

Additional personal notes about
Standard Telephones and Cables Ltd, New Southgate, Oakleigh Road North,
New Southgate, London N 11

Having completed my memoirs of working at STC from 1950 to 1972, I uploaded them to my own personal website and to the forums for people who worked at the new Southgate and Monkstown sites. I had several responses with extra (or forgotten!) information and will keep my own article up to date if I get any more.

But from those responses there were some questions that need a longer explanation. Those I will list individually in this article, updating from time to time.

But first I will set the scene, as I remember it. The main business at NS was telephone exchanges of all types, but mainly based around the GPO's requirements. By the 1950s there were still some orders for manual (operators) positions but mainly for the Strowger designs using 4000 type selectors and 3000 type relays. As the orders were split by mutual consent amongst four manufacturers, later five, and prices were set on a 'cost-plus' basis there was a permanent GPO office on site to oversee production schedules and check that costs were being correctly reported. Generally then the atmosphere was pretty laid-back and most people did not feel pressured into keeping costs down and schedules tight.

One consequence of this was that the ITT board in America had started to get twitchy and by the end of the decade was pushing the STC Board to improve performance and expand more aggressively. Consultants were brought in to investigate performance (lamentable?) and profits (inadequate!). At NS we ended up with a big team from Arthur Andersen *, a Chicago based firm, whose brief was to investigate STC from top to bottom and make detailed recommendations. It was anticipated that changing from a manual paperwork controlled system to a computer controlled system would give many savings, improve scheduling, and make many cost savings. I would suspect that the main push to setup a Work Study Department came from their initial report. Sadly, as it turned out, the AA people were mostly Americans which did not sit well with the British employees!

It also seems, in retrospect, that the AA people had little experience of computer system design and merely assumed that the NS paperwork could just be turned into computerspeak, relying on the Honeywell installers to translate it all. I would suggest that several months of study were needed before redesigning a system that could replace the old – there was no way it could just be grafted on.

Labour relations

I do not remember any serious disagreements between management, workers and unions. That is not to say that there weren't any, but simply that my own work was never affected by any, including strikes if there were any. I have had a look at various historical sources and so far as I can see, STC at NS during that period was not affected.

I do not think that STC was such a paragon of virtue that disputes never arose! More likely, I suspect, that being owned by ITT and being a stable employer in the area, we all got along reasonably well.

Having said that, I also suspect that as management was getting adequate returns on the stable arrangements STC had with the GPO and “The Ring” that there was little pressure from head office to push things too far? As I have written, when it was decided to setup a Work Study department the unions were very reluctant to agree. They were happy with the long established and imprecise methods of production planning and pay rate agreements. When agreement was reached in 1961 to select a few employees and train them in WS techniques, the union representatives insisted that nobody from the embryo WS department would be allowed to investigate current working practices, or suggest any investigations, without prior discussion with the unions involved.

In the event, once the team had finished their training around the end of 1961, no agreement was reached and the WS department was disbanded.

Control of production

The whole system was based around a step by step routine beginning with the writing of a new contract. The planners would get from the engineering design staff a breakdown of the exchange system component parts – so many racks with so many selectors, distribution frames and so on. There were stock lists that gave the number of the individual parts required for each unit and with the number of units known a total ordering requirement could be drawn up. For example, say 950 screws of part number xxx would be needed for the various units that needed that particular part. The ordering department would issue all the orders and send them to either an outside supplier, or internal production department. It was expected there would be some losses or waste, our screw xxx order would probably be placed as a total of 1000. When delivered, the progress department would specify that the batch should go to a store, or stores if it was more convenient to supply different assembly areas from their own store. There were a horde of stock control clerks (my wife was one of them!) keeping track of all the paperwork and entering progress on index cards which were regularly looked at by the progress clerks, male of course.

Take stock control as an example of the paper/card system that worked reasonably well and was part of the AA brief to computerise.

Back to the screws! AA found an order for 1000 type xxx to be delivered to store A. If they wanted to check that order, they would have to actually go to store A and look at the index cards on the storeman’s desk and see if the entries matched. If when delivered the storeman hadn’t got enough space in one location, AA might find that screw xxx appeared in smaller quantities in more than one location, but the total should be 1000. But, if he had been asked by the assembly progress clerk to distribute the screws more conveniently the whole 1000 would not appear on that store’s index! Everybody knew that, except the consultants!

Incidentally, as I well knew, a small order ticket could have been used for a gopher like I had been to withdraw say 20 screw xxx years ago. That would not have been covered by any production order and would distort stock figures. Even to the extent that there were none in any store at all!

Even worse, AA could look at the calculated requirements of screw xxx for the whole exchange order and find that only 950 were needed. Without decades of experience at the NS site, the AA consultant might think that meant that for any further orders involving screw xxx, the number could be reduced by 50 due to having surplus stock! Writing that into the new computer system would then automatically create a shortage instead of the calculated surplus! It was thus

inevitable that after a very short time of trying to produce using the AA system to control production, the whole system was out of balance and production timetables going crazy ☹

One very visible indication was just to have a look at the stock control clerks desks! Day after day huge stacks of corrected computer printouts would be delivered from the overnight computer runs – no computer monitors to look at by anyone except the programmers in their sealed, air filtered room!

Production planning - general

Instead of a Work Study department there was a department by that name of Production Planning (or similar) that had the duty of designing any new assembly line for new products. As part of that process they also agreed on process times and costs, especially pay rates, with the shop foreman and shop steward. The process was well established and relied in the main on historical decisions. Such a process would not be the most effective as far as easy, quick and economic manufacture was concerned, but with very little cost pressure from our main customers, the GPO and other PTTs, there was little incentive for improvement in manufacturing and assembly techniques.

Production planning – sequence

Say the GPO had been offered a new design of a relay by one of the five so-called ‘Ring’ (TEEBSA) suppliers, then samples would be tested at Dollis Hill Labs and provisional GPO drawings and specifications drawn up. At one of the regular committee meetings of TEEBSA the GPO representatives would present these and ask for estimates of cost. At this point the production planners would have a look at the design and samples to sketch out a production sequence from which estimates of material and labour could be made in order to estimate a production cost.

Note that the concept of ‘cost accountants’ was not in use so no expertise was available to the estimators. At that time the accounts department was run only on traditional historical accounting lines.

Often all five would submit an estimate and the GPO would suggest a quantity distribution amongst as many of the five as were interested in signing a contract. By the way, most contracts were cost plus, so competitive incentives were minimal! Once a contract was signed and delivery dates agreed, then the S & M department (at NS as this was Telephone Division business) would find floor space and get together the required benches, machines, power supplies etc and put it all together.

While this was going on the site manager would agree with manufacturing management which department (and hence foreman) would take on the new work and also involve the Inspection department and shop steward(s) in drawing up a schedule. Production Planning would be writing and agreeing a production process/sequence with estimates of time allowed for each assembly stage so that a piece work rate could be agreed. But it has to be borne in mind that the original design would have been tested from prototypes put together by design engineers with little hands-on experience of the manufacturing and assembly processes that would be needed in factory conditions. It was not uncommon for raw materials to be incorrectly specified from the samples obtained from suppliers, and very likely that individual sample parts were never manufactured under factory machine conditions!

One example from the RAR design. The armature was stamped from a nickel alloy and the final adjustment process depended on bending the support limbs so that the stress distorted the

crystal structure to set the armature in a precise relationship with the magnetic circuit. But the press room planners knew that the particular type of alloy needed to be heat treated within a short time of being stamped out to relieve that stress, and that was included in the process for that part – it would then meet the dimensional requirements. No such annealing was possible in the assembled unit and the engineer who dreamed up the adjustment procedure (that seemed so simple!) had a nasty surprise when apparently correctly adjusted units were found to be wrong when tested ☹ The final irony was that the engineer who specified that the armature should be fixed by rivets had not appreciated that the impact needed to place a rivet also stressed the alloy! A production engineer solved that problem by using torque controlled machines to assemble using screws. What appeared to be a more expensive method actually proving to be cheaper overall. Some years later a suggestion was adopted to breakdown defective units and recover the expensive magnets – not possible if rivets had been used!

Production planning – initial manufacture

All the materials are to hand, all the equipment installed and checked, and all the production line workers got together. Now the planning staff have the job of showing (not teaching) them how to get the whole thing up and running. How well that goes largely depended on the quality, experience and planning of the foreman and ‘his’ workers in solving all the many problems that would immediately show up!

While all this was going on, the rate fixers would be checking how well their estimates were working out and trying to agree where they were not so that the workers would end up with what would be considered “a fair rate for the job”.

Production Planning – improvements

Finally, with a product coming off the line at a steady rate, all involved could think about doing it better! As I think I have made it plain, there was little incentive to upset the apple cart and things had to get desperate before the Production Planners and Rate Fixers would be officially involved again. Frequently the Employee Suggestion Scheme was more effective in coming up with ideas for improvements with the other people handling any production problems that involved quality and delivery schedules.

Employee shortages in the 1940s

With the introduction of conscription for men in 1939 (women in 1941) there was an immediate effect on the availability of workers at NS. As the purpose was to send men to kill or be killed, it was only too obvious that the problem would get worse over the next years; calling it National Service may have sounded nice (?) but didn’t change the situation.

As women could choose, to some extent, what they would do to meet the requirements there was an extra loss to such factories as STC at NS. The numbers were not great, but had to be made up to keep production going. One consequence was that if there were men who did not meet some conscription requirements, they could take over jobs that had up to then only been done by women; for example, assembly and adjustment of relays. There was a problem that had to be sorted out as women were paid much less per hour than men, so an adjustment had to be made to piecework rates to keep the men’s take home pay at the level they expected. The adjustment was called MOWW – Men On Women’s Work. After 1945 conscription and direction of labour was eventually ended, but the special rate was preserved as some men had become accustomed to that sort of work and the unions insisted that they should stay if they

wanted to. Thus the production lines had an additional complication when rate fixing if men were still working on those lines!

Sometimes the rates for MOWW were so favourable that the men involved refused to be put back on 'men's work'!

Of course! (sic) the same did not work the other way. Those women who had been forced (cajoled?) into munitions factories and so on were rapidly dismissed when the important MEN wanted their jobs back and the WOMW (Women on Men's Work) rated employees lost their jobs so that the all important males could have their women back at home to look after them.

Production costs – control of

Generally STC at NS had never worried too much about controlling costs as so much of the production of telephone equipment was contracted on a cost plus basis. Even if there was waste, as long as the buyer (GPO and other PTTs) could be persuaded that they had caused the waste by, for example, design changes during production, then the waste could be costed into the final settlement. I came across a good example of that after the WS department was disbanded in 1962. A suggestion had been made that a lot of 'spare' relays could be recovered and fed back into the supply chain for exchange assembly. Dennis Harris and myself were given the job of working out how to do it, which would also result in some floor space being released.

What we found was that many times after a design fault (or error) had been discovered, it had been too late to cancel the specific orders for relays to be assembled into the racks. So those relays were put into store for possible later use while replacements were assembled for the redesigned racks.

Unfortunately, nobody had had the responsibility for keeping track of the stock of stored relays! Our first idea was simply to list all the relay types in store and then compare that with new requirements and tell the ordering department to use those instead of making production orders for those that were available. Simple idea until we actually looked in the store! Racks and racks of the special relay boxes (a small fortune in those alone) without any record of what numbers were involved. In the end it took us weeks of taking down each box, listing the contents, and then physically moving them all to empty space in a proper store. If I remember rightly, we ended up with a list of about 15,000 relays, and another list of just a few hundred that we could send to the next production batches! The ordering department's methods were totally unsuited to matching up paperwork to reality! In the end we had to get on to something more useful so just handed over our lists to the appropriate foremen who had much more incentive to look good on savings than we did! Anyway, who cared; STC would be paid for them anyway, and who wanted to argue with the GPO as to how to adjust the costs.

The AA team were totally flummoxed by all this and were quite unable to incorporate corrective measures in their embryo computer system.

(One other thing – Dennis got quite good at driving the electric trolley we borrowed from stores, and I got to be expert at manning the goods lifts!)

Assembly line training

As an aside to the failure in getting a WS department up and running, I was later involved in a problem found on the selector bank wiring line. In the end I proved it was mainly due to the lack of formal training for such workers, that itself should be based on a proper study of working methods and training of operators that could be specified through WS.

The line employed about 20 women who enjoyed a far higher take home pay than the rate fixers had anticipated. As a unit they had a very good production record and individually were happy with the work and the pay! The cost estimators were not so happy, but the foreman enjoyed the reputation his unit had within the factory.

Obviously employee turnover was very low in that unit. But if a new employee was needed, their individual performance was very bad. It seemed that nobody in line management had any idea how the established women achieved such good results, and also had no idea how to rectify the situation, perhaps by better training? As a problem of meeting higher performance targets had arisen, and just adding more line workers would not achieve anything, a decision was made to see if a properly based study could achieve anything

I had had (it was hoped!) the right sort of training to study the problem and without the WS department available, I was made the fall guy ☺ It helped that having been around for several years and from the same social background as most of the women, I was acceptable to them as almost 'non-management' so they agreed to introduce me to the line and try and tell me how they achieved such good results. They of course had to be promised that if we did get the hoped for results, they would not be any the worse off for pay!

Remember that most of the so-called training of new operatives was done by the infamous (amongst WS engineers) system called 'sitting next to Nellie'. Simply put, seat the new worker alongside an experienced worker and hope that the Nellie chosen was good at showing what to do and how best to do it. Then practice makes perfect!

To explain the problem – wiring the selector banks involved connecting the 200 individual contacts of each bank with the 200 of the next bank in a row of 10 or 20 banks. For stability the wire on the tag behind each contact had to be wrapped once around the tag and then soldered. End result, for every specific contact its solder tag was connected to all the other specific contacts of that row of banks. To keep the whole system physically small, there was only a fraction of an inch between tags which did not make wrapping the wire round each tag at all easy. At some point a small hand tool had been designed that was intended to be used to shape the wire loop and slip it over a tag. But they were all in the foreman's desk drawer as it took longer to use the tool than just fingers.

Another device that did work and the whole team were very proud of was the wire preparation machine. The original wire was tinned copper of 23 swg (I think that's right) insulated with cotton wrapping. The first machine made burnt the cotton at the correct interval to fit between tags on adjacent banks. Reels of wire were driven through the machine so as to give each operator a readymade supply of wire that they could feed straight on to each tag (after looping) and then soldered. Not long before I was involved the wire was approved to be plastic insulated and that made the machine simpler. Instead of burning, which tended to be imprecise and the cotton could fray, the new design was a cutter that made a cut all round the wire, and the movement of the wire and cutter pulled the cut slightly apart to expose the wire which made forming each loop easier. Then all the tags on each bank for that wire had to be soldered. Originally gas heated irons were used but they had been replaced by heavy duty electric irons custom built by the Maintenance department specialised workshop that made and refurbished all the irons on site.

It soon became apparent to me that there was a knack in holding the wire and looping it round each tag in one movement. The operation was done so fast that it was difficult to see how it was being done. The operators tried to explain what they were doing at the same time as demonstrating in slow motion as far as they were able and still make loops.

I will try and explain in words what I eventually discovered was happening; for each tag the wire was held on both sides of the exposed segment of wire by some of the fingers in each hand. The exposed section itself was pressed between the pads of both index fingers. Now for the tricky part – both hands were twisted in opposing directions while still firmly holding the wire and the section in between the index finger pads was thereby constrained to cross over itself and form a loop. Continuing the movement of both hands dropped the loop onto the tag and pulling the hands apart slightly tightened the loop firmly in place so that the hands and fingers could be slid along the wire ready to loop and place the next exposed section.

That is NOT an adequate explanation but it really does cover the basics. After some intensive practice my own kinaesthetic sense managed to grasp the movements and I could start to fumblingly make a wired run of a line of tags and banks. Now came my own problem! The operators had at last managed to make someone understand what they had achieved and it was now up to me to reproduce the explanation in a form that could be documented. I was, and am, hopeless at making decent drawings so I got help from the photographic department. A photographer came over from bldg 8 to get some stills at various points through the handling stages of the wire. That was at least a start.

I ended up with borrowing the photographic studio's 16mm film camera – they had bought it for investigating a machine problem that needed slow motion filming. We got several reels at high speed and made positives for editing. The studio also had an editor that I could borrow and I set up on my desk with that and a pair of cotton gloves to make an attempt at a training film © After lots of viewing the powers-that-be agreed we could write a training manual and include the short film. I don't remember exactly how the pay rate was finally agreed, but the ladies on the line still gave me a wave every time I walked that way to go somewhere!

As I have described in my memoirs, while I was still with STC NS never agreed with the unions to setup WS etc, and the change to overall production system control as the final result of the AA investigation was handed over to a new department staffed by old and new employees. Some of the lessons learned were applied to Monkstown and I hope that the transfer of so much of the Switching Division work to them went smoothly for the few years that were left!

* AA developed improper practices in the 1990s and were closed by Federal Court in 2002

Memoirs at <https://www.snugglebugs.dk/STC.pdf>