

Design and Development of Four Channels Fast Counter

For Charge Exchange Diagnostic

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ABSTRACT:

Charge Exchange diagnostic in Aditya Tokamak is used to measure Core Iron temperature of Aditya Plasma. It is estimated using the energy spectrum of Passive Charge Exchange (CX) Neutrals escaping from the ADITYA tokamak. CX-neutrals are detected by Channel Electron Multiplier. The detector, Channel Electron Multiplier is used in counting mode, to collect the number of charge exchange neutrals reaching in a finite interval of time (~ tens of ms) after traveling across the retarding fields of Neutral Particle Analyzer Plates. These counts are further analyzed to get the information regarding Core Ion temperature of Aditya Plasma.

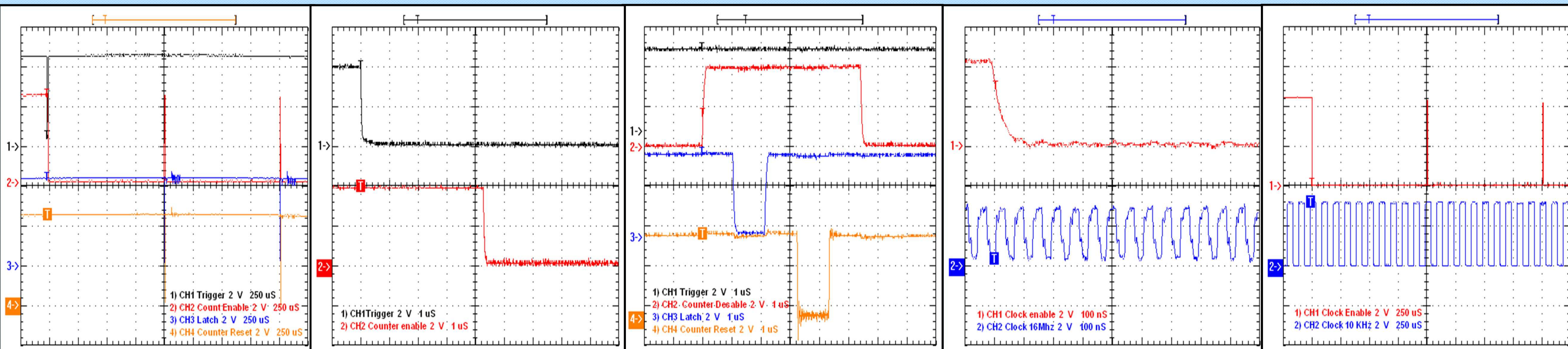
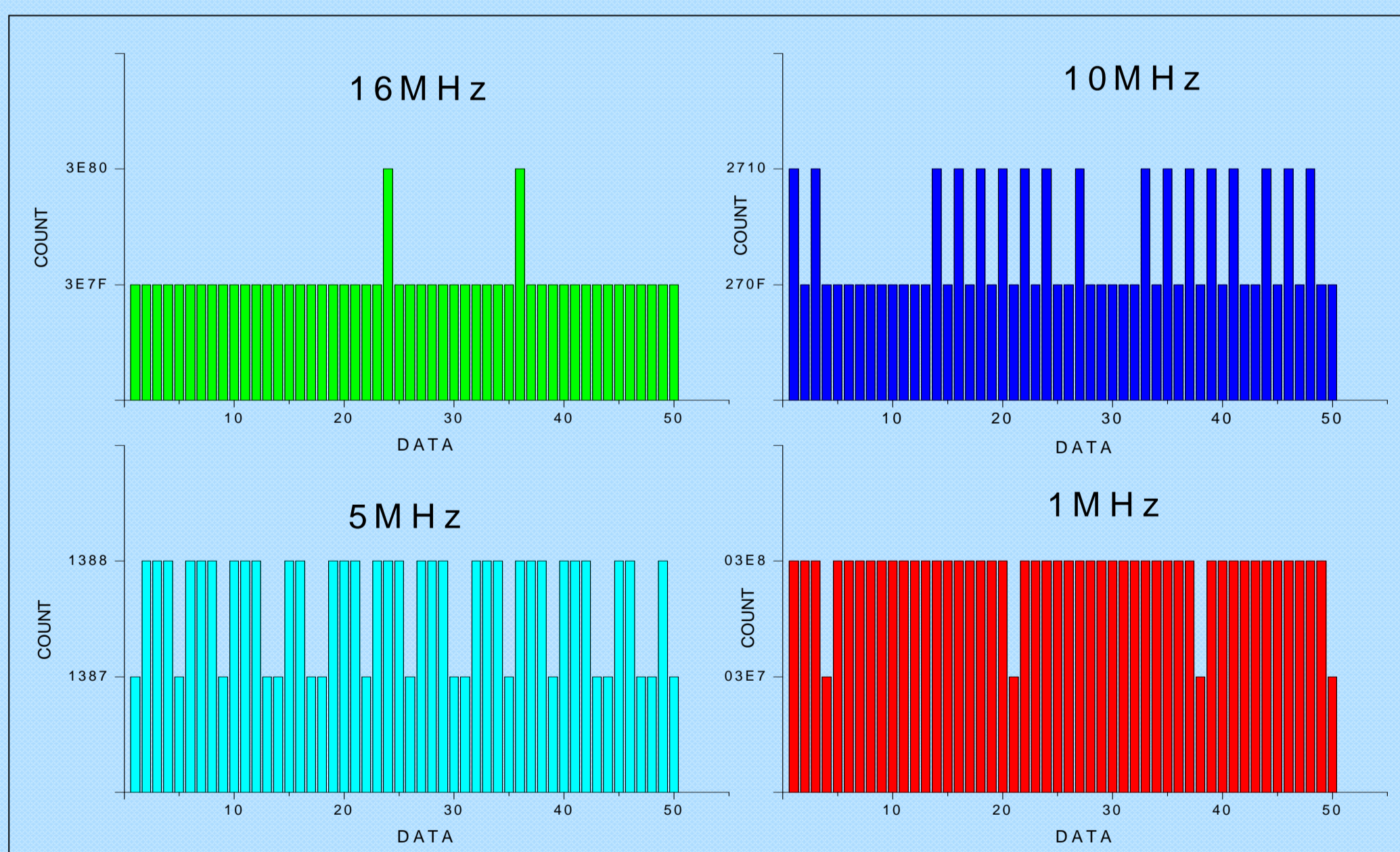
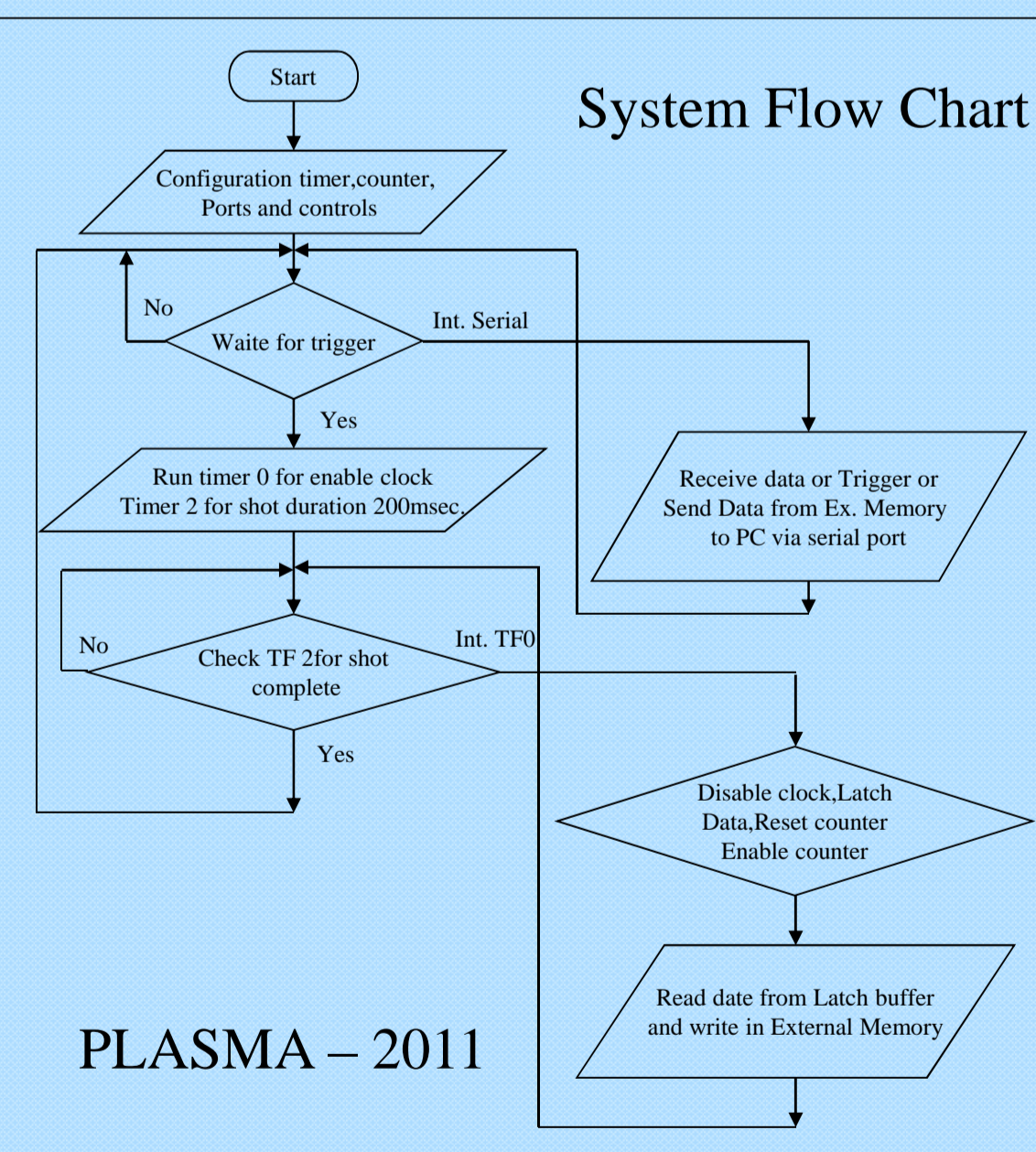
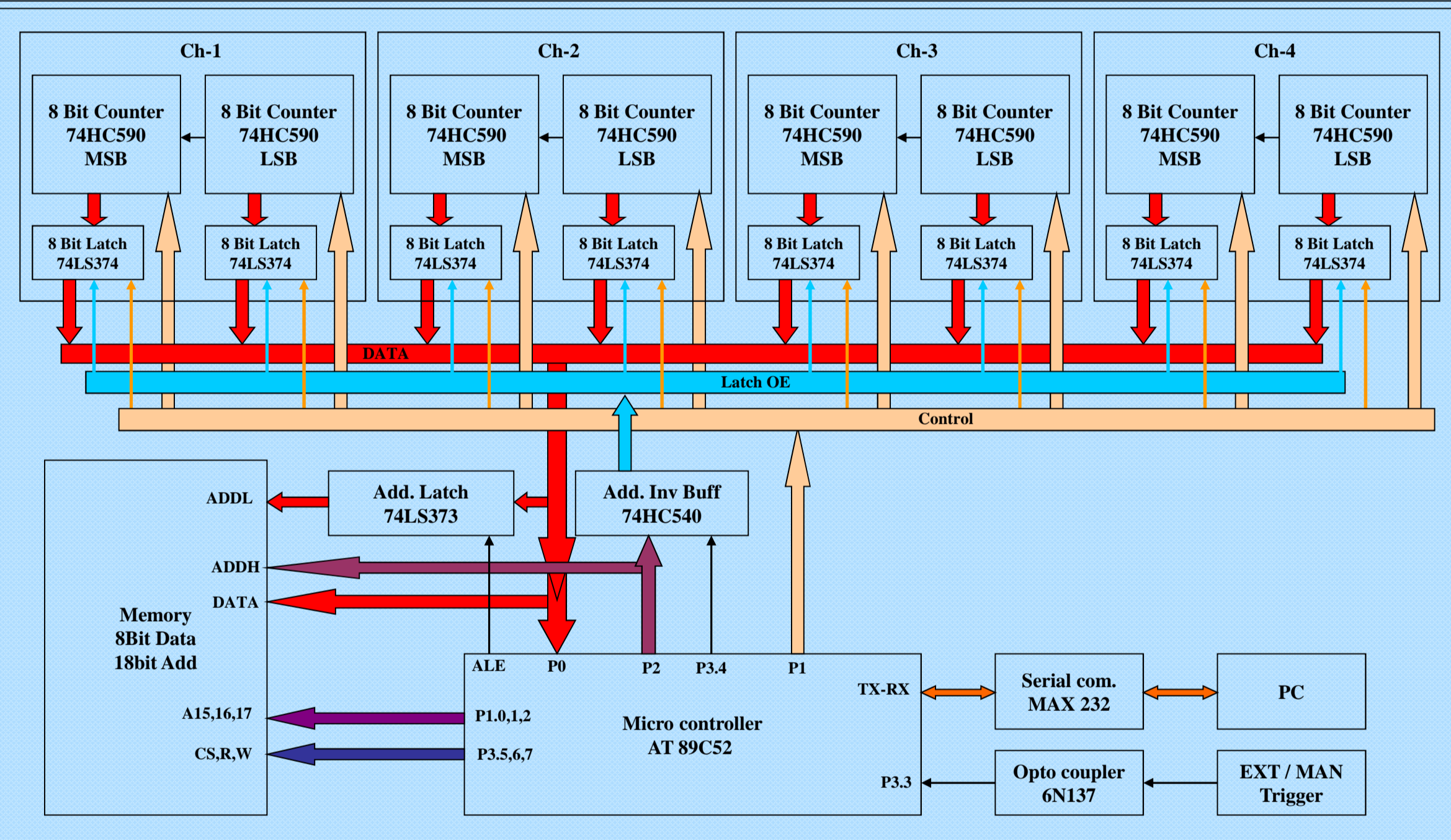
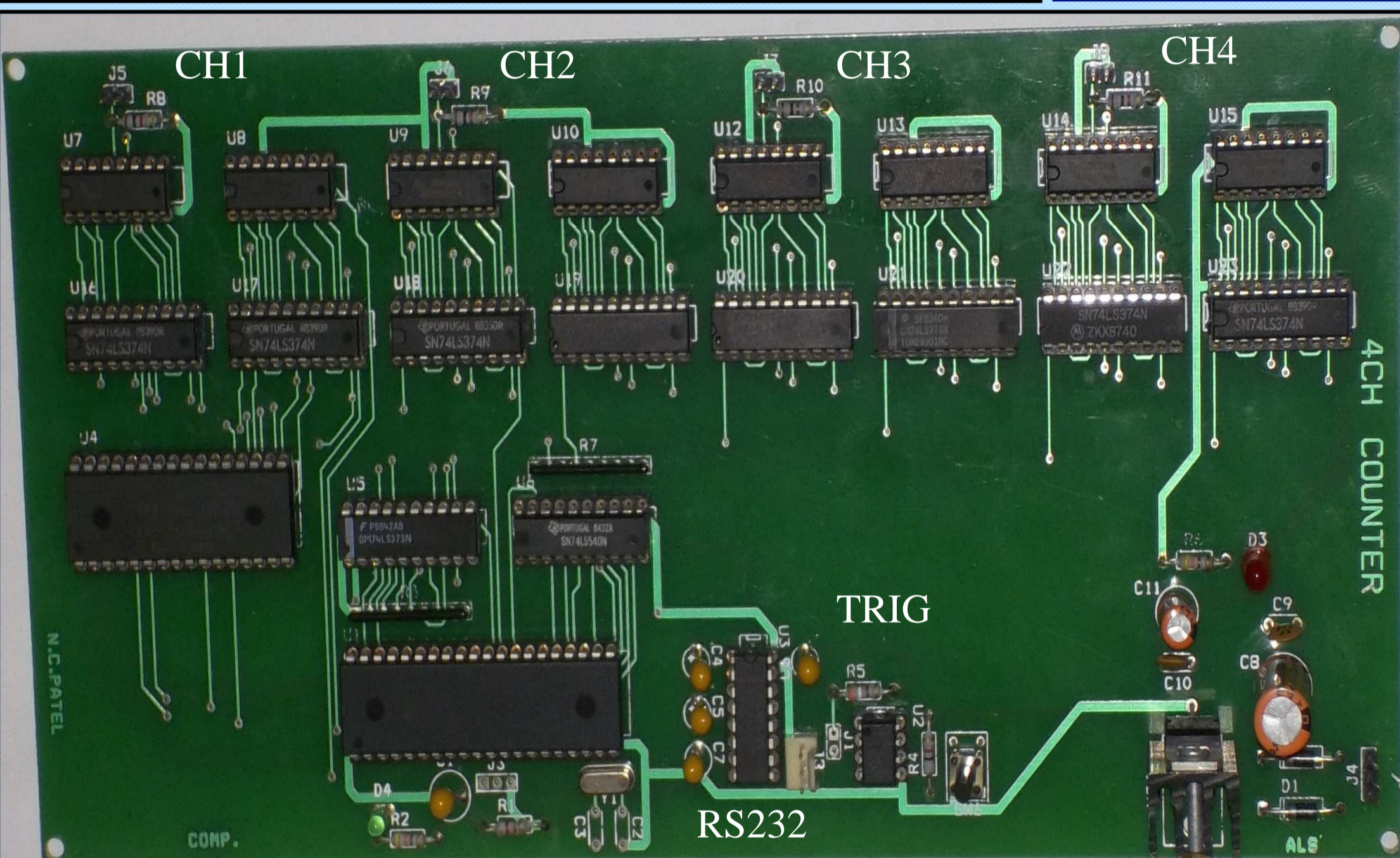
A fast counter is designed and developed to count the number of charge exchange neutral reaching in a finite interval of time detected by Channel Electron Multiplier. It is a four channel 16 bit counter with gating and start facility. The 16 bit counter data is stored in local on-board memory. Different controls and stored data from memory can be transferred to PC using serial communication. The optically isolated external trigger from Loop voltage is used to start counter.

The paper describe the design, development, testing and Graphical User Interface developed using LabVIEW.

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- Input: 4 Channel, 16 Bit counter with maximum count frequency of 16MHz
- Controls: a) Gating time: 1 to 255 ms. insteps of 1 ms while Shot time is 50 ms to 12.75 Sec. step of 50 ms.
b) Trigger input : Manual or External Optically isolated or through Software (PC)
- Interface and storage: LabVIEW GUI for serial communication interface, and 512k x 16bit memory
- Built in regulated power supply.

* All control pulse is generated according CCKEN



Conclusion: The system is tested with actual data of Charge Exchange Diagnostic in Aditya Tokamak.