Capacity Building in Space Technology Through Low Cost Programme Initiatives

By

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SUPARCO, the national space agency of Pakistan, is looking forward for capacity building in the field of space technology within its limited resources.

Two experimental Micro Satellites Badr-1 and Badr-2 have been indigenously designed, developed and launched in the past.
In 2008, a contract was awarded to CGWIC, China for manufacturing and launch of the first communication satellite of Pakistan, Paksat-1R, in order to meet needs of the country.

The contract was utilized by SUPARCO for capacity building in such way that an indigenously designed and developed subsystem named as Customer Furnished Instruments (CFIs) to Paksat-1R was flown and tested in orbit successfully.
Challenges and Constraints of CFIs

- Stringent qualifying criteria for CFIs to check its suitability against a mature Chinese platform
- Meeting the deadlines set for satellite to avoid delays in the schedule of the overall programme
- The subsystem should not cause any failure to the satellite
- Provision of limited space, mass and power
- CFIs functionality be such that it is significantly useful for future programmes
CFIs Design & Development

- It has the necessary electrical function of a satellite platform in order to be useful for the future programmes

- It does not propagate fault to the satellite

- Mostly COTS components were used

- The units were ruggedized in order to meet stringent qualification requirement
Overview of CFIs - Interfaces

PakSat-1R Satellite Platform

Satellite Receiver  CFIs  Satellite Channel Amplifier
Overview of CFIs - Interfaces
Overview of CFIs – Broad Specs

- Total Mass: 48.5kg
- Dimensions: 36” (L) x 30” (W) x 15” (H)
- Power Consump: 75W
- Qual. Temp Range: -5 °C to 60 °C
Overview of CFIs – Broad Specs

CFIs Subsystem comprised of 09 Units

- Remote Terminal Unit (RTU)
- Data Handling Unit (DHU)
- Power Cond. & Dist Unit (PCDU-1 & 2)
- Telemetry Transmitter (Tx-1 & 2)
- Telecommand Receiver (Rx-1 & 2)
- Channel Filter (CF)
Overview of CFIs – FM Units
Overview of CFIs – Integrated Units
Overview of CFIs – Ground Station
Successful Completion of the Project

- IOT of CFIs has been conducted successfully
- All the 09 units are in working condition
- All TMs received are satisfactory
- TC are executed successfully
- The indigenously designed and developed Ground Station is communicating successfully with CFIs
Capacity Building

- 09 space qualified units
- Low cost development
- Human Resource Development
- Test facilities and local industry enhancement
Conclusion

The successful completion of the project has proved a great milestone for SUPARCO in the design and development of low cost space hardware for satellite applications.
SUPARCO is working on a 30 Years plan for design and development of a series of experimental and application satellites such as Paksat, PAKTES and PRSS etc.
Thanks for your kind attention