

**DCVF-5 Digitally Controlled
Filter Bank & Post Amplifier
Instruction Manual
P/N 001022000 Rev. -**

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CONTENTS

Title	Page
Introduction	1
Specifications	2
Input Power Restrictions	3
Connections, Controls, and Indicators	4
System Overview	5
Installation	6
Configuring the GPIB Interface	7
GPIB Address Switch Configuration	8
GPIB Reference	9
Commands	10
General Notes on Setting Variable Filter Frequencies	11
Queries and Their Responses	14
Front Panel User Interface -	
General	16
Setting Functions	17
Appendix A	21
Block Diagram	22
Outline Drawing	23

INTRODUCTION

Trilithic's **DCVF-5** is a digitally controlled filter bank and post amplifier in a rack-mount enclosure. It is a 75 Ohm, uni-directional, RF test accessory that may be controlled via a front panel keypad or its integral GPIB interface. It has an RF input, an RF output, and sixteen unique RF paths through which the RF signals may be routed.

Of these sixteen paths;

One, the default, terminates the input and output into 75 Ohms.

One is a through path

Seven are fixed-tuned bandpass filters for return path "T" channels T-7 through T-13

Four are tuneable bandpass filters covering the range of 55 MHz to 880 MHz, inclusive.

Three are auxiliary paths brought to the front panel for user-defined functions.

User-defined functions for the auxiliary paths may include such uses as:

Insertion of an attenuator for purposes of creating a reference for calibration or comparisons.

Connecting signal sources or measuring/receiving devices to the equipment connected to the input or output connectors.

Or to include special purpose filters not usually included in the filter bank.

SPECIFICATIONS

Electrical -

User Interface:	GPIB and Front Panel Keypad / Display	
Input Impedance:	75 Ohms	
Output Impedance:	75 Ohms	
RF Connectors:	BNC or F female, both supplied.	
Frequency Range:	DC to 1000 MHZ (Termination, Through, and Aux paths)	
Return Loss:		
Filter paths:	14dB, minimum to 880 MHz	
Termination/Through/Aux paths:	DC - 500 MHz	≥ 16 dB
	500 - 900 MHz	≥ 14 dB
	900 - 1000MHz	≥ 11.5 dB
Insertion Loss:		
Filter paths:	11dB, maximum @ center frequency	
Through/Aux paths:	DC - 500 MHz	≤ 5.0dB
	500 - 900 MHz	≤ 6.5 dB
	900 - 1000MHz	≤ 7.5 dB
Bandpass Filters:	T-7 through T-13, 55-110, 110-220, 220-440, and 440-880 MHz. (Custom configurations are available.)	
Filter Shape Factor:	30:3 dB = 2.2:1, Maximum	
Variable Filter Selectivity:	55 - 110 MHz :	5 % of Center Frequency
	110 - 220 MHz :	3 % of Center Frequency
	220 - 440 MHz :	1.5 % of Center Frequency
	440 - 880 MHz :	1 % of Center Frequency
Channel/Frequency Plan:	NTSC Standard	
RF Input Power:	* See "Input Power Restrictions" on the following page.	
Path Switch Type:	Electro-mechanical	
Path Switching Time:	< 30 milliseconds after receipt of GPIB command	
Path Switch Life:	> 1 Million operations	
Filter Tuning:	Variable filters are optically-encoded-stepper-motor controlled. Return Band filters (Channel T-7 through T-13) are fix-tuned.	
Tuning Acquisition Time:	12 Seconds, Maximum from minimum low to maximum high frequency.	
Post amplifier Gain:	20dB 50 - 600 MHz, 17dB @ 750 MHz, 16dB @ 1000MHz	
Post amplifier Passband:	50 MHz - 1000 MHz	
Post amplifier Noise Fig:	5dB	
AC Mains Input:	90-260 VAC, 47 - 440 Hz	
Power Consumption:	75 Watts, Peak (while tuning)	

Mechanical -

Dimensions:	19" Rack Panel X 6U (10.5 Inches) High X 20 Inches Deep
Weight:	45 Pounds (20 Kg) (Estimated weight)
Finishes:	The front panel is brushed, black anodized aluminum. All other panels are aluminum with straw chromate finish.

Specifications are subject to change.

Input Power Restrictions

There are two considerations to be made concerning Maximum Input Power.

1) Maximum allowable input before signal distortions occur:

The Post Amplifier incorporated in the DCVF-5 should not be subjected to broadband RF energy. Its input rating is for a maximum of +20 dBmV CW (a single channel only).

When using the Post Amplifier, a broadband spectrum should be filtered prior to injection into the amplifier. ***This filtered spectrum should be limited to include a maximum of one (1) TV channel with a signal level not to exceed +20 dBmV.***

2) Maximum allowable input before damage occurs to the internal switching hardware:

The Multiplexer Switch Assemblies are capable of switching a maximum broadband input power of 0.5 Watts. In a 75 Ohm system this equates to approximately +75 dBmV CW or approximately +56 dBmV with 78 channels.

When using the external or through paths, this amount of energy may be safely switched. ***However, the post amplifier must not be used with signal levels this substantial.***

CONNECTIONS, CONTROLS, and INDICATORS

Front Panel Connections: RF INPUT RF OUTPUT
 AUX 1 OUT AUX 1 IN
 AUX 2 OUT AUX 2 IN
 AUX 3 OUT AUX 3 IN

Front Panel Indicators: Aux Path / Termination selection - 2 ea. 7 Segment LED
 Channel / Frequency selection - 5 ea. 7 Segment LED
 Post amplifier status - 1 ea. 7 Segment LED
 Power ON indicator - 1 ea. LED

Front Panel Controls: 16 key keypad

Rear Panel Connections: AC Input Connector
 GPIB Interface Connector
 AC Line Fuses
 RS-232C DCE (Manufacturer's use only)

Rear Panel Controls: AC Power ON/OFF switch
 GPIB Address Switches
 GPIB Reset Switch

SYSTEM OVERVIEW

The **DCVF-5** Digitally Controlled Filter Bank & Post Amplifier is one of the many multiplexer products manufactured by Trilithic. It is contained within a single rack-mounting chassis and includes all filters, switches, and amplification necessary to aid in performing measurements over a wide dynamic range of amplitudes and in the presence of multiple carriers as are typical of a broadband application. It provides the selectivity necessary to minimize or eliminate intermodulation products that would otherwise occur in the front ends of the measuring devices. For greatest flexibility, the **DCVF-5** incorporates a front panel keypad and a GPIB interface.

The system contains an array of multi-way RF switches, fix-tuned bandpass filters, tuneable bandpass filters, a post amplifier, and terminations. These are interconnected to provide the user with selectable bandpass filters for use on demand as the application requires.

All RF connectors are located on the front panel. The connections labeled **RF IN** and **RF OUT** provide access to all possible pathways. The **DCVF-5** has five auxiliary pathways that do not pass through filter networks. These impart additional functionality and enhance the overall utility of the system.

Of these five auxiliary pathways:

- One is a through path connecting **RF IN** directly through to **RF OUT**

- One terminates the **RF IN** and the **RF OUT** into individual 75 Ohm terminations.

- Three are external and allow the end-user to tailor the system for specialized applications.

The external paths are accessed via the front panel connectors labeled as **AUX 1 OUT**, **AUX 1 IN**, **AUX 2 OUT**, **AUX 2 IN**, **AUX 3 OUT**, and **AUX 3 IN**. The rf path through these auxiliary connections is as follows: From the **RF INPUT** connector and through the input multiplexer to the **AUX 1 OUT** (or **AUX 2 OUT**, **AUX 3 OUT**) connector. Then from the **AUX 1 IN** (or **AUX 2 IN**, **AUX 3 IN**) through the output multiplexer and to the **RF OUTPUT** connector.

An example of a typical use for these auxiliary paths is one in which the test application requires a -40 DB through-path reference. Here, a 40 DB fixed attenuator could be connected between the **AUX 1 OUT** to **AUX 1 IN** connectors. The reference could then be switched into the test process by selecting the **DCVF-5**'s auxiliary path number 1.

In addition to the paths discussed above, the output multiplexer allows for the output to be routed through a 20 dB post amplifier. This selectable pathway also permits bypassing the amplifier.

INSTALLATION

Insert the unit into a suitable rack location which allows for its height. Using the slots available on the front panel, secure the chassis in place using appropriate screws.

Locate the power entry module. It is positioned at the lower right corner of the rear panel. This module contains the AC Line Fuses, ON/OFF switch, and AC Line plug.

Be sure that the AC power switch is set to the OFF position.

Attach the supplied line cord to the AC Line plug of the power entry module and plug the line cord into a suitable source of AC. **DO NOT turn the power on at this time.**

This system uses a universal power supply. It is not necessary to select an input voltage range. The system will operate properly when powered by any AC Voltage source in the range of 90 - 260 VAC, 47 to 440 Hertz.

If using the optional GPIB interface:

Attach a cable from the GPIB controller to the unit's GPIB connector

Choose a GPIB device address for the system and set its address.

For assistance in setting the switches, please refer to the section entitled "CONFIGURING THE GPIB INTERFACE" and the "GPIB ADDRESS SWITCH CONFIGURATION" chart on the following pages.

Move the ON/OFF switch to the ON position and verify that the Front Panel display LED's have illuminated.

The unit is now ready for use.

CONFIGURING THE GPIB INTERFACE

The GPIB interface is located lower left corner of the rear panel. This interface has a total of 32 possible addresses. They are zero (**0**) through **31**, inclusive. As shipped, all GPIB interfaces are set at the factory default address setting of three (**3**).

To change this address, please follow the instructions below. Otherwise, continue to the **GPIB REFERENCE** section.

The GPIB address is user selectable using the “piano” style switches available through the rear panel of the unit.

Please note that the GPIB address switches are read only at power-up or after the **GPIB RESET** has been pressed. If it becomes necessary to change the unit’s GPIB address, you must either:

- A. Power-down the unit for a minimum of fifteen seconds and then re-apply power
- or B. Press the **GPIB RESET** switch.

Please refer to the “*GPIB ADDRESS SWITCH CONFIGURATION*” table on the following page for assistance in setting the GPIB address.

