

MFJ

Universal SO2R Switch.

Model MFJ-644



INSTRUCTION MANUAL

CAUTION: Read All Instructions Before Operating Equipment

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INTRODUCTION & FEATURES

INTRODUCTION:

The MFJ-644 *hamProAudio* **Universal SO2R Switch** is a quality Single Operator 2 Radio Switch. With the ability to switch the microphone audio between 2 radios and full control of the audio from both radios, you will have the ultimate **SO2R** switch at a great value.

hamProAudio Quality: Designed with the serious ham in mind. Choice of components and extensive RF filtering and bypassing allows for a unit designed for an RF environment.

Designed for ease of use: Set the internal jumpers for the MFJ-393 Professional Boom-Mic Headphones, The Heil Pro Set series of Boom-Mic Headsets or even a Computer Boom-Mic Headset.

Instant visual indication of transmit audio path: With wide spaced LED indicators you instantly know which radio your audio is being passed to.

Choice of PTT function: Use your microphone PTT switch, a foot or hand switch, or the convenient PTT switch located on the front of the MFJ-644.

Full control of audio output: With Mix, Radio 1, Stereo, or Radio 2 in the headphones you can instantly select how you want to hear the audio in the headphones.

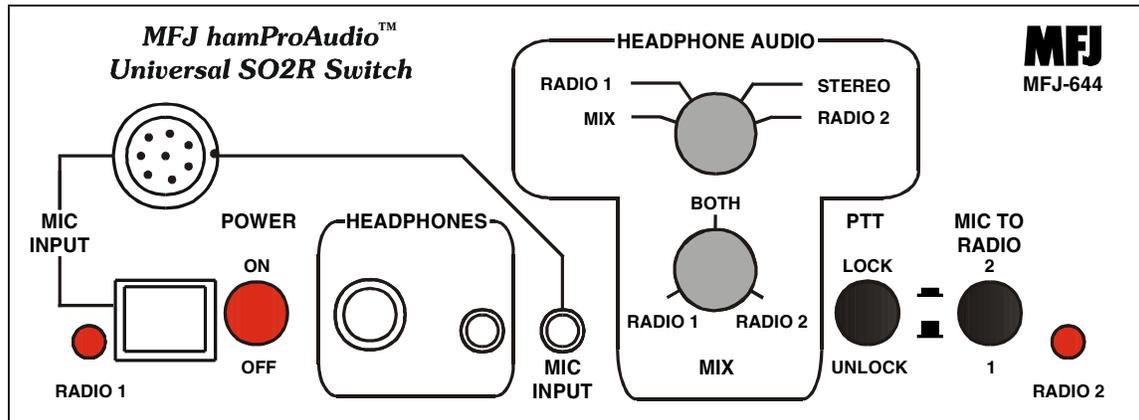
Full control of accessories: Additional inputs and dual outputs for your keyer and 2 lines to control anything you want or need to switch an antenna between radios or key an amplifier.

Rugged Construction: Attractive all-metal cabinet, conservative component selection and extensive RF filtering ensure solid performance for years to come. Fully covered by MFJ's "No Matter What" one year limited warranty.

IMPORTANT: Before attempting to operate your MFJ-644, please read the manual thoroughly. It contains important detail about setting up your unit to obtain the best performance.

SYSTEM CONTROLS AND INDICATORS

Front Panel Jack and Controls



1 2 3 4 5 6 7 8 9 10 11 12

Figure 1: MFJ-644 Front Panel Jacks and Controls

1. **Radio 1 LED Indicator:** Indicates Radio 1 is selected for microphone audio.
2. **RJ-45 Microphone Input Jack:** Accepts input from a standard RJ-45 Microphone.
3. **8-Pin Microphone Input Jack:** Accepts input from a standard 8 pin round microphone.
4. **Power Switch:** Turns the unit on or off.
5. **¼ Inch headphone Jack:** Stereo jack to hook up a standard set of ¼ inch stereo headphones.
6. **3.5 –mm stereo headphone jack:** Stereo jack to hook up a pair of quality stereo 3.5–mm headphones.
7. **3.5 –mm microphone input connector.** Microphone input. Phantom voltage is also available on the either the tip or ring for your specific need.
8. **Mix Control:** Control the audio from either radio from Radio 1 only to Radio 2 only and everything in between when in the Mix position.
9. **Audio selection switch:** Choose from Mix, Radio 1, Stereo or Radio 2 audio.
10. **PTT:** Use this locking switch to key the radio.
11. **Radio 1/ Radio 2-selection switch:** This switches between Radio 1 and Radio 2.
12. **Radio 2 LED indicator:** Indicates Radio 2 is selected for microphone audio.

SYSTEM CONTROLS AND INDICATORS

Rear Panel Jacks

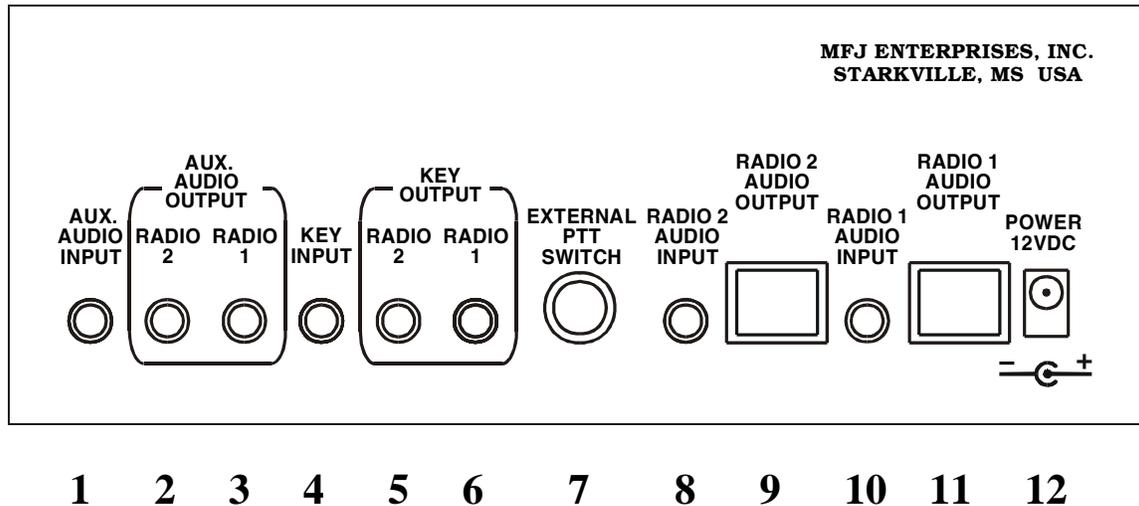


Figure 2: MFJ-644 Rear Panel Jacks

- 1. Auxiliary Input:** This stereo 3.5 –mm jack allows 2 independent lines to be controlled.
- 2. Auxiliary Output Radio 2:** This stereo 3.5 –mm jack allows the lines to be fed to radio 2 devices.
- 3. Auxiliary Output Radio 1:** This stereo 3.5 –mm jack allows the lines to be fed to radio 1 devices.
- 4. Key/Keyer in:** This 3.5 –mm jack allows a key or keyer to be passed through the unit. Can also be used as an additional auxiliary input.
- 5. Key/Keyer out Radio 2:** This allows the Key or Keyer to be connected to Radio 2.
- 6. Key/Keyer out Radio 1:** This allows the Key or Keyer to be connected to Radio 1.
- 7. PTT Input:** This ¼ inch jack allow a foot or hand switch to be connected to the MFJ-644.
- 8. Radio 2 Audio:** This 3.5 –mm jack allows audio to be fed from Radio 2.
- 9. Radio 2 Output:** This is where either a MFJ-5398 or MFJ-5397MX connects the unit to your radio.
- 10. Radio 1 Audio:** This 3.5 –mm jack allows audio to be fed from Radio 1
- 11. Radio 1 Output:** This is where either a MFJ-5398 or MFJ-5397MX connects the unit to your radio.
- 12. Power:** Accepts 2.1 –mm plug to supply 12-15 Vdc to the MFJ-644.

SYSTEM SETUP

Internal Headers

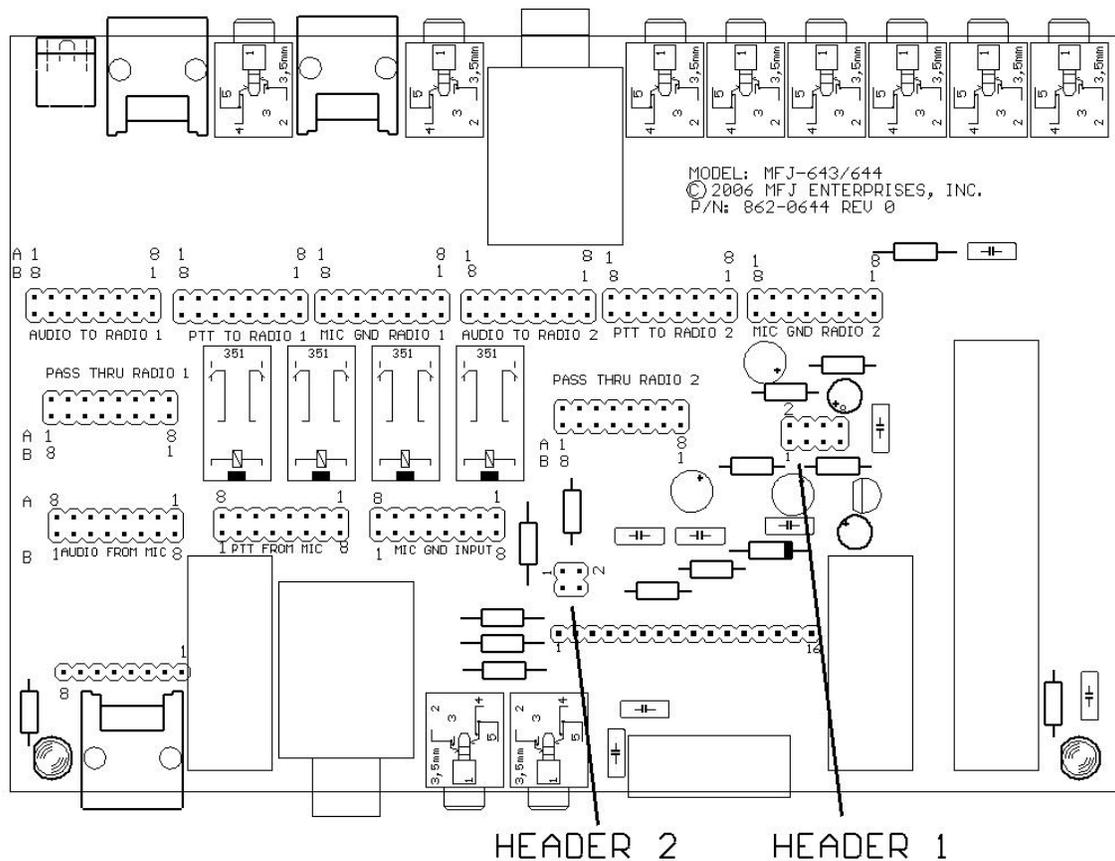


Figure 3: MFJ-644 Internal Headers

1. **Header 1:** This header allows phantom voltage to be fed to electret microphones. Default is 0 volts, pins 1-2 shorted. Move this jumper to pins 3-4 for 1.5 volts, 5-6 for 5 volts or 7-8 for 8 volts. If used with standard computer microphone/headphones set to 5 volts.
2. **Header 2:** This header allows the phantom voltage set by header 4 to be passed to the ring or tip of the Auxiliary input jack. Pins 1-2 place the voltage on the tip. Pins 3-4 place the voltage on the ring. Default is off. Pins 1-2 also place the voltage on the Microphone Input connector and must be shorted for stock microphones that require phantom voltage.

SYSTEM SETUP

JUMPER DIAGRAMS (MFJ-644)

The Jumper Installation diagrams within this instruction manual will help you in setting up your MFJ-644 to match your radio. If your radio is not listed with the diagram, it means that we have not verified your radio to use that diagram. You can try to install jumpers as indicated. If that does not work, please refer to the radio manual to identify the MIC pin assignment for you radio then follow the instructions given at the end of this section in the MFJ-644 instruction manual to install the jumpers. The diagrams assume that you are using 2 identical radios. If not than use the jumpers as required for the 2 different radios at radio1 and radio 2. If using a mic for a radio it was not designed for such as a Yaesu mic with a Kenwood radio do not use any of the pass/thru positions as damage could occur.

Internal Jumpers

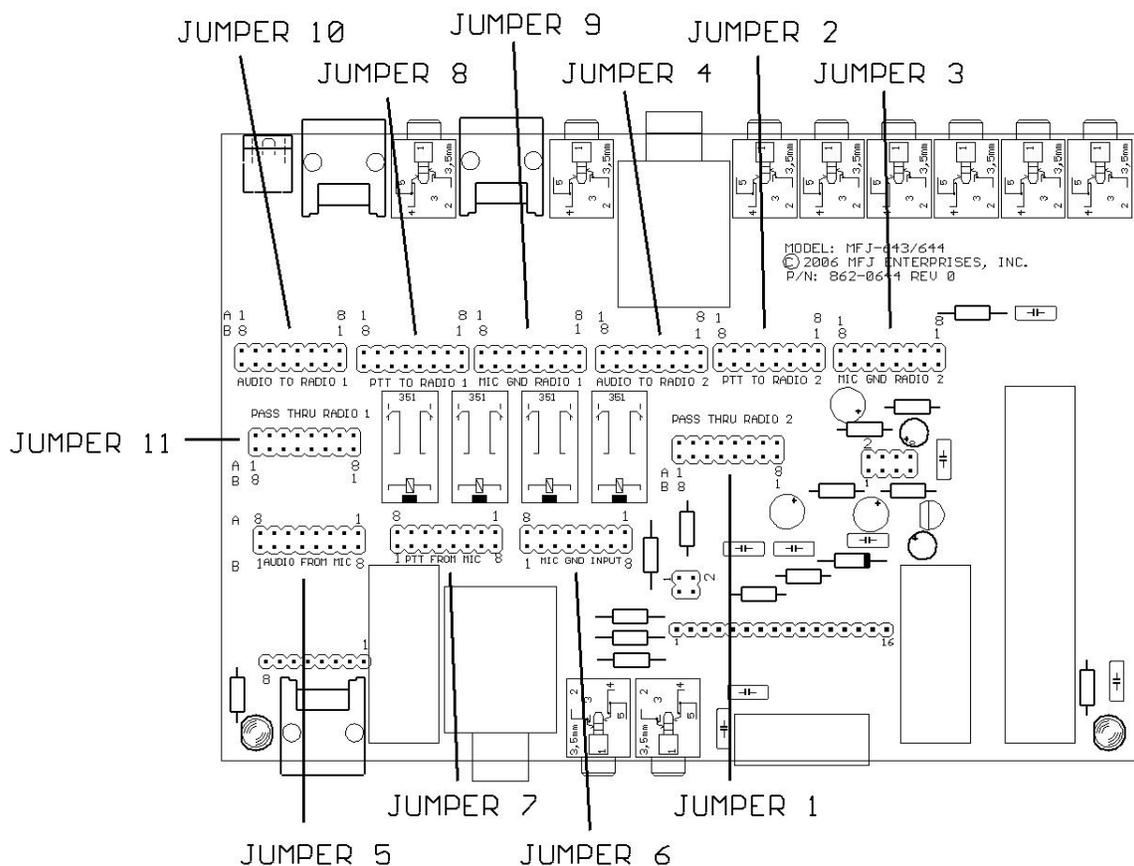


Figure 4: MFJ-644 Internal Jumpers

SYSTEM SETUP

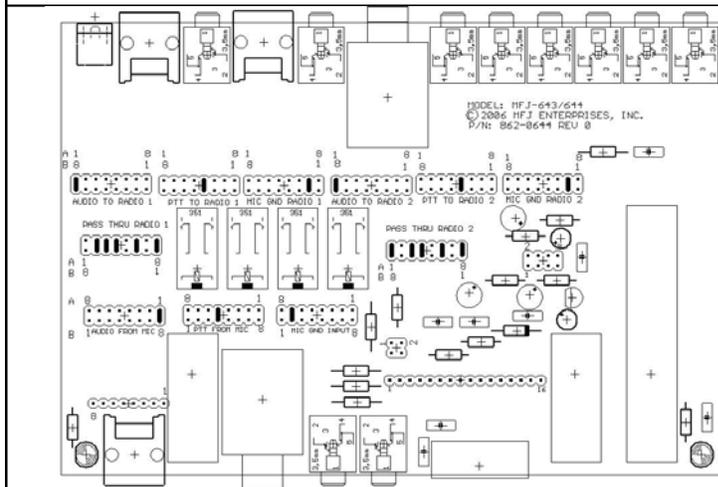
Refer to Table 1 for common microphones. Consult your owner's manual to determine your specific microphone pinout.

- 1. Jumper 1:** Pass/Thru Radio 2. This allows you to pass any other lines from the microphone for feature such as up/down/fast. Normally all lines that are not being used for the Mic Audio, Mic Ground and PTT line will be jumpered. . If using a non-standard mic such as a Kenwood with a Yaesu radio ensure that only lines that are compatible are connected.
- 2. Jumper 2:** PTT to Radio 2. Place a jumper on the pin corresponding to the pin that your radio requires for PTT.
- 3. Jumper 3:** Microphone Audio Ground to Radio 2. Place a jumper on the pin that corresponds to the pin that your radio requires for the shielded ground.
- 4. Jumper 4:** Microphone Audio to Radio 2. Place a jumper on the pin that corresponds to the pin on your radio that feeds microphone audio to the radio.
- 5. Jumper 5:** PTT from the Microphone. Place a jumper on the pin number that corresponds to the pin of your microphone that supplies the PTT line to the radio.
- 6. Jumper 6:** Microphone Audio Ground. Place a jumper on the pin number that corresponds to the pin that supplies the shielded ground from the microphone.
- 7. Jumper 7:** Microphone Audio Input. Place a jumper on the pin number that corresponds to the pin that supplies microphone audio.
- 8. Jumper 8:** PTT to Radio 1. Place a jumper on the pin corresponding to the pin that your radio requires for PTT
- 9. Jumper 9:** Microphone Audio Ground to Radio 1. Place a jumper on the pin that corresponds to the pin that your radio requires for the shielded ground.
- 10. Jumper 10:** Microphone Audio to Radio 1. Place a jumper on the pin that corresponds to the pin on your radio that feeds microphone audio to the radio.
- 11. Jumper 11:** Pass/Thru Radio 1. This allows you to pass any other lines from the microphone for feature such as up/down/fast. Normally all lines that are not being used for the Mic Audio, Mic Ground and PTT line will be jumpered. If using a non-standard mic such as a Kenwood with a Yaesu radio ensure that only lines that are compatible are connected.

SYSTEM SETUP

ICOM 8-Pin Round Microphone Setup:

IC-255, 288, 28, 290, 38A, 375, 707, 718, 725, 726, 728, 729, 730, 735, 737, 745, 746, 746PRO, 751, IC-756, 756PRO, 756PROII, 775DSP, 761, 78, 781, 910H

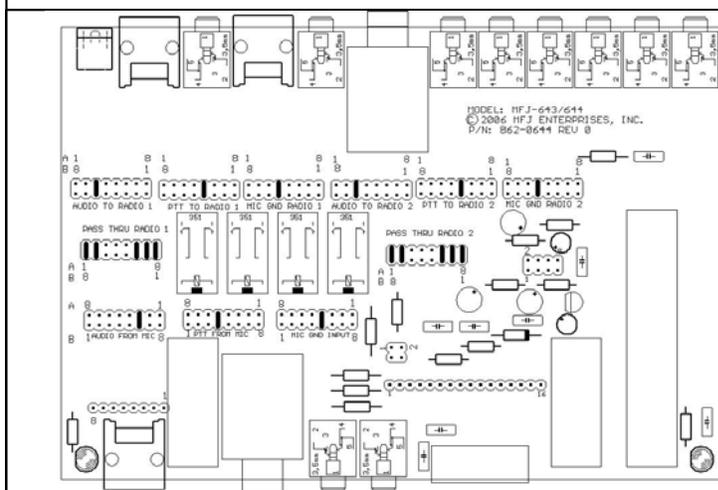


This diagram may cover some other radios in the ICOM product line with 8-pin round microphone jack. If there are any Questions concerning the information provided, please refer to your RADIO INSTRUCTION MANUAL. MFJ is neither liable nor responsible for any mistakes or errors in the information provided. Receive Audio is taken from the Headphone Audio Output.

Figure 5: ICOM 8-Pin Round Microphone Setup

ICOM 8-Pin Modular Microphone Setup:

IC-207H, 2800H, 703, 706, 706MKII, 706 MKIIG, V8000



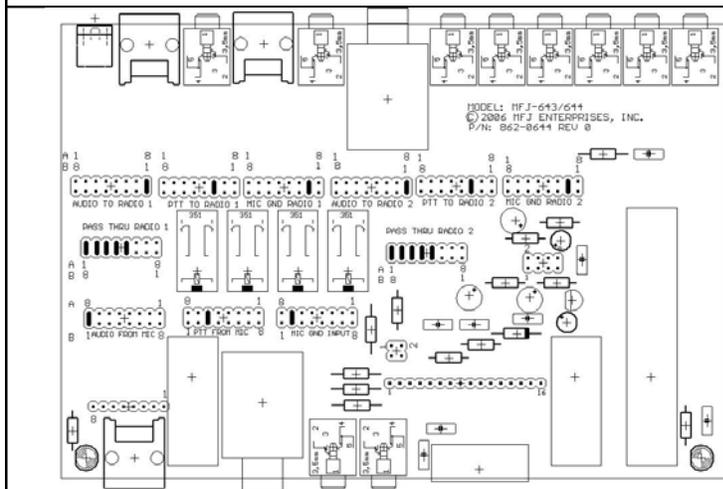
This diagram may cover some other radios in the ICOM product line with 8-pin modular microphone jack. If there are any Questions concerning the information provided, please refer to your RADIO INSTRUCTION MANUAL. MFJ is neither liable nor responsible for any mistakes or errors in the information provided. Receive Audio is taken from the Headphone Audio Output.

Figure 6: ICOM Modular Microphone Setup

SYSTEM SETUP

Yaesu 8-Pin Round Microphone Setup:

Yaesu FT-650, 707, 712, 726, 736, 756, 767, 790II, 700, 840, 890, 990, 1000D

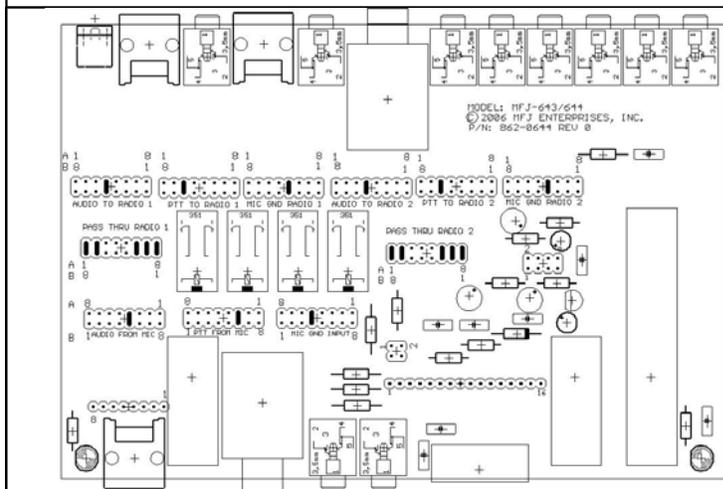


This diagram may cover some other radios in the Yaesu product line with 8-pin Round microphone jack. If there are any Questions concerning the information provided, please refer to your **RADIO INSTRUCTION MANUAL**. MFJ is neither liable nor responsible for any mistakes or errors in the information provided. Receive Audio is taken from the Headphone Audio Output.

Figure 7: YAESU 8-pin Round Microphone Setup

YAESU 8-Pin Modular Microphone Setup:

YAESU FT-817, 857, 897



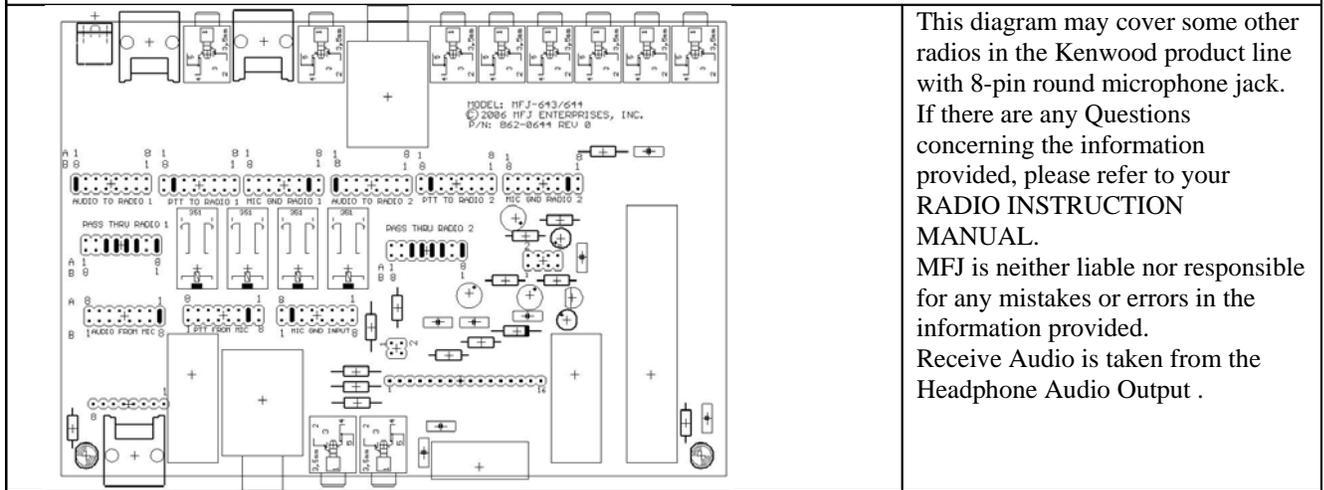
This diagram may cover some other radios in the YAESU product line with 8-pin modular microphone jack. If there are any Questions concerning the information provided, please refer to your **RADIO INSTRUCTION MANUAL**. MFJ is neither liable nor responsible for any mistakes or errors in the information provided. Receive Audio is taken from the Headphone Audio Output.

Figure 8: YAESU 8-pin Modular Microphone Setup

SYSTEM SETUP

KENWOOD 8-Pin Round Microphone Setup:

**TS-50, 60, 140, 430, 440, 450, 570, 660, 670, 680, 690, 711, 780, 811, 850, 870, 930, 940, 950
 TM-201A, 201B, 211, 221, 231, 241, 321, 331, 401A, 401B, 421, 431, 441, 521, 531, 541, 621
 TM-631, 701, 721, 731, 2530, 2550, 2570, TR-50, 751, 851, TW-4000, 4100**

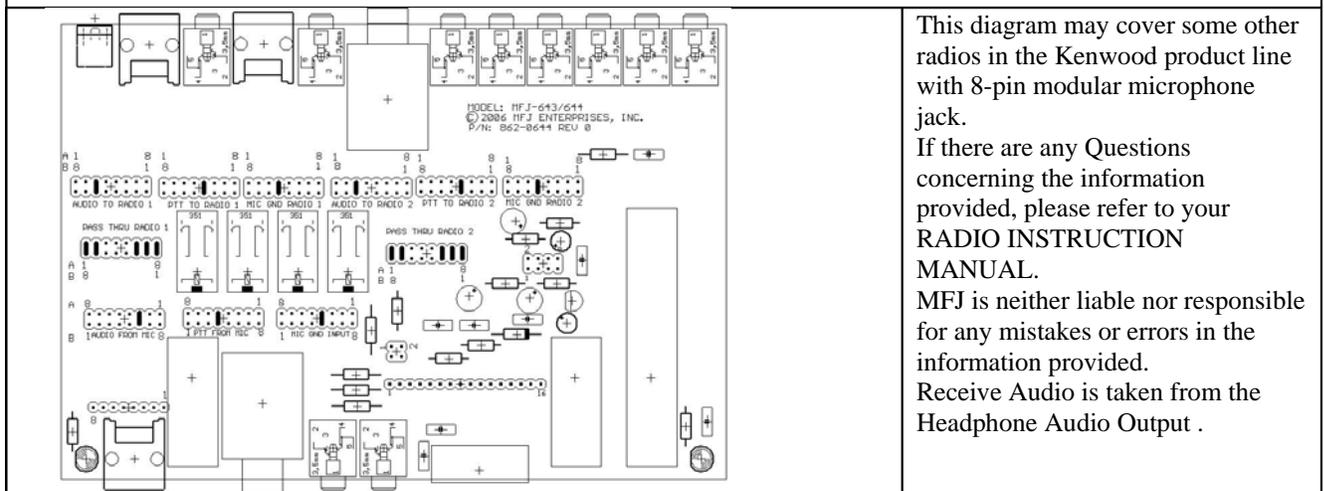


This diagram may cover some other radios in the Kenwood product line with 8-pin round microphone jack. If there are any Questions concerning the information provided, please refer to your **RADIO INSTRUCTION MANUAL**. MFJ is neither liable nor responsible for any mistakes or errors in the information provided. Receive Audio is taken from the Headphone Audio Output .

Figure 9: KENWOOD 8-pin Round Microphone Setup

KENWOOD 8-Pin Modular Microphone Setup:

TM-251, 255, 261, 451, 461, 641, 642, 732, 733, 741, 742, 941, 942, G707, V7A



This diagram may cover some other radios in the Kenwood product line with 8-pin modular microphone jack. If there are any Questions concerning the information provided, please refer to your **RADIO INSTRUCTION MANUAL**. MFJ is neither liable nor responsible for any mistakes or errors in the information provided. Receive Audio is taken from the Headphone Audio Output .

Figure 10: KENWOOD 8-pin Modular Microphone Setup

SYSTEM SETUP

CUSTOMIZING INTERNAL JUMPERS (MFJ-644)

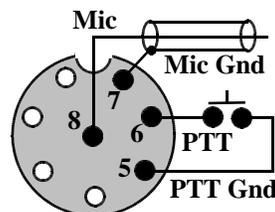
If your radio is not listed above, you can create a custom jumper position table.

Begin by removing the screws from the sides of the cabinet. Lift the cover off. Look from the front view and notice the group of pins and black jumpers on the left side behind the microphone connector and in front of the microphone output jack. Fill in a custom table like the following:

Table 1. Yaesu FT-1000 series

Pin	JP9 rad mic gnd	JP6 mic gnd	JP11 pass	JP7 mic audio	JP8 rad ptt	JP5 mic ptt	JP10 rad audio
1			X				
2			X				
2			X				
4			X				
5			X				
6					X	X	
7	X	X	X				
8				X			X

To make a jumper table for an unlisted radio, you must look at the radio manual. Find the page that shows the microphone wiring. This is a sample of a Yaesu-style wiring diagram that was used above:



Yaesu Mic Jack Pin-out, Front View

Figure 11: Yaesu Mic Jack Pin-out, Front View

If you compare table 1 to this connector diagram, you will see how it is laid out. Notice an “X” was placed at the appropriate PTT and MIC pins according to the rules below.

Look at the microphone-wiring diagram in your radio manual, fill in a table, and connect the leads as we have done in our example

- 1.) Jumper 7 and 10 should copy each other, and use the same jumper pin number for the center MIC wire.
- 2.) Jumper 5 and 8 also jointly share the same pin numbers as the PTT pin.
- 3.) The MIC GND, Jumper, should connect to the same pin as the outer MIC lead and only that pin.
- 4.) Be sure to place a pass-through connection jumper on every lead EXCEPT numbers used on JP 5, 7, 8 and 10.

SYSTEM SETUP

Table 2. Microphone Pin out Chart

Radio	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
Alinco	MIC AUDIO	PTT	DOWN	UP	5 VOLTS	AF OUT	MIC GND	GND
Icom	MIC AUDIO	+8 VOLTS	UP/DOWN	SQL	PTT	PTT GND	MIC GND	
Kenwood	MIC AUDIO	PTT	DOWN	UP	8 VOLTS	NC	MIC GND	PTT GND
Yaesu FT1000	UP	GND	DOWN	FAST	GND	PTT	MIC GND	MIC AUDIO
Yaesu FT-990 FT- 1000MP	UP	+5 VOLTS	DOWN	FAST	GND	PTT	MIC GND	MIC AUDIO

Cables

Simply connect your microphone to the appropriate input and use either a MFJ-5398 for 8 pin Round or MFJ-5397MX for 8 pin Modular connector to the output on the rear of the unit and attach to your radios.

Connect the audio from you radio's headphone jack to the 3.5-mm jack on the MFJ-644. If your radio output is mono, then simply wire the tip and the ring of the cable to provide audio to both sides of the headphones.

Connect a Foot Switch or Hand Switch to the PTT jack located on the rear of the unit.

Power

The MFJ-644 will operate with any well-filtered 10-14 VDC power supply capable of at least 100 mA. The required power connector is a 2.1 -mm ID, 5.5 -mm OD coaxial power plug. As this is a quality audio unit use of an unregulated wall power supply transformer is not recommended as the unloaded voltages can easily exceed 15 volts and the lack of filtration and regulation can introduce hum and other components into your signal. Wire (+) voltage to center and (-) to common.

SYSTEM SETUP

Headphones

Use stereo headphones rated at 8-40 Ohms impedance. Jacks for either ¼ inch or 3.5 –mm headphones are included on the front of the unit. Use of quality phones will aid in the reproduction of the audio from your radios.

Radio Audio

Feed the audio from radio 1 into the jack labeled Radio 1 on the rear of the unit. Feed the audio from radio 2 into the jack labeled Radio 2 on the rear of the unit.

THEORY OF OPERATION

The MFJ-644 SO2R radio control switch uses an 8-pole double throw switch and 4 DpDt relays to control all functions between the 2 radios.

EASY START INSTRUCTIONS

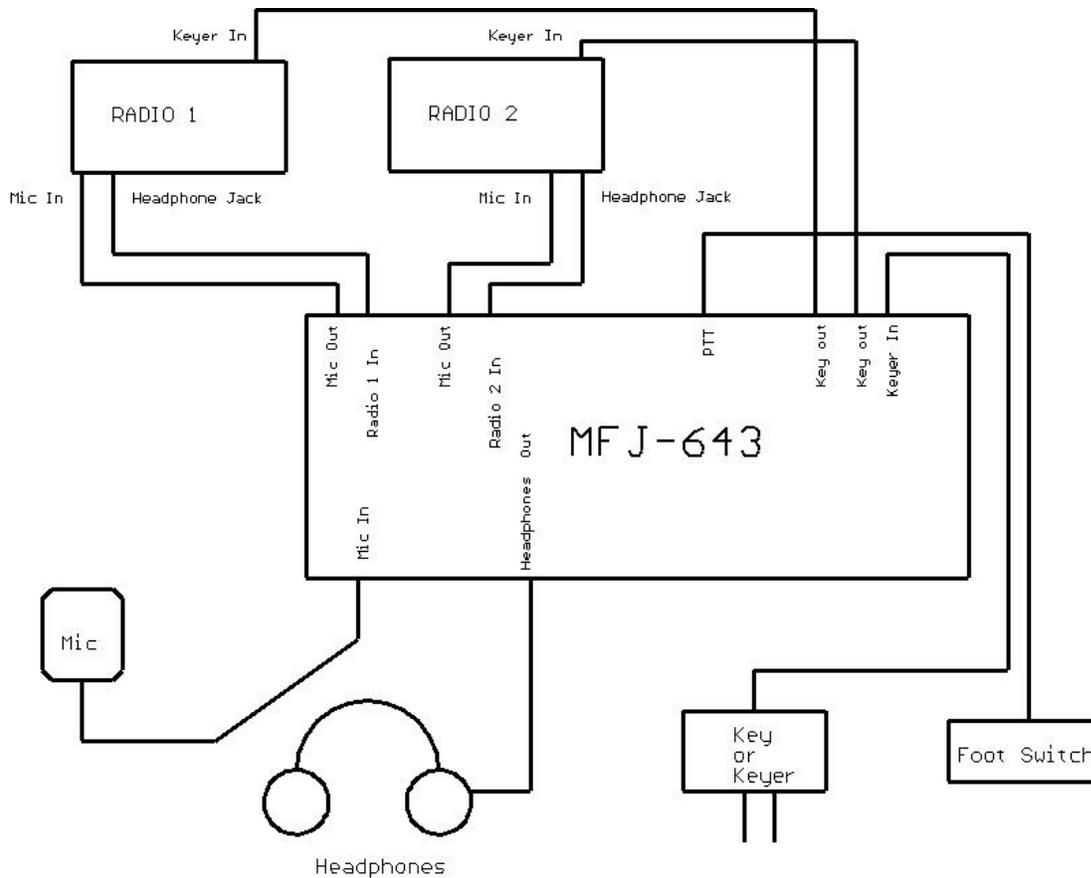


Figure 12: Block Diagram

Plug your microphone into the 3.5 –mm jack on the front of the unit. If using the MFJ-393 set header 1 to 5 volts (pins 5-6 shorted) and short header 2 pins 1-2. If using a Computer boom mic set header 1 to 5 volts (short pins 5-6) and short header 2 pins 3-4.

Plug your headphones into the appropriate jack on the front panel.

Adjusting the audio levels:

Place the switch in the Radio 1 position and turn on Radio 1. Set the volume to a comfortable level.

Place the switch in the Radio 2 position and turn on Radio 2. Set the volume to a comfortable level.

EASY START INSTRUCTOINS

Place the switch in the Stereo position and the radios should be equal in volume Radio 1 in the left ear and Radio 2 in the right ear.

Place the switch in the Mix position and move the Mix control from radio 1 to radio 2 and you will see how the radios are continuously variable in volume.

NOTE: The unit must have power applied to function properly.

TYPICAL SPECIFICATIONS

Input source.....Dynamic or Electret mic low or high Z
Stereo or Monaural radio audio.
Sound card or Modem. Key or Keyer.

OutputAll lines switched between Radio 1 and Radio 2 depending on the position of SW1.

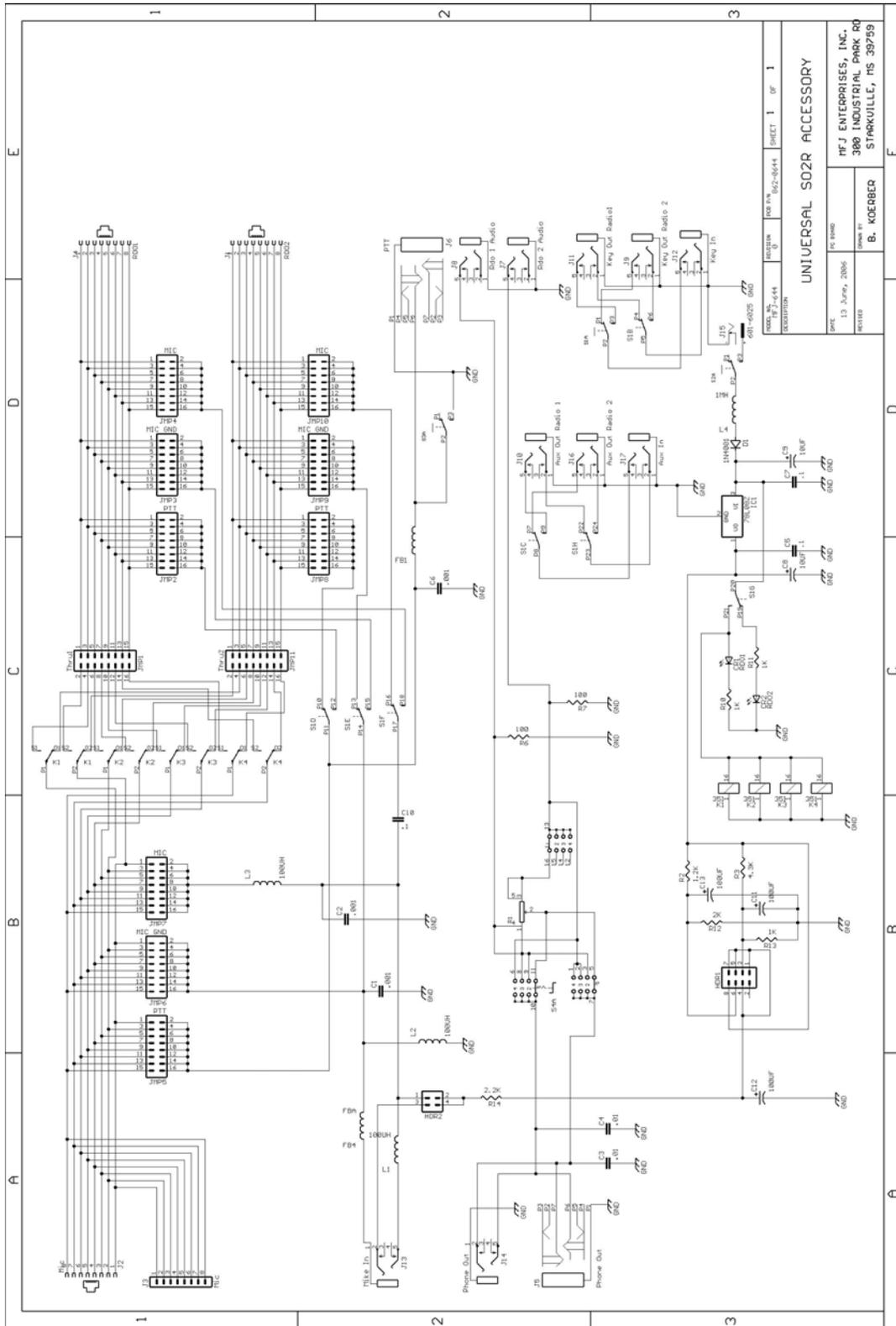


FIGURE 13: MFJ-644 Schematic

TECHNICAL ASSISTANCE

IN CASE OF DIFFICULTY

[] **Won't Power up:** Check the polarity and connection to your power supply.

[] **No microphone audio:** Check the Mic Audio Jumper block and the Mic Ground Jumper block for proper placement of the jumper on the proper header position. If using an electret microphone ensure the phantom voltage has been set to the proper level.

[] **No receiver audio:** Check the cabling from your radio to the MFJ-644. Ensure the Test/Operate switch on the rear of the unit is in the Operate position.

[] **Station PTT will not function:** Check the PTT jumper block. Ensure that you have a ground between the radio and the MFJ-644 as the Mic Ground is isolated from the Chassis Ground.

[] **Noisy audio, Hum:** Magnetically induced hum can be caused to any modern piece of audio equipment by proximity to unshielded power transformers or equipment that radiated strong AC fields. Another source of hum can be caused by a ground loop. This is when equipment is connected together but do not have their grounds well connected. The use of "Daisy Chain" grounding techniques can contribute to this problem. The use of a single point ground is always recommended in Amateur Radio installations. Rf floating in the shack can also contribute to distortion. To determine if you have this problem simply transmit into a Dummy Load. If the distortion goes away then you have RF in the shack.

TECHNICAL ASSISTANCE

If you have any problem with this unit first check the appropriate section of this manual. If the manual does not reference your problem or if reading the manual does not solve your problem, you may call *MFJ Technical Service* at **662-323-0549** or the *MFJ Factory* at **662-323-5869**. You will be best helped if you have your unit, manual and all information on your station handy so you can answer any questions the technician may ask.

You can also send questions by mail to MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759; by Facsimile (FAX) to 662-323-6551; or by email to techinfo@mfjenterprises.com. Send a complete description of your problem, an explanation of exactly how you are using your unit, and a complete description of your station.

LIMITED 12-MONTH WARRANTY

MFJ Enterprises, Inc. warrants to the original owner of this product, if manufactured by MFJ Enterprises, Inc. and purchased from an authorized dealer or directly from MFJ Enterprises, Inc. to be free from defects in material and workmanship for a period of 12 months from date of purchase provided the following terms of this warranty are satisfied.

1. The purchaser must retain the dated proof-of-purchase (bill of sale, canceled check, credit card or money order receipt, etc.) describing the product to establish the validity of the warranty claim and submit the original or machine reproduction of such proof of purchase to MFJ Enterprises, Inc. at the time of warranty service. MFJ Enterprises, Inc. shall have the discretion to deny warranty without dated proof-of-purchase. Any evidence of alteration, erasure, or forgery shall be cause to void any and all warranty terms immediately.
2. MFJ Enterprises, Inc. agrees to repair or replace at MFJ's option without charge to the original owner any defective product under warrantee provided the product is returned postage prepaid to MFJ Enterprises, Inc. with a personal check, cashiers check, or money order for **\$7.00** covering postage and handling.
3. This warranty is **NOT** void for owners who attempt to repair defective units. Technical consultation is available by calling the Service Department at 662-323-0549 or the MFJ Factory at 662-323-5869.
4. This warranty does not apply to kits sold by or manufactured by MFJ Enterprises, Inc.
5. Wired and tested PC board products are covered by this warranty provided **only the wired and tested PC board product is returned**. Wired and tested PC boards installed in the owner's cabinet or connected to switches, jacks, or cables, etc. sent to MFJ Enterprises, Inc. will be returned at the owner's expense unrepaired.
6. Under no circumstances is MFJ Enterprises, Inc. liable for consequential damages to person or property by the use of any MFJ products.
7. **Out-of-Warranty Service:** MFJ Enterprises, Inc. will repair any out-of-warranty product provided the unit is shipped prepaid. All repaired units will be shipped COD to the owner. Repair charges will be added to the COD fee unless other arrangements are made.
8. This warranty is given in lieu of any other warranty expressed or implied.
9. MFJ Enterprises, Inc. reserves the right to make changes or improvements in design or manufacture without incurring any obligation to install such changes upon any of the products previously manufactured.
10. All MFJ products to be serviced in-warranty or out-of-warranty should be addressed to:

**MFJ Enterprises, Inc.,
300 Industrial Park Road
Starkville, Mississippi 39759 USA**

and must be accompanied by a letter describing the problem in detail along with a copy of your dated proof-of-purchase.

11. This warranty gives you specific rights, and you may also have other rights, which vary from state to state.

MFJ

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300 Industrial Park Road
Starkville, MS 39759

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