

Proceedings of the Institute of Acoustics

LONDON UNDERGROUND PUBLIC ADDRESS SYSTEMS - THE STORY SO FAR

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1. INTRODUCTION

1.1 Early Public Address Systems

In common with most other communications systems the history of Public Address on the Underground is relatively short. The first system of any real note was that installed on the Victoria Line completed in 1968. The system employed relay switching, was linked to the CCTV system and allowed announcements to be made by a centrally located "Line Controller" and from certain strategic points on the stations. The main areas of coverage being platform and some ticket halls.

The Line Controller being able to address platforms on an individual basis, but only when that particular area was being viewed on the CCTV monitor provided. The local operator could address all areas available.

These first systems were designed and installed by the signalling teams undertaking the other work on the new line, some of which remained in operation until recently.

With this original success and a recognition that communications systems in general were becoming key to the running of the Railway, a small team was set up to provide them in the early 70's.

The 70's saw slow progression in terms of Public Address Systems. Instead, using the Victoria Line concept as a model, a number of the large interchange stations were linked back to the Line Controller providing both CCTV and Public Address. The operation of the systems was largely as described for the Victoria Line except only a small number of stations on each Line were equipped.

Towards the end of the 70's the importance and role of communications systems was becoming more apparent. Whilst train services ran normally the role of these systems was relatively low key, however, at times of service disruption a means of conveying information and advice to passengers was obviously needed. Also, if this was to be achieved by Public Address then it was also recognised that the Line Controller would not be in a position to make the announcements needed, as at the time when the announcements are most needed the Line Controller is very busy carrying out his main function of regulating the train service which requires a constant gathering of information and then dissemination to the Operators to normalise the service as quickly as possible.

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1.2 Centralised Public Address Systems

Thus the requirement for Centralised Public Address with a dedicated operator was identified.

The system was designed and built by Plessey Controls Limited using Telefunken Public Address Equipment and Neuman Twin Cone Loudspeakers. The installation of the equipment occurred in the early 80s and covered virtually every LUL station with the exception of the Victoria Line where the original system was still in service. All Line Control Offices were equipped with a control system allowing a newly appointed Information Assistant to make announcements to any or all platform areas on the Line concerned. The announcements could be made live or recorded on an automatic announcement machine which replayed the message to the chosen stations at a periodicity selected by the Information Assistant. A uniform approach was taken to equipping each station, announcement points were provided on each platform and for the larger stations a Station Manager's Console (SMC) was added which enabled the Operator to make announcements to any or all equipped areas of the station simultaneously. It was deemed that the best information would be available at the Line Control Office hence the Information Assistant was given priority over local use. The Line Controller was also given access to the system, but in practise made little use of it.

The system, whilst being a significant improvement on what went before, was however found to be limited in a number of ways, and has been dogged by problems of reliability.

1.3 Fire Precautions (Sub-Surface Railway Stations) Regulations 1989

The next and possibly most significant event in this short synopsis of the PA systems on the Underground occurred in the late 80s in the wake of the Kings Cross fire in 1987 and the subsequent public enquiry chaired by Desmond Fennell OBE Q.C. in 1988. In 1989 the Secretary of State made regulation under Section 12 of the Fire Precautions Act 1971 and this created the Fire Precautions (Sub-Surface Railway Stations) Regulations 1989.

These regulations decreed amongst other things that all sub-surface stations should be equipped with fire detection and evacuation systems. The evacuation system taking the form of fire alarm sounders and as far as public areas of the station were concerned the Public Address System.

These Regulations having been brought in during 1989, London Underground Limited were given until 31st December 1990 to comply. At this time any sub-surface station not meeting the requirements would face the threat of closure by the LFCDA (London Fire & Civil Defence Authority). In PA terms this meant designing, procuring, and installing 115 systems compliant with BS 5839 (British Standard for Fire Detection and Alarm Systems) in a period of approximately 18 months. It was also imperative that the failings, as far as possible, were not repeated from the previous systems.

1.4 BS 5839 Part 1 - Fire Detection and Alarm Systems for Buildings - Code of Practice for Installation

We at London Underground were left to interpret what we should do when supplying PA Systems to meet this standard. There was a risk associated with this as the London Fire and Civil Defence Authority (LFCDA) had not themselves, I believe, had to accept that PA Systems could meet this Standard and so it was not until we were committed to a particular course of action and in fact had several systems installed, could all parties involved be satisfied that our interpretation of the document was acceptable. The following is a list of the main criteria used to design the systems (in no particular order):-

- * All cables outside main equipment rack to be fire retardant.
- * Battery back-up must provide for half hour at full use following a 24 hour quiescent state.

Proceedings of the Institute of Acoustics

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- * Loudspeakers to be fire resistant.
- * All inputs and outputs to be continually monitored.
- * Loudspeakers to cover every area and all rooms of a station except excessively noisy areas ie machine rooms etc, where Fire Alarm Sounders would be used.
- * Must be capable of accepting an input from Fire Detection Systems and automatically issuing a two stage alarm and evacuation.

1.5 The Equipment

In terms of functionality it was important that we did not regress and indeed were seen by the users of the system to have addressed their concerns with this latest generation of equipment, as well as meeting the statutory requirements above. To enable the equipment to be flexible in terms of inputs/outputs it was designed around an audio matrix, and modular concept to allow other features, not necessarily required at the time of purchase to be added later by the addition of plug in boards. Also the system priority can be readily altered. In fact this equipment gives priority to the Station Manager's Console each other station based inputs the Long Line input being relegated to a much lower priority.

The system installed replaced the station Public Address Equipment only from the previously installed Centralised PA System and therefore the Plessey Long Line and Control Systems still exist, but interface into the station based equipment as an input only with the ability to select which platforms on the Line concerned it wishes to address.

Due to the timescale involved, the requirements which were to be satisfied and the number of sites involved it was not possible to treat each station individually and therefore a general philosophy was applied which was felt to be reasonable for all sites but not necessarily ideal for every site, and thus in subsequent years a number of modifications have been carried out to enhance performance.

1.6 Victoria Line Public Address System

As the system installed under the original project is now 25 years old a project is in existence to replace this system and provide an Information Assistant for this Line. As all Victoria Line stations are sub-surface and therefore were re-equipped under the works mentioned above, the station based equipment will not be replaced. However, the Long Line System will incorporate some features which are again designed to alleviate some existing problems. Most notably will be the digital audio transmission over optical fibre to eliminate any induced interference and the detection of train movements to prevent the announcements going out when a train is entering a platform.

Whilst these features should ensure the message arrives at the station uncorrupted and in output at a time when it should be clearly heard, the final result in terms of audibility will be dependent upon the station PA system and the acoustics of the environment.