacks on the top panel, and a DB9 connector provides monitoring & external control signal connections for the DAC as follows:



<i>Pin Number</i>	<i>Function</i>
1	GND
2	PANIC (not implemented)
3	RELAY (dry contact closure)
4	N/C
5	EXT REF
6	GND
7	SPARE
8	RELAY OUTPUT
9	+5V

COMM Ports:

The COMM CPU and COMM POD ports share identical pinouts:

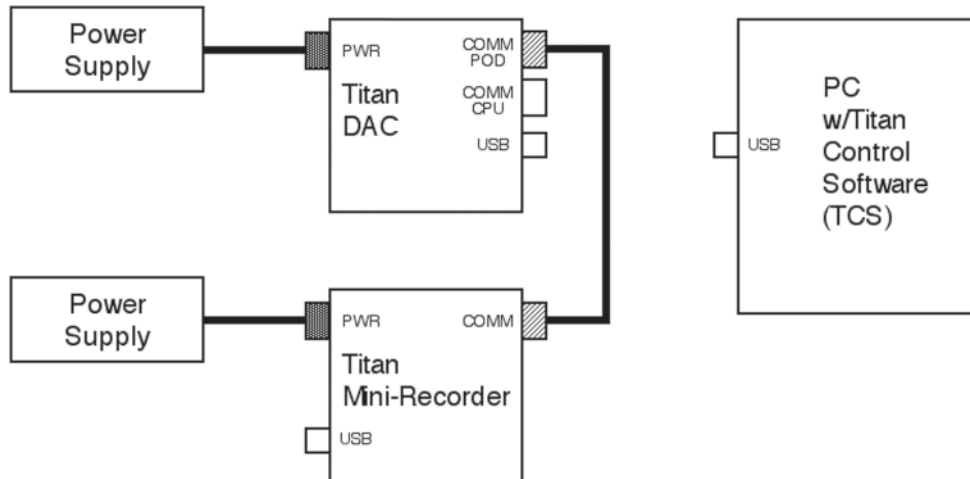


Configuring the DAC with a Mini-Recorder/Pod

NOTE: The DAC operates exclusively in low speed mode, and therefore any Titan high speed device (Mini-Recorder or Pod) that will be connected to the DAC must also be set to low speed mode. To insure that the Titan device has the proper configuration prior to connecting to the DAC, first connect the device to TCS, select low speed mode (any scan rate will do), and begin scanning. Stop the scan, disconnect from TCS, power down the device, and then proceed as described below.

To configure the DAC with a single Titan Mini-Recorder or Pod, perform the following:

1. Make the connections shown, but do not apply power.



NOTES:

1. The above figure shows a separate power supply for the Mini-Recorder. This may be unnecessary if the DAC is providing power on the COMM POD port (see page 8).
2. The maximum recommended cable length between the Titan DAC and the Mini-Recorder is dependent on the COMM baud rate. For the default 3M baud rate, the maximum recommended cable length is 25 feet, but lengths up to 300 feet are possible at lower rates.



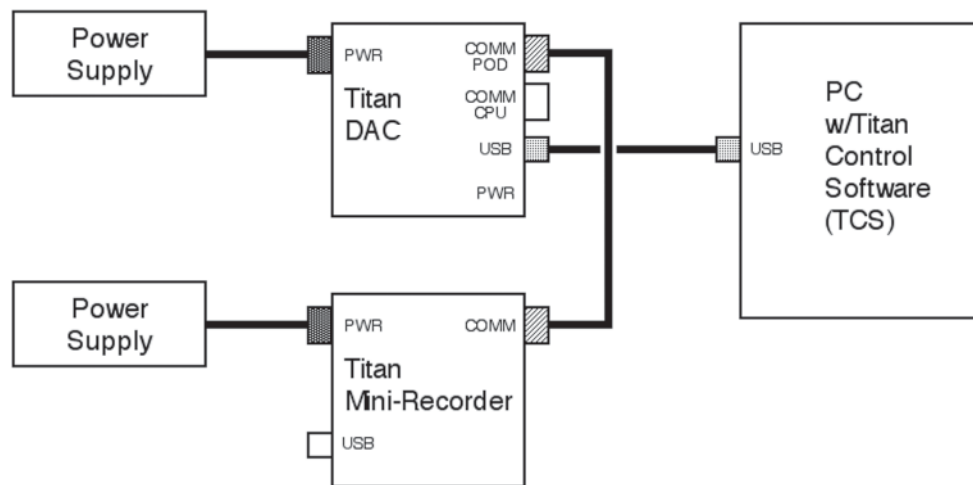
WARNING: When using a power adapter with any Titan device, always connect the adapter to the device before applying power. Never hot plug a device under any circumstances - hot plugging may damage the device!

2. **Apply power to the Mini-Recorder first, and then apply power to the DAC.** Allow the DAC to initialize (about 25 seconds). During initialization, the TX and RX LEDs on both DAC COMM ports will be illuminated. When the initialization process has finished, only the Power LED, the TX LED on the COMM CPU port and the RX LED on the COMM POD port will remain lit on the DAC.



WARNING: During initialization, the DAC will output full scale values (+5V or ± 10 Volts, depending on the DAC model). **Do not connect to the DAC analog outputs until the initialization process has completed. Failure to observe this important step can result in damage to connected equipment!**

3. Connect the Titan DAC to the PC using a USB cable as shown, and then launch the Titan Control Software (TCS) application.

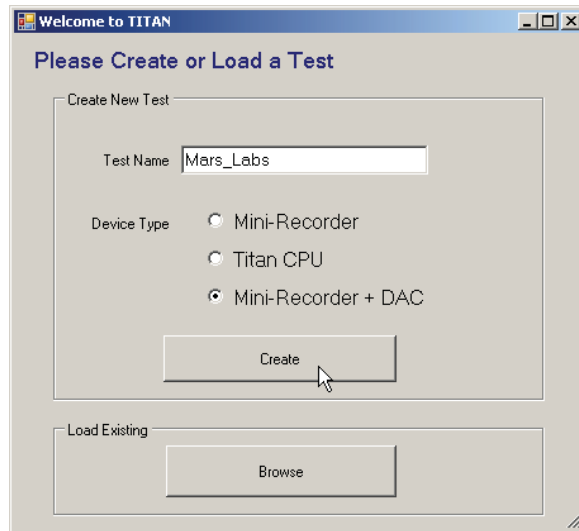


NOTES:

1. If the Titan Input Device (Mini-Recorder or Pod) is powered separately, it must be powered up first in order for the DAC to detect the device and negotiate communication for proper operation. If the Input Device powers up after the DAC, the negotiation does not take place and you will not be able to connect in TCS. Should this occur, the simplest solution is to cycle the power on the DAC, allow for initialization and negotiation to complete before connecting in TCS.

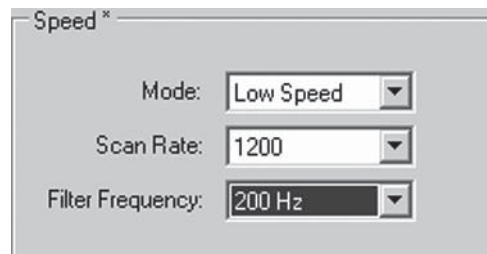
2. If a Titan CPU was used instead of a PC, the USB cable would not be used. In that configuration, a connection would be made from the COMM CPU port to an input port on the CPU.

4. When TCS starts, you will be prompted to create a new test or load an existing test. To create a new test, enter a name in the Test Name field. In the 'Device Type' drop-down menu, select "DAC", and then click the 'Create' button. If you wish to load an existing test, click the 'Browse' button and navigate to the location where the desired test is stored.



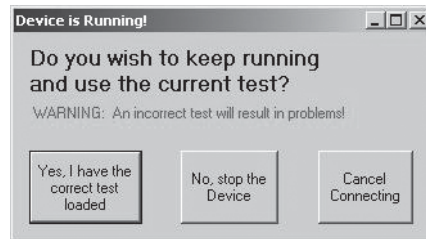
NOTE: Selecting 'Browse' will present all TCS test configurations - it does not filter configurations for DAC-only tests. Note that it is possible to load and run existing Mini-Recorder tests with a DAC, but some reconfiguration in the Device Configuration screen may be required for proper operation.

5. In the Device Configuration window, check the Device Settings field. The DAC operates only in Low Speed mode with a Scan Rate of 1200:



NOTE: For proper operation when using a DAC with a High Speed Mini-Recorder in Low Speed mode, you **must** configure your test to use at least one channel between 1 - 8.

6. Finally, click on the 'Connect' button (F1). TCS will display a 'Device is Running' warning message:



If the test that is loaded into TCS is the same test that is currently running on the Mini-Recorder, i.e. the current configuration, click 'YES'; otherwise click 'NO' to stop the device.

For additional information on configuring TCS, consult the TCS User Manual.

NOTE: The DAC output will always mirror the input of the connected Titan Mini-Recorder proportionally over the full output range (0 to +5V or ± 10 Volts, depending on the DAC). For example, a full scale input to the Mini-Recorder will produce a full scale output on the DAC. Decreasing the input to the Mini-Recorder by 50% will result in a 50% decrease on the DAC output. See Table on page 18.

Special Considerations for Thermocouples

When using a DAC with a Titan device that has a thermocouple connected to one or more channels, the DAC output for these channels represents the raw non-linear voltage response of the thermocouple sensor itself. The response from these channels will be different from the response observed in TCS, which will apply a pre-defined 8th order polynomial transform dependent on the type of thermocouple in use (J, K or T), resulting in a linear response.

For information on thermocouple transforms, see 'Sensor Types - Thermocouple' in the TCS User Manual.

Output Voltage

To understand how the DAC output corresponds to a given input, refer to the table below. The table shows the relationship between the output voltage from the Titan DAC in response to a given input voltage applied to a Titan Mini-Recorder or Titan Pod for Gain = 1. Five input voltages are shown: negative and positive full scale voltage, negative and positive half scale voltage, and mid scale voltage. The tolerance on all voltage values is <1%.

DAC Output Voltage Range	Neg Full Scale (-32.767V)	Neg Half Scale (-16.383V)	Mid Scale (0V)	Pos Half Scale (+16.383V)	Pos Full Scale (+32.767V)
0 - +5V	0.3	1.25	2.5	3.75	5
±10V	-10	-5	0	5	+10
		CAL -	CAL 0	CAL +	

Table 1. The DAC input/output relationship for Gain= 1

NOTE: When the calibration (CAL) function is exercised on a Titan Mini-Recorder or Pod, the DAC output corresponds to the half-scale and mid-scale values as shown in the table. Exercising the CAL function in this manner allows you to easily check the accuracy of the DAC voltage output.

The full scale output of the DAC is equal to the full scale range in the TCS 'Tags and Channels' screen.

Example:

A 10mV/g accelerometer has a full scale range of 204.8g. For a +/-10V DAC:

$$\pm 10V = \pm 204.8G$$

or

$$10/204.8G = 48.82mV/G$$

Delay

There is a small time delay between the input signal (into the Pod) and the output of the DAC. This delay time varies as a function of the Filter Frequency setting, which is configured in the 'Device Configuration' tab in TCS.

The table below shows computed time delays for different filter settings. For all filter settings the Scan Rate is always 1200 Hz.

	Filter (Hz) (Titan Device Config)	Delay Time (Calculated)
Scan Rate = 1200 Hz	200	38.9 msec
	150	40.3 msec
	100	43.1 msec
	80	45.2 msec
	50	51.5 msec
	40	55.9 msec
	20	78.1 msec

DAC Reconstruction Filter Attenuation

The DAC features a fixed 150 Hz, 3-pole reconstruction filter in the DAC output stage. The filter is enabled or disabled using jumpers on the DAC printed circuit board (configured at the factory). When enabled, the filter will gradually attenuate the DAC output signal as the input frequency is raised.

The table below shows the reconstruction filter characteristic as a percentage of attenuation at specific frequencies. An expanded view of the filter attenuation that occurs around the 1% attenuation point is shown at right.

Freq	Atten (%)		Freq	Atten (%)
5	0.0%		15	0.5%
10	0.0%		18	0.6%
20	0.9%		20	0.9%
30	2.1%		22	1.1%
40	3.4%		24	1.2%
50	5.5%		26	1.5%
60	7.0%		28	1.7%
70	8.1%		30	2.1%
80	11.2%		32	2.3%
90	13.5%		34	2.5%
100	16.8%		36	2.9%
110	19.0%		38	3.0%
120	21.0%		40	3.4%
130	23.0%		45	4.1%
140	25.3%		50	5.5%
150	31.3%			

Features and Specifications

Key Features

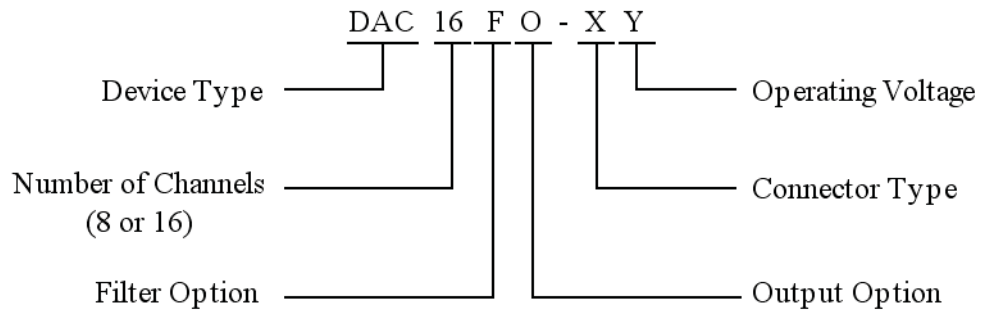
- Connection to a Titan analog input module (Mini-Recorder or Pod) uses industry-standard Ethernet cable. This permits separation of the input and output modules, allowing the input module to be located near the sensors and the DAC located elsewhere, reducing complexity and cost.
- Signals may be monitored when connected to a PC.
- Signals may be recorded when connected to a PC, Titan Mini-Recorder or a Titan CPU.
- Simplified user interface provides easy operation under difficult operating conditions.

Specifications

Number of Channels	16
Output Connector	DB25 (standard), BNC (optional)
Output Voltage Range	0 to +5 Volts ± 10 Volts
Sensor Balance Values	The output is automatically offset to include balance values used for the sensor
Output Bandwidth	150 Hz
Output Sample Rate	1200 samples per second
DAC Output Filter	150 Hz, 3-pole reconstruction filter (optionally enabled)
Digital Interface	(2) RJ45 connections (COMM POD, COMM CPU) (1) USB
Power Requirements	11-32 Volts, 1.4W
Dimensions / Weight	13.75 cm x 10.6 cm x 3.6 cm (L x W x H) / 475g

DAC Nomenclature

The Titan DAC offers a wide range of configuration options. DAC device configurations are specified by the part number in the following format:



Filter Options:

- 0 = No filter
- 1 = 150 Hz filter

Output Options:

- 1 = 0 to +5 Volts (unipolar)
- 2 = ± 10 Volts (bipolar)

Connector Type:

- 0 = DB37 (no adapter board)
- 1 = DB25
- 2 = BNC (16 connectors)

Operating Voltage:

- 1 = 12 Volts (isolated)
- 2 = 24 Volts (isolated)
- 3 = 11 to 32 Volts (wide input range, non-isolated)

Troubleshooting

If you are having difficulties configuring, connecting or using your Titan device, refer to the troubleshooting section below. This section addresses common issues with the operation of Titan devices. If your specific issue is not addressed, please contact the factory for additional assistance.

Issue: Cannot communicate after power up

After configuring and powering up the DAC, you can't communicate in TCS.

Solutions

There are several possible solutions:

1. If your test setup includes a USB hub between the Titan Input device and the PC running Titan Control Software (TCS), rearrange the setup to eliminate the USB hub. The use of USB hubs can cause problems.
2. If the DAC was powered up before the Pod, the DAC will not be able to negotiate communications with the Titan Input device. To resolve this issue, disconnect in TCS, cycle the power on the DAC, and reconnect in TCS.

Issue: Windows holds port open

If you fail to disconnect in TCS before physically disconnecting or powering down the Titan Input device, Windows holds that port open. When you attempt to reconnect, the port may appear twice or you may get a connection error message.

Solution

Click 'Disconnect' in TCS. Physically disconnect the Titan device. In TCS, click 'Query Serial Devices'. This will clear the *Select Port* field and unlock the COMM port. Reconnect the USB and then connect in TCS. Note that other serial programs (such as RealTerm or HyperTerminal, for example) can also hold the port open and cause errors. If these programs are in use while TCS is running, close them before clearing the *Select Port* field.

Issue: The DAC is unresponsive

You are connected in TCS but can't scan.

Solution

Follow the steps outlined below.

1. In TCS, switch to the Device Configuration screen and select 'Get Info'. If the Device Information fields contain valid information then there is communication between TCS, the DAC and the Titan device.
2. In the TCS 'Device' menu, select 'Stop Device'. Select 'Get Info'. If the 'Device Information' field does not update, this indicates that there is no communication between TCS and the Titan devices.
3. Disconnect from TCS and then remove the USB connection. Power cycle the DAC, then reconnect USB. Reconnect in TCS.
4. Disconnect from TCS and then remove the USB connection a second time. Power off the DAC and the Titan Device. Apply power to the Titan device. Apply power to the DAC. Reconnect USB. Reconnect in TCS.

Issue: "Problem Configuring Device" Error

TCS displays a "Problem Configuring Device" error.

Solution

There are several possible causes for the error:

1. This error can be the result of attempting to connect and scan before the DAC has completed initialization. You can prevent this error by allowing sufficient time for initialization and pausing between commands.
2. If the error message includes "Couldn't write test file. The operation has timed out", this usually indicates that the connected Mini-Recorder or Pod is in High Speed mode. To change to the configuration to Low Speed mode, power down all devices, and disconnect from the DAC. Using a USB cable, connect the Mini-Recorder or Pod to TCS. Using a default Pod test, select Low Speed mode and then begin scanning (this sends the test configuration to the device). Stop the scan, disconnect from TCS, and then reconnect to the DAC.

Verifying DAC output

At any time you can verify the DAC Output using calibration (CAL) Mode:

1. Connect and power up the DAC (refer to *Configuring the DAC with a Mini-Recorder/Pod*, on page 14).
2. In TCS, connect to the device (F1), and then start scanning the device (F3) using the default voltage test configuration with Gain = 1.
3. Place the device in CAL- mode (F7)
4. In TCS, switch to the Single Pod Monitor screen and verify that -16.383V is read on all channels.
5. Using a DVM, measure the output value for each channel on the DAC and verify the measurement against the expected value from the table below.
6. Repeat the test for CAL 0 and CAL + modes. For CAL 0, TCS should report 0V. For CAL+, TCS should report +16.383V.

DAC Output Voltage Range	“CAL -” Value	“CAL 0” Value	“CAL +” Value
0 - +5V	1.25V	2.5V	3.75V
±10V	-5V	0V	5V

Table 2. DAC calibration (CAL) output values

NOTE: The tolerance on all voltage values shown is <1%.

Warranty

Mars Labs warrants all their manufactured equipment to be free from defects in material and workmanship. **Mars Labs** liability under this warranty is limited to servicing or adjusting any equipment returned to the factory for that purpose, and to replace any defective parts thereof. The warranty remains effective for 365 days following delivery to the original purchaser. During this time, equipment will only receive repair when the original purchaser prepays all return transportation charges, and **Mars Labs** finds to its satisfaction that the equipment is indeed defective.

If the fault has been caused by misuse or abnormal conditions of operation, normal service charges will prevail. In this case, an estimate will be submitted before work is started. **Mars Labs** must authorize any warranty returns.

Mars Labs reserves the right to make changes in the design of its instruments without incurring any obligation to make the same changes on equipment previously purchased.

This warranty will be void if unauthorized alterations or modifications are found which impede the repair or testing of the equipment.

Receipt of Equipment

The equipment should be tested as soon as it is received. If the equipment is damaged in any way, a claim should be obtained by the claim agent, and this report should be forwarded to **Mars Labs**.

Mars Labs will then advise the customer of the disposition to be made of the equipment and arrange for repair or replacement. When referring to this equipment for any reason, the model number, serial number and purchase order number should be included.

Malfunction

If the unit fails to operate, or any fault develops, **Mars Labs** should be notified and provided with full details of the difficulty or fault, along with the model number and serial number of the unit. Upon receipt of this information, **Mars Labs** will provide service data and shipping instructions.

This warranty is expressly in lieu of all other obligations or liabilities on the part of **Mars Labs**, which neither assumes nor authorizes any person to assume for it any other liability in connection with the sale of its equipment. Contact:

Mars Labs
29 C Street
Laurel, MD
20707
(301) 470-3278
email: Support@MarsLabs.com

Notes & Known Issues

This section offers additional operational information about the Titan DAC not covered elsewhere.

Known Issues:

Remote File Transfer through the DAC not supported

Mini-Recorder remote file transfers through the DAC are not supported. If you attempt to transfer remote files in this manner, TCS will time out and produce an error. To transfer data files from the SD card, either connect the Mini-Recorder directly to the host PC, or eject the SD card and use a card reader. Note that for large data files (>400 Mb) the recommended method is to use an SD card reader (transfer of large data files through the Mini-Recorder is much slower and can result in errors).

'Problem Configuring Device' Error

A 'Problem Configuring Device' error is usually the result of attempting to connect and scan before the DAC initialization process has completed. For example, pressing 'F1' (Connect) quickly followed by 'F3' (Scan) does not provide sufficient time for TCS to process and transfer the commands, resulting in an error. To prevent the error, pause between issuing commands in TCS.

DAC Restarts after stopping a Scan

Occasionally, communication timing issues can result in the DAC restarting after scanning has stopped. If this happens, TCS will issue a message informing you that a test is running and give you the option to use the test or stop the device. Select the 'stop the device' option.

Unplugging a Pod from the DAC while scanning will cause a system lock-up

If you unplug a Pod from the DAC while TCS is scanning, the system will lock up and you will lose the connection. To re-establish the connection, you must power-cycle the system. Unplugging a Pod from the DAC while scanning should be avoided.

The DAC does not support the Digital Pod

The DAC does not currently work when connected to a Mini-Recorder or Pod with a Digital Pod attached (either internal or external Digital Pod). A future firmware update is planned to correct this behavior.

