

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

INSTRUCTION MANUAL

MODELS 751A, 752A AND 753A BRICKWALL FILTERS

Original
Darf nicht verliehen werden.
KST 12/00 024 004
Helmut Singer Elektronik

WAVETEK

WAVETEK SAN DIEGO, INC.

9045 Balboa Ave., San Diego, CA 92123

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

INSTRUCTION MANUAL

MODELS 751A, 752A AND 753A BRICKWALL FILTERS

© 1984 Wavetek

THIS DOCUMENT CONTAINS INFORMATION PROPRIETARY TO WAVETEK AND IS SOLELY FOR INSTRUMENT OPERATION AND MAINTENANCE. THE INFORMATION IN THIS DOCUMENT MAY NOT BE DUPLICATED IN ANY MANNER WITHOUT THE PRIOR APPROVAL IN WRITING FROM WAVETEK.

WAVETEK

WAVETEK SAN DIEGO, INC.
9045 Balboa Ave., San Diego, CA 92123
P. O. Box 85265, San Diego, CA 92138
Tel 619/279-2200 TWX 910/335-2007

Manual Revision: 3/87

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

WARRANTY

Wavetek warrants that all products manufactured by Wavetek conform to published Wavetek specifications and are free from defects in materials and workmanship for a period of one (1) year from the date of delivery when used under normal operating conditions and within the service conditions for which they were furnished.

The obligation of Wavetek arising from a Warranty claim shall be limited to repairing, or at its option, replacing without charge, any product which in Wavetek's sole opinion proves to be defective within the scope of the Warranty. In the event Wavetek is not able to modify, repair or replace non-conforming defective parts or components to a condition as warrantied within a reasonable time after receipt thereof, Buyers shall be credited for their value at the original purchase price.

Wavetek must be notified in writing of the defect or nonconformity within the Warranty period and the affected product returned to Wavetek's factory or to an authorized service center within (30) days after discovery of such defect or nonconformity.

For product warranties requiring return to Wavetek, products must be returned to a service facility designated by Wavetek. Buyer shall prepay shipping charges, taxes, duties and insurance for products returned to Wavetek for warranty service. Except for products returned to Buyer from another country, Wavetek shall pay for return of products to Buyer.

Wavetek shall have no responsibility hereunder for any defect or damage caused by improper storage, improper installation, unauthorized modification, misuse, neglect, inadequate maintenance, accident or for any product which has been repaired or altered by anyone other than Wavetek or its authorized representative and not in accordance with instructions furnished by Wavetek.

Exclusion of Other Warranties

The Warranty described above is Buyer's sole and exclusive remedy and no other warranty, whether written or oral, is expressed or implied. Wavetek specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. No statement, representation, agreement, or understanding, oral or written, made by an agent, distributor, representative, or employee of Wavetek, which is not contained in the foregoing Warranty will be binding upon Wavetek, unless made in writing and executed by an authorized Wavetek employee. Under no circumstances shall Wavetek be liable for any direct, indirect, special, incidental, or consequential damages, expenses, losses or delays (including loss of profits) based on contract, tort, or any other legal theory.

CONTENTS

SECTION 1 GENERAL DESCRIPTION

1.1 INTRODUCTION 1-1
1.1.1 Model 751A 1-1
1.1.2 Model 752A 1-1
1.1.3 Model 753A 1-1
1.2 OPTIONS 1-1
1.3 DEFINITIONS 1-1
1.4 SPECIFICATIONS 1-2
1.4.1 Cutoff Frequency 1-2
1.4.2 Gain (Pre-filter) 1-2
1.4.3 Filter Characteristics 1-2
1.4.4 Input Characteristics 1-2
1.4.5 Output Characteristics 1-2
1.4.6 General 1-3
1.4.7 Options 1-3

SECTION 2 INITIAL PREPARATION

2.1 INSPECTION 2-1
2.2 MECHANICAL INSTALLATION 2-1
2.3 ELECTRICAL INSTALLATION 2-1
2.3.1 Power Connection 2-1
2.3.2 Signal Connection 2-1
2.3.3 GPIB Option 2-1
2.3.4 BCD Option 2-2

SECTION 3 OPERATION

3.1 INTRODUCTION 3-1
3.2 CONTROLS AND INDICATORS 3-1
3.3 TYPICAL OPERATING PROCEDURES 3-7
3.3.1 Model 751A 3-7
3.3.2 Model 752A 3-8
3.3.3 Model 753A 3-9
3.4 REMOTE PROGRAMMING: BCD INTERFACE 3-12
3.5 REMOTE PROGRAMMING: GPIB INTERFACE 3-13
3.5.1 Introduction 3-13
3.5.2 Device Address Code 3-13
3.5.3 Initialization 3-13
3.5.4 Listen State 3-14
3.5.5 Sending Data 3-14

SECTION 4 CIRCUIT DESCRIPTION

4.1 INTRODUCTION 4-1
4.2 MODEL 751A 4-1
4.3 MODEL 752A 4-1
4.4 MODEL 753A 4-2
4.5 ELLIPTIC FILTERS 4-4

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CONTENTS (Continued)

SECTION 5 CALIBRATION

5.1 FACTORY REPAIR 5-1
5.2 CALIBRATION 5-1

SECTION 6 TROUBLESHOOTING

6.1 FACTORY REPAIR 6-1
6.2 TROUBLESHOOTING 6-1
6.2.1 Filter Troubleshooting 6-1
6.2.2 Optional GPIB Interface Troubleshooting 6-1

SECTION 7 PARTS AND SCHEMATICS

7.1 DRAWINGS 7-1
7.2 ADDENDA 7-1
7.3 ORDERING PARTS 7-1

SAFETY

This instrument is wired for earth grounding via the facility power wiring. Do not bypass earth grounding with two wire extension cords, plug adapters, etc.

BEFORE PLUGGING IN the instrument, comply with installation instructions.

MAINTENANCE may require power on with the instrument covers removed. This should be done only by qualified personnel aware of the electrical hazards.

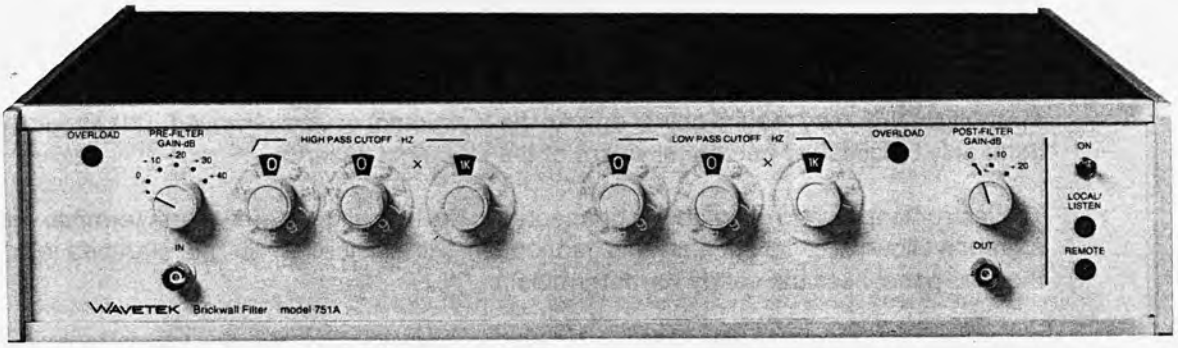
The instrument power receptacle is connected to the instrument safety earth terminal with a green/yellow wire. Do not alter this connection. (Reference: ⏚ or ⚠ stamped inside the rear panel near the safety earth terminal.)

WARNING notes call attention to possible injury or death hazards in subsequent operations.

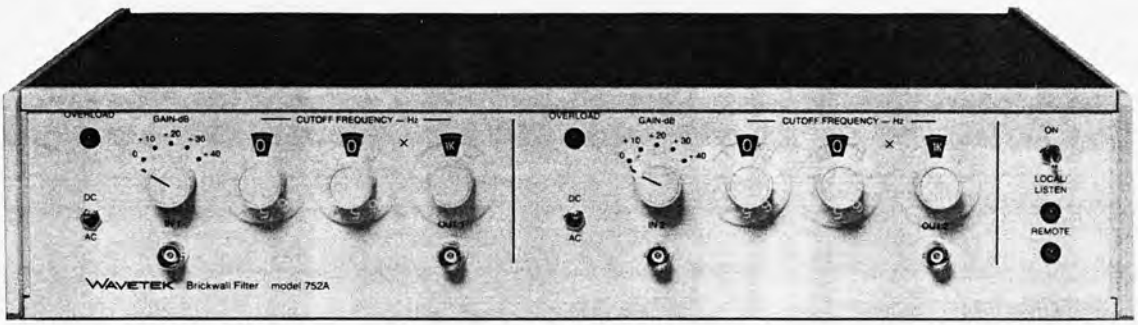
CAUTION notes call attention to possible equipment damage in subsequent operations.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

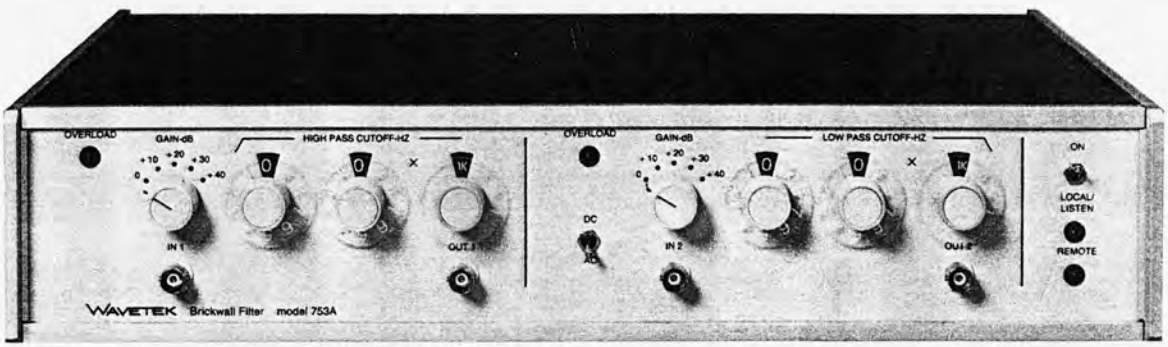
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Model 751A. Brickwall Filter



Model 752A. Brickwall Filter



Model 753A. Brickwall Filter

SECTION 1
GENERAL DESCRIPTION

1.1 INTRODUCTION

The Models 751A, 752A and 753A are programmable Brickwall™ Filters offering near-ideal passband and stopband characteristics.

The instruments employ 7th-order (7 poles and 6 zeroes) Elliptic or Cauer filters with design values of 0.3 dB peak-to-peak passband ripple and 85 dB stopband attenuation. The transition from passband to stopband has a 115 dB/octave rolloff rate. For low pass response, the stopband is at 1.7 × cutoff frequency; high pass response, the stopband is 0.6 × cutoff for frequency.

The cutoff frequency may be programmed from 10 Hz to 99 kHz with 2-digit resolution and 1 Hz to 9 Hz with 1-digit resolution. Pre-filter, and (where available) post-filter gain may be programmed in 10 dB steps, up to the maximum available.

These instruments are extremely valuable in signal-processing applications for band-limiting prior to sampling to prevent aliasing, or for separating a narrow spectrum of interest from noise or other interfering signals. In addition to the extremely sharp filtering, they provide programmable low noise amplification for applications involving low-level signals and overload indicators to ensure operation within their linear dynamic range.

The basic differences of the three models are summarized here.

1.1.1 Model 751A is a single-channel band pass filter which consists of a high-pass section followed by a low-pass section. Low-pass and high-pass cutoff frequencies may be independently programmed. Prefilter gain, up to 40 dB, may be programmed, as well as postfilter gain, up to 20 dB. In addition, there are individual input and output overload indicators.

1.1.2 Model 752A is a dual-channel, low-pass filter. The two channels are amplitude-and phase-matched. They may be used independently, or cascaded for a rolloff rate of 230 dB/octave. Each channel has prefilter gain of up to 40dB, input overload indicators and selectable ac/dc input coupling.

1.1.3 Model 753A is a dual-channel instrument which consists of independent high-pass and low-pass sections. The two sections may be used independently, cascaded for band pass response, or paralleled for band reject response. Each section has prefilter gain of up to 40 dB and input overload indicators. The low-pass section has selectable ac/dc input coupling.

1.2 OPTIONS

Option 001 allows remote control of the filter using 35 lines of parallel BCD programming. Programming delay is 500 μs plus filter settling time, which is a function of the programmed cutoff frequency.

Option 002 allows remote control of the filter using the IEEE 488-1978 (GPIB) interface. The interface includes the following functions: AH1 (Acceptor Handshake), L1 (Basic Listener with listen only), and DT1 (Device Trigger).

1.3 DEFINITIONS

The important low-pass characteristic of an Elliptic Filter is illustrated in Figure 1-1. The high-pass characteristic is the "mirror image" of the low-pass curve shown.

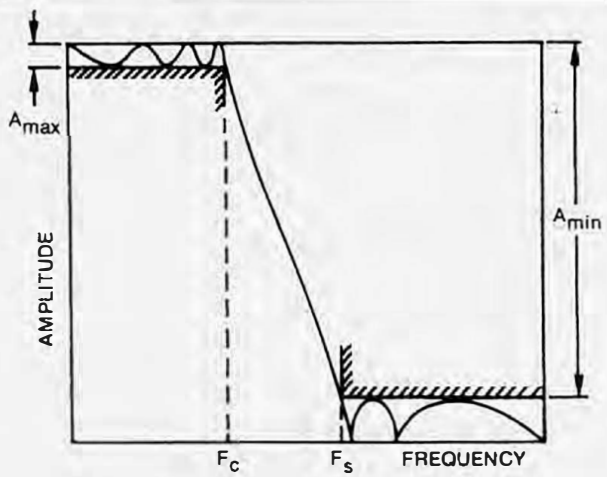


Figure1-1. Elliptic Filter Response

The Cutoff Frequency, F_c, is the frequency at which the response of the filter drops below the specified passband

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

ripple, A_{max}. The conventional −3 dB frequency criterion has no significance in an elliptic filter.

For the low-pass section, F_s is the lowest frequency for which the specified stop-band attenuation (A_{min}) applies. For the high-pass section, it is the highest frequency.

It should be noted that the low-pass and high-pass cutoff frequency tolerances of these instruments are intentionally "skewed" to slightly beyond their nominal values. That is, the high-pass cutoff frequency is slightly lower and the low-pass cutoff frequency is slightly higher than its nominal value. This ensures no data loss up to the F_c setting in the case of the 752A, or in the case of the 751A or 753A, when the two sections are set to identical cutoffs (minimum bandwidth) the slopes of the resulting response will not overlap and cause a passband amplitude loss.

1.4 SPECIFICATIONS

The following specifications apply to all models, except as noted.

1.4.1 Cutoff Frequency (F_c)

Range
1 Hz to 99 kHz with front panel and GPIB, 1 Hz to 100 kHz with remote control (BCD only).

Control (each channel)
Two 10-position switches, one 4-position multiplier switch; remotely by 12-bit code.

Resolution

Multiplier	Frequency (Hz)		Resolution of Setting (Hz)
	Local	Remote	
× 1	1-99	1-100	1
× 10	100-990	100-1k	10
× 100	1k-9.9k	1k-10k	100
× 1K	10k-99k	10k-100k	1k

Accuracy
−0.3 ± 0.1 dB at F_c.

Stability
± 200 ppm/°C.

1.4.2 Gain (Prefilter)

Control (each channel)
One 5-position switch, or 3-bit code.

Steps
0, +10, +20, +30, +40 dB.

Accuracy
± 0.2 dB.

Gain (Postfilter)
Model 751A only

Control
One 3-position switch, or 3-bit code.

Steps
0, +10, +20 dB.

Accuracy
± 0.2 dB.

1.4.3 Filter Characteristics

Type
7-pole, 6 zero elliptic (Cauer).

Rolloff
115 dB/octave.

Passband Response
Low-pass channel: 0.3 dB p-p; High-pass channel: 0.3 dB p-p (−3 dB at approximately 400 kHz).

Stopband Attenuation

Low-Pass Channel	High-Pass Channel
−0.3 dB (dc to F_c)	−0.3 dB at F_c
−40 dB at 1.34 F_c	−40 dB at 0.75 F_c
−60 dB at 1.53 F_c	−60 dB at 0.65 F_c
−80 dB at 1.7 F_c	−80 dB at 0.6 F_c

Maximum Stopband Attenuation
Low-pass channel: 85 dB (typical); 80 dB (minimum) to 10 MHz. High-pass channel: 85 dB (typical); 80 dB (minimum).

Model 752A only

Amplitude Match*
± 0.1 dB, dc to 0.8 F_c. ± 0.2 dB, 0.8 F_c to F_c.

Phase Match*
± 1/2° (typical). ± 1° (maximum), dc to 0.8 F_c. ± 1° (typical), ± 2° (maximum), 0.8 F_c to F_c.

1.4.4 Input Characteristics

Coupling
Low-pass channel: dc or ac with 0.3 Hz cutoff (nominal). High-pass channel: dc.

Impedance
1 MΩ 50 pF nominal.

Full Scale Signal
± 10V at 0dB gain; ± 100V absolute maximum.

Equivalent Input Noise
-150 dBV/$\sqrt{\text{Hz}}$ at + 40 dB gain.

1.4.5 Output Characteristics

Impedance
50Ω nominal.

Full Scale Signal
± 10V into $R_L > 5k\Omega$.

Noise (1 MHz detector BW)
<80 dB below full-scale referred to output at any prefilter gain. (0 dB postfilter gain, 751A).
<10 μV referred to input at 40 dB prefilter gain.

Harmonic Components
>80 dB below full-scale for 1kHz input frequency.

Spurious Components
>80 dB below full-scale (includes line-related spurious).

Intermodulation Products
>70 dB below full-scale for 90 kHz and 70 kHz input frequencies.

DC Offset
Adjustable to 0 Vdc; < ± 10 mV

Drift
± 50 mV (maximum), +15°C to +40°C at 0 dB gain setting.

1.4.6 General

Configuration
Bench-top, convertible to rack-mounting.

Input/Output Connectors
Front and rear panel BNCs.

Accessories Supplied
Instruction Manual, Rack-mounting kit.

Temperature
0°C to +40°C for operation; −20°C to +70°C for storage.

Dimensions
43.2 cm (17 in.) wide; 8.9 cm (3½ in.) high; 33 cm (13 in.) deep.

Weight
8.2 kg (18 lb) net; 10.5 kg (23 lb) shipping.

Power
115/230 Vac ± 10%, 50 to 60 Hz, 25W.

1.4.7 Options

001 Parallel BCD Interface
002 GPIB Interface — (IEEE 488-1978)

*Specifications apply when most significant cutoff digit is used; derate by a factor of 2 when both digits are used.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 2
INITIAL PREPARATION

2.1 INSPECTION

After unpacking the instrument, visually inspect all external parts for possible damage to connectors, surface areas, etc. If damage is discovered, file a claim with the carrier who transported the unit. The shipping container and packing material should be saved in case reshipment is required.

2.2 MECHANICAL INSTALLATION

The Models 751A, 752A, and 753A are designed for bench top operation or standard 19-inch RETMA rack mounting. Ambient temperature within the rack must not exceed + 40°C while the instrument is operating. The rear panel switches should be set before installing the filter in the rack.

2.3 ELECTRICAL INSTALLATION

2.3.1 Power Connection

The instrument will operate from either 115 or 230 Vac ± 10%, 50 to 60 Hz. The unit is shipped with the rear panel line voltage selector set for 115 V and a 1A SB fuse (see figure 2-1). To change the setting, insert a small-blade screwdriver in the switch slot and move switch to expose 115 for 115 Vac operation, or 230 for 230 Vac operation. For 230 Vac operation, change to a ½A SB fuse.

WARNING

In keeping with standard safety practice, the case of the instrument is grounded through the power cord. If the instrument must be connected to a two wire receptacle, use a parallel ground adapter and connect the short lead to ground.



Figure 2-1. Voltage Selector and Fuse

2.3.2 Signal Connection

Use RG58U 50Ω coaxial cables equipped with BNC connectors to distribute signals when connecting this instrument to associated equipment.

2.3.3 GPIB Option

2.3.3.1 GPIB Connection

The GPIB I/O rear panel connection is shown in figure 2-2; pin connections and signal names are given in table 2-1. The panel connector is an Amphenol 57-10240 or equivalent and connects to a GPIB bus cable connector (available from Wavetek in 1 and 2 meter lengths).

Table 2-1. GPIB Data In/Out

Pin	Signal	
1	DIO1	True When Low
2	DIO2	
3	DIO3	
4	DIO4	
5	EOI	
6	DAV	
7	NRFD	True When High
8	NDAC	
9	IFC	True When Low
10	SRQ	
11	ATN	
12	Chassis Ground (⏚)	
13	DIO5	True When Low
14	DIO6	
15	DIO7	
16	DIO8	
17	REN	
18		Signal Ground (⏚)
19		
20		
21		
22		
23		
24		

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

2.3.3.2 GPIB Address

For instruments on the General Purpose Interface Bus (GPIB), ensure that the GPIB address is correct. The GPIB address can be changed by the switch on the rear of the instrument (see figure 2-2) by simply setting the multiple section switch according to table 2-2. The switch sections are labeled from 1 through 5 and their open position noted (OPEN = Binary "0" in table 2-2).

Table 2-2. GPIB Address Codes

	ASCII		Switch Position					
Device	Listen	Talk	16	8	4	2	1	Listen (Hexa-decimal)
1	(space)	@	0	0	0	0	0	20
1	!	A	0	0	0	0	1	21
2	"	B	0	0	0	1	0	22
3	#	C	0	0	0	1	1	23
4	$	D	0	0	1	0	0	24
5	%	E	0	0	1	0	1	25
6	&	F	0	0	1	1	0	26
7	'	G	0	0	1	1	1	27
8	(	H	0	1	0	0	0	28
9	)	I	0	1	0	0	1	29
10	*	J	0	1	0	1	0	2A
11	+	K	0	1	0	1	1	2B
12	,	L	0	1	1	0	0	2C
13	—	M	0	1	1	0	1	2D
14	•	N	0	1	1	1	0	2E
15	/	O	0	1	1	1	1	2F
16	0	P	1	0	0	0	0	30
17	1	Q	1	0	0	0	1	31
18	2	R	1	0	0	1	0	32
19	3	S	1	0	0	1	1	33
20	4	T	1	0	1	0	0	34
21	5	U	1	0	1	0	1	35
22	6	V	1	0	1	1	0	36
23	7	W	1	0	1	1	1	37
24	8	X	1	1	0	0	0	38
25	9	Y	1	1	0	0	1	39
26	:	Z	1	1	0	1	0	3A
27	;	[	1	1	0	1	1	3B
28	<	\	1	1	1	0	0	3C
29	=	]	1	1	1	0	1	3D
30	>	↑	1	1	1	1	0	3E

NOTE

Address 31 is not allowed.

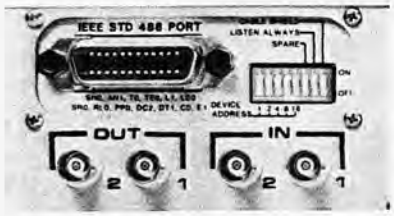


Figure 2-2. GPIB Address Selector Switch

2.3.4 BCD Option

The BCD I/O connector is a 50 pin connector; pin connections and functions are listed in table 2-3.

Table 2-3. BCD Interface Programming Connector All Models(1)

Pin	Function	
1	×1 Cutoff-Frequency Multiplier	True When Low Channel 1
2	×10 Cutoff-Frequency Multiplier	
3	×100 Cutoff-Frequency Multiplier	
4	×1k Cutoff-Frequency Multiplier	
5	Cutoff-Frequency 1	
6	Cutoff-Frequency 2	
7	Cutoff-Frequency 4	
8	Cutoff-Frequency 8	
9	Cutoff-Frequency 10	
10	Cutoff-Frequency 20	
11	Cutoff-Frequency 40	
12	Cutoff-Frequency 80	
13	Gain 1	
14	Gain 2	
15	Gain 4	
16	Overload	
17-22	Ground	
23	Load Command	
24	Ground	
25-26	Remote Enable	True When Low Channel 2
27	Ground	
28	Load Command	
29-34	Ground	
35	Overload	
36	Gain 4 (Not used in Model 751A).	

Table 2-3. BCD Interface Programming Connector All Models[1] (Continued)

Pin	Function	
37	Gain 2	True When Low Channel 2
38	Gain 1	
39	Cutoff-Frequency 80	
40	Cutoff-Frequency 40	
41	Cutoff-Frequency 20	
42	Cutoff-Frequency 10	
43	Cutoff-Frequency 8	
44	Cutoff-Frequency 4	
45	Cutoff-Frequency 2	
46	Cutoff-Frequency 1	
47	× 1k Cutoff-Frequency Multiplier	
48	× 100 Cutoff-Frequency Multiplier	
49	× 10 Cutoff-Frequency Multiplier	
50	× 1 Cutoff-Frequency Multiplier	

[1] For Models 751A/753A, Channel 1 = High pass filter section; Channel 2 = Low pass filter section.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 3
OPERATION

3.1 INTRODUCTION

This section describes how to operate the Models 751A, 752A, and 753A. Each model's controls and indicators are described. This is followed by typical operating procedures and response characteristics. Finally, the two interface options, BCD and GPIB, are discussed.

3.2 CONTROLS AND INDICATORS

The front panel controls and indicators are shown in the following figures and described in the following tables.

Model	Figure	Table
751A	3-1	3-1
752A	3-2	3-2
753A	3-3	3-3

Rear panel controls for all three models are shown in figure 3-4 and described in table 3-4.

Table 3-1. Model 751A Controls and Indicators

Location in Figure 3-1	Function
1	OVERLOAD LED — When lit, indicates an input signal level of greater than ± 10V (including pre-filter gain).
2	PRE-FILTER GAIN — Sets the gain from 0 to 40 dB in 10 dB steps.
3	Most Significant Digit — Sets the MSD of the cutoff frequency of the high pass filter, positions 0 to 9 with continuous rotation.
4	Least Significant Digit — Sets the LSD of the cutoff frequency of the high pass filter, positions 0 to 9 with continuous rotation.
5	Decimal Multiplier — Sets the cutoff frequency range of high pass filter, positions 1, 10, 100, and 1k.
6	Most Significant Digit — Sets the MSD of the cutoff frequency of the low pass filter; positions 0 to 9 with continuous rotation.
7	Least Significant Digit — Sets the LSD of the low pass filter cutoff frequency, positions 0 to 9 with continuous rotation.
8	Decimal Multiplier — Sets the low pass filter cutoff frequency range, positions 1, 10, 100, and 1k.
9	OVERLOAD LED — When lit, indicates an output signal of greater than ± 10V (including all filter gain).
10	POST-FILTER GAIN — Sets the gain from 0 to 20 dB in 10 dB steps.
11	ON switch — Turns the 751A on.
12	LOCAL/LISTEN — A lit LED indicates active front panel controls (LOCAL) or remote GPIB control (LISTEN). With the BCD interface, the LED does not light in remote.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 3-1. Model 751A Controls and Indicators (Continued)

Location in Figure 3-1	Function
13	REMOTE LED — When lit, indicates the 751A is in the remote mode.
14	Output BNC connector.
15	Input BNC connector.

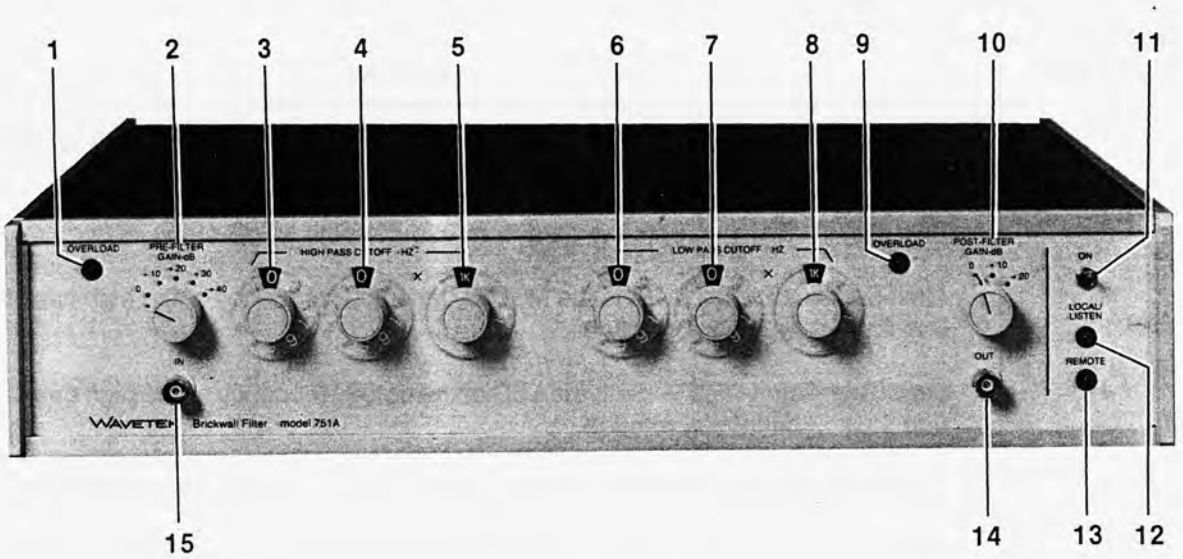


Figure 3-1. Model 751A Controls and Indicators

Table 3-2. Model 752A Controls and Indicators

Location in Figure 3-2	Function
1	OVERLOAD LED — When lit, indicates an input signal level to channel 1 of greater than ± 10V (including gain).
2	GAIN Channel 1 — Sets the input gain from 0 to 40 dB in 10 dB steps.
3	Most Significant Digit — Sets the MSD of the Channel 1 cutoff frequency, positions 0 to 9 with continuous rotation.
4	Least Significant Digit — Sets the LSD of the Channel 1 cutoff frequency, positions 0 to 9 with continuous rotation.
5	Decimal Multiplier — Sets the Channel 1 cutoff frequency range, positions 1, 10, 100, and 1k.
6	OVERLOAD LED — When lit, indicates an input signal level to channel 2 of greater than ± 10V (including gain).
7	GAIN Channel 2 — Sets the input gain from 0 to 40 dB in 10 dB steps.
8	Most Significant Digit — Sets the MSD of the Channel 2 cutoff frequency, positions 0 to 9 with continuous rotation.
9	Least Significant Digit — Sets the LSD of the Channel 2 cutoff frequency, positions 0 to 9 with continuous rotation.
10	Decimal Multiplier — Sets the Channel 2 cutoff frequency range, positions 1, 10, 100, and 1k.
11	ON Switch — Turns the 752A on.
12	LOCAL/LISTEN — A lit LED indicates active front panel controls (LOCAL) or remote GPIB control (LISTEN). With the BCD interface, the LED does not light in remote.
13	REMOTE LED — When lit, indicates the 752A is in the remote mode.
14	Channel 2 Output BNC connector.
15	Channel 2 Input BNC connector.
16	DC/AC Switch — Selects input coupling for Channel 2.
17	Channel 1 Output BNC connector.
18	Channel 1 Input BNC connector.
19	DC/AC Switch — Selects input coupling for Channel 1.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

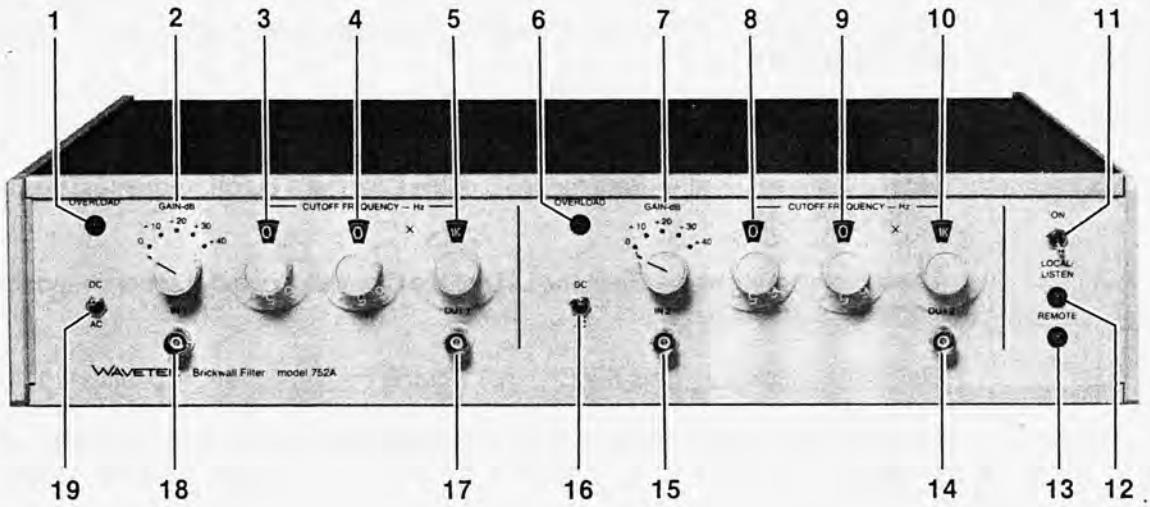


Figure 3-2. Model 752A Controls and Indicators

Table 3-3. Model 753A Controls and Indicators

Location in Figure 3-3	Function
1	OVERLOAD LED — When lit, indicates an input signal level to high pass filter of greater than ± 10V (including gain).
2	High Pass GAIN — Sets the input gain from 0 to 40 dB in 10 dB steps.
3	Most Significant Digit — Sets the MSD of the high pass filter's cutoff frequency, positions 0 to 9 with continuous rotation.
4	Least Significant Digit — Sets the LSD of the high pass filter's cutoff frequency, positions 0 to 9 with continuous rotation.
5	Decimal Multiplier — Sets the high pass filter's cutoff frequency range, positions 1, 10, 100, and 1k.
6	OVERLOAD LED — When lit, indicates an input signal level to low pass filter of greater than ± 10V (including gain).
7	Low Pass GAIN — Sets the input gain from 0 to 40 dB in 10 dB steps.
8	Most Significant Digit — Sets the MSD of the low pass filter's cutoff frequency, positions 0 to 9, continuous rotation.

Table 3-3. Model 753A Controls and Indicators (Continued)

Location in Figure 3-3	Function
9	Least Significant Digit — Sets the LSD of the low pass filter cutoff frequency, positions 0 to 9 with continuous rotation.
10	Decimal Multiplier — Sets the high pass filter cutoff frequency range, positions 1, 10, 100, and 1k.
11	ON Switch — Turns the 753A on.
12	LOCAL/LISTEN — A lit LED indicates active front panel controls (LOCAL) or remote GPIB control (LISTEN). With the BCD interface, the LED does not light in remote.
13	REMOTE LED — When lit, indicates the 753A is in the remote mode.
14	Low pass channel output BNC.
15	Low pass channel input BNC.
16	DC/AC Switch — Selects input coupling for the low pass channel.
17	High pass channel output BNC.
18	High pass channel input BNC.

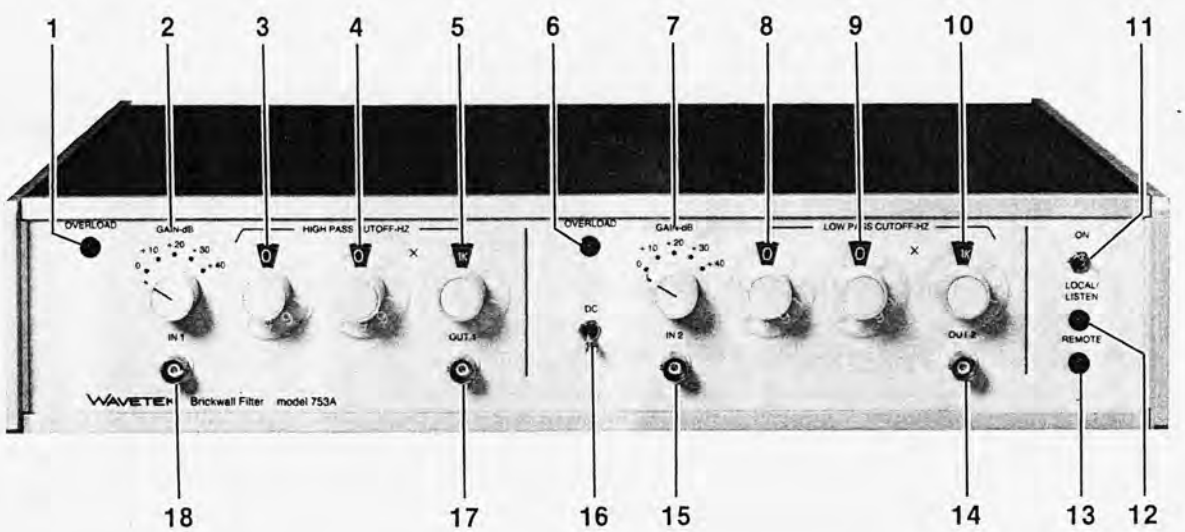


Figure 3-3. Model 753A Controls and Indicators

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

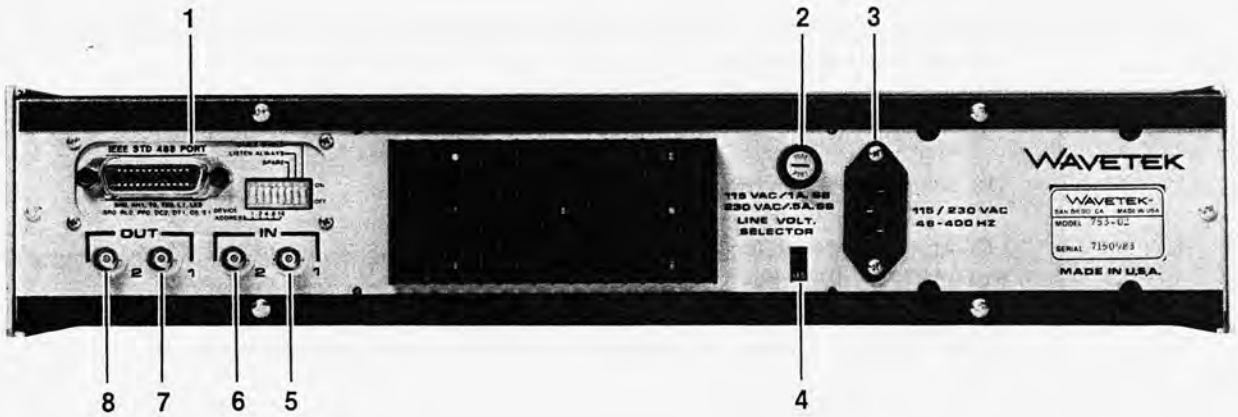


Figure 3-4. Models 751A, 752A, and 753A Rear Panel Controls

Table 3-4. Models 751A, 752A, and 753A Rear Panel Controls

Location in Figure 3-4	Function
1	Optional rear panel programming connector. Option 01: BCD interface 50 pin connector (not shown), see table 3-5 and paragraph 3.4. Option 02: GPIB interface connector, see table 2-1 and paragraph 3.5; GPIB address switch, see table 2-2 and paragraph 2.3.3.2.
2	Fuseholder, see paragraph 2.3.1.
3	Three-wire ac power connector.
4	115/230 Vac line selector switch.
5	Channel 1 input BNC connector parallels front panel BNC. Duplicate of item 6 for input on Model 751A.
6	Channel 2 input BNC connector.
7	Channel 1 Output BNC connector parallels front panel BNC. Duplicate of item 8 for output BNC on Model 751A.
8	Channel 2 Output BNC connector. Parallels front panel BNC.

3.3 TYPICAL OPERATING PROCEDURES

Always select the minimum decimal multiplier setting. For example, a cutoff frequency of 90 Hz can be set as 09 × 10 or 90 × 1. The proper choice is 90 × 1. In other words, the most significant digit of the cutoff frequency dials should not be set to 0, unless the cutoff frequency is less than 10 Hz. The minimum valid setting of Cutoff Frequency dials is 01. The setting 00 is not valid.

3.3.1 Model 751A

Passband

The passband of the filter extends from the high-pass cutoff frequency setting to the low-pass cutoff frequency setting. These, in turn, are detemined by the two cutoff frequency dials and the corresponding multiplier switches.

The narrowest passband is obtained by setting high-pass and low-pass cutoff frequencies to the same value f_o. In this case, the insertion loss is nominally 0 dB; the 3dB bandwidth extends from approximately 0.95 f_o to approximately 1.05 f_o and it is equal to 0.1 f_o. This corresponds to a Q of 10. In this mode of operation, the instrument operates as a constant – Q (or constant % – Bandwidth) filter.

Pre-Filter Gain

Pre-Filter gain may be selected to be 0, 10, 20, 30 or 40 dB. To maximize the useful dynamic range, the maximum gain should be used without causing the corresponding overload LED to light. Overload "On" indicates that an input signal has exceeded the maximum safe desirable amplitude. If the signal exceeds this range and its frequency is within the passband of the filter, a ± 10 Volt A/D converter connected to the output of the 751A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

The maximum desirable full-scale signal is ± 10V (7.1 Vrms) for 0 dB gain. When pre-filter gain is employed, the maximum input signal decreases in direct proportion to the increase in gain. For example, with 20 dB gain, the maximum desirable input amplitude is ± 1.0 V (0.71 Vrms).

Post-Filter Gain

Post-Filter gain may be selected to be 0, 10 or 20 dB. This control should be set such that it does not cause the corresponding overload LED to light. Overload "On" indicates that the output signal has exceeded the maximum safe desirable amplitude and a ± 10 Volt A/D converter connected to the output of the 751A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

When Post-filter gain other than 0 dB is used, the dynamic range of the instrument is reduced by the amount of gain employed.

The primary use of Post-filter gain is when the instrument is being used with small (narrow) passbands; gain may be used to increase the amplitude of a small signal which was buried in broadband noise; or, it may be be used to amplify noise, when the objective is to generate band-limited noise from a broadband noise source.

Response Characteristics

The following figures show examples of Model 751A typical response characteristics.

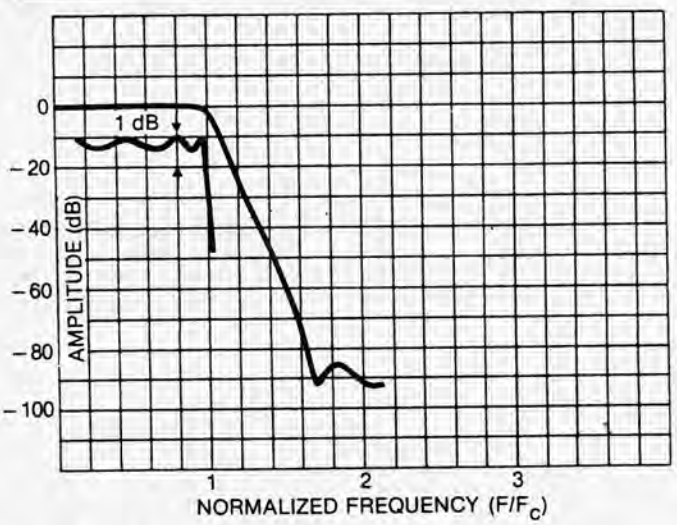


Figure 3-5. Model 751A Low-Pass Frequency Response

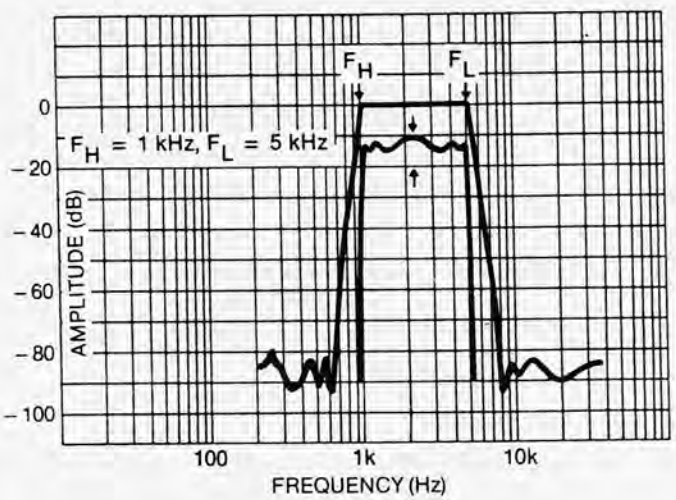


Figure 3-6. Model 751A Typical Bandpass Response

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

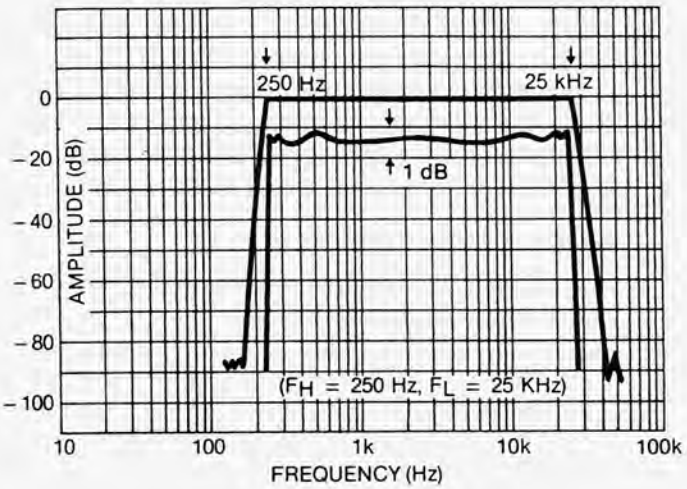


Figure 3-7. Model 751A Typical Bandpass Response

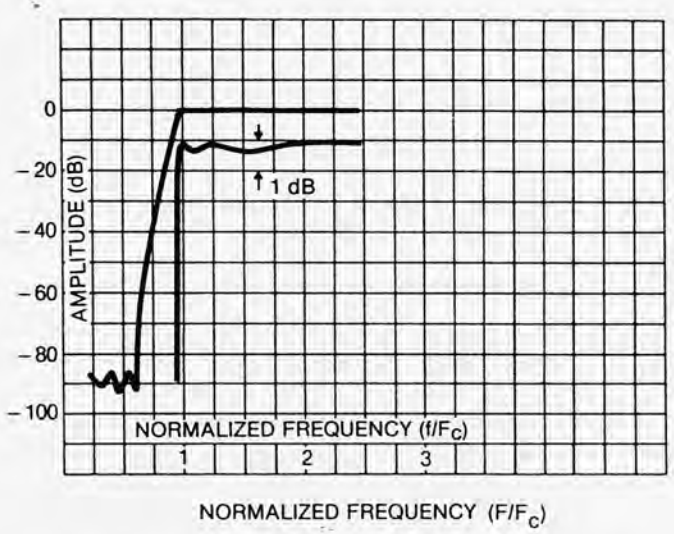


Figure 3-8. Model 751A High-Pass Frequency Response

3.3.2 Model 752A

Low-Pass Filter

The two channels of the instrument may be used independently to process two different input signals.

If the input coupling switch is set to DC, the passband of the filter extends from dc to the cutoff frequency which is defined by the cutoff frequency dials and the multiplier.

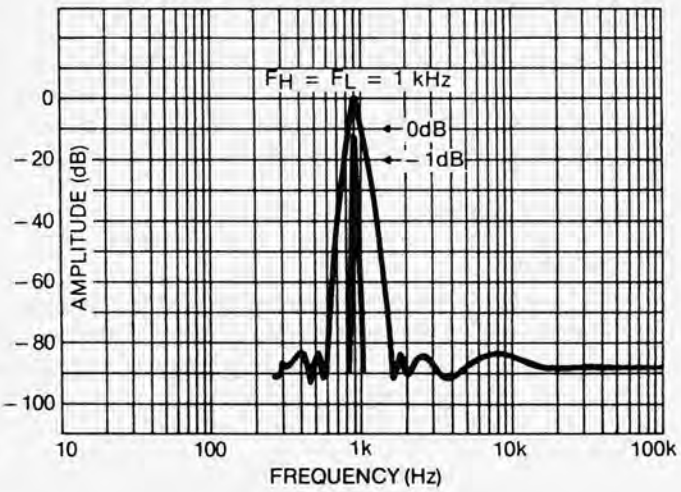


Figure 3-9. Model 751A Minimal Bandpass Response

Switching the coupling to AC causes a 6 dB/oct. rolloff below 0.3 Hz. This position should be used when large dc offsets are present in the input signal and response to dc is not required.

The passband gain of each channel may be selected to be 0, 10, 20, 30 or 40 dB using the Gain switch. To maximize the useful dynamic range, the maximum gain should be used without causing the overload LED to light. Overload "On" indicates that the input signal has exceeded the maximum safe desirable amplitude. If the signal exceeds this range, a ± 10 Volt A/D converter connected to the output of the 752A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

The maximum desirable full-scale signal is ± 10V (7.1 Vrms) for 0dB gain. When gain is employed, the maximum input signal decreases in direct proportion to the increase in gain. For example, with 20 dB gain, the maximum desirable input amplitude is ± 1.0V (0.71 Vrms).

Low-Pass Filter with Doubled Rolloff

The two channels of the instrument may be cascaded by connecting the output of channel 1 to the input of channel 2. The cutoff frequency of both channels is set to the same value. Gain controls of both channels may be used. However, to maximize the usable dynamic range, the gain setting of channel 1 should be used before applying gain in channel 2. For example, if 50 dB gain is needed, set channel 1 to 40 dB and Channel 2 to 10 dB.

Response Characteristics

The following figures show examples of typical Model 752A response characteristics.

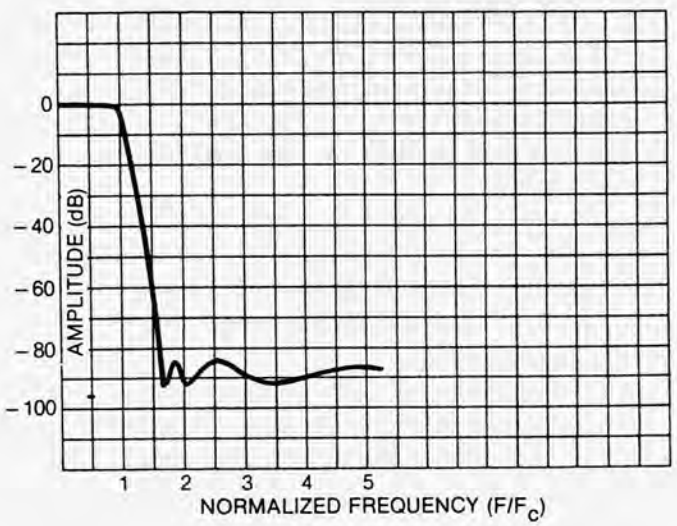


Figure 3-10. Model 752A Frequency Response

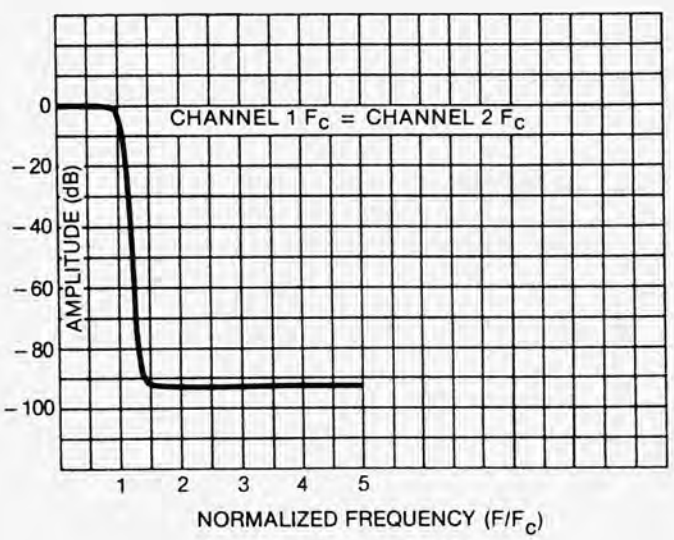


Figure 3-11. Model 752A Cascaded Channel Frequency Response

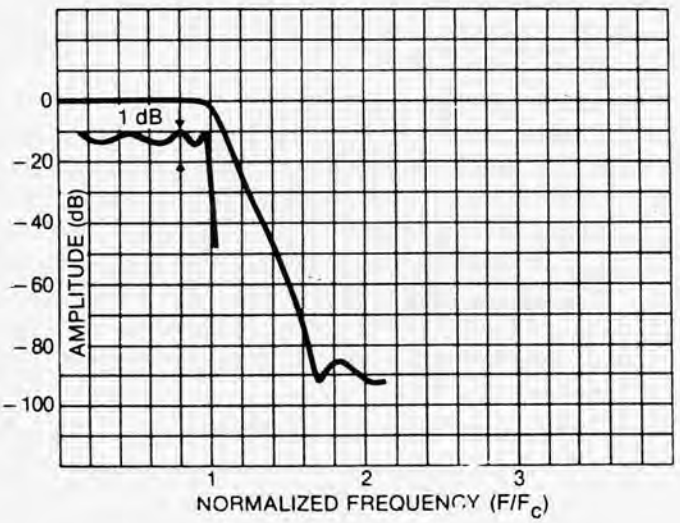


Figure 3-12. Model 752A Low-Pass Freuency Response

3.3.3 Model 753A

High-Pass Filter

The passband of the filter extends from the cutoff frequency setting to the upper 3 dB point of its active elements, which is around 400 kHz. The cutoff frequency is defined by the two cutoff frequency dials and the multiplier.

The passband gain may be selected to be 0, 10, 20, 30 or 40 dB using the gain switch. To maximize the useful dynamic range, the maximum gain should be used without causing the overload LED to light. Overload "On" indicates that the input signal has exceeded the maximum safe desirable amplitude. If the signal exceeds this range, a ± 10 Volt A/D converter connected to the output of the 753A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

The maximum desirable full-scale signal is ± 10V (7.1 Vrms) for 0 dB gain. When gain is employed, the maximum input signal decreases in direct proportion to the increase in gain. For example, with 20 dB gain, the maximum desirable input amplitude is ± 1.0 V (0.71 Vrms).

Low-Pass Filter

If the input coupling switch is set to DC, the passband of the filter extends from dc to the cutoff frequency which is defined by the cutoff frequency dials and the multiplier.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Switching the coupling to AC causes a 6 dB/oct. rolloff below 0.3 Hz. This position should be used when large dc offsets are present in the input signal and response to dc is not required.

The passband gain may be selected to be 0, 10, 20, 30 or 40 dB using the gain switch. To maximize the useful dynamic range, the maximum gain should be used without causing the overload LED to light. Overload "On" indicates that the input signal has exceeded the maximum safe desirable amplitude. If the signal exceeds this range, a ±10 Volt A/D converter connected to the output of the 753A will overflow; however, no distortion occurs in the instrument until the signal exceeds full-scale by 10%.

The maximum desirable full-scale signal is ±10V (7.1 Vrms) for 0 dB gain. When gain is employed, the maximum input signal decreases in proportion to the increase in gain. For example, with 20 dB gain, the maximum desirable input amplitude is ±1.0V (0.71 Vrms).

Bandpass Filter

The two channels of the Model 752A may be cascaded by connecting the output of channel 1 to the input of channel 2 as shown in figure 3-13.

The passband of the filter extends from the high-pass cutoff frequency setting to the low-pass cutoff frequency setting. These are determined by the two cutoff frequency dials and the corresponding multiplier switches.

The narrowest passband is obtained by setting high-pass and low-pass cutoff frequencies to the same value, f_o. In this case, the insertion loss is nominally 0dB; the −3 dB bandwidth extends from approximately 0.95 f_o to approximately 1.05 f_o and is equal to 0.1 f_o. This corresponds to a Q or 10. In this mode the instrument operates as a constant −Q (or constant % − Bandwidth) Filter.

Gain may be selected in either, or both high-pass and low-pass sections. To maximize the useful dynamic range, the maximum gain should be used without causing the corresponding overload LED to light.

Band-Reject Filter

The two channels of the instrument may be connected in parallel by applying the input signal to both channels and summing the output signals, as shown in figure 3-14.

The rejection band of the filter extends from the low-pass cutoff frequency setting to the high-pass cutoff frequency setting. These are determined by the cutoff frequency dials and multiplier switches.

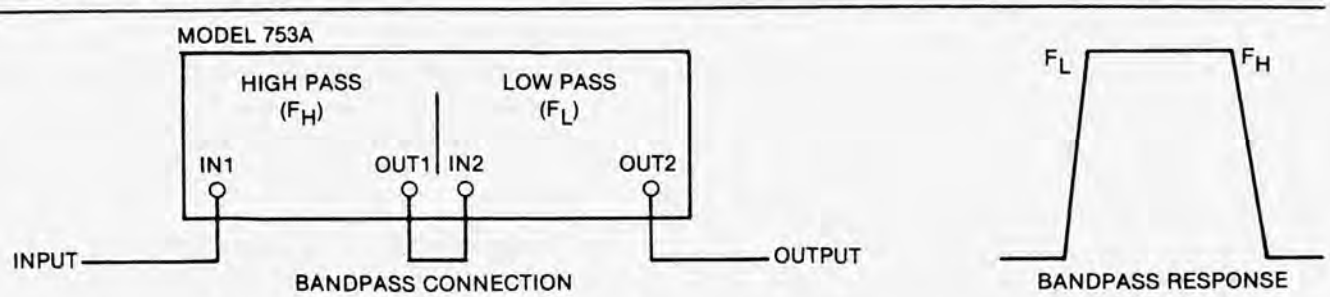


Figure 3-13. Band-Pass

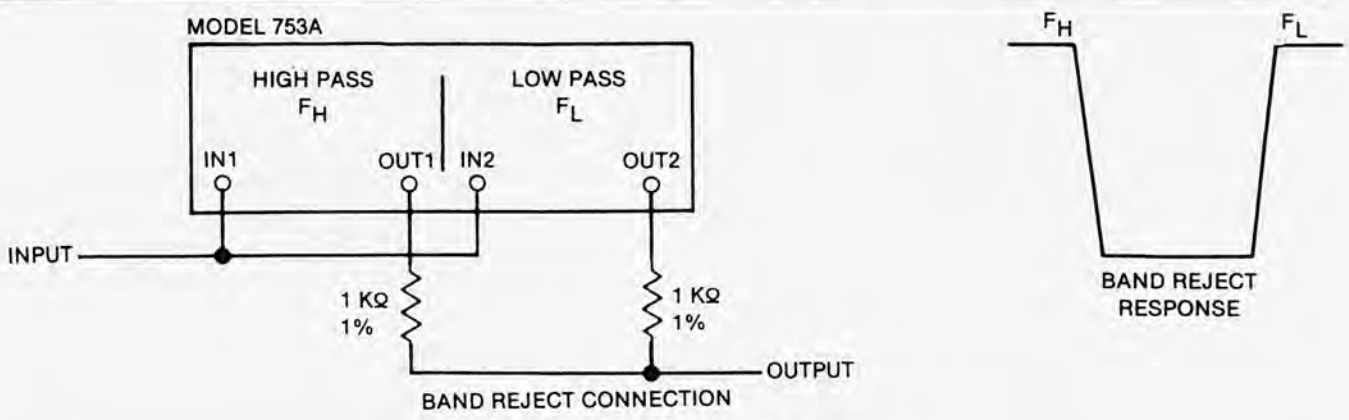


Figure 3-14. Band Reject

Because of the summation network at the output, this connection has an inherent 6dB insertion loss. If gain is necessary, both channel gains must be increased and set to the same value, when equal response outside the rejection band is desired. Unequal responses may be obtained by using different gains. For example, the low-pass side of the rejection band may be made higher in amplitude by setting the low-pass gain higher.

In either case, gain in the respective passbands will be 6dB less than the selected gain settings.

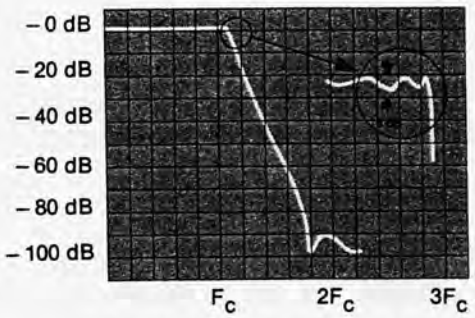


Figure 3-15. Low-Pass Response

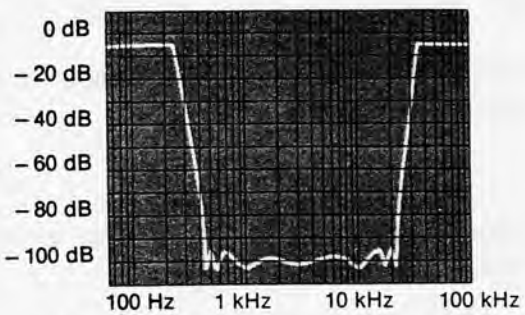


Figure 3-16. Band-Reject Response

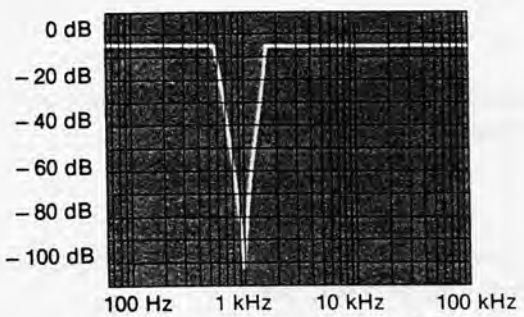


Figure 3-17. Minimum Band-Reject (Notch) Response

A Notch response is a particular case of Band-Reject response. To obtain the minimum-width notch, set the low-pass cutoff at 59% and the high-pass cutoff at 167% of the desired notch frequency.

Response Characteristics

The following figures show examples of typical Model 753A response characteristics.

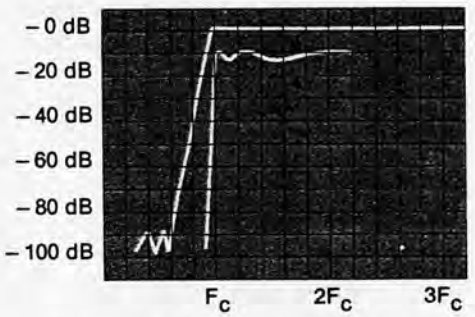


Figure 3-18. High-Pass Response

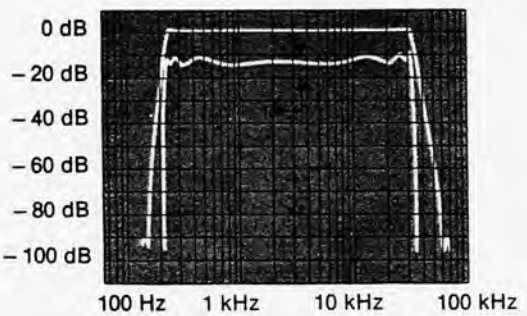


Figure 3-19. Pass-Band Response

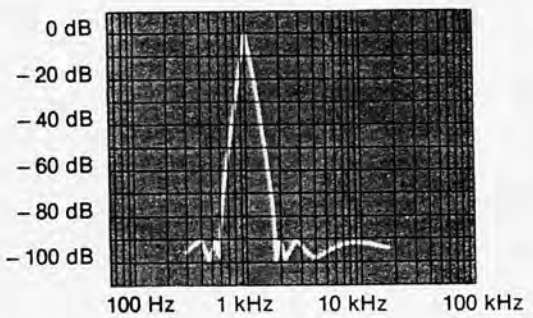


Figure 3-17. Minimum Pass-Band Response

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3.4 REMOTE PROGRAMMING: BCD INTERFACE (OPTION 01)

A 50-pin connector is provided on the rear panel. Table 3-5 lists the pin connections and describes each signal. Remote programming inputs are low active ("1" State). A "1" is 0 V to 0.8 V, and a "0" is +2 V to +5 V.

Table 3-5. BCD Interface Programming Connector[a]

Pin	Function	Description
1	×1 Cutoff Frequency Multiplier	Low active. Selects the cutoff frequency multiplier for Channel 1.
2	×10 Cutoff Frequency Multiplier	
3	×100 Cutoff Frequency Multiplier	
4	×1k Cutoff Frequency Multiplier	
5	Cutoff Frequency 1 Bit	Low active. Selects the units digits for the cutoff frequency for Channel 1 in 8, 4, 2, 1 binary code.
6	Cutoff Frequency 2 Bit	
7	Cutoff Frequency 4 Bit	
8	Cutoff Frequency 8 Bit	
9	Cutoff Frequency 10 Bit	Low active. Selects the tens digit for the cutoff frequency for Channel 1 in 8, 4, 2, 1 binary code.
10	Cutoff Frequency 20 Bit	
11	Cutoff Frequency 40 Bit	
12	Cutoff Frequency 80 Bit	
13	Gain 1 Bit	Low active. Selects the gain for Channel 1 in 4, 2, 1 binary code. Programmed as follows: 0 dB-000, 10 dB-001, 20 dB-010, 30 dB-011, 40 dB-100.
14	Gain 2 Bit	
15	Gain 4 Bit	
16	Overload	Low active. Indicates amplitude of input signal exceeds the maximum value in Channel 1.
17-22	Ground	
23	Load Command	Low active. Loads cutoff frequency and gain into the digital registers of Channel 1.
24	Ground	
25-26	Remote Enable	Low active. Disables front panel control of both channels and enables remote control.
27	Ground	
28	Load Command	Low active. Loads cutoff frequency and gain into the digital registers of Channel 2.
29-34	Ground	
35	Overload	Low active. Indicates amplitude of input signal exceeds the maximum value in Channel 2.
36	Gain 4 Bit[b]	Low active. Selects the gain setting for Channel 2 in 4, 2, 1 binary code. Programmed as follows: 0 dB-000, 10 dB-001, 20 dB-010, 30 dB-011, 40 dB-100.
37	Gain 2 Bit	
38	Gain 1 Bit	

Table 3-5. BCD Interface Programming Connector[a] (Continued)

Pin	Function	Description
39 40 41 42	Cutoff Frequency 80 Bit Cutoff Frequency 40 Bit Cutoff Frequency 20 Bit Cutoff Frequency 10 Bit	Low active. Selects the tens digit for the cutoff frequency for Channel 2 in 8, 4, 2, 1 binary code.
43 44 45 46	Cutoff Frequency 8 Bit Cutoff Frequency 4 Bit Cutoff Frequency 2 Bit Cutoff Frequency 1 Bit	Low active. Selects cutoff frequency multiplier for Channel 2.
47 48 49 50	×1k Cutoff Frequency Multiplier ×100 Cutoff Frequency Multiplier ×10 Cutoff Frequency Multiplier ×1 Cutoff Frequency Multiplier	Low active. Selects cutoff frequency multiplier for Channel 2.

[a] Applies to all Models except the 751A/753A, where "Channel 1" relates to the high pass controls; "Channel 2" relates to the low-pass controls.

[b] Not used in the 751A; Post-Filter Gain is limited to 20 dB.

3.5 REMOTE PROGRAMMING: GPIB INTERFACE (OPTION 02)

3.5.1 Introduction

The reader is assumed to be familiar with the IEEE 488-1978 standard. If not, a detailed description of the bus system and its parameters, IEEE STD 488-1978 is available from:

IEEE Standards
347 East 47th Street
New York, New York 10017

3.5.2 Device Address Code and Mode Select Switches

A row of eight miniature rocker switches on the rear panel sets the device address code and other operating modes.

3.5.2.1 Device Address Code Selection — Switches #1 through #5

The five left-most switches allow the selection of the device address in the system. The range of addresses is from 0 — 30 (decimal) corresponding to the ASCII characters "SPACE" through ">" see table 2-1.

The switches have binary weights of "1", "2", "4", "8" and "16". When the top edge of the rocker is pressed, the binary weight of that switch contributes to the address. When the bottom edge of the rocker is pressed, that weight is off. For example, to set a listen address of 11 (decimal), the rocker switch pattern would be (left-to-right) on-on-off-on-off, or up-up-down-up-down.

3.5.2.2 Listen Always (Listen Only) Mode — Switch #6

The Listen Always (or Listen only) mode allows the instrument to only function as a listener. This eliminates the need for addressing the unit as a listener in simpler systems. When the Listen Always rocker switch is in the up (top depressed) position the Listen Always (Listen only) mode is selected. When this rocker switch is down (bottom depressed), the unit must be explicitly made a listener to receive data.

3.5.2.3 Shield Ground — Switch #8

When this switch is in the up position the shield of the IEEE Bus cable is electrically connected to the circuit ground of the instrument. When the switch is in the down position, the shield is not connected.

Use of this switch may be necessary in achieving optimum noise performance in a multi-instrument system.

3.5.3 Initialization

After power has been applied to all devices in the system, the Controller should:

1. Send REM (Remote Enable) active (low).
2. Send IFC (Interface Clear) active (low).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Send IFC (Interface Clear) inactive (high)

This will initialize all bus devices and set them to an idle state. Exercising the IFC line as above is also useful in reinitializing the system whenever it may be necessary. The instrument will assume the UNLISTEN state after this sequence.

3.5.4 Listen State

In order to receive data, the instrument must be in the LISTEN state, indicated by the LOCAL/LISTEN LED on the front panel. When in the LISTEN state, the unit handshakes and inspects all data sent over the bus. When not in the LISTEN state, the unit does not participate in the handshake and ignores data. Two methods are available for effecting the LISTEN state:

1. Sending the LISTEN command.
2. Setting the LISTEN ALWAYS switch on.

LISTEN Command

The LISTEN command is a universal bus command sent by the contoller containing the address of the device to be affected. After sending this command, the green LISTEN LED on the front panel of the instrument should be lit.

LISTEN ALWAYS

If the rear panel LISTEN ALWAYS switch #6 is set to ON, then the first prefix character handshake cycle on the bus will place the instrument in the LISTEN mode, lighting the green LISTEN LED.

UNLISTEN STATE

If the LISTEN ALWAYS switch is OFF, the instrument will leave the LISTEN state if the universal command UNLISTEN or, IFC is issued or, power is removed. If the LISTEN ALWAYS switch is ON, the instrument will leave the listen state only if power is removed or IFC is issued.

3.5.5 Sending Data

All control and input data are sent in ASCII character format, which is prevalent in GPIB systems. When in the LISTEN mode, the instrument will handshake all characters sent over the bus, but only the characters in table 3-6 are meaningful to filters operation.

If any characters other than these are sent, the instrument will ignore them.

Channel Select Commands

To select the filter channel to be loaded, the character **C** must be sent followed by either:

A for Channel 1 (or H — Models 751A/753A).
B for Channel 2 (or L — Models 751A/753A).
D for both Channels

For example, to select Channel 1 send:

CA

In order to make the string more intelligible to the user, extra characters may be inserted:

CH:A
CHNL = A

Table 3-6. ASCII Codes

ASCII Character	Function
A	Code for Channel 1; high pass (751A)
B	Code for Channel 2; low.pass (751A)
D	Code for both Channels
G	Gain Digit Prefix
0,1,2,3,4,5,6,7,8, 9	Data Value
F	Cutoff Frequency Digit Prefix
M	Cutoff Frequency Multiplier Prefix
C	Channel Select Prefix
CR	Carriage Return for Loading
GET	Group Execute Trigger for Loading

Frequency Digit Commands

The frequency digit is loaded by sending **F** followed by up to two digits between 0 and 99. For example, to send a frequency digit of 6, send:

F6

By inserting extra characters, the string can be more readable:

FREQ = 6
FREQ DIGIT: 6

Notice that both of these last examples contain the same key characters, F6. The other characters are simply ignored.

If more than two digits are sent, only the last two will be retained.

It is advisable never to send a frequency digit of 0 since this may cause a large dc offset to appear at the filter outputs.

Frequency Multiplier Commands

The frequency multiplier is treated like an exponent of 10. To enter the multiplier, send **M** followed by one digit from 0 to 3 which represents the power of ten of the multiplier. For example, M3 corresponds to a multiplier setting of × 1k.

Any digit greater than 3 will be ignored and not loaded and if more than one digit is entered, only the last one will be retained if it is 3 or less.

By adding characters, alternate strings may be issued:

MULT = 3
MULT RNGE: 3

Gain Commands

The gain is loaded by sending **G** followed by 1 digit between 0 and 4 specifying the gain in multiples of 10 dB. For example, to set a maximum gain of 40 dB send:

G4

By inserting extra characters, the string can be more readable:

GAIN = 4
GAIN: 4

The type of filter gain used (i.e., Channel 1, Channel 2, Pre-filter or post-filter) is determined by the last channel select command that was sent over the system.

Notice that all these examples contain the same key characters "G4". The other characters are ignored. The maximum post-filter gain of the 751A's channel 2 is 20 dB (G2).

Terminator Commands

To terminate a digital value following a prefix character, send another prefix character (such as C, F, M, etc.), or CR or GET commands.

For example:

F28M.

The CR (Carriage Return) or GET (Group Execute Trigger) commands at the end of a command-value string loads the string into the instrument.

The GET command is a universal command the controller sends to initiate a simultaneously activity by more than one bus device. The interface interprets the GET command exactly as a CR character, causing loading of the data to the instrument.

Combining Commands

Channel number and gain commands may be entered in one ASCII string followed by a CR or GET which transfers all data simultaneously to the unit. The order of command is unimportant. If one or more of the commands is omitted, the last value entered will be retained (as long as power is maintained). If more than one occurrence of a command is present in a string, only the last one will be retained.

For example, to program Channel 2 with 60 kHz cutoff-frequency and 10 dB gain send:

CBF60M3G1 (CR)

Alternatives for the same parameters are:

F60M3G1CB (CR)
M3CBG1F60 (CR)

In addition, if the channel select, multiplier digit, and gain do not change from the previous entry but the frequency digit changes to 40, then it is only necessary to send:

F40 (CR)

Extra characters may be included for easier programming:

"CHNL = A, FREQ = 60, MULT = 3, GAIN = 1 (CR)"

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 4
CIRCUIT DESCRIPTION

4.1 INTRODUCTION

This section gives a functional description of the Models 751A, 752A, and 753A Brickwall filters. Following this is a detailed explanation of the seventh-order elliptic filter.

4.2 MODEL 751A

For the following description, refer to figure 4-1. The input signal is applied to a low-noise input amplifier with programmable gain (Prefilter gain) of 0dB to 40 dB in 10 dB steps. An overload detector at the output of this amplifier indicates when input signal levels exceed $\pm 10\ V_{pk}$ or $7V_{rms}$. This signal is applied to an active RC seventh order high pass elliptic filter (see paragraph 4.5) whose cutoff frequency is programmed by changing the resistors in 8, 4, 2, 1 BCD steps and changing in the capacitors in decade steps.

The output of the high pass section is connected to an active RC seventh-order low pass elliptic filter. The high pass cutoff frequency is programmed the same as the low pass filter.

The high pass filters output is applied to an output amplifier with programmable gain (postfilter gain) of 0dB, 10 dB, or 20 dB. An overload detector at the output indicates when the output signal level exceeds $\pm 10\ V_{pk}$ or $7V_{rms}$, which is the rated input for most A/D converters.

All filter parameters can be controlled by the front panel controls or optional GPIB and BCD interfaces.

A regulated and shielded power supply provides all the filters power requirements.

4.3 MODEL 752A

For the following description, refer to figure 4-2. The

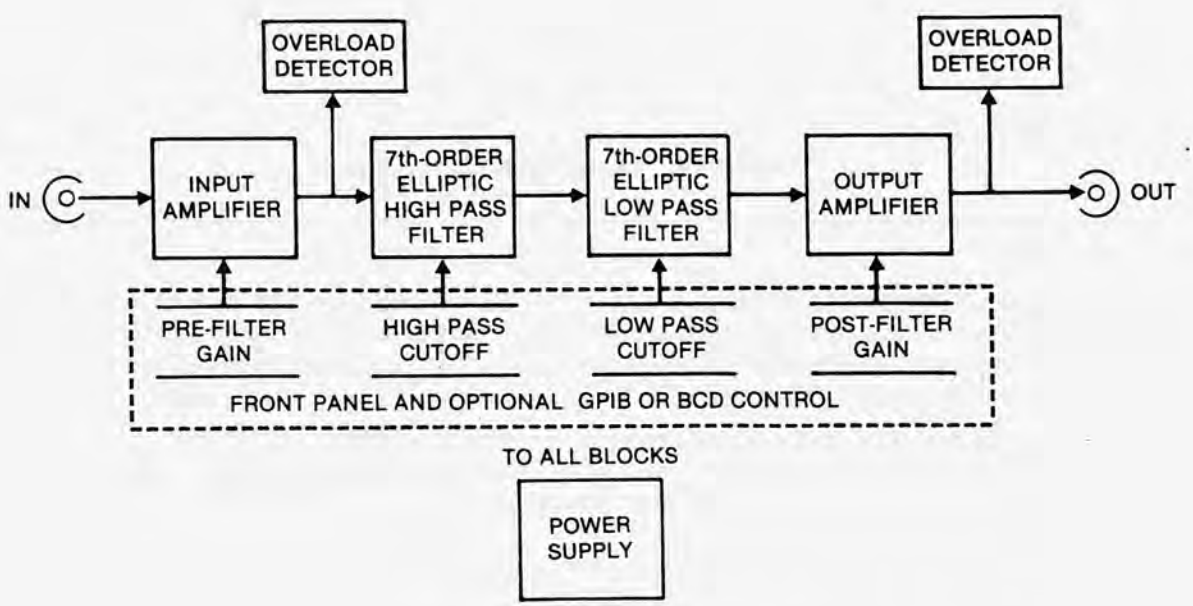


Figure 4-1. Model 751A Block Diagram

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

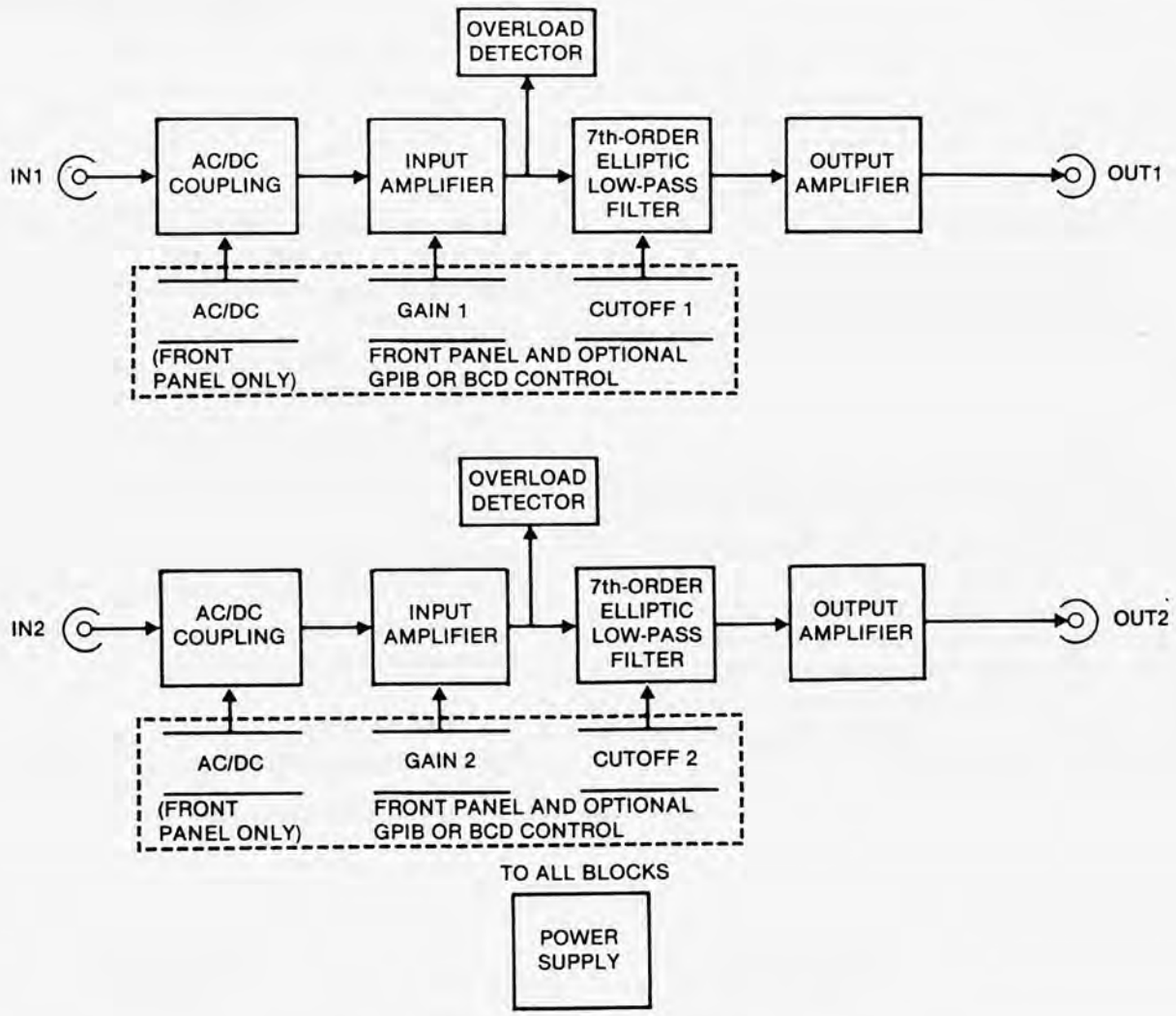


Figure 4-2. Model 752A Block Diagram

Model 752A consists of two identical, separate low pass filters which are amplitude and phase matched throughout the filter pass band. Since both channels are identical, only one channel will be described.

The input signal is applied through the AC/DC coupling switch (front panel control only) to the input of a low noise input amplifier with programmable gain of 0dB to 40 dB in 10 dB steps. An overload detector at the output of this amplifier indicates when input signal levels exceed ± 10 V_{pk} or $7V_{rms}$. This signal is applied to an active RC seventh order low pass elliptic filter (see paragraph 4.5) whose cutoff frequency is programmed by changing the resistors in 8, 4, 2, 1 BCD steps and changing in the capacitors in decade steps.

The low pass filter output is applied to the fixed gain output amplifier. This serves to isolate the filter section from the load connected to the output and defines the full scale output at ± 10 V_{pk} or $7V_{rms}$, which is the rated input of most A/D converters.

All filter parameters can be controlled by front panel controls or optional GPIB and BCD interfaces.

A regulated and shielded power supply provides all the filters power requirements.

4.4 MODEL 753A

For the following description, refer to figure 4-3. The Model 753A consists of a separate high pass filter (Channel 1) and low pass filter (Channel 2).

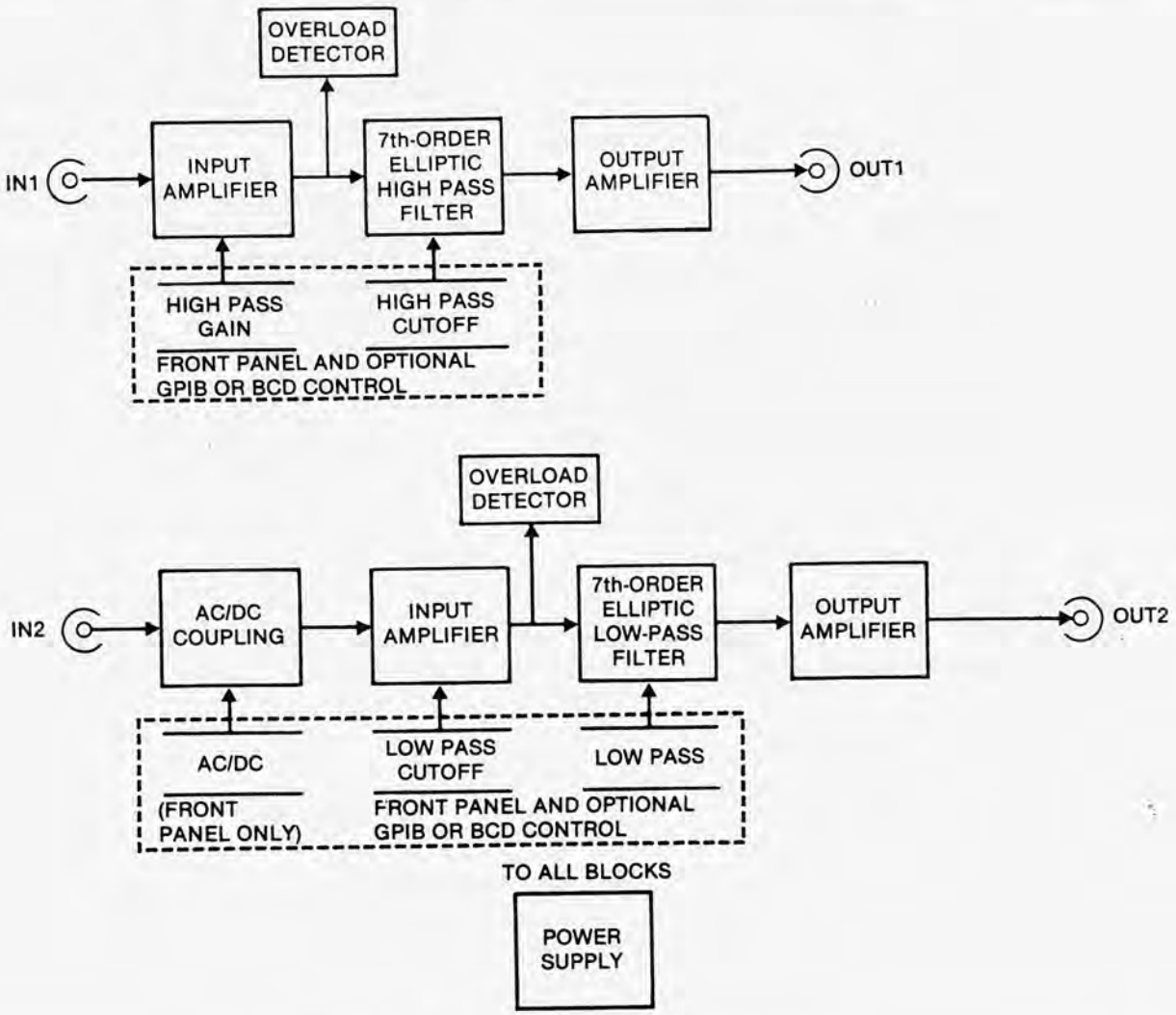


Figure 4-3. Model 753A Block Diagram

High Pass Filter

The input signal is applied to a low-noise input amplifier with programmable gain (Prefilter gain) of 0dB to 40 dB in 10 dB steps. An overload detector at the output of this amplifier indicates when input signal levels exceed ± 10 V_{pk} or $7V_{rms}$. This signal is applied to an active RC seventh order high pass elliptic filter (see paragraph 4.5) whose cutoff frequency is programmed by changing the resistors in 8, 4, 2, 1 BCD steps and changing in the capacitors in decade steps.

The high pass filters output is applied to the fixed gain output amplifier. This serves to isolate the filter section from the load connected to the output and defines the full scale output at ± 10 V_{pk} or $7V_{rms}$, which is the rated input of most A/D converters.

Low Pass Filter

The input signal is applied through the AC/DC coupling switch (front panel control only) to the input of a low noise input amplifier with programmable gain of 0dB to 40 dB in 10 dB steps. An overload detector at the output of this amplifier indicates when input signal levels exceed ± 10 V_{pk} or $7V_{rms}$. This signal is applied to an active RC seventh order low pass elliptic filter (see paragraph 4.5) whose cutoff frequency is programmed by changing the resistors in 8, 4, 2, 1 BCD steps and changing in the capacitors in decade steps.

The low pass filter output is applied to the fixed gain output amplifier. This serves to isolate the filter section from the load connected to the output and defines the full

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

scale output at $\pm 10\ V_{pk}$ or $7V_{rms}$, which is the rated input of most A/D converters.

All filter parameters can be controlled by front panel controls or optional GPIB and BCD interfaces.

A regulated and shielded power supply provides all the filters power requirements.

4.5 ELLIPTIC FILTERS

This section provides general information relative to the filter sections used in the Models 751A, 752A, and 753A.

The seventh-order elliptic filter, as shown in figure 4-4, consists of a first order stage followed by three second-order stages. Also, figure 4-4 shows the zero/pole location for each stage, high pass and low pass filter amplitude responses, and transfer functions.

Figure 4-5 shows a simplified diagram for the first-order stage. This stage is a simple RC network followed by an unity gain noninverting operational amplifier. The R and C values determine the cutoff frequency. Notice the input and grounding connections for low pass and high pass filters.

Figure 4-6 shows a simplified diagram of the second order stage. This stage is a so-called state variable filter. The R and C values determine the cutoff frequency. R_Q sets the Q of the filter. R_L and R_H locates the zeros of the transfer function. The transfer function is represented by the general equation:

$$H_{(S)} = \frac{a_0 + a_1S + a_2S^2}{b_0 + b_1S + b_2S^2}$$

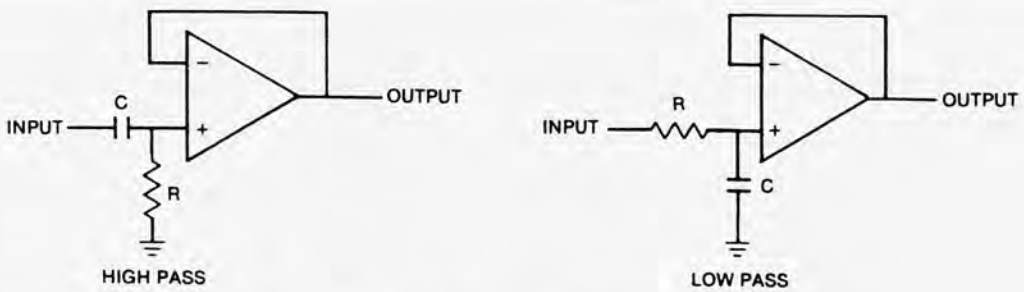


Figure 4-5. First-Order Stage

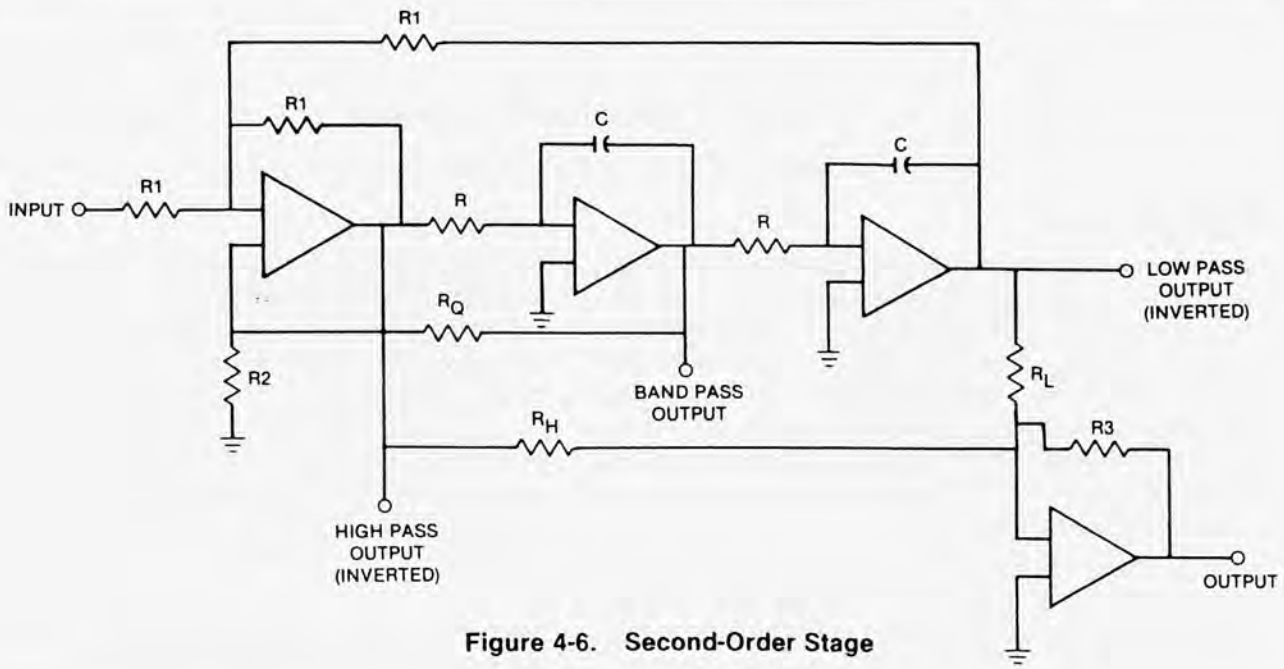


Figure 4-6. Second-Order Stage

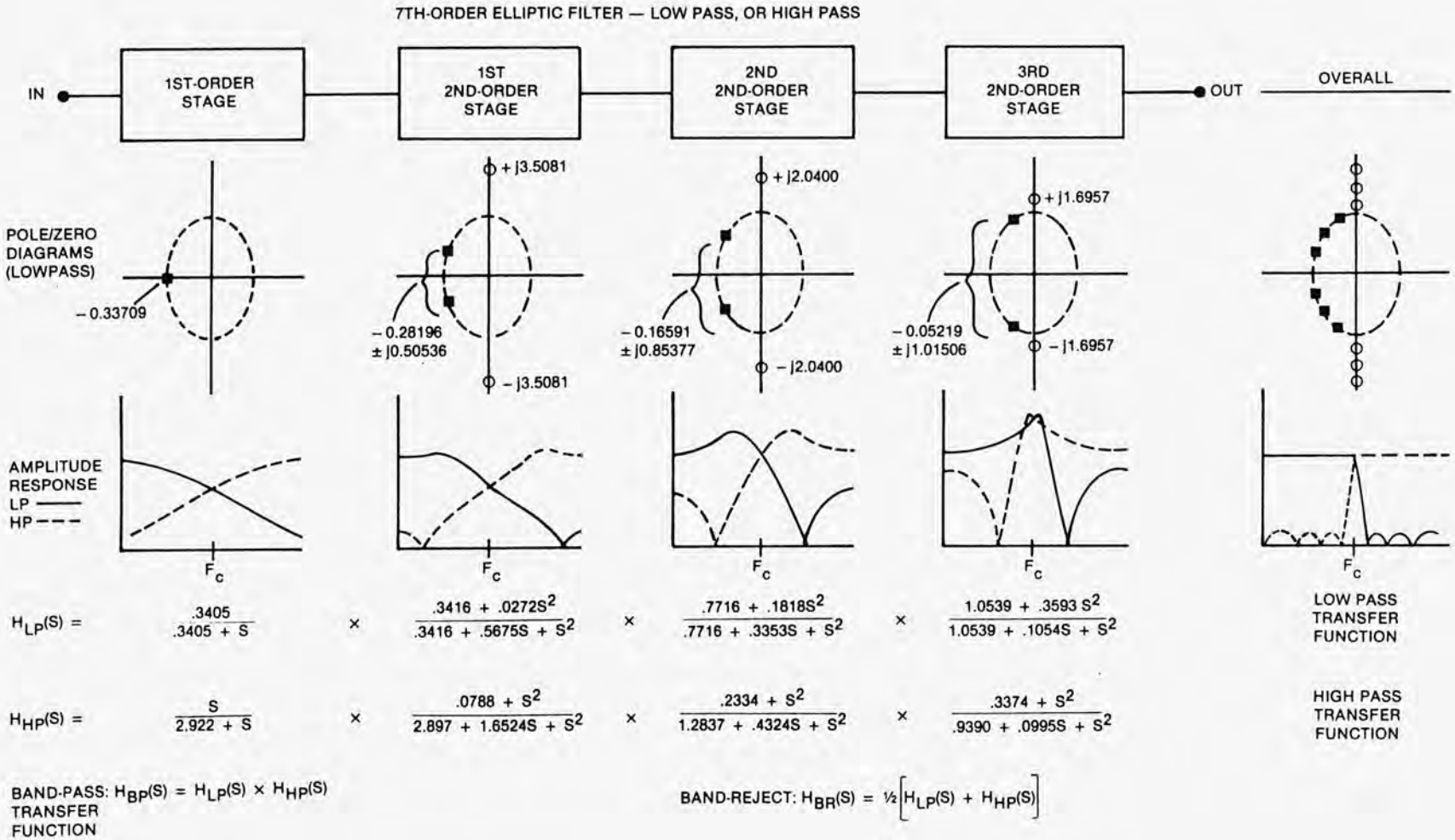


Figure 4-4. Seventh Order Elliptic Filter Parameters

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

SECTION 5
CALIBRATION

5.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

5.2 CALIBRATION

Only limited calibration can be performed in the field, because these instruments are calibrated at the factory by comparing their response against the response of a "Factory Standard" instrument. The "Factory Standard", in turn, has been adjusted and is continuously maintained to provide a response which is essentially identical to the theoretical (or mathematical) response of these filters. As a result, it is recommended that any adjustments which alter the filter response be made only at the factory. The only adjustments that may be performed in the field are those pertaining to Gain Steps and DC Offsets.

Table 5-1 lists the required test equipment required to perform the tests and calibration procedures. Tables 5-2, 5-3, and 5-4 contain the dc offset and gain test for each model; perform these tests to identify calibration problems. Table 5-5 gives procedures for board access. Tables 5-6, 5-7, and 5-8 lists the actual calibration procedures for each model.

NOTE

The completion of these calibration procedures returns the instrument to correct calibration. All limits and tolerances given in these procedures are calibration guides and should not be interpreted as instrument specifications. Instrument specifications are given in section 1 of this manual.

Table 5-1. Required Test Equipment

Instrument	Suggested Model	Comments
Oscilloscope	Tektronix 475	Waveform viewing
Digital Voltmeter	Data Precision 2480	DC offset
RMS Voltmeter	Fluke 8921, 8922	Signal level
Signal Source	Wavetek 5100 Frequency Synthesizer	Gain accuracy
10 dB/Step Attenuator	Kay	Gain accuracy
50Ω BNC Termination	—	—

Table 5-2. 751A Gain and Offset Tests

Step	Test	Tester & Setup	Control	Desired Measurement	Measurement Record
1	0dB Gain	Connect the Model 751A as shown in figure 5-1. Model 5100: Freq 10.00 kHz, Output level 1.00 Vrms. Attenuator: 0dB	High Pass Cutoff: 01 × 1Hz Low Pass Cutoff: 99 × 1kHz Pre-Filter Gain: 0dB Post Filter Gain: 0dB	0 ± 0.2 dB	_____

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

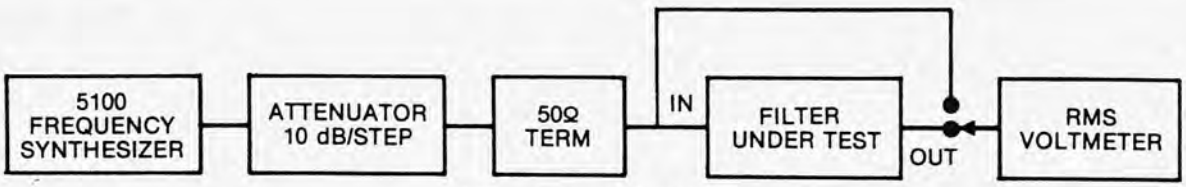


Figure 5-1. Gain Setup

Table 5-2. 751A Gain and Offset Tests (Continued)

Step	Test	Tester & Setup	Control	Desired Measurement	Measurement Record
2	10 dB Pre-filter Gain	Attenuator: 10 dB	Pre-filter: + 10 dB Post-filter: 0dB		
3	20 dB Pre-filter Gain	Attenuator: 20 dB	Pre-filter: + 20 dB Post-filter: 0dB		
4	30 dB Pre-filter Gain	Attenuator: 30 dB	Pre-filter: + 30 dB Post-filter: 0dB		
5	40 dB Pre-filter Gain	Attenuator: 40 dB	Pre-filter: + 40 dB Post-filter: 0dB		
6	10 dB Post-filter Gain	Attenuator: 10 dB	Pre-filter: 0dB Post-filter: + 10 dB		
7	20 dB Post-filter Gain	Attenuator: 20 dB	Pre-filter: 0dB Post-filter: + 20 dB		
8	0dB dc Offset	Connect Model 751A as shown in Figure 5-2	High Pass Cutoff: 01 × 1Hz. Low Pass Cutoff: 50 × 1kHz. Pre-filter Gain: 0dB Post-filter Gain: 0dB	Adjustable to 0Vdc	
9	+ 10 dB dc Offset		Pre-filter: + 10 dB Post-filter: 0dB		
10	+ 20 dB dc Offset		Pre-filter: + 20 dB Post-filter: 0dB		
11	+ 30 dB dc Offset		Pre-filter: + 30 dB Post-filter: 0dB		
12	+ 40 dB dc Offset		Pre-filter: + 40 dB Post-filter: 0dB		
13	+ 50 dB dc Offset		Pre-filter: + 40 dB Post-filter: + 10 dB		
14	+ 60 dB dc Offset		Pre-filter: + 40 dB Post-filter: + 20 dB		



Figure 5-2. Offset Setup

Table 5-3. 752A Gain and Offset Tests

When making the tests on the 752A, set the controls for both channels. Make the tests for Channel 1, then switch the cables to Channel 2 and make those tests.

Step	Test	Tester & Setup	Control	Desired Measurement	Measurement Record
1	0dB Gain	Connect the Model 752A as shown in figure 5-1. Attenuator: 0dB Model 5100: Freq 10.00 kHz Output level 1.00 Vrms	Cutoff: 99 × 1kHz Gain: 0dB	0 ± 0.2 dB	Ch 1 _____ Ch 2 _____
2	10 dB Gain	Attenuator: 10 dB	Gain: + 10 dB		Ch 1 _____ Ch 2 _____
3	20 dB Gain	Attenuator: 20 dB	Gain: + 20 dB		Ch1 _____ Ch 2 _____
4	30 dB Gain	Attenuator: 30 dB	Gain: + 30 dB		Ch 1 _____ Ch 2 _____
5	40 dB Gain	Attenuator: 40 dB	Gain: + 40 dB		Ch 1 _____ Ch 2 _____
6	0dB dc Offset	Connect the Model 752A as shown in figure 5-2.	Cutoff: 50 × 1kHz Coupling: DC Gain: 0dB	Adjustable to 0Vdc	Ch 1 _____ Ch 2 _____
7	+ 10 dB dc Offset		Gain: + 10 dB		Ch 1 _____ Ch 2 _____
8	+ 20 dB dc Offset		Gain: + 20 dB		Ch 1 _____ Ch 2 _____
9	+ 30 dB dc Offset		Gain: + 30 dB		Ch 1 _____ Ch 2 _____
10	+ 40 dB dc Offset		Gain: + 40 dB		Ch 1 _____ Ch 2 _____

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 5-4. 753A Gain and Offset Tests

When making the tests on the 753A, set the controls for both channels. Make the tests for Channel 1, then switch the cables to Channel 2 and make those tests.

Step	Test	Tester & Setup	Control	Desired Measurement	Measurement Record
1	0dB Gain	Connect the Model 753A as shown in figure 5-1. Attenuator: 0dB Model 5100: Freq 10.00 kHz Output level 1.00 Vrms	High Pass Cutoff: 01 × 1Hz Low Pass Cutoff: 99 × 1kHz Gain: 0dB	0 ± 0.2 dB	Ch 1 _____ Ch 2 _____
2	10 dB Gain	Attenuator: 10 dB	Gain: + 10 dB		Ch 1 _____ Ch 2 _____
3	20 dB Gain	Attenuator: 20 dB	Gain: + 20 dB		Ch1 _____ Ch 2 _____
4	30 dB Gain	Attenuator: 30 dB	Gain: + 30 dB		Ch 1 _____ Ch 2 _____
5	40 dB Gain	Attenuator: 40 dB	Gain: + 40 dB		Ch 1 _____ Ch 2 _____
6	0dB dc Offset	Connect the Model 753A as shown in figure 5-2.	High Pass Cutoff: 01 × 1Hz. Low Pass Cutoff: 50 × 1kHz. Coupling: DC. Gain: 0dB	Adjustable to 0Vdc	Ch 1 _____ Ch 2 _____
7	10 dB dc Offset		Gain: 10 dB		Ch 1 _____ Ch 2 _____
8	20 dB dc Offset		Gain: 20 dB		Ch 1 _____ Ch 2 _____
9	30 dB dc Offset		Gain: 30 dB		Ch 1 _____ Ch 2 _____
10	40 dB dc Offset		Gain: 40 dB		Ch 1 _____ Ch 2 _____

Table 5-5. Board Access

Step	Procedure	Associated Figure
1	Unplug power cord.	
2	Remove two screws at rear of top cover; slide the top cover off.	
3	Grasp the card cage, pull it up and forward towards the front panel. Card cage will sit at top of unit.	5-3.
4	Disconnect connectors at front of desired board.	5-4.
5	Release rear retainer.	5-5.
6	Slide desired board towards rear of instrument.	5-6.
7	Place nonconductive material (such as cardboard) on top of card cage. Place the board on top and reconnect the connectors.	5-7.
	To reassemble the unit, reverse the order of the steps in this table.	

	Top Board	Middle Board	Bottom Board
751A	GPIB/BCD Interface	High Pass	Low Pass
752A		Ch 1	Ch 2
753A		High Pass	Low Pass

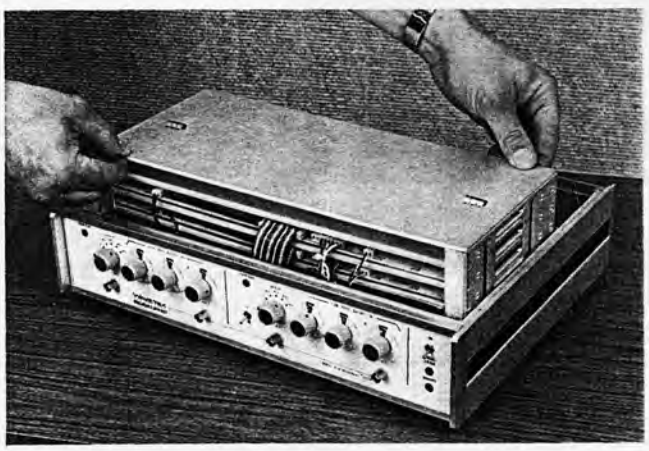


Figure 5-3. Moving Card Cage Out of Instrument

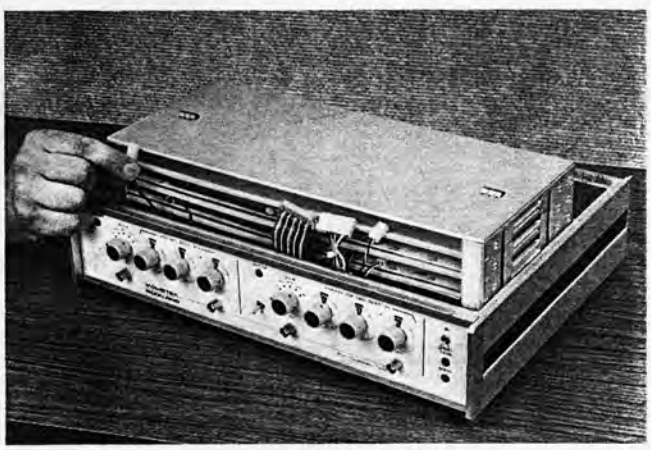


Figure 5-4. Disconnecting Board Connectors

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

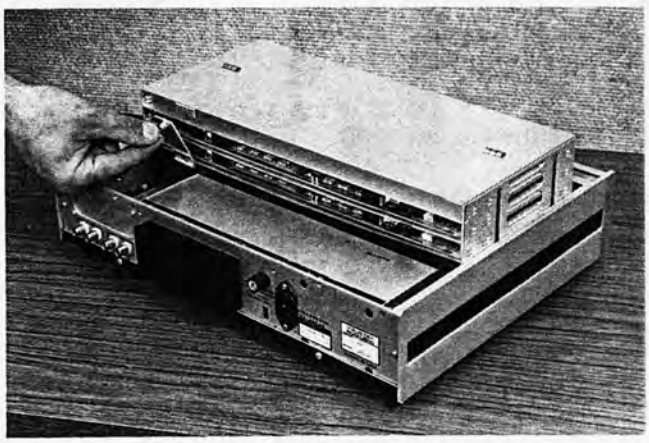


Figure 5-5. Releasing Rear Retainer

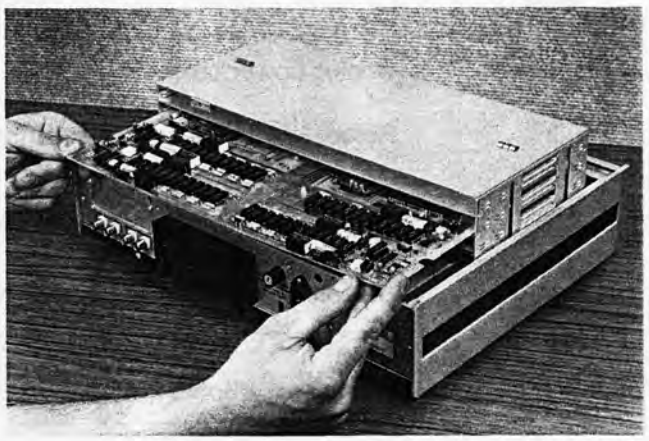


Figure 5-6. Sliding Out Board

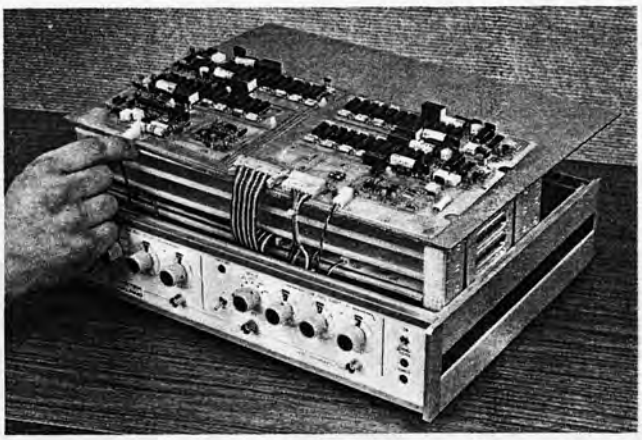


Figure 5-7. Reconnecting and Gaining Access to Board

Table 5-6. 751A Calibration Procedure

Step	Test	Setup	Controls	Test Point	Tester	Adjust	Result	Comments
1a	Gain	Connect 751A as shown in figure 5-1. Attenuator: 0dB Model 5100: Freq 100 Hz Output level 1 Vrms	High Pass Cutoff: 01 × 1kHz Pre-filter Gain: 0dB	J14	RMS Voltmeter	R107	10.0 dB below	Access High Pass Filter board. Turn on, allow 10 min. warmup.
1b		Model 5100: Freq 10.0 kHz				C52		Replace high pass filter when finished.
2a	dc Offset	Connect 751A as shown in figure 5-2.	Pre-filter Gain: +40 dB	TP1	DVM	R106	0 ±10 mVdc	Access low pass filter board. Turn power on, allow 10 min. warm-up. Replace low pass filter when finished.
2b			Low Pass Cutoff: 50 × 1kHz Post-filter Gain: +20 dB	OUT		R138		

Table 5-7. 752A Calibration Procedures

Before beginning, determine which channel requires calibration.

Step	Test	Setup	Controls	Test Point	Tester	Adjust	Result	Comments
1a	Gain	Connect Model 752A as shown in figure 5-1. Attenuator: 0dB Model 5100: Freq 100 Hz Output level 1.00 Vrms	Cutoff: 99 × 1kHz Gain: 0dB	J14	RMS Voltmeter	R107	1.00 Vrms	Remove channel to be calibrated. Turn power on. Allow 10 warmup.
1b		Model 5100: Freq 10.0 kHz				C52		
2a	dc Offset	Connect Model 752A as shown in figure 5-2.	Cutoff: 50 × 1kHz Gain: +40 dB Coupling: DC	TP1	DVM	R106	0 ± 10mV dc	
2b				OUT		R138		Replace channel when finished

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 5-8. 753A Calibration Procedures

Step	Test	Setup	Controls	Test Point	Tester	Adjust	Result	Comments
1a	High Pass Gain	Connect 753A as shown in figure 5-1 using IN1 and OUT 1. Attenuator: 0dB Model 5100: Freq 100 Hz Output level 1.00 Vrms	High Pass Cutoff: 01 × 1Hz Gain: 0 dB	J14	RMS Voltmeter	R107	1.00 Vrms	Remove the High Pass filter board. Turn power on. Allow 10 min. warmup.
1b		Model 5100: Freq 10.0 kHz				C52		Replace high pass filter when finished.
2a	Low Pass Gain	Connect 753A as shown in figure 5-1 using IN 2 and OUT 2. Attenuator: 0dB Model 5100: Freq 100 Hz Output level 1.00 Vrms	Low Pass Cutoff: 99 × 1kHz Gain: 0dB	J14		R107		Remove the low pass filter board. Turn power on. Allow 10 min. warmup.
2b		Model 5100: Freq 10.0 kHz				C52		Replace low pass filter board when finished.
3a	High Pass dc Offset	Connect 753A as shown in figure 5-2 using IN 1 and OUT 1.	High Pass Cutoff: 50 × 10 Hz Gain: + 40 dB	TP1	DVM	R106	0 ± 10mV	Remover the High Pass filter board. Turn power on. Allow a 10 min. warmup.
3b				OUT 1		R138		Replace high pass filter when finished.
4a	Low Pass dc Offset	Connect 753A as shown in figure 5-2 using IN 2 and OUT 2.	Low Pass Cutoff: 50 × 1kHz Gain: + 40 dB Coupling: DC	TP1		R106		Remove low pass filter. Turn power on. Allow a 10 min. warmup.
4b				OUT 2		R138		Replace low pass filter when finished.

SECTION 6
TROUBLESHOOTING

6.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

Customer Service
Wavetek San Diego, Inc.
9045 Balboa Avenue
San Diego, CA 92123
Telephone: (619) 279-2200

6.2 TROUBLESHOOTING

6.2.1 Filter Troubleshooting

If your filter fails to operate when the power switch is ON, perform the following checks.

1. Verify the filter has ac power.
2. Verify the 115/230 Volt switch is in the proper position.
3. Check the fuse and if defective, replace it.
4. With the power switch ON, check continuity of the unplugged line cord with an ohmmeter.

6.2.2 Optional GPIB Interface Troubleshooting

In the event that the bus system is not performing correctly, any functional tests may be made to help locate the cause. In general, an effort should be made to reduce both the hardware and software complexity of the system to the simplest configuration which still exhibits the problem.

Since the filter was exhaustively tested prior to shipment, the probability is low that problems encountered when first setting up the system are due to hardware failures. It is more likely that some set-up parameter, device address, or software convention is causing the problem. Hardware failures are typically indicated only if the system has been successfully operating for some time and then fails with no system changes having been made.

6.2.2.1 Checklist of Set-up Problems

Before attempting diagnostic tests, the following list of common set-up errors should be checked:

1. Make sure power is applied to all units connected to the bus system. Although not true of this instrument, some units, when power is off, will load the bus and cause transmission failures.
2. Check tightness of the bus cable connectors. A connector which is not secured by the captive screws may become partially disengaged from its mating socket causing intermittent or open connections.
3. Review the address code structure of the system making sure that no two devices unintentionally share the same address code. Make sure the controller is correctly identifying each device by its respective address.
4. Make sure the cable between the filter and GPIB controller is correctly installed and locked into place at both ends.

6.2.2.2 Diagnostic Tests

Problems can generally be classified as either related to the bus system operation or to the filter operation. The controller is usually provided with some fault-indicating messages which can be useful in diagnosing bus problems.

1. Bus Testing
   The most basic bus activity is the handshake function which is required for all universal commands and data transfers. The controller will generally indicate if there is a problem in completing the handshake. If a problem exists, the offending device can be determined by connecting devices to the bus one at a time.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Next level of activity is establishing the various devices as active listeners or talkers. Your instrument indicates its status by the green LISTEN lamp. Each bus device should respond appropriately to these universal commands and not interfere with each other. A unit-by-unit check of these operations will verify correct performance of these functions.

2. Instrument Testing
If bus activity appears normal but data is not being loaded correctly into your instrument, make sure a "CR" or "GET" command is being issued by the controller. In addition, the REMOTE lamp on the front panel of your instrument must be lit during remote transfers. If not, check that the REMOTE ENABLE line on the bus is sent active by the controller.

SECTION 7
PARTS AND SCHEMATICS

7.1 DRAWINGS

The following assembly drawings (with parts lists) and schematics are in the arrangement shown below.

7.2 ADDENDA

Under Wavetek's product improvement program, the latest electronic designs and circuits are incorporated into each Wavetek instrument as quickly as development and testing permit. Because of the time needed to compose and print instruction manuals, it is not always possible to include the most recent changes in the initial printing. Whenever this occurs, addendum pages are prepared to summarize the changes made and are inserted immediately inside the rear cover. If no such pages exist, the manual is correct as printed.

7.3 ORDERING PARTS

When ordering spare parts, please specify part number, next higher assembly, and serial number of the instrument.

NOTE

The number etched into a PC board is the bare board part number. The assembly (board and components on the board) part number is stamped on the board. The assembly drawing number is not necessarily the assembly number. However, the assembly number and the parts list number are always the same.

MODEL	DRAWING	DRAWING NUMBER
752A (751, 753)	751A, 752A and 753A Top Drawing	00-000-0750
751A	751A Parts List	000.0700
752A	752A Parts List	000.0750
753A	753A Parts List	000.0753
752A	Mainframe Assembly	02-002-0750
753A		02-002-0753
751A	Subassembly Parts List	002.0700
752A		002.0750
753A		002.0753
751A	Front Panel Assembly	02-001-0700
752A		02-001-0750
753A		02-001-0753
751A	Front Panel Parts List	001.0700
752A		001.0750
753A		001.0753
751A, 752A, 753A	Power Supply Schematic	03-004-0765
751A, 752A, 753A	Power Supply Assembly	02-004-0765
751A, 752A, 753A	Power Supply Parts List	004.0765
751A, 752A, 753A	Rear Panel Assembly	02-002-0785
751A, 752A, 753A	Rear Panel Parts List	002.0785

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MODEL	DRAWING	DRAWING NUMBER
751A	Mainboard HPF Schematic	03-004-0760
751A	Mainboard HPF Assembly	02-004-0760
751A	Mainboard HPF Parts List	004.0760
751A	Mainboard LPF Schematic	03-004-0755
751A	Mainboard LPF Assembly	02-004-0755
751A	Mainboard LPF Parts List	004.0755
752A	Mainboard LPF Schematic	03-004-0750
752A	Mainboard LPF Assembly	02-004-0750
752A	Mainboard LPF Parts List	004.0750
753A	Mainboard HPF Schematic	03-004-0753
753A	Mainboard HPF Assembly	02-004-0753
753A	Mainboard HPF Parts List	004.0753
751A, 752A, 753A	BCD Interface Schematic	03-004-0780
751A, 752A, 753A	BCD Interface PCB Assembly	02-004-0780
751A, 752A, 753A	BCD Interface Parts List	004.0780
751A, 752A, 753A	IEEE Option 002 Parts List	000.0785
751A, 752A, 753A	IEEE Interface Schematic	03-004-0785
751A, 752A, 753A	IEEE Interface PCB Assembly	02-004-0785
751A, 752A, 753A	IEEE Interface Parts List	004.0785
751A, 752A, 753A	IEEE Paddle Board Assembly and Parts List	009.9785

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP