Ortofon P400 User Profile

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The Quality of Beovox Loudspeaker Systems Begins and Ends with the P400

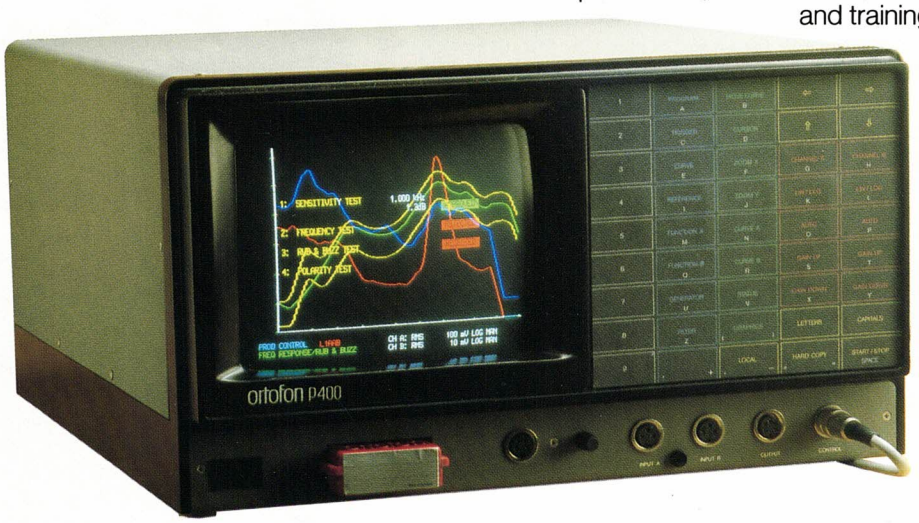
The striking visual design of Bang & Olufsen's Penta and Red Line loudspeaker systems is the outer frame around new acoustical developments, high quality sound, lifestyle, and quality control.

Production Manager Poul F. Johannsen, Bang & Olufsen's loudspeaker factory: "We market systems and solutions. We cannot afford to make faulty speakers, because any defect in a speaker will also influence the customer's appreciation of other Bang & Olufsen products."

All loudspeaker units arriving at the loudspeaker factory are subjected to incoming inspection on a statistical basis, according to AQL guidelines.

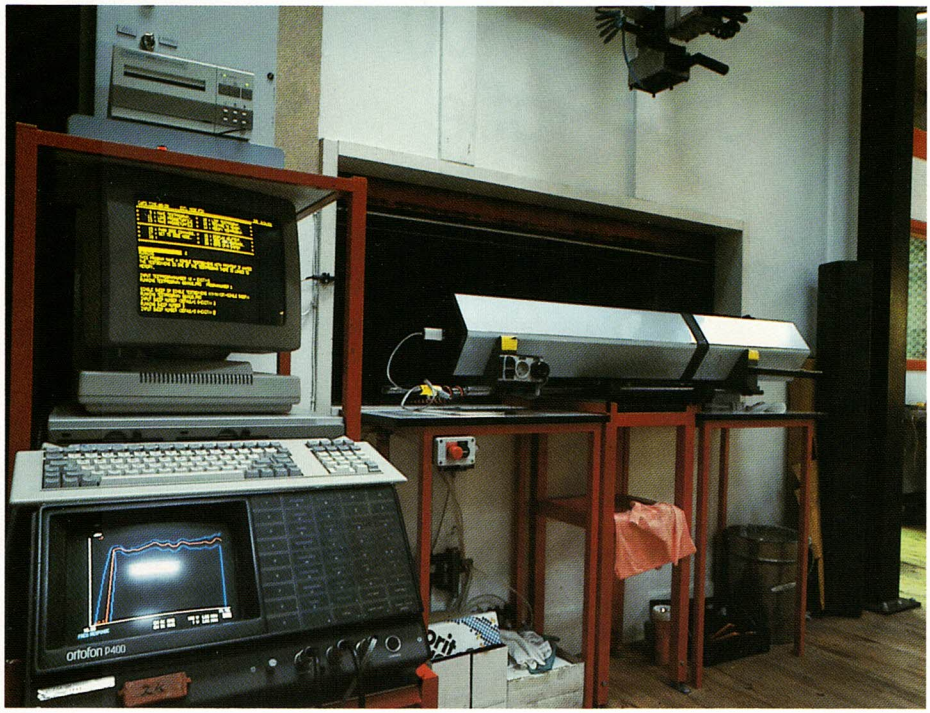
Following the assembly, each loudspeaker system undergoes a 100 per cent check in a purpose-built anechoic chamber.

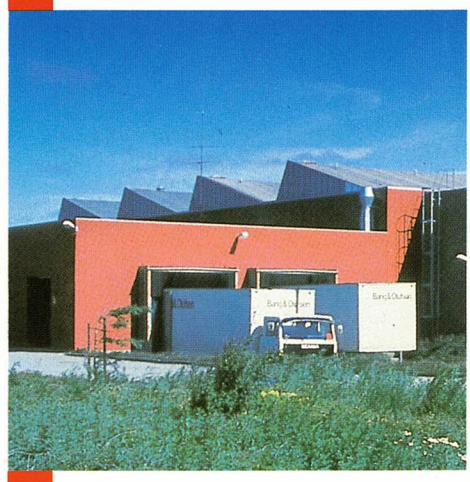
The Ortofon P400 Measuring Computer plays an important role in Bang & Olufsen's quality assurance scheme. A total of four P400's are employed at the factory - one for incoming inspection, two for production, and one for backup and training.



Ortofon Instruments A/S
11B, Mosedalvej
DK-2500 Copenhagen - Valby
Denmark

"Instead of listening, as we did until 1984, we let the Measuring Computer compare the key parameters of each system with those of a reference sample from the development laboratory. In particular, it has been a challenge to reveal "air sounds" from cabinet leaks. We have solved this problem by using an additional microphone, located behind the enclosure in the test chamber."





Subjective Correlation

The P400's at Bang & Olufsen's loudspeaker factory handle a workload of about 400,000 units and 70,000 loudspeaker systems per year. Engineer Karl Erik Nielsen who is in charge of incoming inspection feels that the P400 Measuring Computer has strengthened his position as a professional buyer. "Some suppliers no doubt find it a nuisance that we are constantly looking over their shoulders, but those are the conditions if they want our business." "The P400 is a good tool. Of course, it is not perfect. In particular, it took some time and effort to select the necessary filters and test parameters to reveal all cases of rub and buzz in tweeters. In most situations, there is a close correlation between subjective listening and P400 measurements, but some types of distortion, which are immediately recognized by the ear, only appear as minuscule dips or peaks on a graph, so they may easily pass unnoticed." "The P400 could be made easier to use. I would like to see an auxiliary programme to speed up the programming of reference curves and tolerances. And not least of all, I wish I had accepted the offer of training before I began using the computer two years ago."

Bottlenecks

Since the introduction of P400 Measuring Computers on the production floor, the loudspeaker systems have become even more homogeneous than previously. Nevertheless, Poul F. Johannsen and his staff are aiming for even narrower tolerances. They expect to reach that goal gradually, as they introduce a higher degree of automated assembly and gain more experience with computerized quality control.

The P400 itself is regarded as a very fast measurement tool. However, the final inspection of a completed loudspeaker system remains a bottleneck in the production.

This is mainly due to the fact that the handling involved with computerized testing in a dedicated chamber takes more time than conventional listening. Consequently, the P400 has not made it possible to save manpower at the Bang & Olufsen loudspeaker factory. On the other hand, the training of quality control employees has become much easier, and as soon as the operating of the Measuring Computer has been mastered, the results are not dependent upon subjective judgement.