SRC Vacation School on

COMPUTER CONTROL

# ACTION REQUIRED FOR IMPLEMENTATION OF MICROPROCESSOR CONTROL OF DISTILLATION COLUMN

by

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From: J. B. Edwards 10 June 1980

To: L. E. Taylor, G. Nicklin, P. Hardwick, B. Levy, H. Nabhani, (Prof. H. Nicholson, Dr. S. Bennett, Dr. D. A. Linkens, N. Tabrizi, M. Guilandoust for information).

Subject: SRC. Vacation School on Computer Control

Development Report No.114

Action required for implementation of Microprocessor control of Distillation Column

Objectives

In order that a smooth running laboratory class on column pressure control using the Texas microprocessor system be developed on time, it is essential that a number of proving trials (a) of the programmed microprocessor and input/output system, and (b) of the remotely controlled column be carried out over the next few weeks. Where possible and where interconnection equipment is still outstanding, trials should be carried out with simulated logic and analogue signals provided and monitored by, say, a VIDAC computer. As hardware becomes available this should be progressively inserted into the system. The deadline for a final laboratory instruction sheet is July 20th giving some 6 weeks for trials from now. The trials with which all parties will be involved to some extent should be:

(i) Check that all analogue and logic signals from the column are being correctly received at the microprocessor interface socket via the existing data link and B.N.C. to multi way adaptor, and that return signals injected at the plug are properly responded to by the column actuators.

(ii) Check that the microprocessor program responds correctly to dummy analogue and logic inputs injected from, say, the VIDAC computer simulating column and M.M.I. and that the analogue and logic outputs respond correctly.

(iii) Repeat (ii) with plant and M.M.I. hardware installed to test hardware response (lamps, meters, etc.)

(iv) Sort out any scaling difficulties apparent from (i) to (iii) above.

(v) Complete the closure of the computer-column and computer - M.M.I. loops and debug faults.

(vi) Rehearse experiment planned for S.R.C. course students with demonstrators (B. Levy. H. Nabhani, N. Tabrizi, M. Guilandoust)

Six trials in only six weeks clearly demands observable progress each week from now on and we must not be tempted into wishful thinking that everything will be 'alright on the night'.

Unit Tasks

The following unit tasks are now nearing the stage of entering the critical path of the project:

| | | Action |
|---|---|---|
| (1) | Build and test B.N.C. to multiway connector for computer room | (PH) |
| (2) | Sort out remote relay switching of vent-valve | (PH) |
| (3) | Make provision in computer room for remote analogue adjustment of reboiler heater input as alternative option to present local control. | (PH) |
| (4) | Test software from dummy signals and observe response on and from VIDAC | (BL & H.Nabhani |
| (5) | Test parameter routines for feasibility | (BL,HN) |
| (6) | Decide on final sitings of T.V., audio communication, plant interface M.M.I. and students worktops. | (LET,PH, GN) |
| (7) | Purchase and install audio communications between each column room, control room and computer room. | (LET,PH) |
| (8) | Obtain meters, relays, pots, switches, plugs and sockets etc. for plant interface and M.M.I. | (GN) |
| (9) | Test loading effect/on data link transducers and potentiometers of switching input meter from channel to channel. | (PH,HN) |
| (10) | Obtain plenty of ethanol to maintain 30% feed mixture throughout commissioning trials and course. | (LET,PH) |
| (11) | Obtain a bench test power transducer for possible feedback control of reboiler heat input. | (JBE, HN, PH) |

(12) Ascertain logic latching requirements for interfaces to achieve functions described in development report No. 111. (BL,GN)

(13) Build plant interface and M.M.I. (GN)

(14) Test plant interface and M.M.I. coupled (a) to column and (b) to Texas microprocessor. (GN.BL)

Additional critical jobs will become apparent as the project proceeds. Both the person directly involved, and I should be informed on each occasion to ensure that unnecessary bottlenecks in the work flow do not develop. The need for good communications between all concerned in a distributed system project of this sort cannot be overemphasised.

References

(1) Edwards, J.B., University of Sheffield, Dept. of Control Engineering, Development Report No. 111, April 1980.

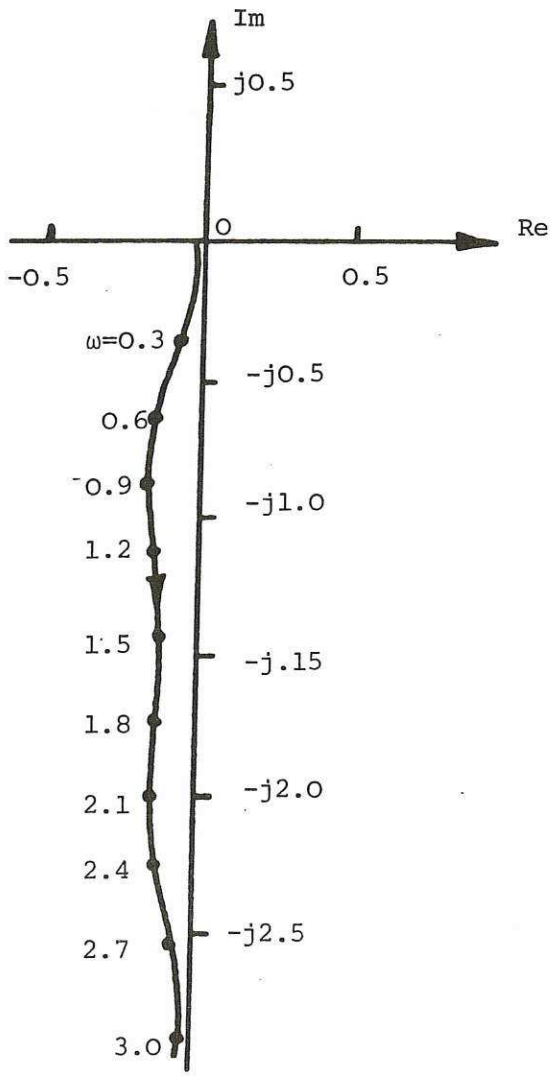


Fig. 9 Inverse Nyquist locus of $g_2^*(o,j\omega)$ for longer column

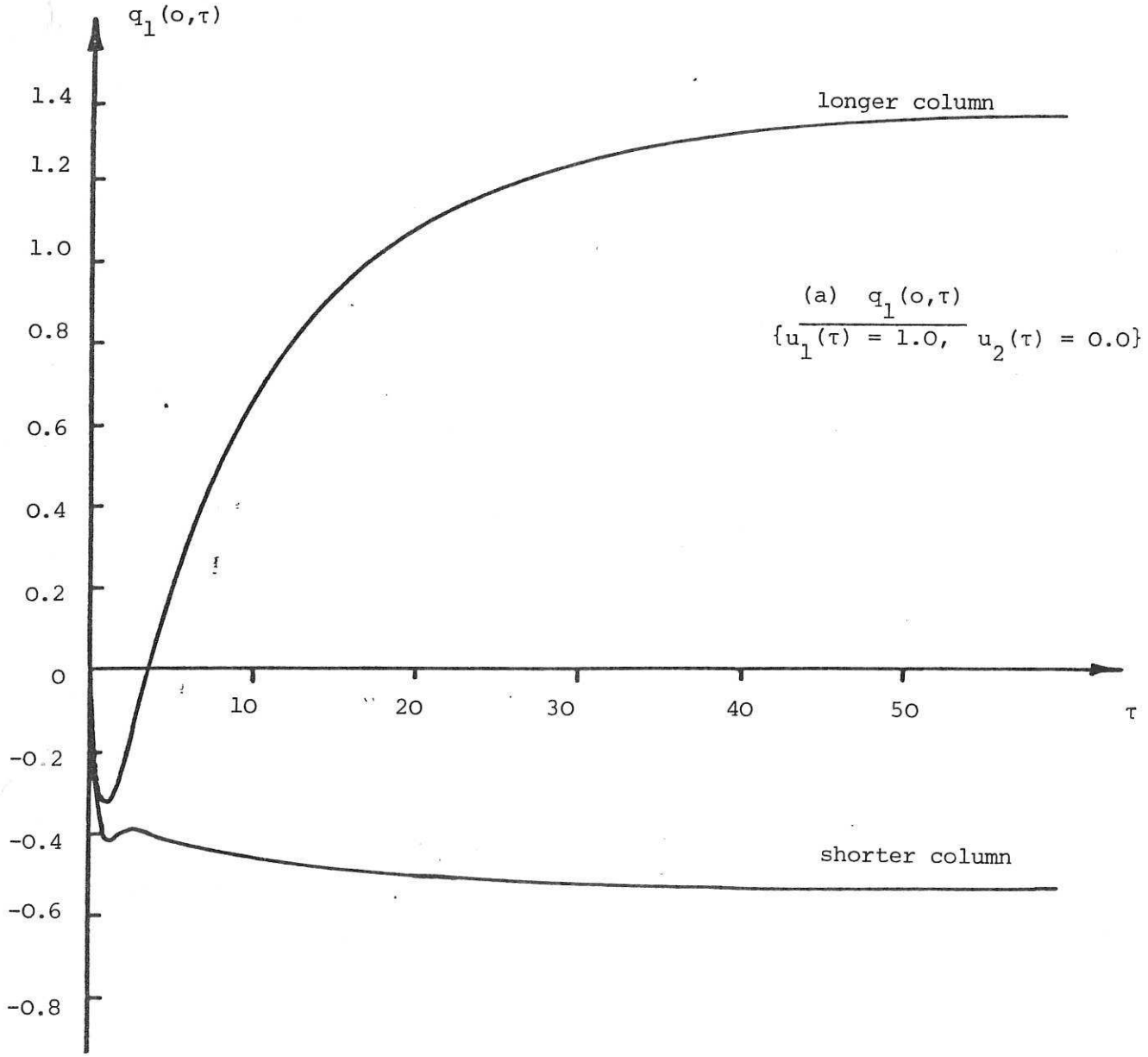


Fig. 6(a) Unit-step responses