Reminiscences of Whetstone ALGOL

Brian Randell
In Summer 1957 I had a vacation job at IBM’s offices at 101 Wigmore Street, London.

These offices housed (and proudly displayed) an IBM 650 – their only computer in the UK.
IBM 650 – a very successful and easy to program drum-based decimal computer
In Autumn 1957 Mike Kelly and I arrived (from Imperial College) at English Electric Atomic Power Division, Whetstone, Leicestershire
Frank Whittle, inventor of the jet engine – whose Power Jet Company’s factory was at Whetstone in WW2.
By the 1960s Whetstone was the site of EE’s Atomic Power Division (APD) and their Mechanical Engineering Laboratory (MEL)
In APD analogue computing was \textit{(at this time)} “king” – and the 1500-amplifier SATURN was being developed
We were hired to program nuclear reactor codes for APD’s and MEL’s first digital computer, a DEUCE.
DEUCE was based on Pilot ACE, so inherited Alan Turing’s clever “optimum” programming scheme.
DEUCE was difficult to program (well), and even more difficult to compile for.

Numerous interpreters were produced – and we invented a compromise scheme of “automatic programming” – EASICODE.

We nearly got fired because of it, but its success led to my becoming head of an Automatic Programming Section, with authority to “do something” for the upcoming KDF9.

(This was to be additional to the plans of EE’s Computer Division (Kidsgrove) for an optimising compiler for ALGOL.)
Our Move to ALGOL

- The Whetstone and Kidsgrove “automatic programming” teams both attended the 1961 APIC Conference.
- Among the presentations was one by Edsger Dijkstra on his X1 ALGOL compiler.
- There was a suggestion (from Kidsgrove) that we seek to base the Whetstone plans on X1 ALGOL.
X1 at the Mathematical Centre, Amsterdam
One Week in Amsterdam

• A major hurdle - obtaining foreign travel permission from EE!
• Lawford Russell and I visited Edsger Dijkstra at the Mathematical Centre, Amsterdam in December 1961
• A week’s intensive discussions on XI, and on the planned Whetstone system

Edsger W. Dijkstra
Hotel Krasnapolsky, Amsterdam
The Mathematical Centre, Amsterdam
“Discussions on ALGOL Translation, at Mathematisch Centrum”

- The approach of designing an “ideal” target machine
- The impact of our subsequent “trip report”
- The recent search for a copy!

http://www.cs.ncl.ac.uk/publications/trnn/papers/34.pdf

DIKU, 30 September 2010
The long-awaited KDF9 (in prospect)
Waiting for KDF9

- The twin compiler strategy (Kidsgrove and Whetstone)
- Whetstone’s stress on compiler speed, and programmer support, for a minimum machine configuration
- One pass compilation
- Interpreted “P-code”
- The extended error reporting scheme
- Our detailed design (flow diagrams)
- Whetstone ALGOL implemented first elsewhere
- Our toy DEUCE ALGOL
The KDF9 (at last)
“Randell & Russell, 1964”

- The idea of a book
- APIC Studies in Data Processing No. 5
- Dijkstra’s advice
- The special typewriters
- Our rush to beat Peter Naur and Gerrit van der Mey

The (127) Flow Diagrams

Update DISPLAY (Control Routine)

Error Scan (Translator)

DIKU, 30 September 2010
A Forgotten Dedication

April 5th 1962.

To my respected parents in law,
wishing you many evenings of
pleasant light reading.

with best wishes.

Brian.
1964 and after

- Whetstone ALGOL completed
- Tony Hoare’s QuickSort certified
- Headhunted by IBM Research
- Allowed to join IFIP Working Group 2.1 (ALGOL)
- IFIP Conf. on Formal Language Description Languages (1964)
- The ALGOL 68 Minority Report
- Return to UK, to Newcastle University (1969)
- Whetstone ALGOL on Newcastle’s KDF9
KDF9 at Newcastle c.1965
2010 – Whetstone Algol Lives Again!

```
EAHZZZZZ00APU@
  _b_e_g_i_n
    writetext(30, _[Hello _[s_] World!_]);
  _e_n_d
@ 
```

```
RAN/EL/000M00S/000M00S  SIZE     11
HELLO WORLD*
RAN/EL/000M00S/000M00S
```

“The Whetstone Algol Translator has been re-keyed from a dog-eared listing, in the main, by Brian Wichmann, Graham Toal and Roderick McLeod. David Holdsworth has written an assembler and a rough-and-ready emulator. Bill Findlay is in the process of implementing a properly-engineered emulator.”