

**Threshold**

**model FET ten preamplifier**

**OPERATING MANUAL**

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## **INTRODUCTION**

Thank you for the confidence you have expressed in Threshold products by purchasing your new Threshold FET ten preamplifier. With the FET ten installed in your system you will experience the musical accuracy, focus, and detail of a truly exceptional high fidelity instrument.

The circuit designs embodied in the Threshold FET ten employ engineering concepts at the forefront of audio technology which do not lose information or gain distortion and maintain the precise signal content and relationships enabling a spatially accurate soundstage of palpable ambience. Its flawless level of construction and finish are the product of an assembly staff who take personal pride in their craftsmanship and the electronic component parts which form the circuits of the FET ten are the finest available to provide assurance of lasting performance and value. Each Threshold FET ten preamplifier is individually tested and adjusted to performance considerations beyond bench specifications.

Threshold and all Authorized Threshold Dealers stand behind your FET ten and are ready to provide you with assistance if you have any questions or problems not covered by this manual.

This operating manual is designed to apply to both the phono stage and high level stage units which comprise the FET ten preamplifying system. The components are available separately, and if you own only the phono stage FET ten/p or the high level stage FET ten/h, please note when the section headings refer to one component or the other. When not otherwise indicated, the information will generally refer to both the high level and the phono stages.

## **INSTALLATION**

This section is designed to allow you to get your Threshold FET ten preamplifier installed and operating as quickly and with as little trouble as possible. If you experience difficulties in the set up or operation of your FET ten review the appropriate section in the body of this manual. In the event you encounter a persistent problem that does not respond to logical procedures you should contact your Threshold dealer who will be able to provide a technical assistance.

### **1) Selecting a Location**

The Fet ten preamplifier system consists of four separate components, each having its own needs with regard to location. The most obvious consideration in the location of components is user accessibility and the lengths of the various interconnect cables in the system.

A more subtle but very important consideration is proximity of the magnetic fields generated by various components and by other components which are noise sensitive to these fields. The power supply transformers used in audio equipment and the motors used in rotating playback components are sources of electromagnetic fields which can be picked up by the sensitive gain stages of a preamplifier. To achieve -80 dB hum noise for a moving coil input, the induced noise voltage must be less than 50 billionths of a volt. For this reason, such circuitry is best kept at some distance from 120 volt sources.

The phono stage unit is the most susceptible to hum pickup from magnetic fields, and should be at least a foot away from the nearest transformer. It should not be placed directly above or below another component containing a motor or transformer, including the power supply module supplied with it. Achieving the lowest possible noise is the reason for providing the power source in a separate enclosure with a several foot umbilical which allows placement at some distance.

The high level control stage is far less susceptible to hum pickup because of the far greater level of input voltages, however its placement still deserves some attention. When you consider that its intrinsic noise levels are comparable to that of a high quality phono stage, there is no reason to introduce degradation, no matter how small. As with the phono stage, the high level gain system is best kept at some distance from sources of magnetic noise. Experience shows that a power amplifier will typically be the greatest source of such noise, and that a placement of a foot or more away will be adequate.

## **2) Phono Stage Loading and Gain Adjustments**

BE CERTAIN THAT THE POWER SUPPLY MODULE OF THE PREAMP COMPONENT IS UNPLUGGED FROM THE AC POWER SOURCE WHILE ADJUSTMENTS ARE MADE TO CARTRIDGE LOADING AND GAIN SETTINGS.

AS SHIPPED FROM THE FACTORY THE THRESHOLD FET TEN/P IS SET FOR AN INPUT IMPEDANCE OF 47,000 OHMS, CAPACITANCE OF 50 PICOFARADS AND THE LOWER OF THE TWO GAIN SETTINGS.

To gain access to the phono stage loading and gain adjustments, it is necessary to remove the cover of the FET ten/p phono stage using the hex driver included in the owner's package.

To adjust the gain setting of the phono circuitry, locate the small vertical jumper assemblies adjacent to the group of four capacitors near the preamplifier center. The jumper slide connects two of the three adjacent vertical pins leaving the other outside pin exposed. To alter gain characteristics grasp the jumper slide, lift it straight up from the base assembly, and reposition it on the two pins you wish to connect.

For highest gain, each jumper slide is positioned toward the center of the preamplifier so that the exposed pins are those nearest the front and back of the preamplifier.

For 20 dB less gain, the jumper slides are positioned away from each other and toward the front and back of the preamplifier so that the exposed pins are those nearest the center of the preamplifier.

To adjust the resistive loading of the phono cartridge, locate the two miniature switch assemblies on the preamplifier circuit board. Each switch assembly controls one channel, and the eight switches on each are numbered. Switches 1-4 control the resistive loading as follows:

SWITCH	ON VALUE
#1	22 Ohms
#2	47 Ohms
#3	100 Ohms
#4	1,000 Ohms
1-4 OFF	47,000 Ohms

Similarly, switches 5-8 control the capacitive loading of the phono cartridge as follows:

SWITCH	ON VALUE
#5	1,000 picofarads
#6	250 picofarads
#7	150 picofarads
#8	100 picofarads
5-8 OFF	50 picofarads

### 3) Phono Stage Signal Connection

BE CERTAIN THAT NO COMPONENT IN THE SYSTEM IS TURNED ON WHILE CONNECTING COMPONENTS.

The FET ten/p phono stage is provided with a pair of input signal connections, an input ground terminal, and a pair of output connections. Route the cables coming from the phono cartridge mounted on your turntable to the input connections, avoiding AC power cords and speaker cables. Insert the left and right male RCA connectors into the inputs and attach the ground wire from the turntable to the ground binding post on the preamplifier. Some turntables and/or arms do not provide a separate ground wire, and obtain their chassis grounding through the phono signal grounds, in which case you will not need to attach a ground wire.

Using an appropriate interconnect cable, connect the left and right output connectors of the phono stage to the Analog Disc input connectors of the high level control stage.

### 4) High Level Stage Signal Connection

Although the signal connectors on the rear panel of the Threshold FET ten/h control section are closely spaced it can be seen that they are arranged in pairs. The identifying titles on the rear of the chassis correspond to those on the front panel controls and describe the type of signal the connector should carry.

Attach the appropriate left and right input cables from audio sources and connect the outputs of the preamplifier to the inputs of the power amplifier.

## **5) Power Supply Connection**

For both the FET ten/p phono stage unit and FET ten/h control unit connect the power umbilical cable attached to each power supply module to the connector on the back of each gain unit. Insert the miniature connector of the dc power cord into the socket until it locks into place.

The power requirements of your Threshold FET ten power source module are specified on the serial number plate located on the underside of the unit and on the packing carton.

Insert the ac power cords of the FET ten power source modules firmly into the AC power connectors on the rear of the modules and connect their plugs to an appropriate ac power source. The LED power indicator on power supply and on the gain stage should light up, indicating power.

After the FET ten has been energized for 20 seconds turn on the associated amplifier and program source units. Select a program source with the FET ten/h source selector control. Advance the audio level control until the desired loudness is obtained.

TO AVOID A HAZARDOUS SHOCK DO NOT REMOVE THE COVER OF THE POWER SOURCE MODULE OR OPERATE THE SYSTEM IN RAIN OR MOISTURE.

ALWAYS UNPLUG THE POWER CORD FROM A LIVE POWER SOURCE BEFORE INSTALLING OR REMOVING IT FROM THE CHASSIS CONNECTOR.

DO NOT LEAVE THE CORD FREE OF THE MODULE WHILE IT IS CONNECTED TO A LIVE POWER SOURCE.

## **PHONO STAGE OPERATING INFORMATION**

The differing levels of signal increase required for .1 millivolt output moving coil and multiple millivolt output moving magnet cartridges are accomplished in the Threshold FET ten/p through a single gain variable stage. This eliminates the necessity for series gain stages with very low output cartridges and completely minimizes the amount of circuitry in the signal path.

One of the most important attributes of a phono stage is the accuracy of its RIAA equalization. To maintain the integrity of the phase and amplitude information contained in a recording the preamplifier must accurately compensate for the RIAA deviation. Precise de-emphasis must occur for accurate retrieval of the recorded.

Your Threshold FET ten/p utilizes an RIAA de-emphasis circuit which was computer modeled to levels of 0.025% accuracy. Precision tolerance and selected components are used in realizing the potential of the design.

The FET ten/p will provide moving coil, moving magnet, or other cartridges having a velocity output characteristic with voltage gain and RIAA equalization of unsurpassed musical accuracy.

## **Input Connection**

The four signal connectors on the rear panel of the Threshold FET ten/p are arranged in two pairs. Connect the Left and Right channel signal leads from your magnetic cartridge to the appropriate left and right MC/MM Cartridge Input connectors. Be sure to make the proper loading and gain adjustments for the cartridge you are using.

If you experience any noise problems in your installation the first thing to do is check the grounding of the system. Make certain no interconnecting audio cable has a broken ground shield. In some older homes it may be that the wall outlets carry only two conductors or it may be found that the third conductor makes poor or no earth ground. If this is the case you will have to utilize a three-to-two conductor adapter on one of the components, attaching the plug's ground wire to earth ground.

A glance at the signal connectors on the rear panel of your FET ten/p will reveal they are arranged in two groups of two connectors each. In both cases the connector on the left as the FET ten/p is viewed from the rear is designated to carry left channel signal information, the connector on the right, right channel information.

To avoid the possibility for damage to your system never to connect or disconnect a signal or ground lead while components, particularly amplifiers, in the system are turned on.

Your FET ten/p is designed exclusively to accept the output of phonograph cartridges exhibiting a velocity response characteristic. Cartridges of this category are exemplified by high and low output moving coil, moving magnet, variable reluctance, moving flux, ribbon, and electret designs. The FET ten/p input load and circuit gain characteristics may be tailored to specific cartridges within this group by means of miniature DIP switches and jumper assemblies for each channel.

## **Output Connection**

The signal appearing at the line output connectors of the FET ten/p has been RIAA equalized to a flat response characteristic and is at a voltage level suitable for connection to the high level inputs of an associated control component such as the Threshold FET ten/h high level control section preamplifier. As it features no control facilities the FET ten/p is not intended for direct connection to an associated amplifier.

The output impedance of the FET ten/p is 420 Ohms shunted by 3000 pf. This low value means that the following component to which the FET ten/p is connected will not induce error at the preamplifier output. In addition, this allows the use of quality audio cable for long runs between the FET ten/p and the associated preamplifier with minimal effects due to cable capacitance.

## **Cartridge Gain and Loading Characteristics**

The magnetic (or velocity responsive) cartridges suitable for use with your FET ten/p require different gain and load characteristics to realize maximum performance. For this reason a range of flexibility is incorporated into your FET ten/p input circuits which allow it to accommodate the differing requirements of these cartridges.

Every Threshold FET ten/p is shipped from the factory preset with cartridge load characteristics of 47,000 Ohms impedance and 50 picofarads capacitance (all adjustment switches in the "off" position), and the lower of two available gain factors (shorting jumper slides away from the center of the preamplifier). This is a gain factor and impedance load suitable for a moving magnet and some high output moving coil cartridges.

Refer to the instruction sheet which accompanied the cartridge you are using to determine its gain, impedance, and capacitive load requirements. It will be a good idea to adjust the input load characteristics particular to your cartridge before installation and connection is made to the FET ten/p.

To make the appropriate adjustments for the cartridge of your choice it will be necessary to go inside the main chassis of your FET ten/p preamplifier. Unplug the power supply from the AC power source. Remove the module plug from the miniature socket on the rear of the main chassis. Remove the screws securing the top cover to the main chassis and carefully set them aside, then lift off the cover.

### Setting the Gain

**DO NOT MOVE EITHER CHANNEL'S SHORTING JUMPER TO ALTER GAIN CHARACTERISTICS WITHOUT FIRST TURNING OFF THE PREAMPLIFIER.**

The cartridges suitable for use with the FET ten/p fall under the generic heading of "magnetic". These cartridges can be classified into two categories according to their construction: Moving Coil (MC) and Moving Magnet (MM). Moving Coil devices have lower output voltages, generally less than a millivolt, and Moving Magnet devices have outputs greater than a millivolt.

Adjusting the gain of your FET ten/p to accommodate either a "moving magnet", or "moving coil" cartridge is accomplished by repositioning a shorting jumper slide on its three-pin header base inside the preamplifier. There is one of these jumper assemblies for each channel. The gain setting will depend on the cartridge output level, but if you find that the output is adequate for your needs, you will realize somewhat less distortion with the lower gain setting.

To adjust the gain setting of the phono circuitry, locate the small vertical jumper assemblies adjacent to the group of four capacitors near the preamplifier center. The jumper slide connects two of the three adjacent vertical pins leaving the other outside pin exposed. To alter gain characteristics grasp the jumper slide, lift it straight up from the base assembly, and reposition it on the two pins you wish to connect.

For highest gain, each jumper slide is positioned toward the center of the preamplifier so that the exposed pins ~~are those nearest~~ the front and back of the preamplifier.

For 20 dB less gain, the jumper slides are positioned away from each other and toward the front and back of the preamplifier so that the exposed pins are those nearest the center of the preamplifier.



## Cartridge Loading

The moving coil and moving magnet cartridges described above require different input load characteristics to realize their optimum performance. As a group "moving coil" cartridges are relatively insensitive to their capacitive load but each individual cartridge will work best into a specific load impedance. Conversely, moving magnet cartridge as a group are designed to work into a load impedance of 47,000 Ohms but each individual cartridge will be sensitive to its capacitive loading.

The impedance and capacitive characteristics of the FET ten/p input circuits are selected by two switch assemblies. Each switch assembly is dedicated to a specific channel and incorporates 8 miniature switches that provide a direct choice of 4 impedance and 4 capacitive selections. Switches numbered 1 through 4 implement impedance (resistive) loading, switches numbered 5 through 8 implement capacitive loading.

## Setting Resistance Loading

With the cover of your FET ten/p removed locate the miniature switch assemblies on the preamplifier circuit board and the load impedance value assigned to switches 1 through 4. These values are also listed in the table below:

SWITCH	ON VALUE
#1	22 Ohms
#2	47 Ohms
#3	100 Ohms
#4	1,000 Ohms
1-4 OFF	47,000 Ohms

When all four impedance load switches are to the left (OFF position) the FET ten/p input circuits will provide the appropriate load for moving magnet cartridges of 47,000 Ohms. By moving any one of the switches to the ON position lower resistance values may be introduced which provide the impedance load required by different moving coil cartridges. Refer to the instruction sheet accompanying your cartridge to determine its recommended operating load impedance. A small jeweler's screwdriver or toothpick is a adequate tool to use for moving these miniature switches.

The value recommended for your cartridge and the termination supplied by the FET ten/p need not be in exact agreement to realize optimum performance because the source impedance characteristic of any cartridge contains a significant reactive component. Simply select the impedance load value nearest that recommended for the cartridge. In large measure the value you select will ultimately be the result of personal preference.

## Setting Capacitive Loading

With the cover of your FET ten/p removed locate the miniature switch assemblies on the preamplifier circuit board and the capacitive load values assigned to switches 5 through 8. These values are also listed in the table below:



SWITCH	ON VALUE
#5	1,000 picofarads
#6	250 picofarads
#7	150 picofarads
#8	100 picofarads
5-8 OFF	50 picofarads

When all four capacitive load switches are in the OFF position the FET ten/p will provide the appropriate capacitive load for most all "moving coil" cartridges of 50 pf. By moving any one of the capacitive load switches to the ON position additional specific capacitance may be added to the circuit. The switched capacitance is added to the fixed load of 50 pf. The sum result is the amount of capacitance seen by the cartridge and also the value shown for a specific switch ON position. These higher pf values will be those required for the optimum performance of various moving magnet cartridges. The 1000 pf position is generally suitable for moving coil cartridges.

Refer to the instruction sheet accompanying your cartridge to determine its appropriate capacitive load. Simply select the switch which provides the capacitive value coming closest to that specified in the cartridge instruction sheet. To a large measure the value you select for your cartridge can be the result of personal judgment. In all cases the capacitance value selected within your FET ten/p will be in addition to the capacitance inherent in the audio cables connecting your turntable to the FET ten/p. This capacitance is generally in the range of 100 pf and an exact figure may be found in the specification sheet for the turntable or interconnects you are using.

Generally it will only be necessary to move one capacitive loading switch to the ON position for any given cartridge as the values provided will accommodate the majority of available moving magnet cartridges. Nevertheless, additional values may be obtained through operating switches in combination if you have an unusual cartridge or wish to get involved in some experimentation. For this purpose you may calculate the combination values by simply adding 50 pf and the values for each switch in the ON position.

### High Level Stage

Although spacing of the signal connectors on the rear panel of your FET ten/h is fairly close it can be seen that they are arranged in groups of two. In every case the connector on the left as the FET ten/h is viewed from the rear is designated to carry Left Channel signal information, the connector on the right Right Channel information.

To avoid the possibility for damage to your system never connect or disconnect a signal or ground lead while components, particularly power amplifiers, are turned on.

## **Input Connections**

The inputs to your FET ten/h are designed to receive flat high level output signals from the associated source equipment. This includes the inputs designated Analog Disc which will not accept direct connection to most phonograph cartridges. If the cartridge you plan to use is a powered electret or strain-gauge type its power supply will probably include an output which has been equalized for the RIAA characteristic and provides a signal at high level. This is the signal required by the FET ten/h. Signals of any other characteristic, such as those of a moving magnet cartridge, high output moving coil cartridge, or moving coil pre-preamplifier/transformer, will require use of the Threshold FET ten/p phono stage before connection to the FET ten/h.

Each of the FET ten/h program source inputs has an identical input load characteristic of a nominal 25,000 Ohms in parallel with the input impedance of the tape recorders to which the signal may also be routed.

The titles to the input pairs of the FET ten/h are essentially self explanatory as to the type of program source equipment which should be connected to them, and they correspond to the control indications on the front panel

## **Recorder Connections**

Your Threshold FET ten/h will accommodate two tape recorders and will allow a great deal of flexibility in their record and playback signal routing. These capabilities for recording and monitoring are explained in the Front Panel Controls section of this manual.

The Tape Recorder 1 and Tape Recorder 2 connector groups on the rear chassis of the FET ten/h consist of two connector pairs each, one pair designated Recording Signal and the other designated Monitor Signal.

The Output from the tape recorder - the signal you want to hear should be connected to the Monitor Input connector pair of either the Tape Recorder 1 or Tape Recorder 2 group to which you wish to assign the recorder. The Input to the recorder - the signal you want to record - should be connected to the Recording Output connector pair of the same group.

Double check your connections to make certain that the input and output of an individual tape recorder is connected ONLY to its own group of preamplifier connectors. The information appearing at the Recording Signal connectors of either recorder group is unaffected by the Monitor, Mode, Balance, or Audio Level controls on the front panel.

Most reel-to-reel recorders will allow simultaneous recording and monitoring of the just recorded signal. Recorders having this capability will allow the FET ten/h to make instant comparison between the source material and the recorded signal through the Monitor control on the front panel. Fewer cassette recorders allow this, as do virtually no PCM video format recorders. Check the owner's manual for your recorder to determine the exact nature of the signal appearing at the recorder's output connectors during the recording operation.

## **Output Connections**

Your FET ten/h output impedance is 100 Ohms in series with 100 uF. This low impedance assures that components driven by the FET ten/h will not induce errors due to input capacitance or active input error currents. In addition, it allows the use of quality cable in fairly extended lengths for connection to the amplifier without the introduction of detrimental signal effects.

## **Program Source Selector**

The Program Source Selector of your FET ten/h determines the input signal that will be fed to the preamplifier circuits from those of the Analog Disc, Compact Disc, Tuner, Video Audio, and Auxiliary source connectors on the rear panel. The designations to the side of the Selector knob correspond with those identifying the input connectors on the FET ten/h chassis rear.

## **Signal Distribution**

Signal allocation within your FET ten/h is determined by the Signal Distribution controls. The Monitor Signal control selects the information that is routed to the Preamplifier Output connectors on the FET ten/h chassis rear for playback through the associated amplifier and loudspeakers. The signal selected by this control will be affected by the Mode, Channel Balance, and Audio Level controls. The Recording Signal control selects only the information that appears at the Recording Output connectors on the rear for recording by the associated tape recorder(s).

## **Monitor Signal Control**

The Monitor Signal control, in conjunction with the Program Source Selector control, will allow you to route any input signal information available to the FET ten/h through the Mode, Channel Balance, and Audio Level controls for appearance at the preamplifier's output connectors. The Monitor control operates with complete independence from any material routed to the Recording Signal connectors of the FET ten/h and may be moved while a recording is in progress provided that the Mono Mode switch is not active.

## **Selector position**

In this position you will hear the signal determined by the Program Source Selector and its associated input components. The signal will be routed through the preamplifier controls described above to appear at the Preamplifier Output connectors.

## **Recorder 1 position**

This position will allow you to hear the program material input at the Monitoring Input connectors of the Tape Recorder 1 group.

## **Recorder 2 position**

This position will allow you to hear the program material input at the Monitoring Input connectors of the Tape Recorder 2 group.

## **Recording Signal control**

**IMPORTANT: THIS CONTROL MUST NOT BE MOVED WHILE A RECORDING IS IN PROGRESS.**

In the Record Signal position the Recording Signal control allows simultaneous or individual recording by tape recorder 1 and/or 2 of the program material determined by the position of the Program Source Selector. The input signal will simultaneously appear at the Recording Output connectors on the FET ten/h for both Tape Recorder 1 and Tape Recorder 2.

With the Recording Signal control in this position parallel interconnection is made between the output of the associated component selected by the Program Source Selector and the input circuitry of the tape equipment connected to your FET ten/h.

### **Recorder 1 to 2 position**

This position will allow tape recorder 2 to record the material being played by tape recorder 1. The Monitoring Input connectors of the Tape Recorder 1 connector group are routed to the Recording Output connectors of the Tape Recorder 2 connector group.

### **Recorder 2 to 1 position**

This position is the reverse configuration of the above and will allow Tape Recorder 1 to record the material being played by Tape Recorder 2. The Monitoring Input connectors of the Tape Recorder 2 connector group are routed to the Recording Output connectors of the Tape Recorder 1 connector group.

## **Signal Mode control**

This control will affect the stereo characteristics of Program material selected by the Monitor control for appearance at the preamplifier outputs.

### **Stereo position**

With the Signal Mode control in the Stereo position the left and right channel signal will appear at their respective output connectors on the FET ten/h.

### **Reverse position**

This position will reverse the Left and Right channels without otherwise affecting the signal.

### **Mono position**

With the Signal Mode switch in the Mono position left and right channel signals are added together (L+R) and information comprising the monophonic sum of the two stereo channels will simultaneously appear at both the left and right channel FET ten/h output connectors. In this position no stereo characteristics will be experienced in the reproduced sound.

## **Channel Balance control**

The relative signal levels between the left and right channels of the FET ten/h are affected by the Channel Balance control. Rotating the control clockwise from the center detent will bias the sound toward the Right loudspeaker, counterclockwise toward the Left.

Many factors within a room can alter the **balance** perception that a listener will have even when the signal is electrically dead-on. **For this reason some** adjustment of the Balance control may be required to achieve a correct image in your normal listening position even when all electrical elements are identical.

## **Audio Level control**

The Audio Level control of your FET ten/h is a **32 detented** position attenuator. A precision resistance element is used to produce the signal attenuation realized for each channel. To assure maximum channel isolation the control assembly consists of two independent controls mounted on a common shaft and it simultaneously alters the left and right channel signal levels which appear at the preamplifier outputs.

At full clockwise rotation, the FET ten/h 1 Audio Level control provides maximum signal gain. As the control is rotated counterclockwise the output is reduced by approximately 3 dB for each **detented** step within the upper and lower ends of the control range and approximately 1.5 dB for each detented **step** throughout the center of the control range.

The Audio Level control affects only the signals appearing at the FET ten/h Preamplifier Output connectors and does not affect the level of signals routed to the Recording Output connectors of the Tape Recorder groups.

## **POWER SOURCE CONNECTIONS**

**IMPORTANT: ALWAYS UNPLUG THE POWER CORD FROM A LIVE POWER Source BEFORE INSTALLING OR REMOVING IT FROM THE CONNECTOR ON THE MODULE REAR PANEL. DO NOT LEAVE THE CORD FREE OF THE MODULE WHILE IT IS CONNECTED TO A LIVE POWER SOURCE**

**TO AVOID DANGEROUS ELECTRICAL POTENTIALS DO NOT REMOVE THE COVER OF THE POWER SUPPLY MODULE OR OPERATE THE SYSTEM TO RAIN OR MOISTURE.**

To reduce the chance for ground loops and their associated noise all the components comprising an audio system should receive their earth ground connection through a single piece of the equipment which is properly earth grounded through its three-conductor ac power plug. If only one component carries a three-conductor plug this will automatically happen via the audio cable shields when the equipment is connected whether the individual pieces are connected to equipment convenience sockets or to the same or different wall outlets. To achieve this condition cheater plugs with their ground wire unconnected may be employed if multiple units in a system are equipped with three-conductor power plugs.



Because all Threshold amplifiers are equipped with three-conductor power cords these units naturally lend themselves to providing the single earth ground connection that is required. For this reason the power source module of your FET ten preamplifier is provided with a power cord whose third conductor connects the circuit to earth ground through a 1 Ohm power resistor. This provides electrical protection while acting to reduce the potential for a ground loop. Because of this the FET ten power source module will not generally require a cheater plug.

The DC power cord from the module is connected to the DC power connector of the FET ten. Insert the miniature connector of the DC power cord into the socket on the FET ten chassis rear until it locks into place. The AC power cord of the power source module should then be firmly inserted in the AC power connector on the chassis rear of the module and may be connected to any convenient AC power supply of correct rating. As soon as these connections have been made the FET ten will become energized. Your FET ten has been designed to remain on continuously and should remain connected in this manner. Power consumption of the preamplifier is small and the its life expectancy is not diminished by being continuously powered.

Your FET ten power source module is wired for the power furnished in the country of original consumer sale unless manufactured on special order. The power rating of a particular unit is specified on the outer carton for the two units and on the serial number plate affixed to the underside of the module. If you remove your FET ten and its power source module from the country of original sale be certain that the power furnished in any subsequent location is suitable before connecting and operating the units. Impaired performance or severe damage may occur if operation is attempted from an incorrect ac power supply.

### **MECHANICAL CONSIDERATIONS**

The FET ten has mounting holes at either end of its faceplate which are configured to the EIA rack standard. These may be used to support the unit in either a horizontal or vertical position. Because the aluminum alloy of the faceplate is a relatively soft, metal nylon washers should be placed below the heads of the bolts used in rack mounting to avoid scratches. An accessory adapter plate is available which holds three power source modules and conforms to EIA rack standards. Your Authorized Threshold Dealer will be able to advise you as to the price and availability of this adaptor plate.

Because the weight of previously installed equipment or manufacturing tolerances may produce a slight misalignment between the mounting holes on two sides of a rack, the bolts holding the FET ten to the rack should be tightened only enough to prevent the preamplifier from moving. Excessive tightening of the mounting bolts may cause stress at the point where the FET's rack mount end plates secure to the main faceplate and chassis. If you are installing multiple components in your rack at the same time, the heavier pieces of equipment should be the first installed and secured at the rack bottom.



## DESIGN AND CONSTRUCTION

The correlation between simplicity of gain path and sonic purity is regarded as axiomatic at Threshold and research efforts have always been directed toward achieving exceptionally wide bandwidth and high intrinsic linearity with an absolute minimum of elements in the signal path. Complexity is reserved for those support circuits that power the gain devices or shield them from conditions that would result in their exhibiting nonlinear performance.

Your FET ten embodies Threshold's most advanced engineering thought applied to circuitry whose specialized application is to preserve the sonic integrity of the highest quality musical sources. These circuits are not designed as "op-amps" but as transparent stages, with as few components between the input and output as possible.

The neutrality of these high performance stages is preserved through isolation of the gain circuits from fluctuations in the power source due to transients inside and outside of the audio system. The power source module of your FET ten employs a large transformer followed by forty-two hundred uF of computer-grade capacitance and four discrete class A voltage regulators. The tight regulation of this design in conjunction with the extensive film capacitor bypass and the high power supply rejection of the gain circuits, insures no interaction between either of the gain stages and the outside world.

The FET ten draws on work conducted at Threshold in the use of parallel gain circuits and their ability to reduce noise and distortion. Input JFETs of the FET ten/p are operated in parallel as a single gain stage which multiplies their transconductance while dividing their distortion and noise. This greatly improves the linearity of the FET operation and increases the purity of the reproduced music signal by enlarging the "window" through which it passes. The second gain stage of the FET ten is made up of a cascoded MOSFET. The cascode circuitry of the MOS-FET suppresses voltage variations and as a result distortion is held to tiny percentages with simple circuitry.

All devices in the gain circuits of your FET ten are biased outside the signal path by precision monolithic JFET constant current sources. These circuits have a simple signal path and are characterized by very low distortion and an extremely wide dynamic range. The FET ten will easily accept the output of a compact disc player or other equipment having substantial dynamic capability with the full potential of the source equipment and material effortlessly realized.

Your FET ten was thoroughly tested for performance and carefully inspected for flawless appearance before leaving the factory. It is built to the high standards of craftsmanship and finish for which Threshold has received world-wide recognition. Components were selected from the finest available. The few capacitors associated with the signal path are advanced technology film types ideal for audio applications. All resistors are precision metal film devices. All FETS are tested and matched. The gold plated signal connectors are exclusively manufactured for Threshold and their multiple contact point inner sleeve is supported in a machined Teflon insulator. The circuit boards are military-grade glass-epoxy with gold over nickel traces and gold plated-through holes. No plug-in connections are used and every internal electrical junction is hard soldered.

## CARE

All signal connectors of your FET ten are gold plated and their surfaces will exhibit no oxidation. If you find it necessary to clean the connecting surfaces, we recommend cotton swab and 99% isopropyl alcohol to remove grease and a recognized contact cleaner and treatment such as Tweek. Caution should be used with rubbing alcohol as it may contain undesirable additives.

All rotating switch contacts are gold plated and the switch bodies are sealed to eliminate the possibility of dust and pollutant entry.

At the factory detail cleaning of metal surfaces is done using lint-free wiping paper and Easy Off spray window cleaner. White vinegar or a dilute ammonia solution may also be used. However, because the formulas for household cleaners vary and/or change without notice, Threshold can assume no responsibility for the results obtained with any particular product.

Abrasive cleaners, polishes, or dusting sprays should not be used on your FET ten. Remember that the aluminum alloy of which the FET ten's faceplate is made is an intrinsically soft metal. It will not withstand the careless use of tools during the course of installing the preamplifier in a rack or cabinet.

## WARRANTY

### **Limited Ninety Day Warranty Coverages**

Your Threshold audio component was engineered and manufactured to the highest standards of the industry and was assembled by a dedicated construction staff who take great pride in their craftsmanship. It was thoroughly inspected, tested, and adjusted for blemish-free appearance and flawless performance prior to leaving the factory. Threshold stands behind your component with the following Limited Ninety Day Warranty:

Any failure of the Threshold product covered by this warranty to operate according to specifications applicable at the time of manufacture as a result of a manufacturing defect will be corrected by Threshold without charge for parts, labor, or surface transport to and from the factory from an Authorized Threshold Dealer, for the defective module or complete unit, for a period of ninety days from date of purchase and not more than five months from date of manufacture.

This warranty is extended to the original purchaser only, and is contingent upon purchase of the Threshold product from an Authorized Threshold Dealer.

The following situations are specifically excluded from Warranty coverage:

1. Any Threshold product under performance testing by any facility or personnel not authorized by Threshold Corporation.
2. Any Threshold product not operated in accordance with the instructions contained in its Operating Manual.
3. Any Threshold product which has been subject to accident, abuse, tampering, unauthorized modification, neglect, or has had its serial number removed or defaced.

#### 4. Any consequential damage of any nature.

This warranty gives you specific legal rights. You may also have other rights and some of the exclusions or requirements may not be applicable in your state.

#### **Optional Three Year Extended Coverage**

An Extended Coverage option is available to Threshold product owners at no charge by the completion and return to Threshold, within 15 days of product purchase, of the Extended Warranty Registration Card that was packed with the Threshold product.

Under this Extended Warranty Coverage service will be provided at no charge for parts and labor for an additional thirty-three months (or no more than thirty-eight months from date of manufacture).

Upon receipt of the completed Extended Warranty Registration Card the Threshold product owner will be issued a numbered Extended Warranty Certificate. Extended Warranty coverage may be transferred to subsequent owners of the product for the remaining period of force provided they register their ownership using the Transfer Of Registration form.

#### **Warranty Service Procedure**

If a Threshold Product should require service under warranty take it with proof of purchase and its carton and packing material to any Authorized Threshold dealer. Direct shipments to the factory will not be accepted without a return authorization number which must appear on the shipping carton.

Threshold products whose original consumer sale was made outside the United States will be covered by those warranty terms extended by the importing distributor which may differ in some respects from those given above.

If a Threshold product is removed from the country in which the original consumer purchase was made, Threshold distributors in other countries are not obligated by the terms of this warranty. Any repairs made under the terms of this warranty will be at their discretion.

Because Threshold is constantly researching new technologies and materials the option is reserved to incorporate design refinements or modifications into production without notice or obligation. For this reason a particular Threshold product may exhibit some difference from its published description but will equal or exceed the performance of the original design.

When practical, these design improvements will be made available to owners of registered units for a reasonable charge. Your Threshold dealer will be able to advise you of any factory updates should they become available for a particular product.

It is Threshold policy to defer to the customer whenever a reasonable doubt exists. However, freight charges will be billed for any product or module returned under warranty and which is found by the factory to be operating properly.

## **TECHNICAL DATA**

### **Phono Stage**

The Threshold FET ten is a two channel, non-inverting field effect transistor audio preamplifier dedicated to amplifying audio signals from moving coil and moving magnet phonograph cartridges. It features variable gain of 40 or 60 dB at 1 KHz, and loading from 50 picofarads to 1000 picofarads and 22 ohms to 47,000 ohms.

**RIAA EQUALIZATION:** Passive and active topology computer designed to 0.025% accuracy. Selected precision components used in construction holds production tolerance to .25 dB.

**DISTORTION:** No greater than 0.01% @ 1 volt output.

**NOISE:** No greater than -85 dBA referenced to 1 millivolt input @ 1 KHz.

**OVERLOAD:** 20 volts output

**CROSSTALK:** No greater than -70 dB @ 20,000 Hz with 1,000 Ohm source.

**OUTPUT IMPEDANCE:** 420 Ohms.

### **High Level Stage**

The Threshold FET ten is a two channel, non-inverting field effect transistor audio preamplifier dedicated to the gain and control of high level audio signals and provides inputs for five line level sources. Two tape recorders may be connected with full flexibility in routing of record and playback signals. Front panel controls consist of program selection, record signal routing, monitor signal selection, stereo/mono/reverse stereo playback mode selection, channel balance, and audio level.

**BANDWIDTH:** -3 dB points; 1.5 Hz and 125,000 Hz.

**CROSSTALK:** No greater than -75 dB @ 20,000 Hz with 1,000 Ohm source.

**DISTORTION:** No greater than 0.01% @ 3 volts RMS, 20 Hz to 20,000 Hz into 10,000 Ohm load.

**NOISE:** No greater than -110 dBA referenced to 1 volt input.

**GAIN:** + 20 dB.

**INPUT IMPEDANCE:** 25,000 Ohms.

**OUTPUT IMPEDANCE:** 100 Ohms.

**MAXIMUM OUTPUT:** 20 volts.

**DIMENSIONS AND WEIGHT: FET ten/h, FET ten/p**

Width	19"
Height	2 3/4" (add 1/4" for feet)
Depth	6 1/2" (rear of faceplate to end of connectors)
Weight	approximately 4 1/2 lbs.

**Dimensions and Weight: Power Source Module**

Width	5 1/8"
Height	1 3/4" (add 1/4" for feet)
Depth	6"
Weight	approximately 2 1/2 lbs.

**ACCESSORIES:** Machined rack mount adapter plate designed to hold 1 to 3 power source modules.