

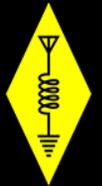
Slow Scan TV – From the ISS

AN INTRODUCTION FOR EPARA AND QUICK GUIDE TO ISS SSTV RECEPTION

ALEX VERDES - KD2FTA



What is Slow Scan TV?



- ▶ Slow Scan television (SSTV) is a picture transmission method used mainly by amateur radio operators, to transmit and receive static pictures via radio in monochrome or color.
- ▶ A literal term for SSTV is [narrowband television](#). Analog [broadcast](#) television requires at least 6 MHz wide channels, because it transmits 25 or 30 picture frames per second (in the [NTSC](#), [PAL](#) or [SECAM](#) color systems), but SSTV usually only takes up to a maximum of 3 kHz of [bandwidth](#).



What is Slow Scan TV?



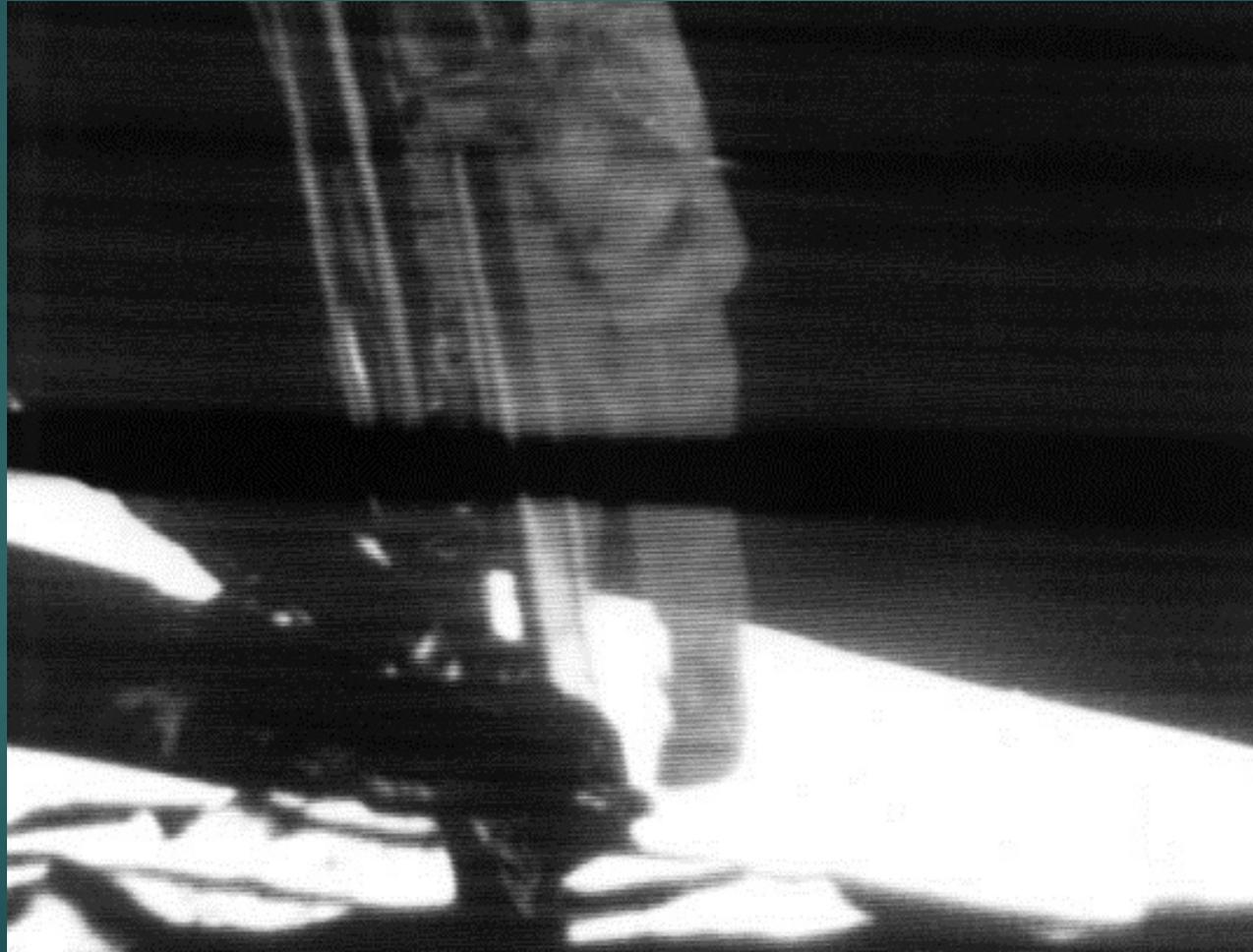
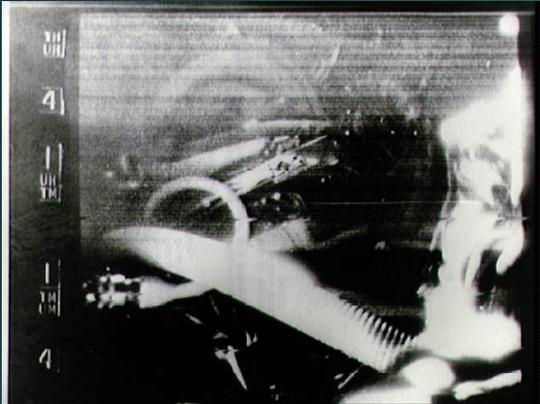
- ▶ It is a much slower method of still picture transmission, usually taking from about eight seconds to a couple of minutes, depending on the mode used, to transmit one image frame.
- ▶ Since SSTV systems operate on [voice frequencies](#), amateurs use it on [shortwave](#) (also known as [HF](#) by [amateur radio](#) operators), [VHF](#) and [UHF](#) radio.
- ▶ The concept of SSTV was introduced by Copthorne Macdonald in 1957–58. He developed the first SSTV system using an electrostatic monitor and a [vidicon tube](#). It was deemed sufficient to use 120 lines and about 120 pixels per line to transmit a black-and-white still picture within a 3 kHz phone channel.
- ▶ First used on the 11 meter band later taken away from HAMs

Early Use –Some Fun Facts



- ▶ SSTV was used to transmit images of the far side of the Moon from the Russian probe [Luna 3](#) (1959)
- ▶ The first space television system was called [Seliger-Tral-D](#)
 - ▶ Used by various Russian probes and capsules to transmit images of the Earth, moon, and their cosmonauts however....
 - ▶ A similar concept, also named SSTV, was used on [Faith 7](#) (Mercury Program) as well as on the early years of the [NASA Apollo](#) program.
- ▶ The Faith 7 camera transmitted one frame every two seconds, with a resolution of 320 lines
- ▶ The SSTV system used in [NASA's](#) early Apollo missions transferred ten frames per second with a resolution of 320 frame lines in order to use less bandwidth than a normal TV transmission
- ▶ The [Apollo TV cameras](#) used SSTV to transmit images from inside [Apollo 7](#), [Apollo 8](#), and [Apollo 9](#), as well as the [Apollo 11 Lunar Module](#) television from the [Moon](#).

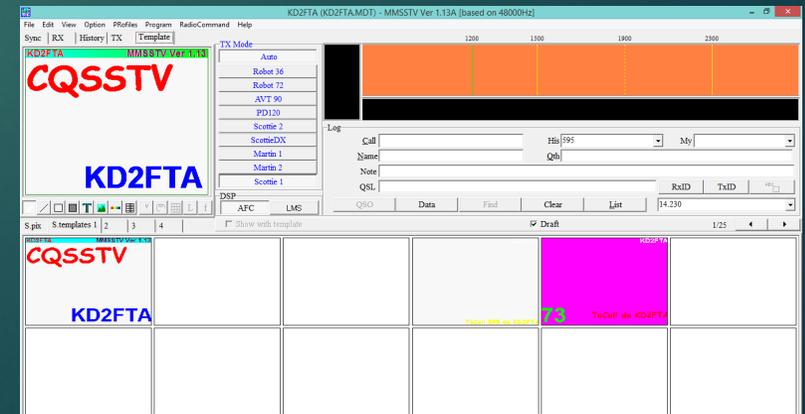
Early U.S. Missions Using SSTV



How to Get Started – What You Need



- ▶ You're going to be receiving signals being sent from approx. 150 miles up in space
- ▶ A 2 meter antenna
 - ▶ A portable hand held Yagi is best if you know where the ISS is so you can point directly at it, but not essential
- ▶ A 2 meter radio you can tuned to 145.800 MHz
- ▶ A Laptop with Windows XP, 7, or 10 and / or a radio interface (more in coming slides)
- ▶ MMSSTV Software
- ▶ Orbitron Software or follow the ISS on N2YO.com



How to Get Started – Putting it Together



- ▶ You can use a mobile/base station radio connected to your base antenna, or you can use an HT connect to a base or portable Yagi
- ▶ Use a two way audio cable to connect your aux speaker output to your laptop aux microphone input
 - ▶ Here's where you may need a radio interface like a Signal Link or RigBlaster
 - ▶ Some newer laptops may not have a aux microphone input using audio cables, but will have a USB port



How to Get Started – Putting it Together



- ▶ Download the MMSSTV application from the internet.
 - ▶ The latest version is MMSSTV v1.13a
 - ▶ <https://hamsoft.ca/pages/mmsstv.php>
 - ▶ Other web sites offer the earlier version, don't use those and be cautious where you get your copy from. This software is free.
- ▶ The other software is Orbitron
 - ▶ <http://www.stoff.pl/>
 - ▶ Use this to track the ISS, and its good for other satellite tracking as well
 - ▶ If you don't want to use Orbitron, you can go directly to the N2YO.com web site where you'll be able to track the ISS from the main web page. <https://www.n2yo.com/>

How to Get Started – Putting it Together



Orbitron 3.71

11-01-2020 12:13:53 (UTC -5:00)

12:13:55
11-01-2020

Mode: Real time / Simulation
Time: Local / UTC

Orbitron

Orbitron

N2YO.com

Tracking 20134 objects as of 11-Jan-2020
HD Live streaming from Space Station
2,027 objects crossing your sky now

ISS will cross your sky in 8h 40m 26s

Track the group of recently launched Starlink satellites

Home Most tracked Just launched Satellites on orbit Alerting tools More stuff Sign in

SPACE STATION

NORAD ID:	25544
LOCAL TIME:	12:15:25
UTC:	17:15:25
LATITUDE:	7.99
LONGITUDE:	-148.26
ALTITUDE (km):	415.76
ALTITUDE (mi):	258.34
SPEED (km/s):	7.66
SPEED (mi/s):	4.76
AZIMUTH:	265.5 W
ELEVATION:	-33.7
RIGHT ASCENSION:	12h 00m 43s
DECLINATION:	-25° 11' 07"
Local Sidereal Time:	19h 39m 54s

The satellite is in day light

10-DAY PREDICTIONS FOR SPACE STATION

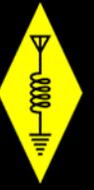
Resources

- Find your Location, IP, Geolocation
- Find your Magnetic Declination
- Space Station HD Live!
- Last Minute Stuff!

Your current location

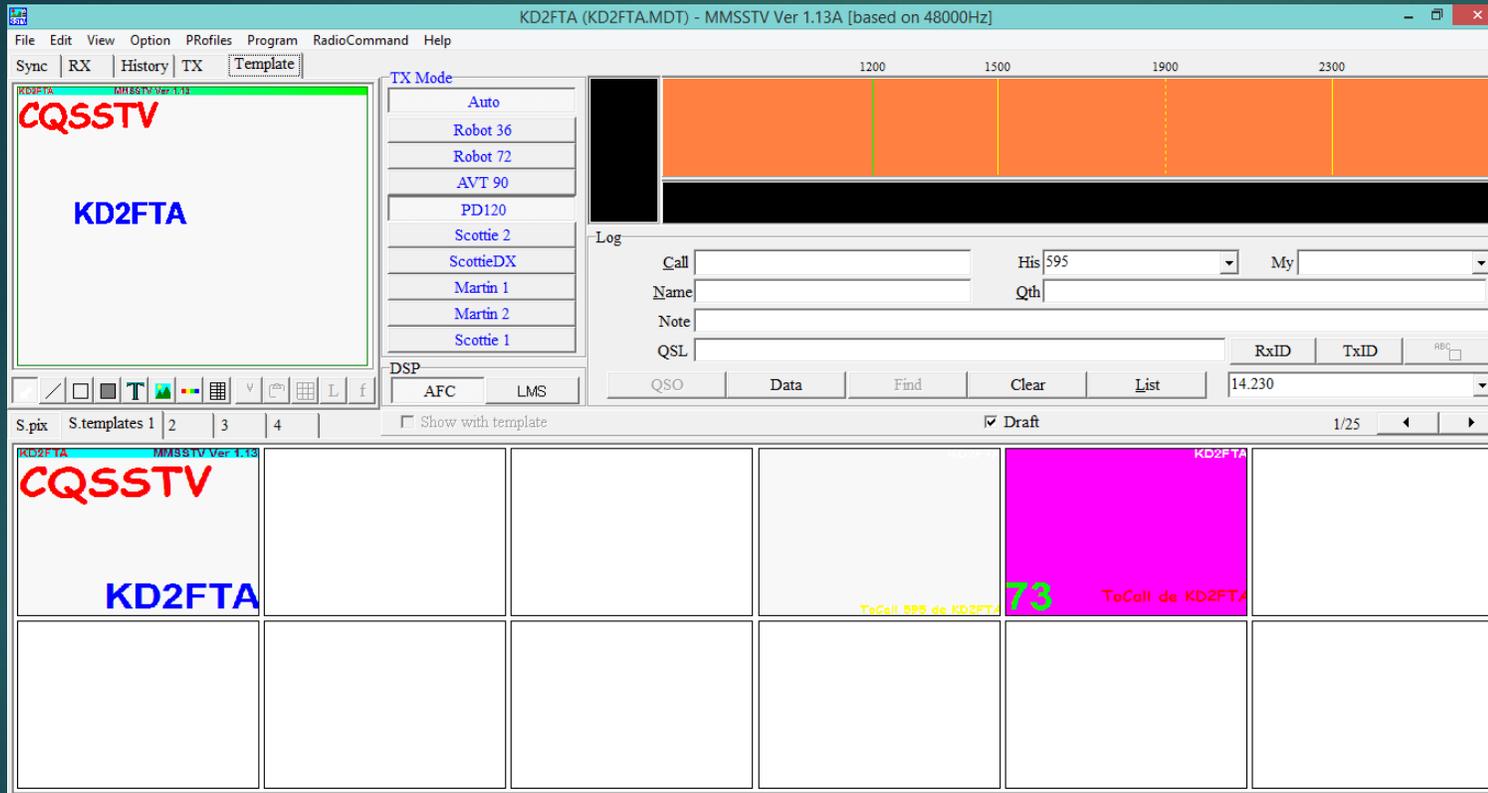
Your IP address: 68.190.209.87
Latitude: 40.841691°
Longitude: -74.57833°

How to Get Started – Putting it Together



- ▶ Once you download MMSSTV you'll need to configure it to receive the ISS signals in the PD120 mode. There's not a lot to do, and the software will be ready to run right away for any other SSTV mode
 - ▶ PD120 means that the software will be alerted to the start tones for a 126 second transmission from the ISS
 - ▶ There's a termination tone as well , and typically the transmissions pause for another one to two minutes to allow the Kenwood radio to cool down.
 - ▶ The Transmissions are identified by the call sign RS0ISS
- ▶ Orbitron is also easy to install
 - ▶ There are many menus however that permit customization and tracking preferences
 - ▶ For the purposes of this presentation and to get started quickly your best bet is to go to the N2YO web site for tracking the ISS

How to Get Started – Putting it Together



- The main MMSSTV screen
- Go to Options to set your sound card
- In the drop down select soundcard input level and with the radio on 145.800 adjust the microphone input so that the sound level is about half way up
- Make sure the squelch on your radio is off!

How to Get Started – Putting it Together



The image shows a composite screenshot of the RadioCommand software interface. The main window has a menu bar with 'File', 'Edit', 'View', 'Option', 'PProfiles', 'Program', 'RadioCommand', and 'Help'. Below the menu bar are tabs for 'Sync', 'RX', 'History', 'TX', and 'Template'. The 'RX Mode' dropdown is set to 'Auto'. A context menu is open over the 'Option' menu, listing: 'Soundcard output level(V)...', 'Soundcard Input level...' (highlighted), 'Setup repeater...', 'Setup Logging...', and 'Setup MMSSTV(O)...'. In the foreground, a 'Sound' dialog box is open, showing the 'Recording' tab. It prompts the user to 'Select a recording device below to modify its settings:' and lists a 'Microphone' (Conexant SmartAudio HD, Default Device) with a green checkmark icon. At the bottom of the dialog are 'Configure', 'Set Default', and 'Properties' buttons. The background shows a partial view of a radio call log with 'CQSS' and 'KE' visible.

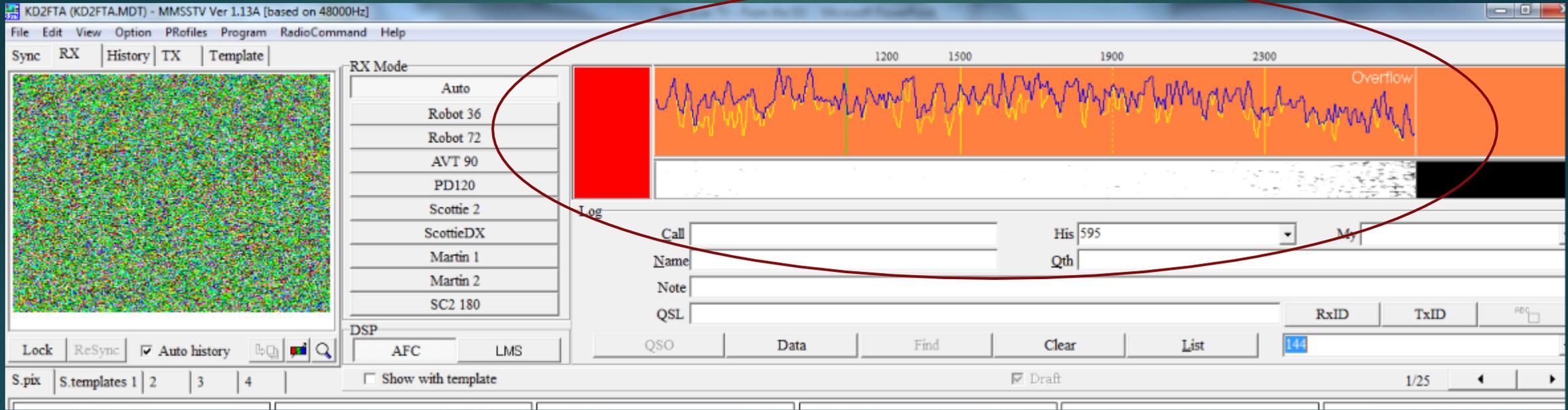
How to Get Started – Putting it Together



The screenshot shows the MMSSTV software interface. The main window title is "KD2FTA (KD2FTA.MDT) - MMSSTV Ver 1.13A [based on 48000Hz]". The menu bar includes File, Edit, View, Option, PProfiles, Program, RadioCommand, and Help. The toolbar has buttons for Sync, RX, History, TX, and Template. A "Sound" dialog box is open, showing the "Recording" tab. It lists three recording devices: "External Mic" (IDT High Definition Audio CODEC, Default Device, level indicator at approximately half), "Internal Mic" (IDT High Definition Audio CODEC, Disabled), and "Stereo Mix" (IDT High Definition Audio CODEC, Currently unavailable). The dialog has "Configure", "Set Default", "Properties", "OK", "Cancel", and "Apply" buttons. In the background, the water fall display shows a solid white band between 1200 and 2300 Hz. Below the water fall is a "Log" section with fields for Call, Name, Note, QSL, His (595), and Qth. There are buttons for QSO, Data, Find, Clear, and List. The status bar shows "Draft" and "1/25".

Note the external microphone input level is approx. half way up
Also note the water fall display is a solid white, and the bandwidth is 3KHz
The input levels above the water fall show the background noise

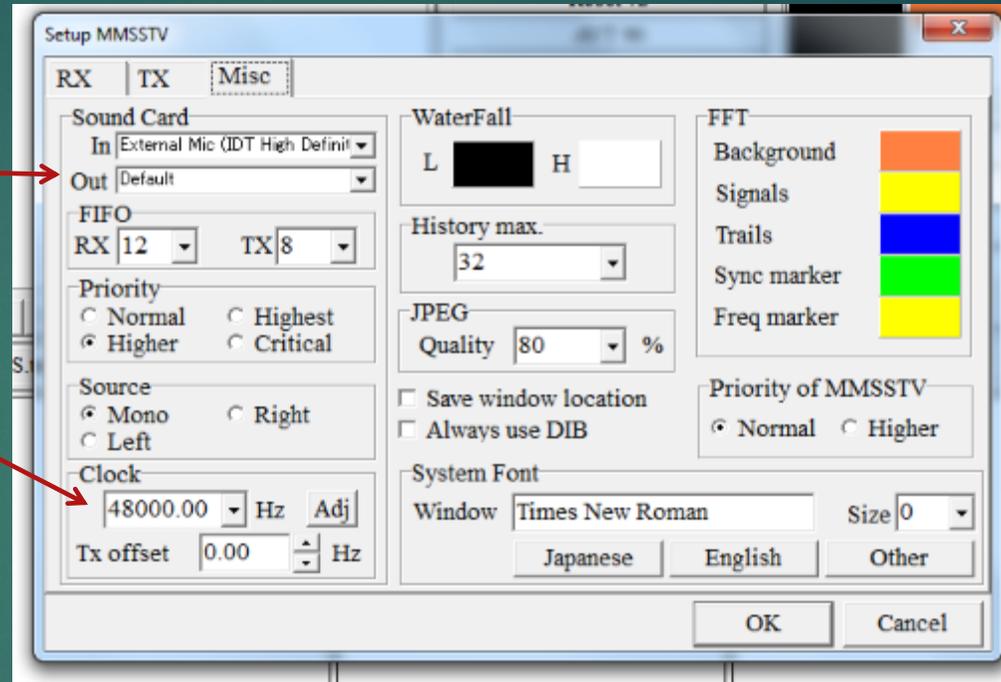
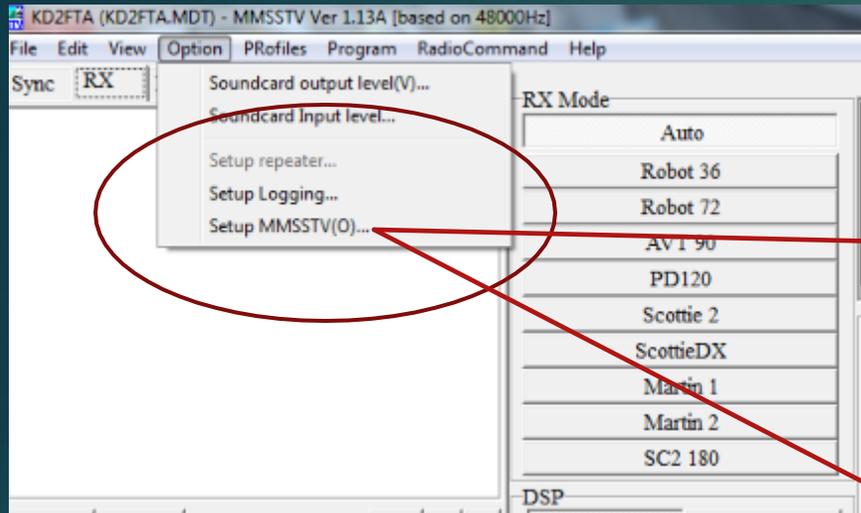
How to Get Started – Putting it Together



While I was preparing this presentation I received an image but the reception was poor

- Note that I was on 2 meters (145.800MHz)
- I had oversaturated the sound card on purpose to demonstrate how not to set your volume level
- The reception bar was a solid red, and the software was telling me that I had a data overflow condition
- Setting the volume control is key to receiving good images
- This might have been a transmission from a satellite – I just don't know!?

How to Get Started – Putting it Together

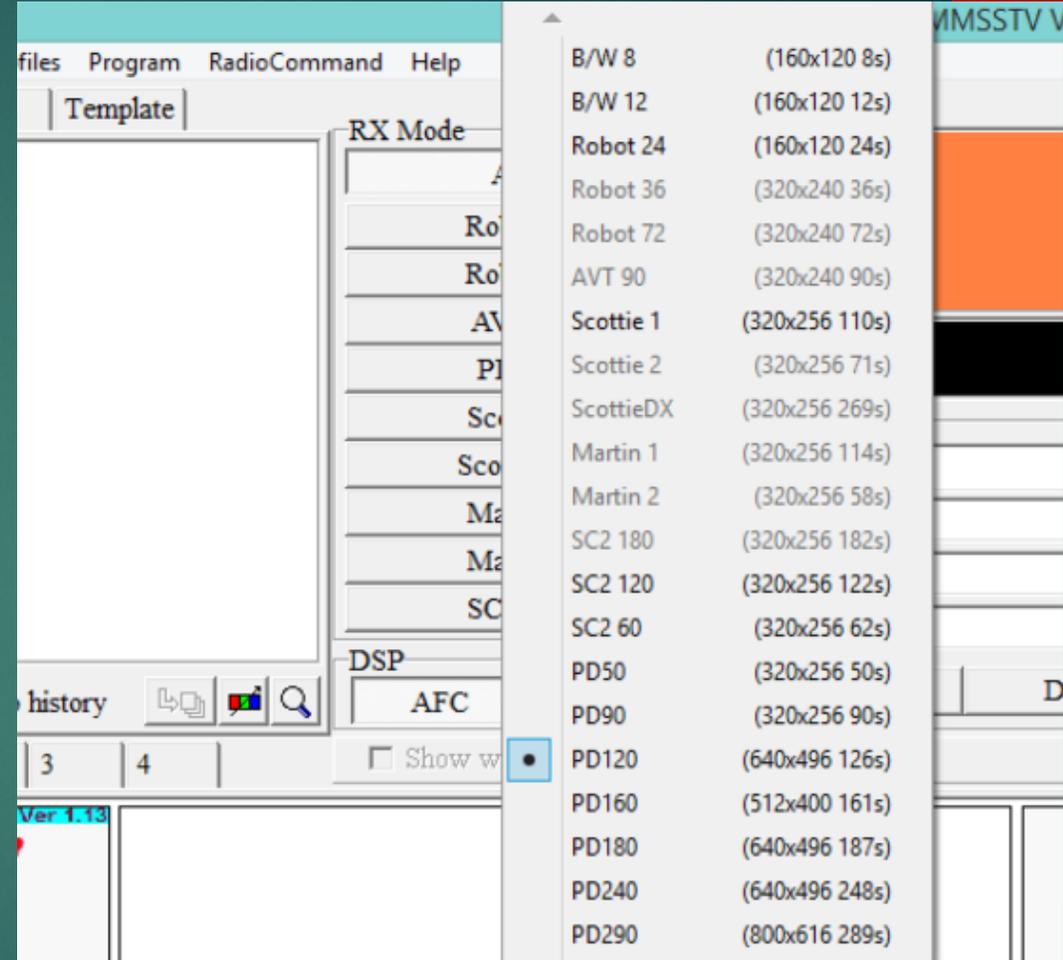
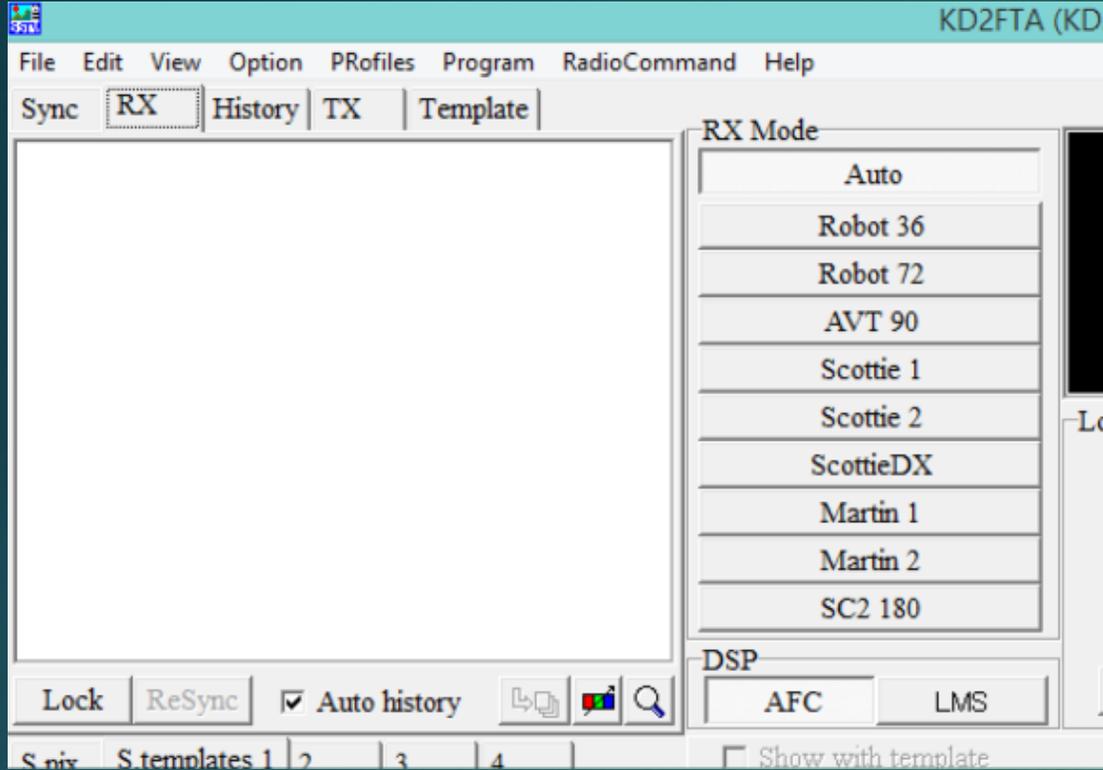


Another important item to note

Although MMSSTV is almost ready to receive ISS images when you download the software
A few items worth noting will improve the quality of the image

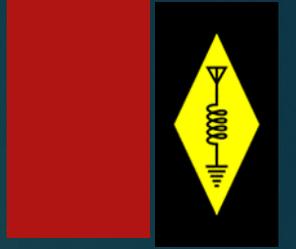
- In the MISC tab ensure you have selected the internal sound card to recognize your input
- In the clock section select 48000 Hz to get the clearest image

How to Get Started – Putting it Together



- In the RX mode section of the screen select Scottie 1 and right click on it
- This will produce the drop down seen on the right
- Select PD120 which is the 126 second receive mode you'll need for the ISS

Final Thoughts and Expectations



- ▶ A few last things to be aware of
 - ▶ This presentation was focused on receiving VHF signals from the ISS for SSTV
 - ▶ There's much more involved for the transmission of SSTV signals in the HF and VHF spectrum
 - ▶ The ISS travels roughly every 90 mins around the world, and the paths it takes will vary the angle at which your antenna sees its signals
 - ▶ Most near overhead passes above 35 degrees will provide great reception
 - ▶ VHF is line of sight so anything that passes through the signal (other satellites, aircraft) will affect the quality of the signal.
 - ▶ You can leave MMSSTV operating with your radio on , and it will automatically sense the start tone and begin deciphering the signal in the PD120 mode. Just click AUTO in the RX menu and you're good to go!
- ▶ WEBSITES to visit
 - ▶ <https://ariss-sstv.blogspot.com/>
 - ▶ <https://amsat-uk.org/beginners/iss-sstv/>

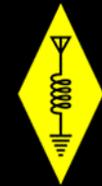


Первая космическая
пресс-конференция Алексея
Леонова и Томаса Стаффорда
Снимок сделан с экрана
телевизора.

Coollest ISS Slow Scan TV Image!

From the July 2015 International Space Station Slow Scan TV Event

Final Thoughts and Expectations



Малые космические аппараты «Танюша-ЮЗГУ-1» (RS6S) и «Танюша-ЮЗГУ-2» (RS7S). Запуск - 17 августа 2017 года.
Small space vehicles «Tanyusha-SWSU-1» (RS6S) and «Tanyusha-SWSU-2» (RS7S). The launch is August 17, 2017.

Юрий ФН

Развлекательские спутники ЮЗГУ / Amateur radio satellite of SWSU

RS01S
Serie 15 - 8/15

Развлекательские спутники ЮЗГУ / Amateur radio satellites of SUSU

«ЧАСКИ - ПЕРУ» «ECUADOR-UTE»

RS01S
Serie 15 - 9/15

Памяти З.Йена и В.Быковского
26 августа - 3 сентября 1978 г. - Союз 31 - Салют 6
Of memory S.Jähn and V.Bykovsky
26th August - 3rd September 1978 g. - Soyuz 31 - Salyut 6

RS01S
Serie 15 - 3/1

Самостоятельно взорвавшийся космический аппарат «Союз-Аполлон». После стыковки. В космическом аппарате (в центре) экипаж космонавта СССР, Герой Советского Союза Алексей Леонов и американские астронавты Тим Стаффорд и Дик Скотт.
Joint Soviet-American space flight «Soyuz-Apollo» after docking. In a gravity-free USSR pilot cosmonaut, Hero of the Soviet Union Alexei Leonov and American astronauts Tim Stafford and Dick Scott.

APOLLO-SOYUZ

RS01S
Serie 15 - 7/1

Слева направо: астронавты Т.Слейтон, Т.Стаффорд и В.Брайд; космонавты А.Леонов и В.Кубасов.
From left to right: astronauts T. Slayton, T. Stafford and V. Byrd; cosmonauts A. Leonov and V. Kubasov.

«Человечество обретет всемирный океан, дарованный ему как бы нарочно для того, чтобы связать людей в одно целое, в одну семью.»
K.E. Tolstovskiy
"Mankind will gain the world's oceans granted to him as if deliberately in order to connect people in one whole, one family..."
K.E. Tolstovskiy

RS01S
Serie 15 - 6/1

Космонавты МКС поздравляют жителей Земли с наступающим новым годом!!!
The ISS cosmonauts congratulate the inhabitants of the Earth with the coming new year!!!

Маленький Ю.И. Волков С.А. Корневский М.Б.

Шкалдеров А.Н. Серова Е.О. Соловьев А.М.

Давид Вульф

Юга-Западный государственный университет присоединяется к поздравлениям космонавтов и желает жителям Земли новых научных достижений и открытий в наступающем 2020 году.

Southwestern state University joins the congratulations of the cosmonauts and wishes the inhabitants of the Earth new scientific achievements and discoveries in the coming 2020.

RS01S
Serie 15 - 11/1

Some of the images Transmitted from The ISS during Christmas 2019

2019-DEC-29 1034

Hope you Enjoyed this Presentation
73 de KD2FTA

