

# **Capacity Building in Space Technology Through Low Cost Programme Initiatives**

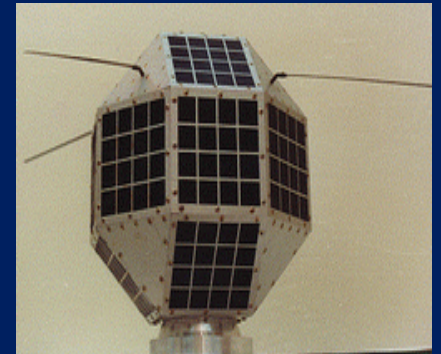
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# Introduction

- 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



**Badr-1**



**Badr-2**

# Introduction

# Contd..

- 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



Launch of paksat-1R

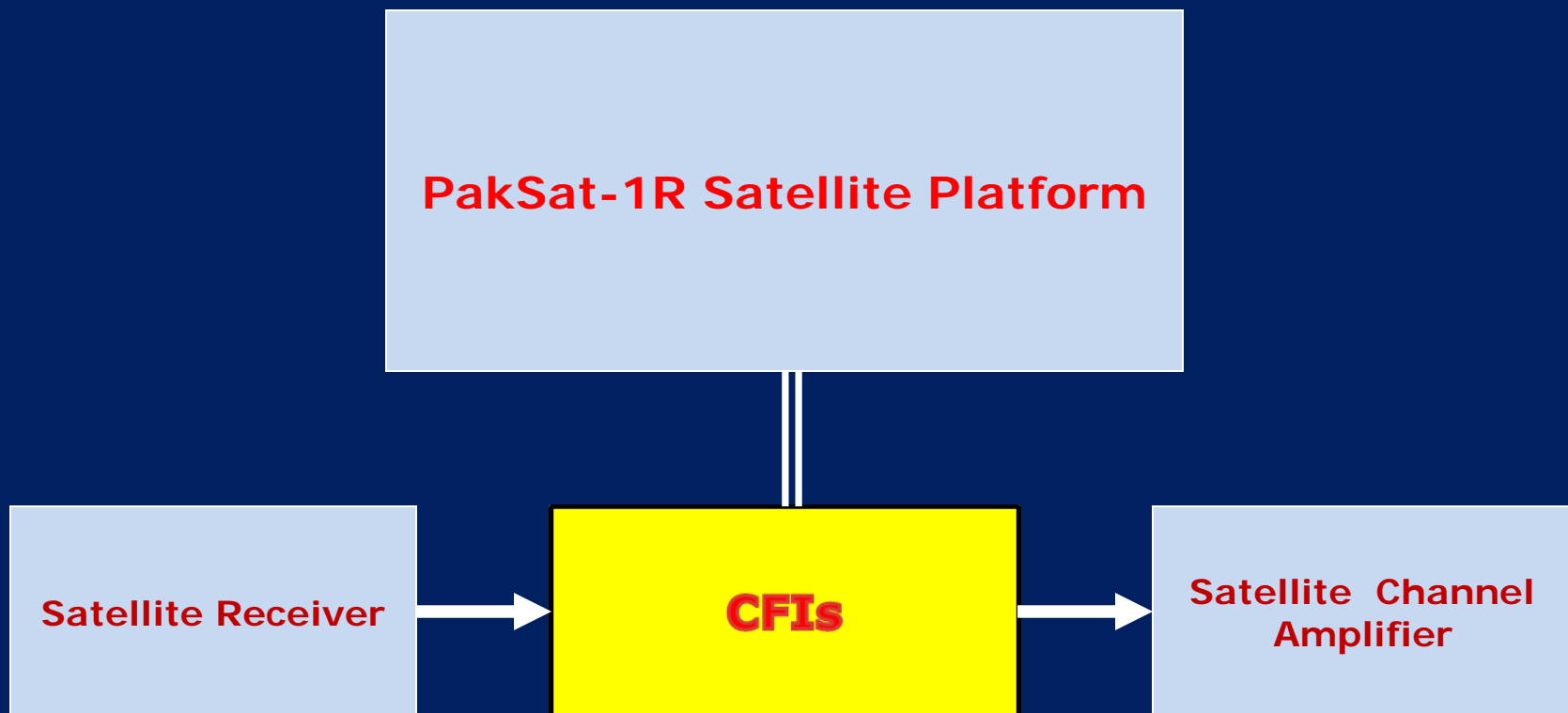
# Challenges and Constraints of CFIs

- 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

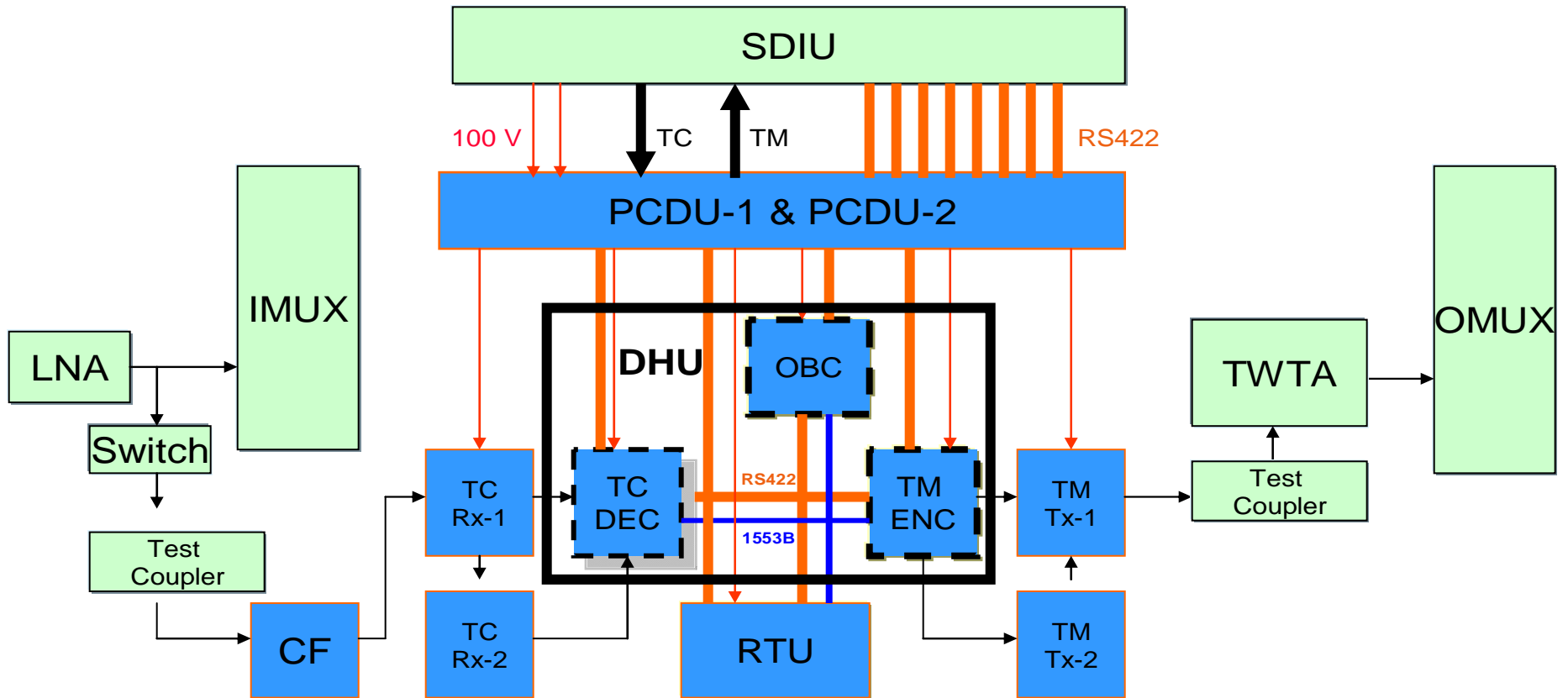
# CFIs Design & Development

- 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



# Overview of CFIs - Interfaces



- CFI
- Spacecraft

# 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

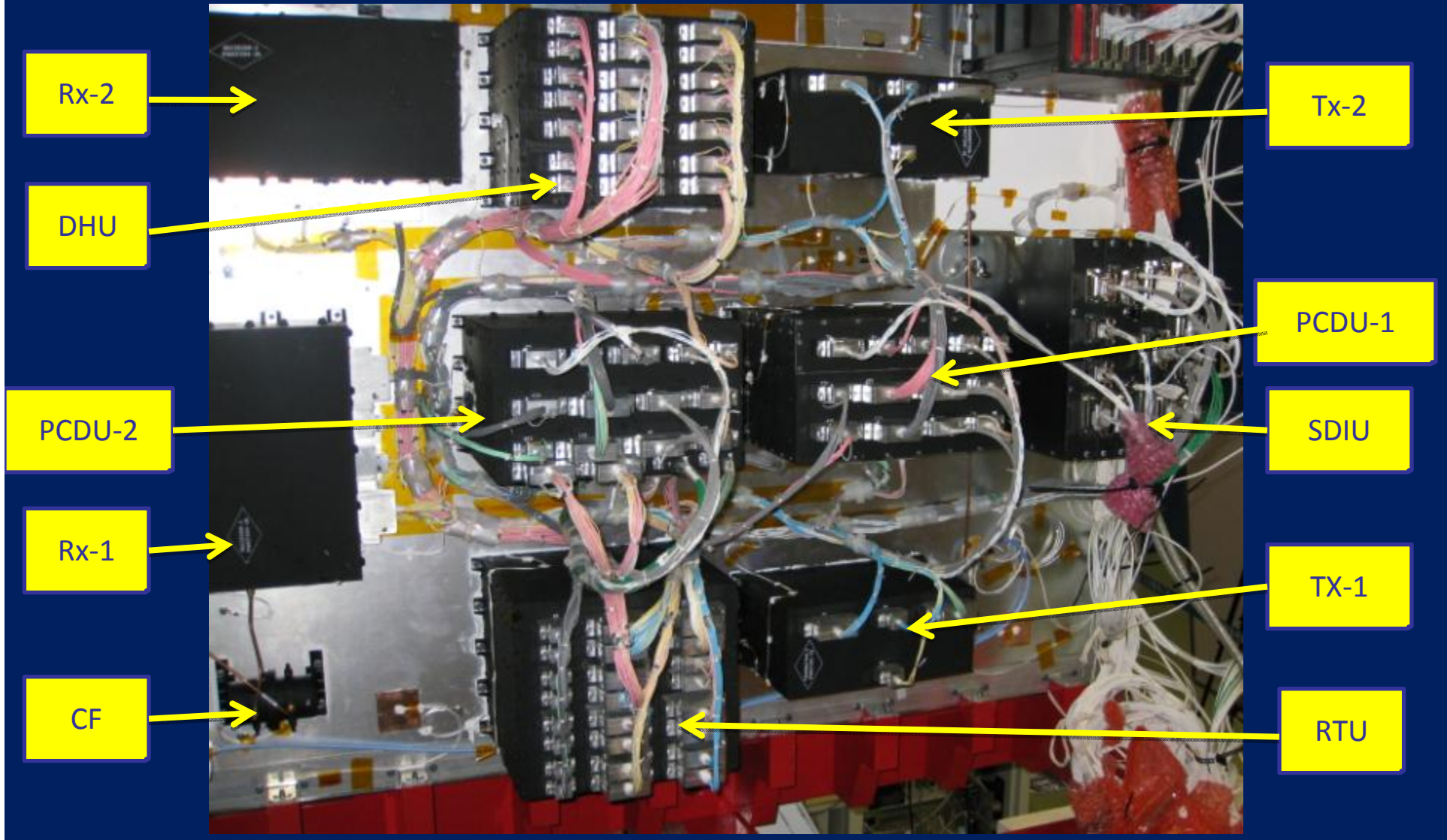
## CFIs Subsystem comprised of 09 Units

- 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

# Step Forward in Capacity Building

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**