

LEO Emulator Implementation

While the first applications were re-written for IMS, LOLA continued to operate its LEO computer at the Southgate Road Computer Centre. But this required the operation of 2 computer centres and numerous staff as well as maintaining the ageing LEO computer.

As part of the contract with IBM they supplied an emulator to translate LEO machine code to IBM 360 code with LOLA responsible for converting the data files into the IMS databases. This allowed the remaining LEO applications, particularly Payroll, to run on the IBM 360/50 and for the Southgate Centre to close.

- As at September 1978 there were still 39 LEO programs running under emulation covering Payroll, Creditors Stock & Transport, Bonds, and Housing Rents ¹.

In May 2025 Alan Cooper was asked by Vincent Bodsworth of the LEO Computer Society:

- *But I am quite intrigued with the information that IBM developed an emulator for LEO on the 360/50. Do you happen to know, or know anybody who might, know whether this was a Microcode emulator or simply a user program that could run LEO Intercode. I ask as I understand that IBM Hursley developed the 360/50 microcode engine and 360 microcode so the expertise was in the UK to do it for LEO also. IBM also had microcode for their 1400 and 700 series machines so a major role of the 360/50 was allowing users to run legacy systems without conversion.*

LOLA documentation showed that LOLA upgraded to an IBM 370/158 in August 1973 and the LEO was retired in 1974 so therefore the "emulator" would have developed for the 370/158.

The [IBM Hursley Museum](#) website mentioned that Hursley developed the S/370 Model 135, so I contacted them and received a reply from one of their volunteer curators Peter Coghlan. He had searched through their records but could find no mention of 158 microcode development for the LOLA project or indeed any other. He then offered to contact Max Campbell at the IBM Archives in the USA.

Max found some emulator information which, although it's not definitive, points to the LEO emulator being part of the OS and not in microcode. An internal Program Product Announcement letter, dated 17 February 1971, refers to the 145 and 155 systems (158 was the successor to the 155) which would have allowed emulators avail of S/370 features which if written microcode would not.

The conclusion is that LEO code was implemented as an emulator. This would also allow other programs to run at the same time under the IBM 370 Operating System MVT or MFT.

P.S. I also found a 1971 conference paper about emulation on the IBM 360s & 370s²

Alan Cooper

5th October 2025

Alan joined LOLA at the start working in the Applications Support Group, responsible for database design and integrity as well as application support software (middleware).

¹ [Summary of Operational Programs Maintained by SPG, SPG, LOLA, 1978-09-01 Scan](#)

² [System/370 integrated emulation under OS and DOS](#), Gary R. Allred, IBM, 18 May 1971 [AFIPS '71 (Spring) Proceedings]