THE DEVELOPMENT OF RADIO DRAMA

AT

HESSISCHER RUNDFUNK, FRANKFURT AM MAIN

1954 TO 1983

ANDREW EDWARD HAYDEN

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ABSTRACT

This study is a case history of radio drama production at one particular broadcasting authority in Western Germany.

Radio drama has assumed a position of increasing importance within the output of German radio networks since World War II. Beginning as an easily produced and quick substitute for the lack of cinema and theatre entertainment in the early 1950's, it has been developed with the advent of stereophony to an art form in its own right, embracing all the technical and artistic possibilities of current broadcasting technology. Very little, however, has been done to document and analyse the creative processes involved.

Beginning with the move to Hessischer Rundfunk's present headquarters in Frankfurt in 1954, the study goes on to describe and analyse the original mono studio complex and productions made there, keeping in mind numerous constraints imposed: small studios, poor acoustics and basic technical facilities necessitating considerable improvisation.

The study continues with the commissioning in 1967 of the new stereo radio drama suite. This was planned from the outset to avoid the problems encountered in the mono suite and thus forms a suitable contrast when comparing productions, production techniques and technology.

The study places considerable emphasis on evolving aesthetic criteria whereby the effect of technology on sound drama can be measured. By taking one facet of radio drama, acoustic depiction
and perspective, and analysing it closely, it has been possible to show how crucial the interaction of actor, studio and microphone can be in achieving a convincing realisation of a scene using sound alone.
Frontispiece 1.

Premises of the Reichssender Frankfurt opened 15th December 1930.

This building was the temporary home of Hessischer Rundfunk from 1946 until 1951.
Frontispiece 2.

Hessischer Rundfunk, Frankfurt am Main as it is today.

The radio studio complex housing the radio drama studios is the round tower building in the bottom left of the picture.
ACKNOWLEDGEMENTS

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FOREWORD

The original impetus for this study stems from the time when I was an undergraduate Tonmeister student in West Germany between 1976 and 1977. Part of this time was spent at Hessischer Rundfunk (Hessen Broadcasting Authority), Frankfurt am Main and more particularly, in the radio drama production studios there. It was here that I was confronted with an aspect of radio broadcast production work which was entirely new and seemingly unorthodox. From this initial confrontation sprang a desire to understand this apparent unorthodoxy and with this desire an interest began to develop in radio drama itself. It has proved to be a highly specialised and complex application of sound recording technology embracing almost every facet both of the apparatus and its usage.

Hessischer Rundfunk offered me the chance to trace the historical development of radio drama from the immediate post war years to the present day (1983) so that this study has also become something of a chronography of radio drama production typified by this broadcasting authority.

Inevitably, personalities were involved and it emerged that Hessischer Rundfunk was fortunate, in its formative years, in having a man who almost single-handedly set a style and standard of engineering which went far beyond the call of the production engineer as simply an executive organ within the production process. His name was Reinhard Krawulsky.
I had the opportunity to talk with Herr Krawulsky in an interview recorded at his home (1) in Frankfurt on 5th December 1979, a short while before his death. Born in Eastern Prussia of an old church musician's family, he began his career with the German Radio Network under the Nazis, having previously gained the necessary qualifications in electronics and electrical engineering. His first post was in Koenigsberg (today Chojna, in Poland) as a sound technician in the main switchroom. He subsequently moved to outside broadcasts and worked as an engineer recording concerts, etc. During the war years, he was transferred to Berlin where his experience included regular broadcasting and recording from Hitler's headquarters. In addition, he was often called to cover for music recording directors (Tonmeisters) who had been drafted into the forces. Following the capitulation in 1945, he was made a prisoner of war. Following his release he began, in 1950, with the newly formed Hessischer Rundfunk, where he remained until his retirement in 1972.

The then Head of Radio Drama, Dr Ulrich Lauterbach (2), remembered Herr Krawulsky as a man with a great understanding of music and feeling for speech, reliable but inclined to stubbornness, particularly if a producer did not like what he was doing. He was also very secretive at work - someone of whom it might have been said, "his art died with him".

It would be idolatrous to say that without him radio drama at Hessischer Rundfunk would not be what it is; it could have well developed along other equally valid lines but such was his
expertise and obvious identification with radio drama that many of the productions bearing his stamp easily stand comparison with productions, in stereo, made with modern facilities of today.

It came as a sense of relief to me, when looking at the results of this study, to find that the medium in which Reinhard Krawulsky worked, namely monophony, revealed itself not merely as an historical forerunner of stereophony but as a viable artistic alternative. The conditions under which he worked were far from ideal yet it seemed they presented a challenge enabling him to succeed, almost brilliantly, where others might have succumbed to the restrictions imposed upon them and who might have delivered a product of little lasting quality.

I was also relieved to find that this study has thrown open the whole question of mono versus stereo in relation to radio drama and with it, what exactly is intended in the radio drama process, rather than confirming conventional wisdom which gladly treats mono as an historical phenomenon only. Anyone approaching the subject must acknowledge that because radio drama, by definition, was borne out of the radio or 'wireless', it is wholly dependent upon the radio machinery for its articulation, symbolised most vividly by the microphone. Many post-war commentators either did not want to or failed to appreciate the full significance of this, preferring to leave technical matters entirely in the hands of the technicians or couching their own observations on the subject in a language which gave little real clue as to how technology impinged upon their art. This appeared doubly strange and quite unwarranted. In the course of some other
research, (3) unconnected with this study, on colour music, I was struck by the close working association developed by the protagonists of this other highly technical art form involving theatre lighting installations controlled by equipment every bit as complex as a studio mixing desk. This view is supported too by a letter received from Dr Christoff Buggert, present Head of Radio Drama at Hessischer Rundfunk, and Herr Nikolaus Klocke, dramatist in the same department: (4)

"The (current) state of knowledge reflects the historical course of radio drama development on both technical and artistic levels, a development characterised by chance, sudden leaps, and material and ideological limitations. Neither the interplay (of art and technology in radio drama) nor the acoustical end product has been systematically researched",

and by implication, the power of the medium to determine the final result.

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This study begins with an examination of typical productions from the studio in which Reinhard Krawulsky worked, Studio VI. This studio suite gave the director and engineer a radio drama 'workshop' but only in miniature. Originally intended as a talks studio, circumstances dictated that it did duty for radio drama for over fourteen years. Much of the time, Krawulsky dominated production engineering there, at least until the early
sixties when his successor, Herr Peter Jochum, gradually assumed responsibility.

Late in 1967, the bottleneck caused by the evermore inadequate facilities in Studio VI was resolved with the commissioning of Studio VII. Spacious and fully stereo-compatible, it was to become the hub of radio drama production at Hessischer Rundfunk. Not only that, but the studio became host to two international symposiums on radio drama in 1968 and 1972 as well as being the place of origination of many productions, winning such prizes as the Prix Italia and the German Hoerspiel Preis der Kriegsblinden.

Studio VII owed much, it seems, to Krawulsky's initiative embodying a great deal that had been learnt from working in Studio VI; the need, for example, for a dead studio of large size and a correspondingly large 'hall-studio'. The mixing desk too was almost a conceptual copy of the one in Studio VI with relatively little in the way of equalisation for example, but, for the time, good mixing facilities.

If it appears that much space has been devoted to discussing productions from Studio VI engineered by Krawulski, then this is because there seemed much to be learned. Krawulski understood intuitively how our perception of our environment is altered when the component of direction is absent and, working in mono, how this component could be suggested. In so doing, he forced the realisation that, conventionally, stereo is mono with added movement and spatial orientation. In other words, it is quite possible to reduce stereophonically recorded material to mono with little real loss of content, a fact witnessed daily by
countless stereo broadcasts heard on single or virtually single speaker portable radios with evident satisfaction.

The commissioning of Studio VII heralded the beginning of a new era in radio drama in Frankfurt. The vastly superior accommodation and technical facilities promised drama producers the likelihood of being able to recreate any situation within the confines of the studio. This proved the case initially for as long as stereo remained a novelty but, as this study will show, the limitations of the drama studio become apparent once the parameters governing realism and reality are defined. This process has taken some long while and it cannot be denied that during that time much excellent work came from Studio VII. However, because stereophony, bringing with it the depiction of space and movement, also brought us closer to dispensing with illusion and a step nearer perfection in portraying realism, in the words of Peter Jochum, Reinhard Krawulsky's successor,

"the more perfect the apparatus (used to evoke reality) the more sterile it becomes". (5)

Exactly for this reason, there has been a tendency of late for producers to turn away from the rarefied technology of the sound studio and opt for a less controlled style of production involving elements of chance and improvisation, dispensing with the polished acoustics of broadcasting house in favour of the rawness of the location backdrop.

In one sense, radio drama could be seen to want to rid itself of conventional stereophony altogether. If it used to be the case
with mono that its obvious limitations allowed abundant room for the imagination to function, stereo, in attempting to be ever more true to life, has had to divest itself of the apparatus which mono used so successfully: studios with differing acoustics, the mixing desk, reverberation plates etc., in order for it to be successful itself.

In another sense, stereophony exists as a means of constructing sound imagery which has nothing to do with conventional perceptions of reality. It becomes a way of ordering acoustical materials, artefacts. The sterility of the sound studio is no longer a point of contention because the apparatus is being used in a way which suits it, like a machine built to do a specific job, a computer programmed to construct order from a jumble.

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Both ways of using stereophony will be considered in this study and, at the risk of pre-empting conclusions, both have thrown the ball back in the mono court. The imagination is, after all, the radio drama producer's most potent aid. How the listener chooses to apply it is an entirely individual matter.
Reinhard Krawulsky (left) at the mixing desk in Studio VI, Hessischer Rundfunk.

To the right are the playwright, Wolfgang Weyrauch and Dr Ulrich Lauterbach, then Head of Radio Drama at Hessischer Rundfunk.
"Radio drama began in the trenches of the First World War"(6) From this point, according to Heinz Schwitzke, it is possible to trace the history of this unique form of radiophonic art.

Soldiers issued with radio and telephone sets for communication, began using them to provide entertainment. There were no records, no disc jockeys, no journalists or producers to create radio programmes. The troops began improvising themselves: readings from literature, magazines, poetry, novels, plays, music from a mouth organ, bugle and the like.

One of the men in charge of organising radio communications was Dr Hans Bredow, later to become a key figure in the development of the German broadcasting system in the 1920's. Bredow was responsible for the first of nine regional radio stations. This was the 'Radiostunde AG' in Berlin, which began transmission on 29th October 1923. From its inception can be traced the beginnings of programmes much along the lines of those evolved in the trenches and whose content can be directly related to the development of the radio play.

Alfred Braun, the first Head of Drama at the 'Radiostunde AG' said:

"Talks given on the wireless often maintain that in the beginning was the word. Looking back however, in all honesty, I have to acknowledge that, in the beginning was the apparatus itself. Night and day,
technicians and engineers beavered away in the studio in the Potsdamerstrasse, home of the Radiostunde, and out of this technical experimentation came the beginnings of the spoken word in broadcasting and with it the beginnings of radio drama." (7)

Just how far the technical aspects of radio governed the pioneers' thinking is referred to later in the same article:

"The first literary work which was broadcast came from Liliencron and sounded dreadful because the reader thought he had to speak in slow motion. Nobody had yet thought primarily of an artistic delivery of a text, but only of it being intelligible at all". (8)

This was due in part to the use of ordinary telephone quality microphones. The sound delivered by these primitive instruments resembled at best the early attempts with Edison's tin-foil phonograph. It was noisy with a constant frying sound in the background, inclined to gross distortion when subjected to loud declamation and with a frequency range barely sufficient for intelligibility. In other words, it was impossible to convey any shading or nuance to the spoken word.

Despite such handicaps, radio listeners (c. 100,000 in the Berlin area in July 1924) reported back to the broadcasting stations and encouraged them to press on with transmission. Braun recollected that the co-operation of enthusiastic wireless amateurs was instrumental in creating the conditions for a first broadcast of a radio play. (9)
In the matter of sound effects, how they were generated and what impression they left on the listener, he noted that in one case the sound of ice breaking on a glacier was imitated by a man standing at a microphone and gargling! Listeners heard this over their wireless sets and reported back that the effect had been a success—a early example of how seemingly impossible limitations could be turned to good effect.

The introduction in 1924 of a high quality carbon microphone designed by Eugen Reiss gave broadcasters an instrument capable of immensely improved fidelity. It was now possible to take stock of factors such as studio acoustics, the effect of speaking at various distances from the microphone, and the dramatic significance, in radiophonic terms, of subtle changes in voice quality.

At first though, it would seem the technical possibilities offered by this and other similar improvements in the transmission chain were not readily appreciated. It fell to one of the younger radio drama directors of the time, Carl Hagemann, to draw attention to the significance of what was being heard, not in the studio itself, but what was heard over the control room monitor, as a measure of the efficacy of the production. The tendency at the time was to play out the piece before the microphone in the studio with little or no technical intervention, as if the microphone were a recorder with no interpretative role. In a letter to Bredow, Hagemann suggested that by using the control room monitor speaker alone to judge the effectiveness of the production, greater integration of and contribution from technical resources could be achieved.
It should not be supposed from these remarks that radio
drama in Germany knew nothing of the effect of different acoustics,
voice qualities, etc. Whereas the BBC was already moving towards
a multi-microphone, multi-studio set-up under central control, (11)
Germany had to make do (partly through lack of purpose built
complexes) with just one or two studios capable of being partitioned
off with curtains and, typically, a mixing desk (12) with just
three inputs.

Such simple arrangements, however, did not hinder producers
in realising that radio drama was potentially as much a distinct
art form as film or theatre. In an article from 1927, Dr Helmut
Habersbrunner, Head of the Literature Department at the 'Deutsche
Stunde in Bayern' (Bavarian Radio Network, Munich), explained how
it was possible to modulate the voice before the microphone with
powerful dramatic effect:

"Of great importance are the character of the voice,
its strength, its pitch and the speed of delivery.
From these few factors alone, working together, arises
an infinite complexity of sounds and moods". (13)

Later, in 1929, Hans Bodenstedt was to write,

"Human hearing possesses an exceptionally finely
graduated ability to discriminate between different
sounds... If an author wishes to write for the micro­
phone, he must understand, almost be preoccupied with,
the idea of an acoustic medium". (14)

Already, the microphone was beginning to be seen as more
than a neutral intermediary between actor and listener.
The First German Radio Plays

"Zauberei auf dem Sender" (Radio Magic), written by Hans Flesch, was broadcast on 24th October 1924 by the 'Sudwestdeutsche Rundfunk AG' (Southwest German Radio Network) in Frankfurt aM. This was the same year as the BBC Broadcast of Richard Hughes' play, 'Danger'.

"Zauberei auf dem Sender" was the first German play specifically for radio and not an adaptation of a stage play. In it, Flesch sought to orientate the play in the direction of what was then perceived to be characteristically 'wireless'. It begins with an announcer who is just about to speak. Suddenly, the Radio "Auntie" bursts into the studio and interrupts him. She is joined by the musical director, the artistic director, and the assistant. The engineer tries to switch off the microphone but something prevents him. The ensuing argument brings the whole 'behind-the-scenes' of a radio production quite unintentionally to the listeners' ears. Later, as the director is writing a report on the happenings, a magician appears. A short while previously he had been refused employment. He it was who caused the commotion and he makes it known that he intends further disruption. The director attempts to drown him out with the music of the Blue Danube but the orchestra is unable to play properly. Finally, through a massive effort, the radio personnel overcome the powers of the magician and everything is restored to normal.

Rather than try to depict scenes from life aurally, Flesch chose to enchant the listener with a tale of magical goings-on at a radio station, opting for an easily realised situation.
concerning the radio apparatus itself. It was an attempt to
illustrate how a piece of drama could exist purely through the
medium of wireless.

Prior to this, much of what had been broadcast had been
adapted from stage plays or literary works. 'Zauberei auf dem
Sender' made specific use of and reference to "the wireless",
microphones, studios, radio valves, air waves, etc. It pre-empted
later works such as Orson Welles' realisation of 'War of the Worlds'
(1938) and, much later, Werner Kofler's 'Oliver' (1982). Such
pieces have radio as the very foundation of their existence both
technically and in drawing on facets of media activity peculiar
to it. They are examples of an indissoluble partnership between
the author's manuscript and the medium used for its realisation.

At about the same time as 'Zauberei auf dem Sender' and a
little more than a year after the opening of the Radiostunde AG
in Berlin, Alfred Braun attempted a transmission of Schiller's
'Wallenstein: Lager'. Here, the main emphasis was on giving the
listener as complete an acoustic picture as possible using the
then available resources in the twofold hope that the multitudinous
sound effects and changes of acoustic would stimulate the actors
and assist the listener in his imagination. Braun recalled that:

"Costumes and make-up brought with them the
encouragement needed to act (before the microphone)
and led us for the first time ...... to depict acoustic
perspective. The troops marching to and from the 'camp'
were positioned all the way down the stairs (from the
studio) to the entrance of the broadcasting complex in the Potsdamer Strasse. The result was acoustically as plastic and colourful as the bunting put up in the studio. Finally, we even imagined that not only were we hearing acoustic depth but we could also distinguish between left and right in our headphones". (15)

At the same time, the limitations of the apparatus became obvious, not least that a single studio could not be manipulated sufficiently to give changes of acoustic through change of microphone distance alone.

"It should be mentioned here that, right from the first dramatic production before the microphone, we were faced with the discovery that a single acoustical room was insufficient. In addition to the padded walls of the studio, we used the whole of the stairway ...... and had all the floors from top to bottom lined (to reduce sound reflections) for the soldiers". (16)

Just how far the Germans had come to grips with the requirements and possibilities of radio drama in its formative years, can be gathered from an article by Hans Bodenstedt from 1929. One of the most important observations he made, and one which has been a guiding principle of this study, concerned the demands imposed by radio drama on the acoustical depiction of rooms.
"The dramatic demands (of radio) are self evident. More important, because it is as yet less evident, is the acoustic demand. Radio Drama needs not only colour and vividness in its scenes but, above all, room, acoustic perspective. Artistic experimentation in radio has to set out the conditions for this. The various scientific disciplines associated with radio (psychology, psychophysics, acoustics) have failed in decisive areas. Only now do we realise that a sense of space is conveyed not only by the senses of touch and sight but can be evoked by the sense of hearing alone. Space is the sounding board for acting in the studio. This sounding board must be so designed that it doesn't choke or hollow out the sound, but carries, amplifies and directs the sound ...... it must be tangible in the mind of the listener". (17)

In other words, Bodenstedt realised the contribution brought by an acoustical environment matching the dramatic content of the dialogue. Without it, the drama was deprived of one of its most important components, and the listener a potent aid to his imagination.

Radio Drama in the Third Reich (1933-1945)

By the time the Nazis were in power, radio drama in Germany was a far cry from the humble beginnings some ten years earlier. In terms of a further development of the dramatic potential of radio drama, the period 1933-1945 brought almost nothing new.
The radio play became, like most other forms of art and communication, a tool of propaganda. Where it seems it did experience refinement was in the way the basic rules governing play before the microphone were worked out. Hansjörg Schmitthenner in a broadcast in 1974, described these developments as a dramaturgy "which had a highly refined understanding of mass-psychology - which was developed into a hard-hitting and dangerous perfection in its effectiveness". (18)

In the eyes of Hitler, propaganda

"must always be directed towards the emotions and only under precisely controlled circumstances, towards so-called understanding. The more it (propaganda) takes account solely of the feelings of the masses, the more effective its success". (19)

Concerning radio drama, this meant devising tools of production which enabled almost nothing to be left to the imagination. Radio Drama studios such as those described in an article from 1935, by Dr Joachim v. Braunmühl, (20) were constructed to give precisely defined acoustics; for example, a living room, the open air, and a large hall, with an echo room to simulate large resonant spaces. Even the technical apparatus, the mixing desk, offered possibilities which it seemed not even the BBC had thought of with their dramatic control panels. Whereas the dramatic control panel used large round knobs to control the channel faders, difficult to move more than two or three at a time, the Germans had introduced so-called
'quadrant' faders with a flexibility of use akin to faders on mixing desks of today. (21) Whole groups of faders could be moved up or down against each other, allowing accurate control of individual levels from several microphones in one studio. Added to this was Neumann's development in 1928, of a superior form of condenser microphone with well-defined directional properties, low noise and high output. The armoury of technical production apparatus was almost complete.

The final weapon was the magnetic tape recorder using a thin film coated with an iron oxide drawn past an array of recording and reproducing heads at a steady speed. The magnetic tape recorder, in a form recognisable even today, first appeared in 1935 with the AEG model FT II, and was to prove a development of far-reaching consequences for the whole of the sound recording industry. This had a frequency response of circa 150 - 4K Hz and an overall performance already comparable with disc recording of the time. (22) This was followed by the K4 in 1939, with an extended response from 50 - 6,0K Hz and a signal to noise ratio of circa 38 dB. (23) In 1940, v. Braunmühl and Weber perfected recording circuitry using hf bias rather than dc bias as in the two previous machines. (24) These circuits were first employed in the R122 tape machine giving a performance far superior to anything heard before - frequency response from 50 - 10K Hz and a signal to noise ratio at 34% distortion of 62 dB. (25)

Such was the quality of even the K4 that in the self same year of its introduction, the machine was in widespread use throughout the stations of the German Broadcasting System.
In a lecture given by Dr. v. Braunmühl as part of a training programme for 'PropagandaKompagnie' radio engineers in January 1943, he remarked on the already exceptionally extensive use of magnetic tape in German broadcasting. He also, importantly for this study, pointed out the value of magnetic recording in radio drama production:

"The possibility of joining together various recordings made in any particular order, in a filmlike flow ....... will prove especially valuable in radio drama production". (26)

In the past, productions had been rehearsed with a view to either live transmission or to be broadcast from wax discs, neither of which system allowed for post-production editing. Magnetic tape offered the possibility of manipulation on a scale comparable with film production. Just as with film, high quality recording was not confined to the studio. Each machine described previously had a portable equivalent for use in an outside broadcast van or capable of being carried in a back-pack. Actuality recordings could now be made, brought back to the studio and incorporated in a piece of fiction such as a radio play.

Towards the end of World War II, such methods were used in producing 'Frontberichte', actuality reports from the battlefield which originally already heavily censored latterly came to be put together from previously recorded material in a manner very similar to radio drama productions. That they were largely fictitious, and hence technically radio drama, pointed to the increasingly important role of magnetic tape in broadcasting.
What is so significant is that the technical quality available from magnetic tape made it indistinguishable from that of a live broadcast. As with film, a superficial examination yielded no clue as to what was documentary and what was fabrication.

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If the magnetic tape recorder was the final element in the range of technical facilities available to the drama director, then it was left to the post-war years to consolidate pre-war experience and apply it in the service of an art freed from the constraints of political dictatorship. How this was achieved forms the first part of this study, as typified by the output of one of the new regional broadcasting authorities of modern-day West Germany.
INTRODUCTION

The Development of Radio Drama at Hessischer Rundfunk, Frankfurt am Main, 1954 to 1985.

Hessischer Rundfunk or Hessen Broadcasting Authority is one of the twelve independent public radio and television networks brought into being in West Germany after World War II.

Each network was set up to supply programmes to its particular region, in this case Hessen, and to contribute material to a separate common network forming a programme channel for the whole country.

Hessischer Rundfunk was commissioned on 2nd October 1948. From a legal point of view it was a completely new entity having no links with the past. In practice however, until more modern accommodation could be provided, it was obliged to occupy the premises of the 'Reichssender Frankfurt' its Nazi predecessor, opened on 15th December 1930 in the Eschersheimer Landstrasse, Frankfurt, close to the centre of the city. (see frontispiece)

The move to a location more suited to the needs of an expanding postwar broadcasting unit did not take place until 1951 and when this did happen it was to an already existing building a short distance to the north. The premises chosen had been previously developed as a possible seat of government of the new Federal Republic. In the event Bonn was favoured and Frankfurt was left with a steel framed circular tower together with some attached buildings from before the war. Rather than redevelop it was decided to move Hessischer Rundfunk to this
new site. Work began on 1st June 1951 and the service was completely installed by the beginning of April 1954. (27)

The circular tower was split into three floors and a basement. It contained, with the exception of the radio concert hall, all the studios, continuity suites, the main programme switchroom and associated technical facilities connected with the radio service. Within this complex were to be built two suites of studios for radio drama production: Studio VI and what eventually became Studio VII.

At the time the plans for the studio suites were drawn up, it was not yet clear what form a possible television service would take. However, early in 1953, Hessischer Rundfunk together with the other regional broadcasting authorities in West Germany, drew up a contract to establish a nation-wide and regional television network. As a result, the space which would have been occupied by Studio VII was replanned for use as a television rehearsal studio since, at the time, no other space could be found.

This decision was to have a far-reaching effect on the production of radio plays at Hessischer Rundfunk. It meant that until the end of 1967 when the new radio drama suite was commissioned, all production had to be undertaken in a complex, the largest studio of which had a floor area no greater than that of a large living room.
It is worthwhile at this point taking a forward look at the constraints imposed upon the production engineer, director and actor alike.

The German approach to radio drama production favours a number of separate studios within a suite, whose acoustical properties are sufficiently varied to be capable of simulating widely differing situations, from a scene in the open air to one taking place in a large and reverberant enclosed space.

Such an approach was discernible as far back as the mid 1930's and was discussed in an article describing the new radio drama studios in Breslau. (28) The suite had one studio with a living room acoustic, an orchestral studio, and a so-called 'dead room' for recording scenes taking place in the open air. There was also an echo room. Until that time most productions had been transmitted from a single studio which, by means of acoustic tents (literally tents made of heavy material) see Fig. 1 could be split off into acoustic areas for different scenes. Use would also be made of varying the distance from the microphone to create, for example, a scene in a cathedral. Here, the actor would stand as far from the microphone as was compatible with intelligibility throughout the transmission chain, relying on what reverberation the studio did possess to create the desired effect.

The acoustic tent was intended for outdoor scenes and other scenes requiring as dead an acoustic as possible. How effective it was can only be guessed at but it would appear that the approach adopted at Breslau was a radical and far-reaching solution to the inadequacies which the single studio system clearly possessed.
MATERIAL REDACTED AT REQUEST OF UNIVERSITY
At Hessischer Rundfunk, the decision to make Studio VI the only suite available for radio drama production meant that production teams were faced with a host of compromises. Some practical examples will illustrate this.

Let us suppose that a radio play includes a scene in a ballroom, or alternatively in the waiting room of a large railway station. Both situations require a spacious acoustic but one which is not ringing like that of a cathedral. Given that production of such scenes would be along lines allowed by a multi-studio set-up such as at Breslau, both scenes would require a large studio to achieve a suitable acoustic atmosphere and, furthermore, to accommodate a sufficient number of actors to create atmosphere and perspective. A ballroom would conceivably include an orchestra playing in the background. The director may call for 'quiet background chatter', glasses being raised and so on, whilst the protagonists play out their roles in the foreground. The drama may then require a transition from the dance floor to a quiet balcony scene away from the crowd. Such a crossfade between two acoustics would normally imply two studios of suitably contrasted ambience.

Studio VI at Hessischer Rundfunk did not allow either for size or such crossfading; the two studios possessing a normal living room acoustic were too alike in character for effective contrast. Furthermore, they were not capable of accommodating more than fifteen or twenty people without producing congestion near the principal microphone(s). Acoustics similar to the ones described above had therefore to be simulated by the use of effects
tapes, a judicious use of artificial echo or by playing a recording of the scene made in a fairly dead acoustic into a studio with the required reverberation characteristics. A microphone situated in the same studio would pick up the sound from the loudspeaker together with the coloration due to the studio. This might then be re-recorded for further use. Basically, a variant on the echo room system.

The lack of floor space in the studios of Studio VI also hindered the production of a feeling of dynamic perspective; of sounds being heard to move towards or away from the listener. For example, in a reasonably spacious studio such as Studio VII was later to have, it should be possible for an actor to approach the microphone from a distance of, say, ten metres, and for that approach to be clearly discernible. This might be indicated by an obvious increase in the sound of his footsteps but it would also be made apparent by a change in the amount of studio ambience heard along with those footsteps. As he begins his walk towards the microphone, the perceived ambience will be relatively great. As the approach continues, the perceived ambience will lessen as the footsteps become louder until they become so loud that we have the overriding impression that the actor is now at the microphone. Such a move as that just described was almost an impossibility in even the largest studio in Studio VI, not least because the studio was only 6,8 metres long and its reverberation time 0,63 sec. (1 KHz.)

It was necessary therefore, to fabricate an illusion of an acoustic expanse by building on the illusion of depth created
by the microphone. By having an actor walk up behind a microphone sensitive to sound from only one direction and then turn to face it, it was possible to generate the feeling that he had at least come from some way off since the ear had followed the change in quality and loudness of the footsteps and was able to build up a mental picture of the action. The opening and shutting of a door at the beginning of the walk very suitably completed the picture. Footsteps alone could not be used, however, because the sound and number of footsteps heard in such a move would not correspond to the depth impression created.

Examples such as these illustrate the type of problem which a director and sound engineer regularly had to face and which demanded the use of various forms of acoustic subterfuge.

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The radio drama productions emanating from Hessischer Rundfunk over the years 1955 to 1967 show that despite limited facilities, it was possible to sustain a high standard of dramatic credibility in the depiction of atmosphere and appropriate environmental acoustics. Furthermore, though all productions were in mono, they provided convincing evidence of the techniques evolved to compensate for lack of space and acoustic variety in the studios. Indeed, these spatial illusions in mono are more convincing than stereo in many cases.

The success of this artificial system for creating ambience at Hessischer Rundfunk was due in large measure to the personnel
involved in engineering the productions and in particular to Reinhard Krawulsky. He made production engineering of radio drama an area of special application and it is my opinion that the stimulus to this man's interpretative genius was the conditions which prevailed at Hessischer Rundfunk during the early post-war years, creating a body of expertise worthy of study. The productions examined in the first part of this work single out Krawulsky as an engineer exceptionally skilled in using the technical apparatus of radio drama to generate images which were both refined and highly evocative.

Before discussing these productions it is necessary to examine the conditions under which they were produced; the individual studios comprising Studio VI and the technical facilities.
CHAPTER 1

Studio VI

Description of Studio Facilities

The radio drama suite at Hessischer Rundfunk known as Studio VI was commissioned on 15th July 1954 although the mixing desk itself did not come into use until September 1954. (29) During this period the desk and other facilities of the neighbouring continuity suite C were used.

Since the tower in which all the studios were housed was circular an optimum use of the available space meant that studios often had at least one wall which was curved. As far as the layout of Studio VI went, the four studios and the control room were built around two thirds of a semi-circle with the control room offset to one side. The remaining third of the semi-circle was taken up by the neighbouring continuity suite C.

In consequence, only two studios in Studio VI had visual contact with the control room (see fig 2). The dead room and the echo room were out of sight for the engineer and director. It was therefore impossible for the director to give visual cues or to direct with hand gestures when these rooms were required to be used. This was a problem which received considerable attention during the planning of the later Studio VII.

The accompanying fig 3 shows the arrangement of the studios. A window did exist between the echo room and Studio VI/2 but its position was such that it was unlikely that the director made use of it because he would have been unable to hear the actors over the microphone in the control room.
Figure 2.

View from the production engineer's position into Studio VI/2.

A similar view could be had by the engineer into Studio VI/4 by looking to the left.

Source: Hessischer Rundfunk.
Provision of an echo room was a normal facility in radio drama suites. The suite in Breslau had one, and the plans for the large radio drama complex of 1951 also showed an echo room. (30)

At the time, the only means of deriving echo was by use of a room constructed for the purpose (the EMT reverberation plate was not introduced until 1957) or by tape delay. The former was the only means of simulating the sounds of a cathedral or railway terminus for example, since tape delay only gave discreet echoes (flutter echoes).

The echo room in Studio VI certainly provided some form of reverberation but of an inferior kind rather like a bathroom. (see fig 4) Latterly, it came only to be used for simulating the echoes in a corridor or stair well. However, its presence at all is worth considering because it sheds some light on the conventions of mono radio drama from before World War II.

An example of another effect will help make this clear; at one time it was perfectly feasible to simulate a house burning down by having someone crackle cellophane close to the capsule of the microphone. Another person would be on hand breaking matchsticks, again close to the microphone. These two sounds mixed together with a siren wailing and people shrieking would have provided a passable sound effect for the scene in question. Combined with up-front dialogue, the total transmitted effect would have been quite realistic. The same applies to the echo room. Heard alone as a foil to the voice in a monologue, the effect would not have been very convincing. Adding echo with other effects, sounds of trains arriving and departing, people shouting and bustling and the whole blended together with the
Figure 4.

Studio VI.

Reverberation curve
echo room (en suite).

(no information available
as to method of measurement).

Source: the author/Hessischer
Rundfunk.
main dialogue, for ears attuned to the restricted quality of AM broadcasting a main railway station would have come to life.

The echo room in Studio VI was a hang-over from those earlier times. With the coming of FM broadcasting in Hessen in 1950, it was not long before the limitations of such an echo room became obvious.

The greatly increased quality possible with FM meant that the coloration heard from the room made it difficult to accept it as a representation of reverberation. With that a mono convention had to be laid to rest. A step closer to reality had been taken with the ability of FM to transmit the full frequency range of human hearing and in at least one sense, the listener was enabled to become more critical of what he heard.

Studio VI did have access to another echo room situated in the basement of the tower. The dimensions of this room were such that the reverberation quality from it was far smoother than that from the room in the suite. The reverberation time of this room was circa 2.0 secs over quite a broad range (no specific information could be found). (see fig5) It was however, intended for use by any studio requiring it, so that Studio VI did not have exclusive access. In the event of Studio VI not being able to use the echo room, production of the passage either had to be delayed, if echo quality was important, or something had to be improvised.

The provision of the echo-room en suite meant that space was taken up which could have been used to enlarge the dead-room. As it was, the dead-room ended up with a floor area of circa 20 m².
Figure 5.
Basement echo room at Hessischer Rundfunk.

Sheets of felt and glass wool could be attached to the walls to alter the reverberation characteristic.

Source: the author.
and represented something of a compromise. Open air crowd scenes were difficult and, as with Studios VI/1 and VI/2, attempts at simulating perspective involved a degree of acoustic licence.

Fortunately, sound intensity in a dead acoustic drops off very rapidly, so that judicious combinations of clever directing and full use of a microphone's directional properties could overcome problems.

The example of a walk to the microphone will illustrate this. In the dead-room, one important aspect, namely the almost total absence of any ambience, can be used to advantage if the approach is to be a long one. The room gives the listener no clues concerning distance in relation to the actor in terms of echoes or reverberation. The actor can lengthen his approach by shortening his pace and the engineer can assist by fading up on the microphone since there is no risk of the echo of footsteps being heard to come up with the fade. Treated this way, the permutations are endless and give scope for a treatment of an approach over and above that of simply walking up to the microphone from a long way off.

For all that, the dead-room in Studio VI still had its limitations and it is a measure of how keenly they were felt when, in planning Studio VII, provision was made for a dead-room studio with over four times the floor area and a large window looking directly into the control room.
Studio VI/1 and VI/2

The two main studios in Studio VI were of conventional treatment and similar size. Studio VI/1 had a floor area of 36 m² and Studio VI/2 had 32 m². (see fig 6) What differences existed came mainly from the internal fittings and overall shape. Studio VI/1 was very roughly rectangular in shape, with only two walls parallel. Studio VI/2 was wedge-shaped with five walls, none parallel.

The intention from the beginning was to make Studio VI/1 sound roomy and for Studio VI/2 to be an acoustic maid-of-all-work. The reverberation times of the rooms differed very little, circa 0.5 - 0.7 secs. The differences lay in the distribution of reverberation across the frequency range. A look at the accompanying graph will show how these differences varied. (see fig 7)

Studio VI/1 could be said to be fairly evenly balanced between 125 Hz. and 6 kHz. Studio VI/2 however, showed considerable damping in the bass with a rising characteristic thereafter (figures are based on the room with acoustic damping at maximum, as no other information was available).

In practice there was a difference more in terms of coloration than a perceptible change in ambience and this difference came to be used in a number of ways as the discussion of productions from Studio VI will show.

Studio VI/2 in common with other general purpose radio drama studios, possessed a number of fixed props. These included a basin
Figure 6.
Top: Studio VI/1 Hessischer Rundfunk.
Bottom: Studio VI/2 Hessischer Rundfunk.
Source: the author.
Figure 7.
Studio VI.
Reverberation curves:
A = Studio VI/1
B = Studio VI/2
Measured with 3-Sve noise
filtered 3-Sve.
Source: the author/Hessischer Rundfunk.
with running water, dummy windows with latches, short flights of stairs with different tread surfaces, a slatted wooden roller blind, a feature of many continental dwellings (see fig 8) and a set of six different kinds of doorbell including a buzzer. The floor was laid with three different walking surfaces of stone, parquet and thin short pile carpet. In comparison, Studio VI/1 had only a linoleum floor and no props other than a set of bells and no vari-acoustic. Sound effects using the built-in props were confined for the most part to the one room and thus one set of acoustic conditions. Nevertheless, sounds could be picked up by a microphone and sent to the echo room to be reverberated or sent to another studio after having been first recorded dry on tape, the studio being used in the same way as the echo room.

Since the studios were connected by short passageways, it was also possible to place a microphone in the passage or in an adjacent studio and pick up the sound at a distance. This way, unusual effects of coloration and distance could be created, entirely different from just sending footsteps to the reverberation plate. For example, footsteps on creaking stair-treads would find a place in a thriller where action may be taking place in one room whilst the killer was heard to approach or depart in the passage outside.

Provision of microphone inputs was so arranged that at least one input from each studio had a dedicated fader on the mixing desk. (see chapter II) In the case of Studio VI/1, three inputs were provided of which two were permanently grouped under group one. Studio VI/2 also had three inputs, again two of which
Figure 8.

Left: interior of Studio VI/2 showing left, water fount, centre, stair treads and right, false window frame. The black panel centre right, was part of a vari-acoustic arrangement whereby panels of materials with different absorption coefficients could be revealed.

Right: corner of Studio VI/2 leading to Studio VI/1. Figure shows continental window blind and three walking surfaces: carpet, parquet and stone.

Source: the author.
were permanently connected under group one. Studio VI/3, the
dead-room, had three inputs, one of which was permanently
represented on group two. The echo room had two inputs, again
one of which was permanently available on group two. The
connecting passage between Studio VI/2 and Studio VI/3 had one
input, though not dedicated. Foldback and talkback was also
provided in all studios.

**Studio VI/3 : The Dead Studio**

Studio VI/3 was the dead studio. Its main purpose was to
enable scenes played outdoors to be recorded with some degree of
authenticity. (see fig 9)

For all practical purposes, the studio could be said to be
unresponsive to sounds above 160 Hz. Dialogue recorded under
these conditions has a dry, rather strained quality reminiscent
of someone standing in the middle of a field conversing with
another at a distance of 1.5 - 2 metres. With time, the strained
quality can be reduced and made to sound natural over the microphone,
but the dryness remains. It must be added that the voice does
not sound neutral. One component of voice quality is the way
the sound is subconsciously altered to take account of different
acoustics so that the voice recorded in the dead room simply
assumes another quality. The psychological presence of the
microphone also aids the actor in helping him to achieve a natural
sounding voice so that all factors taken into account, the
listener is able to appreciate the recording as having been made
in surroundings similar to the outdoors. As with the echo room,
the effect is enhanced by the addition of sound effects and the
Figure 9.

Studio VI/3 Hessischer Rundfunk. Dead-room studio.

Source: the author
general cues given by the dialogue. The realism of the scene is really the sum of these components and is not attributable to any particular one. The dead acoustic was and still is a prime requirement of the radio drama studio set up.

Returning to the one in Studio VI, its dimensions made it unsuitable for recording much other than the dialogue alone. It did possess a sand and gravel tray as well as a hard walking surface of stone circa 2 metres in length, see fig 10. This though was insufficient in itself for anything other than to create the effect of a man walking. Any flexibility of treatment of such a walk would have to come from the engineer and director in the manner already described, using the microphone.

The impression intended so far has been of a studio that was too limited to be of much use. One further example will illustrate how a typical problem might be overcome. The need is to record somebody shouting from some distance away outdoors. Using a similar technique to the walk recording, the actor shouts at the wall of the studio furthest from the microphone, the microphone also has its back to him so that the combination of the directional characteristics of voice and microphone and the rapid attenuation of sound with distance in a dead acoustic, combines to give a plausible effect of distance. Since, in mono, we are not concerned with a physical representation of distance, such techniques can be resorted to.

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Figure 10.
Studio VI/3. Gravel and stone walking surfaces.
Source: the author.
All three studios in the suite really represented a quart out of a pint pot situation. They remained operable for radio drama production over the years because the system built up around monophony allowed it.

In monophony, everything the listener perceives is a form of coloration. In physical terms it is impossible for the listener to feel that he is part of an acoustic environment. In stereophony, this is possible and it is even possible to suggest such an environment from the hiss from a stereo microphone array which, from its random quality and spatial disposition, gives the feeling of a definite ambience in a room.

In monophony, everything heard from the loudspeaker is referred back to it and because it is effectively a point source, the only spatial effect it can suggest is depth. Even that succeeds purely in the context of the play being broadcast, because it is normally inconceivable for a sound to disappear into the back of a loudspeaker.

We are therefore left simply with a changing pattern of sound colour without any kind of spatial distribution. The way this was arranged in the context of a radio drama production became an exercise in sorting out the purely sonic component of everything heard from its possible place in space. Echo and reverberation are probably the two most common and important examples because it is almost an unwritten law and one of the prime conventions of monophony that reverberation is coupled with space and expansiveness.
The same could be said for loudness and intensity. A sound lacking in volume and weak in character suggests distance and a feeling of not needing to be unduly concerned by it. Volume and strength of a sound suggest immediacy and presence so that our attention is drawn to it.

In the case of the footsteps both in the dead room and Studios VI/1 and VI/2, what mattered was not where the footsteps were heard to come from but how they came. Did the actor come through a door? (sound of a door slamming or shutting) Did he approach with a soft or firm tread? How long did his approach take? (suggestion of distance) and so on. The distillation of all these components and the manner in which they were then reassembled lay at the heart of monophonic radio drama.

Studio VI succeeded in this task because physical space was not necessary to portray what was needed. What was important was the sound emanating from the loudspeaker and its context within the whole drama.
CHAPTER II

Studio VI

Technical Description of Recording Facilities

The mixing desk installed in the control room of Studio VI was an early example of a type based on a new modular system developed in West Germany after World War II. (see figs 11 & 12)

The basis of this system was a multi-purpose fixed gain amplifier type V72 developed by the Nordwestdeutscher Rundfunk and introduced in 1952. (31) The circuit of the amplifier was small enough to be housed in a cassette which enabled it to be located directly under the appropriate channel fader in the mixing desk. (see fig13) Its predecessor, the V41, was a large rack mounted unit of circa 470 mm width so that the gain in compactness will be appreciated.

The V72 had the following specification :-

Gain = 34 dB ± 0.2 dB
Frequency response = ≤ ± 0.3 dB 60 - 10 kHz
15 kHz = 0.6 dB
40 Hz = 0.3 - 1 dB
Harmonic distortion at 109 mV input (-17dBm) = 0.8% - 1%
Typical value at working levels = ≤ 0.1%
Input noise = -115 dBm
Output noise = -81 dBm
Figure 11.

General view of Studio VI control room. The studio monitor speaker was a Telefunken type 0 85. The doorway on the left of the picture led to the grams room. The window in the centre of the picture looked in to Studio VI/1.

Source: the author.
Figure 12.

Studio VI mixing desk.

The left side of the desk contained the Group 1 faders, the right side, the Group 2 faders. The fader to the far right of the desk was the independent Group 3 fader.

The master faders for Groups 1 & 2 were placed in the centre of the desk with the mic./line channels immediately next to them (4 each side).

The central button field controlled talkback. The fields to the right and left of talkback controlled monitoring and desk output routeing (whether to tape or transmitter) respectively.

The level meters monitored Groups 1 & 2 separately.

Source: the author.
Figure 13.

Underside of mixing desk in Studio VI showing V72 cassette amplifiers.

Underneath from left to right are the two metering amplifiers for Groups 1 & 2 (U71) and a compressor/limiter (U73b)

Source: the author.
In general, the amplifier was used in a chain requiring three such units as shown in fig 14.

In order that the minimum requirement of a 60 dB signal to noise ratio could be satisfied, a channel using the V72 as an input amplifier needed a minimum input signal of -55 dBm. This requirement effectively ruled out the use of anything other than condenser microphones since dynamic microphones were too insensitive to provide adequate level.

Studio microphone level was standardised at -46 dBm giving some 9 dB headroom above the minimum -55 dBm. Peak output level was circa 17 dBm at which point harmonic distortion reached the maximum permissible. This gave a dynamic range for a single channel of circa 63 dB from microphone input to desk output, roughly that of a good quality cassette recording of today.

The desk in Studio VI possessed fifteen channels divided into three groups. Groups 1 and 2 each had seven channels, four only of which were controlled by a group fader. Group 3 was a single entirely separate channel which could be patched in as required.

The seven channels of Groups 1 and 2 were made up of three line only inputs (those not governed by the group fader) and four microphone inputs able to accept signals at both microphone and low line level. These four were controlled by the group fader.

A microphone/line channel from the desk in Studio VI had the following configuration (see fig 15).
Figure 14.

Studio VI.

Simplified diagram showing use of V72 as an all-purpose channel/group amplifier.

8x = point at which up to seven other channels could be added to signal path.

2x = point at which second group of channel faders could be summed with first.

Source: Handbuch der Tonstudio-technik, p. 312 (simplified)
Figure 15.

Studio VI.

Microphone/line channel configuration from mixing desk in Studio VI.

A = pre-fade echo send and foldback.
B = pre-group fade echo send and foldback.
C = grouping point line-only channels.
D = group output echo send, foldback and group output monitor.
The setting on the input attenuator depended on whether the signal came from a microphone or line source. '0 dB' gave the full 34 dB gain of the input amplifier for use with a condenser microphone. '15 dB' and '30 dB' were intermediate settings suitable for use when the input was a high level microphone signal or a low level line signal requiring extra amplification.

The signal then passed over the second set of double break jacks to the channel fader. From which it then passed to the grouping bus where the three other microphone channels came together. After this came the group bus preamplifier which made up for losses incurred in the channel faders (each 12 dB) and the decoupling resistors. The reamplified signal was then presented to the group fader and finally brought up to +6 dBm by the group output amplifier.

The path of the signal in terms of the degree of attenuation and amplification it was subjected to is best shown by the following diagram (see fig 16). The fixed gain of the V72 and the use of decoupling resistors rather than an active form of decoupling meant that the signal was subjected to considerable level adjustment. This state of affairs was compounded by the need to use fixed attenuators where the set 34 dB of a V72 was really more than necessary to maintain system gain. It also meant that any spurious low level signals which entered the system would be amplified with the wanted signal at a low point.
Figure 16.

Studio VI.

Illustration shows signal path and amplification/attenuation through use of fixed gain V72 in a mixing desk.

The desk in Studio VI was built on the same principle and would have had a similar gain/attenuation characteristic.

KM54 = condenser microphone.
W72 = input attenuator.
V72 = channel amplifier.
W66 = channel (group) fader.

Source: Handbuch der Tonstudietechnik.

p. 712
In later chapters concerning Studio VII, discussion will be given to solutions to some of the problems arising from the design of desk in Studio VI and not least the, by today's standards, poor signal to noise ratio of the overall system.

The German Double-Break Jack

Two features of the design are worth mentioning at this point: the German system of double-break jacks and the routeing used to obtain echo and foldback outputs without over-complicating the desk.

The German double-break jack has its closest equivalent in the British single-normalled jack system and in the block circuit diagram is shown by the following symbol (see fig 17). The signal is presented on the outer ring of the left hand side and is carried over to the right hand side. In the usual wiring configuration adopted in Germany it is then present on the right hand outer ring. The two black centres connected together remain so regardless of whether the socket is serving as an input or output. The advantage of the system lies in only needing to use one form of wiring in the connecting plug. It also allows external apparatus such as equalisers or compressors to be patched in with only one plug rather on the lines of a 5-pin DIN plug as follows (see fig 18).

Referring back to fig 15 it would also be possible for example, to use the input V72 to provide an initial stage of amplification for a microphone which was to be faded independently of the group. The signal would be tapped off via the upper of the two sockets and taken to one of the line only channels via the lower of a
Figure 17.
Studio VI.
Symbol for the German 'double-break jack'
Source: the author.

Figure 18.
Studio VI.
Application of 'double-break jack'. Here used to enable insertion of an equaliser into signal path.
Source: the author after 'Handbuch der Tonstudio-technik'. p. 445
double socket there. If a tape machine was required at the same
time to be brought up with the group fader, this could then be
patched in from the upper of the two sockets on the line only
channel to the lower of the two sockets on the microphone channel.
A simple example of cross patching but which demonstrates the
flexibility of the system.

It was this flexibility which changed a desk such as that
in Studio VI from a fairly basic set-up to one with vastly
increased resources and permutations.

Echo and Foldback

The second feature is the means of routeing signals for
echo and foldback purposes. Basically, the signal could be taken
off at any one of three points, either before the channel fader,
before the group fader (microphone channels only) or after the
main group output amplifier. Selection of which point was
involved was done using a switch which allowed any one channel
(it was not possible to send channels in groups of two or three)
or the group positions to be routed. A further switch could be
used to couple the outputs of groups 1 and 2, 1 and 3 or 2 and 3
so that for example, the echo/foldback output of channel 2/group 1
and the main echo/foldback output of group 2 could be coupled and
sent to echo and/or foldback.

Returning to the main desk outputs, it was possible again
to couple the main group outputs 1 and 2, 1 and 3 or 2 and 3
together so that in the case of 1 and 2, all fourteen channels
of the desk could be sent to the recording unit and/or to the
switchroom where it would be routed to the transmitter.
At the time the desk was put in, equalisation facilities were very limited, consisting of two 'Radio drama' equalisers (33) and later in 1956, a presence booster giving various amounts of lift at frequencies between 1 and 4 kHz. The 'Radio drama' equalisers were filters designed to give steep cut at 60 Hz. and steep cut and some boost at 10 kHz. according to the following curves: (see fig 19)

The device enabled heavily distorted speech sounds to be produced, i.e. telephone quality speech, ghost voices and so on, but obviously could not be considered for corrective equalisation.

As far as can be determined, it was only towards the end of the life of the Studio (circa 1967) that any form of limiting or compression became permanently available on the patch field. In 1957 an input to the then new EMT reverberation plate was added, so that two forms of echo were now available.

Metering of the desk output was by means of a German standard level meter whose specification is defined in DIN 45 406. This was a quasi-peak reading meter calibrated in dB from -50 dB to +5 dB (0 dB equals +6 dBm). Peaks of over 10 ms duration were registered at full value, peaks of 3 ms duration were registered at 4 dB under with a return time between 1,5 and 2 seconds for a decay from 100% to 10%. Display was by means of an optical galvanometer type of instrument with the above calibration. This meter was a standard throughout German broadcasting so that remarks made here apply also to the metering found in Studio VII, see chapter VI.
Despite the simplicity of the desk and the seeming lack of facilities, the plays produced in the Studio testify to its fitness for the purpose of radio drama of the time and to its intelligent use by Reinhard Krawulsky. The provision of a multitude of break and insertion points, though in one sense making the job of engineering a production very laborious when done conscientiously, nevertheless offered the engineer the optimum in facilities and combinations provided he was prepared to work them out. It enabled access to be gained to virtually every part of the system to the point that no one channel could be regarded as exclusively dedicated. The echo and foldback channels by using appropriate insertion points could effectively become extra channels (line only) so that, when necessary, the desk capacity could be increased to seventeen channels.

**Studio VI : Recording Unit**

The recording unit to which the desk was coupled originally consisted of two tape machines (1/2" tape) type AEG T9. (32) The T9 was one of the first in the series leading to the AEG-TELEFUNKEN M10 and M15 and as such set a standard of performance which even today would be considered acceptable for professional recording purposes, see fig 20. Its overall specification briefly was as follows:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency response</td>
<td>60 - 10 kHz ± 1 dB</td>
</tr>
<tr>
<td></td>
<td>(76 and 38 cm/sec)</td>
</tr>
<tr>
<td>3rd harmonic distortion</td>
<td>1 kHz + 6 dBm 2,5%</td>
</tr>
<tr>
<td>Wow &amp; Flutter overall</td>
<td>0,15%</td>
</tr>
<tr>
<td>(76 cm/sec)</td>
<td></td>
</tr>
</tbody>
</table>
Figure 20.

Recording unit Studio VI.

The tape machines shown are AEG-Telefunken type M10 successor to the T9.

The central bay is a small sub-mixer used for editing or dubbing.
The machines were so installed that either one or both could record simultaneously. Their inputs and outputs were also made available directly on the patch field so that like most other equipment in the studio, they were not exclusively dedicated to master recording but could be used for playing in sound effects or, for example, for generating tape echo. Together with these two machines was a small mixing unit consisting of three faders connected to an amplifier. This unit was completely open ended and could be treated as a sub-mixer so that, by patching the outputs from the grams into the sub-mixer and recording the output on one of the mastering machines, the main desk need not be at all involved.

Studio VI: Grams and Monitoring Facilities

Finally, mention should be made of the grams facilities and the monitor speaker.

Grams consisted of three tape machines (playback only) and two record decks, see fig 21. Two of the tape machines were made permanently available on two Group 1 faders whilst the third line only channel was used as a 'house channel' fed from the main control room and on which an output from another studio would be brought. The line faders on Group 2 had the other tape machine and the two record decks available.

The tape machines were originally a type known as the R22. Developed in 1938 by AEG, the design had been taken over by a small firm called Vollmer who continued producing them for a short period after the war. The design survived because the
Figure 21.

Grams room Studio VI.

Tape machines are left, Telefunken M10, centre back, Telefunken M15. The grams unit (right) is by EMT.
AEG works in Berlin had been destroyed so that Vollmer were able to satisfy demand for recording equipment until AEG began manufacturing again. The amplifier used with it was the V67 giving a quality in virtually all respects identical with that of the T9.

The control room monitor speaker was a unit developed by Eckmiller in 1943. It was an electrodynamic system with concentric horn tweeter housed in a large cabinet lined with a sound absorbing material. At the time, it was considered a highly satisfactory arrangement although a comparison with its successor, the Telefunken 085 studio monitor discussed in chapter VI shows up the lumpiness of its response, see fig 22.

The 'handicap' of using a monitor like this seen through the eyes today of a generation used to the ultra linearity of present-day systems would seem that of not being able to make value judgements about sound quality such as those implied by corrective equalisation. Given, however, that a recording engineer could accept that the microphones and the mixing desk he used were adequately linear and that a visual element was involved in the production process (an actor's position before the microphone could be checked visually) then such a loudspeaker delivered all the information necessary.

The mixing desk was, as its name implies, a place at which the mixing together of sounds took place. Since mixing can be understood as the process of combining basic ingredients to form something new, the philosophy of the German approach to the desk becomes apparent. Very little manipulation of sound qualities
Figure 22.

Studio VI.

Response curve for type 03 studio monitor speaker.

Source: Hessischer Rundfunk.
took place other than distortive equalisation and echo. If the sound of the actor received from the microphone seemed unbalanced, then he was asked to move his head slightly to re-establish a normal quality. At no time, though, would a filter be patched in and the bass 'rolled-off' by a few dB to help things along. The quality of partnership established has survived until today where the voice of the actor is regarded as of paramount importance. This has protected it from too much 'technification' and an eagerness to treat it as just another component in a gigantic sound mish-mash.

* * * * * * * * * * * * * * * * * * * *
In the aftermath of World War II, broadcasting in West Germany found itself bound for a period of reconstruction and redefinition. Public confidence in radio as a source of culture, information and discussion needed to be restored after more than a decade of Nazi control and manipulation. Added to this was the pressure on broadcasting to fill a massive gap in provision of public entertainment. The war had left theatres and cinemas in ruins and it was on radio that people focussed their attention. Radio drama was particularly affected as it came to function as a surrogate for cinema and theatre as well as providing for radio appetites. (35) The output of radio drama at Hessischer Rundfunk during the early post-war years was a representative production schedule aimed at satisfying this demand.

The absence of the visual element was a significant factor in determining the choice of material for radio adaptation. As a substitute for live theatre and more especially cinema entertainment, radio drama had to find ways of suggesting settings and characterisation in the absence of a visual component. Radio's ability to establish a dramatic environment in purely aural terms, and to suggest changes of scene and shifts of focus within a scene in a filmic manner, was considerably stimulated at this time. The absence, too, of positional information as in stereophony was an added constraint imposed upon the radio drama producer.
That it was possible to stimulate a sense of direction and depth using monophony is illustrated by an ingenious 1956 production of J B Priestley's 'Die Goldene Pforte' (The Golden Entry). Written for the stage in 1950, it had previously been adapted for radio by the BBC in 1955. Interestingly, the entire action of the play is confined to one room, albeit a fairly large one. This might seem convenient for a radio play, but in fact the absence of changes of scene made the producer's task of maintaining movement and interest in a static 'real' environment unusually difficult (Contrast this with a more conventional story-line with definite changes of time and place, for example). With one exception, the drama unfolds in a single studio around a single microphone; the ostensibly unitary acoustic of the studio is articulated in an elaborate choreography of moving voices. The entire floor area of Studio VI/1 was utilised, the resulting rhythmic interweaving of distant and close and on and off microphone effects creating a remarkable impression of aural breadth and perspective.

Choreographed radio drama is able to create an illusion of extraordinary realism. To achieve this, however, demands a discipline of corresponding severity. Not only are balance and mixing responsibilities substantially devolved from the control room to the studio actors on the floor, but the central role of the microphone as the focus of attention in projecting the drama to the listener was changed to that of a passive observer merely reflecting the passage of events in the studio. When the voices themselves are choreographed to move about the studio, the result
is a constantly varying pattern of direct sound picked up by the microphone. In tandem with this there occurs a constantly varied excitation of the studio acoustic; the studio is the mirror in which the drama is reflected. Like any mirror too, its size, shape and quality will determine the underlying characteristics of precisely what is reflected so that the listener can build up an image in his mind of the kind of room he is listening to.

Not only did 'Die Goldene Pforte' illustrate the possibilities of stimulating a sense of direction and depth in monophony, but it highlighted the importance of the position of the microphone in the studio and its relationship to what the listener perceived. A likely set-up would have been as follows: (see fig23)

The diagram shows a figure-of-eight microphone placed on a roughly longitudinal axis, so that the walls nearest to it are facing the microphone's dead sides. These dead sides or 'dead angles' were useful in two ways. In the one instance, they helped to widen the impression of the room by eliminating reflections from the nearer side walls. In the second case, an approach by an actor which avoided the sensitive angles of the microphone i.e. back and front, could give the impression that he has approached from a long way off. A further practical consequence was that the cast was able to group itself comfortably around the microphone, with adequate freedom of movement for all concerned.

'Die Goldene Pforte' uses these devices to good effect and meets the challenge of maintaining aural interest in a one-room
Figure 25.
Studio VI.
'Die goldene Frote'.
Conjectural microphone positioning.
Microphone has figure-of-eight directional characteristic.
Source: the author/Andrea Stainsby.
setting. Rarely are actors heard delivering their lines standing still since the listener is constantly made aware of minute changes of voice quality indicating movement. To a large extent this is a mimicking of the subtle changes in level and quality we experience when another person speaks to us. His head is constantly shifting its position more or less according to mood and, hence, intention and purpose.

The listener is persuaded of the realism of events portrayed in radio drama through the accumulated perception of changes in sound quality similar to those experienced in real life. Despite the absence of a stereophonic sound image, an experience of binaurality is stimulated by the mono signal. (Tape example 1)

'The Archers' : BBC Radio

In fact, such an illusion could probably never be achieved in stereo. The dramatic situation where players are in constant movement is quite different from a music broadcast, where players are in fixed positions. The danger of applying a music recording approach to radio drama unless handled sensitively produces an overall impression which is flat and lifeless. An example of a production where such a technique is employed is the BBC's long running soap-opera 'The Archers'. Here the production relies on actors in fixed positions in front of the microphone with environmental cues provided by special effects and by manipulation at the mixing desk. (Tape example 2)

Where production time must be kept to a minimum, it is a constant temptation to discourage actors from moving around in front of the microphone, and to use them instead as straight
voice ingredients of an engineered end-product in which the studio acoustic is rendered incidental. In productions such as 'The Archers' voices are conventionally close-miked for outdoor and intimate scenes, backed off for general interiors, and change their angle of orientation to the microphone to cover entrances and exits. Worked like this, the perceived studio acoustic tends to become parcelled out and apart from the initial change between scenes has its contribution rendered almost null and void. Such conventions aid production efficiency but not spontaneity or naturalism of effect. For a production such as 'Die Goldene Pforte', where recognised conventions did not apply and actors were required to execute more nearly natural patterns of movement around the microphone, production time was necessarily less restricted. In the case of 'Die Goldene Pforte', production was from 27th to 31st August 1956, with a few days extra added for rehearsal without the microphone.

The prevailing quality of acoustic heard throughout the production is empty and barren. It is likely that Studio VI/1 was stripped of any furnishings and left like an empty room accentuating the desolate atmosphere surrounding the main character. An art-dealer facing bankruptcy, he is pictured in the empty shell of his gallery, a room devoid of any form of art save the portal removed from the front of his shop 'Die Goldene Pforte', a table and a chair.

From the example of this play, we may identify three principal production criteria for recreating a superior spatial illusion under conditions of monophonic recording and reproduction. These are:-
I. Distinctiveness of voice timbre maintained over the entire range from close to distant.

II. Production choreography ensuring constant but controlled variation of acoustic perspective.

III. An acting style permitting extended freedom of movement relative to the microphone.

A particular feature of this production is the use of close-microphone voice as a highlight rather than as a norm. In effect, the drama is played out in a perceptual middle distance instead of moving abruptly back and forth between a series of two-dimensional aural planes. The close-microphone position was reserved to create audible headroom or distance between the listener and the action, enhancing aural perspective and allowing for the occasional choreographed emphasis of key characters or events. (Tape example 3)

In analysing productions with a view to establishing criteria for synthesis of natural ambience under studio conditions, it is worth remembering the special role of the microphone as an intermediary between actor and listener. To the actor, the microphone is an instrument to be 'played', i.e. whose field of response may be deliberately modulated to create a desired character or tone of voice. To the producer, it is also a monitor of the studio ambience, hence the source of information about the setting for dramatic action. To the listener, the microphone is an extended ear by which one is able to participate directly in the events of the drama, albeit in the guise of a mute and unseeing 'extra'.
'Der Mai ist gekommen' by Goerz Otto Stoffregen (1934)

An early example of listener participation in a radio play is furnished by the 1934 musical 'Der Mai ist gekommen', by Goerz Otto Stoffregen. An example of Nazi radio propaganda, it sings the praises of the era of prosperity and social harmony to come from National Socialism. Much of the play is spoken in an unpolished vernacular and in local dialect. The surviving recording is technically good enough to give an idea of the way the director chose to use the microphone. Here, it played the role of a mute participant. The production has a natural fluidity of vocal utterance and movement, so much so as to lead at times to deliberate obscurity. For example, in a scene during which two lovers exchange intimacies, part of the dialogue becomes difficult to discern as though the two wished to avoid being overheard by the microphone/listener. (Tape example 4)

What is said - or rather, not heard in this case, is less important than the idea that the listener is unwittingly being forced into the role of an eavesdropper or voyeur, amounting to a powerful dramatic lever for involving the listener in the situation. Given the propaganda message of the play and natural human curiosity over titbits, the world of the drama into which the listener is drawn by this technique, becomes the more convincingly 'actual'.

'Ein Lebenswerk' by Gerd Oelschlegel (1956)

Another production using elements of this and in this style, contemporary with 'Die Goldene Pforte', is 'Ein Lebenswerk' by Gerd Oelschlegel, produced in Studio VI at Hessischer Rundfunk
in 1956. This production achieves a degree of exposition and continuity using ambience and sound effects which is remarkably poetic.

The play begins with the sound of howling wind, through which emerges the faltering tread of footsteps on gravel. A door is opened, and the sound of shoes on gravel changes to shoes on bare boards, the exterior crossfading to a remote point inside a large, bare room. The acoustic is not unlike that of 'Die Goldene Pforte', but with the action reduced to a telling minimum. A voice calls out. Again, and this time a weak, quavering reply is heard from a room adjoining. With each successive sound and voice the setting and players become more clearly delineated. Without resorting to extensive narration, but simply relying on extracting the most information from every element of the sound sequence, the listener is able to build up an image of a barely furnished house with an elderly occupant unable to answer the door; a visitor; and a journey through a storm. As the visitor is heard to stumble against something in crossing the room, it is evidently dark.

In the sparse dialogue that follows, the fine detail of a beautifully woven aural scenario is gradually revealed. The visitor is a doctor and the elderly man his patient. (Tape example 5)

The approach of the doctor to the dying man is achieved by an ingenious transition between two microphones, one in the area of the studio representing the main entrance room, the other in another area representing the sickroom. As the doctor advances towards his patient the outer room microphone is treated as the
main microphone and the sickroom microphone as the 'ambience' microphone (for low level room coloration). As he moves from the former to the latter the sound of footsteps will be heard to move into the distance. Then, as the level of the latter microphone is lifted and that of the former lowered in time with the doctor's move across the studio floor, he will be heard to approach the duller acoustic of the (apparently) smaller sickroom (the outer room microphone having been shut right down). The crossover is achieved by a combination of gain adjustment and careful control of the actor's path between the two microphones.

Three basic voice types are in evidence. The dying man's voice is weak and strained, the doctor's alternately warmly comforting (on microphone) and colder, more admonitory (off microphone). As in 'Die Goldene Pforte' the actors appear to behave as though the microphone were not there. The changes of voice are achieved by judicious microphone positioning more than by detailed choreography; nevertheless it is an advantage that the dying man is bedridden, and that 'natural' movement of the actors is therefore kept within limits by such a dramatic device.

A reconstruction of the two-microphone set-up in Studio VI/1 on the evidence of the recording, is shown in the illustration, (see fig24). Both microphones are of the cardioid type, sensitive to sound arriving from the front hemisphere but reducing swiftly in sensitivity to sound from the rear. Microphone 'a' is placed near the entrance door pointing a little across it. Microphone 'b' is placed at the opposite end of the studio with its back to the entrance door near 'a'.
Figure 24.

Reconstruction of microphone positions for recording of opening scene in 'Ein Lebenswerk', Studio VI/1.

Source: Andrea Stainsby.
As the doctor enters, his footsteps come on-microphone to 'a'. As he moves out of direct range of 'a' he will approach 'b' on its dead side. Once at 'b' his relationship to the microphone can be exploited to the full. Moving on-microphone the doctor's voice is heard in close-up, comforting and warm in tone; backing away off-microphone to the side, his voice takes on a harder quality. The character of the patient has to be represented as motionless and enfeebled. This is achieved by seating the actor beneath the microphone. This arrangement obliges him to crane his neck upwards in order to speak into the microphone; the actor playing the doctor who is standing is not affected.

It will be clear that the achievement of a convincing aural dramatic continuity is, to a large extent, due to the actor's knowledge and exploitation of movement relative to the microphone. Equally clear is the fact that their contribution is most effective when the positions of microphones have been estimated for maximum exploitation. The technique can transform a conventional reading into a dramatic experience which faithfully reflects distance, movement and voice shading encountered in real life.

'Ich liebe dich' by Hans Christian Branner (1958)

A very different approach, more cinematic, was Hessischer Rundfunk's production in 1958 of Hans Christian Branner's 'Ich liebe dich'. In this play, background setting and incident, and foreground action are projected on separately defined planes. The play unfolds in set-piece scenes, in a way reminiscent of a Hollywood musical. Indeed, the production appears to have adapted
visual conventions normally reserved for film-work: fades, dissolves, tracking in and out, close-ups, long-shots and so forth. Such a deliberately synthetic use of microphone and mixing techniques relies on listener awareness of visual conventions in film and their imitation in sound. Listener participation is achieved by a continual directing of attention to the desired characters, and through the dynamic of the production itself, the tempo and intensity of the scenario. Unlike the documentary style of 'Die Goldene Pforte' and 'Ein Lebenswerk', the listener's involvement is only superficial (as in the example of 'The Archers'), and no attempt is made to encourage an analysis or interpretation of events.

The principal voices of 'Ich liebe dich' are mostly heard in the foreground on-microphone, with little voice shading or colour, whilst the backgrounds, suggesting a 'Cafe Royal' setting, are equally mannered and two-dimensional. Such a technique is one way of coping with the practical limitations of a studio complex unable to reproduce a suitably realistic dancehall ambience. In this case, the dance music was pre-recorded in a larger studio and mixed in with the voices recorded in the smaller and less ambient drama studio. Music, voices and effects are nevertheless kept separate up to the final mix in order to control levels and entry points.

The cinematic character of the play comes from the dynamic of sound-mixing, which follows recognised film conventions, albeit in terms of sound alone. A typical scene opens via a fade into background music and then proceeds through successive incidents of applause, footsteps and table chatter to the principal dialogue, in direct imitation of a film's exposition of a scene from the
general to the particular. (Tape example 6) Aural close-ups are introduced; the mix cuts from one character to another, following and enhancing every nuance of dialogue. This is a method of production totally opposed to the realism of 'Die Goldene Pforte' where technology is passive and performer action articulates the story. The latter is a translation of the stage environment in terms of radio. 'Ich liebe dich' on the other hand, is cinema in terms of radio: Hörfilm contrasted with Hörspiel.

Nevertheless, there are occasions when the otherwise mannerist approach to production can give rise to effects of startling realism. Towards the end of the piece, the young couple Clara and David, are heard leaving the dancehall and walking through dark, empty streets in the rain. (Tape example 7) A discreet echo is added to the sound of their footsteps - but not to their voices - which is sufficient to evoke the scene and mood realistically and dramatically. In acoustical terms it is still a foreground/background situation, but nonetheless naturalistic.

Perhaps there is a lesson to be drawn from this example: that 'natural' and 'artificial' are both forms of convention, and in radio terms a realistic impression is one in which the chosen production technique is appropriate to the way in which a particular scene would realistically be perceived.

In other contexts this same approach was used to create a sense of absurdity. In the scenes involving André and Vivienne toward the end of 'Ich liebe dich', a self-conscious melodrama is played out against the acoustic backdrop of an empty room, its hollow resonance making the characters sound foolish and lost. (Tape example 8)
The Role of Studio Acoustics and Microphones

It would seem appropriate at this point to examine more closely the roles played by studio acoustics and microphones in the production of radio drama. Because both are fixtures of the set, it is tempting to regard them as passive elements of the drama. However, as we have observed, this is not how their contribution is perceived by the listener. Both are central to the production, not peripheral: they create the conditions in which the action unfolds, exert a continuing influence on the manner in which the drama is interpreted, and finally determine the role played by the listener - as eavesdropper, silent partner or overseer.

'Nächtliches Gespräch mit einem verachteten Menschen' by Friedrich Dürrenmatt (1959)

To be successful, a radio drama must convey a tangible sense of location, one that the listener can grasp, even if not wholly recognise. The action is required to take place somewhere, not simply to exist as a figment of the imagination. An illustration of this is to be found in a 1959 production from Hessischer Rundfunk of Friedrich Dürrenmatt's 'Nächtliches Gespräch mit einem verachteten Menschen', a play written in the form of a dialogue between Death (in the role of an executioner) and the Victim (the condemned man). The play is one of words and ideas: what action there is, is conducted in the cut and thrust of philosophical debate. It is drama of the spirit, which might be expected to be radiogenic in concept, played in an acoustically indefinable region beyond space and time. But experience has shown that this is impossible to achieve.
The disembodied voice, intended to portray the inner promptings of the character's mind, emerges in fact into the external fabric of the listener's personal sitting room and takes its character from that, occupying the same space as the listener. Given the merest hint of a background (backdrop), however, the setting acquires a distance, a necessary detachment. It may be understood as an enactment of an argument rather than the argument itself. In the Dürrenmatt play, the contribution of studio ambience is slight but psychologically significant. It does not provide a setting for the action but serves rather to set the voices in artificial relief. (Tape example 9) A radio announcer's continuity voice or a Radio 3 studio dialogue of philosophers is perceived as real and actual by virtue of its coming untreated from the domestic loudspeaker. With even the merest hint of studio acoustic the voice becomes set at a distance and the listener made aware that Dürrenmatt's argument is to be listened to as something formal, not as an improvised conversation.

On the other hand, in 'Die Goldene Pforte' the studio acoustic is part of the drama. The microphone transmits movement and space as well as text. The text is naturalistic rather than formal. The listener is persuaded of the essential plausibility of the dramatic location, situation, and dialogue even though he is initially aware at the same time that it is a play, scripted and acted.

The choice and positioning of microphones is fundamental to drama production, affecting the type of spatial illusion conveyed and influencing the tempo and dynamic of movement a play may require. Different microphone types permit a greater
or lesser degree of flexibility of movement, and of perspective. Even mono productions, as has already been pointed out, when skilfully handled can suggest spatial breadth and depth to a surprising degree. A significant component of the spatial illusion is sound movement relative to the microphone, and the impression of continuity of direction that may be reproduced. Since this is, in part, governed by the directional properties of the microphone used, it is useful to discuss how such properties affect the listener's perception of sound movement and the ensuing impression of space.

The Role of the Microphone in Radio Drama

Three basic types of microphone directional characteristic come in for consideration in radio drama, the cardioid, the figure-of-eight and the omnidirectional. For an illustration of how these differing characteristics affect the way an actor is heard, see figs 25, 26 and 27.

An actor in front of a cardioid microphone cannot move quickly off-microphone using a simple head or body movement. Because the microphone maintains its sensitivity over a fairly wide angle, the actor has no option but to execute a deliberate movement, such as a walk, if he wants his voice to be heard off. A figure-of-eight microphone on the other hand offers not one but two areas of sensitivity for on-microphone work, each area though of limited size. Here, the art is to avoid too rapid a transition from on-microphone to off-microphone and a consequent sudden drop in intensity. In this case, the transition can be effected by simple head movement, smoothly or abruptly as the action requires.
Figure 25.

Microphone with cardioid directional characteristic.

The top illustration shows the way in which an actor's voice will be picked up as he moves in a circle around the microphone. As he moves from the top (dark) round to the bottom (light) his voice will become progressively fainter and will merge into the room ambience.

Source: Andrea Stainsby.
Figure 26.

Microphone with figure-of-eight directional characteristic.

As the actor moves round from the top (dark) to the side of the microphone (light) his voice will become weaker. As he moves further round to the bottom (dark) his voice will regain strength. Compared with a cardioid microphone, the transition from strong to weak is more sudden and rapid.

Source: Andrea Stainsby.
Figure 27.

Microphone with omnidirectional characteristic.

Regardless of the angle at which the actor stands to the microphone, his voice will be heard at the same strength.

Source: Andrea Stainsby.
The cardioid microphone is therefore a better choice where a considerable amount of actor movement is required; the figure-of-eight is often preferable where the drama is fairly static but large numbers of actors have to share the microphone.

The on-axis characteristics of both cardioid and figure-of-eight microphones are similar. Both pick up a similar ratio of direct to reverberant sound, though from different angles. Whether a similar impression of a studio acoustic will be conveyed by both in a given situation, however, will depend on the shape of the room and where the microphone is placed. For microphones of similar sensitivity, an actor will stand at the same distance on-microphone to produce a similar blend of direct and reflected sound.

Cardioid and figure-of-eight microphones are directional. They pick up sound from certain angles and not from others. In this respect they differ from microphones with an omnidirectional characteristic. This microphone, as its name implies, is in principle equally responsive to sound arriving from all angles. In practice however, many tend to a directional response at higher frequencies.

It follows that the omni microphone does not offer the same scope for depicting movement on or off-microphone, since there are no totally dead angles available. As a result of being responsive in all directions, the ratio of room response to direct sound picked up is approximately three times greater than for directional microphones. An actor must stand closer to an omni to achieve an equivalent balance of direct to indirect sound.
Because the omni microphone is relatively insensitive to direction and therefore to movement, its use in a production such as 'Die Goldene Pforte' would have been unwise, given the producer's reliance on the creation of a plausible aural perspective through voice movement.

Aural perspective is a product of the amount of direct sound arriving at the microphone in relation to the amount of indirect (or reverberant) sound arriving. It is also a product of the distance of the source from the microphone. The further away the source is from the microphone, the greater will be the attenuation of frequencies above 5 kHz due to absorption in the air.

In the case of smaller studios the size of Studio VI/1, the attenuation due to air absorption is insignificant so that the traditional method of altering room perspective was by manipulating the balance of direct and indirect sound at the microphone, maintaining the reflected or 'room' sound at a relatively constant level in contrast to the fluctuating intensity levels of voices in motion.

Directional microphones allow for three techniques of voice level control:

i. moving off-axis while remaining equidistant to the microphone

ii. backing off while remaining on-axis

iii. moving away and to the side at an angle
Omni microphones allow only one possibility, that of retreat, since all angles are in principle equally on-mike. The effect of retreat on an omni signal is of direct sound rapidly swallowed up in the reflected room sound. An actor has only to move a short distance back for his voice immediately to take on the character of the room. For this reason, though admirably conveying a full sense of ambience, the omni is poor at suggesting perspective or distance in the context of radio drama. Spatial dimensions appear compressed by comparison with a cardioid or figure-of-eight microphone.

When an actor moves off-microphone but remains equidistant from it, the voice quality changes in a different way from a voice retreating and remaining on-microphone. Assuming the voice output level (from the actor) remains the same and only the angle of incidence changes, the change in voice quality will be governed by the directional characteristics of the microphone at various frequencies. In the main, microphones with a nominal characteristic other than omni, i.e. cardioid through to figure-of-eight will tend to increased directionality at high frequencies. As the angle of incidence of the actor's voice increases, so the lower threshold of frequency attenuation by the microphone descends. This gradual loss of definition or better, change of high frequency emphasis with change of angle of incidence is analogous to the alteration in signal frequency content caused by the pinnae of the ear in real life.

For a voice in retreat on-axis to the microphone the attenuation experienced by the actor's voice is due to inverse square law effects, particularly at the bass end. Coupled with this is the non-linear frequency response of the ear itself which
will tend to favour frequencies in the presence region and above with an increase in distance. The voice sounds brighter, less massive or immediate. Because moving gradually off-microphone to a directional microphone produces only a gradual change in the direct sound, the effect is of a better sense of aural scale, greater scope for directional nuance, and more realistic 'binaural' illusion.

Omni microphones have to be used with caution therefore. They do not allow the sound engineer a great deal of discrimination between wanted and unwanted sound, nor for modification of voice timbre over as broad a range as do the cardioid and figure-of-eight microphones. Where omnis are useful is in a secondary role of adding fullness to an overall studio acoustic. It is common practice in radio drama and music recording to use omnis as ambience microphones which are added in to give controlled enhancement of aural spaciousness. This technique does have its limits. A room may not be made to sound larger than it is but it can be altered in character and this is a useful facility in drama production.

The Role of the Fader in Radio Drama

We have so far concentrated on the studio microphone and ways in which its response characteristics may be manipulated by actors to suggest room qualities and natural movement. In these discussions it has been the assumption that the output from the microphone remains constant and only the source signal varies in level (by variation of position).
The channel fader which controls the output level independently of the microphone level is, however, an important element in radio drama and should not be neglected. At the very least it is a control of last resort for engineer and producer; at best, it is a potent instrument for the regulation of tempo and dramatic continuity.

The channel fader has the potential for both fine and sweeping changes of signal level, changes which like those effected at the microphone, have significant perceptual implications. With the fader however, these changes are seldom perceived as naturalistic, since they operate indiscriminately at all frequencies, while realistic movements do not. The effect of shutting a door on a room full of talking people is not achieved simply by a sudden drop in level at the fader, accompanied by sound effects. Some sound will leak through most closed doors through the gaps in the doorway; in addition, most doors will transmit sound from one side to the other. The difference between an open and a closed door is not just a matter of level, but also of frequency, lower frequencies being heard through the closed door and higher frequencies not (except at very high amplitudes). The closing door image (common enough in radio drama) cannot realistically be reproduced by the fader alone unless it is operated in tandem with some form of equalisation.

The change in scale associated with fading may be compared to the relationship of scale to status in the imagery of medieval Western art. The change of colour associated with fading may be compared with the effect of a change of illumination in a film.
A fader has two functions:

i. to set a level (assign a degree of audibility to a signal corresponding to its supposed position in the auditory perspective or to its importance in a given context

ii. to change the level (suggest a change in position, relative importance, or narrative attention).

There is a third use of the fader which gives it the status of a refined switching device; it can be used to select or discard a microphone channel (decide what is to be heard).

In the first instance, the fader is used to determine a good balance and composition in the mix depending on the producer's ideas about importance of foreground to background, balance of text to effects, etc. In the second instance, the timing and quality of the fade may contribute to the rhythm and smoothness of flow of a production, usually in a non-realistic way. In the third instance, the fader is used to overcome the abruptness of 'channel on or off' associated with a switch and also has an important bearing on what can be thought of as editorial decisions associated with the movement of the play.

The suggestion that a listener responds more consciously to the dynamic of the fade and less to the sound quality of it may be an acquired perception based on the obvious unreality of the aural illusion. In short, the fade is heard as an intervention
on the part of a higher authority: the editorial decision already alluded to. This decision-making about who or what shall be heard at any time, and how, is contrived to mould the listener's pattern of interest and attention.

The speed of a fade down —whether fast or slow — is a way of suggesting to the listener that the material is more or less memorable. An abrupt fade can in some instances have the effect of traumatic shock depending on the material of the play, calling forth a desperate bid on the part of the listener to try and remember all that has gone on before. The same abruptness can also leave the listener isolated, suspended and clueless, until the play resumes its movement. If the fade on the other hand is slow and deliberate, then the suggestion is that what has gone on before is memorable and is intended to be dwelt upon as if it were something to be cherished perhaps with an air of finality about it. The fader in such respects acts interpretatively; it is intended to assert an influence on the listener's understanding of events, rather than acting neutrally or realistically.

Such a use of the fader is encountered in Branner's 'Ich liebe dich', which as we have seen is highly filmic in character and technique.

The play is a dramatic counterpoint of a number of narrative threads which unwind simultaneously and are heard in continuous alternation. The artificiality of the fade device is exploited to the full in crossfades between situations. For much of the play, these shifts of interest occur against a common background location of a Thé-dansant establishment. The listener is
transported from table to table and from one strand of dialogue to another by fading down one conversation, simultaneously fading up the background chatter and orchestra music, then reversing the process to bring up another conversation. Though presented realistically in succession, it is implied that the several strands are unfolding at the same time; indeed, it can be suggested that (as in cinema) events heard one after another are in fact simultaneous, as for instance several different reactions to the same event, for example a gunshot being heard.

As the background sound is continuous, the implication nevertheless, is that time is continuous as well and that by analogy with film, the 'camera' is panning up and away from one table into the crowd and then down towards another table. The fade up of background also corresponds to an optical change of focus rather than to a physical movement towards the background.

On one occasion where the scene changes to a room away from the dance hall, a quiet bar, the level of activity changes quite rapidly to quiet music and conversation using the fader to suggest a distancing from the main activity simply by fading out the music from the main dance hall and substituting the bar music and acoustic setting. Thus a non-realistic transition can be achieved by use of the fader - the change of location corresponding to a change of scene and time. (Tape example 10)

In a studio such as Studio VI, the fader assumed a high degree of importance, not least as a device which enabled the producer to prepare the listener psychologically for a change in the direction the drama was taking. This was bound up too with the lack of acoustical differentiation between the two main
studios. Crossfading between the two in a dramatic situation has the effect of taking the listener along with the flow of action and conditioning him to expect a change of location when appropriate, even though it may be implied and not real.

A fader then, is first and foremost an artistic device. Nearly every manipulation carried out with it has artistic implications whether it be simple gain-riding in speech recording - avoiding audible distortion or audible system noise (tape hiss) or the more complex and subtle manipulation of the kind described in "Ich liebe dich". The fader can work in potentially destructive and constructive ways linking seemingly disparate elements of a play and enabling the producer to construct viable streams of consciousness.

The Role of the Mixing Desk in Studio VI

Having considered both microphone and fader it is necessary to analyse the importance of the mixing desk: the central point of balance and control to which all dramatic events tend. At this point all events are brought into coherent relationship and from this point they are committed to tape or immediate broadcast.

The Studio VI mixing desk was commissioned in September 1954 and was a good example of the state of the art of the time. By present day standards this desk afforded basic facilities having a relatively narrowly defined role to play as a unit where sounds from a number of different sources were combined in varying proportion. As in a musical score, the combination of sounds is rarely static, generally changing, and therefore the proportionality of the mix is also in relatively continuous change. As the pattern
of the sounds is the principal expression of the drama, so the mixing desk is its mouthpiece, ensuring its diction and regulating its pace.

The action of the mixing desk centres on the fader, both singly and, more typically, in combination. Fader settings determine the balance of sounds at any point in the drama; in addition, faders are the instruments of the dissolve or cross-fade, shaping essential transitions of the drama. This latter function is more critical and more dramatically demanding, since the act of fading up or down (individually or in groups) is no longer instantaneous in effect, and the implication of a fade, dramatically, is dependent to a degree on the time it takes to be executed. A fade's full effect can only be judged therefore after it has been completed, though in practice this is true only of material faded up. A fade down is perceived as such almost instantaneously and its dramatic impact judged in terms of its speed of decline as much as its actual duration.

Such was the importance of the fader in the desk in Studio VI that comparatively little attention was given to the provision of equalisation. It was only later that compressors and limiters were incorporated. The absence of these further modifiers may have been partly due to prevailing attitudes and inherited techniques. Radio drama engineers regarded equalisation as largely superfluous to their needs, and only required when the effect of a telephone or ghostly voice had to be simulated. This attitude persisted in the face of advances in design of equalisation circuits for radio drama from as early as 1952, and increasing availability of high quality passive equalisation networks allowing for a wide variety of effects.
In spite of these advances, radio drama stuck to the principle of inviolability of the threefold relationship of voice: microphone: studio, in terms of which all dramatic sound manipulation was carried out. It was a principle that did not allow the intrusion of secondary levels of sound manipulation. To a traditionalist like Schwitzke, for example, the voice and the fade were the two decisive elements of Hörspiel. (36) Even in 1967 when Studio VII was commissioned the desk had very limited equalisation facilities by comparison with normal desk facilities in an installation of similar size. On this occasion the decisive opinion seems to have been Krawulsky's. And indeed, the restriction of desk facilities was decisive in determining the overall style and character of drama production at Hessischer Rundfunk from then until the mid 1970's, when productions outside the usual definition of a radio play were attempted. Even today, hardly any equalisation will be discerned in a run-of-the-mill 'audio-story-play' production other than to reduce low frequency boominess in close-miked voices.

Even in the US and Britain, where radio drama production evolved along different lines, the fader remained the key feature of the desk mixing facility.

The Studio VI desk incorporated two series of faders, each controlled by a separate group fader. The purpose of the group fader was to ensure that the combined output of the desk faders could be maintained at an optimum level. Were this level to be exceeded, it was brought down by attending to individual channel faders, rather than varying the group setting. In consequence an engineer would 'play' channel faders with an eye to the overall level as well as to that of the individual signals. Oddly enough,
tape or gramophone 'line' inputs were unaffected by the group faders in this desk, so that a general fade of a mix incorporating both microphone and line channels would have required two hands. The implication of this feature is that line inputs were used for prerecording gram and tape effects for subsequent mixing with dialogue; in such a case, levels would be preset to a nominal optimum level as a matter of course (+6dBm) and faded only in the subsequent final mix. If we compare the Studio VI desk with a 1935 design (37) from before the era of magnetic recording and delayed broadcasting, we can observe a similarity of overall layout, i.e. a double series of faders each with its own group fader, but in the earlier desk the group fader acts uniformly on both line and microphone inputs.

The two-fold split array of faders was thus a traditional feature of radio drama desk design. It meant that cross-fading was possible between two predetermined mixes, useful for making the transition between scenes in the present and flashbacks to the past, or between two scenes acted out in the same studio space but intended to be perceived as of different acoustic quality.

In order to bring the entire desk under the control of a single master fader, it was necessary to make use of the open-ended microphone/line channel, group 3, which was independent of the other two groups. To do so would mean sacrificing facilities such as foldback and echo, though such an eventuality would normally only occur in the final stages of production.

Among the plays studied in this survey, only a very few manage to avoid section balancing or fading altogether. Most
of them make at least some use of dialogue overlaid on a composite background. Working in mono was enormously simpler than in stereo where decisions had to be taken on the size of stereo sound stage and the location of elements in it. Nevertheless difficulties could arise, for instance, in adding reverberation, where the options were limited to the individual channel or to the group as a whole, either just before or just after the fader.

Echo (Reverberation) in Mono Radio Drama

The switching arrangement in the desk is a guide to its flexibility of operation and subtlety of available effect. Particularly interesting is a consideration of how it was intended to use echo (reverberation). In theory the desk in Studio VI could have been designed to operate in two parts, one side being used for live balance and the other for balancing echo. Such a formation would apply when a number of sources (to a maximum of four) required sending to echo, and in addition to requiring a special form of tie-line, would suggest a kind of expertise which only arose with the advent of multi-microphone techniques. In practice however, a simpler approach is indicated. This is borne out by established practice within Hessischer Rundfunk in the early 1950's when one echo-room served the whole radio broadcasting complex; the live balance would have simply been parallel routed to the echo-room and recorded along with the mix. Such an arrangement and practice presupposes a very basic attitude to and use of echo. Indeed, those drama productions predating 1957 tend to show that the conventional use of echo was still in a majority, despite
vigorous attempts by Krawulsky to transform it into a wider-ranging art by adding tape-delay and multiple tape echo (coupled with the echo-room).

'Der Staatssekretär und sein Steckenpferd' by Kurt Heynicke (1955)

An example of Krawulsky's extended use of echo is a scene set in a pothole, from the 1955 production of 'Der Staatssekretär und sein Steckenpferd', made only ten months after the new desk had come into operation. (tape example 1) His aim here was to use echo realistically to create the claustrophobic atmosphere of a situation of a team of potholers trapped underground. The signal from the studio was fed first through a multiple tape echo arrangement and then to the echo-room. The return signal was then mixed back with the live signal. The overall effect is astonishingly natural, the only giveaway being the machine-like regularity of the initial multiple echoes from the tape machine used.

An excellent example of a contrasting use of echo for psychological effect is in the courtroom scene from 'Ein Lebenswerk', where it underscores the isolation of the character John Beverley, the accused. Here, echo was not used to create a realistic courtroom atmosphere but purely as emotional coloration for this particular character. (Tape example12)

From examination of the echo-room itself (see fig5 ) and analysis of tape material, the quality of reverberation obtainable was smooth and natural, though scope for varying the reverberation time was limited ($R_t = 2 - 2.5$ secs.). All of which supports the
conclusion of a simplicity of use of echo underlying the desk design.

In the absence of direct evidence of design priorities, one can only speculate about the significance of the fader groupings. But the layout indicated that any crossfading from groups would be executed on voices rather than on effects. This accords with the supreme importance given to the voice in radio drama during the period 1945-1965 in the writings of the theorists Fischer (58), Frank (59), Schwitzke (40), for example, and the plays of Günter Eich which promote a non-realistic view of radio drama in which literary argument, not the creation of acoustic illusion, provides the essential means of orientation. It is therefore distinctly possible that the design of the desk followed this post-war philosophy and was optimised to allow greatest flexibility in the handling of voices in the studio, but was less flexible when it came to building up large scale sound effects or music montages from pre-recorded material.

An early reaction against the literary Hörspiel is Friedrich Knilli's monograph 'Das Hörspiel - Mittel und Möglichkeiten eines totalen Schallspiels' (The Radio Play - Means Towards and Possibilities of a Total Theatre of Sound), written in 1961. (41) In this he sought to shift away from a text-dominated Horspiel to a dramatic form embracing a whole range of sound imagery in the manner of Musique Concrète: one in which the voice was simply sound material like any other. That this new attitude eventually prevailed is indicated by changes introduced into the new Studio VII desk in 1968, which provide patching facilities to FX and Grams of a complexity and variety admirably suited to the demands of Knilli and contemporaries such as Kagel, Pörtner, Wondratschek and Cage.
CHAPTER IV

Stereo Broadcasting and Radio Drama at Hessischer Rundfunk
1962 - 1983

Introduction

In 1962, Hessischer Rundfunk, along with the other West German regional broadcasting centres, began to consider the possibility of transmitting in FM stereo. By January 1963, test broadcasts were being made at night and these showed that the subjective enhancement of programme material was sufficient to warrant further investment. The success of these and subsequent tests culminated in the transmission of regular stereo broadcasts from Hessischer Rundfunk beginning on 21st March 1965. (42)

The opportunity to take a serious look at stereophony in radio drama came with the building of a television studio complex late in 1961, elsewhere on the site occupied by Hessischer Rundfunk. This released the area given over to the television rehearsal studio on the third floor of the circular tower for conversion to a fully stereo-capable radio drama suite in 1963. The new suite afforded a vast increase in floor area compared both with Studio VI and with the original plans for the large radio drama suite of 1951 and corresponded far more closely to the classic German pattern of a radio drama studio. This meant that many of the difficulties associated with Studio VI, not least the lack of acoustic variety, could now be satisfactorily overcome.
The second half of this study is devoted to an examination of the changes in studio practice and production techniques which arose with the move from the old mono Studio VI to this new studio, Studio VII. It will be possible to look at where the benefits lay and conversely to see whether the constraints imposed by Studio VI were such that the solutions sought in overcoming them produced results which were a real alternative artistically, to those which might have come from a better equipped studio.

The commissioning of Studio VII late in 1967 signalled the beginning of an era of new and largely unexplored possibilities in radio drama at Hessischer Rundfunk.

It coincided also with a change of emphasis felt across the spectrum of radio drama in West Germany, from the traditional, classical, literary radio play to one in which the conventional use of words found in a story line for example, was relegated to a less significant role. The desire now was to explore structure and associations of sounds: namely the human voice and other natural and artificial sounds. Stereophony had created a new tool of dissection and with it the precision afforded by a new emphasis on hifi; full frequency, low distortion sound systems had brought a new realism and realistic completeness to recorded sound images.

Excitement over the new realism of stereophonic high fidelity and the novel (and sometimes dramatically absurd) effects of which it was capable, was to have the effect of highlighting the apparent artificiality of many techniques associated with 'the old monophony' which had previously seemed
convincingly real. The first casualty of the new realism was not just the old realism, but the whole concept of audio-realism in radio drama.

Much of the ensuing discussion about productions from Studio VII will centre on the question of realism via stereophony and will attempt to lay down pointers to an effective use of the admittedly limited physical space between the two loudspeakers in a stereo array.

Generally speaking, early productions were often preoccupied with the portrayal of movement between the loudspeakers, that and the positioning of sound sources within the stereo space. A ticking clock might be heard to come from a point midway between the sound of a kettle on the boil and a radiogram. To have attempted the same in mono would have lead to confusion over which sound the listener was meant to concentrate on because they would be superimposed. The only way otherwise of indicating precedence would have been through the apparent distancing of the sound sources from the listener, i.e. from foreground to background.

Positional information in stereophony assumed its own significance in determining the order of precedence; centre stage midway between the two speakers would be taken to indicate a position of primary importance as in the case of an actor delivering a monologue. Had the actor been placed either right or left of centre, the logical conclusion would be to assume that at some point he would be joined by another actor whose presence would help restore the symmetry of the stereo
sound picture. In other words, the position left or right of centre placed the single sound source outside the central area of attention: the middle.

The impression given by these early productions was of a theatre stage represented as a stereo sound stage. Despite attempts to suggest that aural perspective existed at the edges of the stereo sound stage, it was quickly realised that the available useful space between the two speakers - space able to suggest true horizontal perspective and a sense of breadth - was limited to an area the boundaries of which lay just short of those defined by the physical placing of the loudspeakers themselves.

As soon as the limits were exceeded, as when sounds were made to come only from the left or only the right, then the sound image no longer conveyed any impression of breadth and became monophonic; the door leading stage left from the stereo living room into the hall opens on a long narrow tunnel.

The First Stereo Radio Drama Production in West Germany: 'Gewitter über Elmwood' by P.T. Wolgar (1964)

Although not a production from Hessischer Rundfunk, the 1964 play 'Gewitter über Elmwood', produced by Sender Freies Berlin (SFB) and the first stereo radio drama to be broadcast in West Germany, highlights a number of problems and possibilities which had to be worked out for stereo to become an acceptable medium for radio drama. The play is a short thriller of around twenty-two minutes' duration. The plot is simple. A woman returns home one evening from shopping to find the body of another woman
in the garage. A storm is raging outside. She telephones a friend to tell of the incident, the line is cut off and the sound of breaking glass is heard. Much later, past midnight, her husband returns home from work apparently delayed because the railway line was blocked. However, it transpires that he had not been to work but had arranged a meeting with his former wife. The meeting had turned sour and ended with the murder of the woman (the body in the garage). His wife pieces everything together and the play ends with the killing of the husband.

Technical aspects of this production were discussed in some detail in an article which appeared in the magazine 'Funktechnik' in 1964. Three acting areas in which the drama would take place were decided upon:

i. far left: kitchen

ii. centre: living room

iii. right to far right: garage and entrance lobby (interchangeable)

The original aim was for a sound stage with a central area occupying a space mid-left to mid-right. The two areas outside this space were intended to run off diagonally left and right.

At first sight it seemed feasible to effect a literal translation of a theatre stage in terms of a radio stage. However, the limits imposed on such a translation became apparent in the course of the play. It also showed how easily the 'stereophony' of stereo could become compressed into the flatness of a television screen with its sharply defined top, sides and front.
The kitchen, entrance lobby and garage became compressed into the long, narrow, one-dimensional tunnels associated with monophony because all the action that took place had to be squeezed into the space of one loudspeaker. However, where the action demanded, these areas were expanded and brought into centre stage prominence, partly to avoid congestion with actors overlapping each other in dialogue and movement, and also as a tacit reminder that monophony had only a peripheral role to play in what was, after all, a stereo production.

Taking this step also created a paradox. Listening to the whole play in mono revealed just how effective those scenes recorded at the edges of the sound stage could be (kitchen, garage etc.). Listening in mono also revealed how unnecessarily large-scale were some of the to and fro movements across the living room. A sense of naturalness had been sacrificed for the all-seeing wide angle viewpoint which was a hallmark of 50's American 'sitcoms' featuring Lucille Ball, Mary Tyler Moore etc.

An example of this occurs at the beginning of the play during a telephone conversation. The scene is pitched midleft-centre and occupies a space roughly corresponding to a life-size situation (no actual width can be given since the distance between stereo loudspeakers will affect the apparent size of the image). Towards the end of the call, a kettle is heard whistling in the kitchen. To avoid the confusion of having the kettle appearing out of the telephone and to give the actress room in which to walk to the kitchen, the actress and telephone were sprung to mid-right. The jump occurred at a
break in the dialogue and might normally have been construed as a simple change in body position; a change from one foot to the other. Shortly after, the receiver was put down with a click and it then became apparent from the position of the click in the sound stage that the telephone had shifted position as well. (Tape example 13)

In terms of film or television, such a cut from one camera angle to another would have been visually perfectly acceptable. The eye would have been able to stay orientated because of all the remaining visual cues. In radio drama however, the absence of continuous background sound cues makes any sudden changes in their position hazardous unless adequately prepared for.

This scene not only highlights the limitations of stereophony in depicting situations but also the belief that stereo could bring the scene to life and that the whole play could be made to unfold in front of the listener within the confines of the stereo stage already described. There is a limit to the amount of positional information the mind can absorb at any one time. If there is too much activity going on at the same time, the listener becomes confused and loses track of the flow of events. The drastic step taken in the scene just described shows how narrowly defined the limits are.

A similar situation occurred later on in the play when the husband arrives home. It had originally been established that the entrance lobby lay far-right. However, because a fair amount of up-front action was to take place in this scene, the
lobby was moved in to mid-right to give room for a close-up scene between husband and wife. (Tape example 14) This scene succeeded better than the telephone conversation because the last time the lobby had been used was at the beginning of the play, sufficiently far back in time for the listener to have forgotten its original location or to have been aware of the extent of the change.

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Almost four years separate 'Gewitter über Elmwood' and the commissioning of Studio VII at Hessischer Rundfunk. During that time it seems much was learnt about the use of stereo microphones. Peter Jochum, the senior drama production engineer at Hessischer Rundfunk recalled how there were initial problems using MS techniques because of the lack of a correlation meter, (44) what sounded perfectly good in stereo would suddenly disappear when checked for mono compatibility.

For all that, it seems that stereo technique was already well rehearsed by the time Hessischer Rundfunk came to commit its first major production to tape, Brecht and Weill's 'Threepenny Opera', in November/December 1967.

Before considering this and later productions from Studio VII, it is as well to consider the Studio itself; the acoustic and technical facilities it offered, in order to appreciate the conditions under which producer and production engineer were to work for the next fifteen or so years.
Studio VII : General Description of Suite

The stereo radio drama suite at Hessischer Rundfunk, designated Studio VII, was commissioned on 1st September 1967 and superseded Studio VI as the main studio suite for drama production.

Studio VII had four studios arranged around three sides of a central control room, and was situated on the third floor of the round tower building housing the radio production facilities.

Building plans extant from 1951 show a projected design for Studio VII remarkably similar to the suite as finally realised. (see fig 28) (45) This original plan, however, was never put into effect and the space allocated remained vacant until 1957 when, with the decision to begin television transmission, the television rehearsal studio was constructed.

In 1965, following decommissioning of the rehearsal studio, planning for Studio VII was taken up again in earnest. As it happened, the way in which the rehearsal area had been partitioned off was found almost exactly to meet the requirements of the Radio Drama Department concerning individual studio disposition, so that only a minimum of modification was deemed necessary. In a memorandum dated 1st August 1965, (46) it was stressed that as little as possible be done in the way of alterations. Most of the work required would entail acoustic treatment and the repositioning of some doors and windows looking out from the
Figure 28.

Studio VII.

Room configuration as originally planned in 1951.

Studio VII/1 was the large 'hall studio'. Studios VII/2 and 3 were medium and small studios for recording speech.

--- = windows between studios and control room.

Source: Hessischer Rundfunk/the author.
control room. The size and configuration of the studios would remain untouched.

Following visits to radio drama studios in Stuttgart, Baden-Baden, Freiburg and Saarbrucken, a number of points arose, however, which necessitated a rethinking of the overall concept of acoustic treatment. The original intention had been to isolate acoustically one studio from another so that a rehearsal could take place in one part of the suite without hindering recording elsewhere. This would have entailed a complete reconstruction of the partitioning of the studios with a consequently unacceptable load being placed on the steel framework of the round tower. In the light of this, it was decided to retain the partitioning but to rebuild the shell of Studio VII/1 (47) so that it became a 'box within a box' using a form of lightweight construction with a high degree of acoustic isolation. Such a form of construction was by no means new. In an article already mentioned in this study by Dr v Braunmühl, (see page 9) the use of this 'floating construction' is described, and for much the same reasons.

The method of construction was as follows: the interior walls of the studios were constructed of a timber or steel lattice (studding) supported at the base on leaf springs. The lattice would be covered with steel mesh which would be given a coat of cement and finally plaster. The floors would be built up in a similar fashion with steel or timber joists laid on leaf springs. The joists would then be covered with the same steel mesh/cement/plaster lining. At no point did walls and floors actually meet. A small gap filled with rock wool or some such similar material, was left so that it was impossible for vibration from footsteps
for example to be transferred from floor to wall, figs 29 and 30.

The ceilings would be treated in the same way, suspended from the mainframe of the building with clasps made up of springs (see figs 31, 32 and 33). The entire construction gave a level of sound insulation of the order of 90 dB for sounds from outside the building (this figure includes the level of insulation afforded by the outer skins of the circular tower) and 66 dB between for example the rehearsal room and Studio VII/1.

These measures were found necessary because of the high level of environmental noise from outside the studio building circa 90 - 100 dB and because of the generally high level of activity in the rooms surrounding the studio complex (sound recording booths for news reports, talks etc.) (48)

Retaining the dividing walls between individual studios in their original form with the necessary changes to windows and doors, ensured a degree of visual and audible contact, necessary when more than one studio was in use for a recording.

Of the four studios, Studio VII/1 was the largest with a floor area of 177m² (compared with 150m² in the plans of 1951). The second largest studio, the 'dead room', for recording exterior scenes, was, at 81m², twice as large as that originally planned and four times as large as the 'dead room' in Studio VI. The remaining two studios, each with a living room acoustic were of roughly equal size at 40m² and 47m² respectively. (49) See figs 34 - 40.
Figure 29.

Floating floor construction.

Source: the author (after Braunmühl).
Figure 30.
Floating wall construction.

Source: the author (after Braunmühl).
Figure 31.

Studio VII.

Studio ceilings showing suspension rods and cable conduits.

Source: the author.
Figure 32.

Studio VII.

Detail of suspension clasp. This is attached to the ceiling suspension rod at its lower end (see figure 31) and to the roofing girders of the building at its upper end. Ceiling rod and roofing girder are isolated acoustically from each other by the spring in the clasp.

Source: the author.
Figure 33.

Studio VII.

Detail of cable conduit and studio ceiling. Wherever cables were carried over studio partitions, the conduit would be broken to prevent transmission of vibration. Ceilings were lightly bedded on compressed rock wool placed on the top edge of the studio walls.

Source: the author.
Figure 34.

Studio VII.

Room configuration.

Studio VII/1 could be entered from left or right through lobbies serving to keep sound out from the exterior. Studio VII/3 could be entered from the right through a similar lobby which had been treated to make it as reverberant as possible, useful when a bathroom or washroom ambience was called for.

——— = windows looking on to studios.

Source: Hessischer Rundfunk/ the author.
Figure 35.

Studio VII/1.

Interior looking towards dead-room studio (VII/2). On the right are the stairways with different tread surfaces. Centre back is one of the two areas set aside for recording speech (round-table discussions, inserts, etc.).

Source: the author.
Figures 36 (top) & 37 (bottom).

Studio VII/2. Dead-room studio.
Figure 36 shows studio seen from control room. Left is the gravel tray used for simulating outdoor walking surfaces, roads, footpaths, seashore, etc.
Figure 37 shows studio seen from Studio VII/1 looking through to Studio VII/3. Centre right is the sink unit which could be masked with curtains when not in use.

Source: the author.
Figures 38 (top) & 39 (bottom).

Studio VII/3.
Looking through to Studio VII/2. Picture shows casement built into door frame (figure 38).
Figure 39 shows studio seen from Studio VII/4 with sink unit (centre).

Source: the author.
Figure 40.

Studio VII/4 looking towards Studio VII/3.
Source: the author.
Reverberation time was carefully graded in order to offer variety without sudden jumps in quality (excepting the dead room) as follows:

- Studio VII/1 = 0.82 sec.
- Studio VII/2 = dead for all practical purposes
- Studio VII/3 = 0.47 sec.
- Studio VII/4 = 0.41 - 0.55 sec. (variable) *

In practical terms, not only was Studio VII/1 ideally constructed for drama production; it was equally suited to recording chamber music. It was able to provide sufficient floor area and a corresponding ambience for large gatherings or scenes where it was necessary to suggest an expansive interior without added artificial reverberation.

Studio VII/2 offered a facility denied producers in Studio VI, that of being able to dispose actors or other sources around the microphone at distances more nearly 'natural' than the artificially created impressions of distance from Studio VI. The act of walking up to and away from the microphone could now be executed without the need for assistance from the mixing desk.

Studios VII/3 and 4 were intended primarily as 'domestic environment' studios or for recording talks. The idea of having two acoustically similar rooms next to each other meant for example, that a transition could be effected from one room to the other without the need for a cross-fade between scenes. Scenes in which the action needed to be spread across more than one location i.e. kitchen and living room could now be played

* Mean values measured between 80 Hz and 5 kHz.
quite realistically. Freedom of movement between the two acting areas, differentiation of acoustic, and hence location, and also the production of a distinctive and realistic voice-off quality were guaranteed.

Grouping the four studios around a central control room in the manner chosen, meant that an actor could, if need be, make a complete traverse of all four studios one after another without obstruction. Such a move was probably not likely to be called for very often, but it stressed the freedom which this layout gave as an essential feature of a radio drama suite.

By way of comparison, the suite as planned in 1951 would not have allowed this freedom, since one talks studio was separated from the others by the echo room and an actors' rest room. Similarly, in Studio VI, a move from the dead room to Studio VI/2 meant that the actor had to negotiate a passageway. In neither case would a transition have been immediate and smooth.

An interesting facet of studio design arises at this point which illustrates how far studio layout is dictated by prevailing methods of production, and vice versa. Studio VII (1951) and to an extent, Studio VI, suggest a fairly static mode of production in which transitions involving a move from one studio environment to another, would be implied rather than carried out literally. It would have been impossible in both cases for example, for an actor to have walked from a scene played in the garden, through french doors, straight into the living room, without having to negotiate another studio or a passage on the way. The move would have had to have been suggested either by adapting the script or
at the mixing desk. In Studio VII, as built, the actor could have walked from the dead room (the garden) through the door into Studio VII/3 (the living room) without any problem. The progression would be entirely natural.

**Studio 'Props' and Internal Fittings**

Just as with the theatre, props are necessary to aid the realisation of a scene. In radio drama, props (such as varieties of surface to walk on, running water, doorbells, even telephone kiosks) are chosen primarily for their acoustic properties.

All these requirements were taken into account when the suite was finally planned. Studio VII/1 incorporated lino and parquet flooring as well as four flights of stairs. These were variously constructed with treads of wood, stone, metal and carpeting thus providing suitable acoustic walking surfaces. In addition, this studio also had corner seating areas providing a more damped acoustic environment than the main body of the studio. These areas were suitable for recording round table discussions or tete-a-tete conversations. A telephone booth was also provided. Connecting points were provided for four stereo microphones and one mono microphone.

Studio VII/2, the dead room, was carpeted for general use but also had sections of the floor area which could be exposed to reveal gravel and concrete walking surfaces. It had been the original intention to provide stairs and a balcony, again with various tread surfaces, but the plan was dropped when it was decided that introducing such a construction would seriously compromise the exterior quality acoustic. A sink unit plumbed in
with running water could be screened off with heavy curtains when not in use. Provision for two stereo microphones and two mono microphone inputs was made.

Studio VII/3 was reached through a special door construction incorporating a window which could be opened and fitted with a roller blind. There was also a set of door bells of various qualities operable from the control room and studio. The intention here was to provide complementary acoustic environments for domestic drama situations and the like. Studio VII/3 was floored with lino and included a sink unit, as in Studio VII/2, set up on a podium though not capable of being screened off.

Studio VII/4, reached via a glass door from Studio VII/3, included a number of features intended from the outset to make it something of an all purpose small studio. The floor was covered with parquet but could be carpeted if necessary. A special feature was the incorporation of a shuttering mechanism for altering the acoustic, see fig 41. The device was originally intended to screen off or expose sound absorbent lining using wooden shutters. Screened-off, the acoustic would be fairly live, opened-up, and the acoustic would be damped. Practical experience however, indicated that the subjective change was hardly worth bothering about and the shutters were normally left closed. Both Studio VII/3 and VII/4 had inputs for one stereo microphone and three mono microphones together with outlets for foldback and talkback as with Studio VII/1 and VII/2.
Figure 41.

Studio VII/4.

Wall slatting used to effect variacoustic. Opening slats revealed layers of sound absorbing material to decrease reverberation in studio.

Source: the author.
Opinions about the quality of Studio VII as a concept for a suite of radio drama studios seemed to vary amongst engineers and producers. Peter Jochum Hessischer Rundfunk's senior drama production engineer, stressed the flexibility of the whole concept. Studio VII/1 was, in his opinion, one of the best of the drama studios in West Germany. (50) Not only could it be used for large scale recordings but by placing a microphone for example, in one of the corners with its dead side towards the main body of the studio, it was possible to record items such as those referred to above, without a substantial acoustic around the voice but with sufficient bloom for it to sound warm and attractive. Heinz von Cramer, one of West Germany's foremost radio drama producers felt the acoustic of Studio VII/1 to be too well defined and that the remaining studios within the suite were too small to permit much in the way of movement. (51)

The author had the impression that the studios were characterised by a certain blandness, a lack of particular colour or characteristic acoustic quality. A glance at the reverberation/frequency curves for the studios goes some way to support this, (see figs 42, 43 and 44). All the studios, with the exception of the dead room, Studio VII/2, show a reverberation pattern which is very smooth with a slight rising characteristic (the curves were taken without curtains drawn in front of the windows to the control room and slight additional correction to high frequency absorption). This smoothness of reverberation contour meant that a feeling of sterility predominated and as Horst Vollmer, current head of production at Hessischer Rundfunk, expressed it, as though the rooms were always empty - as though
Figure 12.
Studio VII.
Reverberation curve for Studio VII/1.
(no information available as to method of measurement).
Source: Hessischer Rundfunk.
Figure 43.

Studio VII.

Reverberation curve for Studio VII/3.

(no information available as to method of measurement)

Source: Hessischer Rundfunk.
Figure 44.

Studio VII.

Reverberation curves for Studio VII/4.

Curve A = variacoustic shutters closed.

Curve B = variacoustic shutters open.

(no information available as to method of measurement).

Source: Hessischer Rundfunk.
nobody ever inhabited them. (52) For sound recording, the situation is ideal because microphones can be positioned wherever they are required without problems of coloration creeping in to any great extent. On the other hand, it did mean that hard surfaces such as windows or doors came to be valued because they gave the reflections and hence coloration required for particular situations such as a 'cubby-hole' acoustic. Acoustic screens would be set up with the door or window forming one wall, the screens forming the remainder of what in effect, was a small room. The microphone would be placed inside with its dead side facing the window or door so that any reflections would be picked up at a level only sufficient to colour the actor's voice and not swamp it.

* * * * * * * * * * * * * * * * * * * *

On the whole, Studio VII was regarded as a success by those who worked in it. Compared with Studio VI, it obviously represented a great improvement. In the author's opinion, it provided the neutral backgrounds necessary for the realisation of countless different acoustic situations. Had the studios been designed with some coloration present, it would have been difficult to avoid the feeling of listening to a particular acoustic setting and no other all the time. With this, the listener would have been subjected to an unacceptable constraint on his imagination were he being persuaded that he was listening to a room with very definite characteristics and hence suitable for only one acoustic situation.
CHAPTER VI

Studio VII

Description of Recording Facilities

An undated pamphlet from Hessischer Rundfunk gives the following description of the control room facilities in Studio VII: (53)

"The control room facilities enable recordings to be made with MS or XY techniques. The Hessen Broadcasting Authority has decided that with new studio installations, XY technique and signal processing will be the norm from the mixing desk right through to the FM transmitter. MS or XY microphone techniques are possible, however, up to the input to the position and width controls in the mixing desk.

The mixing desk has 18 input faders and 4 group output faders. Faders 1 - 4 are stereo faders and have dedicated stereo position and width controls. Fader inputs 5 - 12 are mono inputs with panpots. Inputs 13 - 18 are simple mono inputs (without panpots). Faders 5 - 18 can also be switched between A or B inputs.

The 18 input channels can be routed at will to either 4 mono group busses or 2 stereo group busses. In addition, the input channels can be routed to 2 echo groups through echo send level potentiometers.

The 4 group busses can either be sent as 4 mono groups or 2 stereo groups to the inputs of the 4 group faders ......

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Artificial reverberation is provided either by a reverberation plate or an echoroom or a delay unit which can be patched in as required.

Bass and treble equalisers and high and low pass filters can be patched in at any point in the signal path. 2 foldback circuits are provided ......

In the tape-machine room are 8 stereo tape machines (switchable mono/stereo), 2 stereo grams units, a 4 track tape machine and a mixing unit for post production work.

The recording and playback routeing of the tape and disc units is connected with the mixing unit via 6 stereo ring circuits (selected using a cross-plugging matrix above each machine). Parallel to this, using the same arrangements, machines can be connected directly to the mixing desk in the control room. The stereo and mono outputs from the mixing unit may also be connected through to the control room via one of the ring circuits."

At the time the desk was installed in 1967, it would have been counted as a comprehensive production facility. It remained in use until the end of 1983 by which time it was beginning to show its age. (see figs 45 - 48)

Originally, the desk was laid out for XY and MS signal processing. By corresponding switching, it was possible to follow XY and MS signals right through the desk without change until the group outputs where they appeared as left and right signals for monitoring and recording. Why this should have been
Figure 45.

Studio VII.

Interior of control room as in 1983.

Source: the author.
Figure 46.

Studio VII.

Mixing desk. From left to right faders are: 1-4 stereo, 5-12 mono with pan facility, 13-18 mono without pan facility. The two sets of faders with coupler bars are the stereo group faders right of which are the echo send faders.

The top row of the inclined field contained the group selectors. The middle panel contained channel width and position controls, record/transmit selectors, monitor selectors and talkback. The bottom row contained echo send controls (pre/post fader, echo 1/2 and level).

Each of the channel faders was equipped with remote start facility whereby any selected tape machine or grams deck could be started as soon as the respective fader was opened.

The metering panel incorporated a correlation meter (centre below the three compression depth indicators).

Source: the author.
Figure 47.

Studio VII.

Patch bay. This was situated behind the production engineer. The bay contained all the microphone power units and amplifiers, termination points for studio tie-lines (mic./line), insertion and break points as well as ancillary equipment.

Source: the author.
Figure 48.

Studio VII.

Recording and grams room. Tape machines were Telefunken type M15. Grams decks (not shown) were EMT.

As in Studio VI a small mixing unit was provided for dubbing and editing (centre left in picture).

Source: the author.
the case is not quite clear but it would seem that, in order to
give recording engineers the option of working in either mode,
it was felt easiest to maintain the signal in whichever mode
was chosen all the way through. In the early years of stereo
recording in West Germany, mixing desks were equipped with
passive position and width controls which gave MS signals
at their outputs. Rather than convert the signal back to XY
immediately, this was done at the furthest stage along, at
the desk output.

A block signal diagram of the installation with the
remark 'diverse alterations 28.7.76' (54) shows a modification
to the overall layout such that regardless of the input to the
 stereo channels, whether MS or XY, by substitution of an up-dated
active version of the original passive width and position control,
the signal would be processed as a normal XY signal from that
point onwards.

One of the problems inherent in MS technique, not to be
confused with MS microphone technique, is that of crosstalk. In
this case, we are not talking about crosstalk in electrical
terms but that of acoustic crosstalk once the signal has been
converted back to L and R. In MS technique, this is caused by
unintentional differences in channel balance between the M and
S signals. The effect can be such that a difference of only
3 dB between channels can reduce crosstalk attenuation to only
15 dB. The same can be said for phase discrepancies between
channels. A phase difference of only 10° between M and S
channels reduces crosstalk attenuation to 21 dB. A phase
difference of 90° gives 0 dB crosstalk attenuation - a mono image.
From the foregoing, it seems reasonable to conclude that technicians and engineers at Hessischer Rundfunk had similar experiences and decided to modify the desk in the mid-70's so that it would run as a normal XY stereo installation.

Before discussing the mixing desk in Studio VII any further, it is worthwhile taking a look at some of the advances in design of such equipment since the Studio VI installation back in 1954.

It will be recalled that the desk in Studio VI was built up around a single multi-function amplifier module, the V72. The main drawback surrounding the V72 was its fixed gain of 34 dB. If this was too much for the job in hand, then the gain was reduced externally with resistive networks, attenuators. If the gain proved too little, two amplifiers might have to be used in series. Either solution introduced noise either from the noise generated in the attenuators or from the addition of a second stage of amplification.

In 1958, the V76 was developed, an amplifier with variable gain up to a maximum of 76 dB. This enabled dynamic microphones to be used in the studio without loss of sensitivity but also meant that nominally line-level sources could be brought up if they were insufficient. Gain could be set from 3 dB through 9, 18 and 24 dB then from 34 to 76 dB in 6 dB steps. The amplifier was also provided with switchable low and high pass filters for removing boom in speech, mains hum (e.g. in television studios) as well as high frequency spit resulting from a microphone being spoken close to. The amplifier was also
very quiet with an input noise level of -120 dBm. Even by a maximum output of +22 dB, distortion did not rise above 1.5%.

Altogether, the V76 was a considerable improvement on the V72 and at the same time, showed that there was a need for specialised amplifiers to do specific jobs in a mixing desk rather than a single 'maid-of-all-work' around which a complete desk might be built. Since the amplifier had such a high gain, passive elements were no longer required to work at low levels e.g. faders, equalisers, width and position controls etc, with the attendant need for large amounts of restorative amplification through insertion losses. A look at a level diagram for a single channel incorporating the V76 will show what is meant. (see fig 49)

This should be compared with fig 16 on page 48. In this case, amplifiers tailor-made to do certain jobs have been incorporated with the result that once the signal from the microphone had been amplified up to line level (+6 dBm), the variation in level remained within 29 dB (compared with 34 dB in a system using only the V72). Although there may seem little difference between the two systems from this point of view, the important feature is that whereas in the system with the V72 the signal level at which such variations occur is of the order of 10 millivolts, in the case of the more modern system using the V76, 'the operating mean' lies around 250 millivolts. This is a necessary point to consider and has already been alluded to in the chapter on the mixing desk in Studio VI. Low level spurious signals entering the system along with the signal from the microphone or at any other point where the wanted signal is at a low level will be amplified with it. If an unwanted signal of say, 0.1 millivolts enters the system where the wanted signal is also at a low level prior to being given the 34 dB gain from the V72, the unwanted signal may
Figure 49.

Studio VII.

Signal path and gain characteristics (simplified) of single channel using the V76 and V75.

With the exception of the W95c, the diagram is representative of the mixing desk in Studio VII.

M269 = condenser microphone
V76/N52t = microphone amplifier with power unit.
W95c = active equaliser.
W66 = channel fader.
V75 = grouping amplifier.

Source: Handbuch der Tonstudio-Technik. p. 325
be raised to 5 millivolts. The wanted signal may originally have been say 6 millivolts and will have been brought up to 300 millivolts. The difference in level between the noise signal and the wanted signal is circa 35 dB, not a satisfactory signal to noise ratio.

In a system using the V76 there were fewer points where a low level noise signal could enter and be amplified to the point where it became a nuisance. If the 'operating mean' already lay around 250 millivolts, a noise signal would only be subjected to some 16 dB of amplification before the wanted signal had already reached line level (+6 dBm) which in the case of a noise signal of 0.1 millivolts amounted to an increase to 0.6 millivolts. The difference in level between this and line level equals some 68 dB, a satisfactory signal to noise ratio.

As well as the V76, two other amplifiers should be mentioned, the V74a (56) and the V75.(57) Both contributed greatly to the design of flexible mixing desks and in the case of the V75, by reducing the need to rely on decoupling resistors when grouping faders together on group busses.

The V75 was an amplifier with 4 inputs and 1 output. In the case of a desk such as the one in Studio VII it would have been used in the following manner:

Individual channel faders would be coupled, via decoupling resistors, in groups of 4 or 5 which would be summed together and sent to one of the 4 inputs of the V75. The output of the V75 would then form one of the main desk outputs (see fig 50). By means of suitable switching, the arrangement could be repeated for, in the case of Studio VII's desk, 3 other V75's giving 4
Figure 50.

Studio VII.

Simplified diagram of fader grouping on mixing desk in Studio VII.

The diagram shows an arrangement using the V75 as a grouping amplifier similar to the one used in Studio VII. Groups of channel faders would be coupled in 4's or 5's to form the input to one input of a V75. The remaining three inputs would be similarly treated to give one group output from the V75.

Further group outputs could be obtained in the same way and if necessary, summed to form two stereo outputs.

W66 = channel fader.
V74a = channel splitting amplifier.
R1 = decoupling resistor.
V75 = grouping amplifier.

output groups altogether and correspondingly, two stereo outputs.

The advantage of using such an amplifier lay in being able to dimension the decoupling of individual channels optimally. By using several amplifiers, quite large installations could be designed in which crosstalk and other forms of mutual interference between channels could be held to acceptable values.

The V74a was an amplifier used for splitting off signals for echo and foldback purposes. Its introduction meant that, whereas in the desk in Studio VI it was only possible to send either one fader alone or the outputs from the microphone channels summed together or the whole desk output (see chapter 2 page 51), individual channels could be sent at their predetermined levels to wherever was required. Two echo lines were provided with their respective group level controls in addition to the two foldback lines.

**Studio VII**

**Stereo Grouping and Mono-only Channels as Special Features**

From the production engineer's point of view, the desk had a particular feature which singled it out as a drama production desk; the provision of two independent stereo groups. It will be remembered that the desk in Studio VI had two output groups governing the microphone channels, which could be used to effect crossfades from one situation to another. The same idea pertained in the desk in Studio VII. It was possible to route channels with microphones (or line sources) pertaining to one situation to one stereo group and those involved in another to the second. The stereo group faders could then be used to dissolve from one to the other. Another feature was the provision
of six mono channels without panpots. These could be switched to any one of the four group faders, used in mono mode, or a stereo group. From correspondence which took place between Telefunken and Hessischer Rundfunk at the time the desk was being designed and built it has not been possible to discover the original reason for providing channels which could only be used to record in mono, or to provide a centre image when recording in stereo. However, the German sound engineer's 'bible', the 'Handbook of Sound Studio Engineering' published by the IRT, Munich, refers to a 'stereo sound mixing installation for a radio drama suite' in which the same feature is illustrated. (58) Four input channels are provided which are mono without the provision of panpots. No explanation is given but it is possible these channels would be used for producing straight mono recordings of speech etc., or a stereo microphone working in either MS or XY mode could be connected to two of the channels for simple stereo recordings. My own experience of engineering practice in Studio VII suggested that these faders were hardly ever used, the production engineer preferring to work at the opposite end of the desk with the stereo inputs where he had full control over width and position.

**Equalisation & Limiter/Compressor Facilities**

Equalisation was provided but in a manner which suggested a degree of secondariness. Instead of each channel having an equaliser as an integral part of channel equipment, it would have to be patched in separately, see fig 51. An oft repeated maxim of the engineering staff in Studio VII stressed the inviolability of the voice, its quality was to be left untouched, not tampered with. If any form of equalisation was found necessary, more
Figure 51.

Studio VII.

Equalisation and compressor/limiter bay.
Top row contained filters giving steep cut and boost of set frequencies for special effects.
Middle row contained limiter/compressor controls.
Bottom row contained filters for corrective equalisation only.

This bay also contained remote controls for reverberation time in addition to delay and phasing units.

Source: the author.
often than not it was done using the filters in the V76 which would simply roll off the bass very gently to avoid bass tip-up. In all other cases, 'equalisation' was done at the microphone itself, a point already mentioned in the chapters concerning Studio VI.

What equalisation there was consisted of low and high pass filters giving a steep roll-off, 24 dB/8ve, at preset frequencies, (59) corrective equalisers giving varying degrees of lift and cut at one bass and one treble frequency, 60 Hz and 10 kHz, (60) and presence boosters providing varying amounts of lift at preset centre frequencies of 0.7, 1, 2, and 3 kHz. In addition, there were two 'radio drama' equalisers of the same kind as the one referred to in the chapter on the technical facilities in Studio VI (see chapter 2).

Two compressors were provided giving continuously variable compression from 0 to 10 dB with release times of 1, 2, 3, 5, 10, and 20 seconds. (61) Both units could be coupled to work in tandem for stereo signals and could also be switched to work as limiters. From my experience, they were only rarely used. Compression or limiting on voice recording is easily detected however moderate and it seems that engineers were far happier to use rehearsal time to work out where any limiting or gentle assistance with gain via the fader was necessary, rather than entrust this task to an automatic device. In the case of one notable West German producer, Heinz von Cramer, gain riding with any technical device was to be kept to a minimum. To him, the technical imperfection of distortion within an otherwise artistically valid performance was not of any importance. Rerecording a take because of a technical fault meant most
likely losing the spontaneity of a first performance. (62)
For this reason and the view shared amongst production staff
of the inviolability of the voice, manipulation with a technical
reason in mind was kept to the least necessary.

Monitoring Facilities

Finally, mention should be made of the monitoring facilities.
These originally consisted of a pair of Telefunken type 085
studio monitors. This was a design developed between Telefunken
and the IRT (Institut für Rundfunktechnik) in Munich in the
eyear 1960's. (63)

The 085 contained a number of design features which made
it rather unusual. Basically, it was a two-way loudspeaker
consisting of two bass units and sixteen treble units. The
treble units were divided into two groups of eight. Eight
were arranged to project sound in a forward direction whereas
the remaining eight projected upwards and from the sides. The
aim of this arrangement whereby the units last mentioned could
be switched off if desired, was to diffuse the radiation of
treble frequencies and avoid something of a point source effect,
particularly when listening in mono. In practice, the diffuser
treble units were left switched off since otherwise, their effect
was to create a muddled stereo image, of little use in radio
drama. Figure 52 shows the response curve of the units measured
from the production engineer's seat in the control room in Studio
VII. Apart from a shelving-off of bass frequencies below 150 Hz
and a dip between 200 and 300 Hz caused by room reflections, the
response is tolerably flat, certainly a great improvement on the
monitor in Studio VI. It would probably not be considered adequate
Figure 52.

Studio VII.

Response curve for Telefunken type 085 monitor speakers measured in Studio VII control room from production engineer's seat.

pink noise - filtered ½-8ve.

Source: Hessischer Rundfunk.
though by today's standards. Examples of the 085, here in use as studio foldback speakers can be seen in figs 36 and 40.

Latterly, (1982/1983) the 085 was superseded by a number of newer designs including the HECO 7302 and the Klein & Hummel 092. At the time research for this study was being undertaken, a final decision had not been taken as to which monitor would eventually be used. By way of comparison with the 085, response curves for these two units are shown in figs 53, 54 measured from the same position as in fig 52.
Figures 53 & 54.

Studio VII.

Top: Response curve for Klein & Hummel 092 monitor speaker
Bottom: Response curve for HECO 7302 monitor speakers.

curves measured as for figure 52.  

Source: Hessischer Rundfunk.
CHAPTER VII

Stereo Radio Drama Production at Hessischer Rundfunk

Brecht and Weill's 'Threepenny Opera' was one of the first major productions to appear from the Hessischer Rundfunk stable after the commissioning of Studio VII and is a good example of the use of a single studio 'umbrella' for both orchestra and cast. The result was a concert version of the opera where the studio acoustic (Studio VII/1) provided a unifying backdrop. Sound effects were used sparingly and largely confined to doors opening and shutting, and at the end of the play the sound of church bells. Other than these, little illustration was added. Musical numbers were recorded separately and then added at the appropriate points.

Surviving photographs taken during the production period show the layout of the orchestra and the recording of soloists (see figs 55 & 56). The orchestra was grouped at one end of the studio near the dead room, (Studio VII/2). The remainder of the studio was used rather as an open stage with presumably a single stereo microphone around which the actors played their parts. As in the production of 'Die Goldene Pforte' in Studio VI, the cast was not expected to simply group around the microphone but was encouraged to act out the scene before it. This intention was confirmed in an interview with Dr Ulrich Lauterbach, then Head of Radio Drama, who directed the piece and who mentioned that he did not wish the actors to remain in fixed positions but to move around freely. (64) Overall, the effect is similar to that encountered in 'Die Goldene Pforte': considerable plasticity and freedom of movement, leading to a definite feeling of
Figure 55.

Studio VII.

The 'Threepenny Opera' during recording of soloists. Spot microphones can be seen on piano, harmonium, percussion, bass and woodwind.

Source: Kurt Bethke.
Figure 56.

Studio VII.

The 'Threepenny Opera'
The angle of the stereo-
microphone (SM69 on boom)
suggest MS microphone technique.

Source: Kurt Bethke.
horizontal perspective. In this respect, care was taken in the preparation of the script to include indications as to how the actors should position themselves. As far as the actual realisation of the positioning went, the indications were treated with some latitude so that the distinction between half-left-back and half-left-front for example, could be quite subtle.

Nevertheless, the 'Threepenny Opera' representing an essentially new departure in radio drama for Hessischer Rundfunk, had to be planned with the aim of a demonstrable application of stereophony in mind. The use of a simple microphone arrangement, a stereo pair with one or two soloist microphones at the most for recording the cast, is a direct application of the thinking which prevailed at the time tending towards an almost textbook usage of stereo techniques. For all that, these techniques have proved themselves in their ability to give a faithful depiction of movement in stereophony. That, and the realisation that the less the microphone was allowed to dictate the flow of events before it, the greater likelihood of a natural flow of movement and hence the overall pattern of the drama succeeding.

One area in which it was felt this production was compromised, fortunately only to a minor extent, was in the use of sound effects. The kind of effect used, pre-recorded unless otherwise indicated, demonstrates how strong the influence of the studio acoustic was, not least in that but for the brevity of their use they would have sounded totally out of place. An example of the kind of effect referred to is found at the beginning of the opera where the scene is set in Jeremiah Peachum's shop. To begin with, a customer enters to the sound of a shop-door bell played live in
the studio. However, when the door is open the sounds of a street scene are heard from outside. This is played over from grams and includes a horse and carriage. Aside from its role merely as an indicator, the effect begs an altogether more realistic treatment of the scene in Peachum's shop, against the certainly stylised and perhaps clinical one afforded by Studio VII/1's acoustics. A more appropriate treatment might have been to retain the shop-door bell and use actors to play a crowd scene with street cries, etc. Recorded in the same studio and faded in and out as appropriate would have avoided the irritation of the street effects and would have probably been more in keeping with the general philosophy of the production. (Tape example 15)

Another case in point, occurs later during MacHeath's 'marriage' to Polly Peachum. This takes place in a stable entered through an old creaking door. The stable is the studio, the door an effect, to which echo was added. (Tape example 16) The result is that a door clearly meant to be opened and passed through suddenly loses all claim to being part of the scene. It sounds disembodied, transitory rather than being a permanent constituent of the acoustical scenery and would have been best omitted.

The danger inherent in these two examples is that of having conditioned the ear to a constant acoustic and then having disturbed it momentarily by a change, however realistically intended.
Where, however, such changes are carried out within the already perceived acoustical framework, the effect is a definite enhancement of the scene being played. One such example of this occurs much later on with the imprisonment of MacHeath. The setting is Old Bailey. The transition from the preceding acoustic of Studio VII/1 to that of a dungeon is managed purely with the use of artificial reverberation. Effects are limited to the rattling of chains, keys turning in locks and at one point, a cell door. The change of scene itself happens almost as a corollary of the fade in that Old Bailey is allowed to grow out of Studio VII/1; is perceived as a subtle cross-fade of acoustic. This is possible and entirely admissible because the quality of reverberation in both cases is quite well matched. The fairly neutral acoustic of Studio VII/1 is complemented by the slightly more hollow and more resonant acoustic generated by the reverberation plate. Later on, in the same scene, reverberation is varied in quantity to outline the distinction between the vaults of the prison and the cell where MacHeath is kept. The cell sounds much drier by implication although the reverberation plate is just barely perceptible.

(Tape example 18)

Overall, this scene demonstrates the successful combination of expectation matched by realisation. The vaults of Old Bailey can be expected to echo to the clanking of gaolers' keys and the rattling of chains and cell doors. MacHeath's cell can be expected to echo less than the vaults outside. The transition from the previous scene in a bordello to a dungeon is managed without the ear being subjected to a nasty jolt.
'Test' by Paul Pörtner (1968)

Not long after the production of 'Threepenny Opera', a play was produced in Studio VII and subsequently broadcast of altogether very different content and purpose. 'Test' by Paul Pörtner was an attempt to explore some of the possibilities of stereophony per se, without being bound to a conventional narrative. Concrete expression of movement, clear differentiation of multiple sound sources, and to a limited extent, electronic distortion of voice and other sounds were the elements under investigation.

According to the author's preamble, the aim was to look at, amongst other things, the distinction between real or natural acoustical surroundings, and the artificiality of voices heard over a loudspeaker. Four of the six people taking part were placed in the studio (Studio VII/1), the other two, the test leaders, were heard over loudspeaker.

At a first hearing, much of what Pörtner wished to investigate at this time is now common knowledge. One of these aspects though, is still of sufficient interest to merit discussion.

One of the principal advantages of stereo over mono is that several strands of material can be presented to the listener at one and the same time, provided they are spatially disposed. Portner did this using varying densities of material composed of variations on groups of syllables and segments of conversation involving people moving about. He also made use of sounds moving between the speakers such as marching soldiers, train run-pasts and two different kinds of music played left and right simultaneously;
left, a jazz group, right, a string orchestra playing avant-garde music. (Tape example 19) Although not Portner's main area of investigation, it is interesting to see how loaded a stereo sound field can become before appearing congested.

The quality of the studio acoustic was a secondary consideration provided the listener was sufficiently aware of some form of ambience, and the room was resonant enough for plosives to be effective in exciting it.

Altogether, it is difficult to see what precisely Portner was attempting to examine concerning stereo. As a catalogue of effects possible in a reasonably resonant studio, played out before a stereo microphone array, then the only point that emerges is the congestibility of the stereo sound stage, a form of artificial cocktail-party effect. Where the piece does score is in the opposite direction; to what extent can stereophony be rarefied before it ceases to be stereophony?

'Oliwer' by Werner Kofler (1982) and
'Der Untergang der Titanic' by Hans Magnus Enzensberger (1979)

The answer lies in two productions, again both from Studio VII, and both directed by Horst Vollmer, now Head of Radio Drama Production at Hessischer Rundfunk. 'Oliver' by Werner Kofler, was produced in 1982 and is a masterpiece of pseudoreality. 'Der Untergang der Titanic' by Hans Magnus Enzensberger, is an earlier production from 1979 and is an example of pure stereophony. It seeks to recreate neither a conventional realistic situation nor an assemblage of circumstances which would have worked just as well in mono.
'Oliver' was billed as a 'real-fiction radio-drama'. A kind of docudrama. It is the tale of a fictitious child-star, a young singer who, pushed relentlessly by his mother, comes to sing in a radio charity concert for the handicapped: a popular child singing star. Kofler's intention was to create a piece which was so 'real' that anyone who happened to switch on the radio in the middle of the play would be fooled into thinking it was a real live charity show. In so doing, the unwary listener would complete the tale of media hype and phony solicitude called forth by such ventures.

'Der Untergang der Titanic' generates its own kind of reality too; the truth, if that ever be known, of the loss of the White Star liner. In this piece, Horst Vollmer used the space between the two loudspeakers as if composed of a sheet of glass behind which was a black void of ever increasing width and infinite depth. On to the sheet of glass could be placed individual sound sources such as voices and other objects. Behind the sheet of glass could be placed music, background choirs of voices either singing or vocalising on word groups and clusters. The nature of this void precluded any constraint on the way these sound sources were distributed.

As a result of this arrangement, the production demonstrated something of a fundamentalist approach to stereophony and at the same time, traces an evolutionary path from monophony.

Single voices were often placed, not centrally as convention might dictate, but half-left or half-right, though never such that they appeared to come from only one speaker. In this way, Vollmer
demonstrated the mobility of fixed sound sources and the difference between a voice coming from a single loudspeaker and one which to all intents is a mono source though located somewhere between two loudspeakers. This voice assumes a plasticity and mobility of identity which is not possible in single speaker monophony. (Tape example 20) The text being spoken obviously conditions the character portrayed by the actor but the voice emanating from somewhere between the loudspeakers can be as mono or stereo as the listener chooses. Its presence can either be ignored to the over-riding importance of the text or it can become present to the extent of portraying an actual person in the room. The identity of the voice is no longer permanently associated with the loudspeaker.

This loss of permanent association received considerable attention in the early period of stereophony. Some producers felt that stereo automatically created a sensation of a room regardless of the content of the play. (65) In so doing, it was forgotten that more than the mere presence of a stereo speaker set-up was necessary to suggest room space. The stereo space needs to be excited, kept alive at repeated intervals for the listener to remember that he is hearing in stereo. Otherwise, the patterns of sound heard remain diffuse, imprecisely orientable mono.

Vollmer did this by continually varying the width of his sound stage. At times, sounds would be point sources disposed at will across the field. (Tape example 21) At others, the sound stage would be filled completely with a sound source, punctuated at intervals by other point sources. (Tape example 22) This juxtaposition of various elements is one reason for the
attractiveness of 'Titanic' as a piece of stereophony; that and
the skill with which these juxtapositions were handled. Technically,
it was not an adventurous work but it went a long way to dispelling
some of the earlier misconceptions about the nature of stereophony.

Three years separate 'Der Untergang der Titanic' (1979) from
'Oliver' (1982). 'Oliver' was stereo carried to the ultimate in
generating plausible reality. The biography of a fictional child
singing star, it culminates in a minuscule 'live-aid' performance
on the radio for the handicapped, complete with 'phone-ins, coverage
by press and television, plus a liberal spicing of jingles and radio
advertising. The success of the piece is due in part to Kofler's
recognition of the average listener's perception of radio and how
the various elements comprising it could be recombined to produce a
play like 'Oliver', (Tape example 23).

'Oliver' is total radio. Apart from the scenes which are more
fairly representative of conventional radio drama such as the
promoters' round-table, press interviews with Oliver and parents
at home, etc.,(Tape example 24) the remainder could have been lifted
straight from a German Radio 1/2 type pop programme. (Tape example 25).
Because this, in itself, is almost entirely a product of the recording
studio, the success of its reality in radiophonic terms almost goes
without saying. 'Oliver' serves to illustrate one major point: radio
and radio drama are at their most real when imitating themselves. The
yardstick by which this success may be measured is the drama production
studio itself.

Location Recording in Radio Drama

'Das ist doch kein Berufsverbot' by Günther Gröschel & Jonas Lassig (1980)

That this need not be the case and that the result can be
'real' out of all proportion to the means employed is illustrated
by a production from 1980 of 'Das ist doch kein Berufsverbot' by Günter Gröschel and Jonas Lassig. This piece tells the story of a young student teacher in West Germany who falls victim to the machinations of the headmaster of the school in which she is training and deals with the subsequent ban on her teaching in the state sector. In West Germany this is termed 'Der Berufsverbot' and is a form of assessment of suitability for public service. The procedure has come in for much criticism recently for the way in which it can be used to weed out 'political undesirables'.

What makes this production one of special interest, is that it was all recorded on location. Through an administrative mix-up, it transpired that the studios in Munich where it was to have been produced could not be made available. Production schedules demanded that it be made anyway so other rooms were obtained and make-shift studios arranged.

These studios were ordinary, untreated rooms. The effect of this was to have the cast play in surroundings which the finished production suggests were very similar to those encountered in real life: classrooms, offices, school playground, assembly hall, corridors, etc. In an interview recorded with the production engineer, Peter Jochum (66) the extent to which the realistic qualities of the location contributed to the realism of the production became apparent. He recalled how, because the location was not acoustically isolated, incidental noises such as someone whistling in a passageway, doors being slammed, footsteps in corridors and the absence of the rather clinical atmosphere of a recording studio, contributed to an ambient quality which it
would have been impossible to achieve had the play been recorded in the conventional manner. Furthermore, the range of different acoustics available permitted the accurate characterisation of various situations such as scenes held in an office, in a classroom, both full and empty, in a corridor and so on.

Where the production did make concessions to convention was in the treatment of voices which were for the most part, kept in the foreground. Why this should have been so was probably the result of using schoolchildren as members of the cast. An actor experienced in radio drama will be aware to what extent he can 'play' the characteristics of a microphone; how far he is permitted to move off-mike and how far away before the intelligibility of his voice drops below an acceptable level. Amateur players generally do not possess this knowledge so that a director has to be careful how they are placed in relation to one another and to a professional acting in the same scene. An example of this kind of situation occurs in the classroom scenes throughout the play. (Tape example 26) The teacher is treated up-front, the listener is shown the scene from the teacher's perspective. The class is kept at a distance in front but not so much that the director's wish to indicate the rapport between teacher and pupils was compromised.

'Brookside', ITV, Channel Four

The dramatic realisation of these and other fictional situations in real surroundings has a parallel in television in the soap opera 'Brookside' broadcast on ITV's Channel Four. Here, the quality of the sound track is dictated by similar constraints as applied to 'Das ist doch kein Berufsverbot'.

The set is part of an actual housing estate on the outskirts of Liverpool. The houses are, for the most part, left acoustically untreated so that the quality of sound heard is dictated entirely by the furniture, fittings and shape of a conventional domestic environment and not by any special arrangement of acoustic absorption or reflection; rooms retain their characteristic coloration from low, undamped ceilings and uneven absorption by furniture, floor coverings, curtains, etc. (Tape example 27)

Incidental noise is also present and, similarly with 'Das ist doch kein Berufsverbot', in a way which could otherwise only be approximated in a television or radio drama studio.

In location scenes, the way in which noise permeates the scene being played is random and complex. It is always there and occupies the same three-dimensional acoustic space as the main centre of interest. A radio drama studio (and television studio) is capable of blocking out this noise completely, only admitting it in canned form and at the discretion of the director. At times, this is a desirable state of affairs but it must be said that a proper appreciation of background noise in dramatic and artistic terms is not always evident. In a scene from 'Das ist doch kein Berufsverbot' in which the young student teacher, Frl. Jahn, speaks to the school director, Blechmann, the two are heard in a corridor. There is the faint sound of some activity in the distance and then suddenly, quite out of the blue, someone begins playing the piano in a room further down the corridor. (Tape example 28) The sound of the piano is reverberated by the same acoustic as the one in which the two actors are playing and yet is entirely unobtrusive. It is a good example of the spontaneity and coherence afforded by working
under such 'deregulated' conditions as those in which this play and others like it were produced.

Future Trends in Radio Drama

In an interview with Dr Christoff Buggert, Head of Radio Drama at Hessischer Rundfunk, (67) the significance of 'Das ist doch kein Berufsverbot' was discussed. From his remarks, it seemed that such a production pointed very definitely towards a future trend in radio drama and one worth giving greater attention to.

'Das ist doch kein Berufsverbot' could also be seen as symptomatic of a more general move away from the highly technified apparatus of radio drama production to one much simpler and less demanding of the technical resources of radio. In the course of the interview, Dr Buggert pointed to the way radio had given rise to a whole new concept of 'broadcast sound'. Since the beginning, radio had formalised, reduced, and categorised elements of everyday occurrence and reproduced them in a way suitable for consumption subject to the programme schedule, a form of media sanitisation. The problem surrounding this 'broadcast sound' is that it has been allowed to permeate almost every facet of the broadcast product, including radio drama.

Ultimately, a radio drama studio can only provide as many natural acoustic qualities as there are studios, and even these are artificial because of the demands traditionally imposed by the microphone. The naturalness of the production conditions surrounding 'Das ist doch kein Berufsverbot' not only gave rise to realistic acoustic depiction but also resulted in a quality
of acting freed from the contrived environment of a drama studio. It was also pointed out that in order for such a production to be successful, actors, engineers and directors had to be found who would respond to the stimulus of such location conditions. It was not enough to simply send a team out and expect that the open air would do the rest. Rather, all concerned had to be aware of the choices presented to them when working under real life circumstances.

Given that studio-based production methods remain established policy in the future, there is every likelihood that they will be subject to increasing scrutiny as the capability of broadcasting technology is further improved. The almost total absence of perceptible background noise, various forms of distortion, etc., coupled with universally superior domestic reception using digital technology will mean that many of the constraints which were part and parcel of contemporary recording techniques will no longer apply. For the serious listener, the absence of technical limitations imposed upon what he hears will introduce a new element of faith in that he can reasonably expect to hear at home everything that was produced in the studio with almost nil degradation. For the radio drama producer, this will throw the field wide open as to the possibilities of the medium but will also subject him to scrutiny concerning his aesthetic judgement and perceptiveness.

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In the final section of this study, a close analysis will be attempted of two scenes taken from rehearsals of recent studio-based productions (1982/1983) which illustrate various possibilities associated with an important aspect of radio drama, acoustic perspective and the use of microphone and acting techniques in achieving this. Technical considerations also play a part in that in at least one case, the final result had to be compromised for the sake of mono-compatibility.
CHAPTER VIII

An Analysis of Acoustic Perspective from Two Radio Drama Productions from the 1982/83 Season.

Throughout this survey, the analysis of productions and production methods has been based on complete works with no possible reference to the stages of thought and decision-making which formed the basis of their final configuration.

Observations have been cast in the shape of informed conjecture without the possibility of seeing how a play might look had different versions of this or that scene been used.

This final section will look at the question in some detail with the aid of scenes drawn from two recent productions from which the author was permitted to retain outtakes. The two scenes chosen shed light on one of the basic problems of radio drama and one which has been already alluded to with the aid of finished productions: acoustic perspective. Both scenes illustrate how, by the use of differing approaches to microphone technique and by the shading and timing of, in some cases, single words, the listeners' perception of the thread of the narrative can be considerably altered.

In each instance, the common feature is the use of depth and a certain freedom from the purely data conveying aspect of speech. Consequently, using the ear alone it is possible to establish a stream of consciousness equal to the perceptive faculty of the eye. Related to this are such elements as the way the relationship between protagonists is portrayed, how stereo o
in some instances, mono space is manipulated to distinguish between main and peripheral components of a setting and how too, planes of acoustic activity can be developed which serve as 'sightlines'.

The first scene is taken from the play 'Schlesisches Himmelreich' by Erich Loest, directed by Jorg Jannings, sound engineer Peter Jochum. 'Schlesisches Himmelreich' is the story of a family reunion soured by the dangers of reminiscence, national prejudice and failed ambition. The subject is a very real one; a family forcibly separated by World War II with brothers and sisters growing up in very different environments; Poland and West Germany.

The scene chosen occurs early on in the play and concerns the arrival of Heini, from West Germany, with his brother Antek, who is half Polish, at the family home. They enter the kitchen where Stefcia, their sister, is about to prepare a meal. Later they are joined by Maria, the other sister, and her husband Ernest from England.

This scene posed a number of technical problems in that, within one studio, it was necessary to create three separate areas of activity: a principal acting area together with two subsidiary areas. Figs 57 & 58 show a reconstruction of the scene during recording in Studio VII/3.

The principal area was based around an SM69* stereo microphone with the capsules set wide at 135° to give as broad a coverage of the room as possible. The second area in use outside the main area was covered by a U87* mono microphone panned far right. The

* Neumann Condenser Microphones
Figure 57.
Studio VII/3

Microphone layout for scene from 'Schlesisches Himmelreich'.

Principal area covered by SM69.

Second area panned far right (Stefcia chopping meat) covered by U87.

Third area (kitchen range) covered by U89 and U87.

Source: Andrea Stainsby.
Figure 58.

Studio VII/3.

Reconstruction of recording of scene from 'Schlesisches Himmelreich'.

Source: Andrea Stainsby.
third area was centred around the 'kitchen range' and was covered by another U87 set to an omni directional characteristic and a U89* (flat response). All microphones other than the U87 on the kitchen had a cardioid directional characteristic.

The two kitchen microphones were provided as spot microphones, the U89 to pick up the sound of the saucepan on the hotplate, and the U87 for use as a speech microphone later in the scene. The second U87 was used to provide a degree of separation for the sound of Stefcia preparing the meat. Since this involved chopping pork cutlets, it was essential to be able to regulate the volume of the blows. At first, a limiter was used but was found unsatisfactory. Not only did it clip the initial outline of the chopping blow, but the noise of the saucepan boiling in the background was heard to pump up and down. In addition, speech was affected so that in the event it proved easier to ask her to moderate the chopping herself, the microphone then being used simply to spot her on the stereo sound stage.

Acoustically the scene was organised around three 'sightlines' which served to fix points of perspective:

Back
____________________________ 1. Saucepan boiling
____________________________ 2. Meat chopping
____________________________ 3. Voices at beginning of scene

Front

Line 1 is present from the beginning of the scene and is the sound of the saucepan simmering in the background (centre).

Line 2 comes in roughly half way through the scene and is the sound of Stefcia chopping the meat (far right).

* Neumann Condenser Microphones
Line 3 starts at the beginning but diminishes in importance about half way through with the exit of Ernest and Maria Hearn. This line is less precisely defined than the other two because the voices are heard to make use of the whole width of and some of the depth of the sound stage. It nevertheless plays a dominant part because of its high average density and the fact that it constantly reminds the listener of its presence.

To make the addition and subtraction of these sightlines clearer, the reader is referred to the extract from the script beginning on page 140.

Overall scene setting is effected by the sound of the saucepan boiling, quiet yet pervasive; references to meat, pork etc., strengthen the impression of a kitchen. The initial impression is buttressed by the remaining two levels, contributing to the sense of a room being used and filled with people and activity.

Four versions were recorded of this scene. The first three were essentially taped rehearsals and in analysing the versions selected this has been borne in mind. The last version, though the one eventually used in the finished production, does not necessarily present features compatible with a good piece of stereophony, so that for the purposes of this discussion it will be treated as of equal value to the others.

Of the four, the first and the final version stand out as meriting attention.
This reading of the scene is the most notable in displaying a high degree of spontaneity and is almost improvisatory in character. Little had been fixed in the way of 'blocking' so that the cast was still working out positions and moves from one microphone to another. This approach gave rise to a quality of acting which firmly placed the microphone in the role of observer. Features noted were the way in which odd words or fragments of sentences would suddenly recede or intensify for no immediately apparent reason. At another point the two brothers Antek and Heini completely disregarded the microphone and talked amongst themselves almost with their backs to it. Closer listening however revealed that the movements of the actors could all be accounted for provided the listener was prepared to relegate his attention to the text.

The most outstanding example of this is to be found halfway through the scene during a tête-à-tête between the two brothers. To describe this in context though, we need to refer back to the beginning of the scene and the three sightlines which were used to fix points of perspective.

At the beginning of the scene, lines 1 and 3 are prominent. Antek and Heini have just entered the kitchen from the centre back and are greeted by Stefcia (left). From this point onwards, the acoustic activity density of line 3 is maintained at a high level reaching a maximum with the entrance of Maria and Ernest a quarter of the way into the scene. This maximum is retained until their departure again later on, after which the activity
density of line 3 is reduced considerably.

A short while before, Stefcia begins preparing the meat, chopping it on a board, far right. In terms of maintaining the overall level of activity, beginning the preparation of the meat at this moment serves to lessen the impact of the sudden thinning-out of the scene when Maria and Ernest leave. This can be seen as a form of transition giving the ear's 'eye' time to adjust to a new order of precedence of the sightlines. Attention is transferred from the foreground to an area whose foremost boundary lies at a middle distance. The ear is led to adjust the requisite level of attention from a fairly low level (sightline 3) to a higher one necessary to cope with sightlines 1 and 2. From a psychological point of view, this preparation is all important. Antek wishes to have a 'quick word on the quiet' with Heini about something which if he is not careful might upset Stefcia. The two men walk round and back to the rear boundary of the scene originally determined by the saucepan simmering on the hotplate (sightline 1). This now acts as the point of focus for their conversation. Because this is technically off-microphone, the quality of their voices is indistinct and contains a fair proportion of room sound. Furthermore, because little attempt was made to increase the microphone level at the fader, the ear has to work hard to comprehend the content of their talk. The result is that the listener has to eavesdrop, the impact of the privacy of their chat is heightened and the relationship between the two established.

Throughout is heard the chopping noise from Stefcia serving to maintain our awareness of her presence and leading to an interesting paradox. Without Stefcia, the two men could have
been anywhere in the room and their talk would have been public. With Stefcia there, the ear's attention is momentarily diverted by the chopping noise, the listener is frustrated and the privacy of the chat gains in significance. Stefcia is the element transforming the exclusiveness of the listener/Heini/Antek relationship from one with a casual element into one with an enforced eavesdropping element. The listener is no longer the only party to the conversation; Stefcia is there also.

Within this short extract then, two main components are prominent:

1. the adjusting of the ear's level of concentration in readiness for a change of perspective,

2. the levelling of a condition on the nature of the ear's response to that change.

Version 4 (Tape example 30)

Whereas the actors' initial response to the scene was characterised by a high degree of spontaneity, the final run used in the production revealed an approach tailored more to the demands of the medium perceived in conventional terms, and which lost much of its improvisatory quality. Part of the reason for this lay in a decision by the director to introduce embarrassed silences in the dialogue as a way of suggesting an underlying lack of familiarity between the various parties. It seemed a pity that what was otherwise a perfectly valid dramatic device had to be introduced fairly late in the day because it resulted in a retrograde but, from the point of view of this study, interesting side-effect.
Asking the cast to introduce pauses in the dialogue gave rise to pauses in the continuity of motion around the studio. In Version 1 it was possible to trace a continuous thread of movement as the situation in the kitchen developed. Part of the success of this version lay in the way the ear was adequately prepared for each change as we have seen, for example, between Antek and Heini. The introduction of pauses led to a disruption of the flow and a consequent jarring of the stream of information received by the listener. In effect, the actors' delivery of their lines was being monophonised - their voices reduced to static articulators dotted about a relatively shallow sound frame.

In this respect, particular mention should be made of the role of Ernest Hearn. Whereas the members of the cast from Poland and West Germany appeared quite at ease with the idea of acting script in hand before the microphone, this actor who was British, appeared to have difficulty in ridding himself of the notion that the microphone at all times required to be spoken to. Consequently, the role of Ernest Hearn was made to appear wooden, lacking any real depth and quite unnatural. A simple pointer would have been to ask how such a character behaved in real life and then apply the answer to a drama studio situation. In the first version, the answer was very nearly arrived at; Hearn, though remaining relatively static, did back off from the microphone and the immediate impression was that he related to the general proceedings in the room. In the present version, his voice remained too exposed while too close for it to be satisfactorily integrated.
A similar situation where acoustic perspective and dialogue content appear at odds with each other is to be found again during the Heini/Antek conversation. In Version 1 we noted how using the back of the studio to enhance the privacy of their exchanges, whilst appearing to sacrifice intelligibility, contributed greatly to making the listener aware of the overall situation. In the production version, the state of affairs was reversed. Heini and Antek are made to speak up-front which, though ensuring that every detail of the script is heard clearly, does nothing to enhance the air of secrecy around Antek's wish to return to West Germany. Furthermore, the chopping sound from Stefcia is no longer allowed to intrude upon the talk and we are back to the notion of radio drama as a simply rather specialised literary construction. The up-front quality of this section of the dialogue was also compounded by the two actors speaking to a single mono microphone, U87, rather than being heard on the back of the SM69. This tended to keep them on the spot with a corresponding loss of stereo ambience at a time when a degree of room presence would have been advantageous.

Which version represents a more nearly stereophonic approach to the use of the radio drama studio? To evaluate this, it was decided to introduce a handicap in the listening chain which consisted of simply listening to the signal monoed on a rather poor quality loudspeaker with a pass-band roughly equivalent to an average portable radio. The reason for adopting this was that by introducing limitations similar to those which the broadcast signal would experience on reception in a 'worst-case' situation, it should be possible to subjectively determine where the borderline lay between a data-communication approach to radio drama and one where the use of the apparatus is optimised in
creating a picture in sound. Not surprisingly, Version 1 proved less compatible with mono listening conditions than the broadcast version but the reasons for this are less evident. The situation is analogous to watching a play in the theatre from a) a seat in the middle of the stalls, and b) a seat towards the back of the upper circle. In case 'a' the onlooker will be able to see much of the detail of gesture and nuance which the actor brings to bear on the role. In case 'b', the onlooker will be reduced to capturing a microcosm of events on the stage some 20 or 30 meters distant. If the actor attempts to 'play to the gallery', the person sitting in the stalls will see an exaggerated portrayal of everything whilst the person in the upper circle will no doubt hear the words but will still lose much of the more subtle effect because it is almost impossible to capture other than gross facial expressions over such a distance.

The mono-compatible version had to sacrifice much of the more intricate acoustic detail heard otherwise on a high quality system, for the sake of intelligibility aimed at more 'lo-fo' reception conditions.

The example drawn from 'Schlesisches Himmelreich' shows what could have been done, had both director and sound engineer worked towards the development of sound cue patterns capable of sustaining the listener's perceptive acuity at a high level.

It could always be argued that, by doing so, there is a danger radio drama will revert to television minus the visuals. This is a fallacious argument because it otherwise presupposes we should have all been blind from birth. Ultimately, everything we perceive will be interpreted in visual terms or will contain
a visual component because of the immediacy of the visual faculty. Where radio drama is able to maintain ascendancy is in its ability to tease out events from the memory which, when put together using the matrix supplied by the drama, constitute a satisfying dramatic experience. The exploitation of all the resources which modern sound technology places at the director's disposal to achieve that is the primary aim.

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The second scene is taken from the play 'Innenansichten', by Gwen Cherell, translated from the English by Valerie Stiegele. 'Innenansichten' was directed by Horst Vollmer whom we have already met in connection with 'Oliver' and 'Der Untergang der Titanic', and is an account of one man's quest for silence. He is bombarded with noise, whether from his wife who has no understanding of his desire, from the neighbourhood or from his place at the office. His search for peace eventually leads him to take drastic action with fatal consequences.

Vollmer's approach to radio drama has always been quite uncompromising in the search for a truly stereophonic articulation of the sound stage. 'Innenansichten' was built up on an optically based 'auralisation' of the manuscript. This involved a transliteration of optical cues in terms of sound with the result that it was decided to place two rooms side by side, each occupying half of the sound stage: the kitchen and the living room. This enabled transitions from one room to another in a number of scenes to take place literally, i.e. without the use of the crossfade. As an artificial device for ensuring continuity
between scenes, the crossfade has certain disadvantages. If used as in this case to effect a transition from one room to another, with a person walking across, it will introduce an hiatus between the scenes. The actual area of time covered by the dissolve presupposes a discontinuity in the action, for the most part a contraction of the time scale normally occupied by the movement, the walk in this case. This was clearly something Vollmer wished to avoid and was the reason for splitting the sound frame down the middle for certain scenes.

This in itself was not without disadvantages. However, such a constraint posed some interesting problems solved in various ways in the scene taken for analysis. As a guide the reader is referred to the script extract on page 195.

In this scene the man, Edward, is having breakfast with his wife, Doreen, in the kitchen. Whilst they are sitting at the table, Edward thinks it would be a good idea not to go in to work that day but to go into the country. Doreen is unable to understand why. Edward then recounts his daily experience of getting to work and rounds off with a plea to her to come with him for a day 'away from it all', "Doreen, bitte lass' uns aufs Land fahren!" Her only thought is that she will be late for work.

Vollmer planned the layout of the scene as follows: Doreen begins by Hoovering in a neighbouring room, back right. Edward sits at the table in the kitchen. After a brief altercation, Doreen finishes the Hoovering and walks across into the kitchen. This transition is initiated in mono, Doreen appearing to walk down the monophonic 'tunnel'.

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towards the listener. At a point front half right, she enters into the stereophonic sector of the sound frame and her movement becomes literal - across to the kitchen. The boundary is now defined beyond which the bulk of the scene is to take place. At no time during this sequence does the listener receive the impression that he is hearing 'mono' as it were. It is accepted there has been activity (sound of the vacuum-cleaner) in another room. The dialogue prepares the listener for Doreen's eventual move to the kitchen to have breakfast with Edward and so the ear accepts the transition without the need to suppose how it might be done. Had a crossfade been introduced then it is feasible that it would have been registered as such, and the continuity of the scene broken. Taking the move as a continuous one, the ear is unaware of any interruption to the flow of events. Realism is also maintained.

After a short piece of dialogue and some movement again by Doreen, she goes to use a liquidiser, after which Edward gets up and moves towards the window. At this point, Edward is set in perspective and speaks across from the window to Doreen. Doreen is in sharp focus, Edward further away and more reliant on room acoustic for the listener to place him accurately in the sound frame.

Vollmer then introduces an almost complete change of focus and brings Edward up-front into an 'abstract middle-point' as he recounts his daily routine. The problem now is how the move back to Doreen is best dealt with from a point acoustically almost identical with the breakfast table.
Of the outtakes available, three illustrate possible solutions. Each relies on distinctive changes in acoustic perspective (because the takes are from rehearsals, they do not show the particular effect described to full advantage. It is felt sufficient is there, however, to convey the essence of what is being discussed). In some cases, the timing of cues is refined down to single words. The spacing of these cues coupled with movement between them particularly in a rearward plane can change the listener's perception of events quite markedly.

The recording of this scene took place almost entirely in Studio VII/3. For the beginning, Doreen walked across from Studio VII/4 (SM69 with only one capsule in use) through the studio partition and round the left side of the stereo SM69 in Studio VII/3. To create the necessary effect of distance for the hoover, the door between the two studios was left only half open. This had two desirable results:

1. the actors were forced to shout at each other through the door, otherwise cues would have been lost

2. the sound of the vacuum cleaner was altered to the desired quality

Edward's monologue was recorded using a U87 placed next to the window in Studio VII/3. Figure 59 shows a reconstruction of this part of the scene.
Figure 59.
Studio VII/3.
Reconstruction of scene from 'Innenansichten'.
Source: Andrea Stainsby.
The three versions of Edward's move back to the table convey different moods; from the detached and contemplative through to the nervous and imminent. They also mirror the degree or kind of involvement required of the listener.

In version 1, Edward's monologue is restrained and reflective as the tale of his journey to work and day at the office is told. Similarly, his re-emergence from the monologue and plea to Doreen is an appeal to her sense of reason, an assumption on his part that she will understand his predicament. (Tape example 31)

In version 2, much the same state persists except that the listener is given a hint that Edward is in worse than a predicament. There is an undertone of a threat – a threat that unless Doreen is prepared to give a little and allow Edward the peace and quiet he so desperately craves, something drastic may soon happen. (Tape example 32)

In version 3, the imminence of Edward's anguish is brought to the fore and the listener is drawn almost without choice into the maelstrom of his torment. (Tape example 33)

How is this achieved? Timing of word cues and their relative positions in the frame of acoustic perspective are the basis. This is best explained with diagrams, see figs 60, 61 and 62.

The diagrams represent an attempt to 'block' out a studio much in the fashion of stage blocking in the theatre. The principal difference being that, in the theatre there is a fair amount of leeway governing the placing of words and sentences
Figure 60.
Studio VII. 'Innenansichten'.
Blocking out for version 1.
1 Edward shuts window after delivering monologue.
2 says "Doreen" during walk to SM69.
2 - 3 between points says "lass' uns aufs Land fahren". On arrival at 3 puts cup down on table.

Source: the author/Andrea Stainsby.
Figure 61.
Studio VII. 'Innenansichten'.

Blocking out for version 2.

1 Edward shuts window and says "Doreen".

2 during walk back to SM69 says "bitte".

3 - 4 continues with "lass' uns auf's Land fahren".

4 puts down cup and saucer with a clatter.

Source: the author/Andrea Stainsby.
Figure 62.  
Studio VII. 'Innenansichten'.  
Blocking out for version 3.  
1 Edward says "Doreen"  
2 begins with "lass' uns aufs Land fahren"  
2 - 3 continues with "einmal ein bischen Ruhe und Frieden, ja?"  

Source: the author/Andrea Stainsby
relative to stage movement. In radio drama, the relationship between words and movements is crucial. The word as such is the principal and sometimes only, element available to the actor and director with which to articulate sound space. Sound effects may add to the battery of stimuli perceived by the listener and help form an overall impression of the framework surrounding the action, but the word is the basic means by which we hear where the actor is in front of us and why.

In version 1, after Edward has delivered his monologue and shut the window he walks back to the main SM69 from behind during which he says "Doreen". This word is heard at quite a low level and with some ambient content. His footsteps continue round to the front of the microphone during which he says "lass uns aufs Land fahren" and puts his cup down on the table. This last phrase is heard to increase in intensity until he is seated and strengthens the impression of motion.

In version 2, there are slight but all important changes. "Doreen" is heard whilst Edward still stands at the mono U87. Almost immediately, he walks back to the SM69 during which he says "bitte" (technically, the level is too low). Towards the end of the move back he continues with "lass uns aufs Land fahren" on the back of the microphone and as he sits down, this time to the side of it, the clatter of the cup and saucer is heard imparting a sense of discomposure to his movement.

Version 3 shifts the whole movement towards the front of the sound frame. "Doreen" is said at the U87, there is a short walk to the stereo microphone, a few paces only, "lass uns aufs Land fahren" is heard almost as if in one breath and
the remainder of the dialogue continues close up as if he were still standing by the U87.

Within our terms of reference, which version appears to be the most successful?

One of the main problems already mentioned is the apparent width of the sound frame within which Vollmer chose to operate. It might seem strange that having narrowed the sound frame down in one direction he did not attempt to maximise the use of depth in the context of a room such as the kitchen. Versions 1 and 2 do precisely that (they were not however referred to in the final broadcast tape) and give a perhaps welcome respite from the otherwise continual close-up treatment of the characters. Version 2 succeeds further in that it solves to some extent the problem of Edward reappearing at a point in the room little removed from that of his monologue. Instead of simply shifting him further to the left which would have landed him on top of Doreen anyway, he appears further away but not so much as to deprive him of the immediacy of his relationship to her. Most importantly, the listener hears that a change of position has occurred which is sufficient to make his move from the monologue back to Doreen appear purposeful. In other words, Edward still moves within a clearly defined room and not back and forth along a line in front of the listener as in version 3.

The extent to which the director may wish to use sound space is mainly governed by dramatic considerations. It has already been pointed out with the three versions above that each conveys
a particular dramatic note which has to be seen in context.

In version 1, Edward is heard to move away from the listener towards Doreen. The listener is kept at a distance. The relationship of Edward is to Doreen and the listener maintains only a peripheral presence. Such involvement as there is lies on a rational plane, "bitte, lass' uns aufs Land fahren" appeals not only to Doreen's reason but also to the listener's.

Version 2 maintains that sense of detachment, this time though more for the listener than Doreen.

Version 3 through its directness, appeals to Doreen and the listener as if Edward was really saying "Unless you allow me some peace and quiet, it will be the worse for us all".

The choice of version will also determine the pacing of later stages of the play. If the listener is to be made aware initially that Edward views the noisy atmosphere simply as a minor irritant, then version 7 would most likely apply. If, on the other hand, Edward is already genuinely disturbed by the noise, then version 3 (and the broadcast version) is the obvious choice.

Such pacing is important because it indicates at what stage the listener is to be introduced to the situation and at what level. Vollmer clearly wanted to underscore the threat of Edward's situation early on in the play, hence the choice of the broadcast version.
From these two extracts, it should be clear how almost minute changes in the timing of words during a movement around the microphone can materially affect the way in which the listener responds to the flow of events. Acoustic perspective becomes then not just a matter of overall scene depiction but also a very fine dividing up of the studio space wherever that may be, so that the significance of detail in the relationship between protagonists becomes clear. The accumulated perception of these details and their inter-relationship forms the basis of a natural and 'true to life' depiction of situations. Without it, radio drama does little justice to the depth and breadth of human aural perception.
SUMMARY

In the course of this study it has emerged that, aside from the historical changes in the development of radio drama recording technique, monophony as a viable production medium in radio drama remains worthy of consideration.

Monophony survives in the main where production schedules and, it must be said, the content of the drama are such that the low status of the material recorded warrants little investment in either time or creative input.

The productions coming from Hessischer Rundfunk during the 1950's and early 1960's however tell a very different story. Monophony was then the only medium available, stereo being very much in the experimental phase, so that it was necessary to work with and get the best out of what there was. To men like Reinhard Krawulsky, working in mono represented the daily application of a lifetime's experience in a medium which had been theirs from the beginning. Monophony was for them a natural form of expression, a language requiring the ability to analyse and extract the essence of dramatic situations in order for them to be represented via the radio in a way which made complete sense to the listener. One facet of this, the art of balancing sound at the mixing desk, was particularly stressed by Herr Krawulsky throughout the interview I recorded with him before his death. (68) Not only was this a means of ensuring that the full force of an impassioned dramatic encounter, for example, could be accommodated within the limitations of AM transmission and reception but it also amounted to an art form in which the engineer came to interpret levels and combinations of sounds heard through the monitor loud-
speaker in terms of the self same restrictions. Today, this is not practised to anything like the extent it was but it highlights a change which has come over the whole spectrum of sound recording and broadcasting. The imperfections of the old mono age demanded an approach in which the engineer was obliged to integrate himself with the apparatus, to identify with it to a degree in which every quirk of the apparatus was known and a method of accommodation worked out. In the normal course of events, this may well not have resulted in an approach by the engineer which could be considered particularly artistic. In the case of Reinhard Krawulsky, this was very far from the case. His mastery of the limitations of his medium and the equipment enabled him to develop a way of handling the apparatus which went beyond simple compensation towards an exhaustive application of the means at his disposal.

With the coming of stereophony, it seemed that such an art was to die a lingering death. The advent of magnetic tape recording almost completed the circle of technical improvement and, certainly as far as the broadcasting-house-end of things went, enabled recordings to be made with ease which technically were little different from anything today. Stereophony, by introducing an apparent element of realism, completed the circle in its entirety so that the art of the medium as Reinhard Krawulsky knew it no longer applied.

The introduction of stereophonic recording and broadcasting however, opened producers' and engineers' ears in a different way. Whereas in monophony the emphasis lay on an artistic interpretation of what was heard with one ear closed as it were,
stereophony required that the other ear be opened but nevertheless, still left the listener blindfolded. In other words, it was now perfectly feasible to hear sounds coming from various directions, as in real life, which were real to a greater or lesser extent. Blindfolded though, the listener had no reliable clues as to where he really was. His location could be exteriorised but remain entirely fictional. The listener had gained in ability to decide in which direction his sense(s) should be leading him but was still unable to give his bearings. Early stereophonic radio drama tried to compensate for this by exaggerating the gains - movement became portrayed in a manner at times bordering on the preternatural - invisible people made giant strides across an invisible stage in the listener's living room only to disappear suddenly down long, dark tunnels either side.

As producers and engineers acquired working experience with stereophony, so the desire emerged to experiment with some of its intrinsic characteristics. Space could be divided up and each division made to represent or portray a particular sphere of activity. No longer was it necessary to consign each of these spheres to an order determined by time alone. Stereophony enabled several spheres to be present at the same time; several strands of an argument could be presented simultaneously.

Studio acoustics also took on a new significance. Whereas monophony made use of 'room-tone-colour', so stereophony came to make use of 'acoustic-sound-space'. Not only could a room be made to sound in a particular way by the actor's voice exciting reverberation, but this sound could be spread out, if need be, to occupy the entire space between the loudspeakers.
With this came a danger. Space, like a vacuum, needed to be filled with movement and with objects signifying a reason for the movement. In stereophony, the capability of being able to represent movement in something approximating every-day experience brought with it the possibility of wanting to fill the space with all the paraphernalia of everyday life. At first, every-day life and all its paraphernalia was used to clutter the sound stage but it soon became clear that at any particular moment, much of this clutter was redundant; the ear, like the eye, focussed on events which were the centre of interest whilst ignoring the rest. The ear's acuity was less than that of the eye, so that an order had to be imposed on the presentation of material. The basis of that order was once again, time.

Two factors emerged then in the handling of stereophony, time and space. Time determined when, and space determined where. In the general order of things, time is indispensable. Space, though, is of secondary importance provided that a single 'slot' exists within which time can operate.

Monophony provided the single slot of theoretically infinite depth and infinitesimal width. Stereophony enabled the slot to be widened until it reached almost the whole width of the space between the speakers or, it enabled an almost infinite number of slots to be spread across that same width.

From this, a choice becomes apparent; where time is an over-riding factor, monophony seems the solution. Where time and space are both important, then stereophony is the choice.
Sadly, the choice seems to be very heavily weighted in favour of a stereophony which 'does' for everything. The idea that there may be aesthetically valid reasons for choosing monophony seems to have taken an historical back-seat. Peter Jochum, senior drama production engineer at Hessischer Rundfunk, compared a good monophonic radio play to the aesthetic of a good black and white Hitchcock thriller. Colour makes the blood red, perhaps too red. Black and white gives the viewer the opportunity to colour it with his own shade. Whether actual or imagined, blood is blood. (69)

Where does this leave stereophony if we are to accept that monophony possesses its own validity as a radio-dramatic medium? Is there such a medium as 'Idiostereophony'?, a form of stereophony which like monophony is irreducible? Where, for example, the requirement of mono-compatibility would render it meaningless to the listener? Two works examined in the course of this study came very close in my estimation to defining 'Idiostereophony': 'Der Untergang der Titanic' and 'Das ist doch kein Berufsverbot'.

'Der Untergang der Titanic' is an example of an approach to stereophony which, far from attempting to recreate an existing slice of 'reality', took a very detached view of the space between the two loudspeakers of a stereo array. This space came to be used rather like a background for a montage of sound objects. The producer had complete freedom over the use of this space and, because any comparison with reality was impossible and unwarranted, the charge of inadequate or distorted depiction could not be laid against it. In an article in the magazine 'Akzente' from 1969 the dramatist Johann M Kamps discussed
"In reality, stereophony does not replicate a room, rather it evokes the impression of spaciousness. This it does in a questionable manner. (Stereophony) steers the attention of the listener in the direction of the spatial distribution and simultaneity of acoustic signals, it projects acoustical events always in the line of sight of the listener and gives him a representation which is necessarily only a fragment and whose format is determined by the loudspeaker arrangement. It leads to a process of perception which though a development of the ear's ability to localize sounds, is based, in the main, on the way in which the eye functions. Stereophony pretends to conjure reality in a way which is normally the product of the interaction of all five senses. For this reason, the illusion is bound to fail."

Later, in the same discussion, Kamps remarked how technical developments in the medium had led to a reduction in its ability to compensate for the lack of the other four senses.

"It is not to be wondered at that the perfecting of the acoustical production and broadcast system (stereophony) brings results which causes the listener to regret the absence of the other missing possibilities of perception."

'Der Untergang der Titanic' answers Kamps' criticism of the new medium in a number of ways; it does not seek to replicate a room but simply to evoke a space within which acoustic events may take place. It does project acoustical events in the line
of sight of the listener, but these acoustical events represent
the totality of all that is going on, so that the listener is
not concerned with the need to complete an otherwise very
incomplete representation. By restricting himself to the format
offered by the loudspeakers, the producer, Horst Vollmer, ensured
that the listener was kept 'in the picture' and not subjected to
a sudden perceptual jolt as when sounds might be made all of a
sudden to come from only one speaker, the door leading to a
monophonic corridor.

'Das ist doch kein Berufsverbot' answers Kamps' criticisms
from another angle. The microphone is used in a manner very
similar to the way in which human attention works: for relatively
short periods and then mostly focussed on a particular event.
During these short periods the quality of information fed is of a
very high order. Room ambience is highly characteristic, actors
perform as if the microphone were not there. There is also a
high degree of spontaneity, not least because the script serves
as a basis from which to work and not as a means whereby the
author imposes some kind of will upon the performer. Contrary
to Kamps' view, using the ear in this way does not lead to the
listener regretting the exclusion of the other senses. Rather,
the imagination is stimulated almost to fever pitch, through
something bordering on a surfeit of the right ingredients.
Reduced to mono, the listener is confronted with an at times,
confused jumble of sound colours distilled indiscriminately
from the stereo original.

As with 'Der Untergang der Titanic', the reduction to mono
of sounds moulded entirely in the context of stereophony implies
foresaking the human logic of the production process for the entirely random yet unmoving logic imposed by simple electronic circuits adding two stereo signals to make a single mono signal. In view of audio technology's ever-increasing capability of allowing us more and more to decide what we wish to hear, it seems mistaken to compromise our decisions by assuming technology does not allow us that choice.

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SYNOPSIS OF PLAYS

1. **Die Goldene Pforte (The Golden Entry) by J B Priestley.**
   Adaptation of a stage play written in 1950. However, first performed as a radio play, 30th November 1955 as last play of a J B Priestley festival, BBC Light Programme.
   Produced: HR: 27-32.8.1956
   Directed: Ulrich Lauterbach
   Engineer: Reinhard Krawulsky
   Recorded in Studio VT, Hessischer Rundfunk

   **Synopsis:** Martin Harkfast is the owner of an art gallery in Burmanley, a small, provincial town with little interest in good art. A combination of poor business sense and too great an enthusiasm for art for art's sake, has driven Harkfast to bankruptcy. His shop is now little more than an empty stage upon which a string of tawdry local characters play out the various attitudes of the town to Harkfast's plight. The gallery known as the Golden Entry (Gate?, Portal?) because of a sign over the door, is stripped of whatever good paintings Harkfast had whilst the local hacks gloat over his demise. He is befriended by a woman rejected by her husband, and a young couple, and the play ends with a glint of renewed hope in Harkfast's eye.

2. **Ein Lebenswerk, by Gerd Oelschlegel.**
   Produced: 14-18.7.1956
   Directed: Fränze Roloff
   Engineer: Reinhard Krawulsky
   Recorded in Studio VI, Hessischer Rundfunk
Synopsis: Ein Lebenswerk tells of the ruin of an American farmer obsessed by the discovery of oil on his land. John Beverley attempts to trick his neighbour into selling his farm because he knows that oil is to be found there too. Finding that the neighbour already knows, Beverley arranges an accident, killing his neighbour and setting in motion the alienation of his family and the community. Test-drillings end in disaster, Beverley losing his son. His wife leaves him and the old man is left to end his days on the now deserted and barren farm.

Produced: 8-9.12.1959
Directed: Theodor Steiner
Engineer: Reinhard Krawulsky
Recorded in Studio VI, Hessischer Rundfunk

Synopsis: In a society completely subjugated by totalitarian government, there still exists a writer who must be liquidated. His assassin plans to kill him one summer's evening away from public scrutiny and without trace. The assassin and his victim engage in a dialectic of force and spirit - a final dialogue about the death of the powerless.

Produced: 27-31.1.1958
Directed: Ulrich Lauterbach
Engineer: Reinhard Krawulsky
Recorded in Studio VI, Hessischer Rundfunk
Synopsis: Three couples; a middle-aged lawyer and his wife; an aging gallant accompanied by his lover, a third rate bit actress with no prospect of employment, and a young law student with his girl-friend, find themselves sitting at the same table in a dance-cafe. The conversation is continually punctuated with the word 'love', no doubt prompted by the film they have just seen at a local cinema. The two elderly men and the actress bemoan their existence before the others in the party with the deliberate intention of seduction. Eventually, after a series of tragi-comic pastiches, the game of deceptive emotions and domestic melodramas comes to an end, fortunately without any casualties.

5. Der Staatssekretär und sein Steckenpferd, by Kurt Heynicke.
   Produced: 20-24.6.1955
   Directed: Matthias Neumann
   Engineer: Reinhard Krawulsky
   Recorded in Studio VI, Hessischer Rundfunk

Synopsis: A French secretary of state with a passion for potholing discovers there is a lowly member of his staff capable of impersonating him to such perfection that, at first, he is inclined to sack him. The secretary of state has a change of heart when he discovers he is double booked between a private matter and an affair of state. Favouring the private engagement he decides to send the wretched clerk as his double. The clerk accedes if only to save his neck. The deception is perfect and the clerk discovers a lever to his own advancement when, during a potholing expedition, the secretary of state is trapped underground when he should be in attendance at a prestige motor show. The clerk has to
stand in for him but on arrival at the motor show, discovers he has forgotten the text of the speech he is to deliver. The clerk decides to improvise, albeit brilliantly, bringing his master untold political embarrassment and the option of defecting to the opposition, advancing his career at the same time. This he does and the story ends with the clerk well provided for in his retirement.

   Transmitted: 1.5.1934

Synopsis: A propaganda Hörspiel consisting of a series of short scenes played against a background evoking Mayday celebrations as understood by the National Socialist regime of the time - post card kitsch of everyday life in Germany.

7. Gewitter über Elmwood, by P T Wolgar
   Adaptation for stereo and direction: Curt Goetz Pflug.
   Produced: Sender Freies Berlin, 1964

Synopsis: A short thriller adapted for stereo production with a view to highlighting the possibilities of the new medium. A woman returns home one evening from a shopping expedition to find the body of another woman in the garage. As she telephones a friend for help, the line is cut off and there is the sound of breaking glass. Much later, her husband returns home from work with the excuse that the storm raging outside had blocked the railway line. It transpires that instead he had arranged a meeting with his former wife. The encounter turned sour and ended with the murder of the woman,
the body in the garage. The play ends with the husband being shot by his present wife.

8. **Oliver**, a real-fiction Hörspiel by Werner Kofler.
   Transmitted: 13.9.1982
   Adaptation and Direction: Horst Vollmer
   Engineer: Helmut Schick
   Recorded in Studio VII, Hessischer Rundfunk

   **Synopsis:** Oliver is a latterday juvenile pop phenomenon. This Hörspiel is a potted biography culminating in a mini live-aid concert with listener phone-ins, multi-media exposure and all the glitz and glamour that goes with a life among the stars. Oliver is, nevertheless, pure fiction; the real message of the play is the trivialisation of important issues, in this case, the welfare of handicapped people in society, by a branch of the media eager to capitalise on Oliver's moneymaking potential.

   Produced: 1/1979
   Directed: Horst Vollmer
   Engineer: Peter Jochum
   Recorded in Studio VII, Hessischer Rundfunk

   **Synopsis:** Der Untergang der Titanic is a contemplation in words and music of the destruction of the ill-fated White Star liner. Using documentary material, sound tracks from films and original material, Enzensberger succeeds in conveying to the listener, the immensity of the catastrophe.
10. Das ist doch kein Berufsverbot, by Gunter Gröschel and Jonas Lassig.
Directed: Heiner Schmidt
Engineer: Peter Jochum
Produced: Bayerischer Rundfunk, Munich
Transmitted: 10.11.1980
Recorded: Improvised studios, Bayerischer Rundfunk

Synopsis: A young student teacher has the misfortune to be placed in a school run by a reactionary and repressive headmaster. Despite attempts to do her job as best she knows how, she suffers criticism and humiliation to the point where she has no option but to fight back. The headmaster plays his trump card when on examination for her teacher's qualification, he recommends she not be accepted for service in the state sector. This amounts to an effective stop on her further career. She is able to take comfort, however, from colleagues who have also suffered in this way. On appeal, the headmaster's recommendation is overturned and they are free to pursue their careers.

11. Test, by Paul Förtner.
Produced: 16-22.5 and 10-12.6.1968
Directed: Paul Förtner
Engineer: Peter Jochum
Recorded in Studio VII, Hessischer Rundfunk

Synopsis: Test is designed as a game played with hearing. Various aspects of stereophony such as spatial perception, sound source discrimination and acoustical response in rooms
are put under scrutiny. At the same time, 'Test' is a social game, a way of evaluating people's personalities without the use of lengthy psychoanalysis.

12. The Threepenny Opera by Berthold Brecht, Music by Kurt Weill.
Produced: 27.11 - 16.12.1967
Directed: Ulrich Lauterbach
Engineer: Peter Jochum
Recorded in Studio VII, Hessischer Rundfunk

Synopsis: Jeremiah Peachum is the owner of a shop for pedlars' requisites and supplies. His daughter, Polly, falls in love with Mack the Knife, bringing misery and fear upon the Peachum household. Polly marries him, and Peachum in revenge, plans to disrupt the coronation by sending thousands of beggars and pedlars to line the streets of London. His intention is place the blame firmly on the shoulders of 'Tiger' Brown, chief of police who has so far kept Mack the Knife out of trouble, unless he imprisons him forthwith. Brown can do nothing else, and Mack lands in the Old Bailey. At the last minute, before Mack is due to hang, he receives the Royal Pardon and is set free.

13. Innenansichten oder ein schöner, stiller Ort, by Gwen Cherell from the English by Valerie Stiegele.
Produced: Autumn 1982
Directed: Horst Vollmer
Engineer: Peter Jochum
Recorded in Studio VII, Hessischer Rundfunk
Synopsis: Edward and Doreen live in an apartment directly under the approach flightpath of a new airport. Doreen is unperturbed by the noise and indeed seems to enjoy it. Edward however, is gradually becoming more and more sensitised to the noise, a situation made worse by Doreen's insistence on having some form of noise accompaniment to her activities; radio, food-mixer, pressure cooker, hoover, etc. The noise pollution rapidly sours domestic harmony until Edward discovers the absolute quiet he craves by stopping the lift at work between floors. Some while after though, he is discovered and in a fit of desperation he builds sound attenuators into all of Doreen's household appliances. Upset, she attempts to remove them and is killed by an electric shock. Edward, under suspicion of having deliberately engineered the situation to do away with Doreen, is taken away by the police, numb, confused and basically innocent.


Produced: 6-11.6.1983
Directed: Jörg Jannings (RIAS, Berlin)
Engineer: Peter Jochum
Recorded in Studio VII, Hessischer Rundfunk

Synopsis: The divisiveness of war is the theme of this play, dramatised in the reunion of a family split up by Nazi war-mongering. One half is left in Poland, the other in West Germany. Different cultures and political environments have formed the thinking of the two halves but not along the directions imagined. There is still a
hankering after the material comforts of the West, as well as a barely concealed condescension on the part of those who have such comforts. In the middle is Stefcia, wife of Bernhard, Polish through and through and who suffered as a child at the hands of the Germans. Old wounds are reopened and the piece ends with relationships worse than ever.
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