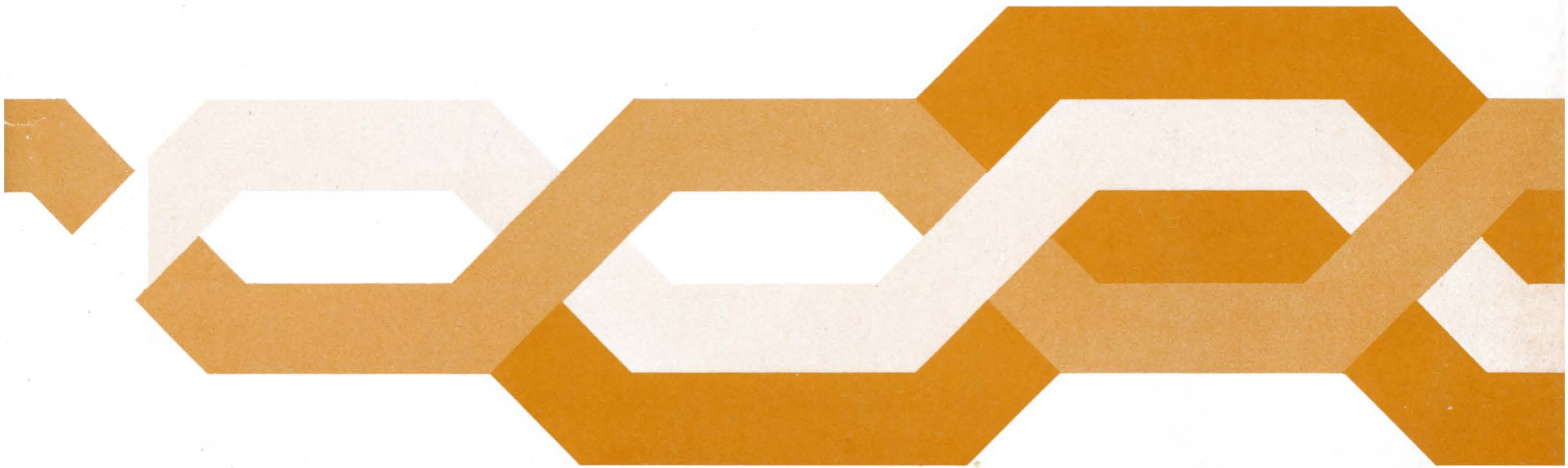
Maintenance News

17
Autumn
1980



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Contents

Editorial

This issue contains several articles from contributors outside THQ. This is good because the articles reflect first-hand operational experience; demonstrate that *MN* is appreciated as a national medium; and should show most readers that we, in THQ, are interested in **your** experiences in the field. There is always a good chance that your experiences may interest others. So, if you wish to offer an article, please send it through your representative – his name is given inside the back cover.

Our printers apologise for problems in distributing *MN16*. I hope all regular readers received their copies eventually.

Ron Quinney
Editor

Area repair centres

by **Ron Quinney** NE/ES 5.4.3

For some time now THQ and the POEU have been considering how best to deal with the repair of the vast quantities of electronic units that will enter service during the next few years. The present arrangements – based on some twenty RESCs (Regional Equipment Service Centres) – will need extending for a number of reasons:

- to cope with large volumes of electronic and microprocessor-based customer apparatus, with field support as local as possible
- to give effective back-up to System X exchange maintenance staff
- to give a broader base of expertise at area level
- to allow greater flexibility, if needed, in the location of repair work
- to preserve and protect the Business's future interests in a competitive market.

It was quickly realised that the logical solution would be to set up electronic repair facilities in areas. To this end, a new *TI E16 A0011* has been produced, which authorises GMs to establish Area Repair Centres (ARCs). All areas are expected to have at least one ARC within the next three to five years.

Some specialisation

No doubt some ARCs will be larger than others, but all will have the same status. Each will be competent to fulfil the wide range of fault finding and repair work with the same degree of skill, but in practice, not every ARC will repair every equipment type and it will be necessary for some ARCs to specialise. This could be because:

- providing very complex or expensive test gear to all ARCs would not be economic
- population or geographical distribution of a particular equipment might not justify widespread repair facilities
- some ARCs will be the first to deal with particular new equipment, closely monitoring faults and developing expertise.

Regions' role

Although it will be the GMs responsibility to provide for electronic equipment repair, the regions still have a big part to play in keeping the machinery 'oiled'. First, all regions have been asked to nominate one person from their maintenance group to act as a Regional Equipment Repair Liaison Officer (RERLO). One of the RERLO's first tasks will be to coordinate the introduction of ARCs for his region and to liaise with THQ and other regions. Already most regions have nominated their RERLO, so it might be useful to get to know yours. Regions will be seeing that adequate transport facilities are maintained so that faulty and repaired items can be sent in the most effective way. They will also be responsible for providing the appropriate staff with all the information and instructions for the job. Regions will as usual

be the first contact when area staff encounter difficulties or problems.

THQ's role

THQ has arranged for funds for basic test equipment needed for ARCs, and an equipment list to enable ARCs to 'get off the ground' has been made. The list includes oscilloscope, multi-meter, soldering and desoldering tools, and so on. As soon as it is known what units are to be repaired at a particular ARC, THQ will arrange to supply any 'special' test gear necessary for that work. Of course, the provision of expensive automatic test systems (ATS) will be subject to close scrutiny by THQ and weighed against the specialism aspect – mentioned earlier. We are also issuing other TIs in the E16 series. One lists the addresses of all ARCs (*E16 A0013*) and another (*E16 A0012*) lists which region repairs what items of equipment. To make sure that ARC staff, and their supervisors, receive all TIs in this series, distribution is being made through Basic Duty Code 484 (see *E1 A0002*) – a code which used to be for RESCs, but has recently been altered to ARCs. So, if you work in an ARC, make sure BD 484 is included in your TI file.

EERCC

The EERCC (sometimes known as E²RC², or 'E squared') is the electronic equipment repair coordination committee. Comprising members from regions, Factories Division, Quality Assurance Division and the appropriate THQ 'expert' groups its main role is to recommend where an item of equipment should be repaired. At first sight, this might appear to be a sledgehammer-to-crack-a-nut. But this committee's work is very valuable. First, all THQ groups introducing a new item of electronic equipment are required to inform EERCC formally if 'off-site' repair is envisaged when the equipment becomes faulty. (Off-site implies that it is impracticable to repair the unit in its installed situation.) Information to EERCC involves written explanation of the salient design features and the maintenance needs of the unit, or system of which the unit is a part. The engineer concerned usually attends a meeting of EERCC to introduce the item and answer any questions. These aspects influence the decisions made. After full consideration of an item it may be repaired off-site :

- at ARCs in all regions
- at specified ARCs
- by Factories Division (FacD)
- at ARCs or FacD.

Periodic review

An important feature included in the joint discussions leading to the introduction of ARCs was to ensure a fair sharing of work between ARCs and FacD. This will be done through joint, periodic, reviews of workloads.

Future aims

The increasing application of microprocessors and other LSI-based systems, will lead to more automatic fault finding techniques, replacing elaborate and time consuming manual methods. We shall see more and more automatic software controlled test systems (ATS) introduced, accompanied by necessary staff training. Another development is likely to be the introduction of computer-based information systems into ARCs. These will allow data to be collected and processed for such purposes as :

- unit fault histories
- component fault data
- repeat faults – identifying 'rogue' units
- management control information
- data for the joint reviews
- locating units following repair.

Sharing resources

To make full use of available resources, it is probable that many ARCs will provide facilities to Works Groups, for example, programming PROMs in customer apparatus before installation. An ARC may also help, for instance, a TO on PABX maintenance duties dealing with a particularly troublesome fault. He could take part in the testing and repairing to give greater job-satisfaction and more confidence in the plug-in unit itself.

In developing the new policy, account has been taken of the need to meet competition from a variety of sources, both specialist and general. Provided the facilities are used in a practical and economic way, we should have a widely distributed, speedy and highly professional repair capability – with a degree of technical competence that few could match. Bearing in mind that all modern electronic equipment is based upon the printed-circuit board, the scope for these centres is considerable.

01-739 3464 Ext 7695

Service triangle helps Midland reach PCA 25 target

by **Jeff Jones** MTR/SM 4.3

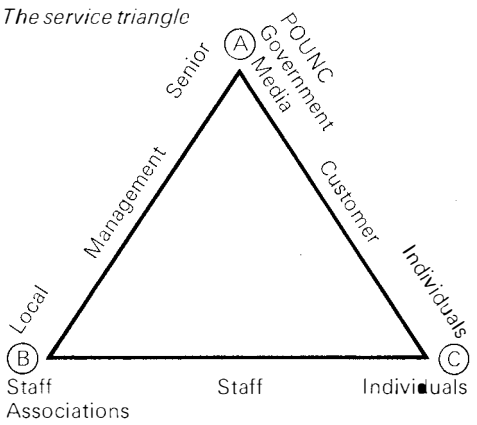
Customers often become frustrated and annoyed if they have to listen to more than 25 seconds of ring-tone when attempting to report faults to '151'. So the speed of answering is important. PCA25 – the percentage of '151' calls answered in 25 seconds – is the method used for measuring this performance. A device known as the 'Service Triangle' helped Midland Region appreciate that the Direct Reporting (DR) Repair Service Controls (RSCs) – the first point of customer contact – are only one component in the repair service organisation. The dramatic improvements achieved in PCA25 at two Birmingham RSCs – using different methods – demonstrate how each component in the service triangle played its part.

The service triangle

For a completely satisfactory repair service, the system – depicted by the triangle – must be closed at A, B and C. This means that communication, discussion and agreement should be maintained between the parties concerned, for example :

– at **A** senior management determines the quality of customer service to be provided by considering

The service triangle



- our historic performance
- reaction of customers through POUNC, Government and media
- other telecommunications organisations' performance
- overall financial strategy

– at **B** targets are set and agreement reached on local arrangements necessary to achieve them

– at **C** agreed level of service provided to the customer on a day-to-day basis is measured by performance.

Target achievement

After region and area management had expressed concern at the PCA 25 performance in Birmingham Area, one solution considered was the '151' call distribution system (CDS). With CDS, '151' calls are presented in sequence to each test desk and can also form queues with indications at each position. The system, which is standard for the new modular-type test desk, was examined by area management and staff representatives at an RSC already using it with 56-type test desks. As a result, talks were held at the two RSCs involved in the improvement plans. RSC staff, POEU representatives and local management decided to adopt a CDS for Northern RSC, but not for Midland RSC where a different plan was formulated.

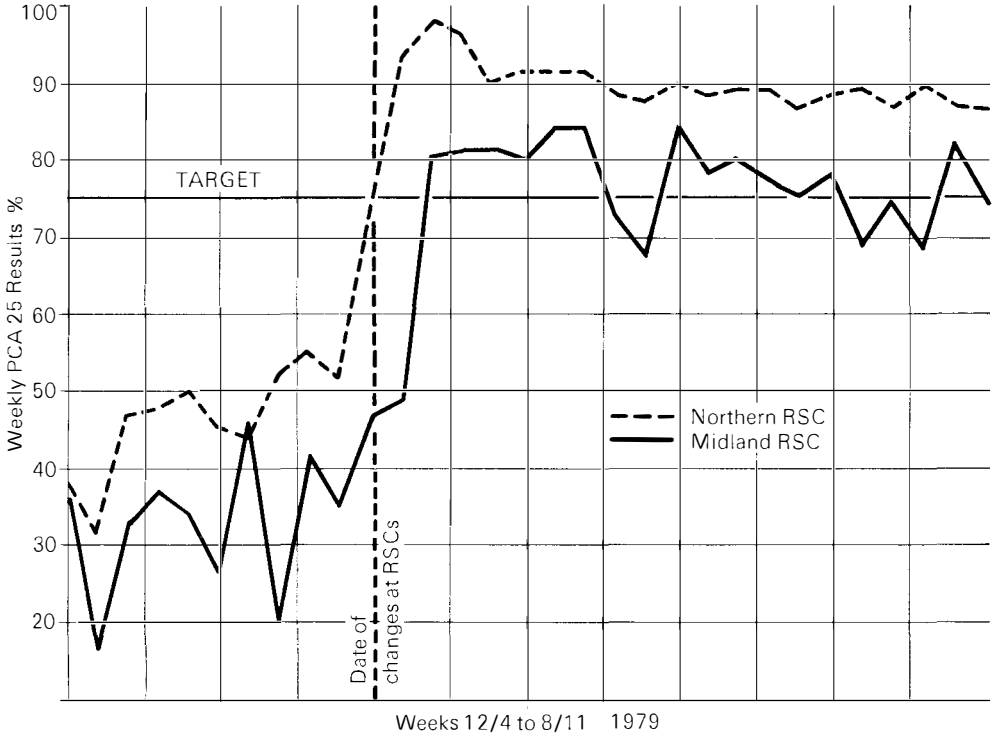
Northern RSC

In providing a CDS, it was agreed that the package agreement would include :

- improved working conditions
- rearranged attendance based on the shorter working week
- a docket officer.

A locally designed unit was built and installed, and the improvement in PCA 25 performance was immediate – see graph. The RSC staff have also found additional benefits :

- sharing of '151' reception duties between all test desk staff
- the cyclic distribution normally allows each



officer a definite minimum period between '151' calls

- by having '151' call meters for each test desk position, the arrangements can be *seen* to be working fairly.

Midland RSC

Here, it was agreed that the '151' reception should remain as before except that the staff normally dealing with public call office reports would help with calls during busy periods. A working system of 14 days every 3 weeks was also agreed in return for a more concentrated effort on '151' reception. No additional staff were introduced in this case.

CDS for all RSCs

The graphs compare the performance of the two RSCs. Northern RSC shows that fluctuation in PCA 25 performance is relatively independent of input variations. Midland RSC have proved that dedication to the job can achieve the target, but it is difficult to maintain such an effort during times of high fault incidence. Nevertheless, the changes made at the two RSCs have demonstrated that each method produced successful results. Much of the improvement can be attributed to the willingness of staff to use new schemes. It has now been decided that CDS will be installed in all Birmingham's RSCs, so that the benefits can be passed on directly to the customers. After all, by keeping the 'service triangle' closed, everyone must benefit – let's keep it that way.

●21-262 4448

Care for a chip!

by **Steve Plumb** NE/ES 5.4.1

Quite a lot of advice has been written about how not to handle Integrated Circuits – especially those MOS (metal oxide on silicon) devices which, nowadays, are found in almost every equipment. Most of the advice given is about avoiding anti-static charge build-up which can be caused by incorrect manual handling. The correct techniques, using earthed work areas and so on, discharge the would-be damaging electric fields. *MN8* shed some light on this problem. Here is news of another troublesome mechanism. It will be of most interest to those who are employed on fault-finding and repair work.

Freezer sprays are often used for cooling electronic components – to help locate faults. Such sprays must no longer be used on MOS devices. The coolant used – under the trade names 'Freon 12' or 'Arcton 12' – is dichloro-difluoro-methane, and has been found to be positively charged. Using this spray causes a static charge build-up on the inside of the device lid, which can permanently corrupt the binary data stored in the tiny elements of an MOS device. With an ultra-violet (UV) erasable programmable read-only memory (EPROM) it has been found that exposing a corrupted device to UV light for a few seconds in an EPROM eraser can sometimes restore it to its original data or function. But this cannot be quantified and is not recommended as a solution to the general problem.

If you observe a similar trend in corrupted EPROMs or other MOS devices remember to check for a common process that could be causing static charge to be built-up in the devices. After all, someone discovered the 'freezer spray' effect by being inquisitive.
01-739 3464 Ext 1697

Radiopaging nationwide

by **Norman Brown** ME/BS 5.2·3

This article first describes the present services operated from proprietary control equipment – to be withdrawn from service in early 1981 when the Radiopaging Service goes nationwide. We then deal in more detail with the new system.

The first PO system – known as the Thames Radiopaging Service, which opened in 1973 – serves an area around Reading, Berkshire. A trial soon demonstrated the popularity of such a service with customers, and its financial viability. Basically this system operates to a 10-digit number dialled from anywhere in the UK. The first four digits (0072) route the call to paging control equipment (PCE) where the remaining digits identify a particular Radiopaging receiver (pager) which is signalled (bleeped) by a radio transmission of the pager's unique code. On hearing the bleep, the customer takes some pre-arranged action, such as phoning his office or home to obtain a message.

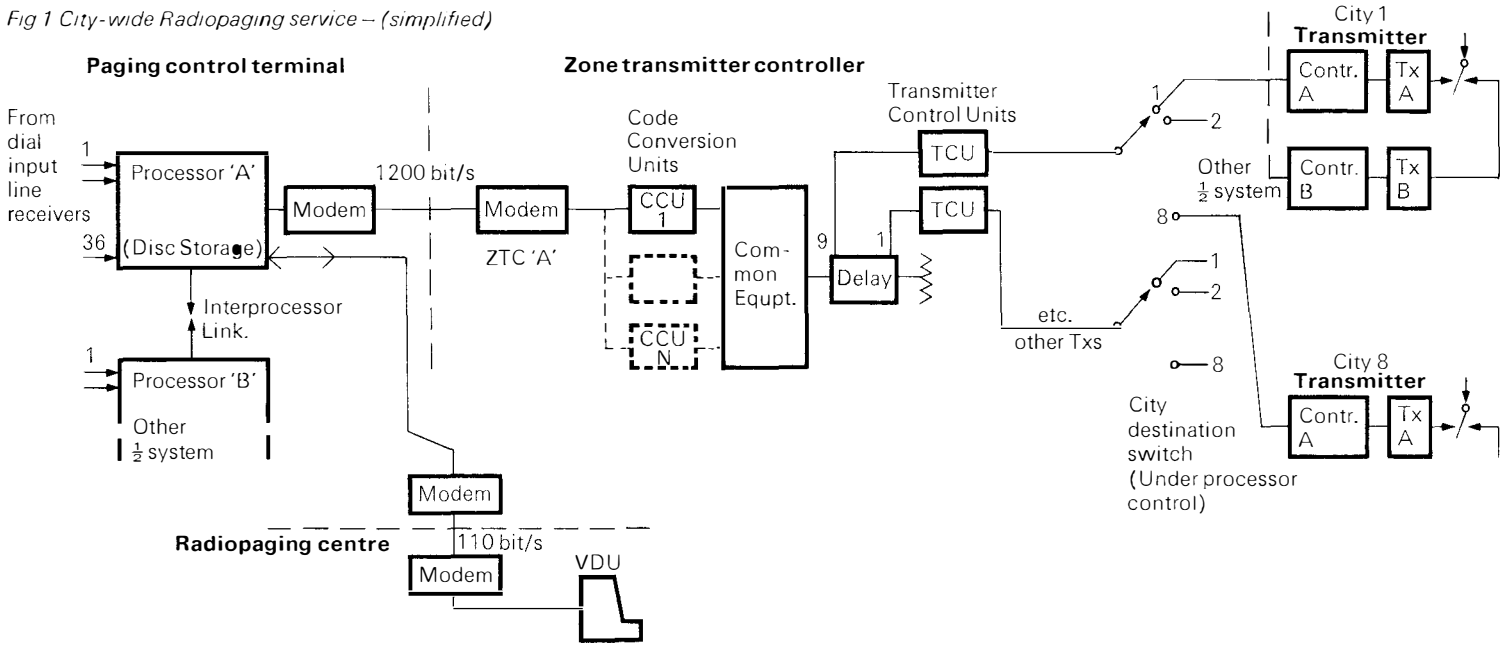
The Reading-based service is limited to about 3000 customers, but soon after it opened, it became possible to obtain 100000 code capacity pagers and control equipment – so, in December 1976, the service was extended to London.

London and the City-wide services

The London PCE has recently expanded capacity from 20000 to 100000, and is accessed by the STD code 0073. Six further digits are then absorbed by one of the many input data sets which convert 'Strowger' pulses to a binary-coded decimal (BCD) form, suitable for the PCE's minicomputer. Customers' paging codes and service requirements are retrieved from a disc store and, when the PCE receives a valid number, the caller hears "Paging call accepted". After a short interval, the paging call is released from a queue and transmitted in binary form over a data link to a zone transmitter controller (ZTC). The ZTC switches on, monitors the operation of the transmitters, and converts the data into the radio signalling codes required to operate pagers of different manufacturers' types and code formats. Duplicated 4-wire circuits carry the pager identities from the ZTC to modems at each base station transmitter, the lines being delay-equalised to ensure that the transmitters modulate in phase. Solid-state transmitters provide up to 100W of radio-frequency power and simultaneously radiate a frequency shift keying (fsk) signal in the 150 MHz band. Nine of these base stations cover the Greater London zone.

The transmission of one call takes about 0.25 seconds, and is sent as one of a batch for a particular type of pager. For a small fee, customers may opt for a second 'address' – using an alternative telephone access number – to give a different bleep from the pager. This allows customers to distinguish, say, between a call from home or office. The

Fig 1 City-wide Radiopaging service – (simplified)



latest type of pager identifies its code in only 0.07 seconds, and operates on the PO Code Standardisation Advisory Group (POCSAG) code – agreed with industry as a UK standard for the new nationwide service. This code is freely available for use by any organisation and is attracting world-wide interest.

While equipment for the national service was being developed, it was decided to make use of the spare capacity of the London PCE to operate transmitters in seven additional cities : Birmingham, Manchester, Liverpool, Bristol, Cardiff, Glasgow and Aberdeen. So since April 1980 by paying a little extra, customers have been able to enjoy a 'roaming' service. To achieve this, the London ZTC was adapted using a special switching unit to time-sequence its output to all 27 base station transmitters serving these cities. Calls are queued in the PCE for each city destination, a header code setting the ZTC-to-base-station destination switch (Fig 1).

National Radiopaging Service

At the turn of this year the City-wide services will be transferred to the first of five control systems code-named PACE which, collectively, will provide capacity for 0.5 million paging numbers. THO has designed a new control system – similar to that used for Prestel – based on GEC 4070 processors, which will give :

- routeing of paging calls from the PSTN to the nearest PACE
- transfer of calls over an inter-PACE network
- conversion of pager codes in an encoder forming part of PACE, each operating eight ZTCs remotely located in the eight zones served by each PACE installation

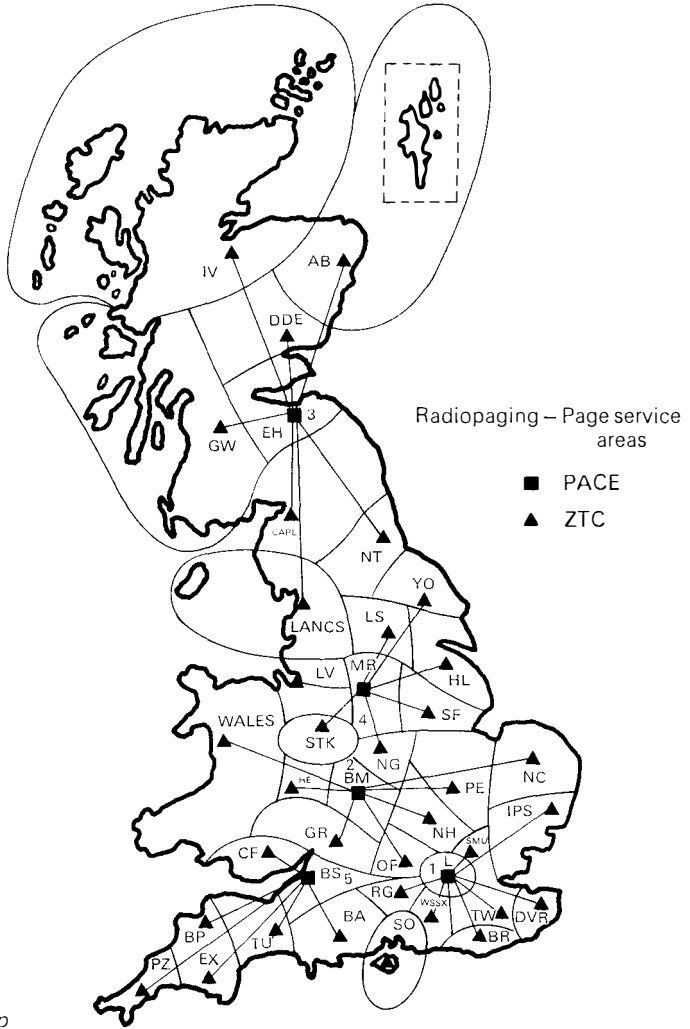


Fig 2 UK Zone map

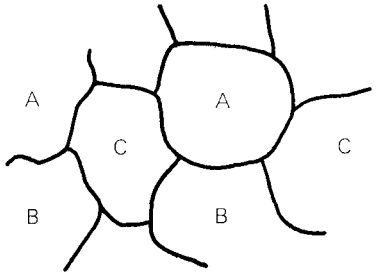
- 40 service zones which, by tariff grading, allow customers to choose the zones in which they require service – saving air transmission time in other zones. Fig 2 shows these zones.

Within a zone, all transmitters are keyed simultaneously, but transmissions between zones are time sequenced so that adjacent zones do not operate at the same time. This prevents radio interference around the zone boundaries, as zones radiate differing traffic patterns dependent on customers' 'roaming' requirements. Time sequencing causes a loss of air time, but this can be made up by alternating adjacent zones between two radio frequencies (Fig 3). Whether or not all transmitters will be equipped with this second channel depends very much on the number of provincial users wishing to pay for roaming into London – where air time will be at a premium.

System outline

The main elements are shown in Fig 4 :

- the telephone line interface equipment (TLIE) – designed by THQ and made by Factories Division – provides 210 input units, enough to cope with peak paging traffic – normally 10.30 to 11.30 every morning. It converts the six 'Strowger' digits, following the national 0073 access code, into BCD form for computer processing ; provides supervisory codes, and the "paging call accepted" message. A 2-tier multiplex arrangement gives a reduced grade of service should unit failure occur.
- the paging call processor (PCP) comprises 'active' and 'standby' GEC



Paging zones

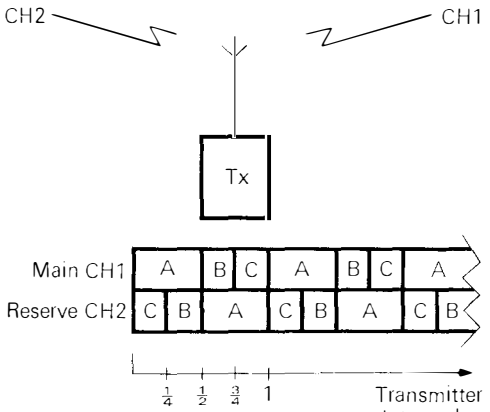


Fig 3 Two channel time slots

4070 processors, each with 4M byte drums holding duplicate data on at least 100000 paging numbers. Updating of customers' files, service zone requirements and so on, can be done from up to 32 remotely-located Radiopaging Centres using visual display units (VDUs). Each PCP has a 256k byte store which holds data on calls passing through the system such that the standby unit can take over at any time without loss of paging calls.

For each pager call, the PCP :

- accesses the drum store for customer status
- tells the TLIE which message is to be given to the caller ; for example "paging call accepted"
- outputs data on the pager type and identity
- indicates the zone in which the call is to be transmitted.

Calls for each pager type are batched. This minimises loss of air time in the transmission of preambles which are necessary for correct operation of the pager's call detector – a device that prevents the battery economy circuit operating during receipt of calls.

The encoders – at the output end of PACE – contain microprocessors which convert the parallel data giving the paging identities received from the PCP, into the form of serial data required by the three different types of pager. Twelve similar encoder units are used, since PACE serves a maximum of eight ZTCs at any one time, with four available for 'hot' standby use. As well as code generation, encoders supervise the operation of the ZTCs and their dependent transmitters, signalling back to the processor any fault, which then appears as a printout with an appropriate alarm.

The zone transmitter controller (ZTC) is situated near the centre of the eight PACE-controlled zones. From each ZTC,

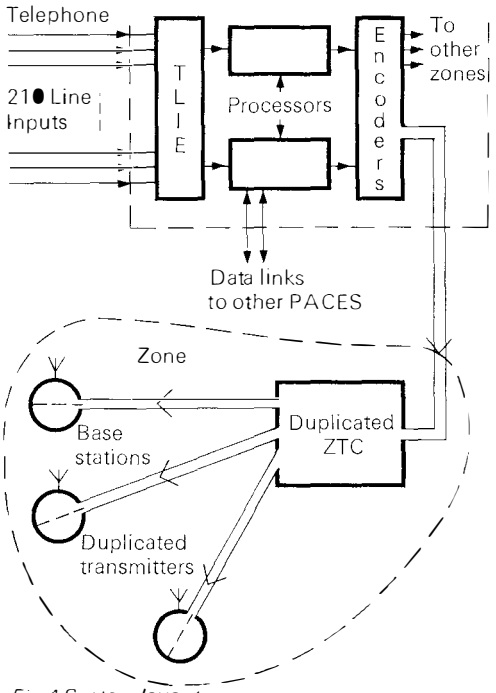


Fig 4 System layout

4-wire circuits radiate to each base-station transmitter and carry the data from the encoder to key up and select the radio channel for each transmitter in the zone. If a transmitter fails to respond, the ZTC switches to an alternative line connected to the second transmitter at the base station, and sends an alarm back to the PACE. So that all transmitters in the zone modulate in phase, the line connections

are specially delay-equalised using a 5millisecond delay-line tapped to the nearest 50microseconds. The monitoring, switching and supervisory functions are all microprocessor controlled, and a ZTC is capable of operating up to 24 base stations. After the initial setting-up phase, the ZTC becomes 'transparent' to the paging identities from the encoder which then pass directly to the base station. Should a fault occur, an alarm is raised, and the encoder switches from the 'active' ZTC to the standby.

Each base station has two transmitters, with controllers and power units housed on a rack 73B. The transmitter is a binary fsk 100W solid-state design, powered from a 28v rectifier which also feeds the logic circuitry. A 1200 bit/s modem interfaces the line from the ZTC to each transmitter controller and conveys data in the range 400–512 bit/s depending on the type of pager being signalled. Most base stations have a 6 dB colinear aerial, which is switched to the transmitter in use. The normal effective radiated power (erp) limit is 100W, the transmitters being adjusted to provide this after aerial gain and feeder loss have been taken into account.

Paging receivers

Thousands of proprietary pagers are already in use on the city-wide scheme, and conform to specified sensitivity, out-band rejection of unwanted signals, battery consumption and ruggedness. The encoders in the new national system will be able to signal them using their particular coding formats. But for future supplies, the POCSAG code is mandatory – the chief attributes being that it is faster and has a much larger code capacity (2 million), allowing each pager to have a potential of four addresses distinguished by different bleeps

Radiopaging centres – RPCs

Staff in these centres issue and replace faulty pagers and making changes to zone coverage, at customers' request. On issuing a pager, a VDU is used to feed appropriate data to the drum store in PACE. Such information comprises of a paging number (PN), a radio identity (RI), the zone(s) of coverage required, and further PNs/RIs if the customer requires a second paging address. The customer may also be one of a group of users – up to 99 in number – where one address can be used as a 'group call' facility. After the data is input, the pager is tested and posted to the customer, although an over-the-counter service is sometimes possible. Faulty pagers are either posted to the RPC, or handed in, when an immediate replacement is issued. The replacement RI is input to the PACE together with the PN which remains the same for customer convenience.

Maintenance

Each part of the system – for example the PACE, ZTC or base station – will usually be maintained by a specialist who will also have a general understanding of the system. Some variations will occur, especially in the five zones in which the PACE installation happens to be, and where the ZTCs are co-located with PACEs.

At present the hardware is being installed, documentation produced, and initial training planned for maintenance staff this autumn. POTTC, Stone, are preparing formal training courses on the ZTC and transmitter as well as giving a general system appreciation. It is hoped to start these early in 1981.

Training on the TLIE, PCP and encoder will need to be at a PACE location. Initially this will be done at Burne House, Edgware Road, London, where PACE 1 is installed. A development system is also available alongside PACE 1 which will be retained for future development work and training purposes. Further training courses are being planned for the staff who will be involved in maintaining PACEs 2-5, located in Birmingham, Edinburgh, Manchester and Bristol.

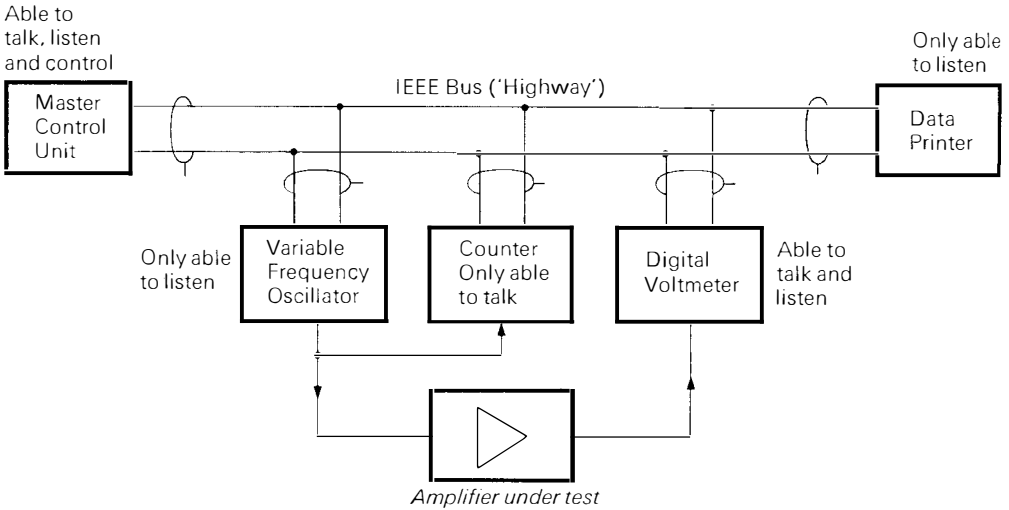
01-357 2567

What is an IEEE Bus?

by **Ron Quinney** NE/ES 5.4.3

You can hardly open a catalogue of electronic test equipment nowadays without coming across the words "IEEE Bus Compatible". What does this mean? An explanation might be useful before reading the next article which deals with some new testers for line transmission use.

Most test equipment can be classified either as *signal sources* – examples are oscillators and pulse generators, or *measuring devices* – such as digital voltmeters and oscilloscopes. Until relatively recently, most test equipment designed for general use had to have range-changing, output-level adjustments, frequency setting, and so on, done manually. That was the only practical way of doing things. For some tests, these operations were laborious and often difficult to repeat with accuracy. Although it was possible to apply a degree of automation to some measurements – and much ingenuity has been used in the past – it is only since the development of large scale integrated (LSI) circuits in the shape of microprocessors on one silicon chip, that automatic test sequencing has blossomed.



Simplified diagram showing the application of IEEE Bus Compatible Test equipment to a gain/frequency response test of an amplifier

Standard test interface

America's Hewlett-Packard (H-P) engineers are given credit for proposing the first standard approach of coupling a variety of test instruments together by means of a multi-way cable under control of a central, or master, control unit. They called their system 'The H-P Bus'. Why Bus? Well, one way of looking at it is to regard the multiway cable as a signal 'highway' which interconnects a number of items of equipment along its path using parallel connections – see diagram. Signals (the passengers) can be put onto, and set down, at prescribed points (the bus stops) or at predetermined times, under central control. So, the expression 'bus system' was coined.

Following the submission of the H-P proposals to the American Institute of Electrical and Electronics Engineers (IEEE), an agreed national standard was issued – number 488 – which prescribed standard control, signal and digital interface requirements for automatic control and operation of electronic instrumentation. Thus the IEEE 488 interface – or the 'I triple E' bus – was born.

Increasing usage

As the opening sentence of this article

implies, many of the signal generators, oscillators, oscilloscopes and other test instruments today are IEEE Bus compatible. This means that automatic testing is possible with a suitable control unit or sequencer programmed to give the desired instructions, and coupled to the testers applied to the measuring process concerned. It is also possible with such systems to attach, say, a data printer to automatically record the measured quantities or to print-out an out-of-limits condition.

The future of automatic test systems using the IEEE Bus has yet to be fully realised, but when any application is seen as being helpful – or indeed it could be the only practicable solution to a measuring problem – THQ will let you know. On the other hand, you may identify an application which could help other staff – in which case let us know.

01-739 3464 Ext 7695

New line transmission test equipment

by **Tim Wright** NE/T1.3.3

New testers are being introduced to keep pace with the changing demands on the transmission network – and the methods recommended for its performance measurement. Here, we look at the facilities offered by some of this new generation of test equipment.

☐ 20 MHz Selective Level Measuring Sets

Level Measuring Sets (LMS) 12D and 244A are the latest in the line of portable 20 MHz selective sets. They both feature:

- auto-ranging down to −120 dBm
- keyboard control for setting the frequency
- digital displays of level and frequency
- IEEE bus control capability (see previous article)
- 240/110v ac operation

The LMS 244A (Fig 1) with its associated thermal printer (Printer 2A) and X-Y display (Display Unit 4A) is already in use. It differs from the LMS 12D in that it has the FDM line frequency plan programmed-in. This enables pilot levels, and channel and group

Fig 1 Level measuring set 244A with Printer 2A and Display Unit 4A

powers to be measured, simply by keying the number of the appropriate channel, group, or supergroup. Also, when in its semi-automatic mode, it can scan the pilot levels or channel powers of a complete 12 MHz system, giving automatic printout of the out-of-limits conditions using the thermal printer. The X-Y display may be used to provide a visual indication of the level at each point of a scan or spectrum sweep.

The LMS 12D (the upper instrument in Fig 2) should be available by the end of 1980. Like the LMS 244, it can measure pilot levels, and channel and group powers ; but the user has to key-in or manually tune the instrument to the desired frequency. The frequency can be increased (for example, in 4 kHz steps) by just one key-stroke.

□ 20 MHz Variable Frequency Oscillator

A new portable 20 MHz variable frequency oscillator – called the Oscillator 168A – is being introduced. It supersedes the Oscillator 111, and is the lower instrument in Fig 2. Being a companion oscillator to the LMS 12D, it features :

- keyboard control for setting the output level and frequency
- digital displays of output level and frequency
- IEEE bus control capability
- 240/110v ac operation.

The output may be set with 0.1 dB resolution to any level in the range + 5 and – 70 dBm.

Fig 2 LMS 12D (top) and Oscillator 168A (bottom)

Fig 3 Measuring Set 55A

Fig 4 LMS 242A

☐ **600 kHz Measuring Set**

Known as the Measuring Set 55A, this portable wideband selective LMS with a tracking oscillator output, is shown in Fig 3. It covers the frequency range 300 Hz to 612 kHz, and has 75, 140 and 600 ohm balanced and unbalanced operating impedances with send levels extending from 0 to − 70 dBm, and receive levels from + 20 to − 110 dBm. Tuning is achieved using a rotary control covering the complete range, the frequency being indicated on a digital display. Measurements of pilot levels and channel powers may be made by selecting the appropriate filter. A conventional meter is used to indicate the send or receive levels. The instrument may be operated from either a 240v ac supply or its internal rechargeable batteries.

In addition to the Measuring Set 55A, which is already in use, separate LMSs and oscillators with the same facilities and performance – known as the LMS 10C and Oscillator 109C – should be available by the end of 1980.

☐ **Programme Circuit Noise Meter**

The latest CCIR requirements for programme circuit noise measurements – CCIR Recommendation 468-2 – meant that a new instrument was needed to replace the obsolescent LMS 8A, which does not have the recommended response to bursts of tone. Also, the LMS 8A had to be used with separate weighting networks and filters.

The new portable programme circuit noise meter (Fig 4) is known as the LMS 242A, and features :

- unweighted, weighted, and weighted plus 11 kHz low-pass filter measurement capacity – eliminating the need for external weighting networks or filters
- 600 and 140 ohms through and terminated operating impedances
- + 25 to − 90 dBm measurement range
- battery powered (or a Power Unit 91A)

A rack mounted version – the LMS 243A – powered from 24v or 50v dc supplies is also available.

A list of all the transmission test equipment, both analogue and digital, for which NE/T1.3.3. has the design responsibility, has been provided to all regions/boards. Further copies may be obtained from this group.
01-357 3487

Cleaner telephone exchanges

by **Laurie Child** LTR/SV2.2.4B

It is time that Buzby became aware that the Cinderella buildings can also be made into beautiful princesses! Nowadays, we have the techniques for controlling dirt entering our buildings, the means to remove particles of accumulated pollutants (and rubbish), and the work methods to maintain good environmental standards.

Fifty-five per cent of our energy now comes from oil. Not so many years ago solid fuels, coal and coke, were burnt wastefully and the fumes and dust polluted the towns' atmosphere. Filtration removed dirt

particles from the air entering telephone buildings,but did not remove the smaller-sized pollutants from the combustion of oil-based fuels. With introduction of smokeless-zones came better combustion of both coal and oil-based fuels, which effectively reduced the size of pollutants emitted. The last decade saw the 'Golden Age' of cheap oil and its increased use in heavy manufacturing processes as well as for heating and transport needs. In larger towns and cities, and areas adjacent to major trunk routes, new sizes of pollutant – between one and three micrometres – became the main source of air-borne dirt. To filter this type of pollutant mechanical membranes need to be highly efficient. Although many of our air-conditioning plants are inadequate for this purpose they can be effectively modified.

The future will bring the development of new energy sources, and the greater use of old sources such as coal for heating and industrial purposes. But for at least the next 100 years transport will remain the major user of oil, though we should expect more efficient use of the fuel from improved engine performance and lighter vehicle design.

With electronic telephone exchanges filters will remove the larger fibrous materials of three micrometers and above but it is possible that the much smaller traffic pollution will be passed through. The electrical characteristics of settled pollutants under these conditions may change and become semi-conductive instead of non-conductive, and affect the long-term performance of the equipment in, say, 15 years time.

Exchanges suffer from three major sources of pollution :

- from air used for cooling, and air refreshment
- foot-borne dirt brought in from outside
- pollutants shed by staff within the building

To deal effectively with air-borne pollution a building's air-filtration plant should match the external conditions. Levels of pollution alter very dramatically from one building location to another, a fact which can be verified by monitoring each site. A portable particle counter, available but not in general use, is best for this. Such an instrument can also be used to measure the effectiveness of the air plant and cleaning schemes used in an exchange, and will quickly show if and where environmental standards are failing to reach acceptable levels.

Geography and size make London Region unique. It lies within a shallow basin, covered by a layer of cold air which traps much of the pollution produced by heating and transport. Throughout the year a fountain-effect in air circulation distributes pollutants evenly in the region. Dirt deposits in the outer telephone areas in warmer months, and in inner areas in cooler months. The overall effect is that London is three times dirtier than the national average.

Dirt brought in by feet can be reduced easily by using mats at all entrances to buildings. Generally the larger PVC-backed coir mats are recommended for grit control and PVC-backed nylon mats for wiping wet shoes. For very small telephone buildings a PVC-backed nylon mat serves both purposes. These mats should be cleaned regularly with a vacuum cleaner. Other PVC-backed nylon mats should also be placed near internal doors, under test desk positions, work bench areas, and so on. But these mats are provided to prevent damage to the more frequently used areas – not as a form of dust control.

Anti-static

Stat Zap – a new PVC-backed nylon mat – is being introduced where electro-static problems exist. Similar in appearance and cost to others, it has a surface of carbon filaments which reduce build-up of electro-static charge on staff. The mat will be suitable for polished and carpeted floors and will be placed near exits and other problem areas. These mats must not be moved from their positions. Non-static vinyl flooring is now laid at new electronic installations. An important point with this, and any similar flooring is that it must not be polished otherwise its anti-static properties are lost.

In a building the amount of pollutant fibre shed from clothing can be limited by using Terylene-based materials. Since such controls are not possible, it is necessary to restrict access to protected areas, such as apparatus rooms, to authorised staff. Using protected areas as through-ways to other parts of buildings should be discouraged.

Despite cleaning and controls, dirt will still accumulate with passage of time. So cleaning methods are required which remove but do not recirculate this dirt, and cleaning materials are needed which do not add to the pollution problem. The traditional methods of cleaning – still included in some of our instructions – have shown themselves to be

inadequate. They were based on the concept of a common postal and telecommunications cleaning policy which disregarded the differing needs of the two Businesses.

New scheme

LTR – helped by THQ, SETR and others – has introduced a new cleaning scheme which involves :

- removing accumulated pollution from protected areas
- producing a pleasing environment for welfare rooms in telephone buildings.

Full cooperation from resident staff and management is essential for the new scheme's success, as much depends on the initial renovation by visiting, mobile, cleaning teams. This initial cleaning – planned to cause minimum disruption to normal working – produces a high standard of cleanliness, easing subsequent maintenance. The new cleaning techniques are very different from the apparently adequate methods established over many years. Also, the new scheme – formed of a number of parts – needs to be used wholly.

When a building has been renovated, staff find that the new standards are the only acceptable ones. Maintaining these standards requires some self-discipline in helping to keep the building clean – for example, by

- remembering to use waste-bins
- not cluttering work areas
- tiding away tools, steps and so on
- not dragging heavy items across polished floor surfaces – scars look unsightly and may be permanent
- mopping-up spilled liquids – also a safety hazard
- using an ashtray if you smoke

The new finishes are safer than many of the old ones, and staff will find that – when working at floor level or at the top of racks – they will remain surprisingly clean and not become covered in dirt.

Many tasks, such as selector-bank cleaning and lubrication, can be reduced in frequency following the renovation and regular maintenance cleaning of an exchange. Equipment reliability also improves.

01-587 7975

Small exchange replacement – the Scottish solution

by **Alex Dewar** STB/S1.3.3

Policy for the modernisation of telephone exchanges is to phase out by 1995 all Strowger-type exchanges with a projected multiple size of 600 or more connections at that time. Such a course of action – without a stated policy on the replacement of small exchanges – would be potentially disastrous for STB. STB has about 670 unit auto and small auto exchanges which would have had no prospect of replacement by more modern systems until a variant of the System X family of exchanges became available. As this would be some time in the future the problem caused concern to the region for two reasons :

- even when the System X small exchange variant arrived, and assuming a replacement rate of four exchanges a month, it would take about 15 to 20 years to complete the modernisation programme.
- the poor service given by many of the older UAXs could fall below an acceptable level in the longer term.

For these main reasons STB and THQ considered whether an interim solution was possible. Eventually an agreed strategy was evolved. In essence this called for evaluation of the facilities offered by all small proprietary exchanges currently in production. In the event two small exchanges were selected as most suitable.

- The GEC RS (Rural System) 22.
- The Plessey ERS (Electronic Reed Small).

Both were proven systems, but the Plessey ERS exchange needed some engineering to adapt it to meet our

requirements.

Good performance has been obtained from an export demonstration RS22 exchange installed for GEC at Clipston, Leicestershire, and preliminary results of the modified Plessey (PTL) ERS exchange at Wigtown are promising. So much so that a decision has now been taken to purchase 24 small electronic exchanges – 12 RS22 and 12 ERS.

Description

- **GEC RS22** – now called the **UXE7** caters for 50-500 lines housed in racks either 8' 6" or 6' 6" high, by 3' wide and 2' deep. One rack has all the equipment for 50 lines (excluding the MDF). Two racks are required for 100 lines, increasing to six 6' 6" high racks for 500 lines.

- **PTL ERS** now called the **UXE8** also caters for 50-500 lines. It is related to the PTL PENTEX family of exchanges. The racks are 7' 8" high, by 3' wide and 1' 10" deep. Each rack houses equipment for 100 lines.

Equipment in both exchanges is similar in appearance and construction to TXE2. Reed relays are used in the switching matrix and the cards are of the slide-in-unit type also found in TXE2 – in fact the RS22 B unit is a TXE2 C unit. Inter-rack cabling rests on bearers forming part of the racks and is mainly plug ended. Apart from battery feeds and cables to the MDF there is little cabling external to the racks.

The exchanges are commissioned as working units before leaving the factory, are delivered as a package and installed by regional staff. The exchanges perform all the functions of the replaced UAX/SAX and provide a number of additional facilities in keeping with up-to-date requirements.

Buildings and power

UXE exchanges should be accommodated in standard Class II buildings, but all existing timber buildings will be replaced by modern 'B1' brick. Those exchanges designated as Maintenance Repair Centres will also be 'B1' brick but extended by two metres.

As with other electronic switching systems, the UXE7 and UXE8 exchanges require a high standing load current making it impracticable to use batteries as the only form of standby power. Therefore diesel generators will be fitted as standard. But the new UXE equipment occupies less floor space than equivalent UAX racks, so the engine sets can be located within a Class II building. An acoustic hood will be fitted to reduce the noise level – a departure from normal practice. The new power plants have been numbered 235 and 440.

Locations

To ease staffing and future training problems – and to reduce the holdings of stores and spare units – the UXE7 and UXE8 will replace discrete groups of exchanges in remote parts of Aberdeen and Scotland West Telephone Areas. The table lists the exchanges involved and the map shows their approximate locations.

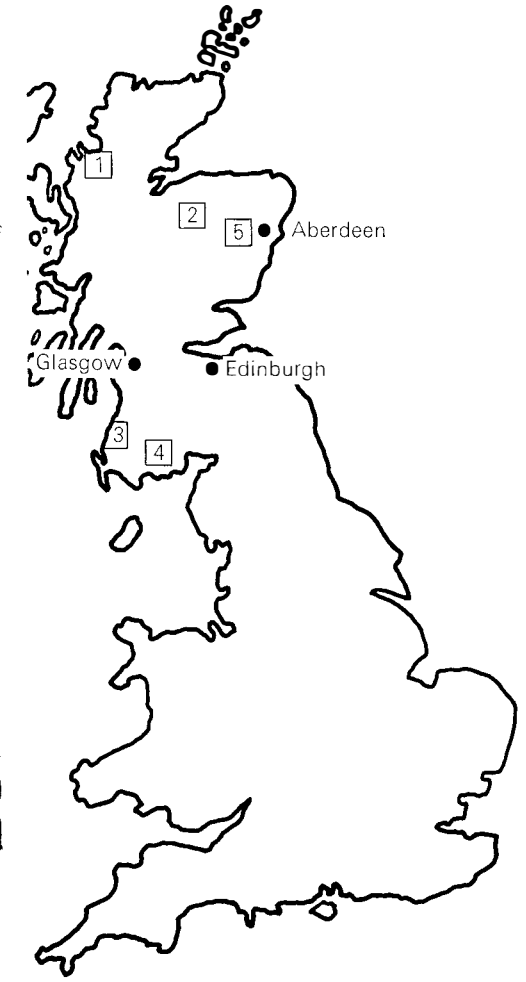
Training

Initially, courses for STB regional staff are being given by the manufacturers. Later training will probably be arranged by areas in association with the Regional Engineering Training Group.

Maintenance organisation

UXE7 and UXE8 systems are designed to function as unattended exchanges in the same manner as the UAX/SAX they replace. But because of their superior design features a new maintenance approach is being adopted. Fault print-out information will be signalled over a traffic circuit to a point convenient for the local maintenance officer. This point can be located at the GSC or a nominated UXE7/UXE8 where a printer will record the fault information. Header codes are to be used to identify originating exchanges. Thus, the local maintenance officer will be able to watch over his group of exchanges and, by analysing fault patterns, plan his daily itinerary accordingly. In addition to the remote printer each exchange has a local on-line printer to record fault information. This printer permits on-site testing and identification of individual malfunctioning units.

If a faulty plug-in unit is found it should be replaced by a locally-held spare to restore immediate service. The faulty unit should then be set aside for repair. Selected spare units for the less sensitive areas in the exchange will be retained at the Maintenance Repair Centre as reserves for a group of exchanges.



Map Ref	Exchange	Type	Maintenance Centre	Remote Print-out
1	Aultbea	UXE7	Badachro	Gairloch TXK1
	Badachro	UXE7		
	Diabeg	UXE7		
	Poolewe	UXE7		
	Torridon	UXE7		
2	Boat of Garten	UXE7	Nethybridge	Grantown-on-Spey TXK1
	Cairngorm	UXE7		
	Carrbridge	UXE7		
	Dulnain Bridge	UXE7		
	Kincraig	UXE7		
	Nethybridge	UXE7		
	Newtownmore	UXE7		
3	Barr	UXE8	Dailly	Girvan TXK1
	Barrhill	UXE8		
	Ballantrae	UXE8		
	Dailly	UXE8		
	Lendalfoot	UXE8		
	Pinwherry	UXE8		
4	Bargrennan	UXE8	Wigtown	Newton Stewart TXK1
	Creetown	UXE8		
	Garlieston	UXE8		
	Kirkinner	UXE8		
	Port William	UXE8		
	Wigtown	UXE8		
5	Glenkindie	UXD5	—	—

Repairs

The repair of faulty cards or plug-in-units will be effected at one of three locations :

- On site
- At the UXE7/UXE8 exchange in the local maintenance officer's load designated the 'Maintenance Repair Centre'.
- At the Edinburgh Area Repair Centre.

A full technical back-up will also be provided by STB/HQ Service Division for elusive faults and circuit design defects.

Maintenance aids and testers are provided appropriate to the locations. For example, an oscilloscope is supplied for a group of exchanges and will be held at the 'Maintenance Repair Centre' until required at an exchange in that group.

Looking to the future

Since the decision to purchase the UXE7 and UXE8 exchanges was taken, the public exchange variant of the Monarch 120 Call Connect System, designated UXD5, has emerged as a practical solution for replacing small exchanges. The prototype is now undergoing a feasibility study at Glenkindie, Aberdeen and a further nine UXD5s, now being assembled in PE/Factories Division, are to be installed in Scotland, for evaluation, during 1980-81. The Plessey Company are also involved, and will provide a replacement for the prototype early next year. In the longer term a System X variant for small exchanges will be provided to meet national needs. So it is unlikely that any additional UXE7 and UXE8s will be purchased.

031-222 2585

How the Isle of Man solved a problem

by **Bob Farish** NWTB/IM51

This contribution was prompted by the article in *MN15* describing an Automatic System of Surveillance Equipment for Transit (ASSET).

In the Isle of Man (non-Director) the situation regarding transit traffic is similar to that in Scotland, in that most of the National Number Group (NNG) codes used are routed over circuits using SSMF2.

The method used for informing us about a service-affecting difficulty on an MF2 route was far from satisfactory. This was because reports came from the Auto-Manual Centre (AMC) *after* sufficient customers had complained. So we decided to do something to speed-up the detection of such difficulties.

The Quality of Service (QOS) on circuits using MF2 can be determined from the number of repeat attempts which take place. We found a reasonably effective method of checking this was to install a panel consisting of lamps on each seizure (PC) lead, and each repeat attempt (RP) lead, of the Multi Frequency Sender Receivers (MFSRs) in the exchange. Each of these leads was connected via a diode to a lamp No. 2/45v – the lamps being fitted in standard 20-way lamp strips, together with 20-way jack strips. This showed the status of each MFSR at a glance, as well as allowing a convenient audio monitoring point. The panel was cabled directly to a nearby Unit IDF.

The main disadvantage of this method was that a member of the maintenance staff had to watch repeat attempt signals so that action could be taken if the failure rate became excessive. If no member of staff was available the method could not be used. The answer was to install a form of automatic monitoring system with an alarm. We also decided to fit re-settable meters which would give a running total of the MFSR seizures and repeat attempts. The fitting of these meters proved more difficult than anticipated. In periods of heavy MF2 traffic the seizure meter – which is wired via an array of diodes – never released. This was overcome by providing a pulse unit in each PC lead, to give a pulse to a monitoring unit 9A each time the PC lead is earthed on an MFSR. The monitoring unit 9A then operates a high speed relay which steps the meter. We have found that MFSR seizures not closer than 30ms apart, will be registered on the meter – quite adequate in practice.

The automatic monitoring system which was devised – Repeat Attempt Monitor (RAM) – consists of a uniselector No. 4 and a few relays. These count the number of repeat attempts in a specified period, give an alarm if a specified number is reached, or 'home' if the period expires. The number of failures given, and the period, were determined by experiment. An inhibit signal is given to RAM if the Multi Frequency Test

Unit (MFTU) is in use.

At any time of the day an indication of the failure-rate is immediately obtainable by referring to the two meters. Together with the existing call count and repeat attempt meters on each MFSR, remedial action can be taken if any MFSR should become suspect, or if outgoing circuits should become faulty, before the QOS is too seriously affected.

An earlier idea to provide a means of decoding and displaying the 2-out-of-5 DC signals to an MFSR, was shelved some time ago. We resurrected it following STB's ASSET article. After consultation with ASSET designers, further thought was given to building a simplified version of their equipment.

We have recently completed it, using mainly surplus equipment, and some assorted items from recovered equipment. It gives a visual display of the ABC digits stored during the setting up of a transit call, and prints out the stored digits if a repeat attempt occurs. Access to an MFSR is given by 'polling' each MFSR in turn by uniselector. An indication is given, in addition to RAM, of where suspect plant may lie, and gives maintenance staff at least some idea of what is happening on live calls. It is now being evaluated but seems to be working reasonably well within its obviously limited capabilities.

Acknowledgements to STB whose enthusiasm prompted the 'knocking together' of this equipment.

0624 21508

Footnote from NE/ES9.3.4.

LTR have produced a Repeat Attempt Counting Equipment (RACE) which may be provided in other regions if supply problems on parts can be overcome. RACE provides an alarm condition if a predetermined percentage of repeat attempts is exceeded on a Sender/Receiver. Each RACE equipment covers ten Sender Receivers.

01-432 1364

Prestel in London

by **Andrew Sheill** LTR/SV801

The network

Until September 1979 only an experimental Prestel service based on a computer at Gresham Street operated in London. Information Providers (IPs) and Users both accessed the same machine.

Following the trial, a public Prestel service opened in LTR with IPs accessing an up-date machine at Clerkenwell and Users accessing a retrieval machine at Fleet. By the end of January 1980, three more retrieval machines had been added at Wood Green, Ealing and Eltham Sector Switching Centres (SSCs).

At each Information Retrieval Centre (IRC) the machine holds a store of the complete information available. This information is kept up-to-date by 4.8 kbit/s data links from the Up-Date Centre (UDC) at Clerkenwell. Each of the IRCs has been code named for public use.

- Clerkenwell – DUKE
- Fleet – BYRON
- Wood Green – JUNIPER
- Ealing – ATLAS
- Eltham – VIGILANT

IRC's have also been opened in the provinces

- Birmingham – KEATS and DICKENS
- Edinburgh – SCOTT and BURNS
- Manchester – ARKWRIGHT and WORDSWORTH

By the end of 1980, LTR will have opened new IRCs at

Croydon
Kingston
Baynard House
Ilford
N. Paddington

A Closed User Group (CUG) Centre at Nine Elms is due to open in December. (A CUG is a group of Prestel pages which can only be accessed by users specified by the IP.)

The main function of Croydon IRC will be to serve Luton, Reading, Sevenoaks and Brighton over 4.8 kbit/s Dataplex links.

User access

Prestel terminals have an inbuilt modem and autodial programmed to produce two

alternative calling numbers giving access to two IRCs. Some early models with only one calling number are still in use.

Originally these autodials produced the seven digit numers – nine if outside London – for routeing calls to the Byron IRC. Now, short dialling codes are used to route calls via the sector tandem to the local IRC, or via Faraday MST to Byron.

Users in the four central areas have two routes to Byron, one over the normal PSTN route and the other via Faraday.

In the provinces the two IRCs are co-sited, while in London each is paired with Byron.

The Prestel terminal providers are converting autodials to the short dialling codes but some delay has occurred, and Byron is still carrying the bulk of the traffic.

Operations

Operational supervision of the service is normally provided by the Regional Prestel Centre (RPC) at International House during the day and by Prestel Operations Centre (POC) at St Alphage House on a 24 hour basis.

Both centres have links with IRCs giving a VAMPIRE display. VAMPIRE is short for Viewdata Access Monitoring and Priority Incident Reporting Equipment. It allows monitoring of every access port. A remote Subs Busy facility to control port availability is also provided.

Also, the RPC handles registration of new customers, customer service complaints and Prestel promotion.

Maintenance

The maintenance organisation is described in *TI E8 P0010*. The part the Business provides to the customer's installation consists of a Jack 96 in series with the DEL and is maintained by Customers Apparatus maintenance staff. Installation information is given in *TI C3 S9001*.

Definite service complaints about Prestel are passed to the RPC ; others are handled by RSC. The RSCs at present are only able to monitor by listening to a customer's test call to Prestel. This establishes that a connection can be made (see *TI E13 B0026*). In cases where the RPC is unable to decide whether the fault lies within our or customer-owned equipment, the RPC can direct the Area Prestel Special Faults Investigator (PSFI) to visit the customer's premises (see *TI E8 P5002*). The PSFI has been provided with a Pye Visa Prestel terminal for substitution testing.

Terminals

The Business owns and hires a large number and variety of Prestel terminals which are maintained by SC/ET36 in LTR. The large range causes maintenance problems but the models will be rationalised soon.

IRC maintenance

The maintenance responsibility is described in *TI E8 P1001*. Archiving is done on alternate days between 8 am and 9.30 am during which up-date is suspended ; billing is done monthly. A 24-hour maintenance service is provided with call-out.

Training in LTR

So far some training has been given to RSC staff, including demonstrations of Prestel, an outline of the system engineering, and the RSC function

Prestel HQ has trained PSFIs for each telephone area.

TOs responsible for the on-site operation now receive training at Stone TTC. By the end of 1980 at least two TOs in each IRC will have been trained. Training for other Prestel maintenance staff is in hand.
01-587 8000 Ext 7291

Green means caution

by **Dave Memory** NE/ES5.1.3

Everyone should know that red markings, either adhesive tape or Markers 24A or 25A on MDF terminations, signify a 'High Grade' circuit (see *MN 14*). *TI A6 D0811* lists the type of circuit to be marked red. It explains also that red markings apply to any circuit that must not be interrupted without permission, or to a circuit where special precautions must be taken to avoid reversals.

But there is a green marking too, and many people regard this as merely indicating a PBX line. This is not so. The same TI (*A6 D0811*) informs us that a green marking indicates that some *special* condition applies to the circuit and that the circuit record card should be read before any testing or other work is carried out on that circuit. In other words, on the MDF, green means *caution*.
01-432 1386

A day in the life of the Service Protection Network

by **Jim Haarer** and **Peter Long** NE/T5.3.3

An interruption to service on 18 hyper-groups occurred at 3.45 pm on 3 June 1980, when the coaxial cables 6 and 7 from Cambridge to Peterborough were completely severed. Blame lay with a contractor carrying out road works on the A604 at Fenstanton, about seven miles east of Huntingdon.

Within one hour, service had been restored on five of the failed hyper-groups. One had been rerouted on the International Protection Network (IPN), another rerouted on the Service Protection Network (SPN), and the remaining three restored by the cancellation of 'planned work'. These three hyper-groups had already been rerouted on the Cambridge to Peterborough SPN which was itself affected by the failure.

At the same time a number of other planned works were either cancelled or rearranged to free SPN links. Staff had to be called out to unattended repeater stations to connect through SPN links and spare regulated line sections (RLS) so that further routes could be made up. These were decided by the National Network Coordination Centre (NNCC) and the Regional NCCs in Eastern, London, Midland and North Eastern regions.

These actions resulted in a further five hyper-groups becoming available within the following hour. The 'make-good' route of three of these hyper-groups required the tandem connection of nine SPN links!

A second blow

While recovering from this event, at 4.50 pm a further six hyper-groups were lost in a separate incident at Blackcastle Radio Station in Scotland, where an aerial dish fell and damaged wave-guides. Two of the hyper-groups affected were restored within an hour using single link SPNs, and a further hyper-group was restored at 7.50 pm by the use of five SPN links in tandem.

Restoration of this second incident was handled by the Scottish NCC and the North Eastern RNCC in collaboration with the National NCC. Staff at Carlisle and Heaton Park Radio Station acted for the North Western RNCC which had closed before news of the incident reached there.

Meanwhile, restoration of six of the remaining hyper-groups affected by the cable fault continued until the last available make-good route was put through at about 11.30 pm. (This route consisted of seven SPN links in tandem, and had involved calling out staff to several intermediate stations.)

Of the 24 hyper-groups lost in both incidents, only five could not be made good. Two had to await the repair of the cables at Fenstanton, and three a temporary repair of the damaged wave-guides at Blackcastle.

All the RNCCs mentioned (and the NNCC) remained on duty until most of the hyper-groups had been restored, and the make-good arrangements for those that could be restored, had been finalised. The North Eastern, National, and Scottish NCCs finally closed at 8, 8.30 and 10.30 pm respectively. (Normal closing time is 5 pm.)

A few figures

For the cable damage incident, the time to restore service – where make good routes were available – averaged 2 hours 10 minutes (ranging from 11 minutes to 7 hours 35 minutes). The first pair of cable tubes were repaired 10 hours after the damage and the second pair 6 hours after that, when the last hyper-group was restored.

For the wave-guide damage incident, the average time to restore – where make good routes were available – was 1 hour 30 minutes (ranging from 50 minutes to 3 hours). The remaining hyper-groups being restored after 5 hours.

Both incidents together used a total of 70 SPN or spare plant bands – making it quite a day!

01-357 2280

MASS for MAC

by **Ray Cheung** and **Mike Deacon**
TE/SES3.1.2

A Measurement and Analysis Centre (MAC) is being installed in every area to measure the Quality of Service of the Public Switched Telephone Network (PSTN) and provide a centralised maintenance aid in fault finding.

Each MAC consists of a minicomputer, disc drive, minicette and so on, and software packages. All the facilities provided for in MAC are organised, controlled and monitored by software – a set of program instructions executed by the minicomputer according to some specified data which consists of MAC-data and program data. The program and data require modifications when not performing according to the existing specifications or when the specifications are to be changed. These functions are currently performed by our Management and Support System (MASS) software team in THQ.

The division for maintenance is made between MAC-data, to cover area variations, and programs and program data which are common to all MAC's. Most of the data is MAC-data which characterises the area telephone network. MAC staff can modify and improve MAC-data, via the Transtel console, to add, delete and amend features at new and/or existing exchanges. Another THQ group (NE/ES9.3.5) vets data alterations and provides advice on data problems. They can also help in data changes by encoding large quantities of data onto cassettes which subsequently can be loaded into the MAC processor via a digital cassette unit.

The MASS team at THQ receive notice of both software faults and specification changes from the MAC operational group (NE/ES9.3.4), who have, in turn, been informed about site problems by the MAC regional liaison officers. Such problems may be discussed informally at first – persistent problems being reported by MAC staff using the A646 procedure. Subsequently, the MASS team modify and/or improve programs and associated program data.

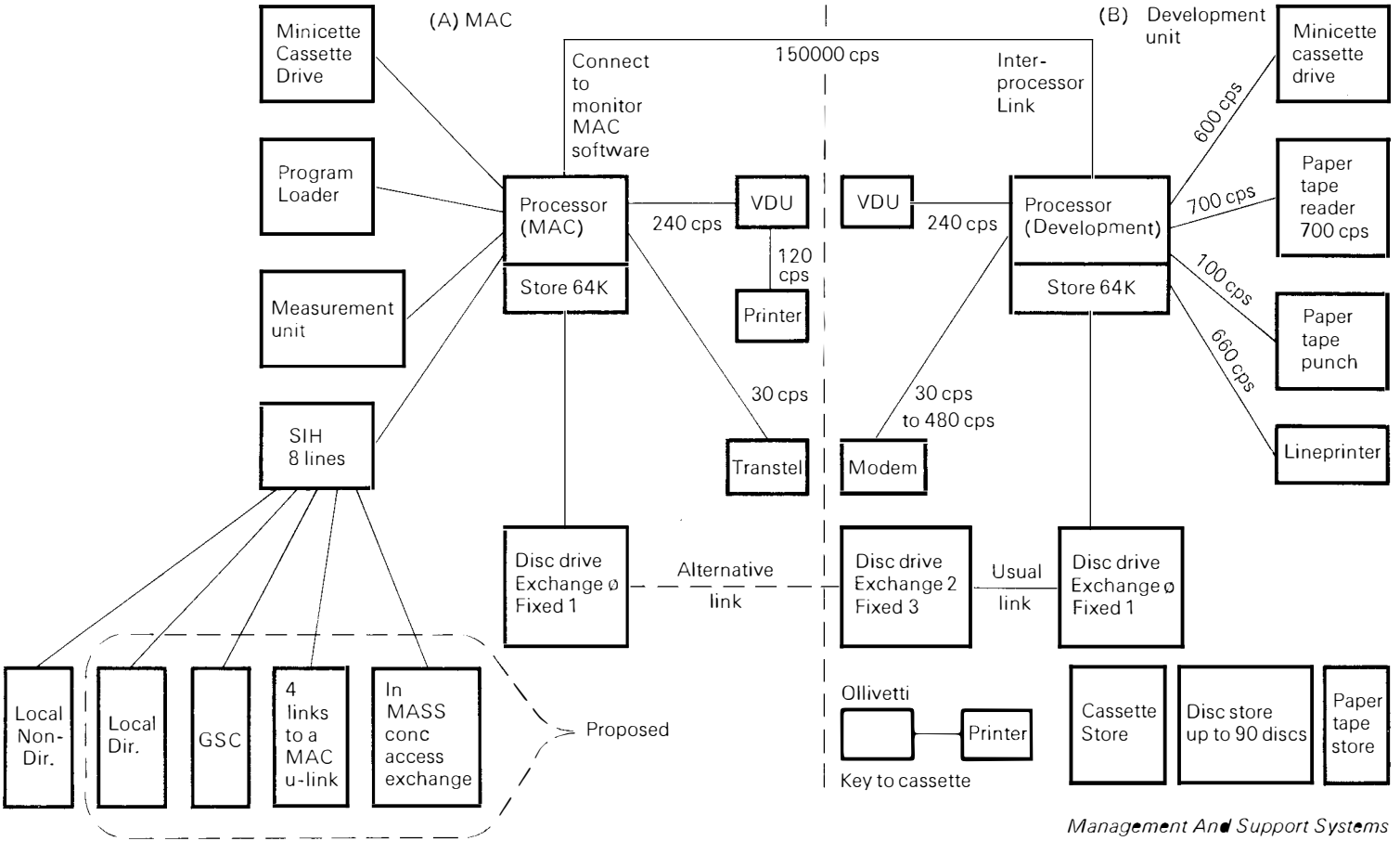
Maintenance of software, covers

- Software amendment – to cure faults in the existing program/data
- Software enhancement – to add new facilities to the existing software and these involve
  - Analysis of fault reports
  - Fault investigation/identification
  - Modification to program/data
  - Implementment and test of new/modified software
  - Generation and release of new software to all areas
  - Updating documentation to reflect changes

To carry out these activities, the MASS team have a dual GEC 2050 system configured as shown in the diagram. The MASS is essentially (A) a MAC with a single crate of special interface hardware (SIH) and (B) a development unit. Points to note are :

- Either half of the MASS can be used for development work
- All peripherals are interchangeable
- An inter-Computer link allows the MAC software to be monitored by another processor and can be used at any MAC site for special fault investigation
- Both halves are capable of generating new software for the area

The keynote of the MASS is flexibility. Although the diagram shows the system as two interconnected halves, both halves can be used individually with the best possible peripheral configuration for the investigation and maintenance of MAC software.


(A) MAC
(B) Development unit
Minicette Cassette Drive
Program Loader
Measurement unit
SIH 8 lines
Connect to monitor MAC software
150000 cps
Inter-processor Link
Processor (MAC)
Store 64K
VDU
240 cps
120 cps
Printer
30 cps
Transtel
VDU
240 cps
Processor (Development)
Store 64K
30 cps to 480 cps
Modem
600 cps
700 cps
100 cps
660 cps
Minicette cassette drive
Paper tape reader 700 cps
Paper tape punch
Lineprinter
Disc drive Exchange ø Fixed 1
Alternative link
Disc drive Exchange 2 Fixed 3
Usual link
Disc drive Exchange ø Fixed 1
Local Non-Dir.
Local Dir.
GSC
4 links to a MAC u-link
In MASS conc access exchange
Proposed
Ollivetti
Printer
Key to cassette
Cassette Store
Disc store up to 90 discs
Paper tape store

Data Customer Service Officers

by **Tony Borkowski** ME/RCS 1.1.1.3

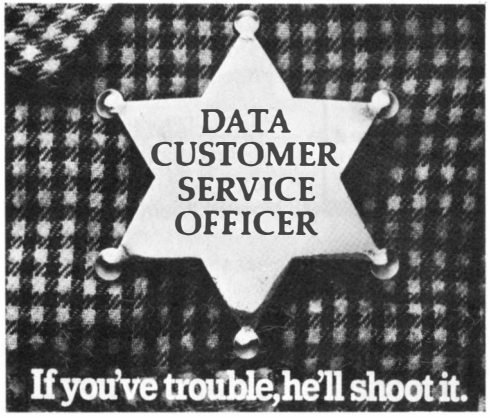
The Data Customer Service Officer (DCSO) concept originated about four years ago from suggestions made by some Datel customers to the Datel Maintenance and Customer Service Policy Groups in THQ. It was evident that what was being called for was some form of after-sales service for Datel customers – a focal point within the Business which could accept complaints and act on behalf of the customer.

Focal point

An examination of our existing Datel organisation confirmed that a gap in data after-sales service existed. There were already clearly defined roles for Datel Sales Officers, Datel Co-ordination Officers and their Assistants, and Datel Maintenance staff – but no contribution from the Customer Service Division. So it was decided to fill this important gap. Every Area Customer Service Division was to establish a specialized duty to act as a focal point for handling queries and complaints from data customers. About two years ago the DCSO concept was publicly launched, following extensive training, production of operating instructions and the preparation of suitable records. Advertisements like the one shown were inserted in the computing press, and letters were sent to computer user groups to make most data customers aware of the existence of DCSOs and what they had to offer.

Each Area now has its own DCSO – normally a Telecommunications Traffic Superintendent (TTS) – in most cases being part of a duty load. In large cities though, there are an increasing number of full-time DCSO's. A DCSO is normally supported by a Telecommunications Traffic Officer (TTO) and a number of specially trained Telephone Service Representatives (TSR's) who do most of the routine visiting to Datel customers. A DCSO is responsible mainly for customer liaison, handover to, and training of, the customer's staff, and for resolving queries and service complaints. Customer liaison means that DCSOs actively make their existence known to customers and establish themselves as points of contact in the Telecom business to which service complaints and enquiries about any aspect of British Telecom data transmission services should be directed. When a customer takes on a Datel System, they see that customers are given instruction on how to operate the Datel equipment and receive the appropriate operating instructions. Most important from the maintenance point of view is to see that customers are made aware of the correct fault reporting procedures. In most cases commissioning staff perform this role, but sometimes a customer's operating staff are not on site during commissioning, so the DCSO – or more usually a TSR – will instruct the customer's staff later. Where complex Datel systems are involved the DCSO ensures that the customer is conversant with the means of operating the various facilities and, more often than not, an on-site visit is arranged. A TSR visit is also offered where a customer requests staff refresher training on existing Datel equipment.

A feature of the press campaign April/May 1979



DCSO's also find themselves taking up fault complaints on behalf of customers and liaising with the maintenance officer in charge of the data fault reporting point to ascertain priorities for fault attention. The DCSO also advises a customer of the probable fault clearance delay, keeps him regularly informed of progress, and eventually confirms with the customer that service has been satisfactorily restored. Where a customer's service interests cross Area/Regional boundaries, the DCSO's concerned are often in the best position to

appreciate the complexities of the customer's problems and ensure that all the appropriate groups are briefed.

Developing relationship

During 1979 we made a series of visits to 19 Areas up and down the country to see how the DCSO scheme was developing, and what reactions there had been from other Divisions. One of the clearest trends to emerge was the good working relationship that had developed between Datel Maintenance groups and the local DCSO. Maintenance staff welcomed the part that DCSO's could play in relieving the pressure of demanding customers, and dealing with general customer queries, thereby allowing them to get on with the job of Datel maintenance itself.

The rapid growth of existing Datel services, new data services, new modems, Packet Switching – and the Government's stated intention to liberalise the supply of many types of equipment – means that the importance of the DCSO can only increase. This is because he acts not only as the interface between the customer and the Business, but, equally important, with other Divisions – most particularly engineering maintenance. The scheme has got off to a good start and can only get better as more people become aware of the DCSOs role and the ways in which they can play their part in improving Data Customer Service.

01-432 9344

Special range telephones —maintenance

by **John Bright** ME/BS4.4.2

Until a few years ago a faultsman attending a telephone fault would be fairly sure of encountering a standard 700-type or, perhaps, 300-type dial instrument.

Things started to change at the end of the sixties, with the introduction of various types of press button telephone first onto certain types of PABX and then onto direct exchange lines (DELs). At about the same time, the dial Trimphone and then the Compact telephones were introduced to supplement this 'premium' range of instruments.

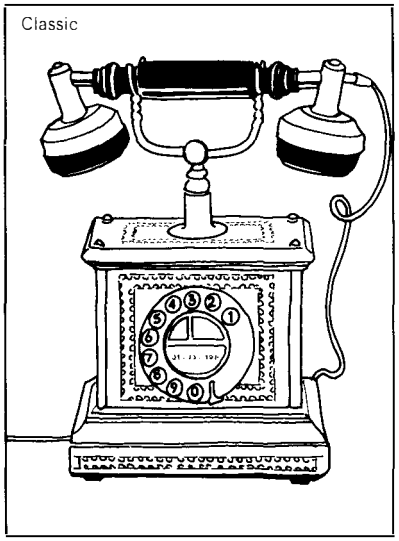
At the end of the seventies the special range of telephones were offered to the public to meet the demand for distinctively designed or luxury instruments. Some of these were originally designed for use on foreign networks and have been modified, where necessary, to meet British Telecom network and interworking requirements. The figure shows those instruments currently offered in the special range ; further models are being considered.

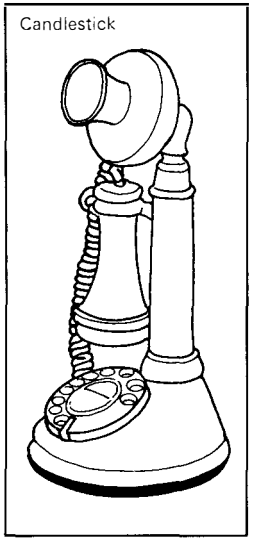
The maintenance of special range telephones is covered in *TI E5 B2001* and is generally limited to changing any identifiable British Telecom parts or the complete instrument.

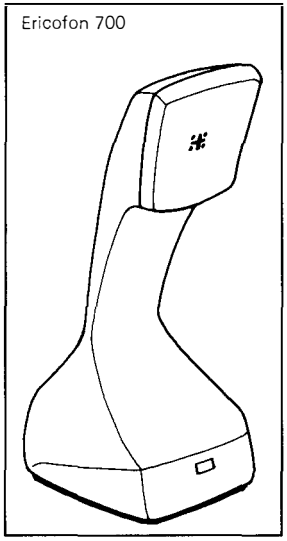
Due to the low penetration of these instruments in the field it is not economic to stock a large number of non-standard spares, so repair and refurbishment is at present carried out by the manufacturers. So it is important that special range telephones are only maintenance exchanged when proved definitely faulty.

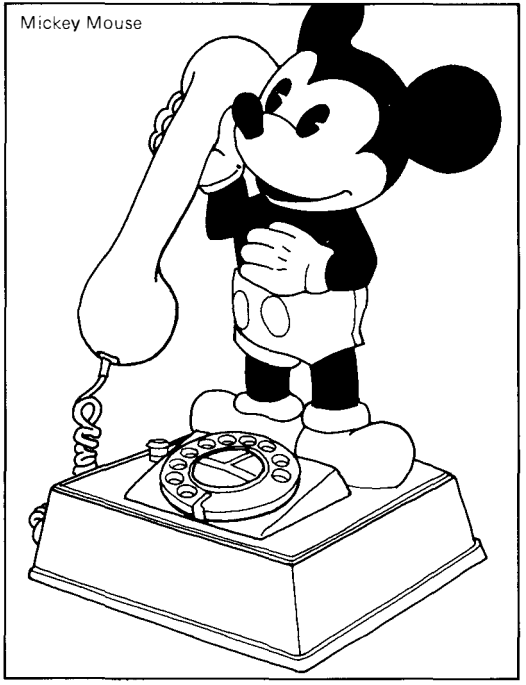
Most of the special range telephones use similar circuitry to standard 700-type dial instruments and interwork satisfactorily. The Astrofon and Ericofon 700, however, are electronic press button telephones and their circuitry can give misleading results when tested by an RSC or by faultsmen. Testing an Astrofon or Ericofon 700 tele-loop from a RSC using either the test desk voltmeter or a multimeter switched to the ohms scale, will result in a very high resistance reading (typically 10,000 ohms). This is because the testing current is insufficient to operate the electronics in the telephone. They require a minimum of 20 mA line current for correct working, but they will function down to 10 mA with degraded transmission. The best way of loop testing these telephones is to measure line current by connecting a multimeter (switched to 100 mA scale) in series with the telephone and one leg of the line. The reading should be well within the range of 20-100 mA. This test can be carried out at either customers' premises, exchange MDF, or RSC test positions with line current testing facilities (56-type test desks).

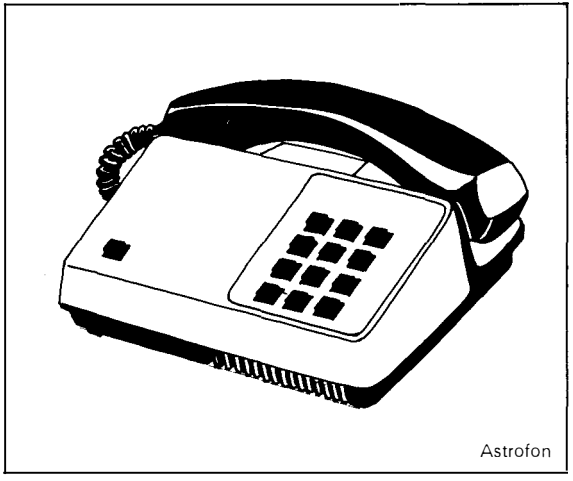
Special range telephones with circuits similart o 700-type telephones may be used on 700-type extension plan arrangements.

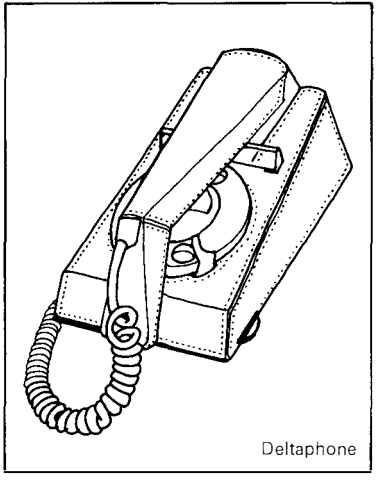

Classic

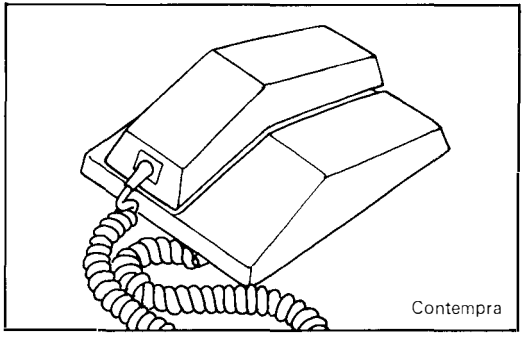

Candlestick


Ericofon 700


Mickey Mouse


Astrofon


Deltaphone


Contempra

Parallel working (although not an advertised facility) is also generally possible. Due to their line-powered electronics, the Astrofon and Ericofon 700 may give transmission problems if parallel extension working is attempted with 700-type telephones. This is because the transmitter of the lower resistance 700-type telephones, shunts the higher resistance special range telephone, which may cause the SRT transmission circuit to be degraded – or even cut out – giving no transmission. This problem is not unique to these special range telephones, as it can also occur when interworking carbon and non-linear microphones on the same extension plan.

Special range telephones are numbered in the SR 1000 series, and diagrams in the N4900 range. The suffix A, B, C or D, after the number indicates the category of the instrument.

An A or C suffix indicates that a bell, or calling device, is included whereas a B or D indicates that there is neither.

A or B suffix also indicates that it is suitable for use on DELs, and C or D that it is wired for use on PBX earth recall extensions.

The special range of telephones on offer to our customers are, in effect, in competition with the 'illicit' market of exotic and unusual telephones. By definition they are not expected to become large volume items, so incur an extra rental during their five-year maintenance period. It is likely that most customers regard them as items of special furniture rather than just instruments.

Faultsmen should make every effort to retain customers' confidence in the special range telephones ; precautionary changes and unnecessary dismantling of instruments must be avoided. A satisfied SRT customer may well order further instruments and recommend them to others, rather than purchase from elsewhere – especially when the monopoly is ended. This is good business !

01-432 9277

Letters

. . . call for a TRT119

Can any reader help me please ?

I have an increasing need for a TRT119 Test Call Sender. The item is obsolescent in the Vocabulary and stock is exhausted. Enquiries throughout the area and regional offices have drawn a blank. I would be pleased to hear from anyone who knows the location of a TRT119 which is, for one reason or another, no longer required.

R S King, Mtce AEE, M35 Cambridge T.A. 0223 353648.

. . . rheumatic joints

I agree with everything in Dennis Ansell's article 'Better Joints for Local Lines' (*MN 16*). I tried to introduce this system nearly ten years ago following a demonstration by a prominent firm in this field. No one seemed interested.

But the author misses the point. No amount of joint sealing will be effective until the problem of laying cables direct in ground has been overcome. Once a cable sheath is punctured the water will get in, and no joint closures will keep it out. I imagine that one day someone will come up with the bright idea of putting cables in ducts ! The question of costs will be raised – but let the doubtful look into U/G MTCE costs, and the indifferent service to our customers !

J W Dyer, M242, T.E.C. Haywards Heath, Sussex.

NE/T8.2.5 replies: Information collated over the years shows that 25-30 per cent of the D-side faults are due to joint closure defects. Since all cables have to be jointed – ducted or buried – the correct application of the improved closure methods described will be of major benefit in reducing this type of fault. Mr Dyer has a point regarding damage to buried cable, but statistics indicate that 66 per cent of these faults occur on unarmoured cable – many of which are undoubtedly 'unfilled', permitting water penetration into joints via the cable sheath. It was for this reason that cable butt injection was introduced for use on existing unfilled cables.

Now for the future. Following extensive field trials, which demonstrated that acceptable fault rates of about 0.04 faults/working circuit/annum can readily be achieved, new housing estate practices are soon to be introduced. Grease-filled

armoured or annular protected cable, ducted cable between house and footway, radial distribution schemes, and so on, will all help.

These practices – when allied with revised Estate Liaison Officer and cable maintenance acceptance procedures (Form A349) that are being introduced – plus maintenance renewal uplift programmes for existing plant, should make considerable inroads into providing a more reliable and secure network.

. . . on Factory Stock Numbers

The article on page 31 of the Spring 1980 issue may cause confusion especially as we are starting a publicity exercise to persuade staff in areas/regions to use Factory Stock Numbers (FSN) where allocated, on all requisitions sent to FacD. FSNs consist of eight-figure numbers, the first two digits of which indicate the type of item for example 30 = Resistive Devices, 75 = Cradles. There is no intention at present to allocate FSNs to the majority of PP Depot items.

The numbers shown on the requisitions illustrated in the article are PO part numbers and are in no sense Factory Stock Numbers. R H H Brent, Procurement Executive PE/F2.3.1.2. 01-272 7700 Ext 291.

NE/ES5.4.3 replies: Mr Brent is quite right to point out that the photographs show PO part numbers in the column headed FSN. But until all piece parts are given such numbers we are stuck with either the PO part numbers or the manufacturer's reference as the only means of identification. Perhaps this letter will help with the publicity exercise mentioned?

Maintenance News aims to provide a medium for two-way communication – that is, between Headquarters and the field. If you want to write about anything you may have seen in *Maintenance News*, or indeed, about any maintenance topic, send your letter to: The Editor, Maintenance News, Room 1230, 207 Old Street, London EC1V 9PS. Say what you like, but the Editor may tone comments down if he decides to publish. Do please give your full address.

If you have a contribution to offer to *Maintenance News* other than a letter to the editor, please forward it through normal channels to the *Maintenance News* agent for your Region or Telecommunications Board. The list is shown below. The editor cannot publish anything to do with current awards suggestions.

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