

MAREX & ARISS-RUSSIA

Personal Message System (PMS)
Upgrade project for ISS

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Introduction

ISS Ham - Current Packet station

- ISS has 2 Packet Mail systems on board.
- PacCom TNC and Ericsson Radio combo.
- Kenwood D700 with built in TNC.
- Both systems have operational problems.

PacCom

- Memory limited to 64k (usable)
- Prone to frequent lockups (weekly)
- Several document software issues, Lost Mail, phantom mail numbers and Race condition
- Has not been used since December 2003
- Battery status unknown

D700 Packet

- Mail Box does not Acknowledge message body packets. Causes Retry timeout frequently
- Long Random packet delays
- Unexplained packet disconnects not related to LOS or Retries
- Can take 2 minutes to send a 1 line message
- Most successful Mir packet users can not access the ISS D700

Introduction continued

MAREX Packet Upgraded Project

- Supports all existing features of current ISS-Ham System (Mail and APRS)
- Uses Kantronics KPC-9612 TNC
- Uses Icom ID-800
- Data Rates: 1200 - 9600+K Baud
- 512k memory storage for Email
- Full Remote Control support from Earth

KANTRONICS KPC-9612



Current ISS hardware

- The 9612 can be cabled to work with the D700, bypassing the built-in TNC.
- It may be also possible to design a cable system for the Erickson HT

Recommended Packet Upgrade Hardware Overview

- Transceiver: Icom ID-800
- TNC: Kantronics KPC-9612

TNC: KPC-9612 Features

- 1200 - 9600 Baud data rate
- 512kbyte RAM
- Orbiting Store and forward Mail box
- Fully remote controllable by System Operators on Earth
- Expandable support for two radios

TNC: KPC-9612 Flight History

- Successfully flown on Mir 1997 - 2000.
- PC-Sat1 and PC-Sat2
- Proven space flight reliability
- Earth based System operators maintained the PMS file system without ISS crew intervention.
- Proven compatibility with Kenwood radios

KPC-9612 Software Enhancements Required

- ISS ROM Settings Pre Burnt
- Log off Banner Message

9600 Baud, Faster than 1200

- 9600+ Baud will offer a realistic data transfer rate of 4x.
- Large capacity internal mailbox supports multiple users and mail forwarding feature
- More users will be able to access the mail box during the typical 10 minute window.

More Data per Pass

Efficiency in Characters per Second

	35%	65%
1200	42	78
9600	336	624

Efficiency in Characters per Minute for an 8 minute pass

1200	20,160	37,440
9600	161,280	299,520

Development Schedule

- Icom ID-800: Work with Icom to modify radios if needed
- KPC-9612:
 - ROM update from Kantronics

2007 Installation Configurations

2 Meters

70 CM

- D700 & KPC 1200 baud
- Icom & KPC 1200 baud
- Icom & KPC 9600 baud
- Icom & KPC 9600 baud
- Or dual radio mode

TNC Comparison Features

Feature	KPC	PacCom	D700
9600 Baud	Yes	NO	Yes
Remote Ctrl	Yes	Problems	NO
Software Support	Yes	Problems	Dificult
Current Production	Yes	NO	Yes
Memory	512k	64k	112k

Future KPC-9612 Upgrades

- New features can be added if ARISS and sponsors wish to pay for the enhancements
 - Multiple user mail box access, already completed by Kantronics
 - Dual radio mail box support
 - Mail pending beacons
 - Expanded beacons

Summary

- The Packet Upgrade Project will help solve some of the existing problems we are experiencing with the current system.
- It will provide an expandable platform for the next 2-3 years.
- It is ready for deployment.
- Let's go for it!

Power Supply Load

	Min	Transmit	Power W (13vdc)
● Icom			
● Low TX 5w	1,100 ma	5,500 ma	
● Medium TX 15w	1,100 ma	7,500 ma	
● High TX 55w	1,100 ma	12,500 ma	
● Kantronics KPC-9612	45 ma	45 ma	1
● Maximum Total Loads	1,145 ma	5,500-12,545	
● The Power load of the KPC-9612 is not a significant factor.			

PacCom Problems

- PacCom Lockup's
 - frequency = monthly
 - Impact = off line for days
- Message 33 list bug
 - frequency = weekly
 - impact = off line for a day at a time
- Race Condition
 - frequency = daily
 - impact = minimal

PacCom Lockup

Stat : PR

Posted : 02/10/22 19:22

To : WF1F

>From : RS0ISS

@ BBS :

Subject: TXNKS

MILES,

I DIDN'T KNOW THAT PMS FAILED.

CLAUDIO ASKED ME ABOUT WHAT HAPPENED WITH IT.

I JUST RECYCLE POWER OF PMS.

I LOST ABOUT WEEK TO COm VIA PACKET AND YOU TOO.

73. VALERY

Message 33 Bug

WF1F>RS0ISS-1 [11/11/02 09:27:29]: <<C>>:

*** CONNECTED to RS0ISS-1

Logged on to RS0ISS's Personal Message System on board the International Space Station

CMD(B/H/J/K/KM/L/M/R/S/SB/SP/ST/SR/V/?)> LIST

Msg #	Stat	Date	Time	To	From	@ BBS	Subject
33	P	30/20/79	61:4D	7,200	1m99i>	m99MR	í9?>@í9>>

15368 Bytes free

Next message Number 466

Mailbox selected: 0

Message Bug 33 Suggestions

- Inform crew of the Message Bug problem
- ARISS Sysops should test Dave Larsen's Control Z theory
- Test for memory leak, if true then Time-line a monthly hard rest of the PacCom
- Update Users Manual, Teach public not to send mail when problem exists

Race Condition

- The ISS TNC responds too quickly to a packet acknowledgement. This causes lost data.
- Estimated packet delay is less than 200 milliseconds
- $(\text{Slot} + \text{TXD} + \text{AXDELAY} = \text{ReciverTurnAroundTime})$
- Suggest settings of 400 - 500 ms