

SERVICE:

DUCHIFAT1 provides a worldwide position service for base and mobile amateur radio satellite users. We are not yet sure whether the satellite's receiver sensitivity is sufficient for reliable hand held transceivers usage.

Grade of service depends on user adherence to Power levels, transmission timing and period and precedence criteria as explained below.

DUCHIFAT1 is in accordance with IARU and ITU regulations for the Amateur Satellite Service.

COMPRESSED APRS:

To provide the best service for the largest number of users, DUCHIFAT1 is APRS¹ protocol driven and requires that all users adhere to the fundamental COMPRESSED APRS protocol requirements. Users that adhere to these published protocol and operating standards are very welcome.

DUCHIFAT1 will only respond to COMPRESSED APRS packets. Please do not send any transmission to DUCHIFAT1 other than 14 characters long COMPRESSED APRS packets.

We have tested the BYONICS TynyTrak4 successfully with DUCHIFAT1 in space, but we believe that there are more possibilities to generate COMPRESSED APRS out there, but we haven't tested them. The BYONICS TynyTrak4 can be connected to a GPS receiver to obtain your location, but it can also be pre-programmed with a location without the need for on line GPS receiver. The "Configuring TT4 Explanation" document in the link below explains how to do it.



Byonics TinyTrak4

¹ APRS® is a registered trademark of Bob Bruninga

Registration:

Please register in advance at www.H-SPACE-LAB.org and obtain your own valid **Symbol Code** and **Symbol Table** characters. Program your COMPRESSES APRS generator with these two characters so that DUCHIFAT1 ground station can identify your packet and show your location on the map in the above site later on.

Frequencies and transmit power:

DUCHIFAT1 uses 1200bd AFSK uplink on 435.220MHz (UHF), and 1200bd BPSK downlink on 145.980MHz (VHF). Doppler shift is up to about ± 10 KHz in UHF, and ± 3.3 KHz in VHF and slight thermal frequency deviations is possible, below 1KHz.

User transmit mode is usually FM for transmitting the 1200 baud AFSK audio from TinyTrak4 to the satellite. User receive mode is USB for the ability to decode the 1200 BPSK telemetry.

Our experience shows that transmitting with a peak power of 5W with a 15.5dBic (circular polarity) antenna at elevation above 50 degrees gives very good results, so please limit your EIRP to not higher than above combination of 5W into 15.5dBic antenna.

Operation and transmit timing – two scenarios:

1. With close monitoring of satellite's downlink

DUCHIFAT1 sends BPSK modulated telemetry every 20 seconds, with relatively long quiet pause between transmissions. It also sends a Morse code beacon every 1 minute saying "hi de duchifat" ...

- a) Send your packets during the quiet pauses and listen to the satellite's downlink. If the satellite receives your packet you will hear an immediate very short transmission of your packet being retransmitted by the satellite.
- b) Stop sending additional packets immediately after hearing your packet retransmitted by the satellite, and let other HAM operators try.
- c) Do not transmit to DUCHIFAT1 when it is below 50degrees in this operating scenario
- d) Use a high packets sending rate of up to every 7 seconds but please BE FAIR to the other users, and STOP SENDING packets immediately after you hear the satellite retransmits your packet for the first time.

2. For mobile operation, with APRS rig running 50W into a monopole / whip antenna

This is for mobile 1200 baud AFSK APRS trackers that can generate 14 characters long COMPRESSED APRS in UHF into car roof mounted whip or $1/4 \lambda$ and similar antennas

- a) Set your tracker to send a packet every 1 minute, to avoid congestion at the sat input
- b) Using non directional vertical antenna, and 50W transmit power even at low elevation angles.
- c) Consider antenna gain vs. elevation. Refer to chart Elevation of Vertical Whip by Bob Bruninga near the bottom of the page at <http://aprs.org/astars.html>

Mobile operation

- a) Use a smart phone application for predicting and tracking satellites passes, for example: AmsatDroind FREE.
- b) For receiving the satellites packet retransmission of your uplink COMPRESSED APRS packet, you must be able to receive USB. We have good experience with the Kenwood TH-F6A handy, Yaesu FT817 portable radio, and AMSAT-UK FUNcube Dongle Pro+ with a laptop.
- c) We haven't yet succeeded reaching DUCHIFAT1 with 5W and handheld directional antennas like the Arrow and ELK. It may be possible but one must be well trained with Doppler compensation, antenna aiming, and be lucky to hold the antenna with its linear polarization matching the correct satellite's linear polarization at that very second...

DUMP Satellite's memory

The Herzliya Science Center students will dump the satellites memory during adequate passes and save the received locations and callsigns in the site world map. Unfortunately we cannot guarantee how much time will elapse from the moment your packet was successfully received by DUCHIFAT1 until you can see your own callsign and location on the map. It may take few days or even more.

There is also no mechanism for resending packets that got lost during dump to the ground station, so therefore please forgive us if your packet got lost, and please try again during another pass of the satellite above your QTH.

QSL cards

We will send a QSL card via bureau to every amateur radio station that the satellite will receive and its location will be shown on the map.



73 and GOOD LUCK!

The Herzliya Science Center team – 4X4HSC