

AccessionIndex: TCD-SCSS-T.20121208.019

Accession Date:

Accession By:

Object name: IBM 1620

Vintage: c.1959

Synopsis: TCD's first computer, purchased in 1962.

Description:

The IBM 1620 Model 1 was TCD's first computer. The installation was overseen by John Gabriel Byrne, later appointed first Professor of Computer Science, and recorded for posterity by Brendan Scaife, see Dan McCarthy's sequence of captioned photos below, or his slide presentation in the associated folder in this catalog.

The IBM 1620 was developed at IBM's Poughkeepsie Laboratory in New York, was introduced on Oct-1959 as an inexpensive scientific computer, and was sufficiently successful to continue in production until Nov-1970. It had a variable word length decimal architecture, with 12-digit instructions that had a 2-digit opcode, and 5-digit *P* and *Q* addresses (destination & source address or immediate value). It had a very simple instruction set, with no arithmetic instructions (lookup tables were used instead), and only allowed one level of nested subroutine call. In modern terms its performance would have been about 0.001MIPS.

There were no programmer-accessible registers, instead all operations were memory-to-memory. A 5-digit decimal address space could access up to 60k digits of 12-bit 20uS core memory, each word of which could hold two 6-bit decimal 'denary' digits or one 'alphameric' character encoded into two denary digits. Each denary digit included four BCD bits, a multipurpose flag bit (e.g. in the LS digit it indicated a negative number) and an odd parity bit (the machine stopped if there was a parity error). *Fixed-point data words* could be of size from 2 digits up to all of spare memory. If the hardware option was installed, *floating-point data words* could be of size from 4-102 digits.

The logic was constructed with resistor-transistor circuits of discrete components mounted on single-layer PCB modules with edge connectors that plugged into sockets on swing-out racks that were wired on their rear side.

The standard software included the Symbolic Programming System (SPS), essentially an assembly language, and FORTRAN. The operator controlled the machine from a console with lights, switches and knobs, and a typewriter, and loaded programs from paper tape or punched cards. See Figures 45 and 46 for closeups of the console.

Trivia: The fictional computer in "Colossus: The Forbin Project" used about a dozen scrapped 1620 front panels.

Afterlife of TCD's IBM 1620

There are no remnants of the IBM 1620 in this collection, but as this IBM 1620 was TCD's first computer, its afterlife is of interest, and there is a remote possibility some piece is lying in someone's garage or barn, so the following reviews what is known.

When the 1620 was replaced in 1967, it went first to Dunsink Observatory for use by the DIAS School of Cosmic Physics, and then in 1974 to the Dundalk RTC. From the DIAS Annual Reports it can be deduced that the 1620 was sold on 31-Mar-1974 (the end of the DIAS 'year'), and removed on 8-Apr-1974 (DIAS changed its 'year' to Jan-Dec in 1974, which explains why the 2nd report was just for 9 months).

Ian Elliot managed it in Dunsink, but alas, he died on 10-May-2015. John Butler of Armagh Observatory (ex-DIAS, its biggest DIAS user) knew the 1620 was sold or given to Dundalk RTC but had no details as that happened after he had left Dunsink. He did enquire about it at one stage but that was a long time ago and, as far as he remembers, the response was that it had been broken up to show students how early machines worked. It's possible that the contact there was Henry Bacik as he had worked as a technician at Boyden Observatory whilst Dunsink was involved there and later became a lecturer in Dundalk RTC. Henry was a long standing member of staff in Physics in Dundalk, and may know details, so contact details are welcome.

However, Columb Collins, ex-UCD experimental Physics, who was head of Dundalk RTC Dept.Science (but left Dundalk c.1988 to become first Principal, renamed Director, now President, of Tallaght RTC) can recollect a lengthy discussion in Dundalk over the offer of the 1620 but believes that they may have not taken it up in the end. Moreover, Daniel O'Brien (Head of Dept.Electronic & Mechanical Engineering at Dundalk RTC) who worked in the Engineering School at Dundalk (not School of Science) since 1979 has no recollection of ever being told that there was any computer in Dundalk prior to the purchase of a DEC Pdp8, and never was of the belief that RTC Dundalk ever had a 1620. He does recall seeing it in Dunsink, probably as an undergraduate. Furthermore his understanding was that Dundalk's history with computers started c.1976 with the DEC Pdp8 (which was "loaned" to Galway university about 10 years ago), and he has never seen any artefacts from an IBM mainframe in Dundalk, and as they were hoarders even then, he is sure he would have come across them had they existed. His colleague Eugene Roe could not recall it either. James Mulvanny may have some recollection, so contact details are welcome. John Connolly had worked as a field engineer with IBM some time before he joined Dundalk, so contact details are again welcome.

Prof.J.G.Byrne thought that the 1620 went from Dundalk to either Athlone or Sligo. Any further details are very welcome.

References:

1. Bitsavers IBM 1620 documents and brochures,
<http://bitsavers.trailing-edge.com/pdf/ibm/1620>
Downloaded 4-May-2015.
2. Butler, C.J. and Wayman, P.A., *The IBM 1620 Computer at Dunsink Observatory*, Irish Astronomical Journal, Vol9, No1, Mar-1969,
<http://articles.adsabs.harvard.edu/>
3. Spicer, D., *The IBM 1620 Restoration Project*, IEEE Annals of the History of Computing 27:3, pp.33, July-Sept. 2005.
4. [The IBM 1620 was] “put out of use on 31 March 1974 prior to removal to Dundalk RTC where it will be used for instructional purposes”, DIAS Annual Report 2-Apr-1973 to 1-Apr-1974, courtesy Prof.Luke Drury, DIAS.
5. “The IBM1620 computer was removed on 8 April having been purchased for instructional purposes”, DIAS Annual Report 2-Apr-1974 to 31-Dec-1974, courtesy Prof.Luke Drury, DIAS.

See the extensive set of documents in the related folder in this catalog.

Introduction

In an email dated 22 April 2015 Professor John Byrne gave the following account:

The IBM 1620 was delivered on Saturday, 16 June 1962, through a window on the first floor of 21 Lincoln Place. It cost IR£10,000. £5,000 came from the Engineering School Trust Fund, £1,000 from the DIAS in return for free time which was used by Professor Cornelius Lanczos, and £4,000 was loaned by the College who were paid back by the Engineering School except for the last instalment. The principal instigator in the campaign to acquire this computer was William Wright, Professor of Engineering Science from 1957 until his death in 1985.

I have a box of 35 mm colour slides which were taken by Brendan Scaife, mostly on the day the machine was delivered. I scanned them and in 2009 sent a copy to Dag Spicer at the Computer History Museum in California, and the scans should be on the machine in my office. The first operator was Vivian Killeen who left after a year. She was succeeded by Rosemary Murphy in November 1963, who was joined a year or so later by Eithne Dunne.

Introduction ... continued

The computer had 20 K. decimal digits of memory, a paper tape reader and punch, and an IBM electric typewriter. The Assembler provided variable word length. A Fortran compiler was provided. Later the University of Toronto produced a much better version, and an IBM 870 card-to-tape convertor was added.

The machine was used for both teaching and research. Our M. Sc. course in Computer Applications started in October 1963, and that continued to evolve for many years, and we also gave short programming courses for both College and Industrial personnel. Professor Lanczos used Fortran and Assembler routines that I wrote to prepare his paper on exponential smoothing, which was published in the first volume of the *SIAM Journal for Numerical Analysis* in 1964.

Introduction ... continued

The following captioned photographs are copies of the scans mentioned by John Byrne which have been retrieved from the PC in his office, and he has also provided much of the information that is given in these captions.

These photographs document the process of unloading the IBM 1620 into the first floor of 21 Lincoln Place, then views of the machine *in situ* and in use, and then various details of the hardware of the machine.

Dan Mc Carthy

6 May 2015

Trinity College IBM 1620



The IBM 1620, packaged in two crates, was delivered by CIE lorry, and preliminary un-packaging was undertaken here at the entrance to the Nassau street car park. Aboard the lorry are two CIE men, and the crane driver in a grey shirt holding a hammer. Below, from left to right are, Michael Rogers (electronics technician), Joe Little (attendant), Gary Lyons (technician) and John Byrne (lecturer).



A group view, clearly taken at the same time and place, where left to right are: Gary Lyons, Joe Little, John Byrne and Michael Rogers .



The first floor window removed from 21 Lincoln Place, where Gary Lyons and Michael Rogers await the lifting of the crates by the crane in the right foreground.

Trinity College IBM 1620



A longer view showing the crane parked behind the lorry, where a CIE man is attaching the slings to the smaller crate watched by his capped colleague.

Trinity College IBM 1620



A closer view showing the larger crate containing the main system to the rear of the lorry, and the smaller crate containing the paper tape reader and punch to the front.



The smaller crate is lifted clear, provided with a control line operated from below.



The smaller crate is swung closer to its destination.

Trinity College IBM 1620



What appears to be John Byrne's grey sleeved arm reaches to receive the first components of Trinity College's first electronic computer.



The smaller crate is manoeuvred into the open window.

Trinity College IBM 1620



The crate has been slung obliquely, and the capped CIE man below holding the control line appears to be only watching, not controlling it!



The crane driver is clearly having some difficulty aligning the crate with the window.



A Garda patiently observes the proceedings from the far side of Lincoln Place.

Trinity College IBM 1620



The larger crate awaiting its lift.

Trinity College IBM 1620



The CIE man commences attaching slings to the larger crate watched by his capped colleague and the crane driver.



The larger crate is lifted aloft, with the control line now operated from the window.



The larger crate swings closer to its destination.

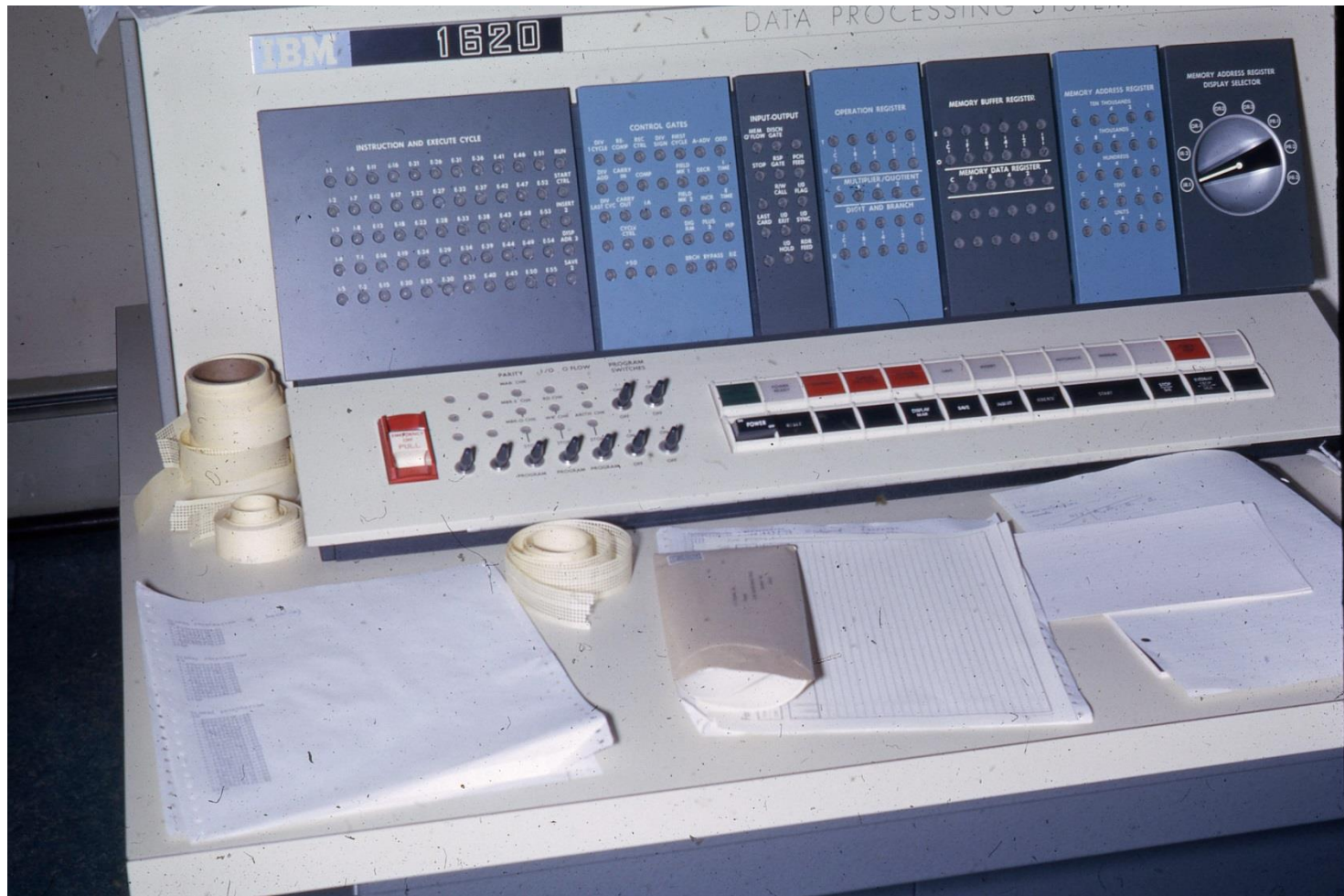


The final view of the larger crate reaching its destination.

The IBM 1620 in use, and its personnel

The following photographs show the main units of the IBM 1620, now installed in 21 Lincoln Place, and the personnel who used them.

Trinity College IBM 1620



The main console with its control and selection switches, above an array of lamps displaying a choice of the main system registers, and on the desk-top, paper tape, program listings, coding sheets, and notes.

Trinity College IBM 1620

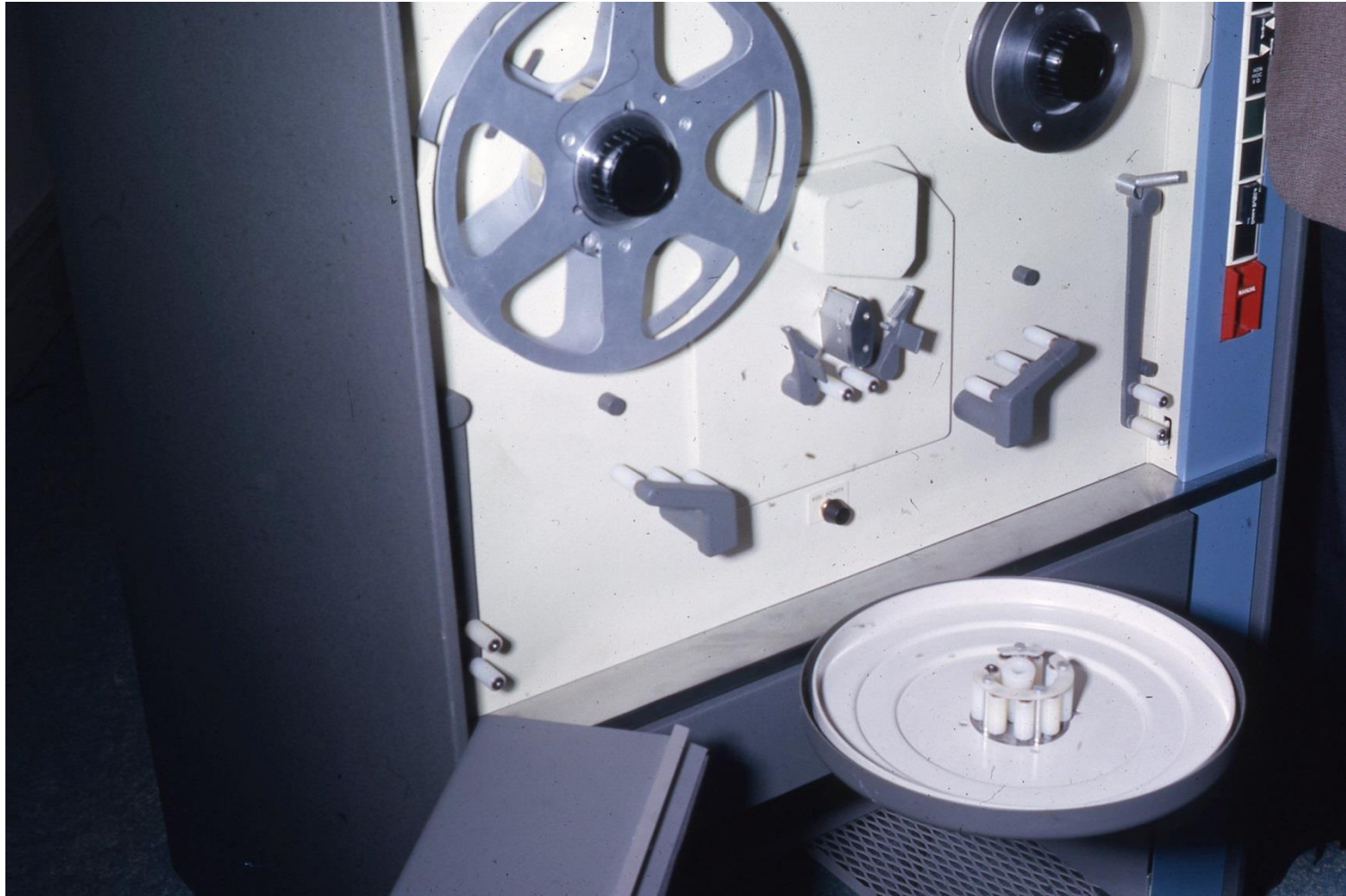


The right-hand end of the console with the same notes on the desk-top as in the previous photograph, together with another programme listing, and the electric typewriter which produced these listings.

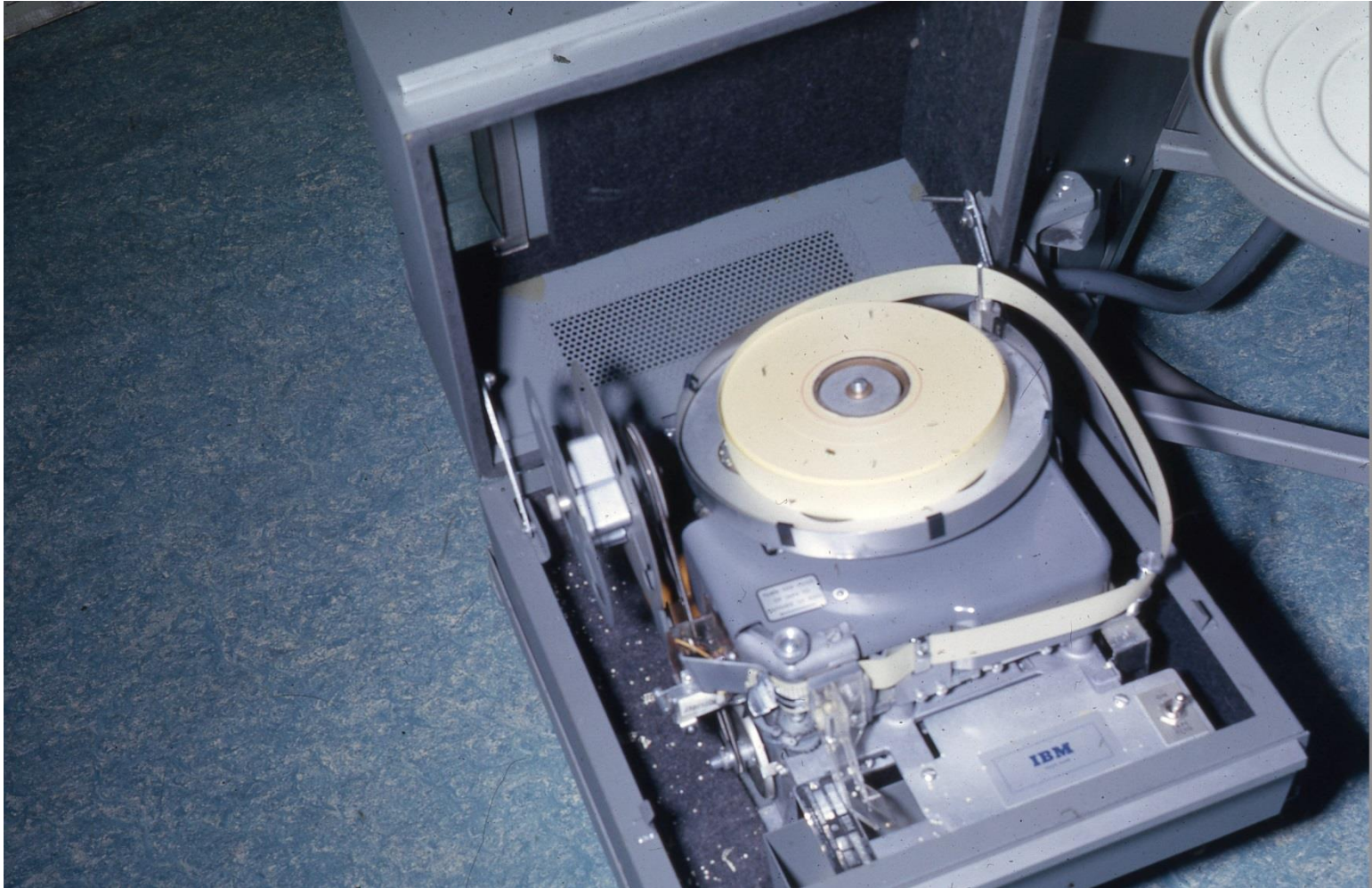
Trinity College IBM 1620



A closer view of the same listing and the typewriter.



The paper tape reader – the horizontal white disk in the foreground served to hold the input paper tape, which was not provided with a spool and so required support.



The paper tape punch, which was a free-standing unit placed on the floor in front of the paper tape reader.



John Byrne, seated at the console, studying a roll of paper tape.



John Byrne, seated at the console, showing the position of the paper tape reader.



Vivian Killeen, the first operator, regarding labelled boxes containing rolls of paper tapes with recorded programmes. On the shelf behind is a Facit mechanical adder-subtractor-shifter, now a relic of the preceding computational age.

Trinity College IBM 1620



John Byrne and Vivian Killeen working at the console of the IBM 1620.

Trinity College IBM 1620



Michael Rogers, the first electronics technician in Engineering, who helped to unload the IBM 1620, and who later was managing director of CARA computing.

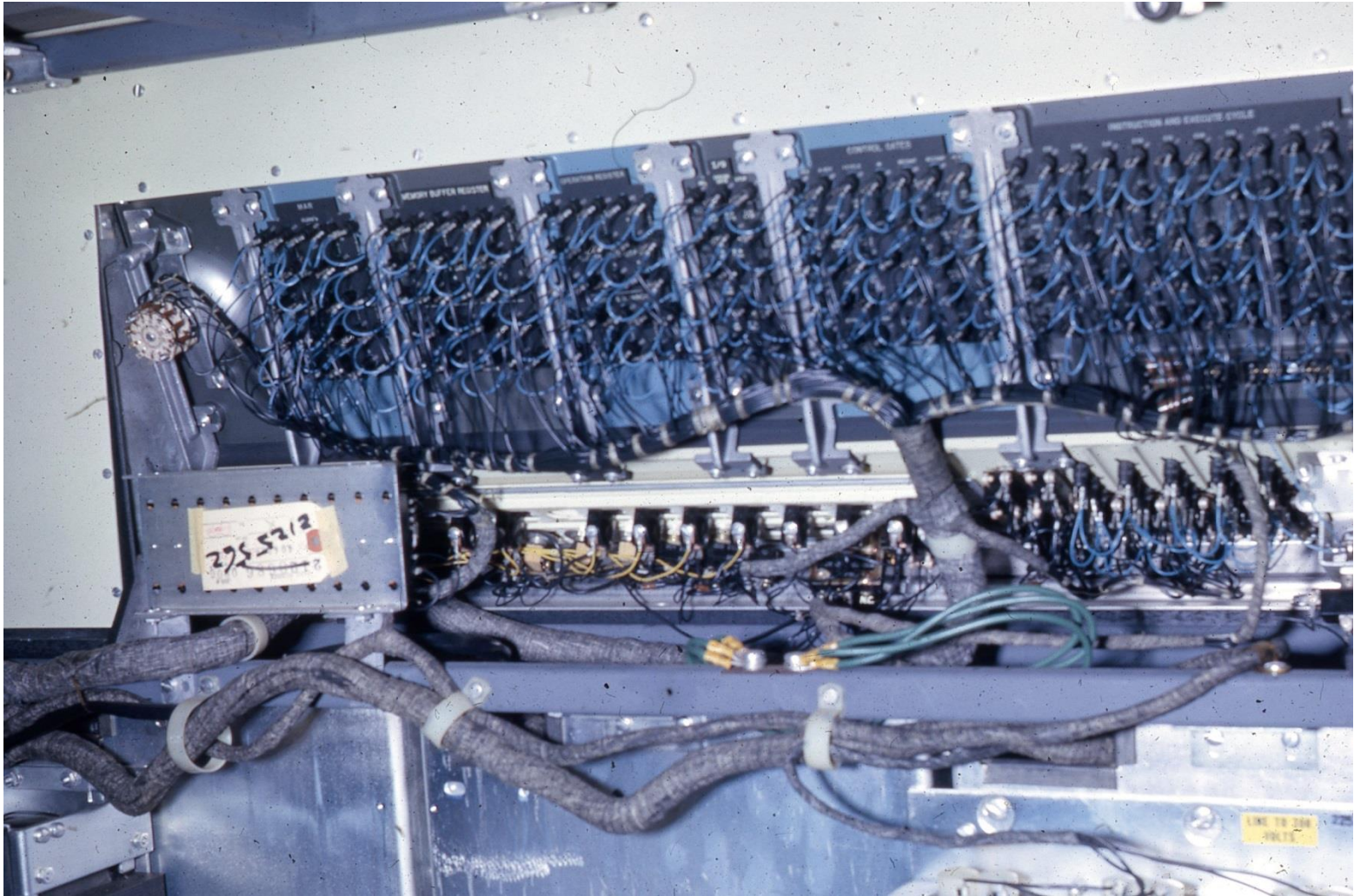


Vivian Killeen, the first operator, a Mathematics graduate from Cork, who subsequently married and emigrated to Australia.

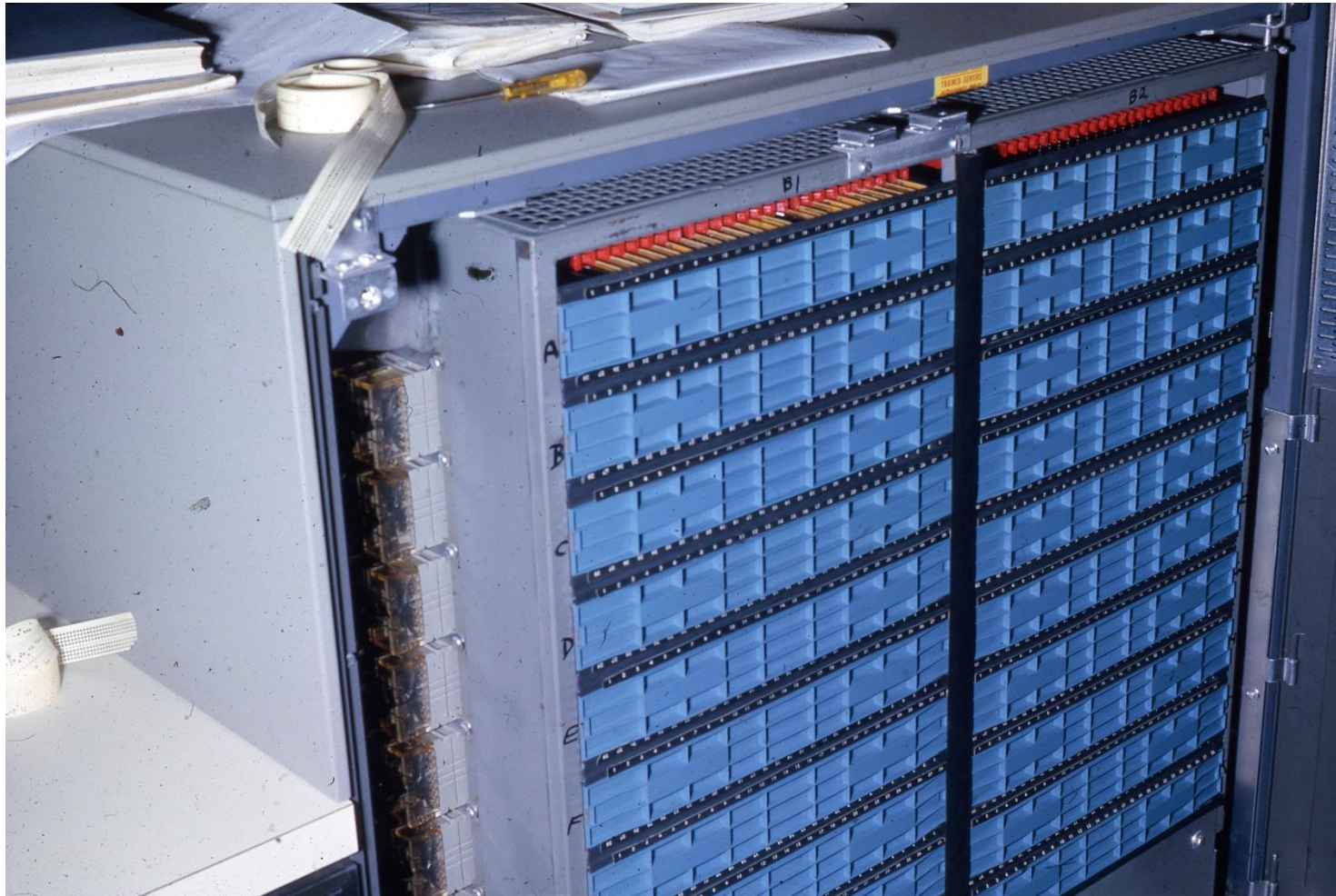
Hardware details of the IBM 1620

See http://en.wikipedia.org/wiki/IBM_1620

and, D. Spicer, 'The IBM 1620 Restoration Project', *IEEE Annals of the History of Computing* 27:3 (July-Sept. 2005), pp. 33–43.



On the extreme left is the back of the rotary system register selector switch, and to the right is the wiring for the lamp displays for these registers on the console.

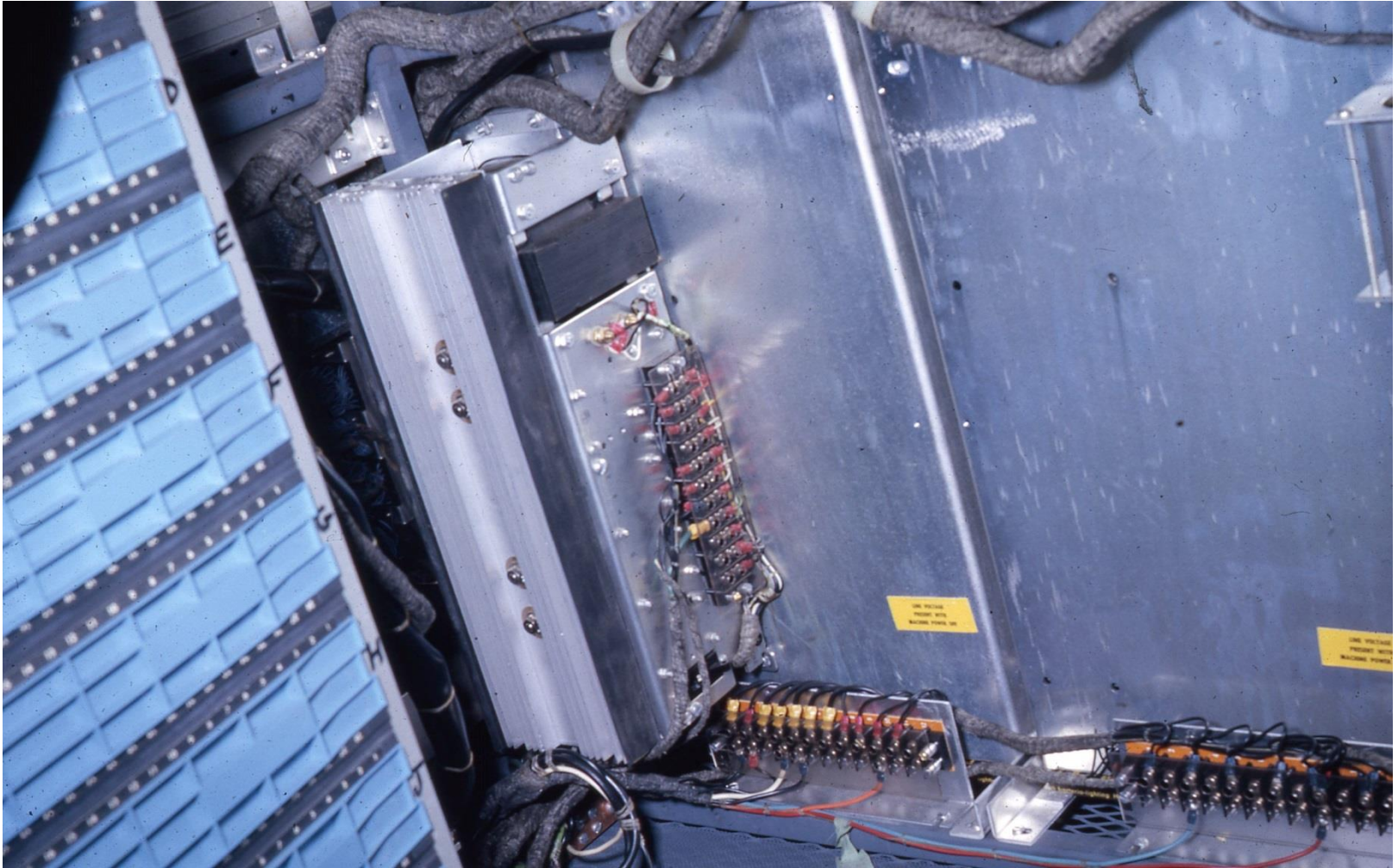


A view from the back of the left-hand bay of the console unit – the PCBs were inserted into sockets mounted on racks called ‘gates’ by IBM. This is gate B, which was hinged on the left, allowing it to be swung outwards for servicing.



The metal box at the top left contains the core memory unit with a capacity of 20 K decimal digits, cf. Spicer (2005), p. 40, Figure 4.

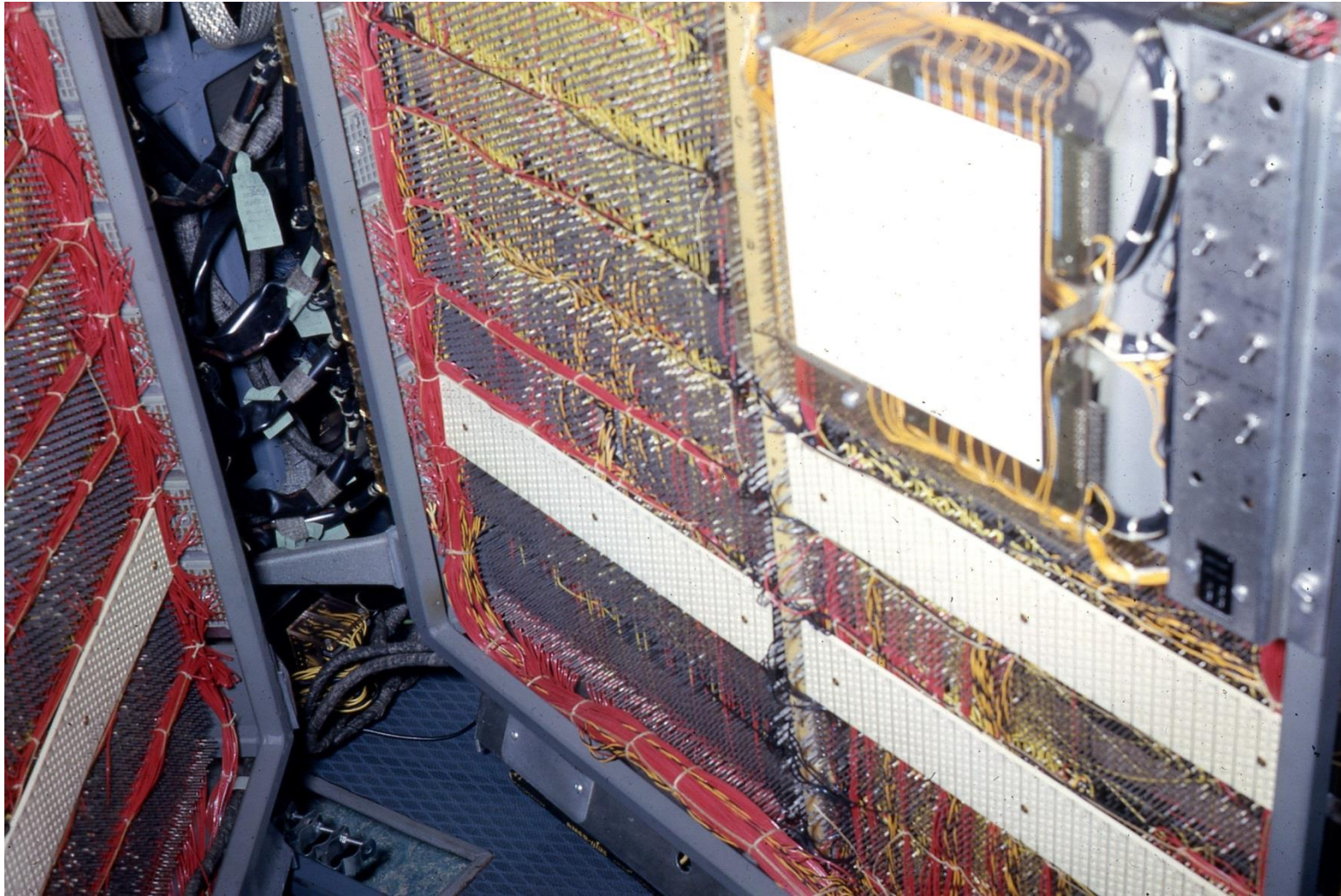
Trinity College IBM 1620



On the left appears to be gate B of the right-hand bay of the console, while on the right is gate C or gate D, which were not hinged and held the PSU and I/O logic.



This appears to be the socket side of the inner, second hinged gate, gate A, of the right-hand bay of the console unit when viewed from the back. Spicer (2005), p. 41 states that the yellow wiring was 'IBM's original', but the very extensive, neatly-braided loom of the red wiring here was clearly done by IBM before the delivery.



On the left-hand is the bottom corner of gate A shown in the previous slide, and on the right-hand is the inner side of gate B, whose lower hinge is clearly visible.



Brendan Scaife, who took these photographs, balancing a roll of paper tape.

Trinity College IBM 1620



John Byrne, on the day of his election to Fellowship in June 1969, with Professor William Wright, who played the key role in the College's acquisition of the IBM 1620.

The End

Dear John,

I have the article in front of me.

#1. I'm afraid I don't quite understand what is meant by 'the last six photos.' Could you clarify?

#2. The voluminous amount of red wiring in Photo 7 "Reliability made manifest..." is indeed all a result of the restoration. I agree it looks like a lot but most of this is the wiring from the magnetic core memory replacement unit which indeed involved a lot of changes.

Does this help?

Please let me know if I can be of more assistance... Esp wrt to my point #1. I don't feel I've likely answered to your satisfaction.

With fond wishes,

Dag

On 7/20/09 11:30 AM, "John Byrne" <John.Byrne@cs.tcd.ie> wrote:

```
> Dear Dag,
> You may certainly share the photos with your colleagues. I forgot to
> mention in my email that they were taken by a colleague, Brendan Scaife. I
> doubt if anyone wants to publish some of them but if they do I would have
> to ask Brendan. Someday I hope to write an internal report on our early
> machines. We have the front panel from the 360/44 which we bought in 1968.
> We have some printouts and some paper tapes but no hardware not even a
> broken zero from the typewriter.
> Best wishes
> John
>
>> Dear Dr. Byrne,
>>
>> Delighted to hear you are preserving your own computer history! If you
>> can
>> give me a day or two, I will reply with the details you request below.
>>
>> With fond wishes,
>>
>> Dag
>>
>> PS The photos are an absolute delight! How prescient to have taken them
>> at
>> the time! May I share them with colleagues?
>>
>>
>>
>> On 7/20/09 6:43 AM, "John Byrne" <John.Byrne@cs.tcd.ie> wrote:
>>
>>> Dear Dr. Spicer,
>>> I have been reading your article in the Annals for July-Sept. 2005.
>>> We had a 1620 in 1962 and one of my colleagues took some pictures
>>> (Kodachrome slides) of it.
>>> You can see them at
>>> https://www.cs.tcd.ie/John.Byrne/IBM1620%20in%20Trinity%20College%20Dublin/i
>>> nd
>>> ex.html
>>> I am trying to create a display relating to the various computers we
>>> had. Would you be so kind as to name the components in the last 6
>>> pictures or give me a reference where I could find about information
>>> them. I note that you say the engineering changes were in yellow but in
>>> your restoration you used red. There are many red wires in the photos
>>> which are clearly not all engineering changes so I wonder why you chose
>>> to use red for the engineering changes.
>>> I would be most grateful for your help.
>>> John Byrne
>>>
>> --
>> Dag Spicer | Senior Curator | Computer History Museum
>> 1401 N. Shoreline Blvd. | Mountain View CA 94043
>> Tel: +1 650 810 1035 | Fax: +1 650 810 1055
>>
>> PGP 8.0: 0x9E80BBA8: {C5A4C4F7 72768EB5 E102B617 AAC6F96F 9E80BBA8}
>>
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Figure 43: Prof.J.G.Byrne's correspondence with Dag Spicer about the IBM 1620 wiring

ROCKET TEST WITH £28,000 COMPUTER

Engineering students will
use new equipment

IN a demonstration given in the Electronics Department of Trinity College, Dublin, yesterday, the new £28,000 IBM 1620 electronic computer plotted the course of a rocket fired on a target 20,000 meters distant.

Fed the information on the initial velocity and the angle of fire, the trajectory was plotted on a chart on which a terse "Off target. Short by 3,000 meters" was typed as the rocket's flight ended. In a third attempt by the amateur "rocketeers" the message read: "Congratulation. On target."

The new computer was delivered to the college ten days ago and has been in operation for the past week.

Dr. P. D. McCormack and Dr. B. Scaife intend that every student taking engineering will be trained in the use and maintenance of the computer which will also be used to assist research done by all faculties of the university.

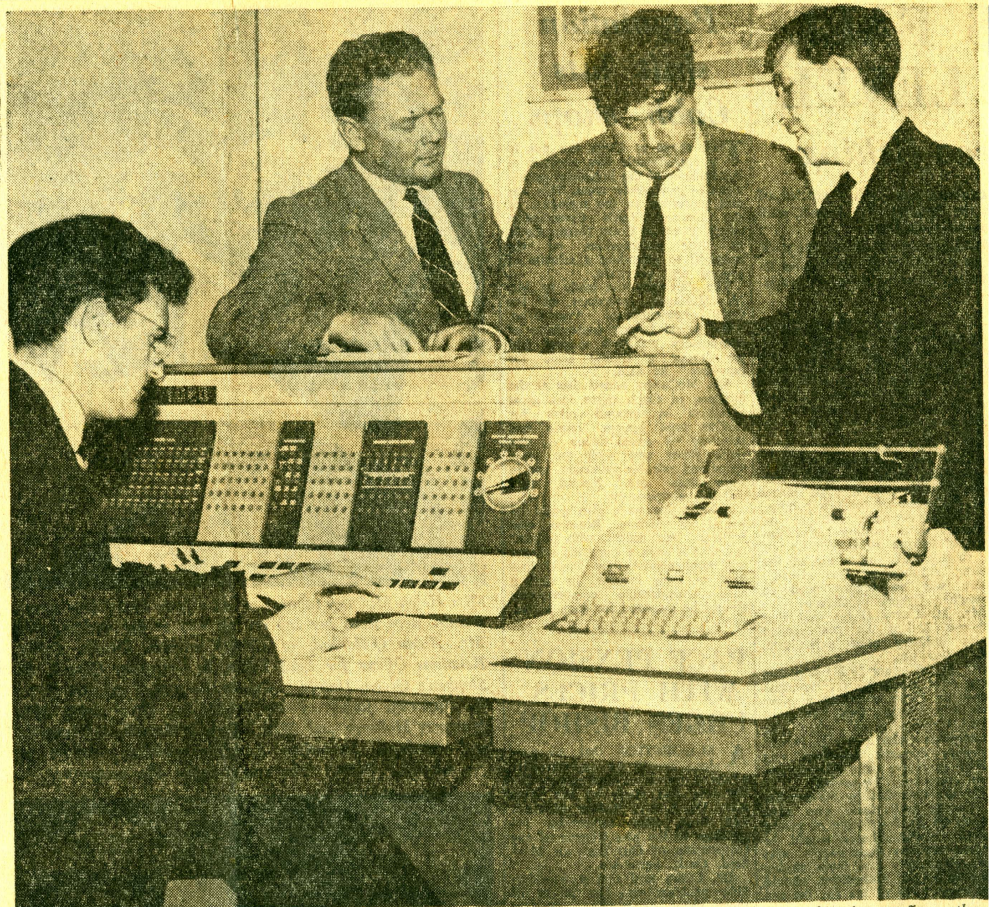
Prof. W. Wright explained that the emphasis in teaching was placed on "production and management." He said that all students do at least two years on mechanical engineering before branching into such fields as civil or electrical engineering.

"The boundaries in lots of cases are nebulous and we have no hard and fast divisions," he said.

EXTENSIVE PLANT

Mr. Dermot O'Clery, the Senior Lecturer in Mechanical Engineering, demonstrated some of the equipment in the Heat Engines Laboratory. The plant holds various steam engines, turbines and boiler as well as a variety of internal combustion engines run on gas, petrol and diesel oil. The newest acquisition is the Perkins gas turbine Mars unit of 50 h.p. at 40,000 r.p.m. with hydraulic brake and fully instrumented console.

In the Materials Testing Section he demonstrated the Denison 50 tons Universal testing machine which broke a steel rod. In the Soil Mechanics section the workshop is fully equipped for determining the characteristics of all soil samples.

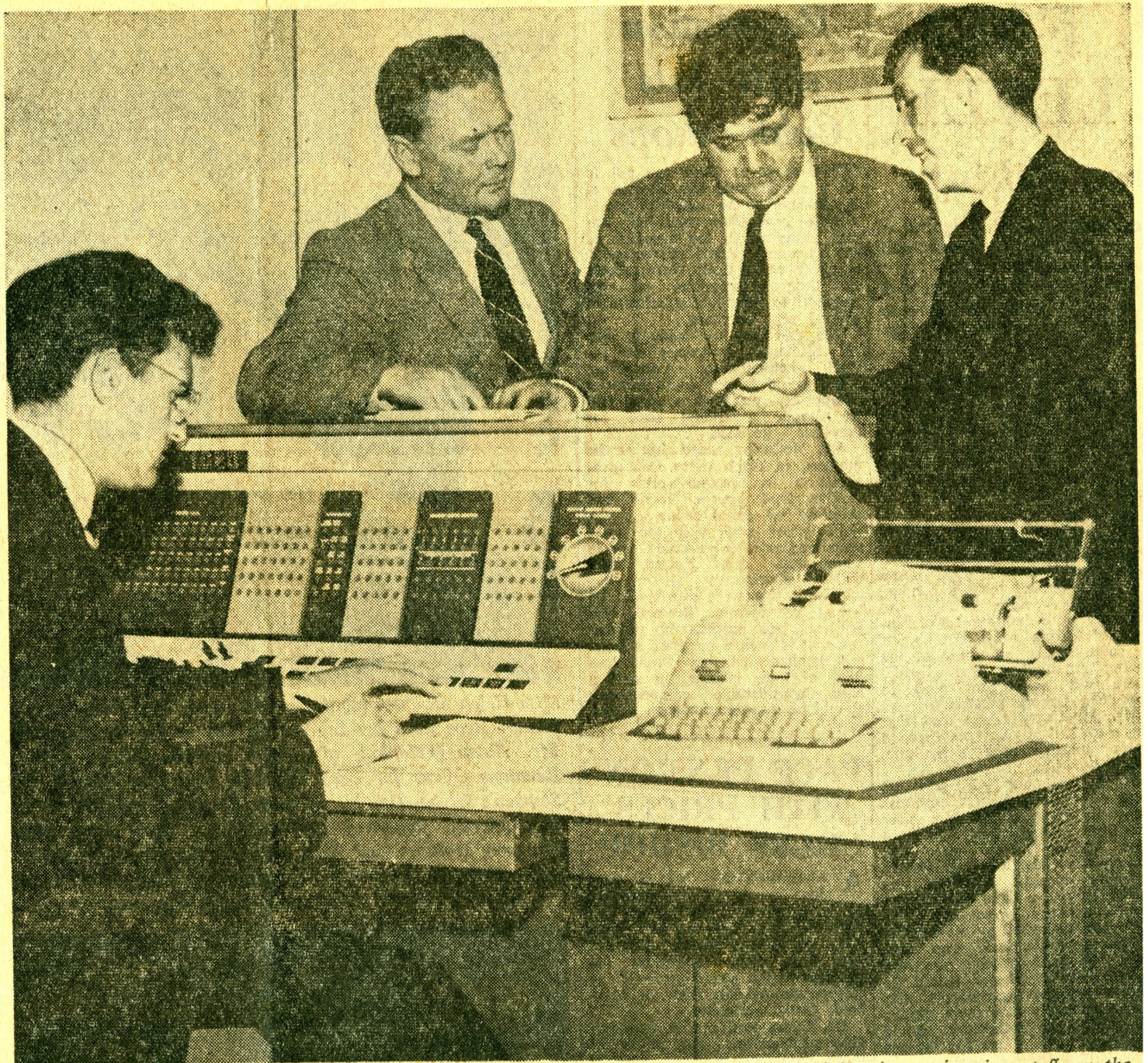


Mr. John Moriarty, J.B.M. systems engineer (seated), who is instructing the Dublin University engineering staff on the use of this new electronic computer, the 1620. Standing are (from left), Dr. P. D. McCormack, lecturer in Electrical Engineering; Dr. John Byrne, I.C.I. research engineer; and Dr. B. K. P. Scaife, lecturer in Electronic Engineering.

Figure 44: Irish Times article of 15-Jun-1962 on TCD's IBM 1620, ten days after delivery, showing John Moriarty, Percy McCormack, John Byrne and Brendan Scaife
Photograph courtesy John Moriarty

John Moriarty became the first Director of the university's computing service, the Computer Laboratory, TCD
Percy McCormack left TCD to study medicine, went to the America, joined the U.S.Navy and retired eventually as a Surgeon Commander
John Byrne became the first Head of the Department of Computer Science, TCD
Brendan Scaife became a Professor (now Emeritus) of Electrical Engineering in TCD

THE IRISH TIMES, FRIDAY, JUNE 15, 1962



Mr. John Moriarty, J.B.M. systems engineer (seated), who is instructing the Dublin University engineering staff on the use of this new electronic computer, the 1620. Standing are (from left), Dr. P. D. McCormack, lecturer in Electrical Engineering; Dr. John Byrne, I.C.I. research engineer; and Dr. B. K. P. Scaife, lecturer in Electronic Engineering.

Figure 45: Photo from Irish Times article of 15-Jun-1962 on TCD's IBM 1620, ten days after delivery
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Figure 46: Text from Irish Times article of 15-Jun-1962 on TCD's IBM 1620, ten days after delivery
Photograph courtesy John Moriarty



*Figure 47: Vivian Killeen and Neville Harris with TCD's IBM 1620
Photograph courtesy John Moriarty*

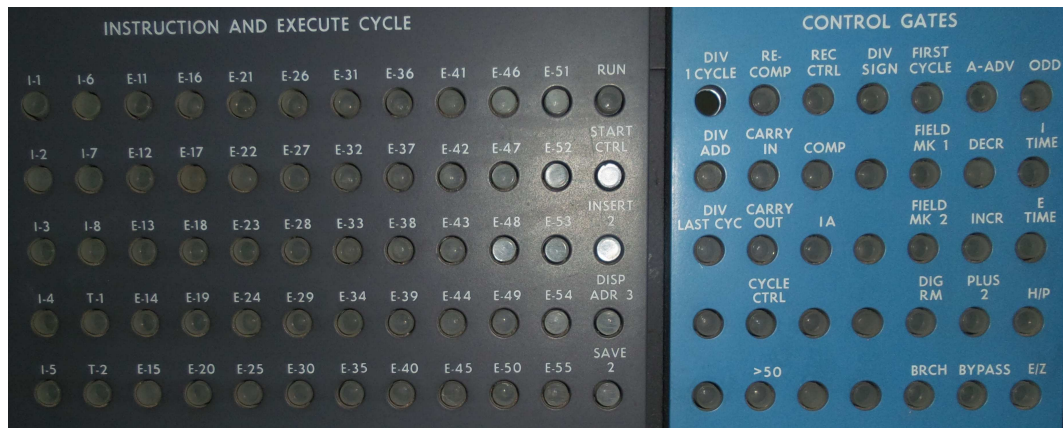


Figure 48: IBM 1620 console (upper) closeup

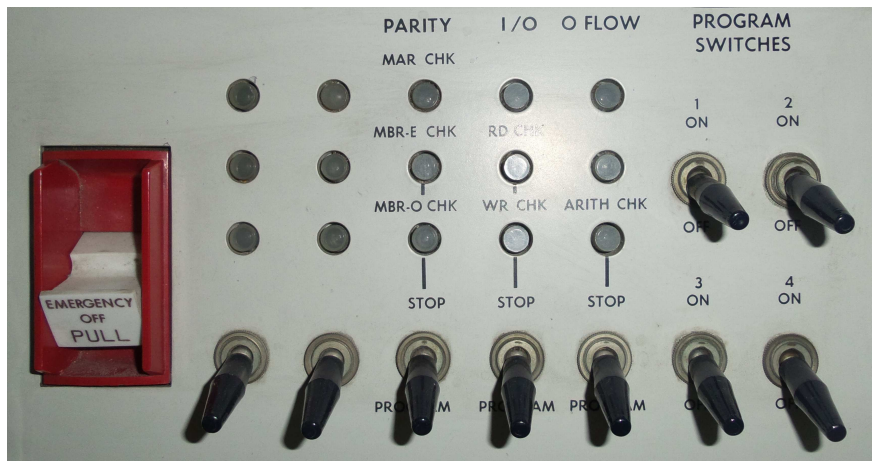


Figure 49: IBM 1620 console (lower) closeup