

# Amateur Fast SCAN TV

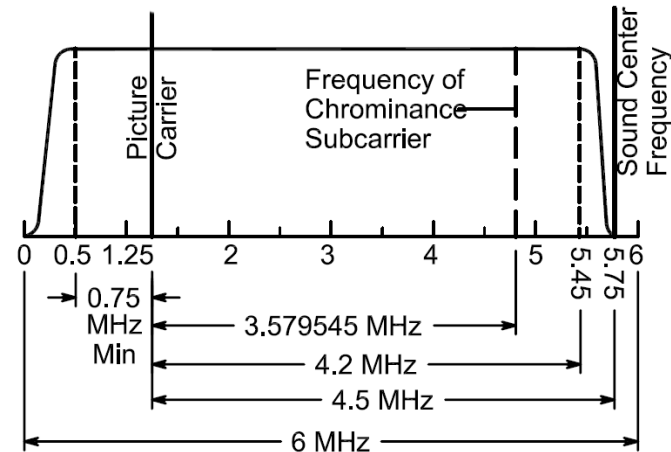
*or Analog TV is alive and well*



# ATV Bandwidth

## Fast Scan

- Occupies 6 MHz of Bandwidth



- Offers real time motion, just like your home TV
- Standard analog NTSC Format
- Can only be transmitted on 70 cm and higher bands

# How does it work?

- Just like the Pre-Digital TV Transition Analog TV
- You can receive ATV signals on your old cable ready analog TV set.

*And you thought your analog TV was obsolete!*

- Video portion of the transmission is AM
- Audio portion of the transmission is FM
- Transmitter PEP varies with video signal content

# 70 cm ATV Band

- In the 70 cm Band there are 5 carrier frequencies available for ATV Transmission.

421.25 MHZ

426.25 MHZ

427.25 MHZ

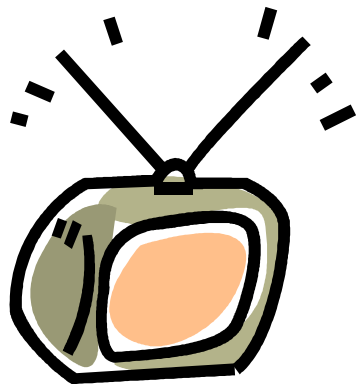
435.00 MHZ

439.25 MHZ

- In the 33 cm band - 902 - 928 MHz
- In the 23 cm Band - 1240 -1300 MHz

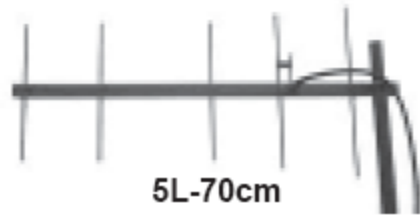
# The Receiver

- Any Cable ready analog TV set can receive 70cm ATV broadcasts by simply connecting a 70 CM antenna and tuning to cable channels 57 thru 60. These CATV channels are the same frequency as the most popular 70cm ATV band TV Channel Frequencies (*420-450 MHz*).



# The Receiver

- For more sensitivity (longer range) a gain antenna and lower noise pre-amplifier will be needed.



## ANTENNAS FOR 420-450 MHZ ATV

**OAL 5L-70cm** 8 dBd gain beam, 31" boom, vertical or horizontal polarization rear mount. This antenna was specifically designed by the Olde Antenna Lab for ATV point to point, fixed at a repeater or is small enough to be portable for R/C or at public service events to minimize multipath ghosts and get some gain at the same time. Wide 60 degree beam width. Type N female connector.

**5L-70cm** 5 element 8 dBd Yagi antenna, end mounted H or V .....\$80

# The Receiver

- Low Noise ATV Pre-amplifier and down converter



**TVC-4S**  
ATV Downconverter  
Plug-in and Play  
4.7 x 3.7 x 2.1"

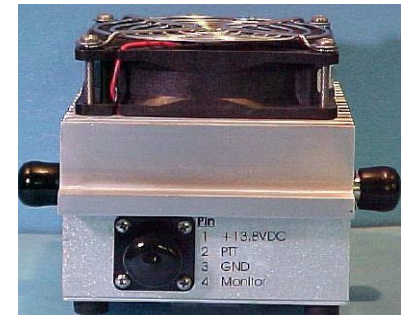
Connects between your TV set and 70cm antenna.

**ATV DOWNCONVERTER, TVC-4S with AC supply.....\$149**

This ready to go box downconverts the standard 5 420-450 MHz ham band channels - crystal locked and switch selected 421.25, 426.25, 427.25, 434.0 and 439.25 MHz - down to TV channel 3 or 4 so your TV receiver can see and hear AM ATV just like broadcast TV. Contains the very sensitive TVCX-4S board which uses a low noise HJ-Fet preamp stage and GaAsFet mixer in a rugged black die cast 4.7x3.7x2.1 inch aluminum box ready to go with 120 Vdc 60 Hz to 12Vdc 300 ma. wall plug power supply. 50 Ohm N connector antenna input and 75 Ohm F output to

# The Transmitter

- Commercial ATV Transmitters are available with 1 and 10 watt output power.
- For higher power an amplifier designed for ATV applications would be required





# Assembling a Station

- You need a camera with NTSC video output and a lens. They are available new.

## CB-35 Low Cost High Resolution 480 line Color Camera...\$189

The [CB-35](#) color camera is perfect for the ham shack, but also good for mobile or portable with our ATV transmitters with it's 480 lines of resolution using a 1/3 inch Sony CCD. 768(H) x 494(V) picture elements, .1 lux, AGC built in, >48 dB S/N ratio, switchable back light compensation, automatic white balance, automatic electronic shutter and optional auto iris control. 6mm adjustable focus CS mount lens supplied as well as a 12Vdc @ 300 ma / 110 VAC wall plug power supply (camera draws 150 ma and can run on external +11 to 13.8 Vdc - Make your own DC power cable with a 2.1 x 5.5 DC power plug to connect to a battery or other supply - Radio Shack 274-1569). Camera body is 4.1 x 1.8 x 2.25 inches and weighs 13 oz. NTSC 1 volt peak to peak composite video out BNC connector.



- A discarded camcorder will work as long as the camera portion is still functional. Camcorders also have built in microphones and have an audio output as well as NTSC video.

# The Camera

- Powering the camera if it does not work on 12VDC
  - Determine the voltage required for the camera from the original battery voltage or labels on the camera itself.

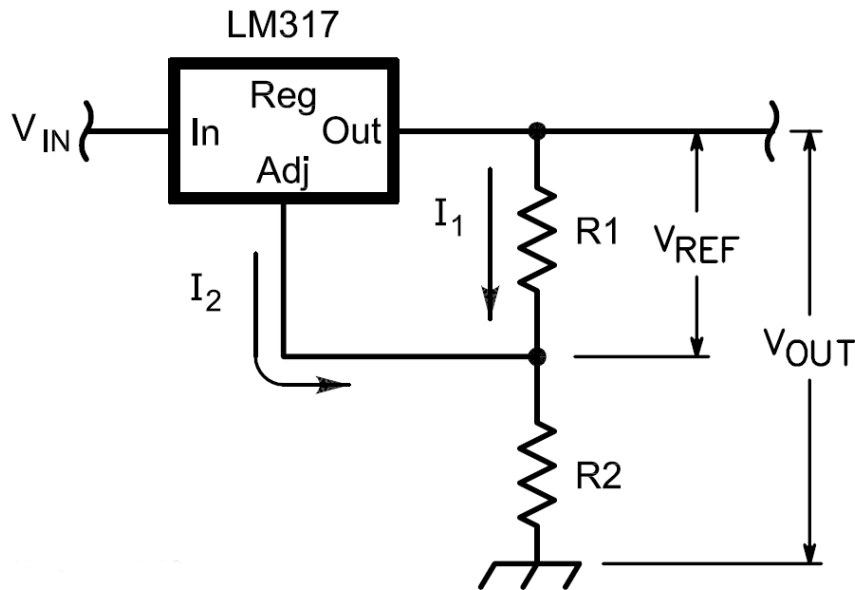


- Find a way to connect to the camera battery terminals being sure to get the polarity correct:
  - Solder directly to camera battery contacts.
  - You may be able to make a battery connection adapter from discarded camcorder battery.

# The Camera

- Make a voltage adapter from 12VDC to the needed camera voltage. If the camera does not work directly from 12VDC. The simplest way to do this is with an LM317 regulator chip and a few external resistors and capacitors.
  - Be sure to mount the LM317 regulator on a heat sink.
  - Used fixed resistors to set the voltage rather than a potentiometer to prevent accidental overvoltage to the camera.
  - Use polarized connectors different than your normal 12 VDC connectors.

# Voltage Regulator Circuit



Add a small (1-10  $\mu\text{F}$ ) capacitor across the input and output

The LM317 is a general purpose voltage regulator that will accept up to 32 volts input and can be set for an output voltage between 1.25 volts and about 2 volts below the input voltage.  $R1$  is 220 ohms and  $R2$  is between 0 and 5000 ohms. Maximum current is 1 amp. It must be mounted on a heatsink

# The Camera

Photos of AD7FO's old camcorders and cameras found at Hamfests



# Assembling a Station



- **Receiver**

- A gain antenna for the 70 cm band is preferred. Can be purchased or built from scratch (see ARRL antenna handbook)
- A cable compatible TV Set for direct connection to the antenna.
- For more sensitivity a down own converter with a low noise preamplifier (gives more range)
- If you are using a video monitor then a channel 3 down converter to video/audio is required.
- Cable from the antenna to the TV or Down converter should be low loss coax type like Belden 9913.

# Assembling a Station



- **Transmitter**

- You need an ATV transmitter or transceiver with at least one watt output.



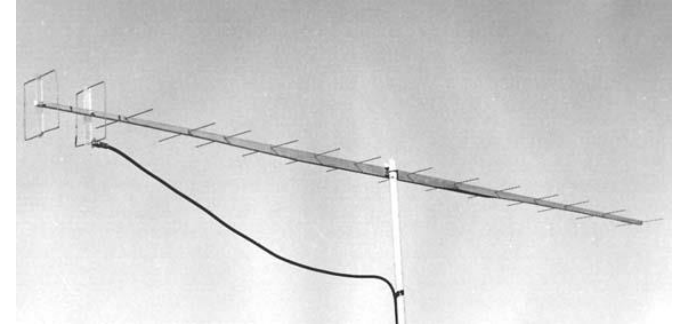
- You need a video camera and microphone



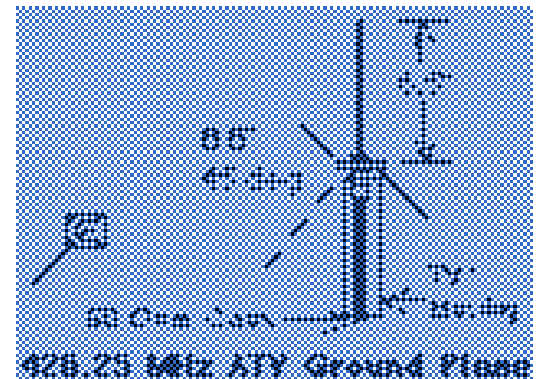
- You need a gain or Omni directional antenna

# Assembling a Station

Homebrew Antennas - low cost and easy to make .  
The [Quagi](#) antenna by Wayne N6NB is made from  
12 gage copper house wire and wooden boom –



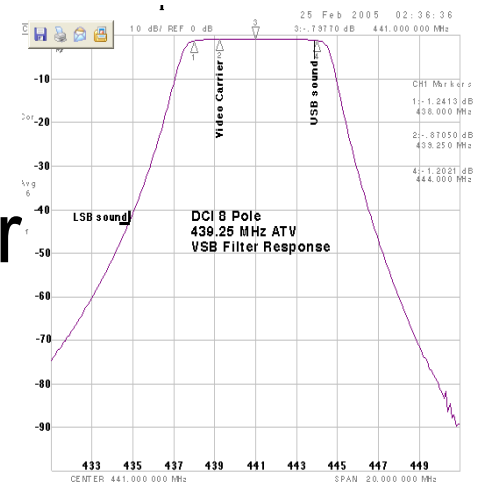
A simple omni directional vertical antenna for  
demo's, R/C receive, etc., is the [ground plane](#)  
antenna made with just a connector and some  
wire





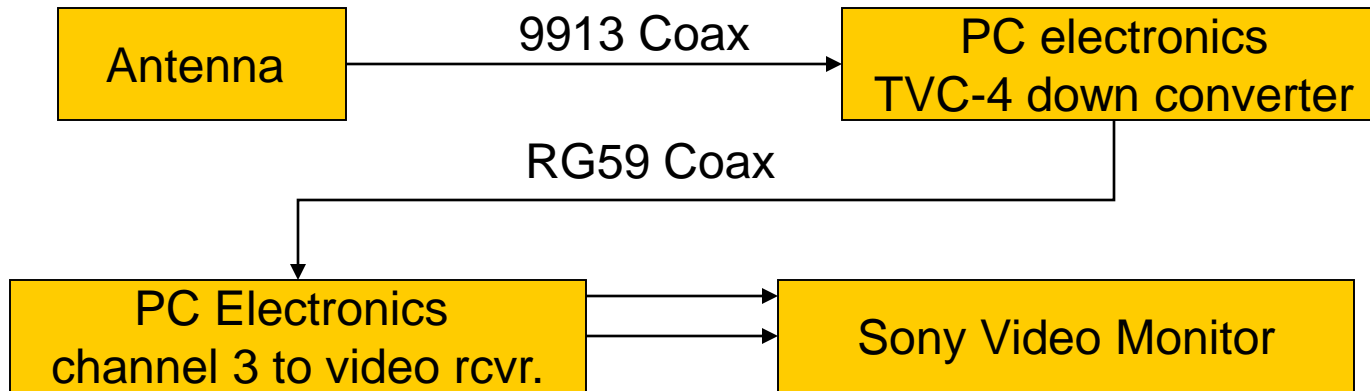
# Assembling a Station

- You may want to add a power amplifier to your transmitter to increase it's range.
- You need low loss coax from the transmitter to the antenna (Belden 9913 or equivalent).
- You may need a band pass filter to keep your ATV transmitted signal from interfering with other ATV's or ending up out of band. This is important if you are operating on the lowest or highest channel

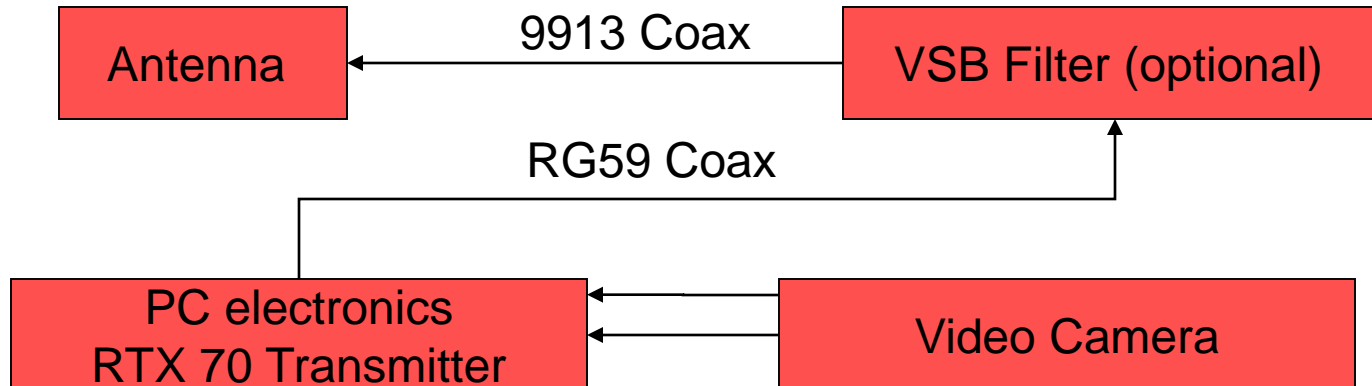


# Assembling a Station

## The AD7FO receive station



## The AD7FO Transmit station



# Operating ATV

- Two meter simplex can be used for coordination between transmitter and receiving stations.
- **Word of caution – Do not operate your HT antenna close to the camera, especially if it is a camcorder. You can destroy the electronics in some camcorders with 2 watts of RF.**

# Operating ATV

- ATV is line of sight
- ATV requires strong signals at the receive end for good video.
- If used for an event practice the receive and transmit locations to be sure they will work.
- A VCR can be used at the receiving station to save the transmission.

# Slow Scan TV



# Slow Scan ATV

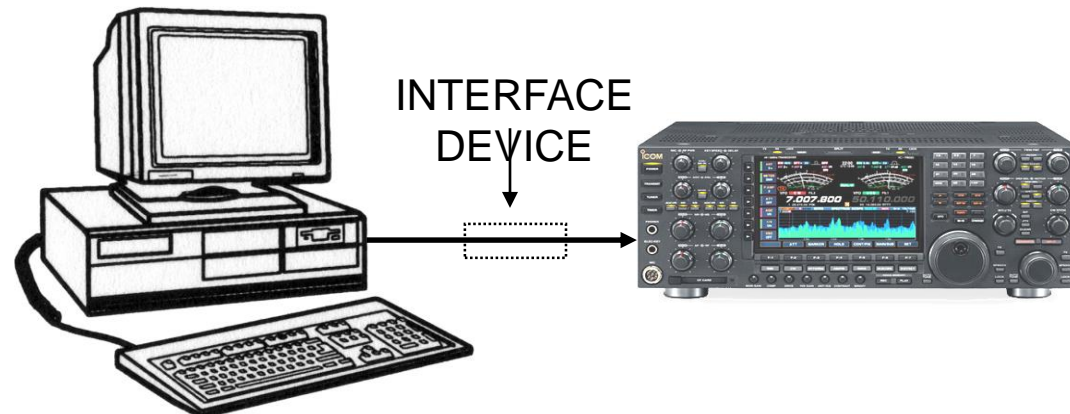
## Slow Scan

- Occupies the same bandwidth as a voice transmission (~3KHz)
- Not real time motion
- Sent one frame at a time
- Takes a long time to transmit one frame
- Can be sent on HF, VHF or UHF bands

# BASIC SSTV

## Sending a Picture

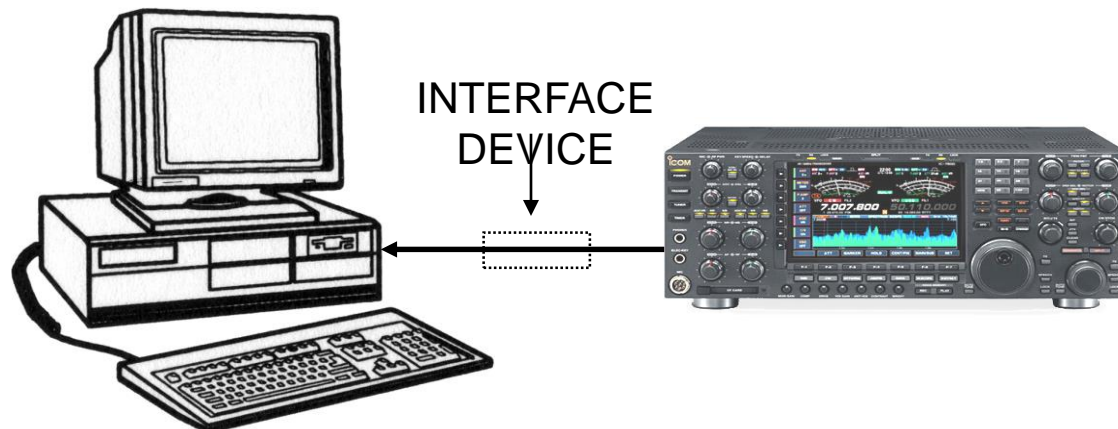
- Sends images one picture or frame at a time
- Software converts Image pixels to tones
- Each color is represented by a tone between 1200 and 2300 Hz
- A picture is sent by sending tones to the transmitter as modulation .



# BASIC SSTV

## Receiving a Picture

- Received signal is demodulated to recover the tones
- Demodulated tones are sent to the computer sound card input
- Tones are converted to the pixels that made up the transmitted image and displayed on the computer



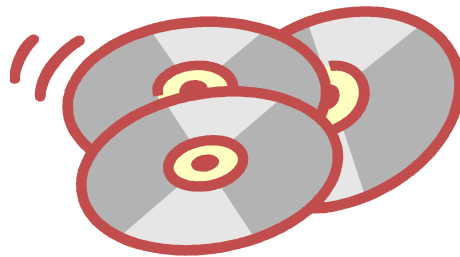


# Slow Scan Frequencies

- **160 Meters: 1.916**
- **80 Meters: 3.845 ~ 3.857**
- **40 Meters: 7.171 & 7.172**
- **20 Meters: 14.230, 14.233, 14.236**
- **15 Meters: 21.340**
- **10 Meters: 28.680, 28.690, 28.700**
- **6 Meters: 50.680**
- **2 Meters: 145.5**

# Slow Scan Software

- **MIXW** Version 2.19 available at [WWW.mixw.net](http://WWW.mixw.net) for 15 day free trial
- **MMSTV** version 1.11G is freeware
- **MScan** SSTV and Weather
- **QSSTV for Linux** for linux 5.3C

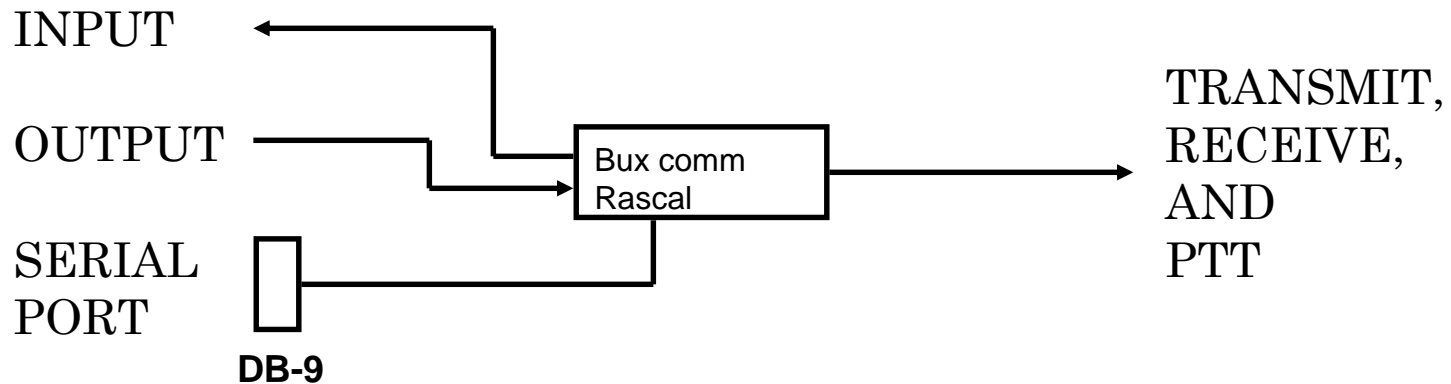
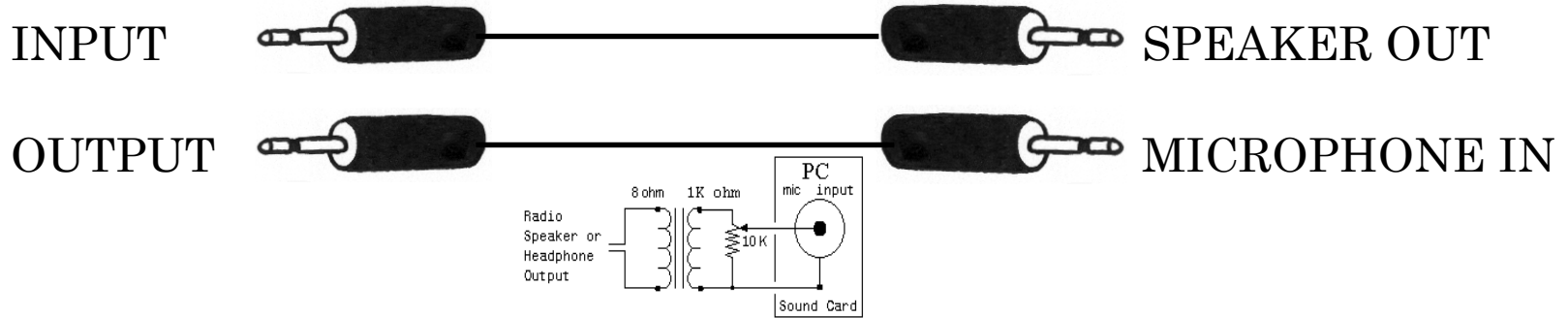


# Simple Interface



## COMPUTER & SOUND CARD

## SSB TRANSCEIVER



# Setup Thoughts

- SSTV is a continuous signal
- It is 100% duty cycle while transmitting
  - Reduce your transmit power to no more than 50% of rated power (for a 100 watt rig this would be 50 watts)



- Radios are set up for a normal SSB QSO
- Audio gain setting is critical for SSTV
- Do not use VOX
- Do not use Speech Processing

# Fast Scan vs Slow Scan

## **SLOW SCAN:**

- Computer (use existing machine)
- Special Software (\$50 MixW or Free MMSSTV)
- Interface Device or Cable (\$10 Homebrew or \$40 Interface Device)
- Still pictures (photographs) and Drawings only
- HF Transceiver (use existing rig)
- Antenna (use existing)
- Many Frequencies to choose from.
- Normal bandwidth of a SSB signal
- Can send images around the world on HF

# Fast Scan vs Slow Scan

## **FAST SCAN:**

- Special Transceiver (\$550 from PC Electronics)
- No software needed
- Send still pictures, photographs and moving images
- Video Camera (use existing camcorder equipment)
- Video Cables (use existing)
- 5 or 10 Element Beam (\$ <50 to build or \$125 and up to buy)
- UHF - Limited distance
- Bandwidth is 6 MHz

# Want to get started in SSTV?

Amateur Television

Slow  
&  
Fast Scan

Software, Equipment  
&  
Operation

Larry Telles  
K6SPP

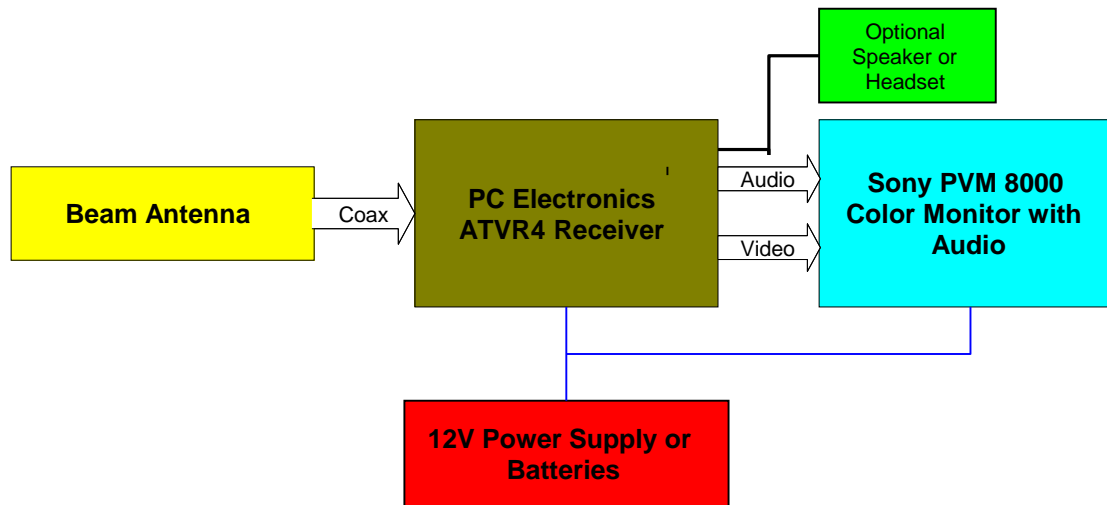
[ltelles@icehouse.net](mailto:ltelles@icehouse.net)

# See You on ATV





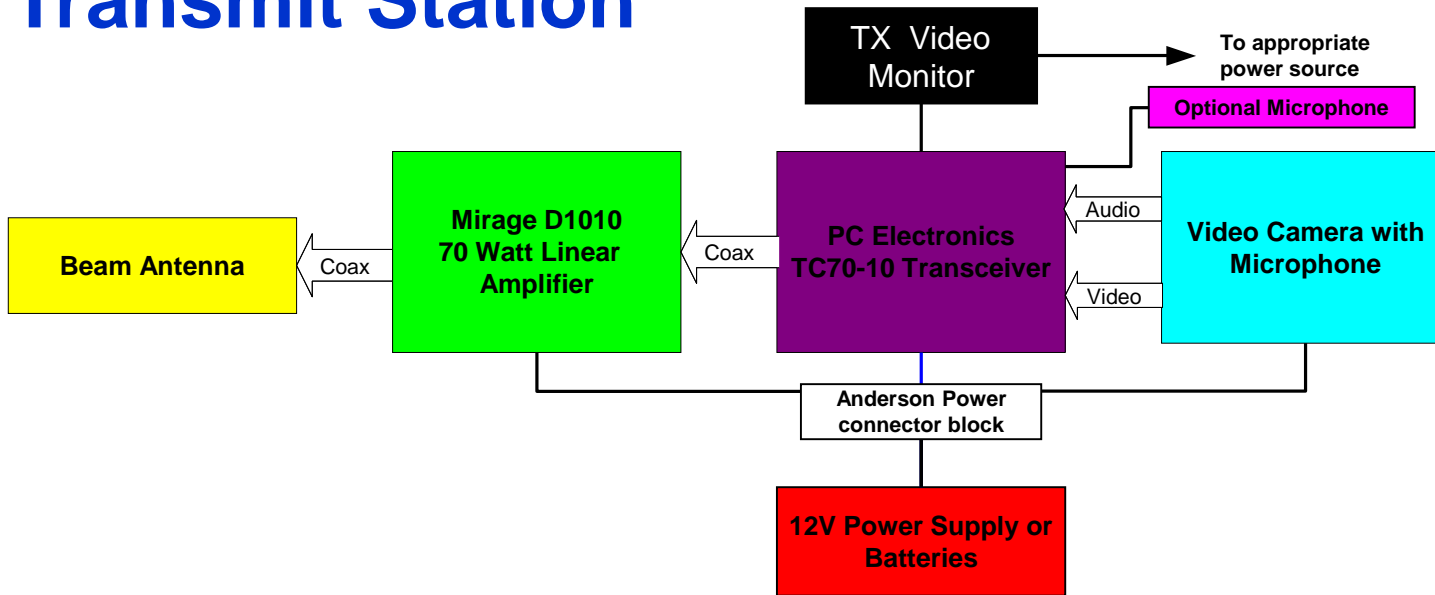
# AD7FO's ATV Receiving Station



## Instructions for ATV receiving setup:

1. Connect antenna to ATVR4 receiver to the antenna with 50 Ohm low loss 9913 or similar coaxial cable. Cable with PL-259 on antenna end and N male (or adapters to N male0 on other end.
2. Connect RCA phone jack audio video cables between the receiver and the Sony PVM8000 color monitor. The monitor can run on 12 VDC or 120 VAC.
3. Connect 13.8 VDC power to the ATVR4 receiver and power the PVM8000 color monitor
4. Aim antenna in direction of the transmission you wish to receive.
5. Turn on the receiver and monitor power.
6. Find a position of the antenna for best picture
7. Adjust receiver Squelch and Audio volume as desired.

# Transmit Station

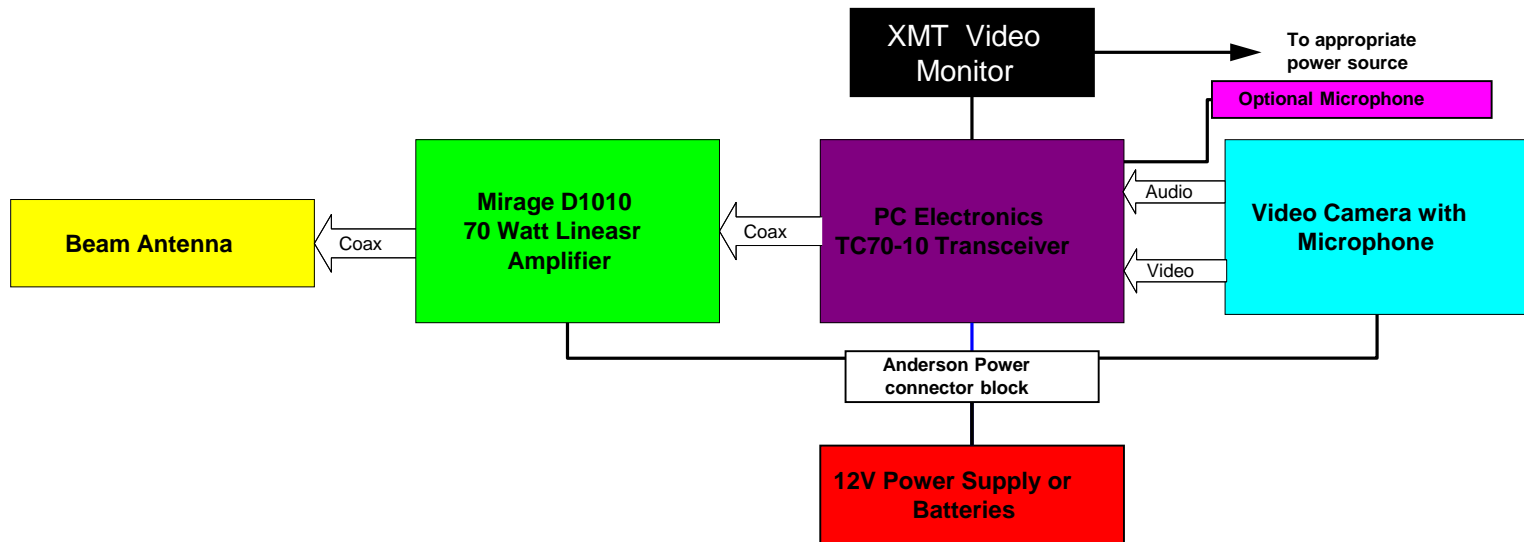


## Instructions for ATV Transmitting initial setup:

1. Connect antenna to Mirage D1010 Amplifier RF output using 50 Ohm low loss 9913 (or similar) coaxial cable. Aim antenna in direction you wish to transmit.
2. Connect a pair of RCA phone jack audio/video cables to the camera audio and video outputs.
3. Connect the other end of the camera audio cable to the audio in jack on the lower left side of the front panel of the TC 70-10 transceiver. If an optional external microphone is to be used connect it to the MIC jack on the TC 70-10
4. The video from the camera goes into one of the two camera inputs on the aluminum switch box on the side of the wooden case. A BNC male to RCA female adapter will be required. A second camera if being used can be connected to the second BNC. The toggle switch allows you to choose which camera image is being transmitted
5. Set transmitter switches as follows: Power Off , mode to REC, transmit frequency to F1, all other controls max CCW. Set Mirage amplifier mode to SSB and power to OFF. Set power supply to OFF.
6. Connect 13.8 VDC power supply or 12V Battery to the Anderson Connector Block (the rear most Power Pole Connection Block connector labeled input).

**Proceed to operating instructions**

# AD7FO's ATV Transmit Operation



## Instructions for ATV operation:

1. Insure all connections are correct, that there is an antenna connected to the Mirage Amplifier and all power switched are off;
2. Turn on the equipment in the following sequence: 1 Power Supply, 2. TC70-10 transceiver (in REC mode), and Video Camera. The Mirage amplifier will remain off unless needed to conserve power.
3. Make contact with Receiving station using your HT on an agreed upon frequency and have them turn their receiving equipment on.
4. Select the video input you wish to transmit (switch on side of wooden case). Move the TC 70-10 mode switch to XMIT. You are now transmitting a carrier without audio or video information.
5. While observing the picture on the transmit Video monitor increase the video gain for a good picture. Ask the receiving station how it looks on their end and make minor level adjustments if required.
5. If the camera Microphone is being used advance the line gain about half way. Stand in front of the camera and ask the receiving station how it sounds. Adjust line gain till it sounds distorted at the receive end then turn the control back about 5-10 degrees.
6. If you wish to use an external microphone instead of a video camera microphone turn the Line gain fully CCW, and advance the MIC Gain control half way. Check audio quality at receive end and adjust the Mic Gain as appropriate.