My Stay at NCR

By Chris Hegter

It has been a privilege and a pleasure working for NCR. My 41 years at NCR has been both exciting and educational. I started in South Africa in 1959 as a Field Engineer employed initially to convert mechanical Cash Registers and Accounting Machines for Sterling to Decimal. There were 1000 applicants for these positions, and only 40 of us managed to pass the required aptitude tests.

It has been exciting to see and be part of the evolution of technology in our industry, - to see the migration from mechanical, to electromechanical, to electronics, to vacuum tubes, to transistors, to IC's, and to Microprocessors.

After Decimalisation, I was sent to Dayton for 390 training, then later for 500 training. Later I was sent to Dayton for Century training. After spending some time in the field maintaining these computers, I was selected to start our Rework Centre. I managed the Rework Centre for about 10 years, during which time I designed and built various Test Equipment to repair the boards and modules we were repairing.

The First picture shows the 640 Hammer Module Tester. The 640 was the High Speed Century Printer. After repairing a Hammer Module, it was placed on the jig as shown. The Tester would pulse one of eight selected Hammer Module coils. The Hammer would strike a plate on which was mounted a sensor (I used a gramophone pickup).

The signal from the sensor was fed back to the Tester where a series of Op Amps analysed the signal, for strength and duration. Each coil had two adjusting screws (Timing (Line-up) and Impact). Four Lights in the Tester indicated to the operator which direction to turn the adjusting screws until the module was calibrated.

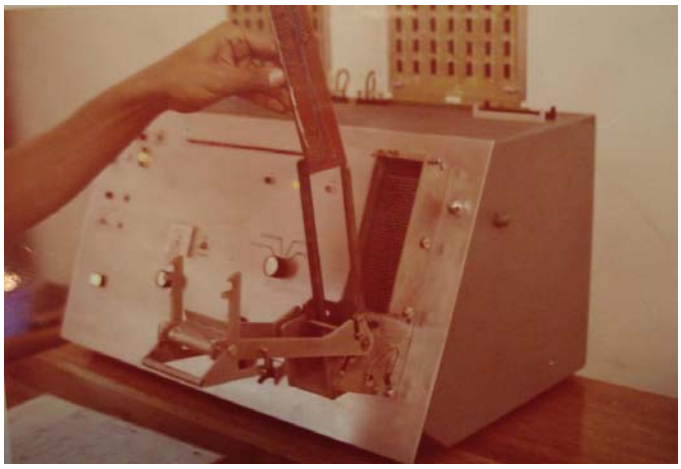
The Second picture shows a number of Testers. Each was designed for a particular board or device. The unit on the far end of the bench was the 655 Head Tester.

The next two pictures show the Board Comparator Tester I built. This tester compared a good and bad board. A plug-in patch board was used to program the board under test. The patch boards simply identified to the Tester which pins were Input pins and which pins were Output pins. The Tester, when run, applied a binary sequence (to cover all possible combinations) pulse to all the

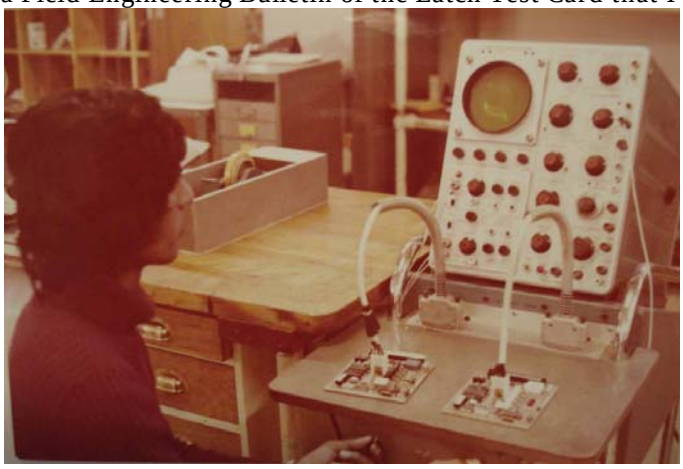
Input pins, and monitored and compared the Output pins. On finding a bad compare, the Tester would stop at that particular combination, indicating by means of LED's which pin failed. The operator would then by means of a logic probe, and schematic, trace back into the circuit, comparing the good and bad boards to identify the failed component.

This Tester was used very successfully and extensively on Century and 230 boards.

The Fifth picture shows a 535 Oscilloscope converted to a tester. This uses the two channels of the scope to compare two boards (Good and Bad). The Tester uses the principle of a Curve Tracer, which displays the Voltage verses Current waveform that is unique to different devices (Resistance, Capacitance, and Diodes). Two Chip Clips are wired into the unit together with a rotary switch which corresponds to each pin on the Chip Clips. The operator clips the Chip Clips to the same IC in each board. The Scope displays both the signals received from each board on the scopes two channels simultaneously. Then by means of the rotary switch the operator can scan through all the chips pins, looking for any difference. This method tests the boards cold (does not require them to be powered up).



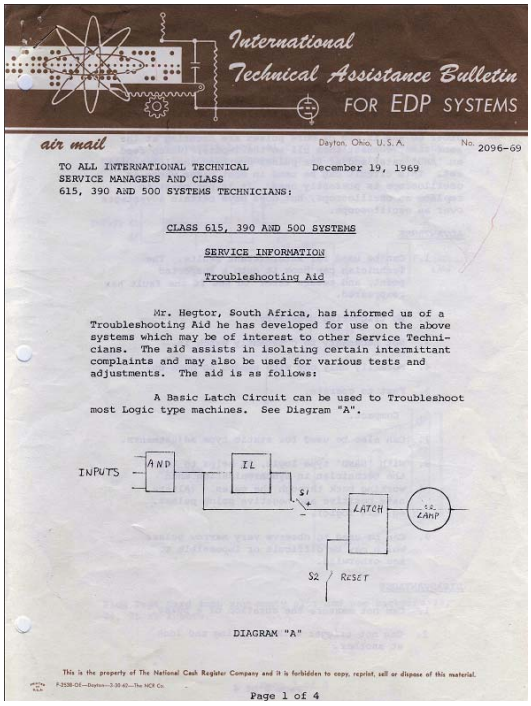
The Sixth picture you may remember is a Field Engineering Bulletin of the Latch Test Card that I developed and we all used as a troubleshooting tool on the Century. This saved us carrying an oscilloscope to site. The only time we really needed a scope after this was to do adjustments.



The Seventh picture is the Waste Proof System that I developed. This was to sort non-MICR encoded cheques. This was designed around the 2950. I designed both the cabinetry and the interface to the 2950. Touch Switches on each pocket sent a signal to the 2950, which processed the cheque data entered by the operator.

The switch was an aluminium plate engraved with the pocket number. The switches worked on a capacitive principle. The operator placing a cheque into a pocket activated the switch. Hugh

Brown wrote the software for this system which was written in MRX Basic. We sold a few hundred of these systems. Our customers were Barclays, Standard Bank and Trust Bank. We had to come up with such a system because NCR had discontinued production of their Waste System (the Eighths picture), based on the NCR Transverse Printer.



International Technical Assistance Bulletin FOR EDP SYSTEMS

air mail — Dayton, Ohio, U.S.A. — No. 2096-69

TO ALL INTERNATIONAL TECHNICAL SERVICE MANAGERS AND CLASS 615, 390 AND 500 SYSTEMS TECHNICIANS:

December 19, 1969

CLASS 615, 390 AND 500 SYSTEMS

SERVICE INFORMATION

Troubleshooting Aid

Mr. Hegtor, South Africa, has informed us of a Troubleshooting Aid he has developed for use on the above systems which may be of interest to other Service Technicians. The aid assists in isolating certain intermittant complaints and may also be used for various tests and adjustments. The aid is as follows:

A Basic Latch Circuit can be used to Troubleshoot most Logic type machines. See Diagram "A".

DIAGRAM "A"

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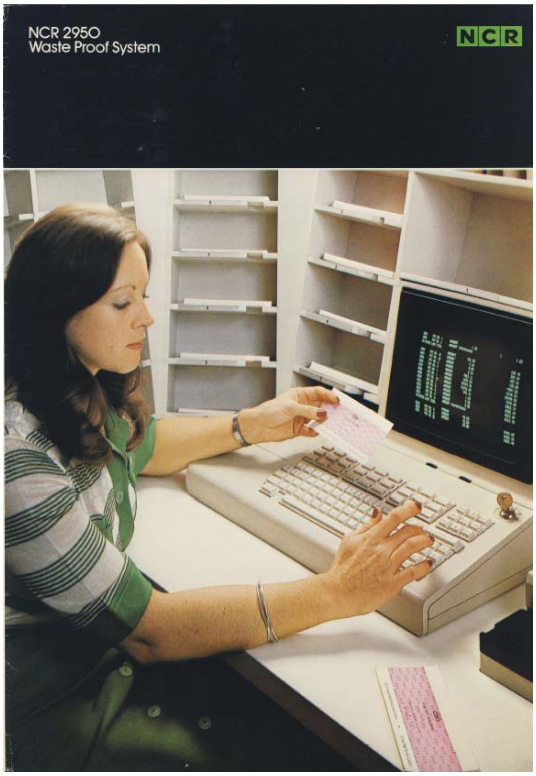
During my stay in the Rework Centre, I was sent to Dayton for 5 months to program some board testers made by DTC (Data Test Corporation). I was later sent to Dayton on a PSP (Portable Service Processor) training course, then later to Phoenix, Arizona on a Microprocessor Test equipment training course at Genrad Corporation. I was later transferred to the Hardware Support Group, Where I spent most of my time at NCR. I was the support person on all Proof equipment, PC's, Tower, ATM's.

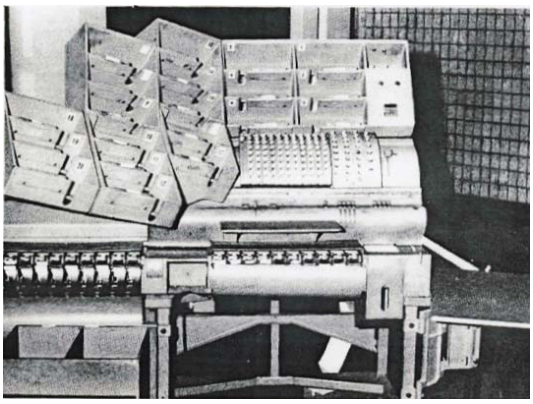
During this time I was frequently called upon to design various electronic solutions for NCR, such as Machine Modifications, Interfaces between different machines, add on features to machines, Test Equipment, Data Scopes, Protocol Converters, Solutions to overcome Fraud, etc.

Among my developments were:



- A Data Scope to capture data on a GPITS LAN.
- An Interface to give the 7700-100 communication capabilities. To do this I had to first develop data scope to analyse the data on the Proprietary Pocket LAN.
- A protocol converter to give the 1255 Cash Register RS232 capabilities. The NCR 1255 only used proprietary comms via the GPITS LAN.
- A 2950 Waste Proof System to replace the NCR Waste Proof System Based on the NCR Transverse Printer which went out of production.
- A UPS Interface that gave a Standard UPS Intelligence (to automatically reboot a Unix server in the event of a power failure).
- Various features for the DM5 (Decision Mate 5) Real Time Clock, Drawer Interface, Bus Switcher, Analog to Digital Interface.
- Tax Modifications for 2115, 2116, 2135, 2120 Cash Registers.
- 7820 Scanner Not On File Modification.
- Cheque Writer for ATM Printer. Developed Barcode Reader (to read Code 29) to read and track pre-printed Cheques.
- 7156 printer interface to the 1255 Cash Register.

- Modification to overcome ATM Fraud.
- 8051 Processor in Circuit Emulator.
- Modification to overcome 5070 ATM Note Runaways.
- True ATM Remote Status Indicator using RF.



These are just a few of the over 100 electronic developments I did during my stay at NCR, which was largely done in my own time as it was not part of my Job Description.

During my stay at NCR I have been privileged to travel to the United States 12 times, to the UK 8 times and to Japan once on Training Courses and Seminars.

When all is said and done, NCR has been a fantastic Company to work for. I have learned a lot, made many dear friends with whom I am still regularly in contact.

My Stay at NCR has been a Privilege and a Pleasure.