



**MODEL 5002IQ®**  
(1991-MSRP: \$1200.00)

## **OWNER'S MANUAL AND INSTALLATION GUIDE**

### **INTRODUCTION**

Latest technology, high sound quality, powerful delivery and **LINEAR POWER™** reliability all describe **LINEAR POWER™** amplifiers. With new "IQ®" circuitry, their value increases. Versatile capabilities such as stereo, mono or mixed stereo/mono operation and 2 ohm capability make these amplifiers extremely desirable to build an entire system around or begin a system.

### **TECHNICAL DESCRIPTION**

The "IQ®" series amplifiers are a series of inverted channel ("I") amplifiers. A quiet turn on circuit ("Q") has been added for improved performance. The amplifier design incorporates an unregulated power supply for increased dynamic headroom and efficiency. The **TO-3** output stages of these amplifiers will deliver a significant increase in power into 2-ohm stereo loads. Amplifier reliability is accomplished by operating the output transistors at **50%** of their maximum rating even into a 2-ohm stereo load.

### **CONSTRUCTION**

**Power Supply:** Self oscillating for reliability and efficiency. The transformer is epoxy dipped for extreme vibration resistance. Banks of high-speed **TO-3** switching transistors provide massive current reserves. The amplifier design incorporates an unregulated power supply for increased dynamic headroom and efficiency.

**Output Stages:** Transformerless, direct coupled and fully complimentary. Output transistors are high current and low distortion **TO-3** devices, operating at a fraction of their limitations. In **4-ohm stereo**, the output devices in the **5002IQ** work at less than **30%** of their design capabilities as engineered by Motorola. **Linear Power™** products are seriously over built!

**Protection:** Our stable amplifier design is made virtually indestructible by three protection circuits. One is a precision thermal protection circuit, which prevents damage from high frequency oscillation, or an excessive ambient temperature. The second protection circuit is a current sensing device guarding against instantaneous abnormalities, such as short circuits. Both of these circuits automatically reset. The third form of protection guards against component damage from reversed power connections.

**Construction Features:** Our unique, variable input sensitivity control permits optimal signal matching for lowest noise and lowest distortion with virtually any source. All components used are rated for at least **150%** of their intended use, and are mounted on double-sided fiberglass epoxy circuit boards.

**Quality Control:** In-house construction of critical components like transformer and chassis, as well as total assembly, allows **LINEAR POWER™** to maintain uniform quality. **100%** of the finished units are tested, then burned in for four hours, and tested again. Amplifiers, which pass this rigorous test, have truly earned the **LINEAR POWER™** logo.

## **WIRING**

Disconnect battery ground cable before making any power connections.

**RED WIRE:** +12 volts. Connect directly to battery positive terminal and should be fused within 18 inches from the battery and another fuse where the connection to the amplifier is made. Remember to use the proper size fuses. **WARNING: USING OVERSIZED FUSES IS DANGEROUS AND WILL DAMAGE YOUR AMPLIFIER!** See specifications for proper fuse size.

**BLACK WIRE:** Negative Ground. Connect to clean unpainted metal surface on car chassis.

**RED/WHITE WIRE:** Remote turn on lead requires 12 volts; connect to power antenna lead from radio. When this is not available, you may connect to a +12 volts wire that is on with the ignition on or in the accessory position.

**RCA CONNECTIONS:** Connect with quality-shielded patch cords from source, crossover, or any other sound processor.

**SPEAKER CONNECTIONS:** Connect speaker terminals to amplifier, facing the terminal, left to right, **Left (-), Left (+), Right (-), and Right (+)**. For mono operation use left positive (+) and right negative (-). These amplifiers are capable of 2-ohm operation in stereo or 4 ohms in mono.

**OPERATING THE AMPLIFIER AT LESS THAN THESE RATINGS WILL CAUSE AMPLIFIER FAILURE AND VOID YOUR WARRANTY.**

## TWO-OHM CAPABILITY

**NOTE:** The **5002IQ**® has internal taps for **2-ohm** operation. To access, remove bottom cover. They are located about the middle of the amplifier and are set to **4 ohm** at the factory. To change to **2-ohm stereo** operation, pull the quick disconnects off the taps marked "4" and place them on the taps marked "2". This will ensure safe operation into **2-ohm stereo loads**, as well as **4-ohm bridged loads**.

## DYNAMICS IMPROVING PROCESSOR®

**(D.I.P.):** This switch is accessible through a plug on the bottom of the amplifier. In the on position it redistributes power in the bass region to help overcome factors in the mobile environment that limit bass response. This is not simply a "bass boost" but a carefully measured EQ curve to enhance performance if needed.

## WARNING

Your new **LINEAR POWER™** amplifier, when used in conjunction with many of the efficient speaker systems on the market today, can produce sound pressure levels that are considered harmful to your hearing.

Exposure to loud music may lead to loss in hearing. This effect may not be readily appreciated because the damage to hearing is progressive. Those who are exposed to excessive sound pressure should utilize direct individual protection in the form of earplugs or earmuffs, which are specifically designed for noise reduction.

In accordance with the **OSHA** (Occupational Safety and Health Act) regulations for noise levels as they relate to the work area, excessive sound pressure is defined as **115db(a)** continuous for any length of time.

We recommend that you exercise restraint while enjoying the performance of this and other high-powered mobile audio equipment.

## GAIN ADJUSTMENT

Set the amp gain to minimum, turn the source up until it just starts to distort, then back down slightly. This is the point where the output of the source is cleanest. Now adjust the amplifier gain up until it just starts to distort and back down slightly. This will allow the source and amp to reach maximum usable output at the same time.

## MOUNTING

1. The amplifier works best if it is kept as cool as possible. Mount in a position that allows air to flow freely through the fins. Be sure there is ample space above the amplifier to avoid trapping heated air rising from the amplifier. The amplifier should not be mounted upside down. Avoid mounting any amplifier in the dash or on the firewall to avoid noises being radiated directly onto the case.

2. The case of your amplifier is designed to act as a noise shield. To maintain this protection, be sure the metal case of the amp does not touch the metal of the car. Do not remove or damage the rubber grommets, which provide electrical insulation and vibration isolation.

## GENERAL TROUBLESHOOTING

**NO SOUND:** Check all connections. Check fuses. With a meter be sure there is +12 Volts on the main power wire and the turn on wire, but not on the ground wire. Check by substitution or other method for proper operation of music source.

**BLOWS FUSE:** Check all connections to be sure all power wires and speaker wires do not touch ground or each other. Re-check polarity of main power wires.

**SHUTS OFF:** This amplifier is equipped with a thermal and short circuit protection. In the unlikely event of excessive temperature or improper speaker impedances, the amp will turn itself off. When the condition is corrected (temperature decreases or speaker short is fixed), the amp will turn itself back on. To avoid damage to the speakers, turn volume to a minimum while waiting for the amp to turn itself back on.

## NOISE TROUBLESHOOTING PROCEDURES

In most any car, the possibility of picking up unwanted noises can be reduced if the installation is done properly. Keep the system's wiring away from the vehicle's wiring harness. Do not run the low level signal cables beside the power or ground cables or next to the vehicle wiring harness. Attach the ground for the amplifier to a clean, solid portion of the body or frame, as close to the amp as possible. Use a good grade shielded cable for all low-level signals. Because of the astronomical number of possible noise problems, a detailed solution to each and every specific problem is impossible. Here we discuss the major noise types, and try to proceed from cause and solution of each.

## TYPES OF NOISE

1. **Alternator noise:** This is the most common source of noise, and expresses itself as a high-pitched whine, which increases and decreases in pitch with the speed of the engine. Unfortunately for sound systems, the cable between the alternator and the battery forms a beautiful antenna to transmit the alternator's noise to anything surrounding it.
2. **Ignition noise:** Ignition noise is formed by the primary and secondary ignition systems in gas engines. It is characterized by a rapid ticking or popping noise that increases or decreases with engine speed. The first form of ignition noise, from the primary circuit, is caused by the points or solid-state circuitry that fires the coil. These primary pulses can feed back through the ignition coil and into the vehicle's electrical system. The secondary ignition circuit is composed of the ignition coil, the spark plug wires, and the spark plugs. Since the secondary circuit operates at quite a high voltage, and since this voltage is pulsed, it forms a nice radio (noise) station under the hood. This noise is often transmitted to the vehicle's wiring harness.
3. **Accessory noise:** Accessory noise is caused by the electrical noises formed by the many electrical accessories in the vehicle. The most common noises are the pops caused by high current switches (like the brake light switch) and whirring noises caused by the various electrical motors in the vehicle (such as the fuel pump or fan motor).

## ENTRY METHODS

1. **Radiation:** Radiated noise is the most common problem found. As mentioned earlier, the worst problem area is the wiring between the alternator and the battery. The entire wiring harness can become contaminated if a portion of it runs along side the alternator to battery cable.
2. **Ground Loops:** Ground loops are the most common way radiated noise gets into a mobile stereo system. This is especially true of multiple amp systems. They have more grounding points, and that means more possible locations for ground loops to form. A ground loop is formed when any ground point is at a different potential than at any other ground point in the system.
3. **Power Lead (+12V) Noise:** Since true power lead noise is the only noise that isn't radiated, and since the vehicle's battery (if in good condition) provides adequate filtering for alternator noise, then only ignition and accessory noise could enter the system through power leads.

## **BUILT IN NOISE SUPPRESSION**

The vehicle's battery forms a huge capacitor bank that does a fantastic job of filtering noise. Unfortunately, batteries grow old and lose their ability to hold a charge. At the same time, they lose their ability to filter noise; even corrosion on the battery terminals will cause increased noise as it isolates the battery.

If the vehicle is in need of ignition repair or tune up, increased noise will result. Specifically, check the condition of the points and condenser, as well as the spark plug leads. More modern electronic ignition systems will have less noise because of the use of solid-state parts. Don't forget to check for resistor spark plugs, too. They help reduce noise.

## **TROUBLESHOOTING NOISE**

Once the type of noise has been determined, the entry method must be located. The easiest place to start is the amplifier. Unplug the RCA jacks and listen for a change in the noise level. If little or no change occurs, the amplifier's power source is contaminated. If the noise is gone, the possibilities are a ground loop or a noise problem earlier in the system. If the problem is a ground loop, the best solution is a better ground for the amp(s). Another solution is to carefully connect a wire from the shield of the RCA connector, at the amplifier end of the RCA cables, to a good ground on the vehicle. This will effectively short circuit the ground loop.

The next check is for radiated noise. With the radio still electrically connected to the vehicle, slowly remove it from its installation, and listen for a change in noise level, as it is pulled away from the dash and any vehicle wiring harnesses. If you are dealing with radiated noise, the only solution is isolation. The easiest method is usually to move the contaminated vehicle wiring harness away from the stereo's wiring.

The best way to eliminate power line noise is to install a filter capacitor across the noise source. The best capacitors to use are .5 mfd 25v bypass capacitors for the coil, as well as any accessory motors, and a .1 mfd 100v ceramic disc capacitor for switches. Another way to suppress power line noise is with noise filters, but be sure the filter is rated for the current of the circuit that you are installing them on.

**SERVICE OR REPAIR**

To obtain modification, service or repair, please contact our **ONLY Authorized LINEAR POWER™ Product Service Center:**

**T.I.P.S. INC.**

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## SPECIFICATIONS

### 5002IQ<sup>®</sup>

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<b>RMS Power Output @ 4 Ohms stereo</b>	250 x 2
<b>THD @ full output 20 - 20Khz</b>	.12%
<b>Slew Rate volts/microsecond</b>	16V/ms
<b>Damping Factor @ 4 ohms</b>	>210
<b>Channel separation</b>	>75dB
<b>Maximum current</b>	
4 ohms	77A
2 ohms	90A
<b>Idle</b>	2A
<b>Fuse rating</b>	60A
<b>Dimensions:</b>	3" x 9.5" x 14.5"

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