

# MFJ-8704

## Micro ATV Transmitter

**High Performance, SAW stabilized  
Micro Video Amateur ATV Transmitter**

**This product is only to be used by a licensed radio amateur**

### Specifications:

#### Video

Video Input: NTSC or PAL composite video (1 V P-P) SMPTE STANDARD  
NTSC 625 Line 60 Hz  
PAL 625 Line 50 Hz

#### RF

Center frequency without modulation 433.97 MHz +/- 50Khz  
Output level: +19dBm clean carrier  
+16.5dBm modulated  
Modulation type: High level amplitude modulation  
Spurious output: 2nd harmonic better than 40dB down

#### VCC

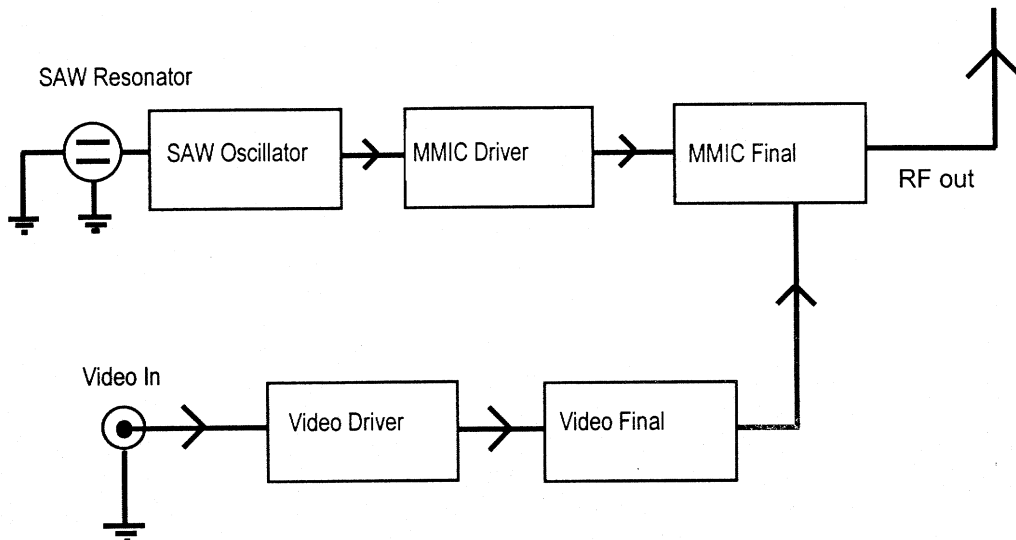
Supply Voltage 9V DC (+/- 300mV)  
Current draw 35 - 40 mA

The **MFJ-8704** is a high quality, high performance SAW stabilized video transmitter, using surface mount technology.

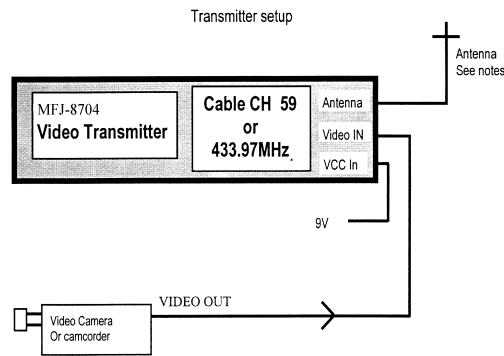
A SAW oscillator is used in the fundamental operating mode to transmit at **433.97 MHz (Cable channel 59)**. The power output stage uses the latest in MMIC technology.

The **MFJ-8704's** range can vary any where from 1/4 mile to 8 miles depending on the antenna used. A high gain yagi antenna usually provides the best gain. If you plan to build your own antenna, an experimental antenna plan is included; however, commercially available high gain antennas provide the best performance. Use the highest gain antenna possible for both the transmitter and receiver with the shortest possible transmission line.

Internal Block diagram

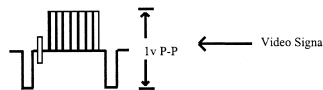


# Operation and Setup



## Video Input

The block diagram above shows the how the **MFJ-8704** needs to be connected to a video source. Make sure that you have SMPTE standard video at 1 V P-P. Most consumer and commercial cameras and camcorders deliver SMPTE standard video, at the “**video out**” connector. If for any reason you are not sure if the video device is delivering SMPTE standard video, you can confirm this by looking at the video signal on an oscilloscope.



## VCC Input

Due to size limitations there is no regulation provided inside the MFJ-8704. It operates on a 9V supply. While the MFJ-8704 may tolerate about +/- 2V of VCC error, higher supply voltages may reduce the power output. A power supply could be substituted in place of a battery. Use caution in providing the proper polarity. For battery operation, best results are obtained while using nickel hydride or lithium 9V batteries. For extended operational time, you can parallel two 9V batteries. **Caution: The MFJ-8704 does not include reverse polarity protection.** Therefore be careful to not reverse polarity. The red power lead is (+) positive and the black power lead is (-) negative.

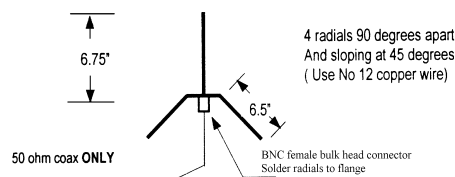
## Antenna

The transmitting and receiving antenna are probably the most critical items for attaining best range. A small piece of 1/4 wave wire as a transmitting antenna in combination with a high gain receiving antenna will work for short-range video transmission. **Best results are obtained while using both high gain transmitting and receiving antennas.**

Range testing was performed using the following antennas. The transmit antenna was a 14 element yagi, the receiving antenna was an 8 element yagi. At an approximate distant of 3/4 of a mile excellent picture quality was received. The receiver was a consumer grade Sony TV tuned to Cable CH 59. Please remember, that while a cable ready television would suffice as a good receiver, a sensitive ATV down-converter will far outperform any cable ready television.

Using a 1/4 wave ground plane (shown below) as a transmitting antenna and using a 14-element yagi antenna for the receiving antenna, excellent picture quality at 1/2 mile is possible.

## Experimental transmit / receive antenna



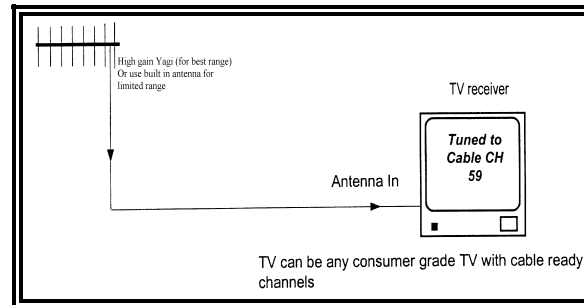
## Some antenna performance characteristics

While some transmit-receive antennas combinations perform differently, the following chart depicts the theoretical system performance of the MFJ-8704 using various combinations of antennas and an ATV down-converter.

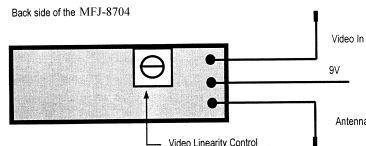
**Receiver:** ATV down-converter  
**Transmitter:** MFJ-8704, with a power output of 50mW  
**Carrier/Noise:** 40 – 45 dB  
**Picture quality:** Snow Free P5  
**Antenna:** Ground plane, 5 element 5L-70cm beam,  
 25 element DSFO ATV-25 Beam

	Ground Plane	5L-70cm	DSFO-ATV25
Ground Plane	0.25 miles	0.6 miles	1.5 miles
5L-70cm	0.6 miles	1.3 miles	3.5 miles
DSFO-ATV25	1.5 miles	3.5 miles	8.0 miles

## Receiving Setup



## Adjustment of the Video Linearity Control



The video linearity control in the MFJ-8704 is pre-adjusted at our lab. Adjustments are not necessary unless the unit is used with an external linear power amplifier. (See Troubleshooting notes). To adjust the linearity, attach the MFJ-8704 to a video source and antenna. While observing a received picture, turn the control CCW until the picture goes black. Then turn the control in the opposite direction until the picture appears and is stable. Use the same procedure when using the MFJ-8704 with an external linear power amplifier for the first time.

## Troubleshooting:

The MFJ-8704 provides a 50Ω antenna match. If you use anything other than 50Ω coax to feed the antenna, severe RF reflections or high SWR may occur. This could result in the unstable output from the amplifier of the MFJ-8704. Usually this will appear as a distorted receive image. Remember the MFJ-8704 is a relatively high power output device for its class. Therefore it is vital to provide good antenna matching. **Supplying the MFJ-8704 with a properly matched antenna is critical!**

If for any reason you cannot supply a matched antenna system, where you are constrained to using a small 1/4-wave piece of wire for an antenna you may compensate for any video instability by adjusting the linearity control clockwise. This reduces the power output of the MFJ-8704, which in turn will stabilize the picture by reducing the RF energy that is reflected back to the transmitter. However, this may come at the cost of a reduced power output. Therefore, it is best to provide a good antenna system (50 ohm @ 433.97 MHz) for optimal operation of the MFJ-8704.

The linearity adjustment trimmer located in the MFJ-8704 is a very critical adjustment. This control affects both the video quality as well as RF power output. The nature of an amplitude modulated video signal is such that a video signal with high contrast will result in a lower power output level while a video signal that has less contrast will provide a much higher RF power output. Adjusting the linearity control fully clockwise will result in the lowest power setting with greatest contrast. Adjusting the linearity control fully counter-clockwise will result in the highest power setting with the least contrast. In order to obtain the highest RF power output while achieving good picture, adjust the linearity control to the most counter clockwise position and then gradually turn the control in the clockwise direction until a good quality image is received. This will be the optimum video to power output position.

**Notice: The MFJ-8704 is an Amateur Radio ATV transmitter. The transmitter can ONLY be operated by a Technician class or higher licensed Radio Amateur in the USA and for legal purposes per 47 CFR part 97 of the FCC Rules. Section 97.113 of the FCC Rules prohibits Amateur Radio frequencies to be used to further any business purpose whether profit or non-profit. With few exceptions per 97.1 11 all transmissions must be directed to at least one other licensed Radio Amateur. Amateur Radio is intended for personal or hobby non-commercial communications between licensed Radio Amateurs. With the exception of running less than 1 watt for radio control purposes, Amateurs must identify with their call letters plainly seen in the video every 10 minutes for extended transmissions and at the end of every transmission per 97.119.**

# 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 or 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 warranty, 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. MFJ Enterprises, Inc. will supply replacement parts free of charge for any MFJ product under warranty upon request. A dated proof-of-purchase and a \$5.00 personal check, cashiers check, or money order must be provided to cover postage and handling.
4. This warranty is NOT void for owners who attempt to repair defective units. Technical consultation is available by calling (662) 323-5869.
5. This warranty does not apply to kits sold by or manufactured by MFJ Enterprises, Inc.
6. Wired and tested PC board products are covered by this warranty provided on 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.
7. Under no circumstances is MFJ Enterprises, Inc. liable for consequential damages to person or property by the use of any MFJ products.
8. 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.
9. This warranty is given in lieu of any other warranty expressed or implied.
10. 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.
11. 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.
12. This warranty gives you specific rights, and you may also have other rights which vary from state to state.