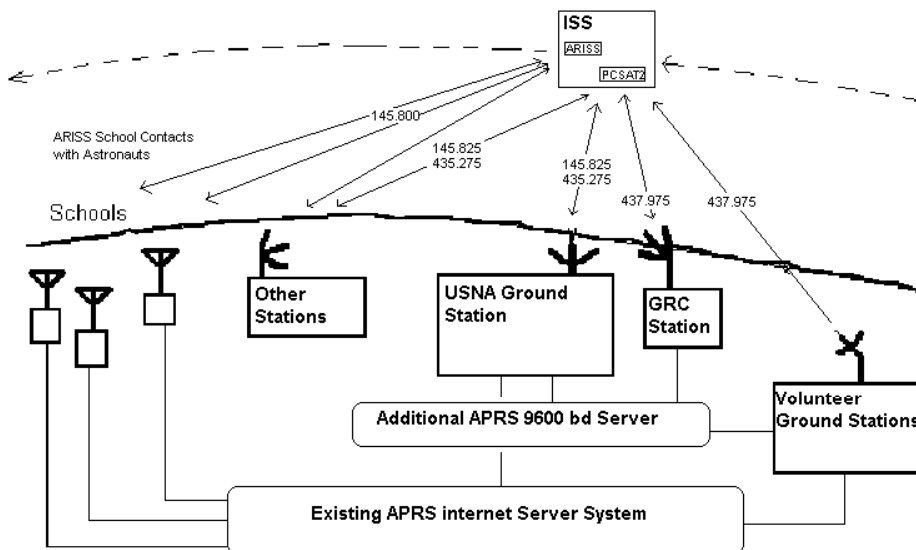
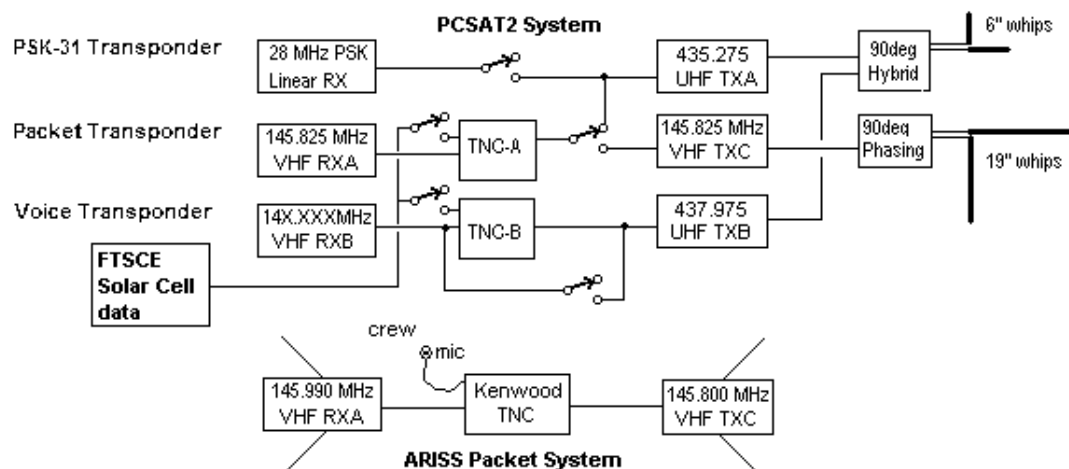


## EA467 PCSAT2 Operations LAB

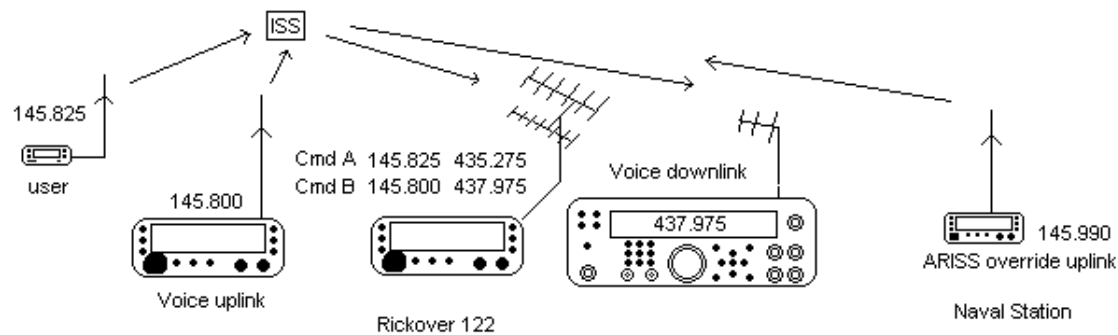
(rev 1) Fall 2005

PCSAT2 Concept of Operations

PCSAT2 was launched on 26 July and activated on 3 August 2005 to provide science data on new technology solar cells, and to support communications experiments for schools and other radio amateurs as shown above. Ideally, during this lab period you will have the opportunity to command some of its functions. Unfortunately, although there are 6 passes a day, only one will occur during your lab period and then, only for 6 minutes, so it will be a very critical few minutes. We will use a scripted plan to try to exercise as much of the spacecraft as we can. The diagram below further details the communications payload:



The PSK-31 receiver built by students at Brno University in the Czech Republic is off since it has degraded on orbit. The FTSC is the NRL Forward Technology Solar Cell experiment. Normally we have the FTSC data routed to the side B transmitter. The diagram on the next page shows how we will configure our ground station to operate on all the various uplinks and downlinks for this experiment.



Notice how users can send and receive packet digital data on the packet transponder and at the same time we can activate the FM voice repeater. But only our station is presently allowed to use the voice transponder because it has an unpublished VHF uplink. Therefore, to exercise both transponders on the same pass, we have informed the amateur satellite community that we will be watching the 435.275 Packet downlink for signals and messages from other users and then will respond to them by voice on the voice transponder. This kind of cross-band, cross mode has never been done before.

**Telemetry:** Similarly, since the packet transponder also has telemetry data, we will capture all telemetry packets to give us the health of the spacecraft:

- Battery and individual cell voltages.
- Electrical Power System currents (solar, battery, load and shunts)
- Communication circuits currents
- Spacecraft Temperatures
- Command Status

**Preparations:** During the first part of class, everyone will prepare for the event. This includes reviewing these web pages, and downloading the latest Keplerian elements and loading them into your copy of Instanttrack running on your the lab PCs. Setting your clocks to correct time.

- PCSAT2 OPS PAGE: <http://www.ew.usna.edu/~bruninga/pec/pc2ops.html>
- PCSAT2 Live Telemetry: link on the above page
- PCSAT2 Telemetry plots: link on the above page
- CelesTrack Elements: <http://celestrak.com/NORAD/elements/> (get amateur.txt)
- ARISS Operations: <http://www.ariss.net>
- ISS Tracking page: <http://heavens-above.com>

**OPERATIONS:** The following student volunteers will operate the station:

- 1) Tracking Officer: Will use InstantTrack to keep the command station antennas pointed to ISS
- 2) Voice Tracker: Will use InstanTrack to keep the Voice receiver's antenna pointed at ISS
- 3) Command Operator: Will send the commands to activate the mode switches.
- 4) Packet Receiver Operator: Will monitor and log all user packets observed and tune for Doppler
- 5) Voice Receiver Operator: Will keep the voice receiver tuned for Doppler
- 6) Voice Operator: Will respond with voice comment to all user packets seen
- 7) Telemetry Officer: Will monitor and log all Telemetry
- 8) PAO student: Will take candid photos of the event