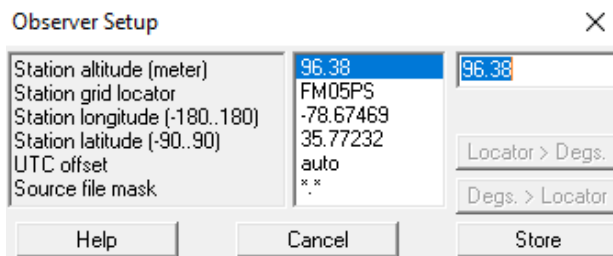


SatPC32 Setup with IC-9700 at W4ATC

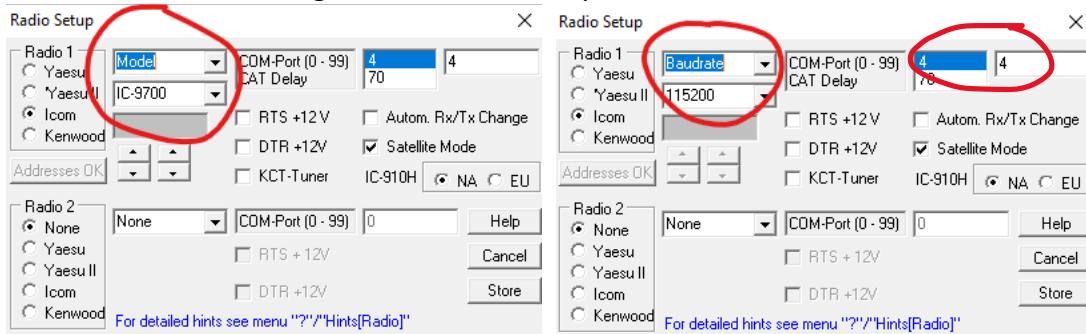
SatPC32 vs SatPC32ISS: SatPC32 is the normal program to use to communicate through satellites, including the FM repeater on the ISS. These are cross-band links, generally between 2m and 70 cm. In contrast, SatPC32ISS is for communicating directly with the astronauts on the ISS when they are active. It's setup to TX and RX on the same band (2m), but SatPC32 is set up for crossband satellite mode. It appears that the setup information for SatPC32 is used by SatPC32ISS.

The following are setup screens for SatPC32. Click "Store" after setting up your windows to match the ones below.



GPS coordinates are from our GPS disciplined oscillator.

There are several settings for the Radio Setup window:

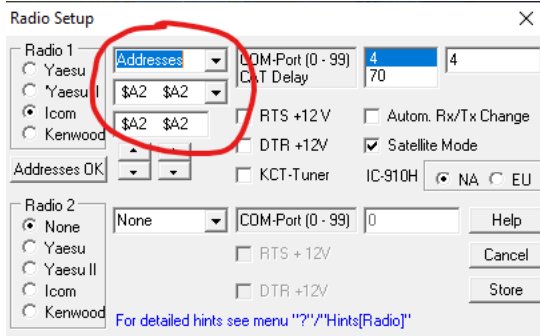


With the radio on and connected, you will also need to change the default baudrate for COM4 on the computer, since it defaults to 9600. Open the device manager and click Ports (COM & LPT) to expand the list. Right click on the entry for COM4 and select Properties. Go to the Port Settings tab, and set the baudrate to 115200 to match the SatPC32 & radio settings. Click OK and close the device manager.

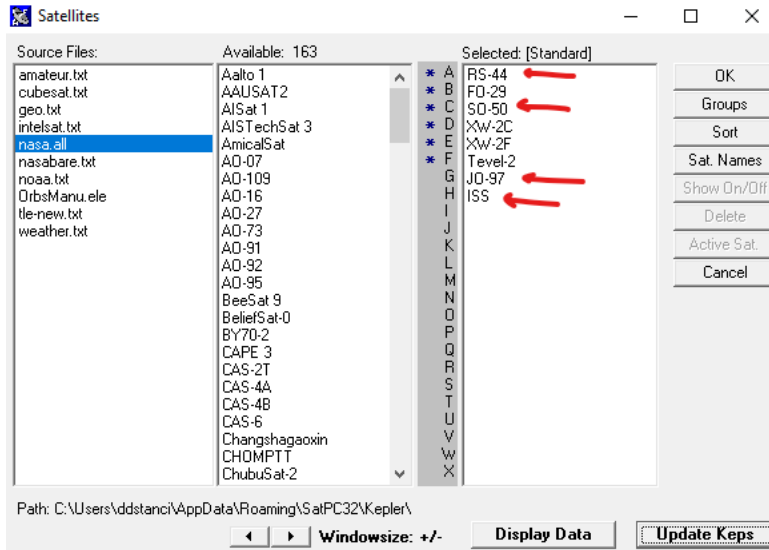
Note there are some tricks for setting the address. Here is an excerpt from the Manual:

“Now, click on the upper pull down menu again and select ‘Addresses’. Use the upper or lower LEFT arrow button below the address windows to change the address to “\$A2”.

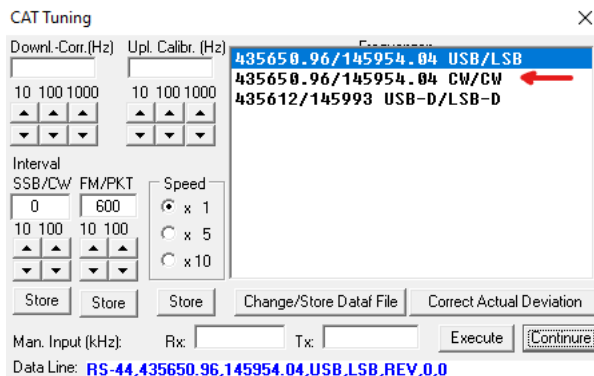
This is the unique radio for the IC-9700 that we saved in the radio. If you changed the radio's address for whatever reason you need to enter the address you changed it to here in SatPC32. Now, very important, before you close this window press the "Addresses OK" button and now all of the address windows should show \$A2. In case you wonder why you have four different address windows, they are for both TX and RX and two radios, in case you use a second Icom radio."



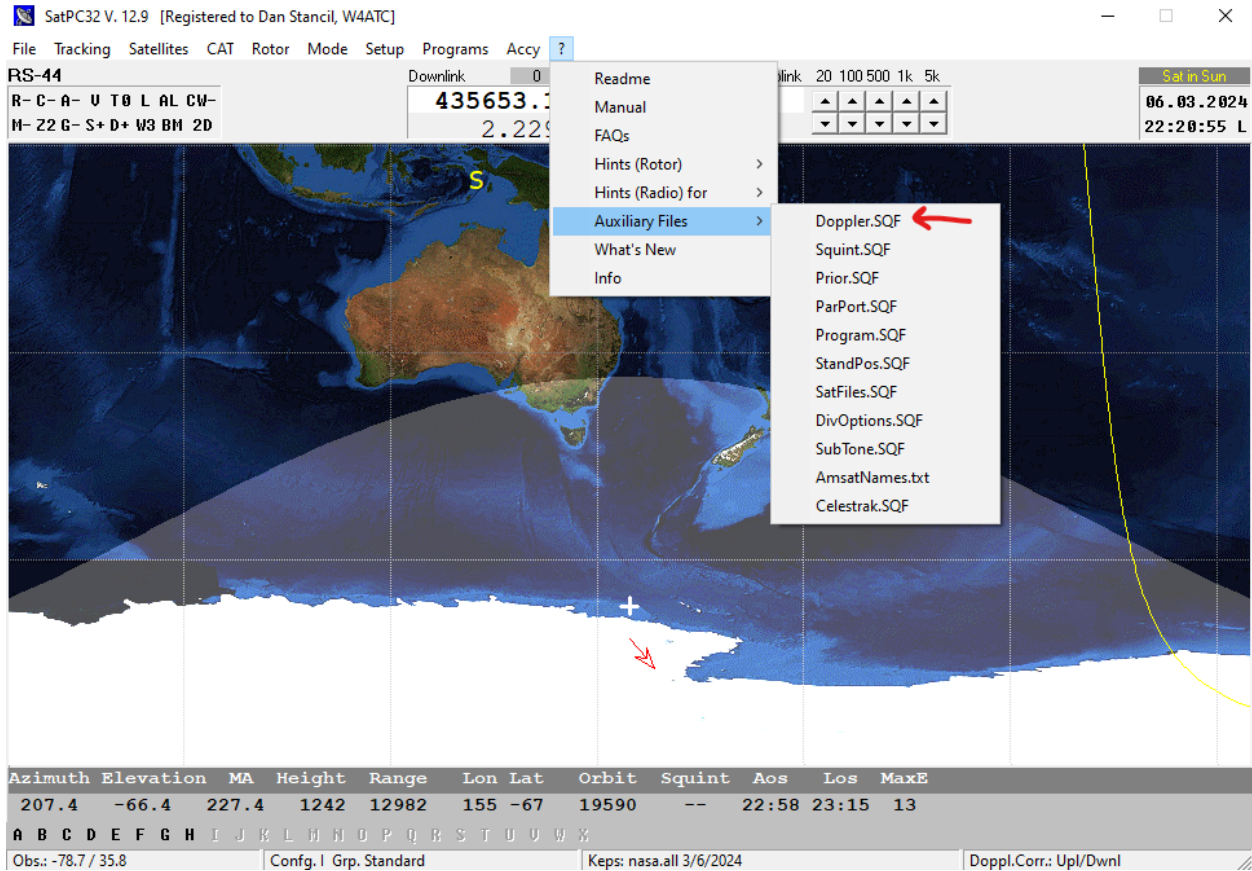
Next, setup the Satellites window by selecting the satellites you want to track. These will appear indexed by letter across the bottom of the main window. The current status of satellites can be found at <https://www.amsat.org/status/>. In my experience, at present the most reliable satellites are ISS and SO-50 for FM repeaters, and RS-44 and JO-97 for CW/SSB frequency translator satellites. These are marked in red below. Clicking the Update Keys button will reach out to the NASA data bases to get the latest orbital parameters.



On the Computer CAT menu (Compute Aided Transceiver protocol), for the CW/SSB satellites I add a CW/CW mode with the same frequencies as the USB/LSB mode. The CW mode makes it easier to adjust the Receiver Incremental Tuning (RIT) to match the pitch of the local sidetone to ensure that you're transmitting and receiving on the same frequency:



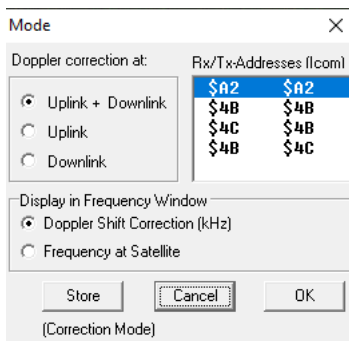
This file can be edited from the ? menu on the top ribbon: ? -> Auxiliary Files -> Doppler.SQR.



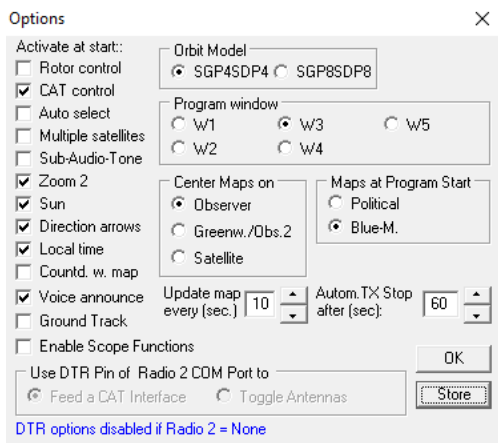
Note that the frequency entries for ISS are wrong. You should edit the Doppler.SQR file so that the first ISS line reads

ISS,437800,145990,FM,FM,NOR,0,0,Cross band repeater
 Only use this line in the CAT menu.

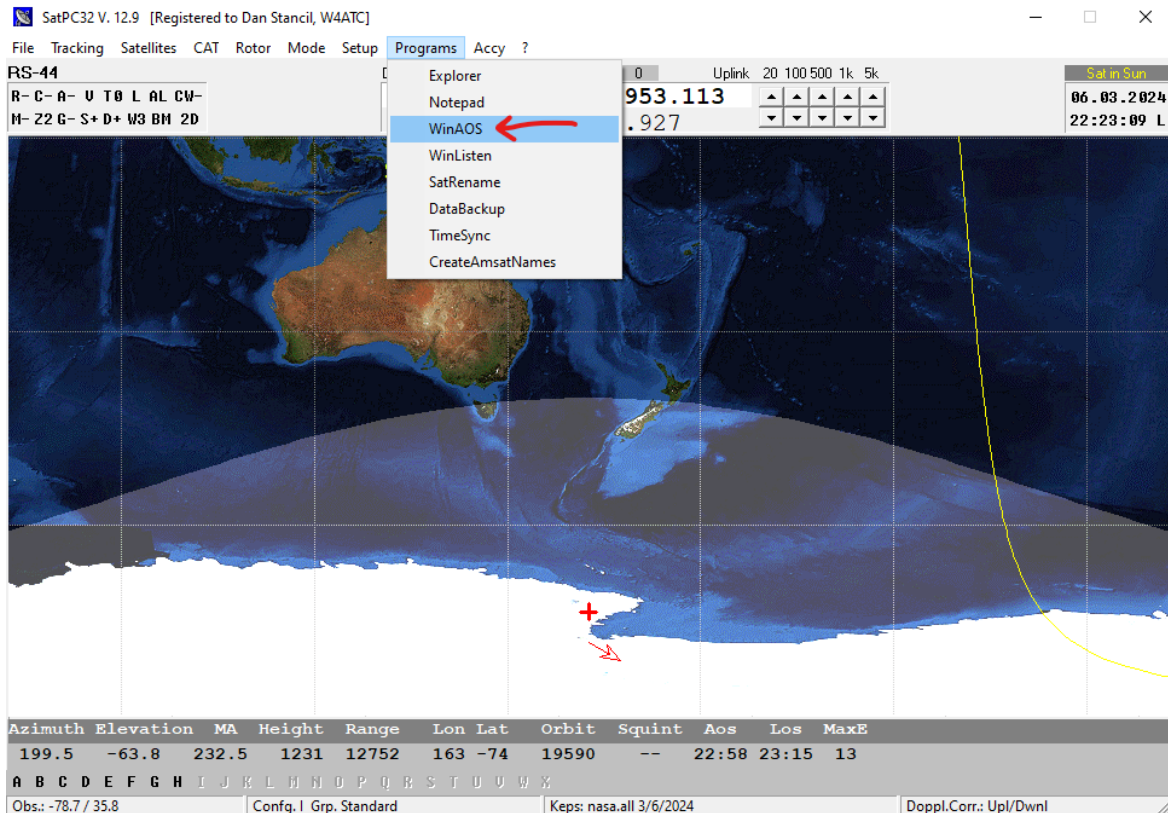
Set the Mode menu as shown below:



Other options having to do with the appearance and operation can be set from the Setup -> Options window:



Some additional programs are available from the Program's drop-down menu. A particularly useful one is WinAOS (see below). This calculates the time of Acquisition of Signal (AOS) of the satellites you have selected over a specified time range into the future. This enables you to identify particularly useful passes. From my experience to date, it appears as though best results are obtained for satellite passes with a maximum elevation of 20 degrees or above with our eggbeaters.



Here is an example of the WinAOS output with the RS-44 passes highlighted. The maximum elevation for the pass is given in the column marked "maxE".

WinAos V. 12.8d [Standard] - □ ×

File Lists Setup Hints

Day	Objects (06)	AOS (L)	LOS	Period	maxE	AZ
06.03.2024	RS-44	22:59	23:15	16	13	124 - 025
06.03.2024	ISS	23:04	23:13	09	26	257 - 042
07.03.2024	SO-50	00:15	00:21	06	04	133 - 067
07.03.2024	ISS	00:43	00:49	06	07	305 - 035
07.03.2024	RS-44	00:48	01:09	21	82	182 - 008
07.03.2024	FO-29	01:10	01:22	12	16	041 - 153
07.03.2024	SO-50	01:51	02:04	13	66	201 - 033
07.03.2024	ISS	02:21	02:27	06	05	326 - 052
07.03.2024	RS-44	02:45	03:03	18	17	240 - 355
07.03.2024	FO-29	02:54	03:09	15	55	006 - 205
07.03.2024	AO-07	03:09	03:18	09	04	059 - 118
07.03.2024	SO-50	03:33	03:43	10	14	259 - 013
07.03.2024	ISS	03:58	04:06	08	15	326 - 090
07.03.2024	FO-29	04:41	04:48	07	05	334 - 268
07.03.2024	AO-07	04:58	05:18	20	50	024 - 182
07.03.2024	ISS	05:35	05:44	09	70	309 - 137
07.03.2024	AO-07	06:51	07:10	19	35	006 - 228
07.03.2024	ISS	07:13	07:19	06	05	269 - 194
07.03.2024	AO-07	08:46	08:55	09	04	346 - 288
07.03.2024	SO-50	08:46	08:51	05	02	010 - 061
07.03.2024	RS-44	08:58	08:58	00	00	046 - 051
07.03.2024	JO-97	09:41	09:52	11	47	019 - 181
07.03.2024	SO-50	10:24	10:36	12	25	342 - 125
07.03.2024	RS-44	10:45	11:05	20	28	005 - 141
07.03.2024	JO-97	11:17	11:25	08	11	339 - 237
07.03.2024	FO-29	11:24	11:29	05	02	076 - 033
07.03.2024	SO-50	12:05	12:16	11	27	314 - 176
07.03.2024	RS-44	12:38	12:59	21	58	348 - 190
07.03.2024	FO-29	13:03	13:18	15	42	146 - 355
07.03.2024	AO-07	14:06	14:20	14	10	087 - 360
07.03.2024	RS-44	14:34	14:47	13	07	323 - 247
07.03.2024	FO-29	14:49	15:02	13	22	203 - 330
07.03.2024	AO-07	15:53	16:13	20	55	144 - 348

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Also available from the Programs tab is WinListen. This program gives you more detailed azimuth and elevation position as a function of time for a given satellite. Below is an example of passes over a 24 hour period for FO-29:

Day	Time (L)	Azm	Elev	MA	Height	Range	Lon/Lat	Orbit	Squint
07.03.2024	E 01:09:00	35.7	0.4	20.7	844	3391	310 56	36063	-
07.03.2024	E 01:11:00	47.5	6.1	25.5	860	2821	307 49	36063	-
07.03.2024	E 01:13:00	64.6	11.9	30.4	879	2396	304 42	36063	-
07.03.2024	E 01:15:00	87.3	15.4	35.2	901	2205	302 35	36063	-
07.03.2024	E 01:17:00	111.1	14.4	40.0	925	2312	300 28	36063	-
07.03.2024	E 01:19:00	130.2	10.0	44.8	952	2676	298 21	36063	-
07.03.2024	E 01:21:00	143.5	4.6	49.6	980	3208	297 14	36063	-
07.03.2024	E 02:55:00	4.9	7.2	19.7	841	2680	285 57	36064	-
07.03.2024	E 02:57:00	359.3	19.0	24.5	856	1923	281 50	36064	-
07.03.2024	E 02:59:00	343.7	38.8	29.4	875	1286	278 43	36064	-
07.03.2024	E 03:01:00	279.8	57.7	34.2	896	1036	276 36	36064	-
07.03.2024	E 03:03:00	226.4	36.6	39.0	920	1397	274 29	36064	-
07.03.2024	E 03:05:00	213.5	19.3	43.8	946	2064	272 22	36064	-
07.03.2024	E 03:07:00	208.4	8.7	48.6	974	2820	270 16	36064	-
07.03.2024	E 03:09:00	205.8	1.4	53.4	1004	3599	269 9	36064	-
07.03.2024	E 04:41:00	334.7	0.9	18.7	838	3315	259 59	36065	-
07.03.2024	E 04:43:00	319.3	3.9	23.5	853	3019	255 52	36065	-
07.03.2024	E 04:45:00	301.7	5.1	28.4	871	2942	252 45	36065	-
07.03.2024	E 04:47:00	284.6	3.9	33.2	891	3098	250 38	36065	-
07.03.2024	E 04:49:00	270.2	1.2	38.0	915	3453	248 31	36065	-
07.03.2024	E 11:25:00	69.1	1.4	222.6	893	3376	316 41	36068	-
07.03.2024	E 11:27:00	53.5	2.1	227.4	872	3253	314 48	36068	-
07.03.2024	E 11:29:00	37.7	1.0	232.2	854	3338	310 55	36068	-
07.03.2024	E 13:03:00	145.1	2.3	202.4	1006	3493	297 11	36069	-
07.03.2024	E 13:05:00	140.0	9.7	207.2	976	2742	296 18	36069	-
07.03.2024	E 13:07:00	130.5	19.9	212.0	948	2039	294 25	36069	-
07.03.2024	E 13:09:00	108.9	33.6	216.8	922	1478	292 32	36069	-
07.03.2024	E 13:11:00	62.1	40.5	221.6	898	1282	290 39	36069	-
07.03.2024	E 13:13:00	23.0	27.4	226.4	876	1600	288 46	36069	-
07.03.2024	E 13:15:00	6.7	13.8	231.2	858	2221	285 53	36069	-
07.03.2024	E 13:17:00	359.1	4.3	236.0	842	2956	281 60	36069	-
07.03.2024	E 14:49:00	202.3	3.2	201.4	1012	3410	271 10	36070	-
07.03.2024	E 14:51:00	212.0	9.6	206.2	982	2763	269 17	36070	-
07.03.2024	E 14:53:00	227.5	16.7	211.0	954	2221	268 24	36070	-
07.03.2024	E 14:55:00	252.0	22.3	215.8	927	1889	266 30	36070	-
07.03.2024	E 14:57:00	281.9	21.3	220.6	903	1892	264 37	36070	-
07.03.2024	E 14:59:00	305.8	14.4	225.4	881	2228	262 44	36070	-
07.03.2024	E 15:01:00	321.0	6.6	230.2	861	2778	259 51	36070	-
07.03.2024	E 15:03:00	330.6	0.1	235.0	845	3435	255 58	36070	-

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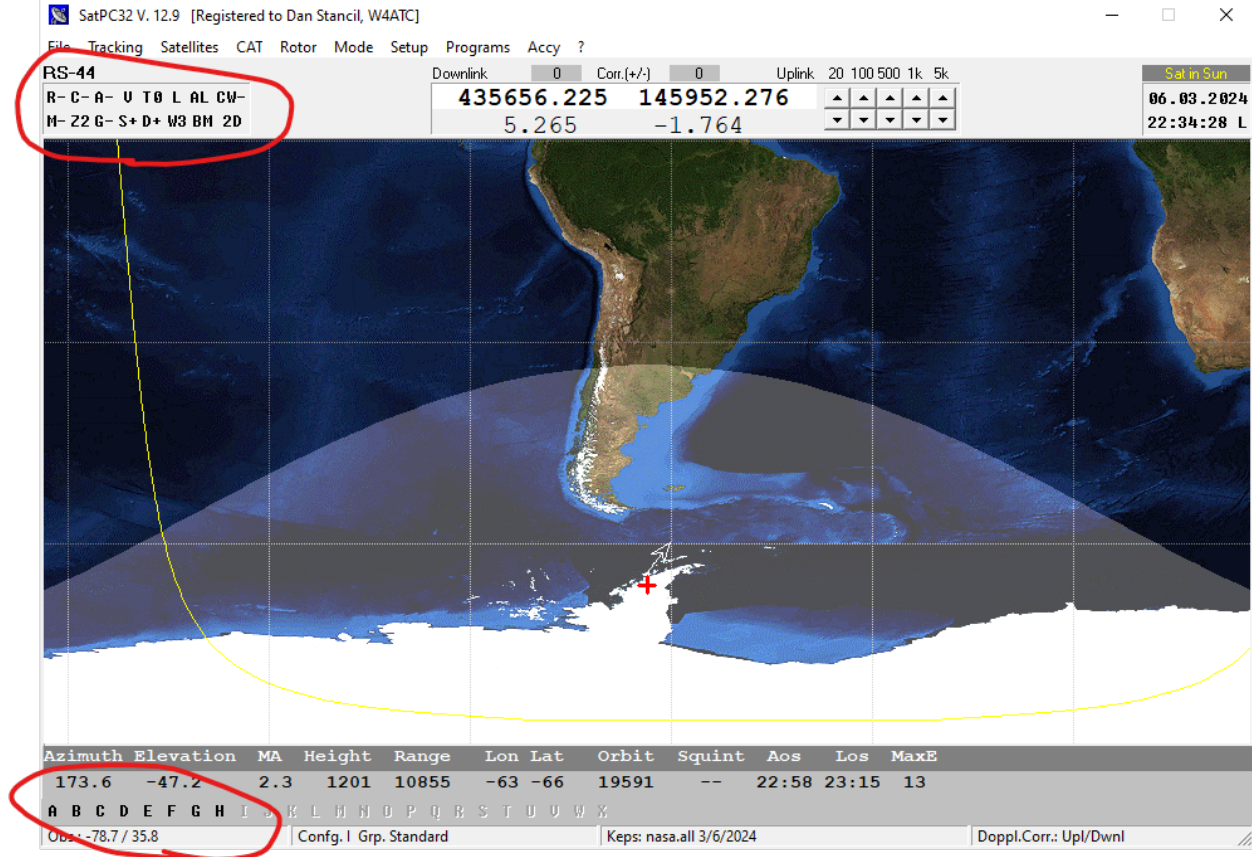
Note that the Observer coordinates must be entered in the Setup Menu for both WinAOS and WinListen. Apparently you can't put in the more accurate GPS coordinates, but only our grid of FM05PS.

Operation Pointers

1. To set up the radio, turn on the Spectrum waterfall by clicking Menu-> Scope. Next, turn on Receiver Incremental Tuning (RIT) by pushing the button on the top right of the radio. A small "RIT" should then show at the top right of the screen under the time. The small knob to the left of the RIT button adjusts the receive frequency without changing the transmit frequency. We will need this below to adjust the frequency for the linear transverter satellites.



- Particular satellites can be selected by clicking the letters across the bottom of the screen. When a satellite is visible, the letter is white.



- For the software to control the radio, click on the C- in the upper left to toggle it to C+. In addition, for most of the FM satellites, you also need to click the T0 button to toggle it to T1 to turn on the tone for access. Apparently the tone for a satellite is not included in the SatPC32 database, so the frequency needs to be set manually on the IC-9700 (67 Hz for ISS and SO-50). Since most FM satellites that require a tone use 67 Hz, you probably won't need to set this. However, if things aren't working, it would be good to check. Instructions for setting the tone (from the IC-9700 Advanced manual) are given below.

◇ Setting the repeater tone frequency

Some repeaters require a subaudible tone to be accessed. Subaudible tones are superimposed on your signal, and must be set in advance. Do the following steps to set the tone frequency.

1. Push **FUNCTION**.
2. Touch **[TONE]** for 1 second.
 - Opens the TONE FREQUENCY screen.

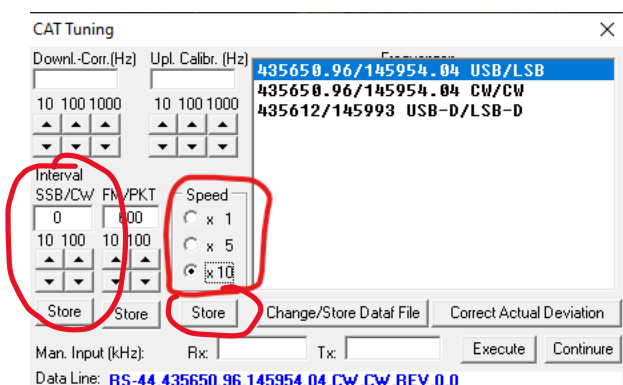


3. Rotate **(MAIN DIAL)** to select the desired subaudible tone frequency.

• Selectable tone frequencies

67.0	88.5	114.8	151.4	177.3	203.5	250.3
69.3	91.5	118.8	156.7	179.9	206.5	254.1
71.9	94.8	123.0	159.8	183.5	210.7	
74.4	97.4	127.3	162.2	186.2	218.1	
77.0	100.0	131.8	165.5	189.9	225.7	
79.7	103.5	136.5	167.9	192.8	229.1	
82.5	107.2	141.3	171.3	196.6	233.6	
85.4	110.9	146.2	173.8	199.5	241.8	

4. The default update rate for the Doppler correction is once per second. This is fine for the FM satellites. However, it is not fast enough for CW and SSB. To work CW and SSB, select the option to update 10 times/second on the CAT menu. Click “Store” just below this button.



5. Also, set the SSB/CW interval to 0, and then press “Store”. This ensures that the calculated updates are promptly send to the radio hardware.

6. For setting the RIT for the SSB/CW satellites, it is helpful to first listen for the loopback signal on CW, then adjust the RIT so that it matches the pitch of the sidetone (upper knob on the left is the volume on the receive channel, lower knob on the left adjusts the volume of the sidetone, as well as receiving on the transmit channel). The frequency will then also be set correctly for SSB (which is harder to adjust on loopback). Note that the CW key jack on the IC-9700 is 1/8" (3.5mm) instead of 1/4" as on the FTDX101MP. However, there is an adapter cable that lets you plug in any of the keys to the IC-9700. The outer knobs around the volume controls are the RF gain/squelch controls. For the MAIN (receive channel for us), I increase the RF gain to just before the squelch cuts in. On the SUB (TX channel for us), I increase it until the squelch kicks in, silencing the noise from the channel. This will still enable you to hear the sidetone by adjusting the volume, without being distracted by noise from the transmit channel.

SatPC32 can be used stand-alone. However, it is convenient to link it to DX Lab Suite so that DXKeeper can be used to easily log contacts, using information from the software and radio. Setting up DX Lab Suite to work with SatPC32 is the topic of a separate Setup Note.