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# Programming the Echotek ECDR-GC814

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# Introduction

- This talk is intended to be an overview of the programming required to run the ECDR-GC814 VME card



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# Topics of Discussion

- Software platform
- Card layout
- API for the card
- Integration with Recycler BPM system
- Difficulties
- Conclusions



# Software Platform

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- VME VXWorks Platform
- MVME2401 Libraries

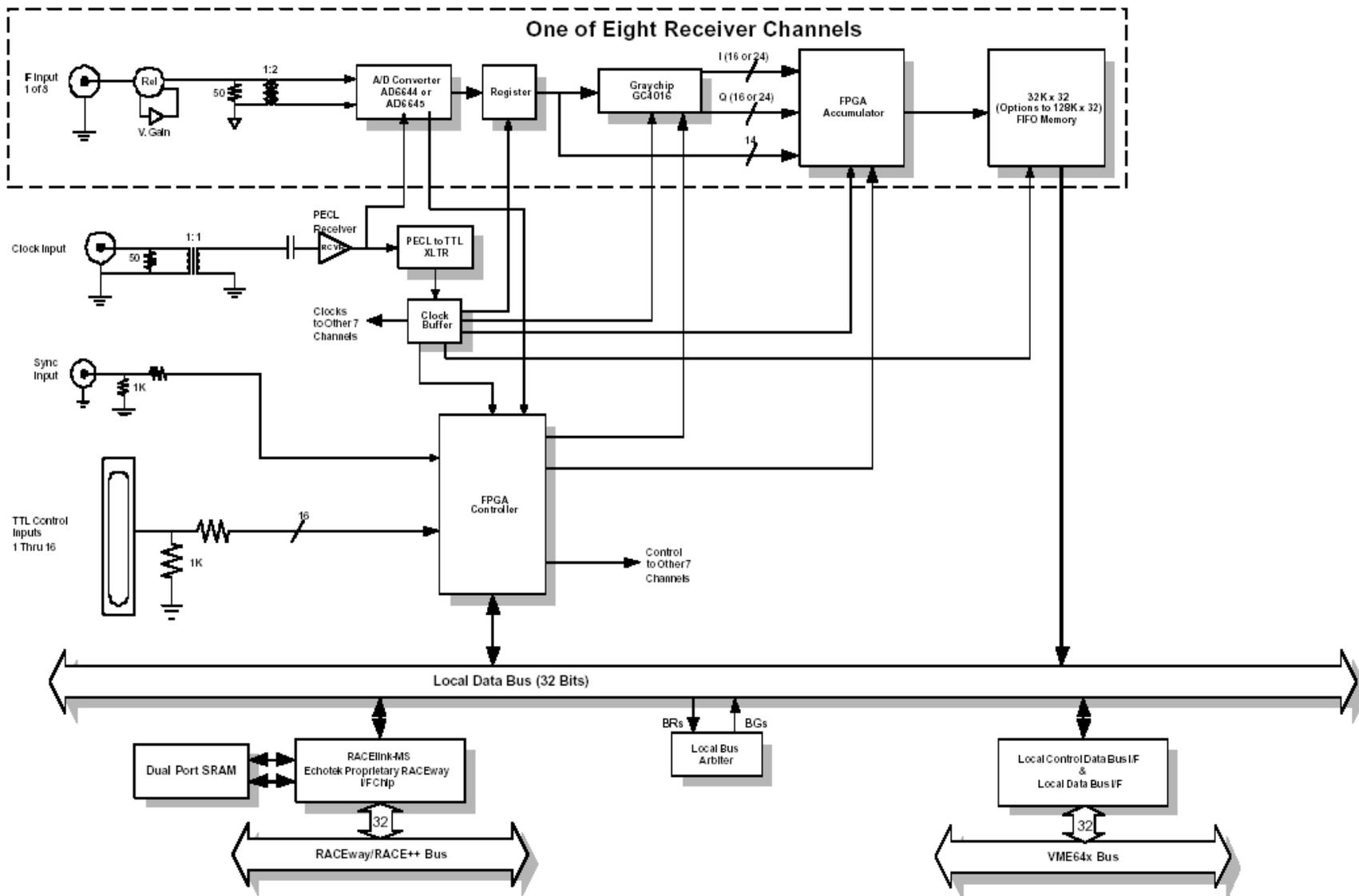


Figure 1-1 ECDR-GC814 Block Diagram



# Controlling the ECDR-GC814

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- Basic UNIX style driver functions
  - Open()
  - Close()
  - Read()
  - IOCtl()



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# The IOCTL Function

- `status = ioctl(ecdr814pt, COMMAND, variable);`
- Allows setup and control of all the cards functions

Table 4-1 IOCTL Function Codes

| IOCTL Commands               | Argument                                  | Command Descriptions   |
|------------------------------|---|--|
| ECDR814_GET_BYTE_COUNT       | Address for storage of the byte count     | Writes the number of bytes to be collected on each trigger to argument.  |
| ECDR814_GET_DATA_MODE        | Address for storage of the data mode      | Writes the data mode to be used to argument.<br>Available values are:<br>COUNT_DATA<br>PACKED_DATA (receiver boards only)<br>RAW_AD_DATA<br>UNPACKED_DATA (receiver boards only)   |
| ECDR814_GET_CHANNEL          | Address for storage of the channel number | Writes the channel number to be used to argument.<br>Available values are:<br>CHAN_0 (if populated)<br>CHAN_1 (if populated)<br>CHAN_2 (if populated)<br>CHAN_3 (if populated)<br>CHAN_4 (if populated)<br>CHAN_5 (if populated)<br>CHAN_6 (if populated)<br>CHAN_7 (if populated) |
| ECDR814_GET_HEADER           | Address for storage of the header         | Writes the current header to argument.<br>Argument must be an address to a 64-bit space.<br>The lower 32 bits will store header word 0. The upper 32 bits will store header word 1.  |
| ECDR814_GET_TRANSFER_TYPE    | Address for storage of the transfer type  | Writes transfer type to argument.<br>Available values are:<br>RW_TRANSFER<br>SINGLE_READ_TRANSFER<br>VME_TRANFER   |
| ECDR814_MODIFY_WORD_COUNT    | The word count                            | Forces all DMAs to be of size argument.  |
| ECDR814_PROGRAM_ALL_CHANNELS | None                                      | Programs each channel based on the setup contained in the initialization file (populated channels only).*  |

**\*This Command is not valid if using a VI Power4e BSP due to BSP limitations.**



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Table 4-1 IOCTL Function Codes (continued)

| IOCTL Commands            | Argument                          | Command Descriptions   |
|---------------------------|-----------------------------------|--|
| ECDR814_PROGRAM_CHANNEL_0 | None                              | Programs channel 0 (if populated) based on the setup contained in an initialization file.  |
| ECDR814_PROGRAM_CHANNEL_1 | None                              | Programs channel 1 (if populated) based on the setup contained in an initialization file.  |
| ECDR814_PROGRAM_CHANNEL_2 | None                              | Programs channel 2 (if populated) based on the setup contained in an initialization file.  |
| ECDR814_PROGRAM_CHANNEL_3 | None                              | Programs channel 3 (if populated) based on the setup contained in an initialization file.  |
| ECDR814_PROGRAM_CHANNEL_4 | None                              | Programs channel 4 (if populated) based on the setup contained in an initialization file.  |
| ECDR814_PROGRAM_CHANNEL_5 | None                              | Programs channel 5 (if populated) based on the setup contained in an initialization file.  |
| ECDR814_PROGRAM_CHANNEL_6 | None                              | Programs channel 6 (if populated) based on the setup contained in an initialization file.  |
| ECDR814_PROGRAM_CHANNEL_7 | None                              | Programs channel 7 (if populated) based on the setup contained in an initialization file.  |
| ECDR814_READ_INI_FILE     | Initialization file path and name | Reads the initialization file specified by argument.   |
| ECDR814_SET_CHANNEL       | The channel number                | Writes the channel number to be used.<br><br>Available values are:<br>CHAN_0 (if populated)<br>CHAN_1 (if populated)<br>CHAN_2 (if populated)<br>CHAN_3 (if populated)<br>CHAN_4 (if populated)<br>CHAN_5 (if populated)<br>CHAN_6 (if populated)<br>CHAN_7 (if populated) |
| ECDR814_SHOW              | None                              | Displays the contents of the ECDR-GC814-ACCUM registers  |
| ECDR814_SHOW_PROGRAM_INFO | None                              | Displays the setup information obtained from an initialization file.   |
| ECDR814_TRIG              | None                              | Performs a software trigger if the ECDR-GC814-ACCUM is setup for software trigger mode.  |



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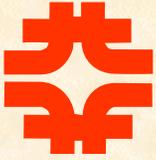
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# The Read Function

- Waits on FIFO transfer to complete
- Transfers data from FIFO to MVME2401 via Direct Memory Access (DMA)



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# Integration into Recycler BPM Front End

- Data Engine Class will be developed
- Engine will have 3 modes of operation
  - Flash
  - Turn by Turn
  - Calibration
- Engine stores data in Front End in Raw mode
  - Is and Qs
- Engine accepts data back from Front End for processing
  - Positions, Intensities, Averages.



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# Troubles with the ECCR-214-PMC

- When doing TBT in Synchronized mode FIFOs can get out of sync.
- Echotek will work on the VME DMA interface and TBT on the ECCR-GC814 for now.



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# Conclusions

- We have been able to prove that this style of BPM can do Flash and TBT measurements.
- Echotek has had good response with problems that have occurred.
- Integration into the current Recycler BPM Front End will save a great deal of development time.