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Electronics

Revised Cost Estimates

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Revised Estimates for Channel Amplifiers and Control

Introduction

Estimates presented in June 1993 were based on an assumption that the final 320 channel array would be simply an extension of the 32 channel prototype. This used the original amplifier design which now included remote control for gain, pole zero and discriminator threshold. The amplifier was supported by a control module which processed the analogue output and also controlled the selection of the channel within an event.

After further investigation it now appears that we can obtain a higher density and lower cost by rearranging the functions of a control module into groups of eight and shifting certain system features into Camac. A revised layout would fit 32 amplifier channels into a Eurocrate along with four modules to control selection of channels in an event and four modules to convert amplitude to time. The pile-up indication would be placed directly within Camac along with an interface for remote control. These two Camac modules would each handle 32 channels.

Redesign of the system is mainly concerned with re-packaging existing functions to get a better balance between keeping interconnections at a minimum but saving on common support circuits by grouping similar functions together.

In the revised scheme the amplifier has been extended to include the analogue processing circuit along with the gate generation circuit. The analogue output from the amplifier is then less dependent on the time relation of its digital discriminator output and this eases the task of both selecting a set of channels within an event and converting amplitude into a digital value.

There are now five parameters within each amplifier which are under remote control: Gain, Pole Zero, Discriminator, Gate Width and Integrator Time Constant. These are controlled by a Camac Control Interface module which is connected in a daisy chain fashion to 32 amplifiers. Non-volatile devices are used at each amplifier to ensure that the current settings are preserved following a power interruption.

The remaining functions of the Channel Control are re-packaged into three modules with an overall reduction in the cost and an increase in density. The generation of Walk signals and the associated Accept levels to mark channels within an event are grouped into an eight channel unit while the Conversion of Amplitude to Time is separated in another eight group unit.

This rearrangement makes better use of common circuitry at a slight increase in the number of interconnections. The overall result will reduce costs by around 20% and enable 32 channels to be placed in a single crate. Detection of Pile-Up from 32 channels is arranged directly in a Camac module which is read immediately after the TDC output has been processed

Extended Amplifier

The component and production costs for building an Amplifier are estimated at £176 for each unit. This includes the charge of £3200 for rearranging the PCB layout and manufacture of 320 boards. The total cost of building 320 Amplifiers is then £56320

Walk and Accept module

The component cost is £240 and the ancillary cost is £60. The PCB artwork is estimated at £25 and the final assembly cost is £45. These estimates give a unit cost of £370 and a total cost of £14800 for 40 units. **Conversion module**

The component cost is £170 and the ancillary cost is £60. The PCB artwork is estimated at £25 and the final assembly cost is £45. These estimates give a unit cost of £300 and a total cost of £12000 for 40 units.

Pile-Up Recording Interface

The component cost of this module is expected to be £500 giving a final cost for 10 units £5000

Channel Control Interface

The component cost of this module is expected to be £400 giving a final cost for 10 units £4000

Sample-hold/Integrator

We have been quoted £63 for the Silena Sample/Hold sub-circuit based on a quantity of 100 and it is estimated that for a quantity of 320 the price might be reduced to £45. An alternative Integrator board is priced at £25 based on a quantity of 320 units.

Powered Crates

The component costs for building a crate with power supply is estimated at £1149 for component and ancillary costs and £500 for production giving a unit cost of £1649. Only 10 units will be required to house 320 channels in the revised scheme this yields a total cost of £16490.

Summary and Comparison

The original estimate

Channel Amplifier	£161	320 off	£51520
Channel Control	£179	320 off	£57280
Channel Interface	£150	20 off	£3000
Powered Crate	£1649	20 off	£32980
Sub total			£144780

The revised estimate

Channel Amplifier	£176	320 off	£56320
Walk and Accept	£370	40 off	£14800
Convert Amplitude/Time	£300	40 off	£12000
Pile-Up Recorder	£500	10 off	£5000
Parameter Control	£400	10 off	£4000
Powered Crate	£1649	10 off	£16490
Sub total			£108610

Additional costs unchanged by revision

Sample/Hold Silena	£45	320 off	£14400
	or		
Integrator	£25	320 off	£8000

R Hunt and D Savory 1st September 1993