



BOGEN®

MODEL CFC

SOLID-STATE P.A. COMPONENTS

ACOUSTIC FEEDBACK CONTROLLER

DESCRIPTION

The Bogen Model CFC is a fully solid-state 2/3 Octave Graphic Equalizer incorporating the latest integrated circuit technology. The model CFC may be used in a wide variety of applications for sound system equalization, including the tailoring of system frequency response to room acoustics, de-emphasizing specific frequencies to improve intelligibility and reducing acoustic feedback to increase system gain and compensate for non-linear frequency characteristics in transmission lines, equipment and transducers.

The Model CFC employs 10 two-third octave active notch filters covering the frequency range from 80 Hz to 5 kHz. Each filter can provide up to 14 dB of attenuation within its band. The individual filter controls are proportional, linear-action (slide) controls whose relative positions provide the operator with a graphic display of the equalizer response curve. Additional spectrum shaping is provided by continuously adjustable Hi and Lo cut filters. The low frequency rolloff is continuously adjustable from 15 Hz up to 140 Hz, and the hi frequency rolloff is adjustable from 25 kHz down to 4 kHz (-3 dB points). An optional locking cover assembly may be installed to prevent unauthorized adjustments of these controls. The equalizer has a Filter/Bypass switch that enables the operator to bypass the filters and obtain a flat

response without disturbing the equalizer control settings.

The Model CFC will accept two simultaneous inputs, one Hi or Lo impedance microphone and one program, each with independent gain controls. The microphone input may be high impedance, unbalanced, or balanced or unbalanced low impedance. The equalizer provides two simultaneous outputs, balanced or unbalanced low impedance, or high impedance unbalanced, microphone level output, together with a high level-high impedance output. The unit operates from either 120 V, 60 Hz AC, or +24 to 28 VDC.

FILTER CHARACTERISTICS

The individual filter slide controls reduce gain by up to 14 dB \pm 2 dB at the filter center frequency. This center frequency is within 20% of the nominal indicated frequency.

The low-cut filter is continuously variable from 15 to 140 Hz at -3 dB point. The high-cut filter is continuously variable from 25 kHz down to 4 kHz at -3dB point. Filters drop off at 6 dB per octave.

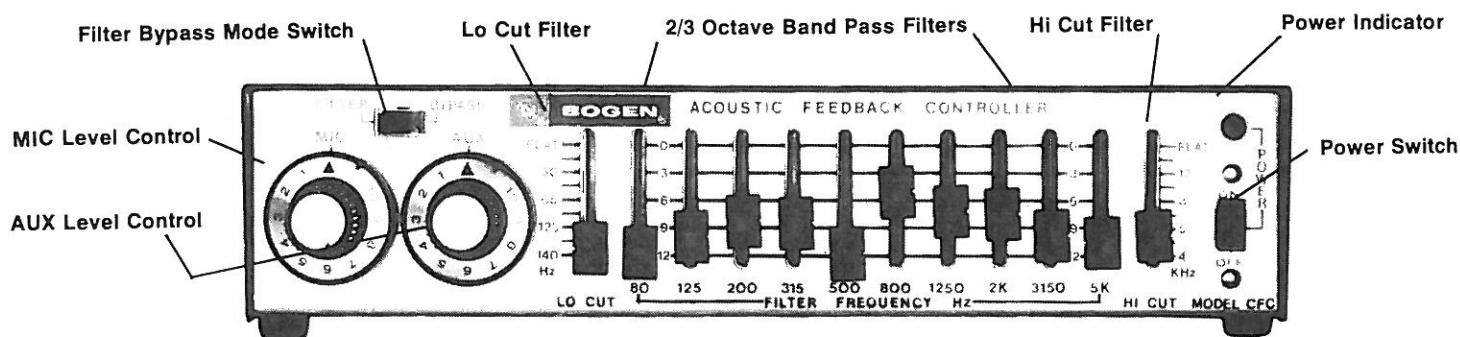


Fig.1—Front View, Model CFC Acoustic Feedback Controller

INSTALLATION AND OPERATING MANUAL

TECHNICAL SPECIFICATIONS

Notch Filters:	10 filters centered at 80, 125, 200, 315, 500, 800, 1250, 2000, 3150 and 5000 Hz			
Filter Attenuation:	0 to 14 dB, individual filters			
Frequency Response:	20 to 20,000 Hz, ± 2 dB with filters flat or in bypass mode. Additional 6 dB/octave rolloff adjustable below 140 Hz, with low-pass filter, and above 4000 Hz with high pass filter.			
Impedances: (Input & Output)	Lo Z Mic 25-600, ohm, Hi Z Mic 33,000 ohm, Aux 50,000 ohm.			
Equivalent Input Hum and Noise: (Lo Z Mic, 150 ohm source)	20 to 20,000 Hz: -127 dBV 300 to 20,000 Hz: -129 dBV			
Aux Output Hum and Noise:	20 to 20,000 Hz: -82 dB below rated output 300 to 20,000 Hz: -83 dB below rated output			
Rated Output:	4 volts @ less than 1% THD 20 to 20,000 Hz			
Aux Output Clipping Level, Min.:	5.5 volts			
Input Clipping Levels, Min.:	20 mV, Lo Z Mic 350 mV, Hi Z Mic			
Total Harmonic Distortion:	0.5% maximum, Aux output level of 4 volts, in filter and bypass modes, with all filter level controls full up at 1000 Hz			
	Outputs	Lo Z Mic Input	Hi Z Mic Input	Aux Input
Gain (Bypass or filter mode)	Lo Z Mic Hi Z Mic Aux	28 48 84	4 24 60	-28 -8 28
Input:	Two simultaneous inputs: high impedance, unbalanced microphone (phone jack) or low impedance, balanced (transformer isolated) microphone (professional 3-pin Cannon XLR female); and high impedance, auxiliary level (phono jack).			
Sensitivity for Rated Output:	Lo impedance microphone 250 μ V, Hi impedance microphone 3.5 mV, Aux 150 mV.			
Outputs:	Two simultaneous outputs: high impedance, unbalanced microphone level (phono jack) or low impedance, balanced or unbalanced (professional 3-pin Cannon XLR male) microphone level; and high impedance, high level auxiliary (phono jack).			
Controls:	10 slide-type attenuate filters, 2 slide-type high and low-frequency rolloff filters, mic level control, aux level control, filter mode (bypass/filter) switch, power on/off switch.			
Indicator:	Power on-off indicator light.			
Power Source:	105-125 Vac, 50/60 Hz, 24 mA or +24/28 VDC, 24 mA			
Operating Temp Range:	-10°C to +55°C (14°F to 131°F)			
Dimensions:	11 $\frac{3}{8}$ " W x 2 $\frac{7}{8}$ " H x 7 $\frac{3}{4}$ " D (28.9 cm x 7.3 cm x 19.7 cm)			
Weight:	4 lbs, 10 oz (2.1 kg)			
Semiconductors:	1 integrated circuit, 12 transistors, 4 diodes			

ACCESSORIES

RPK-35 RACK PANEL.

The Bogen Model RPK-35 rack panel is designed to mount the Model CFC in a standard 19-inch sound rack. The rack panel is finished in gray enamel and is 3 $\frac{1}{2}$ " high.

WMK-1 IN-WALL MOUNTING KIT.

The Bogen Model WMK-1 In-Wall Mounting Kit is designed to mount the Model CFC flush in a wall. Depth of the mounted unit is 3 $\frac{1}{2}$ inches.

INSTALLATION

UNPACKING

The unit was carefully checked before leaving the factory. Inspect both the unit and its shipping container carefully for indications of improper handling. Report any equipment damage immediately to the distributor from whom the unit was purchased. If the unit was shipped to you, notify the shipping carrier without delay and place your claim.

POWER AND GROUNDING

PRIMARY AC POWER. The ac line cord has a three-prong plug which should be plugged into a three-wire, grounded 120 volt, 60 Hz outlet. It is important to ground the unit. If a grounded, three-wire outlet is not available, install an adapter (e.g., Leviton No. 5017) and connect the pigtail lead to the grounded wall plate mounting screw. If this screw is not

grounded, connect a wire from the GND terminal of the unit to a conduit pipe or other electrical system ground.

AUXILIARY DC POWER. The unit may be powered from an external 24 to 28 Vdc supply. The D.C. supply may remain connected even when the unit is powered from a 120 Vac source. The power switch disconnects both the dc and ac supplies, turning off the unit. The Model CFC is supplied with a pair of push-on lugs for connecting the external dc supply to the EXT. SOURCE power input receptacle.

The pilot light indicates operation only when A.C. power is used.

CAUTION

Observe polarity on all dc power connections (red to +).

INPUT/OUTPUT CONNECTIONS

All input and output connections are located on the rear of the unit and are shown in figure 2. Required connections are indicated in table 1.

The CFC is typically connected in the auxiliary, high-level line between the preamplifier/mixer and the power amplifier, or between the microphone and the pre-amplifier/mixer in single-microphone systems.

Any combination of inputs and outputs available may be used, however, according to the particular needs of the user.

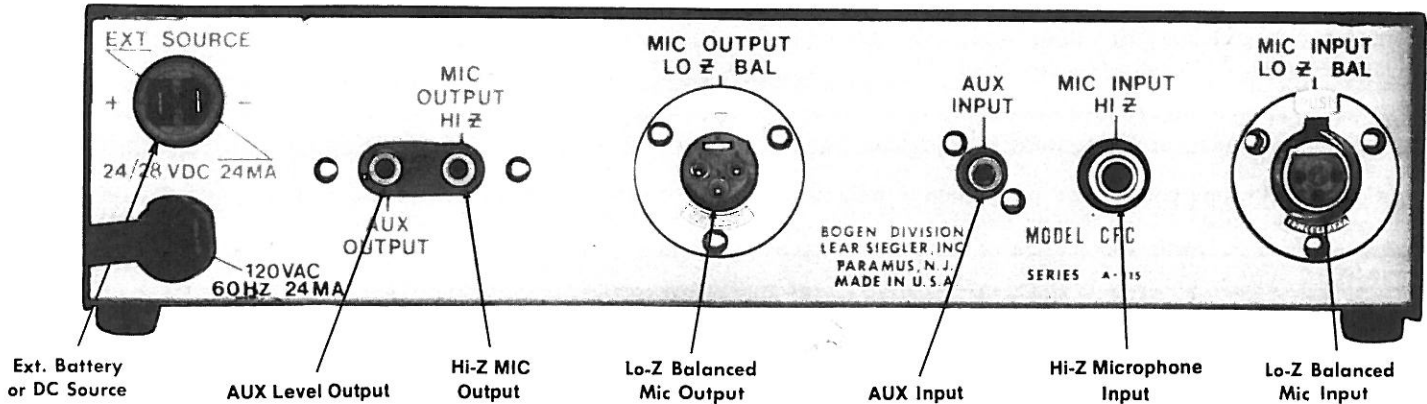


Figure 2—Rear View, Model CFC Acoustic Feedback Controller

Input/Output	Connections
Lo Z MIC Input	Two-conductor shielded cable terminated with Cannon XLR-3-12C or equivalent. Connect balanced or unbalanced line to this input.
AUX Input/Output	Single-conductor shielded cable, terminated with Cinch 13A or equivalent.
Hi Z MIC Input	Single-conductor shielded cable terminated with switchcraft 280 or equivalent.
Lo Z MIC Output	Two Conductor shielded cable terminated in a Cannon XLR-311C or equivalent.
Hi Z MIC Output	Single-conductor shielded cable terminated with Cinch 13A or equivalent.*

* See note in figure 3

Table 1—Input/Output Connections

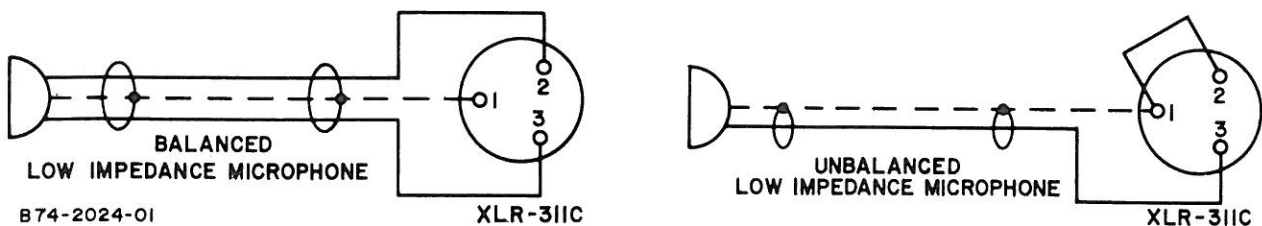


Figure 3—Connecting Microphone Cable Connector

CONTROLS AND INDICATORS

All controls and indicators are located on the front panel and are shown in figure 1. A list of these controls and their functions appears in table 2.

Control	Function
Power switch	Controls both AC and DC power to unit.
Power indicator	Lights when AC power is applied
MIC volume	Sets level of appropriate microphone input channel.
AUX Volume	Sets level of auxiliary input channel
Filter Frequency slide controls	Reduces gain at indicated frequency down to -14 dB.
Low Cut	
Filter control	Controls low frequency roll off point.
High Cut	
Filter control	Controls high frequency roll off point.

Table 2—Controls and Indicators

OPERATION

ACOUSTIC EQUALIZER FILTER ADJUSTMENTS

MICROPHONE SOURCE

The following adjustments of the CFC permit you to "tune" your sound reinforcement system so that feedback occurs at a substantially higher output before acoustic feedback ("squeal" or "ringing") occurs.

1. Set panel controls as follows:

Set MIC and AUX controls to zero (counter-clockwise).

Set all slide controls to full up position (flat).

Set Filter Bypass switch to Filter mode. With speakers connected to the power amplifier and microphone or microphones in normal operating location, turn CFC ON-OFF slide switch to "ON" position.

2. Increase MIC control until feedback squeal or ringing is heard.

3. If the feedback sound is high-pitched, one of the five high-frequency filter controls — 800 Hz to 5 kHz — will be most effective in its elimination. Individually move each filter frequency control slowly from top to bottom and back to top while listening for feedback. The control which eliminates feedback with the least motion should then be moved down only so far as necessary to eliminate the feedback.

4. If the feedback frequency happens to fall between the bands covered by two adjacent controls, it may be necessary to move down both controls to obtain the desired feedback suppression.

5. If the feedback tone is low-pitched, the adjustment procedure should be started, using the low-frequency (80 to 500 Hz) filter controls.

6. Having eliminated the first feedback condition, slowly increase the gain of the sound system with the MIC control until feedback is heard. Repeat the procedures of steps 3, 4 and 5.

7. Continue to advance MIC control and adjust individual filter controls until MIC control is at maximum setting consistent with a stable output without feedback at any frequency.

8. If the position of the microphone is changed or addi-

tional microphones are used, some adjustment in the feedback controls may be necessary.

9. Where both microphone and program sources are to be used, a program should be played over the system after microphone equalization to determine its sound. If the program source does not sound adequate after microphone equalization, either a compromise of equalization settings must be used, resulting in somewhat less gain, or a separate equalizer must be used for the program source.

PROGRAM SOURCE ONLY

Where the system is to be used with a program source only, the use of specialized test equipment is generally necessary to obtain optimum response. However, without this equipment the equalizer should be adjusted to produce the best sound. (*Note: very often there is a lack of both highs and lows from a system*). Begin adjustment by setting all the filters to approximately -9 and the High and Low Cut filters to Flat, then proceed to adjust the individual filters as necessary.

HIGH AND LOW CUT FILTERS

During the acoustic feedback adjustment it will not usually be necessary to set either High or Low Cut Filter controls. These controls are primarily intended for improving voice quality and intelligibility of the paging system.

After feedback has been eliminated as outlined in ACOUSTIC FEEDBACK ADJUSTMENT, move High and Low Cut filters down and note the tonal character of the system during a talk test.

Each system, depending on the speakers used and room acoustics, will require some experimentation with controls for optimum results.

BY-PASS FILTER MODE SWITCH

In the by-pass position, all filter controls are disabled and the frequency response shall be flat, as per specifications, from all inputs to outputs. With Mode Switch in the filter position, all filters are active.

MAINTENANCE

CAUTION

There are no user replaceable parts within the unit. Have all internal servicing done by qualified service personnel.

BOGEN SERVICE

We are interested in your Bogen equipment for as long as you have it. While these carefully made units are designed to provide years of reliable performance, if trouble ever develops, do not hesitate to ask our advice or assistance. Information can be obtained by writing to Service Department, Bogen Division, P.O. Box 500, Paramus, N.J. 07652

When communicating with us, give the model and series designation of your unit. Describe the difficulty and include details on the electrical connections to associated equipment, and list such equipment. When we receive this information, we will send you service information if the trouble appears to be simple. If the trouble requires servicing, we shall send you the name and address of the nearest Bogen authorized service agency to which you can send your unit for repairs.

WARNING

Improper soldering may damage components or the printed circuit board, and such damage can void the warranty.

REPLACEMENT PARTS

Most components used in the unit are standard parts available through reputable parts jobbers. The parts listed here may be obtained from Bogen distributors, service agencies, or directly from the factory. When ordering a part, specify the part number and the model of the unit. Also, give the SERIES designation, which is a letter followed by numbers, usually stamped on the chassis directly under the model designation. For parts on printed circuit boards, include the PC board assembly number, which begins with "45".

Standard components may be obtained from any reputable source if no manufacturer is specified. Where a manufacturer is specified, only that manufacturer's component should be used. Resistors designated "AB" on the schematic diagram must be Allen-Bradley.

When shipping your unit, pack it well, using the original shipping carton, or a similar container and filler material, to prevent damage in transit. Send the unit, fully insured and prepaid, via United Parcel where available. Do not ship via parcel post unless so instructed. The unit will be promptly repaired and returned to you express collect.

REPLACING COMPONENTS

All semiconductor components are soldered in place to ensure maximum reliability. When soldering transistors or diodes, use a heat sink (such as a small alligator clip) between the component and the source of heat. Unless you are experienced in the removal of IC micromodules, do not attempt to remove them because excessive heat can damage an IC and/or the printed circuit board. If you are certain that an IC is defective, the easiest method of removal is to cut the leads off close to the component and unsolder the leads individually. If you are not certain an IC is defective, the use of a low-wattage, vacuum-type desoldering tool (such as Ungar Type 7800) is advised.

BOARD ASSY.

Ref. No.	Part No.	Description
A1	45-9975-01	Board Assembly
C5, 12	79-008-051	Capacitor, Elec., 25MF, 35V
C8	79-504-032	Capacitor, Tantalum, 2.2MF, 15V
C9	79-008-064	Capacitor, Elec., 330MF, 50V
C10	79-008-044	Capacitor, Elec., 1000MF, 35V
C11, 17, 41	79-008-053	Capacitor, Elec., 100MF, 35V
C14	79-008-049	Capacitor, Elec., 500MF, 35V
C19, 20	79-008-054	Capacitor, Elec., 2MF, 50V
CR1-4	96-5333-01	Diode-400 PIV @ 1A
IC-1	96-5375-01	I.C. LM 387
Q2	96-5176-01	Transistor MPS-6518
Q1, 3-12	96-5213-01	Transistor 2N5089
R9	77-001-757	Control, MIC. Vol., Slide
R10	77-001-756	Control, AUX., Slide
T1	83-058-000	MIC. Transformer

CHASSIS ASSY.

T101	83-781-000	Transformer, Power
SW101	81-003-065	Switch, Power, Slide
SW102	81-003-059	Switch, Filter, Slide
R102-111	77-001-753	Control Slide
R113	77-001-754	Control, Hi Cut
R112	77-001-755	Control, Lo Cut
DS101	94-0302-05	Pilot Light Assy.
	03-0656-01	Control Knob
	03-0665-01	Slide Control Knob

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