OEQ-1
OCTAVE EQUALIZER

OWNER'S MANUAL

OEQ-1 Octave Equalizer

Rockford Fosgate

Dear Customer,

Congratulations on your purchase of America's finest car audio components. At Rockford Fosgate we are committed to musical reproduction at its best, and we are pleased you chose our product. Through years of engineering expertise, handcraftmanship and critical testing procedures, we have created a wide range of products that reproduce music with all the clarity and richness you deserve.

For maximum performance we recommend you have your new Rockford Fosgate product installed by an Authorized Rockford Fosgate Dealer, as we provide specialized training through Rockford Technical Training Institute (RTTI). The length and nature of your warranty are dramatically affected if you install the product yourself. Please read your warranty and retain your receipt and original carton for possible future use.

For your musical enjoyment, Rockford Fosgate offers everything from two channel Punch® amplifiers, the more powerful four channel Power Series™ amplifiers, to three lines of speakers: Pro Series™, The Punch®, and Series One™. In addition, we offer two, three, or four way speaker systems, and subwoofer and full range enclosures. For sound reproduction at its best, we offer signal processors: equalizers, pre-amps, and crossovers.

To ensure overall installation quality, Rockford provides top quality wire, connectors, carpet, grille cloth, speaker grilles and amplifier shrouds, high output alternators, and many more accessories through our Perfect Interface® division.

To add the finishing touch to your new Rockford Fosgate image, order the Rockford P.O.P., which includes everything from t-shirts and jackets, to key chains and neon hats.

To get a free brochure on Rockford Fosgate products and Rockford P.O.P., please call 602-967-3565 or FAX 602-967-8132.

INTRODUCTION

The Rockford Fosgate OEQ-1 is a quiet, flexible nine-band equalizer designed to correct response errors in autosound installations. As car stereo systems become more sophisticated, the unpredictable colorations of typical speaker installations are becoming less acceptable. The OEQ-1 offers a convenient method of solving response problems without system re-designs.

- Nine-Band High-Q Filter System (IS0 Center Frequencies)
- ±9dB Control Range Each Frequency
- ±1/2 Octave Frequency Control Each Frequency
- Over 90dB Signal-to-Noise Ratio (A-Weighted)
- Fully-Floating High-Voltage Power Supply
- Defeat Switch (Bypasses all circuitry)
- Jeweler's Screwdriver Control Adjustments

OEQ-11DESIGN

NINE-BANDS: Eight Octave-wide bands and one two-Octave band of boost and cut are employed in the OEQ-1. One-Octave bands are the minimum required for effective control over the bass and midrange; the two-Octave-wide 12kHz band controls the very high "tingle" region where tonal perception is less critical.

HIGH-Q FILTERS: Filter "Q" or quality factor is a measure of the "narrowness" of the filter response: a high-Q filter affects a narrow band of frequencies and a low-Q filter affects a wide band. Most octave equalizers use relatively low-Q filters in order to avoid large response ripples when all controls are at maximum or minimum. However, the wide band of low-Q filters allows adjustments made on one control to strongly affect the neighboring frequencies, especially at modest boost or cut. In addition, relatively narrow response problems cannot be fully cancelled by a wide-band filter.

The rationale for reducing filter Q to avoid max-control ripple is in error, since it is a situation which realistically never should happen. By using relatively high Q (over 2.0), the OEQ-1 avoids much of the adjacent-band overlap that is time consuming to adjust out.

FREQUENCY SHIFT: When a high-resolution test instrument (one-third Octave RTA or swept tone analyzer) is used, it is common to find that a problem dip or peak is located between the band centers of the equalizer. The OEQ-I has controls to shift the center frequency of each band up or down one-half octave, eliminating this frustrating problem.

FULLY-FLOATING POWER SUPPLY: Most autosound signal processors use the battery voltage to power internal circuitry. This practice leads to two potential problems: inadequate headroom and noise. The noise associated with directly battery-powered equipment arises from the presence of a direct ground path from circuitry to chassis. This provides the potential for a ground loop, a path for alternator whine and electrical system noises to enter the system. The headroom issue resolves itself to a simple lack of voltage. Typical maximum voltages available from a battery alone amount to about 3.5 Volts RMS. Many sources put out over one Volt RMS, leading to less than 11dB or headroom.

The OEQ-1 employs a fully isolated 36-Volt (plus and minus 18 Volt) supply. There is no DC path to chassis ground, so ground loops are eliminated. The high voltages allow pre- and de-emphasis for the most sensitive frequencies lead to exceptional noise performance.

EQUALIZING WITH A REAL TIME ANALYZER

For best resolution, a 30-band (1/3 Octave) Real-Time Analyzer (RTA) or a swept spectrum analyzer with 1/3-Octave resolution should be used. A lo-band, l-Octave resolution RTA will give decent results, but is harder to use. Either RTA method will require a pink noise generator.

An extender cable is available from Rockford which allows the equalizer to be adjusted from a convenient location. NOTE: If you would like further advice on acquiring the above mentioned support equipment, feel free to call Rockford at 602-967-3565.

Step 1: The RTA or analyzer microphone should be set up near the driver's listening location. Microphone placement will have a significant effect on frequency response, and moving the microphone around in the driver's area will give a good idea of overall response.

Step 2: Feed one channel of the Octave Equalizer with pink noise from the pink noise generator.

Step 3: Evaluate the unequalized response. Major system problems, for instance large response “holes” or “peaks”, should be solved by correcting speaker or system problems. Trying to equalize out large response errors (over 6dB) will result in overdriven amplifiers and speakers, and **should not be attempted.**

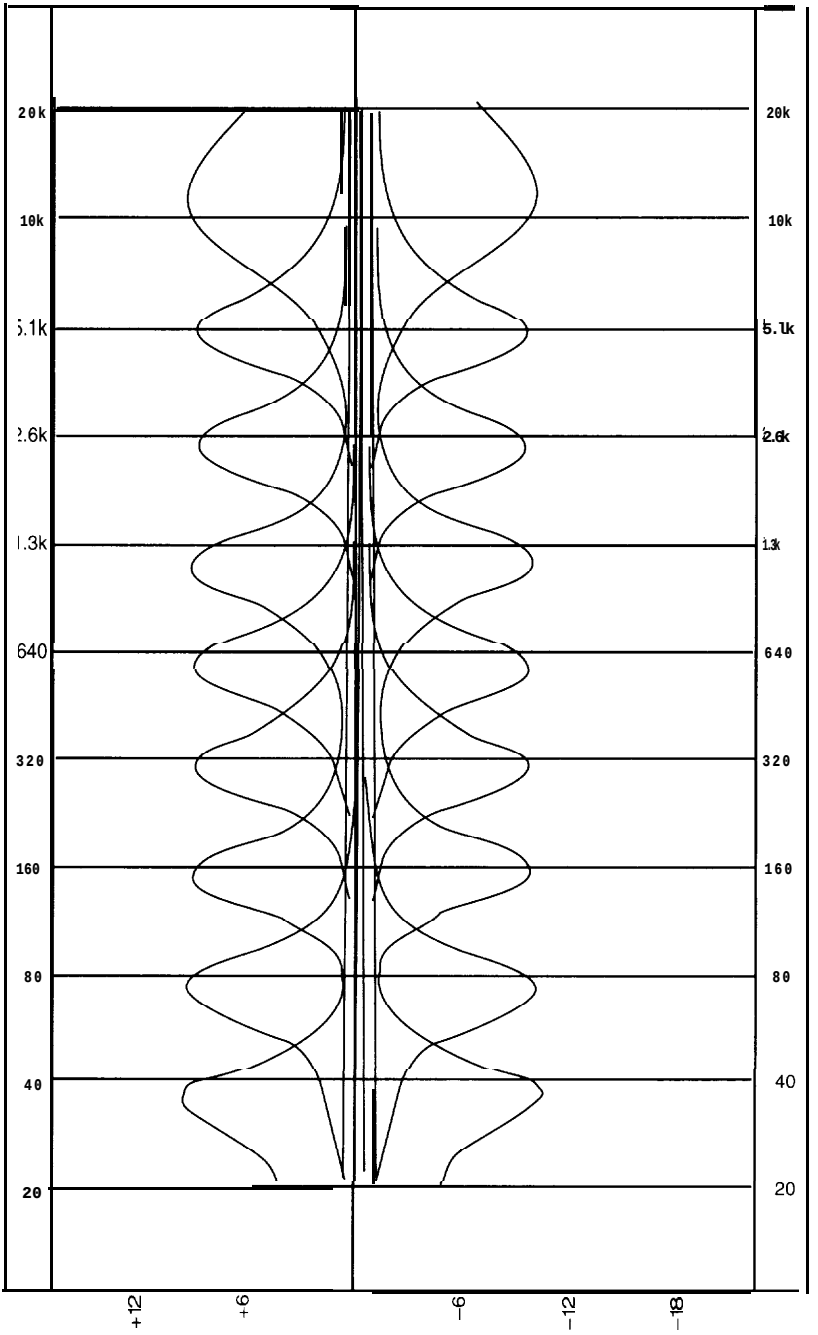
Step 4: Adjust equalizer for the system response desired. Since adjacent bands interact with each other, you will need to go back and forth between frequencies to get the best balance.

Step 5: Move the microphone to the opposite side, change the pink noise channel, and equalize for the same response as Step 4.

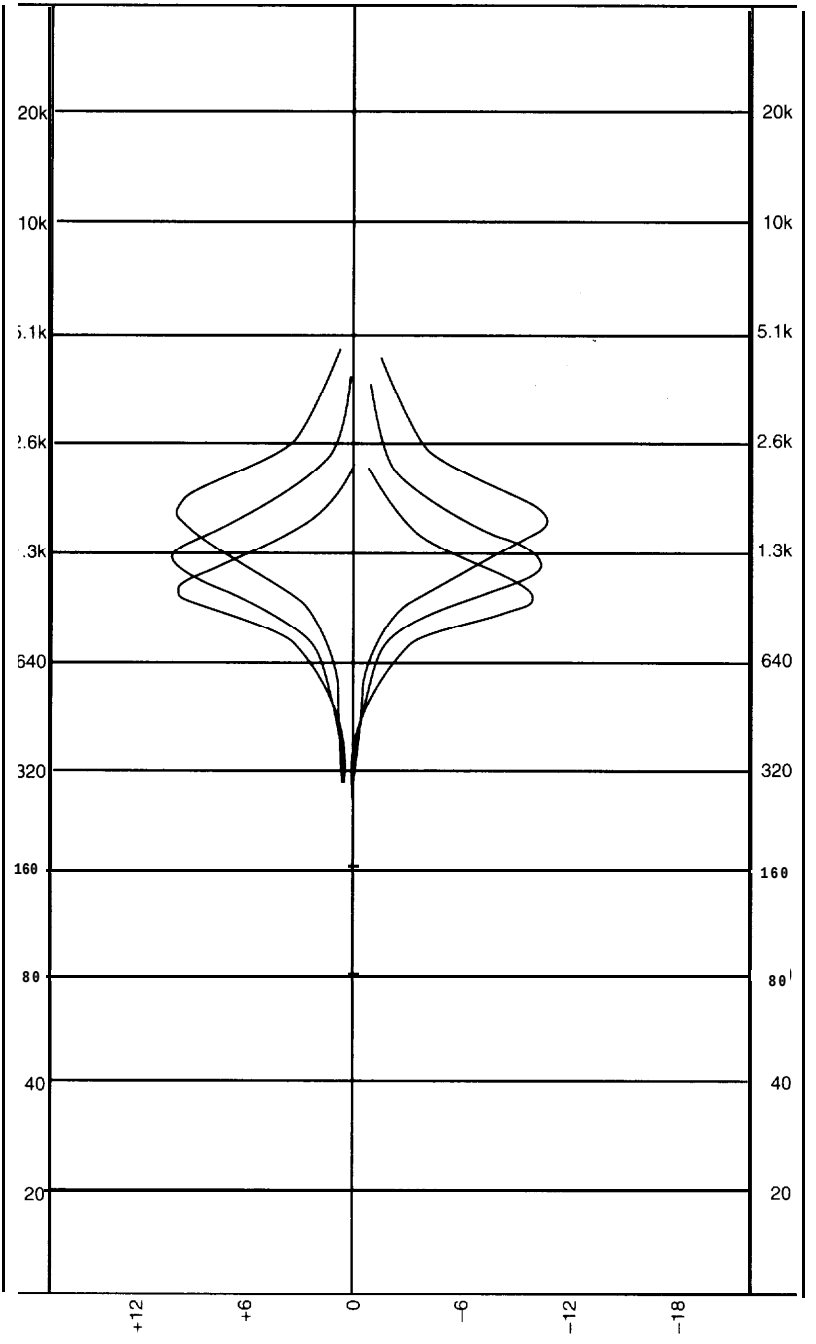
SOME SUGGESTIONS

- It is best to equalize one channel at a time. Trying to set up both channels at once confuses which channel is producing the results.
- If you can identify a response problem by ear, move the microphone to a point that reveals the problem. Mike placement can have a very large effect on response, and some microphone positions will obscure problems instead of showing them.
- The audible effect of response problems is a product of both the magnitude of the error and its width. A 9-dB “hole” one/third octave wide is less audible than a 2-dB “dip” two octaves wide. Try for an average response equally above and below the desired response over each octave span.
- The human ear averages the overall sound-field response by complex physiological and psychological pro-cessing. A single microphone only hears at one point, which must be selected to represent as closely as possible the overall sound field. Since tonal perception is most influenced by the nearest source, we usually equalize each side separately. The mike is set up at the driver’s listening location, facing forward, and the left channel is equalized. Then the mike is set up at the passenger’s location and the right channel is set up to match the left. This procedure usually gives good results.

EQUALIZER FREQUENCY BANDS



EQUALIZER FREQUENCY SHIFT



POWER WIRING

The black wire should be chassis-grounded to a solid metal ground. The red wire should be connected to the source unit's auto-antenna or accessory lead. If present, the white wire should be connected to the battery or another positive voltage source.

EQUALIZATION GOALS

The primary goal of the equalizer set-up is to produce a smooth response approaching a desired curve, eliminating or reducing peaks and valleys in the system response.

Systems could be equalized for a perfectly flat response, but a flat response sounds very thin and bodiless. A better approach is to attempt a final response similar to the room response of a good home speaker.

Figure 3, shows some typical "good-sounding" system response curves. Curve "A" is a good general-purpose goal. Curve "C" with increased bass will give more impact on rock and roll, while "B" would sound more natural for symphonic music. Curve "D" illustrates reduced roll-off in the mids and highs.

The OEQ-1 is deliberately restricted to 9dB of boost or cut per band. This is meant to discourage attempts to correct large system response problems with the equalizer. System response errors greater than about 6dB over a span of an octave of more should be corrected elsewhere in the system, by correcting speaker or amplifier problems. Excessive use of equalization is likely to overdrive amplifiers, speakers, or other components.

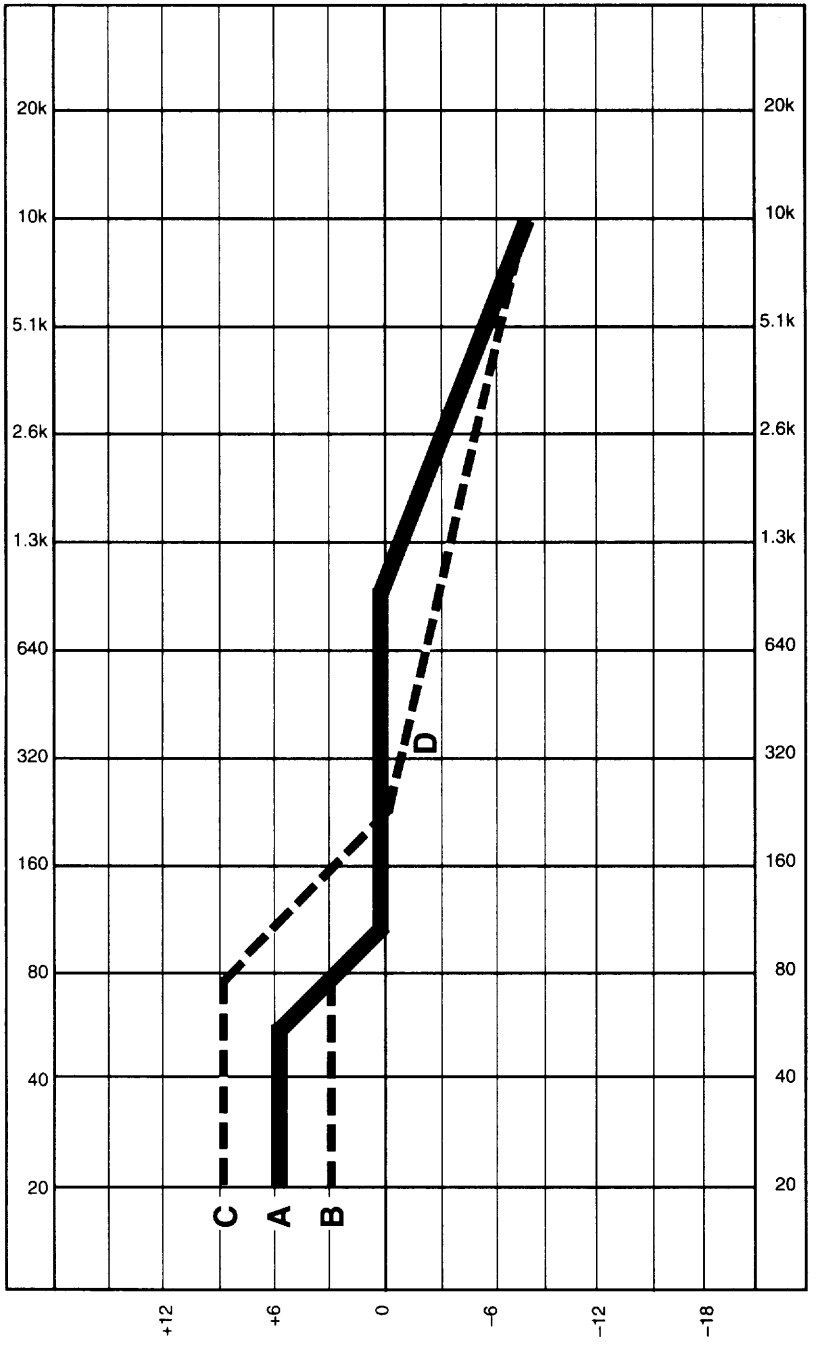
INPUT AND OUTPUT LEVELS

The OEQ-1 is designed to be used at preamp-output levels only (500 to 750 mVRMS). Higher input levels may overload the circuitry and must be attenuated. The OEQ-1 is designed to have a gain of one (output equal to input) when all potentiometers are centered.

DEFEAT SWITCH

The Defeat Switch completely disconnects all electronics in the signal path and connects the input directly to the output.

TYPICAL EQUALIZATION GOALS



OEQ-1 SPECIFICATIONS

Input level:	750 mV RMS
Input Impedance:	20 k Ohms
Output level:	750 mV RMS
Output Impedance:	500 Ohms
Signal-to-Noise Ratio:	Over 90dB (A-Weighted)
Distortion:	Under .01% THD + Noise
Filter Q:	2 typical (Bands l-8); 1 (Band 9)
Power Required:	Under 1 Amp at 12 Volt nominal
Dimensions:	4.75” wide x 8.65” long x 1.25” high 120.6mm x 219.7mm x 31.75mm
Weight:	1 lb. 13 oz. 822 grams

Specfications subject to change without notice.

ROCKFORD FOSGATE
LIMITED ELECTRONICS WARRANTY

Rockford Fosgate warrants all electronics to the original retail purchaser only, to be free from defects in materials or workmanship for a period of two (2) years parts and one (1) year labor providing the product was purchased from and installed by an Authorized Rockford Fosgate dealer. Warranty on products purchased from but not installed by an authorized dealer is one (1) year parts, no labor. This warranty is not transferable. Electronics found to be defective during the warranty period will be repaired or replaced at Rockford Fosgate's discretion. Repaired or replaced electronics will cover the balance of the original warranty period only.

Defective product must be shipped prepaid, together with proof of purchase and installation with a brief description of the problem, to the Rockford Fosgate Dealer from whom you purchased the product or to the factory in Tempe, Arizona in the original factory carton or equivalent. Any shipping loss or damage will be borne by you. If you return your product to the factory, please call 800-669-9899 for a return authorization number. If upon inspection at either the Dealership or the factory a determination is made that the product has failed due to materials or workmanship, we will repair or replace it at no charge, and return it in a reasonable length of time. If a determination is made that the product has been abused or is out of the warranty period, it will be repaired and returned C.O.D. for the repair and freight. Warranty does not cover the cabinet or any appearance item, any cost or expense related to the removal or reinstallation of the product, any accessory used in conjunction with the product, or any damage to the product resulting from alteration, accident, misuse or abuse. This warranty does not apply if the parts or labor, which would otherwise be provided without charge under this warranty, are obtained from any other source than Rockford Fosgate or an Authorized Rockford Fosgate service center. Rockford Fosgate limits obligation under any implied warranties under state laws to a period not to exceed the warranty period. This warranty applies only to products sold in the United States of America, or its possessions. For warranty outside the U.S.A., please contact your local agent. This warranty will terminate if the serial number has been removed, tampered with, or defaced. This product has no factory warranty if purchased from any other than an Authorized Rockford Fosgate Dealer.

Ship to:
Rockford Corporation
Warranty Repair Dept.
2055 E. 5th St.
Tempe, Arizona 85281 U.S.A.

PRACTICE SAFE SOUND™

CONTINUOUS EXPOSURE TO SOUND PRESSURE LEVELS OVER 100dB MAY CAUSE PERMANENT HEARING LOSS. HIGH-POWERED AUTOSOUND SYSTEMS MAY PRODUCE SOUND PRESSURE LEVELS WELL OVER 130dB. USE COMMON SENSE AND PRACTICE SAFE SOUND.

Make your Rockford Fosgate system complete with installation accessories from Perfect Interface, a division of Rockford Corp. Ask your salesman about Perfect Power alternators, power cables, speaker wire, connectors, cosmetic accessories and fabric.