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NOVEMBER 1979 60p

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**Joel Dorn ★ Recording Synths**

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REVERB COMBO • OLYMPIC B1033 DRUM KIT • EMS  
POLYSYNTHI • WLM HIT ORGAN • J&C SPEAKER SYSTEM



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The RS-505 is a paraphonic string machine offering unbelievably realistic string sounds with the range of a symphony orchestra. The three sections of the RS-505-strings, synth and bass, can be played either separately or together. Three modes of pitch shift are available: manual, automatic and pedal and a pitch slider is located on the front panel for convenience. A 49 key six octave keyboard allows full technique to be employed.

The MP 600 has proved to be the ideal piano for live performances. The 64-note keyboard has a weight-balanced action and a built-in graphic equaliser allows the player complete control over sound shaping. A damper pedal provides realistic control over sustain. See the Key Three at your Roland dealer now.

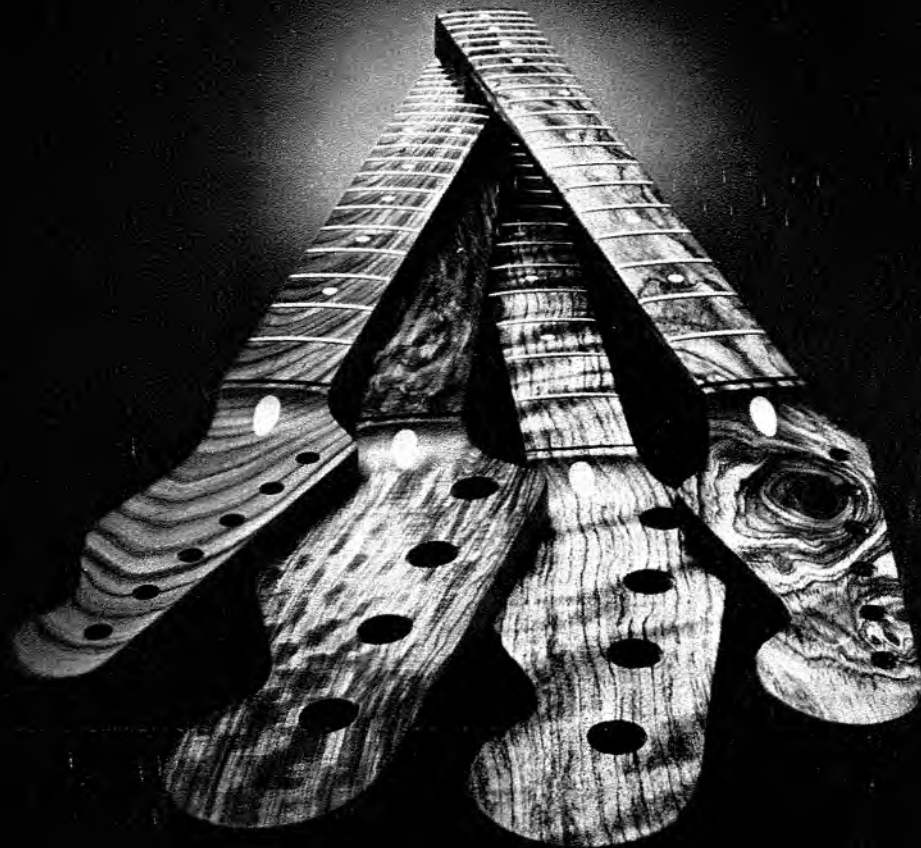


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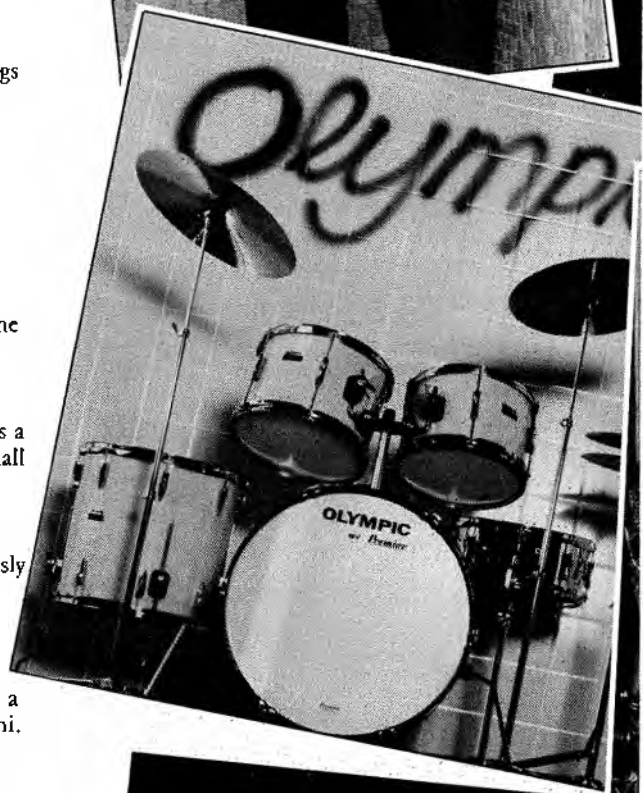
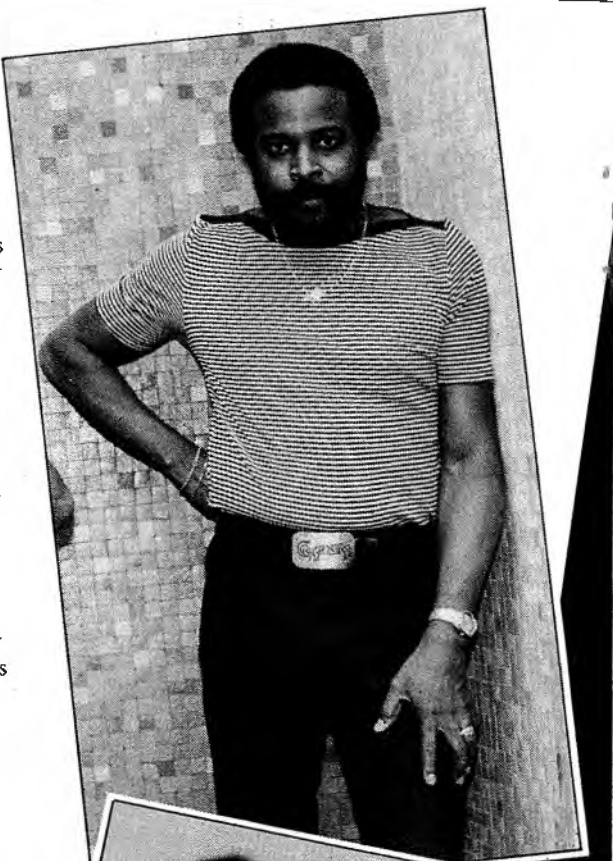
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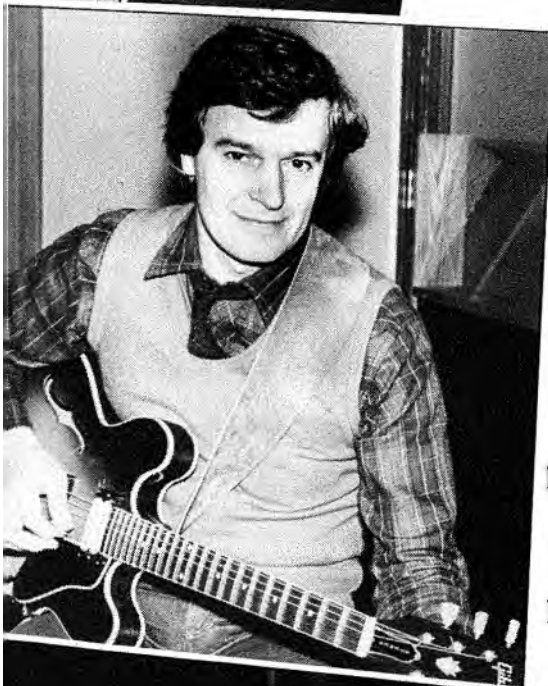
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## EDITORIAL

We have never failed to print International Musician and Recording World! We've never even lost one copy! But you may have noticed that we've suffered delays and difficulties of printing over the last couple of months.

These extreme delays can be blamed on the industrial malaise affecting British Industry as most of the problems have been caused by direct or indirect industrial action at our printers, Carlisle Webb Offset part of the Oxley Printing Group.

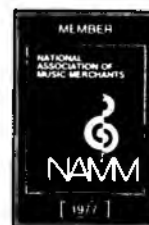
International Musician and Recording World is owned and staffed by people who care about music. We work through the night to produce the magazine on time and despite being the most important musicians' magazine in the world we are still in the hands of our printers. We apologise to all our readers and advertising customers for our late appearance. Believe me it wasn't for lack of effort on part of the IM&RW team.

We are now changing printers after several years with Carlisle Webb Offset. We have been forced to move to independent printers in Essex. We promise that barring flood, storm, pestilence or act of God to deliver IM&RW on time!

We know that IM&RW is the best magazine in the world for musicians and we promise to keep it that way. We also promise to deliver it on time.

Thank you for your continuing support. Keep Music Live.

Richard Desmond  
Managing Director  
International Musician  
and Recording World



Vol. 5 No. 11  
NOVEMBER 1979 (UK)  
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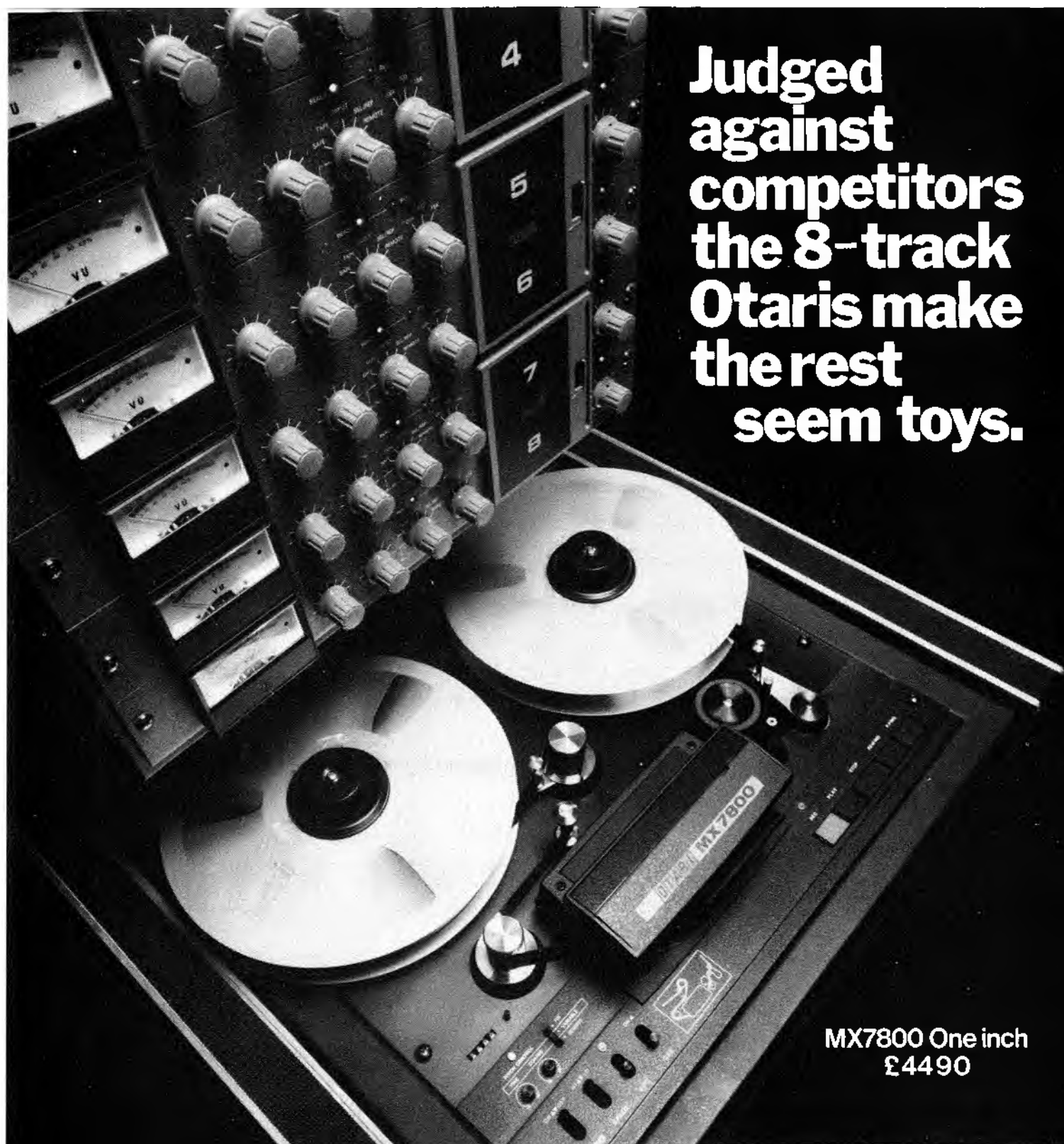
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We welcome your comments and criticisms. Write to: Letters, International Musician, Grosvenor House, 141-143 Drury Lane, London WC2B 5TE.

## Sound Advice

Dear Sir: Thank you very much for all the time and effort that you put into the reply to my letter (*IM Letters October: A Sound Career*). The information that you sent me has helped me enormously in understanding the structure of, hopefully, my career. Since I wrote to you I have had an interview with EMI and may be able to get training there and work in Abbey Road Studios. Thank you once again, I really do appreciate your help.

Graham Clayton  
The Warren  
Rock Robin Hill  
Wadhurst  
Sussex

## Setting the tone

Dear Sir: As always, I read your fine publication since I consider it one of the most informative magazines available today. The recent article pertaining to the Burns guitar was quite interesting to me, especially some of the claims made within the article about the "innovative" tone circuitry.

From the sound of the article, it appears that Mr Burns is using a circuit similar to the one we have employed for the past few years (U.S. Patent No. 4,164,163 and applied for in other countries). Our circuitry allows the humbucking pickup to be continuously varied from the dual coil "humbucking" mode to the single coil "nonhumbucking" mode through the novel use of potentiometers as opposed to the conventional switches.

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I have never had the opportunity to examine the internals of Mr. Burns' guitar but from the description, it sounds amazingly similar to ours. Since our guitar has been in production for several years, I would suppose that we were the first to put this circuit into a commercially produced guitar. In any case, I thought you folks should be aware of this interesting "coincidence". Keep up the good work!

Rick Grigsby  
Director  
International Marketing  
Peavey Electronics Corporation

## PA:CE pointers

Dear Sir: Mark Sawicki's excellent review of our SR402 amplifier (*IM October*) has raised one or two points on which I would like to comment. In particular, he remarks on the accuracy (or rather inaccuracy) of the LED power meters. A few early production models, of which the review sample was one, did suffer from this problem, which has since been rectified by a re-calculation of the resistor chain that fixes the trigger points of the LEDs. Current production models now have meters that are accurate to within approximately one per cent.

The model reviewed also appeared to exhibit higher levels of distortion than is typical. Again, some early models did suffer in this way, not because of the inherent distortion, but due to inductive coupling between the output stages and main HT wiring. A re-routing of the wiring loom has now improved this aspect of performance, giving typical intermodulation distortion of 0.004% at 200 watts into 8 ohms, and THD at 20KHz of 0.01%.

Apart from these minor points, your review is very fair and reflects our own feeling that the SR402 represents a considerable advance in power amplifier design. As with any new technology, there will be a certain amount of concern over long term reliability, and in this respect we feel that our experience with MOS.FET devices, which dates from a time before they were made available to any other manufacturer outside Japan, has given us the ability to produce an amplifier that will prove to be far more robust than if it used bipolar output stages.

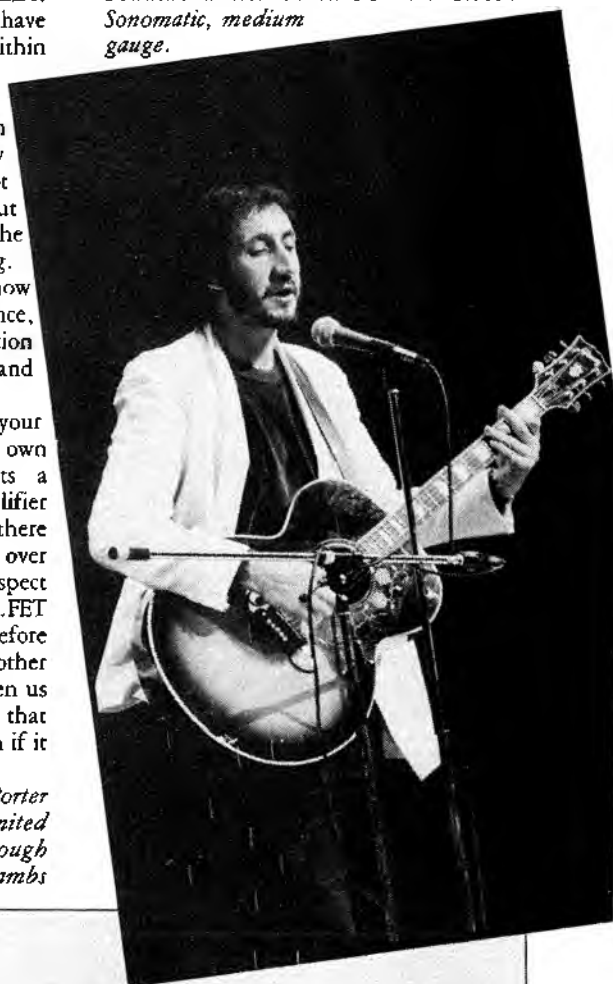
Barry E. Porter  
PA:CE Studio Equipment Limited  
Peterborough  
Cambs

## Townshend's strings

Dear Sir: Could you find out for me please what gauge and make of strings Pete Townshend used on his Gibson SG on the album *The Who Live At Leeds*.

Dave Lincoln  
'White Gables'  
Lower Street  
Horning  
Norfolk

As far as we know, the strings which Pete Townshend used on his SG were Gibson Somatic, medium gauge.

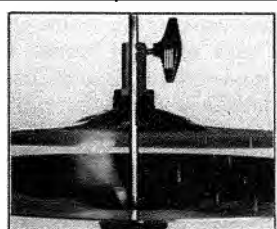


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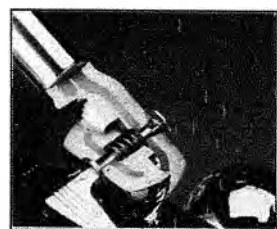
## PERCUSSION

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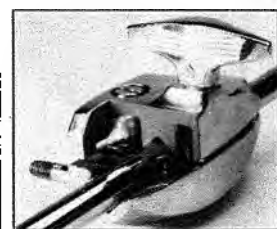
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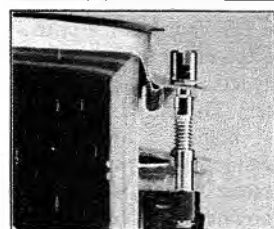
All stand tilters cast over a steel skeleton giving added strength.



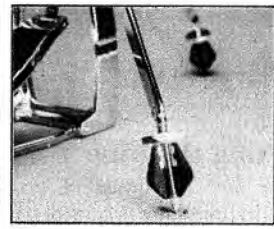
Prism clamping device for positive positioning of tom-tom legs and two dimensional bass drum spurs.



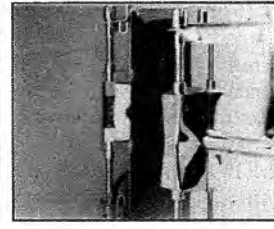
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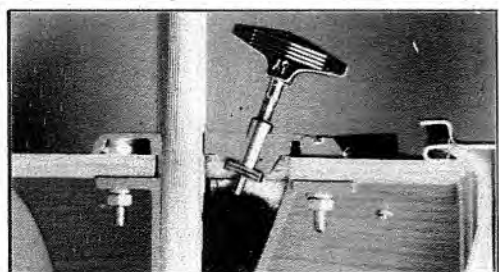
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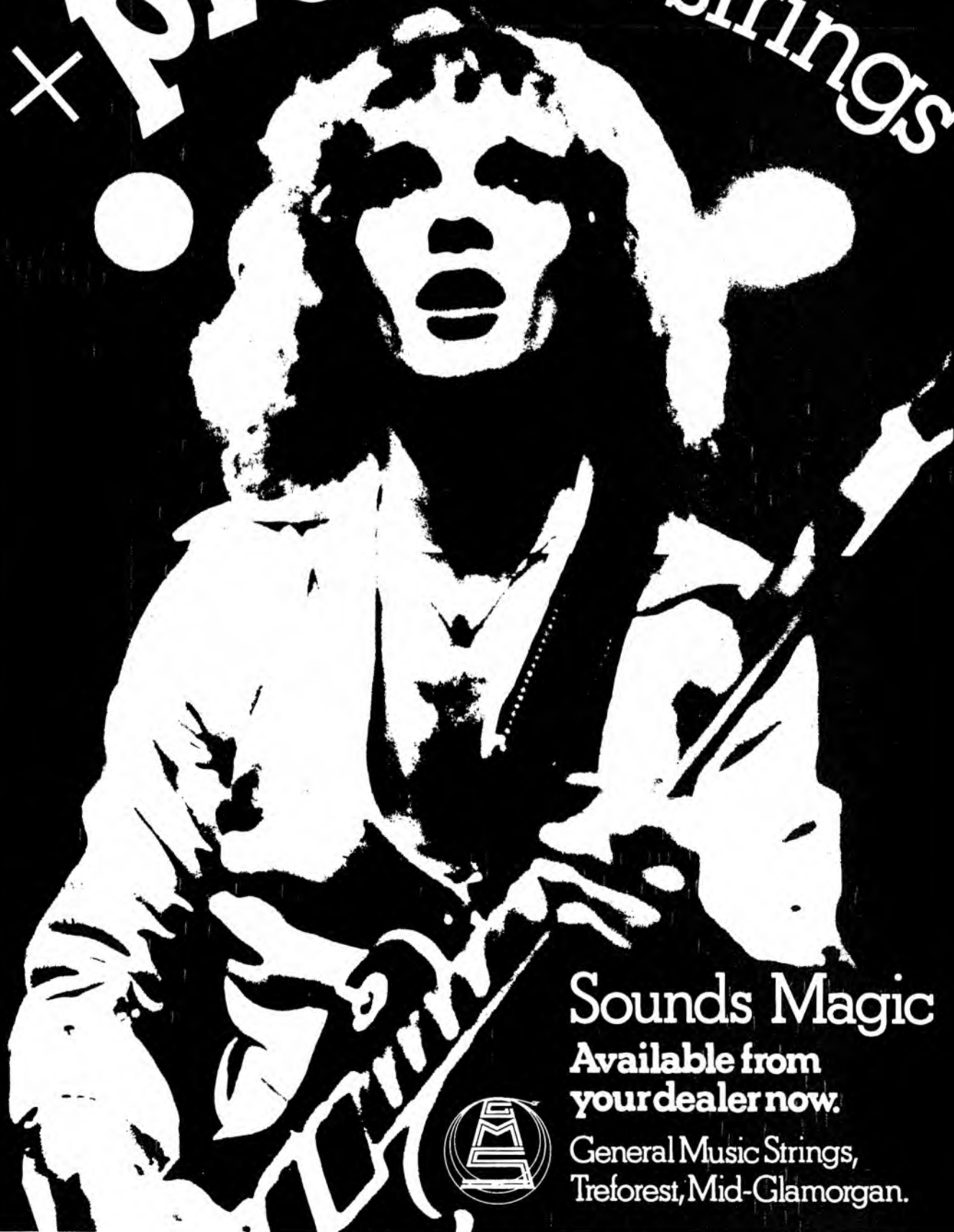
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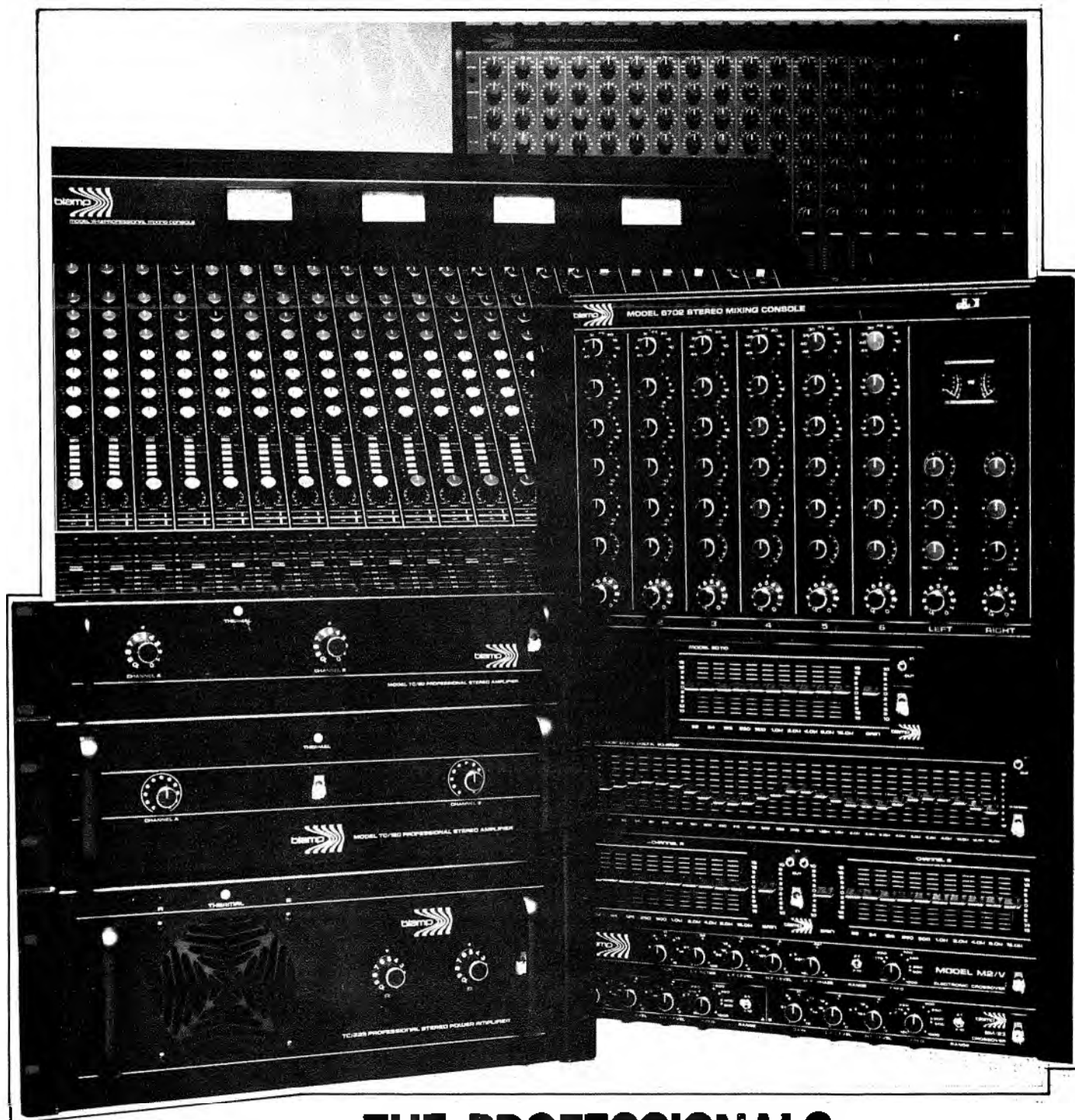
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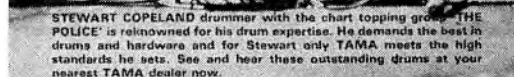
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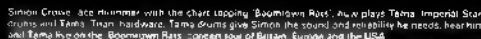
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# Buzz

## What's happening in the music biz

### Turnkey Forum To Open The Studio Door

A two day forum designed to give musicians in-depth guidance on everything they need to know about recording, takes place next month at London's Kensington Close Hotel. Organised by studio equipment specialists Turnkey, of New Barnet, there will be lectures, demonstrations and the opportunity for musicians to try out equipment themselves.

The company is billing the event as the "Hands On Sound Show" and will have a wide range of equipment on view over the two days, December 7 and 8. Musicians will be able to experiment with effects units and other devices, while receiving instruction on all that is involved in recording. A panel of experts will be on hand to take part in a "question and answer" session. The show gets underway at 11 a.m. on Friday, Dec 7th, with an earlier 9 a.m. start on the following day.

### 16 Track Facility for Bristol

The Facility, situated in Bristol, announces that they have rebuilt their studio and upgraded it to 16 tracks. They boast the new Soundcraft console 24 into 16 Series — the very first off the production line. They are the only 16 track in their area and like to work mostly with small bands. The engineer and resident producer is Roger Wall, and the Studio Manager is Rick Yerbury.

The studio can supply a full range of instruments, through Biggles of Bristol, who are probably one of the best group gear shops in the UK. They redesigned the studio themselves, bearing in mind that being able to catch a live or dead sound is one of the most important factors when achieving a band's particular 'sound'.

The unusual construction, which is the result, gives a good live picture from one side of the recording area, and a dead one from the other. The Facility also run a production company and have already signed three bands. For any further information, Rick may be contacted on 0272 49682 and the address is The Providence Meeting Room, 145 Whitehall Road, Whitehall, Bristol.

### Screen Idols

Screen Idols were recently signed to the newly formed EMI Cobra Label to join Darts as special guests on their mammoth tour of the UK. The band's debut album titled *Premiere* and single "Blind Man" are to be rushed released to coincide with the tour.

Screen Idols' personnel include Woody Woodmansey, who back in October '77, dissatisfied with the progress of his group U Boat and anxious for a fresh musical challenge, linked up with Tony Smith, ex-Lone Star. Shortly after, guitarist Ched Cheeseman and bassist Geoff Appleby, both former members of The Monitors, were welcomed into the fold. Michelle Nieddu is the dynamic little lady

fronting this talented group. She previously played bass guitar in her own band.

### The Strays

Anyone based up Worcestershire way will be interested in this recently formed Seventies band (influenced by the Sixties). They are a five piece consisting of lead vocalist Mark Dunning, guitarist Martin Turvey, Roger Gitting on drums, Jane Hall on vocals and keyboards and Pete Shaw on bass. The band was originally formed by Martin and Roger, and Jane is their newest addition. Their present set consists of songs written along with some true Sixties "mod" songs.

Although the 1960s are essentially the band's main direction, certain other influences are apparent in their music. They are presently looking for a record label to sign with. Anyone interested should get in touch with Ventur Musical Services, 12 College Grove, Malvern, Worcestershire or telephone VMS on (06845) 4769/6659.

### Thieves Like Us

It is not often we get a band writing in to us and enclosing copies of a dozen reviews — all of them raving about how great they are, and if the single they also enclosed is anything to go by they deserve every word of it. The band's personnel is Chris Stoner, alias Lord Paygate (keyboards), Tim Barron alias Geoffrey Boycott (vocals), Mark Meredith alias Dolly Parton (bass and vocals), John Parish alias Wurzel Gummidge (drums) and Tony Oxley alias the Wimpy Bar Kid on guitar.

In two years they have completed 184 gigs, and being based in Winchester they have collected a very sizeable following all over the south.

The single, released in August, has so far sold over 1,000 copies. It was named "Record of the Week" in Record Mirror, and has also been given a couple of airplays by John Peel. Available at record shops all over the south of England, the record consists of their three most popular songs — "(Do it) For the Rest of Your Life", "Murder in New York" and "Touch Your Love". However, if you don't happen to live in the south, it is also available by Mail Order (price £1 incl. p&p) from Winchester Wax, 10 Stockbridge Road, Winchester, Hants. Cheques should be made payable to John Stoner. If there is any other information you would like about Thieves Like Us, their telephone number is Winchester (0962) 62581, where there is also an Answerphone.



Thieves Like Us





### Airport

News from Brighton of a four-piece rock band who have been together for six months and are building up quite a following for themselves. The line-up consists of front girl Jane White (lead vocals), Andrew Kinnear-Miller on lead guitar, spoons, pitchpipes etc, Trevor MacNeill (bass guitar and backing vocals), and Nick Candlin on drums. They recently recorded a session for the local radio station — Radio Brighton — which will be going out around November 5th. They play "hot, sticky, and ballsy rock". Any further information can be obtained by writing to Trevor MacNeill, 67a Blatchington Road, Hove, Sussex or phoning Brighton (0273) 737507.

### Wessex in Portsmouth

The South Coast has always had more than it's fair share of musical talent — yet until recently it seemed that the only way to get that talent noticed was to try to interest the jaundiced ears of the London A&R boys. However, Wessex Music Ltd hope to change all that.

Wessex Music is a new publishing company based in Portsmouth. The company's aim is to seek out songwriters and bands and — through their association with the giant Warner Brothers organisation — give local artists the sort of promotion and marketing that until now has only been available in London. The company is the brainchild of Mike Devereux, Nick Hug, Pat Phelan, Richard Newton and Roger Kennedy — and they've certainly got off to a flying start. For their first signing — a Portsmouth band called Gimmix — Wessex have secured a record deal with Electra/Asylum.

The Gimmix first single — called "Too Much Coloured Vinyl" — was recorded locally at Telecomms Studio, where Wessex Music currently has its offices. The company is now busy looking for new signings and — unlike some major publishing companies — Wessex Music guarantees that every demo tape will be lent a sympathetic ear.

Wessex Music is at 189 London Road, North End, Portsmouth. Ring (0705) 62145.

Write to "Buzz", International Musician, Grosvenor House, 141-143 Drury Lane, London WC2.

### Modern Music?

Anyone interested in the contemporary classical music scene should make a point of attending at least some of the concerts in the Modern British Quartet Series.

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will take place in the Purcell Room on the South Bank on November 8th, 15th, 22nd and 29th. The programmes have been carefully chosen to give as wide a picture as possible of the range and variety of British contemporary music and should prove to be very enjoyable.

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Australia is hardly renowned for producing heavy rock bands—which makes AC/DC rather special. Exhaustive tours of Europe and America have given them international status and attracted a large hard core following, which has been rocking in the aisles at their high energy antics on stage.

They have come a long way since they first arrived on Britain's shores as unknowns in 1976. From initial pub gigs through to the recent Who concert at Wembley Stadium is quite a jump. Formed by the Young brothers, Angus and Malcolm, in Sydney, in 1974, it has taken AC/DC five years to establish themselves in the top flight and it now seems that Aussie rock is here to stay. This summer they have been engaged on their third tour of America interspersed with visits to Europe, to coincide with the release of their latest album *Highway to Hell*.

Watching AC/DC live is a real experience with Angus, the youngest of the two brothers, the focal point of attention. Dressed in schoolboy's uniform he is not hard to miss and his blitz-like riffs often carry him through to the point where he rolls around on the floor. Minus school tie and cap he talked about the band's rise to fame at one of London's Holiday Inns, prior to the Who concert.

"When we first came to England we got a really good reaction because it was a time when there weren't many hard rock bands around," he recalls. "With the exception of established bands like Status Quo and Bad Company, hard rock seemed to have gone through a bit of a slump, so it needed something like us. It was a very exciting time for the band. Over in America it's taken us three tours to really get going. Last year we did a big 76 date tour and we're doing very well now."

Hard touring Down Under in their early days has since proved to be good preparation for the rigours of worldwide travel. It was always their intention to leave Australia after realising the potential and scope a new rock band would have in Europe and America.

"My brother Malcolm, who'd been playing in different bands saw there was something lacking and just decided he was going to put together a really good rock band. At the time I was into doing lots of things like rolling around on the floor with the guitar. He thought it would be good on the visual side, and looked around for a good bass player, drummer and vocals. We did our first gig in Australia in a little club on New Year's Eve. The band took off on the club and pub circuit which is a lot different than it is here. In England club bands play one gig a night, but over there if you're in demand you'll often play three or four in one city, in one day. Once we got the band happening in Australia and got enough money behind us we just took off."

He comes from a large and musical family which includes six brothers, but they were not influenced by their parents. "They can't play a note although my father can do a soft shoe shuffle — but only when he's drunk! I picked up guitar from my brothers, who were into a whole range of instruments, like clarinets, guitars and saxophones. My first guitar was an obscure Woolworth's type thing, which kept going out of tune. It was terrible and got smashed in the end. Then Malcolm got a Gretsch Firebird, and passed onto me an old Hofner, my first electric guitar. There was a touch of magic about the neck because the guitar had been broken in a car smash and the neck was glued back on. It sat just right but it was a pity the electrics weren't as good."

Angus lists his early influences as Chuck Berry, Yardbirds and the Rolling Stones. This early rock'n'roll really fired his enthusiasm for the guitar and he used to stay up late at night listening to the radio. He played in bands with school friends and keen competition developed with Malcolm. Both would listen to each other playing through the walls of the house.

The Young family had quite a hand in the launch of the band with his sister suggesting to Angus that it might be novel if he dressed up in schoolboy's uniform. "We were all sat around and she just came up with it. She said she'd got something for me that no-one had done before, went out got all the stuff and put it together. When I first saw it I thought it was a bit stupid but because of the effort she'd put into it I gave it a try. It went down so well we decided to keep it."

As for special effects on the guitar, he prefers the natural sound with out foot pedals. He plays Gibson SG's and uses Marshall amplification which in his opinion cannot be bettered for the live sound. "I've got six or seven SG's, different models and some are so light you can pick them up with one finger. I use those transmitters on them, no cord, so I can run around and play anywhere with them. They do the job — I think they are about the meanest guitar Gibson ever built. As for amplification I don't think you can beat the hard rock sound you get with Marshall. No-one's come up with a better amp for my money, you can tell them a mile off, they really come across. They stand up to all the touring and I've never had any trouble with them."

"I like the natural sound of the guitar. Pedals tend to take over from the sound of a guitar and people rely on them too much. I've seen some who can use them really well but a lot of others can't. They're certainly not for me but I like the transmitters. You get a more natural sound from them because they work on a direct frequency. With a guitar lead, no matter how long or short, you still lose part of the sound. A lot of people in bands

ask me about this, whether some of the sound is lost, but you actually gain more with the transmitter."

The band which comprises Angus and Malcolm on guitars, Phil Rudd (drums), Cliff Williams (bass), and vocalist Bon Scott, recorded *Highway to Hell*, their fifth album for Atlantic, at London's Roundhouse Studios. With the exception of their live album *If You Want Blood — You've Got It*, most of their recording has been done in Australia. Work at the Roundhouse with producer Robert John Lange, marks a significant step in their development. It is their most polished album to date, although recording has never been a problem for a band which is really at its best performing live.

"We used to do most of our recording in Australia at a rock studio which has a very good live sound. This album we did at a new studio for us with a new producer and we really like the sound. We're thinking of doing the next one in London too. All you lose recording in the studio is the audience contact. We've been in the studios and got carried away to the point where we've been rolling around on the floor, because since our early days we've learned not to depend that much on an audience. It can be a bit deceiving because sometimes they'll react when there's nothing happening. Generally when we're doing an album the shortest amount of time we're in there the better. If you're in a studio too long, the atmosphere starts to wear a bit thin, especially when you're going in early in the morning and coming out late at night. All you're seeing is four walls and it can get claustrophobic."

# ANGUS YOUNG

## AC/DC's Livewire



The live album was recorded during a worldwide tour, but most of the material that eventually appeared came from gigs in Britain. Angus remembers how news of an AC/DC live album launched a flood of bootleg tapes. As a live recording project they approached the tour like any other and did not allow it to inhibit any of their performances. "Most bands really sweat when they're recording a live album because they think it is a real do or die thing. And when they get the tapes and listen to them, they usually end up doing the guitars and everything again, maybe keeping the audience and the drums from the concerts. We let it go without cleaning it up, so the feedback and everything was on it. I think it all adds to the excitement."

All the songs are written and composed by the Young brothers in collaboration with Bon Scott. With all the touring they do it's not often they get time to sit back and concentrate on writing, so a large proportion of their material is conceived on the road. "If you're working really hard and doing a lot of travelling, sometimes it's really tough to get down to writing, but we manage to put together quite a few ideas that come to us while we're touring. From the point of view of getting to know what the kids want to hear, tours are the ideal testing ground. I don't think you can beat the live thing, going out on stage and all the kids are there. It can be really tiring, but I wouldn't want to take a year off or anything like that."

By Sean Higgins



# Pete Briquette gets off on a CUSTOM SOUND 706 Bass Amp.



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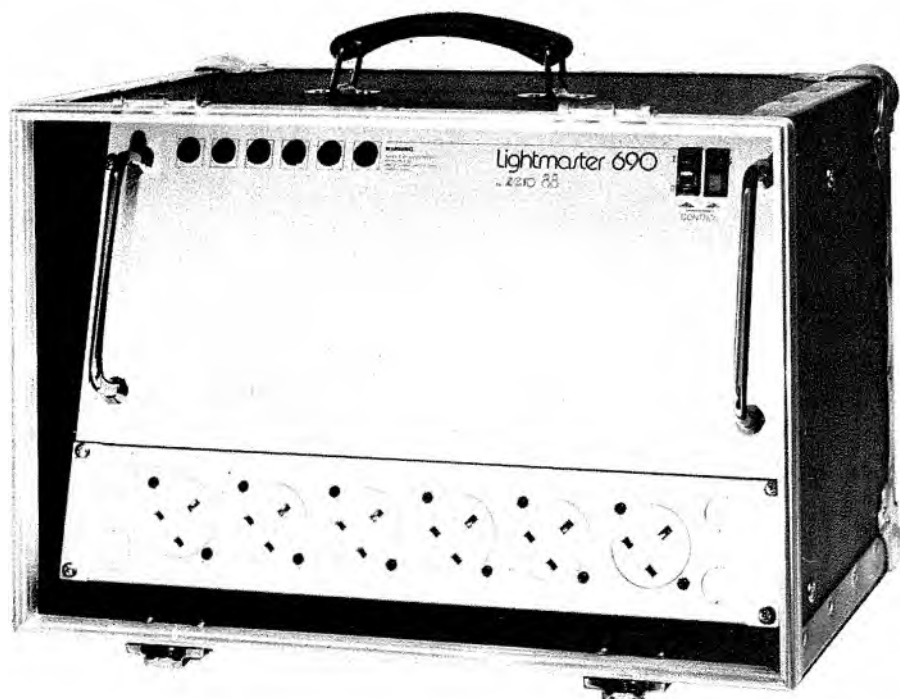
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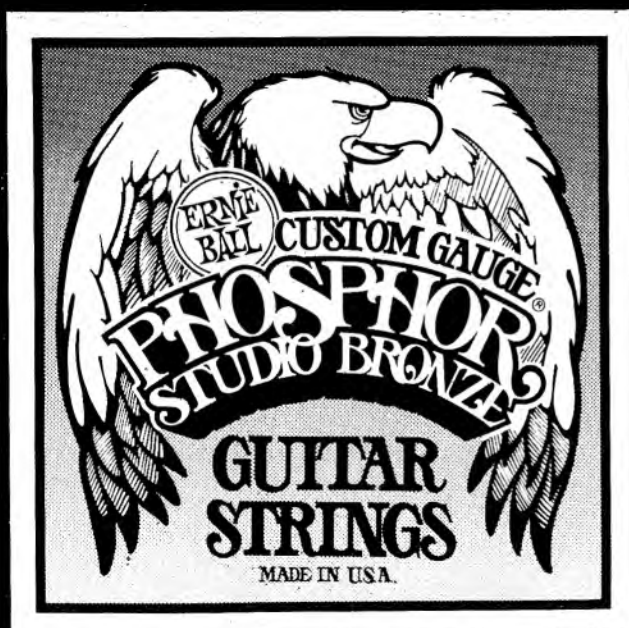
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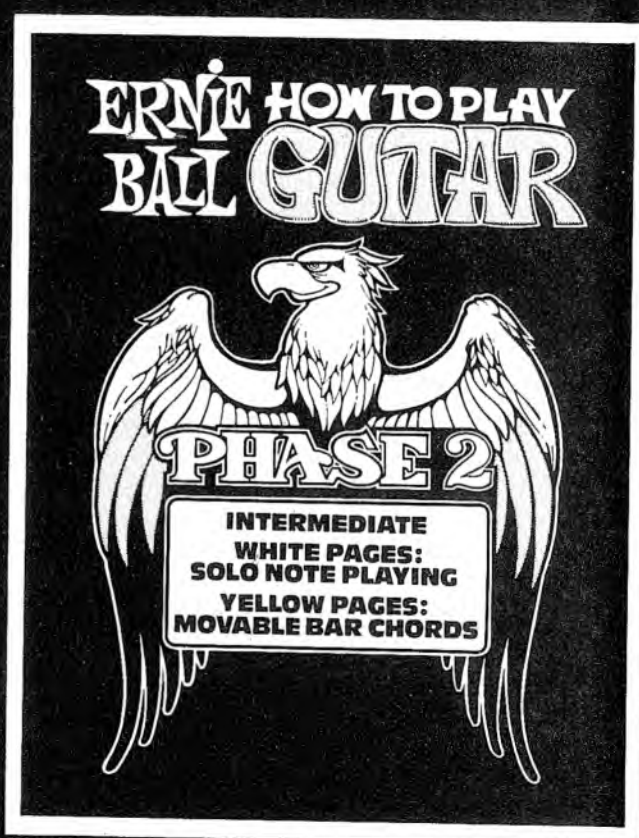
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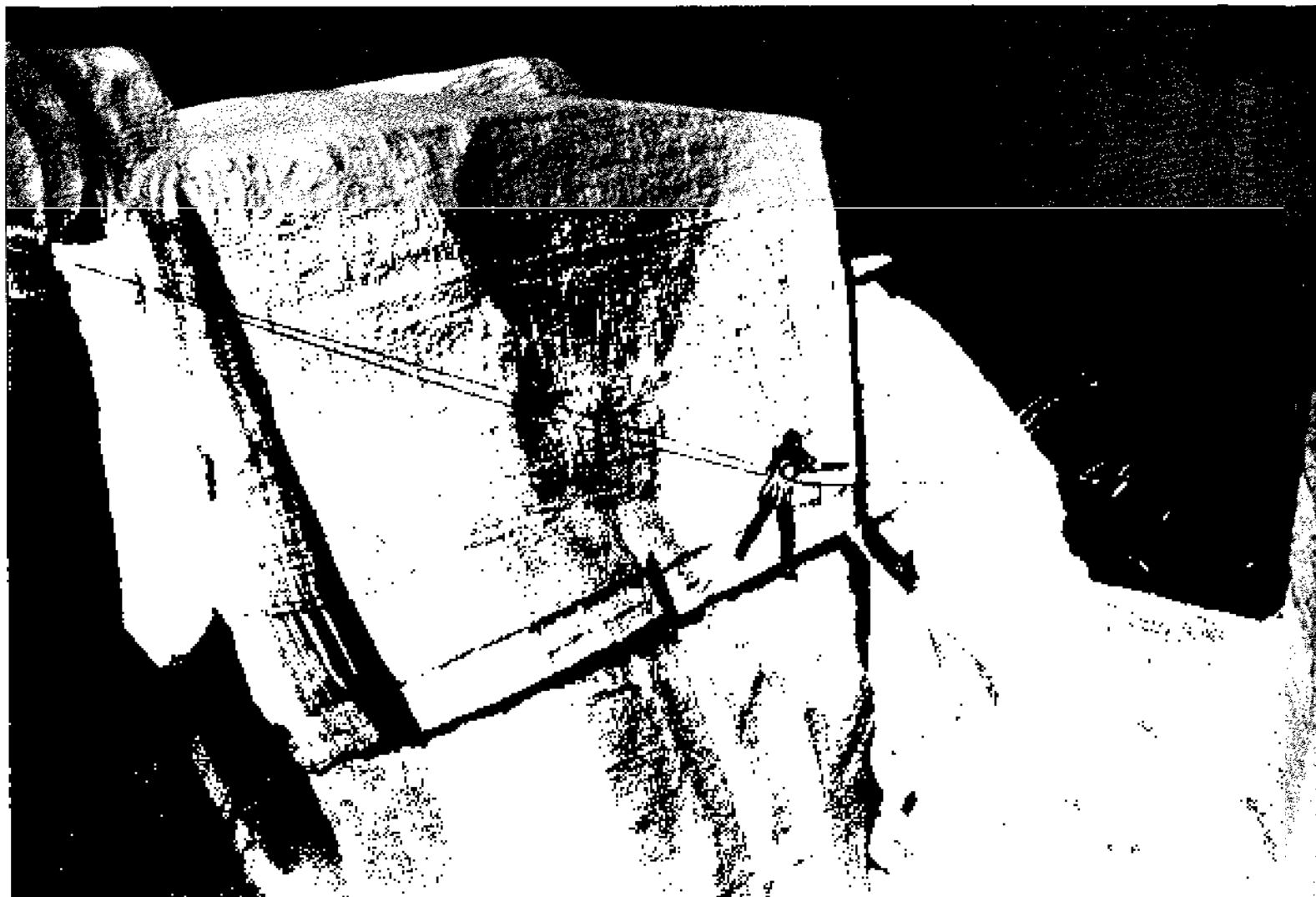
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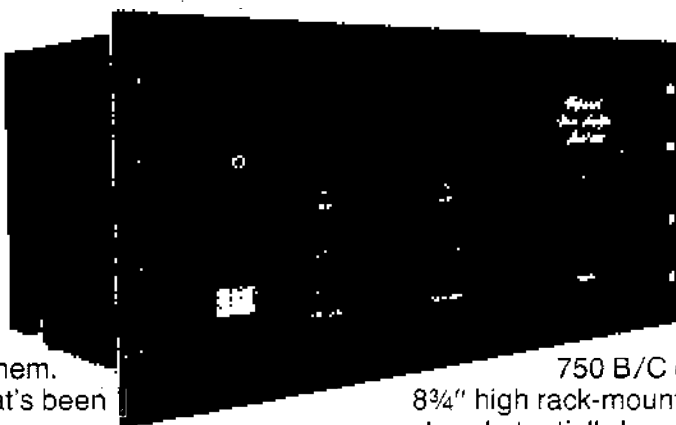
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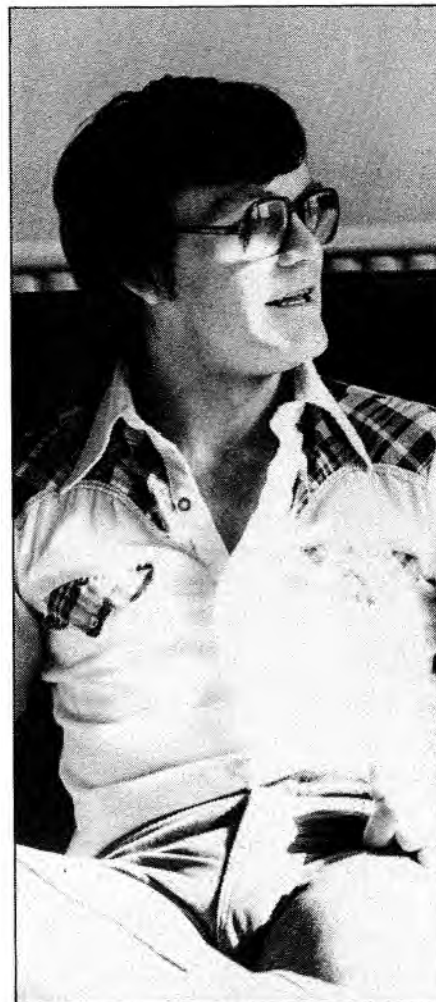
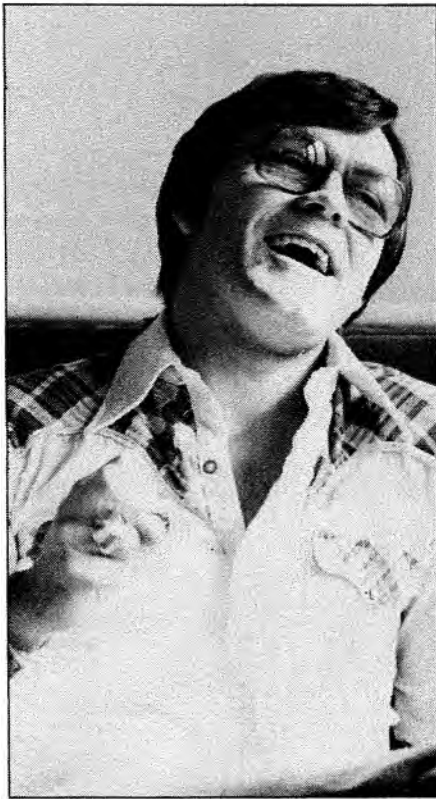


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Country fans are so conservative they're terrible, I hate them." No, it's not the latest New Wave star slagging off everything but his own music. The words came from Mr Brian (BJ to many) Cole, one of Britain's premier pedal steel players.

"Pedal steel?" I hear you mutter, "but ain't that what Country and Western is all about?" No, it isn't according to BJ who's blood visibly boils when you mention his instrument in the same breath as cowboy hats and Jim Reeves.

You see Brian has developed an all-consuming passion for the pedal steel guitar. He's in love with the instrument and gets mighty annoyed when it's dismissed as just an instrument to play Country music on. He believes that the potential of the pedal steel is unlimited, and that it takes a very special kind of person to play it.

Brian explains: "The thing that you need when you start playing pedal steel is that little magical quality which makes the instrument something a bit different from anything. You've got to love the instrument before you start playing it. You've got to love the sound of it, and if you love the sound of it then it carries you through all the problems of getting it together."

Learning to play the pedal steel is, he admits, very difficult. But all the good players are fanatics, and the effort is well worth all the aggravation. Brian has been through it all, and emerged as one of this country's leading exponents.

You can hear his work on countless albums spanning a wide variety of artists. Names that immediately spring to mind are Joan Armatrading, Leo Sayer, Andy Fairweather-Low, Dave Edmunds and Kiki Dee, although he is hard pressed to reel off a list without much involved thought — the mark of a successful session man.

Naturally enough, Brian started out on straight electric guitar, copying Hank Marvin. Not such a bad thing, because as he points out: "Hank plays guitar quite like a steel. The sound he gets out of it and the feel are very much the thing you get out of a steel guitar, so that was a little connection."

Grappling with Chet Atkins and Barney Kessel proved a depressing experience for the young Cole, but a trip down London's Charing Cross Road in 1961 brought a

glimmer of hope. He saw his very first Hawaiian lap steel in a shop window, an instrument which in those days was so weird and wonderful it might have come from Mars.

"I'd never seen one before and I related it to something in the back of my mind like seeing Santo and Jerry on the Perry Como Show. It was something intangible, it was a magical instrument that completely captivated me. When I saw this instrument I thought, 'Right I'm going to do it properly.' So I gave up the guitar completely and took it up."

This, according to Brian, is where many players fall down. He believes you need to concentrate totally on the instrument in order to master it and get the best out of it. Musicians who dabble with it, or just take it up as a second instrument can never hope to have any real command, he believes.

So Brian stayed at home for five years learning his craft. At first he transferred some of the Shadows tunes to the steel, then with the help of a few written tutors, he began to develop a technique where he was able to play tunes unaccompanied. A wise move since there weren't that many openings for steel players.

However, inevitably his first band was a Country and Western outfit. Word had been passed around at the Post Office where he worked and he ended up sitting in with the Alabama Hayriders. They later recommended him to a band called the Saddletamps, who were working the Hammersmith pubs, and in about 1966 he turned professional with them.

During this time he had gone from a six string lap steel to an eight string, had had a few lessons from an Hawaiian teacher named Edward Kirkman, and ended up hearing a mind blowing album called the Nashville Steel Guitar. He recalls: "It featured players like Pete Drake, Jimmy Day and Roy Wiggins and I just freaked out because it was the first time I'd heard a pedal steel. The instrument became completely transformed for me and it made me want a pedal steel very strongly."

Brian ordered a Fender 1000, which was a double eight string guitar, and began the painstaking process of mastering all the levers and a new technique. Still, enthusiasm carried him through and he worked regularly with many London

# BJ.COLE—

## Man Of Steel

country bands.

It was during this period that Brian developed his hatred of the dyed-in-the-wool Country fans who didn't want to hear anything other than Jim Reeves and Johnny Cash.

"My whole career has been trying to get over that terrible bias. The Country fans, who are enough to break any artist they want to, are so conservative they're terrible — they're a load of stick-in-the-muds. I hate them.

"Anything that's a little bit adventurous or got something to say in addition to your Johnny Cash and your Jim Reeves, they don't want to know. That wouldn't be so bad, if it wasn't that the rest of the business is at the other extreme. They're looking out for something new and innovative, and they won't touch Country music because all they see is the conservative element. There's nobody in the middle trying to do something creative.

"The hip businessmen are looking at Country music and saying 'Yuk, cowboy hats and nasties' and won't touch it. Then you've got the people on the other side going, 'I hate all that rock 'n' roll crap.' There is an area in the middle where there are a lot of very frustrated musicians. My whole career has been either consciously or unconsciously in that area, and there's an enormous market."

Brian recalls one moment of inspired madness when the Country band he was in treated the audience to a bit of free-form jazz during a Buck Owens number. "We had a bass player who was into Charlie Mingus and we did a song called 'Together Again'. When we did the solo I think the rhythm dropped out and we all went into 5/4 together which was staggering in a 3/4 song. We did silly things like that and were innovative then, but it was never really organised enough to make an impression."

Still, Brian's next venture proved to be a step in the right direction. He was working in a travel agents and got a call from Chris Dreja, who used to be in the Yardbirds. He was working for Peter Grant and Mickie Most and they had decided to put together a sort of English Flying Burrito Brothers. In fact it became the first version of Renaissance so Brian went back to the travel agents.

"Then I got a call from Stuart Brown and we got a band together with Mick Grabham, Rickie Wills, and Willie Wilson which became Cochise. That was my first experience of a rock band, or one outside the basic country line-ups and it was great. That developed and we got a record deal with United Artists.

"Our first album was very badly produced and very loose but it had a much better feel about it than the later albums. Then Stuart Brown left and we got another singer and drummer but it never really happened. We made two more albums but they never came up to the potential of the first. Cochise ended about '72, during which time I made a lot of

friends and contacts which gave me the basis for my session career, which has been the backbone of my work since then."

The chain of contacts led to Steve Marriott and some work on a couple of Humble Pie albums. Steve knew Andy Fairweather-Low and so Brian worked on two of the Fairweather albums, and because Andy knew Dave Edmunds this led to work on the first Rockpile album. Of all his work Brian is particularly enthusiastic about his involvement with Kiki Dee's band and Andy Fairweather-Low.

He says: "Andy had done the Spider Jiving album in Nashville and when he came back wanted to put a band together. Originally we had Pick Withers on drums, but we changed it around and had Rabbit on keyboards and Dave Mattacks on drums. We stayed together for about a year and it was an incredible band — the best I ever worked with. The thing about Andy was that he just took me and the steel and said, 'play it'. He had respect for the instrument and me."

Brian is very conscious of the fact that it is essential to mix live work with studio sessions. In the studio you develop precision, while on the road you get the chance to stretch out with other musicians. He believes that a creative musician has to do both.

In contrast with straight electric guitar, almost all the British pedal steel players copy American ones, with the result that there are only a handful of home-grown musicians with any originality.

"Nobody has done anything totally creative on steel guitars since about 1963," he states. "A lot of people will argue that point."

"Since 1963 there has been a mushrooming of players and that's great, but it's all inbred. There's been no progression, everyone's too frightened of it. Speedy West, one of my favourite players, attacks his instrument, he actually throws the bar at it, and this was in 1952 so they weren't afraid to do it then. People take it too seriously, they need to loosen up — treat it like Pete Townshend treats his guitar. Steel guitar is a totally universal instrument that shouldn't be pigeonholed as just an instrument for country music."

This label is likely to be blown sky high if Sneaky Pete and Roland have their way, because Brian knows that the two are working together to develop a variation of the guitar synth for pedal steel. Brian also

points out that something like the Avatar would probably work just as well for the steel.

Of his own instruments, his main guitar is an Emmons single neck 12 string which he's been playing for about 10 years. It has six pedals and four knee levers and does just about everything Brian could wish, with an incredible tone. However he has recently acquired a real collector's item, a Fender Stringmaster four neck made in 1953.

Brian explains: "It's serial number is 0058 and it was always a custom model, it never went into production. The idea of the four necks really came from before pedal steels, when players were restricted harmonically. It's a fiendish instrument to play, and much harder to play than pedal steel."

Much time and effort has also gone into discovering the best amplifier for pedal steel. The usual range of guitar amps he finds too middly. "A steel guitar amp has got to be very powerful to start with, but no hint of distortion, so when you hit the note you feel the power behind it.

"The ones I like are Solid State, and it's got to have a speaker that's efficient, something like JBLs. They're the best for steels because you've got a lot of highs in the middle and lots of room for bass frequencies. It needs much more range than a guitar because the pickups tend to be more powerful and better. I also find that in time steels screw up amps, they seem to destroy them because they're so demanding harmonically. I also like as much control over the tone as possible.

"The best amp available here for steel is the Peavey LTD which is a cut down version of the Peavey Session 400. It has got bass and treble and middle but also parametric on the middle so you can alter the area the middle control is working. I use it on a setting of about one and a half in the studio and two on stage and there's so much projection, it's great." The only effect he uses is a Boss Chorus with sometimes an MXR Dyna Comp.

To sum up, BJ Cole is more than just a musician, he is a musician who is carrying out a crusade to break down some very strong musical barriers. As he says: "It's strange that I'm so involved in country music, when as a musician I'm so involved in getting the instrument out of country music. I refuse to believe that people won't enjoy music that's up, invigorating and dynamic."

David Lawrenson





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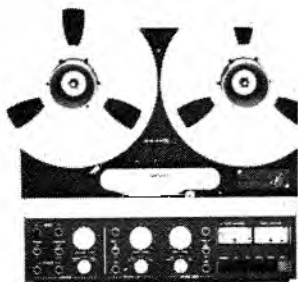
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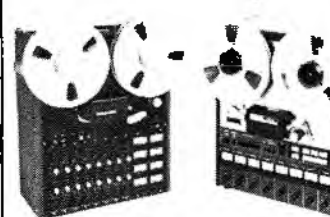
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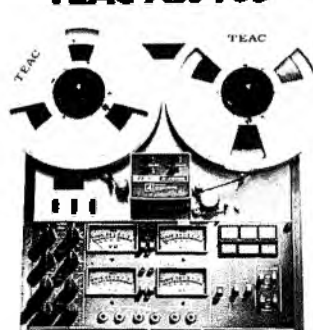
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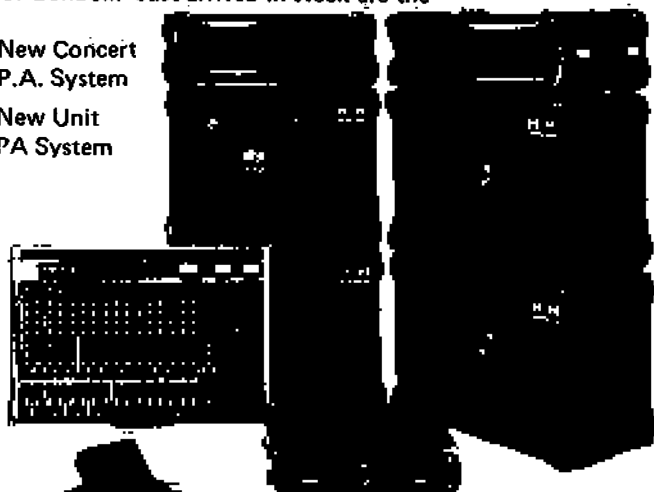
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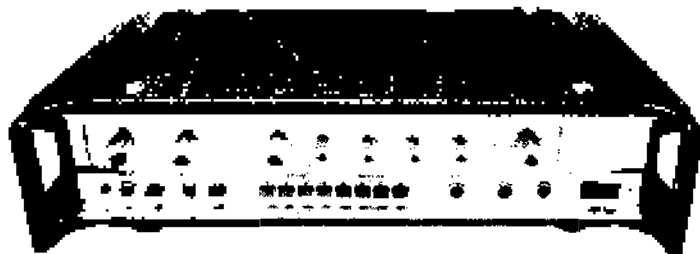
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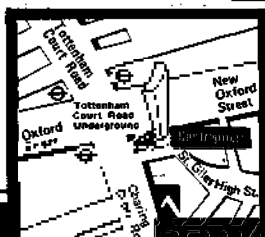
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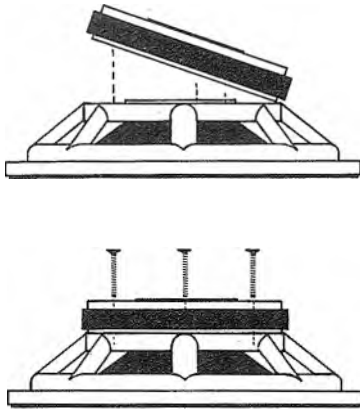
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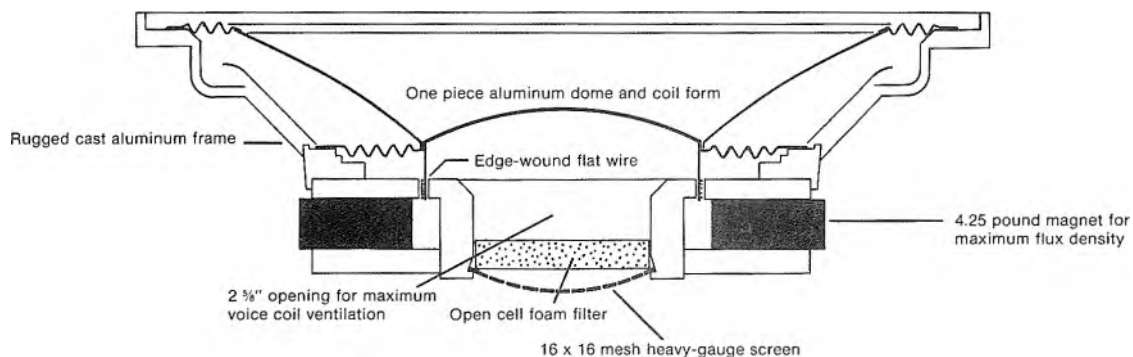
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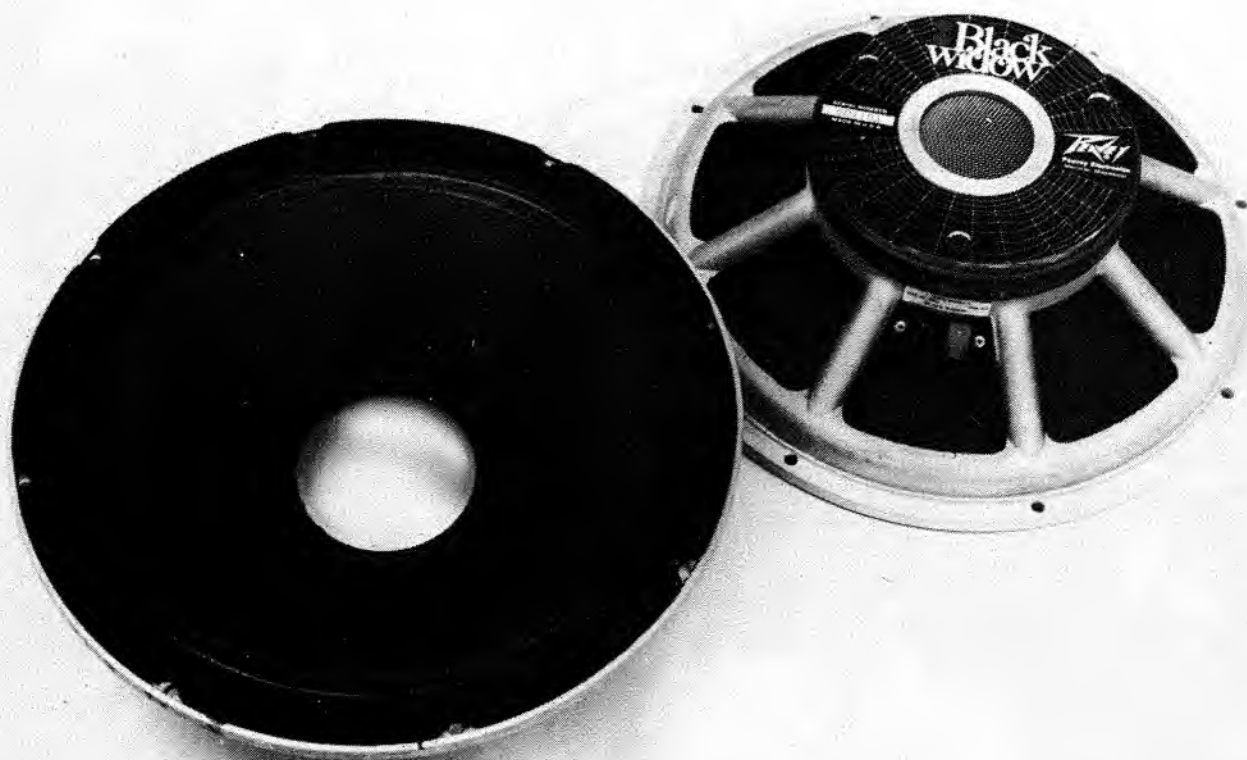


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# COBHAM & McLAUGHLIN

## ***Mahavishnu Revisited?*** **By David Lawrenson**

**D**espite the mounds of equipment piled high on the stage of London's Rainbow theatre, the only sound that fills this Victorian auditorium on an autumn afternoon is a tinkling acoustic piano. However, the huge figure in the pork pie hat and rimless glasses picking out little tunes on the Yamaha is better known in a less sedate occupation.

He is Billy Cobham, arguably the greatest modern drummer and he is waiting for the members of his new band to appear for a rehearsal. The "band" comprises John McLaughlin, Jack Bruce and keyboard player Stu Goldberg.

For those who have followed Cobham's career, his teaming up with John McLaughlin will be one of the year's surprises. It is no secret that Billy was upset by the break up of the Mahavishnu Orchestra and was always quick to point out that it was John's idea to disband the

group.

It was with Mahavishnu that Billy rocketed to prominence and revolutionised Seventies drumming. Since the break up he has not been idle, releasing almost a dozen albums to date, and yet none of his solo efforts have quite captured that Mahavishnu magic. In many ways those halcyon days have been a millstone around the drummer's neck.

One of the reasons for his less than spectacular solo career could be his failure to establish a regular working band. Cobham is not a natural band leader, and he seems far more at home with someone else calling the tune, so he can concentrate on his drumming. Billy's recent work has also reflected the need for a certain amount of commercial success, and the financial rewards that follow. He makes no bones about the fact that he needs the money!





McLaughlin's career since the Mahavishnu band has reflected the other side of the coin. He is one of those characters who fellow musicians will gladly play for, and he has the confidence and resolve to pursue his own musical ideas and directions and ignore any criticism.

Commercial success and critical acclaim probably come much lower down on the McLaughlin scale of priorities and while his excursions with Shakti and the One Truth Band may have alienated some Mahavishnu Orchestra fans, it has undoubtedly enabled the man to broaden his musical horizons.

There have been signs, however, that John is moving back to his roots, particularly after the *Johnny McLaughlin, Guitar Player* album. An album which incidentally featured Cobham on a couple of tracks, and led to the disconsolate drummer scotching any ideas of a re-union saying, "I could see Return to Forever reconstructed sooner than Mahavishnu."

Well there are no signs of Chick Corea and company getting back together, but yet here we find Billy the C waiting for his old mate John McLaughlin. So what happened?

"Well," said Billy, "there really is no reason why we're getting back together except that I felt like playing. I haven't played all year, not really for the better part of this year or last year. I haven't really been very much inspired to play with anybody really. Music in general, particularly in America, is pretty boring, it's disco or bust. So I decided to sort of recede and paint some pictures, work on my art, develop my photography portfolios and enjoy my children. Then I got one phone call.

"I've always kept in the back of my

mind people who have been very special artists to me, of which John is one. A sort of logic always wins out, and you don't turn down these things. I've never had any trouble working with John. There have been extenuating circumstances in the past but we've all come along with experience and age.

"I don't see any reason why I shouldn't be working with him or why there should be any problems working with him. Outside of what is creative for us, the only problems would be outside ones — the things that come up that we have no control over."

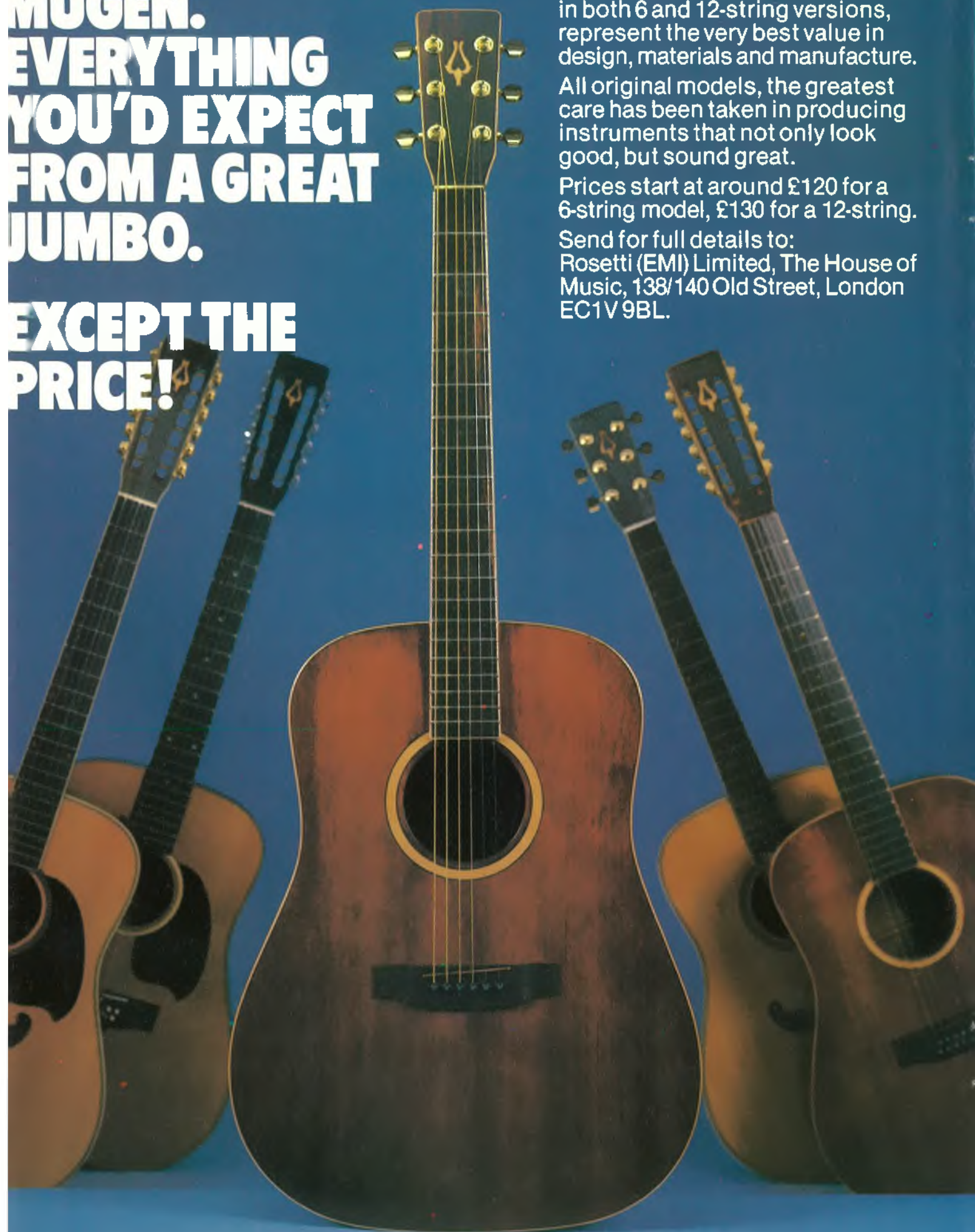
He hinted at the possible problems which any band has to suffer, and maybe shed some light on the break up of Mahavishnu. "We try to endure but some of us have tolerance levels that are longer or shorter than others. I'm here because of the music and the personnel, the music presents itself in a positive light for me. The whole environment presents very positive things for me, otherwise I would not be here."

Removed from his drum kit, Cobham presents a totally different character to the powerhouse percussionist on stage. Softly spoken, he chooses his words carefully, often thinking long and hard before replying to a question. This could well be a reluctance in talking to journalists, and not wanting to say anything that may rock the boat i.e. the current band. When asked if the music would be purely a nostalgia trip he was typically guarded.

"I don't know, it depends on the individual, that's why I felt somewhat shy in speaking to writers because I feel that I would not be quoted in a light that I'm not sure of. I do not want to really set up any critics for something that may not be.

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I would prefer for everyone to take their own stab at it and decide for themselves. It's safer that way, and I feel that's what the music is about anyway.

"There are some things here that I've played before, some themes and sub themes that I've heard before, but I have to say that I'm playing again like I've not played before. Also I've never played with Jack Bruce before, although I've heard him play, and I've played with Stu Goldberg just once on John's album. By bringing in new people and new elements, it means that concepts are going to be different.

"Even if it were the Mahavishnu Orchestra, the very first one, we're all very different people now, our influences are different. So I would put my money on the fact that it should all be different. Certain little things that will happen are bound to be familiar, but it should all be different."

However much Cobham and McLaughlin may shy away from comparison with Mahavishnu, the harnessing of these two major forces in the world of Seventies music will inevitably beg the question, "will the new band be as innovative as Mahavishnu?" Billy wouldn't commit himself as to whether that particular buzz was there, but he did feel that his approach to drumming would be different with the band.

"The feeling I get is that we're going back and utilising an art form, especially for percussionists, which has been overlooked, I feel, out of fear. Most percussionists, drummers cannot place me very well, it's a very difficult thing to play, it demands a lot of finesse. There's no two and four on the snare drum to bog you down and give you a reference, you've got to have chops. It's like playing a snare drum from a military standpoint.

"The drum will not give you anything you don't give to it, and this is a great chance for me to get myself back together in that area. I haven't played this much swing since Horace Silver about 12 years ago. So for me, that's one element that I hadn't expected.

"Hearing John's bands in the States, like the One Truth Band they were playing some of that stuff, it's starting to come back I just wonder how far it's going to go. It's radical, as per usual, we're just saying, 'here it is,' instead of saying to the listener, 'this is what you want to hear.' We can only be ourselves, and I would prefer it to be that way."

Artist integrity is all very well, but it doesn't necessarily pay the rent, as Billy has found out. He is clearly a little resentful of the criticism his solo efforts have received, and welcomes the opportunity to work with a stimulating outfit again.

"I'm really tired of trying to earn a living. Not only the frustrations of trying to earn a living and playing some compromising material, but also getting smacked down for playing it — trying to do what's right for everyone and ending up with nothing. Not necessarily with nothing, but with a small amount of gratification in return for the time committed to try and



make everyone happy. You might as well please yourself and do as you feel."

Despite this feeling he remains happy with his solo output over the last five years. At least since Mahavishnu he has been writing a lot of material and he intends to contribute to the band. He has never contributed anything to the bands he and John have been in before, but he now feels more confident to do so.

"It's very very difficult to go the particular route we're going and try to earn a living in the States, it's virtually impossible. For me I have to think of other people — so therefore this situation is a real nice blessing, it's a lot of fun to do."

The secret of success for bands who work in this area of improvising jazz/rock is, according to Billy, a hit single. "The only other two bands I've seen being that successful to a degree have been Return to Forever and Weather Report. They've been able to get through on their own perseverance and having one tune catch fire which has given them the impetus to carry on.

"That's basically it, if you get a tune that everybody whistles down the street and buys the record — we could work forever, which isn't my objective any more. I would love to see myself doing something like this once a year."

Billy has his usual Tama kit set up, but he has dispensed with any electronic hardware and is playing completely acoustically. He works with Tama on drum design and has already contributed some modifications to their equipment. His own kit contains minimal modifications, in the belief that "you should leave well enough alone."

During the conversation, the stage has filled up with the rest of the band, and Billy goes off to take his place in the drum chair. Within minutes the whole place is filled with the four musicians operating on full power. Cobham driving them along, obviously enjoying his recall, and a dapper Jack Bruce pumping out a surging bass line from his Aria.

The man himself, McLaughlin looks in relaxed mood and lets fly a series of those blistering runs from his Gibson, as though firing a gun from the hip. Stu Goldberg punctuates on keyboards and the whole effect is initially quite breathtaking.

Every so often McLaughlin, a towel hanging from his waist French waiter style to dry his hands, stops the action and gives an instruction. "A little more snap at the end," he asks his drummer, and Cobham

replies with enough snap to take his drums through the floor.

For one sequence the leader starts off on Ovation Adamas, a solo exploration of the fretboard which leads into a few rhythmic chords taken up by the rest of the band while he switches back to electric. The only other instrument on stage is an old banjo, which John has fitted with a pickup, and obviously gets much fun out of playing.

The McLaughlin set up has remained somewhat standard for some time, Marshall amps, a sunburst 345 which has a new fingerboard and a DiMarzio pickup with a tapping switch. The only effect he allows himself is a Roland chorus pedal.

In between numbers comes the inevitable question, why has he put this band together, "Cos they play so good," he replies. "With Jack I just felt it was time we played together. He recorded on the *Electric Guitarist* album and we've stayed friends over the years and been speaking of getting together for quite a while.

"We were together in Lifetime, which was 10 years ago, and we were together 10 years before that. He plays so great, and it seemed about time for us to get together again."

What does he think of the inevitable comparisons with Mahavishnu? "It's not, as somebody said, Mahavishnu revisited, not at all. There's a lot happened to me musically and as a person since those years. As for breaking new ground, I don't know since I didn't know when I put Mahavishnu together. That was just to play concerts, to play music and people said, 'wow'.

"In retrospect I see, but I still don't know, why people only accepted that whereas before they didn't and after they didn't so I don't even think of things like that."

As with Cobham, the word commercial raises its head, but from the opposite end of the spectrum. "If I stopped to think, 'will I have another audience', I wouldn't have formed Shakti, because that commercially, as far as commercial people were concerned, was a dismal failure. But musically it was incredibly successful and still is, we'll probably play in India next year. I don't know when we'll ever play in the West, but who knows?

"When I put something together I think of the people involved — the musicians and whether we can enjoy an involvement, a relationship and help each other evolve a bit more. If people enjoy it, which we hope they will, and the musical respect and admiration we share is there, then I think those are the factors which lead to the best kind of music. That's really all I'm interested in, to play the best possible music."

At the moment there are no plans beyond their European tour, but John admits that if it all goes really well and everyone enjoys it, then an album could be the next step. Whatever the future of the outfit, it will be definitely worth catching, if only to hear McLaughlin and Cobham together again.



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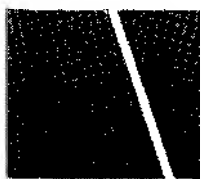
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# Guitarcheck

## Music Man Sabre 1 £429.95

The Sabre 1 is American-made, built in the same general style as the well-known "Strat" but distinctly different in most of the small details of design and operation. The body outline is immediately recognisable (as I am sure it is meant to be), and the general feel of the neck and fingerboard is quite similar to what one would expect to find in a recently-made Fender instrument. Music Man do not claim to be producing a guitar which feels like a "Strat". It may simply be that the shape of the average hand, combined with the need for certain playing techniques, results in this particular shape of neck, as one of several possible working compromises. However, I would suggest that very few, if any, Japanese instruments use a neck with this sort of feel: it seems to be found mainly on American-made guitars.

I do not wish to stress any comparisons between Music Man instruments and those from other makers; each should be considered on its own merits. However I feel it would be fair to say that the Sabre looks a bit like Strat and has a neck which feels a bit like a cross between a Strat and a Tele. On the basis of past experience, that must be a good starting point.

The body is made from ash and the neck and fingerboard are made in one piece from maple. Both are very nicely finished in a hard, clear, high-gloss lacquer. The front of the maple fingerboard is also lacquered, and while there is certainly a thin film of lacquer over the ends of the frets and around the base of the fretwire where it fits against the fingerboard, it is difficult to see where polished lacquer ends and polished fret surface begins. There seems to be none of the blistering or peeling from the frets which one sometimes finds on lacquered maple fingerboards. I don't know what the effect of wear will be, but I did try to peel a tiny piece of lacquer away from one of the frets with a scalpel, and it seems very firmly adhered. This is unusual, as hard lacquers often do not stick well to fretwire.

This may seem rather an obscure point to anyone buying a shiny, new guitar, but you would find it very far from obscure if the playing surface of the fingerboard became rough and chipped after a few months' use. I cannot be absolutely certain, but it would appear that this fingerboard will last quite a long time before the lacquer wears through. It should also be possible to re-shape the frets or replace them, when necessary, without the need to re-finish the fingerboard, involving more time and expense.

Apart from the obvious prestige of a high quality name, you may ask what advantages come from buying a fairly expensive guitar, when you could get by with a cheaper one. I usually explain to people that some of the additional cost goes towards research, and production time, so that this sort of attention to detail becomes possible. The Sabre 1 is fitted with what the makers call "Jumbo-sized" frets, to distinguish them from the smaller and lower frets used on the Sabre 2. In fact, they are not excessively large; they are the normal, larger size of fret similar to what is often called "Gibson fretwire", although it is available from various suppliers. On this sample, the frets are "stoned" down to a reasonable and comfortable height. The top playing surfaces are slightly rounded and polished to prevent string-bending scratches. Although the review instrument was supplied with "regular" (10 to 46) strings I found string bending smooth and controllable. It is not enough for a maple fingerboard to be glossy, it also has to feel smooth and

"slick": this one does!

The nut is the usual fairly ordinary — looking piece of plastic found on many Strat-type guitars. On my sample, the string slots were too deep under some of the strings. The open G and D strings buzz, even when played quite gently. It is pleasing to find a nut which has not been left much too high, but I think the adjustment has been slightly overdone on this sample. This is unlikely to apply to all examples of Sabre guitars, but as at least one is a bit too low, it might be sensible to check before purchase. It is possible to remove the nut and replace it with a higher one, but this is *not* an easy do-it-yourself job.

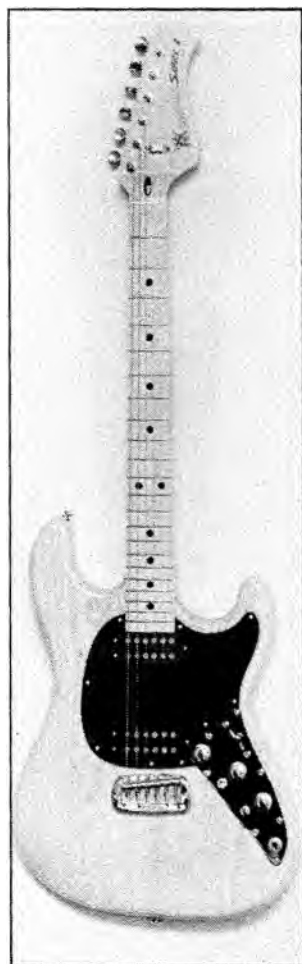
The machine heads on the Sabre seem to be a variant of the Schaller S.T.6 model, fitted with a reverse-tapered string roller so that the string coils are pushed towards the face of the guitar head. This gives the largest possible string angle over the nut, something which is very necessary in an instrument whose head does not bend back from the neck. On a Gibson-type head, the string angle over the nut is quite enough to hold the strings firmly in the bottom of the nut slots. On a Fender-type head, the string angle is only just enough to ensure clear-sounding open strings, even with a correctly set nut. You may notice that some of the more recent instruments (of various makes) now have hold-down clips for the top four strings to increase the string "break angle" over the nut. Originally, only the top two strings were held down in this way and some of the older instruments are not entirely happy with very light third strings.

The Sabre has a hold-down loop for the top three strings and also the special tapered machine head rollers, which keep the bottom three strings at a suitable angle. As is customary on this kind of guitar, the rollers are slotted at the end, with a central hole to take the bent-over end of the string. It is recommended that wound strings are bent at right angles, *before* the surplus length is cut off. Alternatively, you can use the deep end slot just like a cross-hole through the roller, and fit strings in your usual way, with the ends either curled up or cut off after fitting.

The machine heads work quite well, but they would probably be more consistent if they were all screwed securely to the head. On my sample, the first string machine was loose, until I screwed it into place. The bush around the string roller is not fitted level with the head. The sixth string machine is also not screwed down into place. Both screws are very stiff in their holes and it occurs to me that screwing them fully into place would be easier with a slightly larger hole and perhaps a bit of soap. I am sure there is no need for screws to be so hard to turn. This is an example of the sort of detail which *should* have been checked in a relatively high-priced guitar (and in this case apparently has not been checked).

At the other end of the strings is an original — design Music Man bridge assembly, which is easily adjustable for individual string height and intonation. A raised frame around three sides holds the adjustable string supports tightly together to prevent rattles and loss of sustain and also makes a comfortable hand rest for the player. The string-height screws are fitted underneath the string supports so there is no chance of projecting screw heads cutting your hand when you are palm-damping the strings. The small pairs of holes visible at the front are only for inserting the height-adjustment key. Unfortunately, like the machine heads, the bridge is not completely screwed into place.

The fixing screw on the treble side does seem to



have some traces of soap on the thread, but it is too loose a fit in its hole. Instead of finally tightening down, it turns round and round in the hole. On the bass side, there was some wood and lacquer debris around the hole, trapped between the bridge and the front of the body, and keeping them apart. After I had removed this, the bass side of the bridge frame could be screwed firmly into place. As the guitar arrived, it was quite possible to see daylight under the bass side of the bridge. It happens that the bridge is rather well designed and carries most of the string tension on a projection underneath, which fits tightly into a slot in the front of the body. However, I think the designer probably intended that the bridge should also be screwed solidly down onto the body.

Although this instrument uses a bolt-on neck, which can on some instruments (of various makes), be difficult to tighten securely, our sample showed no signs of neck, or neck-joint, instability. The neck fixing bolts were reasonably tight on delivery and it was (just) possible to move the neck sideways slightly. After using normal one-handed force to tighten the three bolts more securely, the neck was held solidly with no likelihood of slipping in any direction. It is perfectly normal for a new guitar to need a slight re-tightening of the neck fixing bolts some months after first assembly, and this would (or should) normally be checked at the time of sale. Considering that the neck joint uses three bolts, not four, and also incorporates a neck tilt mechanism for initial setting up and larger overall changes of action, this looks like another very successful bit of design work. I would not expect it to give any trouble at all, as long as the bolts are checked, and if needed, tightened firmly every year or so. *Excessive* tightening will improve nothing, and may damage the threads in the neck.

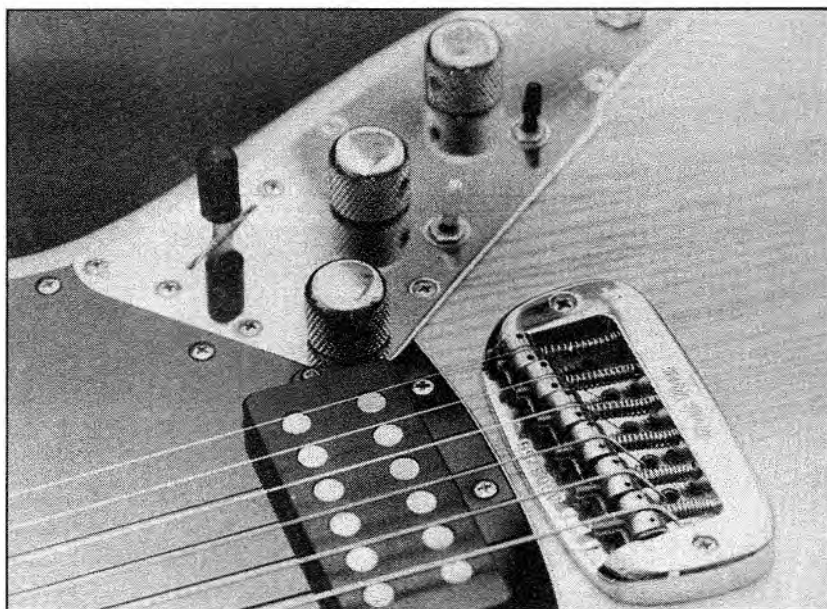
This sample was supplied set up and in tune as it came from the packing box. I think this may have been done in England, by the importers. From the shopkeepers' point of view, it must be helpful to receive a guitar fitted with excellent strings and more-or-less ready to play. The strings supplied are those distributed by Music Man. I recently ordered (yet another) custom-gauge box outfit, this time of Music Man round-wound strings, and I was beginning to have some slight doubts about the sanity of this arrangement until I *tried* the strings. So far I have "cured" two cases of "pickups with no top" and one case of pickups with apparently "not enough of anything" simply by removing the old strings and fitting replacements out of the Music Man Box. This does not apply in all cases of "bad-sounding pickups", but when the problem is obviously a chronic case of average pickups and very dead strings, it really brings a little joy into my day to watch the owners' faces, when they try their guitar with a complete matched set of new strings.

Of course, you need to have a supply of bright and rather gutsy-sounding strings which hold their tone for a relatively long time. I think this present batch of Music Man strings do that job rather well, although using them with super-output, super-powerful pickups may be going a bit over the top. While on the subject of strings, I suspect that the Super (9 to 42) set might be a better choice for standard-issue strings than the present Regular (10 to 46) set. The frets and fingerboard are so smooth that some people have not noticed the slightly heavier gauges and mistakenly thought that string bending was a little harder on this guitar. Not so: the strings supplied are Regular gauge and while

they are certainly bendable, they are not perhaps the easiest strings for an aspiring lead guitarist. Also as it came out of the packing box, the action was a good lowish compromise on all strings and the intonation sounded just right at the 12th fret on all strings.

The Sabre guitars are fitted with two Music Man humbucking pickups, but with a Strat-style 3-way selector switch. The straight sound is fairly flat without much bright "ring" but a separate small switch on the control panel can add as much bite as you are likely to need. Of the three knurled chrome knobs, the one closest to the bridge is the single volume control, for all pickup selections. It is very well placed for violinizing effects. The other two knobs operate separate treble and bass controls. I found these needed some time and playing before I could make much sense of them. The bass control is easy to understand, but it really is a *bass* control: don't turn it on full unless your speakers can take it. None of the rotary controls have any numbers, but I found the most useful bass settings in the range between what would have been three and five on a numbered knob. The treble control seems to work mainly in the lower treble/upper mid-range and has a different effect from the usual treble-cut control on other guitars. As the Sabres are the second range of Music Man guitars, I suppose this treble control must suit the needs of many guitarists, or the makers would have taken the opportunity to change things. I find it inconvenient. I would be happier with a *switched* upper-mid boost and the "treble" knob used to vary the effect provided at the moment by the "bright" switch.

This guitar is fitted with an unusually quiet and well-behaved pre-amp and buffer circuit which allows low noise operation even with very long cables. This is obviously an advantage, particularly so, since the battery life is much greater than usual with such guitar mounted preamps. If you use a "Duracell", or similar manganese-alkaline battery, you would need to replace it probably only once every year. I think this is how all guitar pre-amps ought to be; quiet, clean, and using minimal power. Very few meet all three requirements at the same time. On the Sabre, the treble boost switch does cause an apparent increase in the hiss level, but it is a small increase, and greatly superior to the noise level of any accessory treble-boost unit I have come across.





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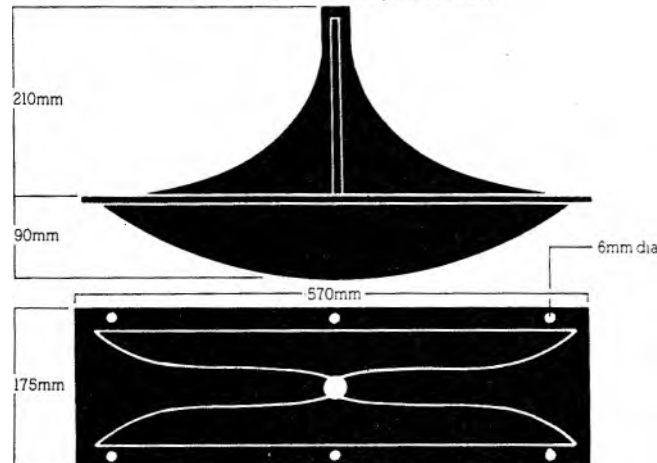
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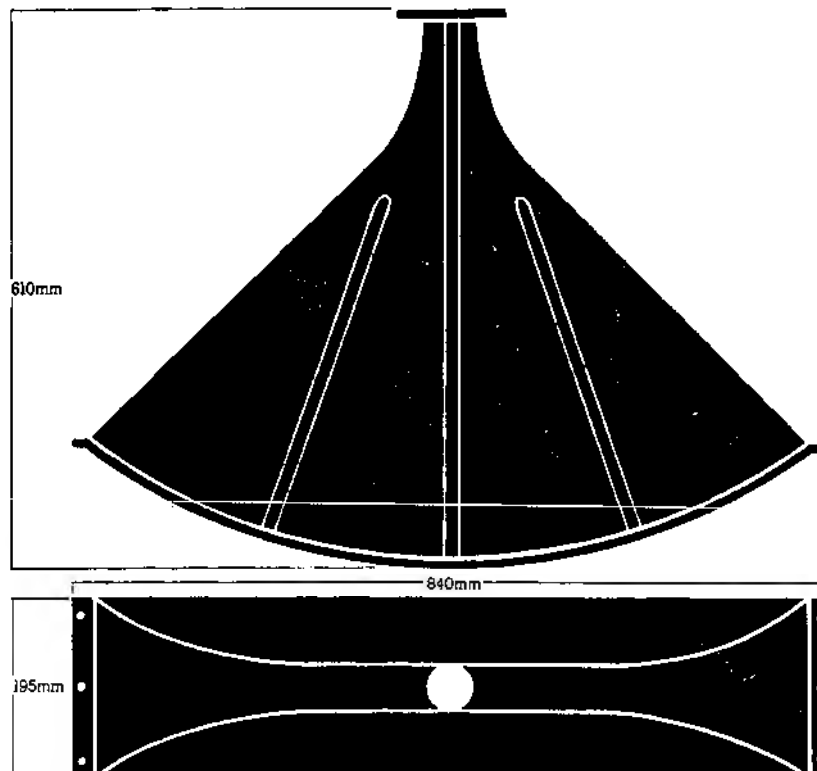
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# Guitarcheck

The pickups on this guitar are each adjustable for height and tilt with a three screw arrangement and may also be angled to give greater emphasis to the bass or the treble strings. The individual poles are not adjustable. This is becoming common practice with many makes of guitar. It is not possible to raise the loudness of, for instance, the first and fourth strings to balance with the other strings. Any particular balance between strings must be obtained by careful selection of string gauges and by careful playing technique. It seems that many players find this arrangement quite satisfactory. It is claimed that pickups *without* individual pole adjustments attract fewer complaints of strings "fading away" when bent across the fingerboard. This is probably true, for a mixture of reasons.

One feature of the electrical circuit has not been discussed. The Phase switch operates in an unusual way which I find useful and convenient. Normally the phase switch on a two-pickup guitar only has an effect when the pickup selector is in the "both on" position. On the Sabre guitar, when the phase switch is moved upwards, it switches in *both* pickups in out-of-phase connection whatever the setting of the pickup selector switch. This means that the "hollow" out-of-phase sound is always available by *one* switch movement, instead of a combination of one switch on, and one in the centre position. The electrical connections inside are the same in either case, but operation of the guitar has been made more straightforward for the player. As the out-of-phase sound on this instrument sounds distinctly different from the other three settings, it seems logical that it should have a separate on-off switch, like any other built-in effect.

## Overall sound impressions

It seems that guitar amplifiers generally come in two varieties; the bright, sparkling ones, and the thicker, more mellow-sounding ones. My impressions of the sound of this Sabre depend very much on the choice of amp used with it. I noticed this also with a previously-reviewed Music Man guitar, and so, to be fair, I asked for one of the smaller Music Man amps to be sent along with the review instrument. Guitars with built-in preamps often have a slightly different sound balance from ordinary instruments and I feel one ought, initially, to hear the whole outfit as intended by the designer.

Now my standard instrument testing amp is a Peavey Vintage combo. This has a wide range of tone and distortion settings. I have marked two "standard" tone and gain set-ups with coloured dots on the panel, so that review guitars can be compared at the same settings from one month to the next. Almost any guitar will produce a good sound at one standard setting or the other. (Incidentally, this model of amp is no longer in production. If you want one, don't give your music shop a hard time; write a nice letter to Peavey instead. One day they might consider making a few more.)

Against all previous experience, the Sabre 1 did not sound particularly interesting at either standard setting of the Peavey or, for that matter, at *any* settings. It sounded, to my ears, cheap, empty and generally gutless. Before you criticise the guitar, read on! The same guitar, plugged into the Music Man two-ten, 65 watt combo sounded very much better and gave a wide range of interesting and useful sounds. I next tried the same guitar into a

tiny Roland 40-watt "Cube". Although this is a very different amp from the Music Man, the Sabre guitar once again sounded good. In particular a setting of Treble 4½ / Middle 5 / Bass 5 was perfect for playing single note lines with an open tuning and a metal slide. Someone said that "It weeps in the right way" which is as good a description as any. (The 4½ setting seems critical for this sound: 5 is too much and 4 not enough.) So the conclusion would seem to be that certain amps just do not suit certain guitars. The Music Man seems to be perfectly happy with two popular, but quite different, amps and rather unhappy with an amp which works magnificently with other guitars, but in any case is not made any more. As few of these amps were made, even when they *were* in production, I don't see this as much of a problem for owners of Sabre guitars! However it does suggest that anyone trying out a Sabre, with a view to purchase, should probably try it through at least two different amps, and preferably through the amp they intend to use with it. Of course, the obvious answer, is to buy a Music Man amp, and although they are certainly not cheap, they are solidly built and good value if you want an amp which will last. My own best buy would probably be the two-ten H.D.

## Conclusion

1. I think this is an interesting guitar, and closer to my tastes than the earlier Music Man Stingray model. The design ideas are generally very good and overcome several small, but annoying, problems found on this kind of instrument. While the overall finish is very good, the actual assembly and final adjustment of this particular instrument leaves something to be desired.
2. A wide range of sounds are available and I particularly liked both the sound and the switch arrangement, of the out-of-phase setting. This guitar may sound more interesting with some amps than with others, so try more than one amp.
3. The strings are good, and seem to last longer than usual.
4. The smaller Music Man combos seem to have more poke per cubic inch than anything else, and the sound does not appear to suffer because of their relatively small size. (One of the Polytone Mini-Brutes might come very close, and if I ever manage to get my hands on one I will let you know.)
5. The Sabre 1 guitar, like the Stingray 1, has a gently cambered fingerboard and big frets. The Sabre 2 (and Stingray 2) offer the alternative of smaller, lower frets and a more rounded fingerboard, for those who prefer this sort of neck.

### Measurements on Music Man Sabre 1

Serial No: A 005755

Scale Length: 647mm

String Spacing at bridge: 54mm

String Spacing at nut: 34mm

Fingerboard width at nut: 41mm

Depth of neck at fret 1: 20mm

Depth of neck at fret 12: 23mm

Depth of neck at fret 15: 25mm

"Heel" starts around fret 15

Body joins at frets 16-17

Treble Side Cutaway to fret 20

Frets on fingerboard: 22

Action as supplied 1.5mm Treble/1.8mm Bass

Stephen Delft

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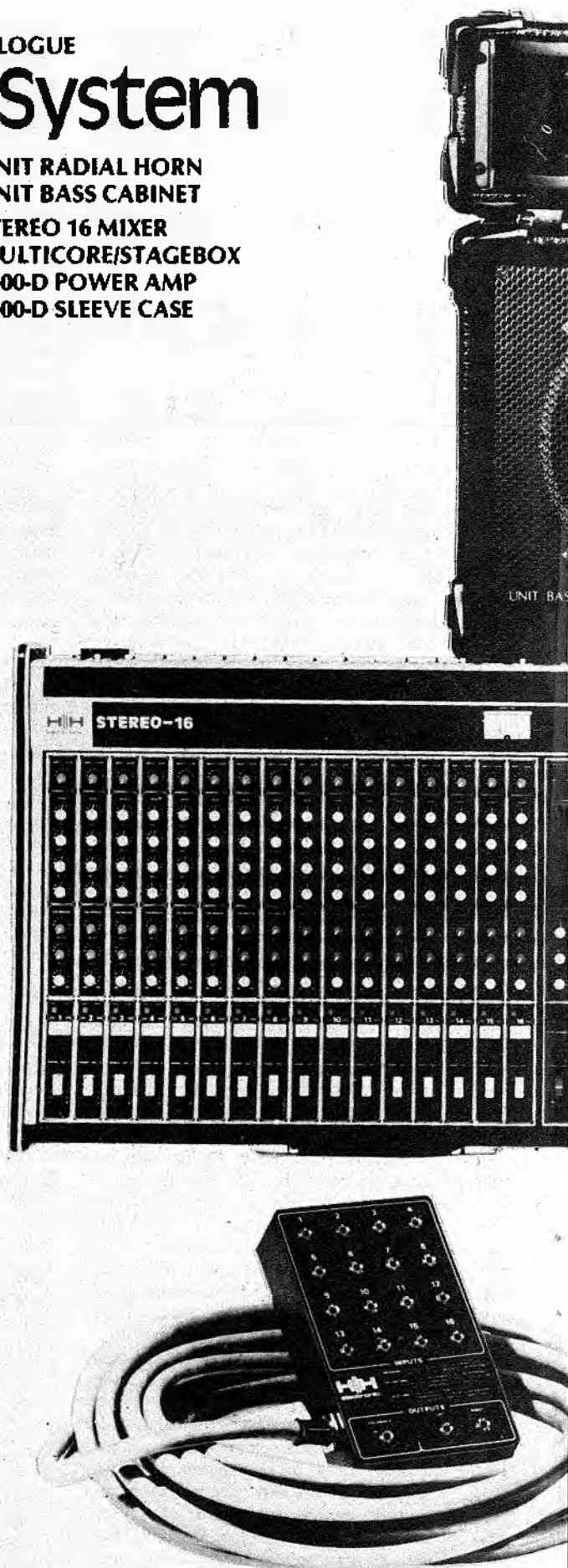
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# Soundcheck

## Marshall 2144 50W Reverb Combo £381.75

The name of Marshall, of course, is known to musicians and non-musicians alike as being associated with high-power quality instrument amplification. Marshall have stuck to a simple successful formula over the years and kept their range of 50watt and 100watt amplifier heads basically similar to the original ones produced many years ago.

More recently, a number of additions have been made to the Marshall range including transistorised amplifiers and a range of combos. The unit on test here is the newest of these combos. The Marshall model 2104 50watt 2x12" combo has been around for a little while so Marshall decided to bring out basically the same combo but with the addition of a Hammond spring reverb unit (unusual for a Marshall guitar amp) and an extra boost circuit (more about this later).

### Construction

The 2144 combo is based around the standard 50watt Marshall all-valve amplifier head, however the chassis is turned through a right angle and mounted at the back of the cabinet. This means that the front panel is facing upwards and the back panel downwards inside the cabinet with the valves facing forward. The cabinet is finished in the usual Marshall black vinyl and white piping round the speaker grille with black plastic corner protective pieces and four skids (feet).

The back of the cabinet is open with two removable pieces of vinyl covered plywood. The one at the top has the chassis bolted to it (thus making servicing straightforward especially where valves may need regular replacement) and the bottom section which has the Hammond spring unit bolted to it. There is a gap in the centre of these two panels which allows access to the chassis back panel sockets. A carrying

handle is mounted on the top of the cabinet with a plastic grille just in front positioned over the top of the valves to allow sufficient ventilation.

### Controls and performance

The front panel consists of the usual range of tone controls; middle, bass, treble and presence with pre-amp volume and master-volume controls and also of course a reverb level control. A mains power on/off illuminated (neon) rocker switch is provided with in addition, a standby on/off rocker (switching the valves H.T. off while leaving the heaters on to allow instantaneous switch on and off using the standby switch).

Two jack inputs are provided each with different sensitivities not just to match up different output guitars to the amplifier but to allow pre-amp overdrive with even the lowest output guitars. The interesting feature here is that the higher gain input sensitivity is controllable (by a fixed amount) with a footswitch which is supplied as standard with the combo. The footswitch has two switches; one which switches reverb in and out (via reverb level control) and the other labelled Boost. When plugged in and the boost switch operated this alters the sensitivity of the high input by approximately 8dB to a maximum of 12mV for full output compared to 300mV for the basic channel. This allows lots of valve sustain where required at low volume levels.

The back panel has mounted in it the standard I.E.C. mains connector with separate mains fuse and voltage selector. A loudspeaker impedance selector (4, 8 or 6 ohms) is also provided with two loudspeaker output jacks—clearly labelled to try and prevent accidents happening. A 3-pole jack socket is also provided for connection to the footswitch. Two heavy duty Celestion loudspeakers are fitted and wired in parallel to present an impedance of 8 ohms to the amplifier.



## In use

The range of control offered on each of the tone controls on paper leaves a lot to be desired. The middle and treble controls appear to interact and with the bass pot, only provide the most basic of control while the presence appears to make only a slight difference to the sound.

Suffice it to say that when this amplifier was tested under domestic conditions the initial reaction was one of disappointment. The basic sound when used with a guitar was good but it was not possible to obtain a variety of sounds out of it as it is possible to do with many of the amps these days (using tone controls coupled with graphic equalisers). In addition the pre-amp volume control made quite a difference to the overall sound as it brought up more bass when turned up full.

The combo, however, appeared to transform overnight when used onstage at a gig. What can one really say about the Marshall sound? Certainly it needed to be turned up loud to really be appreciated and with the tone controls available it was possible to fine tune what was already initially a really excellent sound. The footswitch control for gain was extremely useful and enabled for instance a rhythm guitar volume to be set up and then in the boost position to cut easily through for lead playing.

A good 50watts through two efficient Celestion speakers produced a remarkably loud sound and with considerable pre-amp overdrive available as well as the more normal valve output stage distortion (at higher outputs) the warm valve sustain/distortion was excellent. The reverb sound was good and not too tinny.

## Conclusion

To sum up — for the guitarist who wants a typical Marshall sound for loud rock music this combo is excellent. Full marks to Marshall for using a Hammond spring reverb. I personally would much rather hear a decent spring reverb unit for a guitar amplifier than the approximation to a reverb sound offered by many (expensive) analogue delay effects boxes.

I would however prefer to see the mains input connector mounted horizontally rather than vertically downwards as it is all too easy for the mains lead to accidentally come adrift. Still, if you want the real Marshall valve sound then this is the combo that will do it with some additional good effects.

Dave Mann

*Dave Mann gained an honours degree in Electronic Engineering at Southampton University in 1972. Since then he has been working in Television and Sound Studios with more recent involvement in the design of guitar amplifiers. He is also a member of a regularly gigging band.*



## MARSHALL COMBO TYPE 2144

PARAMETER	RESULT	TEST CONDITION	COMMENTS
Power output	51WRMS	Onset of clipping into 8 ohms.	Measured into 8 ohms — same as speaker impedance.
Input sensitivity			
Low	300mV		
High-boost off	30mV	All tone controls at '0'. Master and gain at full.	Good range.
High-boost on	12mV		
Tone controls			
Range (dB)			
Treble	+ 24dB	@7kHz and above	With tone controls at '0' approx. flat response — each control advanced clockwise.
Bass	+ 20dB	@85Hz	
Middle	+ 16dB	@3kHz and above	
Presence	+ 5dB	@2kHz and above	
Amplifier not tested under short or open circuit conditions as would have possibly have resulted in damage to valves. (Instantaneous short circuit can be tolerated.)			



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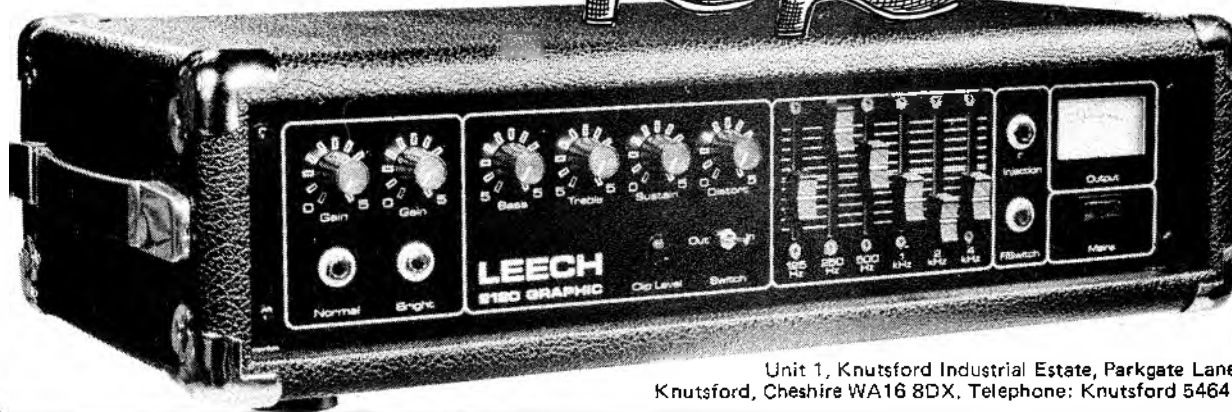


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# Keyboardcheck

The WLM Hit Organ is made in Finland. The smart styling, practicality made aesthetic by virtue of simple austere lines, reflects the country of origin — modern but with great respect for tradition (in this case Hammond) — an instrument with an impressive lack of frills. The organ is housed in a robust cabinet constructed of thick plywood, painted black and edged with aluminium. It looks pretty tough and if you do dent it all you need is some wood filler and a small tin of black paint. The keyboard unit is suspended inside the cabinet when the organ is in transit and it only takes a minute to set up. One side of the cabinet swings down, the keyboard unit swings up and the cabinet side returns to its former position in which it now supports the keyboard.

The organ's solid construction makes it heavy enough to deter most people from trying to carry it unaided — a couple of spring-hinged handles (one at either end) indicate that the co-operation of another band member is desirable and it's a pity the handles aren't a bit less gleamingly functional looking and a bit more comfortable to grip. The organ has two manuals, each with four octaves C-C, the upper manual being offset to the right by the space of one octave. To the left of the upper manual in the space thus left clear is a row of touch-sensitive aluminium buttons, each with a small red light to indicate operation. These are: Drawbar (for manual control), Full Organ, Preset 1 and Preset 2 (internally adjustable), Chorus, Off and Tremolo (the Off button affecting the two adjacent effects).

Above the upper manual are the drawbars, each marked from 1 to 8 in the Hammond manner. On the left is the bass section — a switch consigns this either to the lower two octaves of the lower manual or to the optional one octave pedalboard. In either case the bass is monophonic, the lowest note played being the one that sounds. The bass has sustain and attack drawbars, the sustain being the equivalent of release in synthesizer terms — i.e. in conjunction with a sharp attack it is possible to obtain fairly realistic plucked bass sounds. There are drawbars for 16', 8', 5 1/2' (a fifth above) and 4'. Next come the drawbars for the upper manual: 16', 5 1/2', 8', 4', 2 3/4' (an octave and a fifth), 2', 1-3/5' (two octaves and a major third), 1 1/3' (two octaves and a fifth) and 1'.

This line-up is repeated for both the percussion (which affects upper manual only) and lower manual. The percussion has two extra controls for attack and decay, the decay determining the time the sound takes to fall from the initial 'ping' — not to be confused with the sustain in the bass. The percussion is primarily for use as an additive element for the upper manual 'straight' voices — to spice up the sound though it may be used as a staccato sound in its own right. It's worth noting that the percussive effect will not happen if any note on the upper keyboard is already depressed. As well as all the footages listed above the lower manual has a drawbar marked 'balance'. This affects the volume of the lower manual only — the nomenclature leads one to half suspect that boosting one manual may mean subtraction from the other but this is not the case.

The last three drawbars are effects: reverb, vibrato and brilliance. The reverb, though effective, noticeably increased the amount of hum on the instrument being reviewed. The vibrato adds a fairly fast pitch vibrato and the brilliance adds an edge to the top registrations though here the effect is not particularly marked. Of the two touch sensitive effects the chorus introduces a slow quasi-flanging

gloss to the sound. The tremolo is again on the fast side — some control of speed and amount would be a useful addition.

Both keyboards are light in the customary organ manner and providing that one accepts that concept of keyboard touch, feel pleasantly positive. The optional cable-connected pedalboard adds £100 to the price. The organ has no amp or speakers of its own. Soundwise it's very much a traditional instrument — the sine-wave generator and drawbar facilities make sure of that — all in a modern, easy to move and, by today's standards, relatively inexpensive package. Sounds ideal, doesn't it? — well there are a few minor carps — the full organ preset and the bass attack drawbar stopped functioning while I had the organ in the house. A small rotary knob marked 'pitch' failed completely to effect that quality. The malfunctions end there but the fact that such an *efficient looking* machine should fail in some way is slightly disturbing.

However, I don't think these factors should be allowed to detract from what is basically a simple no-frills organ — and in any case WLM provide a *super-comprehensive* selection of circuit diagrams for the dedicated owner who really likes to know his instrument. If on the other hand you, like me, haven't a clue about circuit diagrams be warned by the preceding sentences and make sure that the after-sales service is going to be there, if and when, you need it. One last negative comment — the situation of the variable controls for presets 1 and 2. To get at these you have to undo seven screws and then, assuming that your instrument is as well fitted together as the one I had, spend another couple of minutes attempting to wrest the cover off — hardly the last word in ergonomics.

Forgetting these minor oddities if you are looking for an organ that will give you a good gutsy sound with plenty of flexibility and you DON'T need a carved fake-wood music stand but you DO need a top that you can stack another keyboard on etc. — in other words a serious, purposeful playing instrument, check this one out.

**Tony Hymas**

*Tony Hymas is a keyboard player and composer with experience in rock, jazz and classical music. He has played with groups ranging from the Jack Bruce Band to the London Symphony Orchestra, and recently toured with the band fronted by Jeff Beck and Stanley Clarke.*

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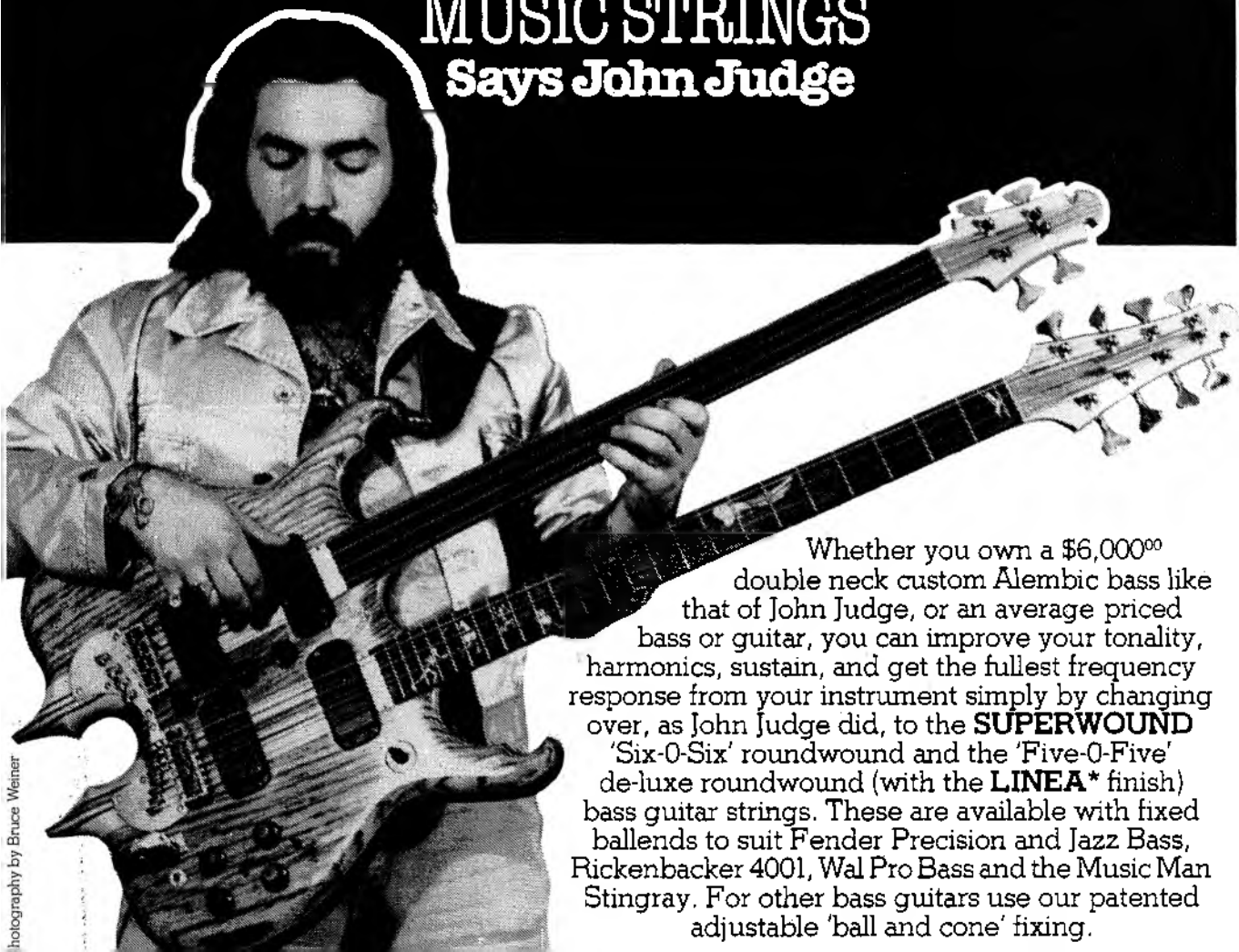
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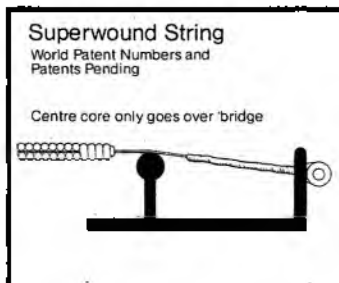
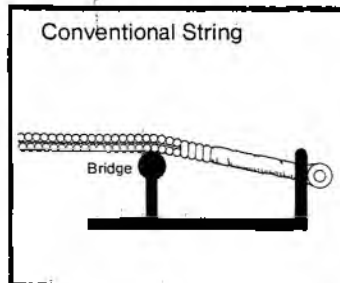
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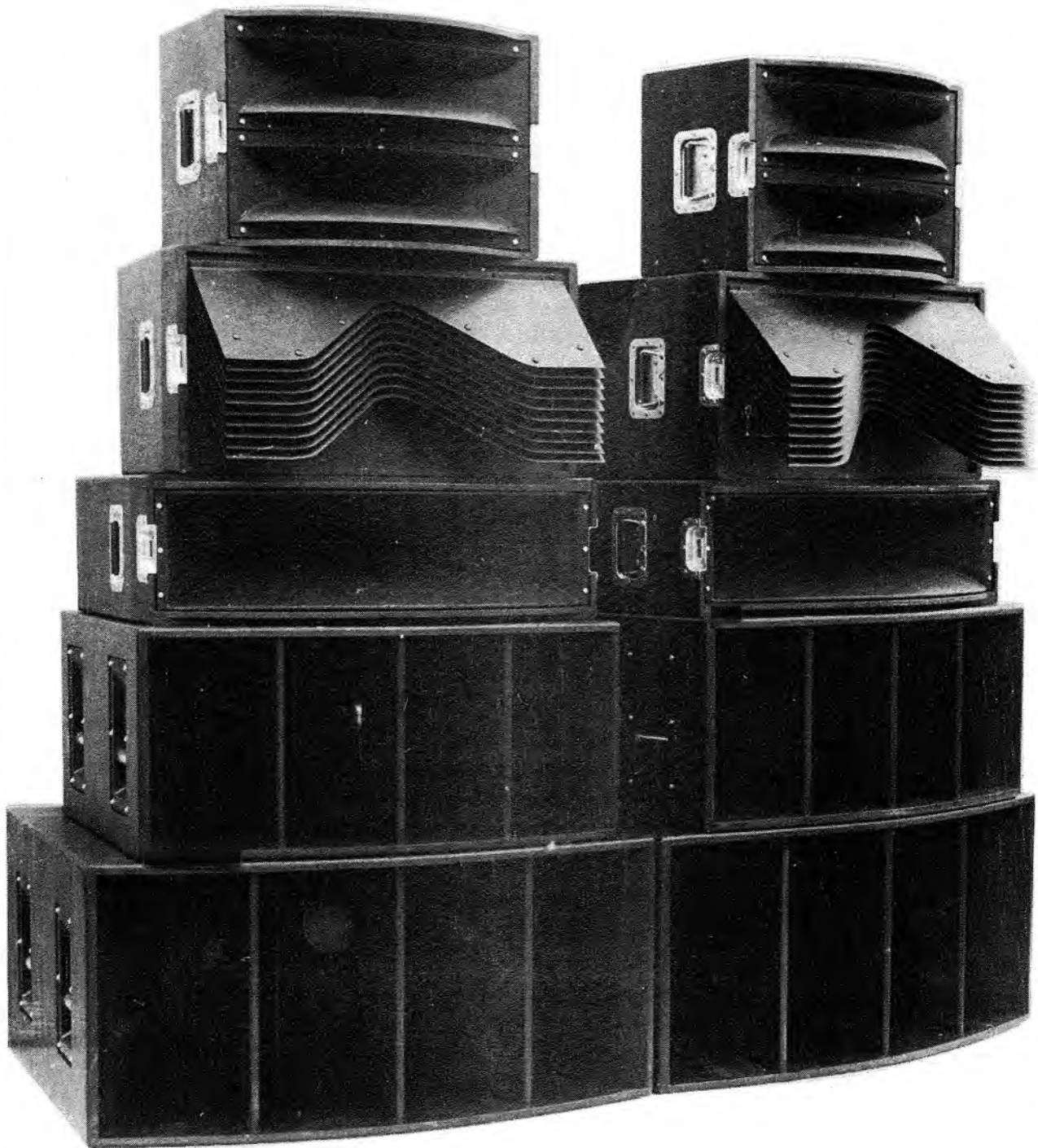


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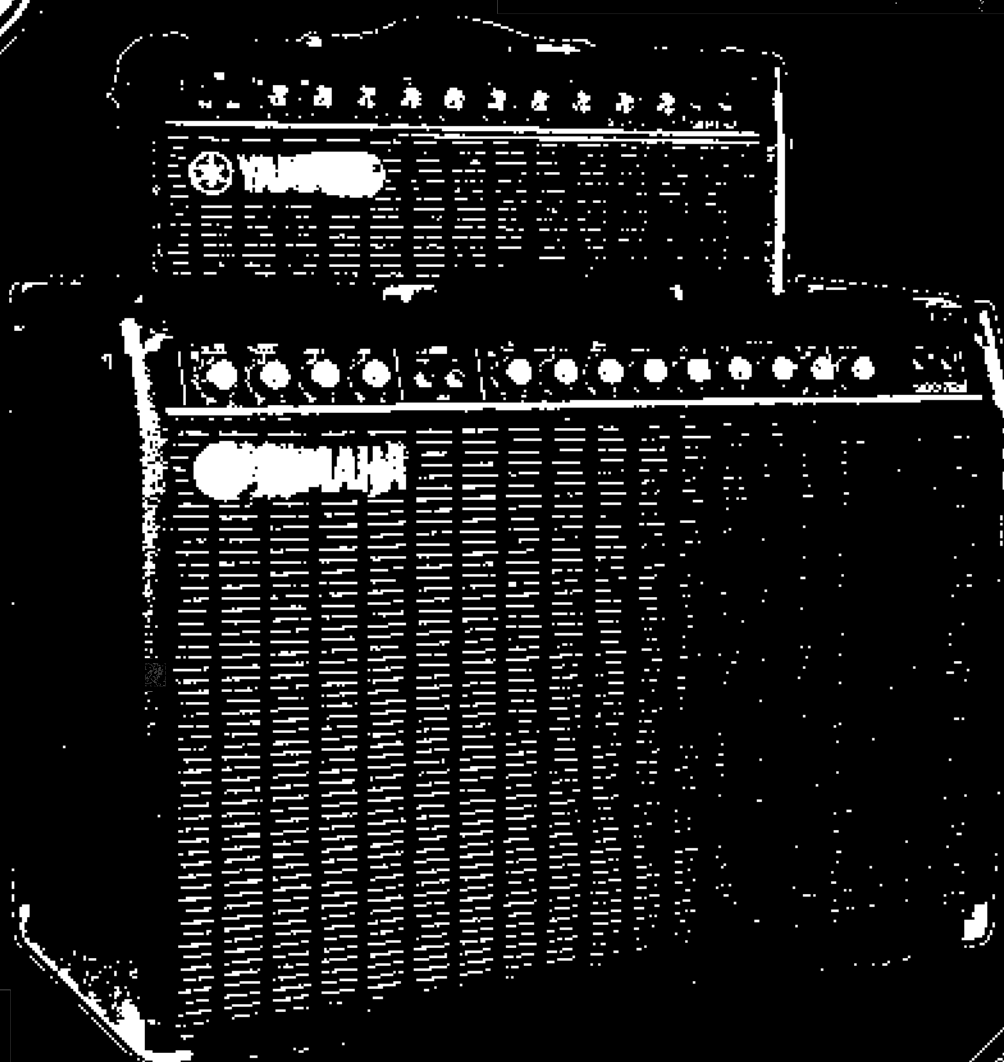


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**Howard Brain**  
(Manager)

# Synthcheck

## EMS Polysynthi £1491 inc.VAT

The Polysynthi from Electronic Music Studios (London) Ltd. — known generally as EMS — aims to give live performances sound synthesis through a fully polyphonic keyboard at a price within reach of most musicians.

Like most other companies that have expanded from monophonic to polyphonic synths, EMS has followed the trend in selecting the "switch-linked" type of instrument as the most suitable for live performances. The majority of these make use of preset controls for instant selection of user patched or in-built sound, yet Polysynthi provides internal audio signal connections between the Oscillator Bank (VCOB), Filter (VCF), Amplifier (VCA) and Analogue Delay Line (ADL) so that sounds can be quickly made using the minimum of controls. Also, three rows of switches form control busses that allow a useful variety of control voltages and triggers to be chosen.

### Cabinet and Presentation

The size and shape of this instrument makes it a unit that could go on top of some organs and grand pianos, but otherwise needs some kind of frame for support. Although it can be carried by one person, care has to be taken with the top panel and keyboard. Don't push too hard on the control knobs or you will scratch the panel; keys may become misaligned if you knock against them while carrying. The angled top surface of the instrument consists of the large metal control panel with its vivid colouring for easy selection of the various devices, and a 49-note pressure sensitive keyboard. Unlike other sensor keyboards, the whole keyboard of the Polysynthi physically moves downward as you exert more pressure on the keys. This causes a metal bar mounted underneath to pass between a photo-electric cell combination to give varying control voltage.

The panel markings are unusual in that numbered dials are printed so that they can be seen clearly looking from the keyboard without having to peer over control knobs.

The cabinet is constructed of chipboard and plywood covered in black rexine which is stapled in place. The underside has four rubber feet and a hardboard cover which can be removed for servicing. At the back are jack sockets for optional dual-foot-pedal, external input with mic/line switch, mono signal output, plus a detachable A/C powerline and sequencer socket. When the sequencer is not used, a plug is inserted in this socket to connect keyboard control voltages and triggers. The foot-pedal unit can be connected into two of the three sockets provided for controlling volume level, filter cut-off frequency and pitch-bend. A handbook is supplied with clear instructions on using the Polysynthi plus some patch-charts to start you off.

### Internal Electronics and Sequencer Option

This synthesizer uses a large number of CMOS chips and op-amp ICs in its circuitry which is mounted on four large printed circuit boards that swivel outward on a "piano" hinge for access to all the components. The pitches for the keyboard notes are derived from one master oscillator in a phase-locked loop device for stability in tuning, established after five minutes warm up on switch-on. This had only drifted two cycles after a further hour in fairly warm on-stage conditions.

Because this synthesizer connects directly to its own custom-built sequencer (via a 25-pin socket), it contains advanced circuitry for multiplexing

analogue voltages from the keyboard and main control devices. These are sent directly to the sequencer for storage in digital form (using a Z-80 microprocessor based system). The sequencer can store up to 10 minutes of polyphonic music in its memory, a unique advantage. Not only does the sequencer play back your music at whatever speed you want (without necessarily changing original pitch), it also stores control voltages for octave additions, transpositions and VCF or VCA control. Playing mistakes can be edited out and the sequencer format follows the Polysynthi simple-switching principle of operation.

### The Control Panel

The brightly coloured knobs are there for a purpose, providing a simple, quick means of identifying the functions of each part. In the past, many electronic organs have used coloured tabs for tone identification. This visual aid, combined with a host of yellow, red and green LED lights, makes setting up easy for anyone.

Any number of notes can be played at once to make truly polyphonic music, although it must be remembered that this synth does not have separate VCF and VCA on each note. In playing, the effect of the single VCF/VCA can produce repeated triggering from sustained notes as additional notes are played. This does not sound too pleasant yet by using the sustain control to hold the filter open it can be avoided. Information from the keyboard note last played is stored in the keyboard memory, similar to normal sample/hold systems on other synths — a trigger pulse is produced. At the same time, a separate control voltage is generated from the highest notes played. The mechanical keyboard also provides a voltage proportional to the pressure applied. These are sent to the bottom row of the control busses.

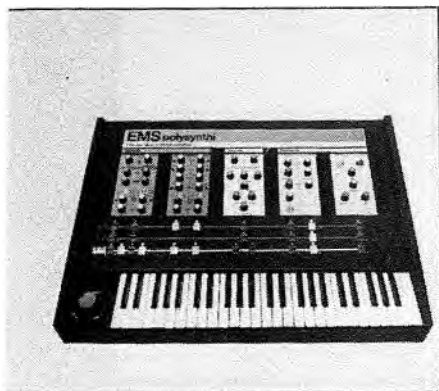
Across the matt black panel from left to right are the main synthesizer devices grouped into appropriate controls, sources and treatments sections. The two red control sections contain the envelope follower, two voltage controlled LFOs and two ADSR envelope generators. All the control voltages and triggers, apart from those connected with the keyboard, are produced in these sections and operate on themselves or sources and treatments either by pre-patched internal connection or by selecting one or more of the switches in the other two rows of control busses.

The switches work either one-way or two-way for selecting VCLFO 1 or 2 on the top row and ADSR 1 or 2 on the middle row. A switch on any control bus in the up position has a red LED indicator and in the down position has a green LED, with both lights extinguished in the centre-off position. It is possible to use up to 4 switches at once on a single device. The center blue sources section contains a white noise generator external input level control and a voltage controlled oscillator bank (VCOB).

### Sources

The synthesizer's main source of sound generation comes from the oscillator bank. Three waveforms are provided which can be mixed together to make a wide range of basic tones. These are a pulse-wave, square-wave and a triangle-wave.

In practice, the pulse wave has to be used sparingly, otherwise clashing overtones result from certain note combinations. The squarewave gives the characteristic hollow clarinet tone as it should and the triangle wave is also acceptable for strings or





flute sounds.

The power supply uses an exceptionally large capacitor for smoothing and helps to give a very clean output signal which is hum-free and good enough for studio recording. Only one control seemed to be suspect, producing slight high frequency break-through in the VCA.

A keyboard memory switch remembers the last note or chord played. The EGs can give a release time during which the note will die away after the key is released. When this switch is off, the keyboard gives on-off electronic organ touch with only attack, decay and sustain controls operating. With keyboard memory on, it is possible to switch off the keyboard information send so that the last notes played are stored and the keyboard top note and sensor voltages can manipulate the sound as required.

A tune control sets the overall pitch of the instrument and a range switch selects 32', 16', 8', 4', 2' or 1' pitches for the keyboard, covering a nine octave span, all you would need for most performances. You can play a chord, then set a new pitch range and nothing will happen until you play the next notes. This is very useful, avoiding hearing pitch jumps on long envelopes. Not so useful is the clicking that occurs if you change pitches during continuous playing, but this is inevitable where a lot of electronic "sampling" is going on continuously.

A control level knob receives voltages for modulating the overall keyboard pitch from VCLFO 1 or 2, ADSR 1 or 2 and key pressure. There is a fourth switch in this group that has to be left on if you want the keyboard to change pitch normally. Pitch modulation is limited to plus or minus a third interval using LFO squarewave control.

Two other sources are available from the noise generator, which can be mixed with the three waveforms, and an external input. A level control for the latter is provided so adjustments can be made. The envelope follower in the control section can be set up for maximum undistorted input level by its own gain control. The level at which a trigger is produced for the external input is set by a threshold control and yellow LED. This trigger pulse works on ADSR 1 only so this device would be used to control both VCF and VCA.

### Controls

The Polysynthi controls in performance are similar to monophonic synths using separate LFO, EG, VCO, VCF and VCA functions. Two EGs give ADSR control waveforms to modulate VCLFO 1 and 2, VCOB pitch, VCF, VCA and ADL delay time. Each parameter of the ADSR can be varied from 5ms to 10 secs and ADR events are indicated by individual red or green LEDs. Output waveforms can be inverted when sent through the control busses to a device. A complete attack is set longer than the other parameters — the waveform cycle will be completed before retriggering takes place allowing continuous tone modulation. To complete the EG section there are level controls on ADSR 1 and 2 for setting the amount of control the envelope provides.

### Treatments

The two yellow sections provide tone and sound shaping of the signals from the sources section and form an internally linked chain to the output: Sources Filter Amplifier Delay or Straight Mix Output.

Instead of using switchable filters, the Poly-

synthi has a low pass switchable two-pole (12dB/octave) or four-pole (24dB/octave) VCF with a 'Q' or resonance control that at maximum will highlight harmonics present at the cut-off frequency without going into oscillation itself. The VCF has a direct control prewired to send a variable amount of ADSR 1 output to sweep the filter frequency. Since EGs are most frequently used to control VCF and VCA, this direct control allows most basic sound patching to be done on the panel.

Three switches on the control busses are usually left on sending separate keyboard triggers to operate the EGs and keyboard "information" to set VCOB pitches. There is also a VCF control level for adjusting voltage waveforms received from VCLFO 1 or 2, ADSR 1 or 2 and keyboard top note or sensor via the control busses. The keyboard top note voltage can be used to open the filter on higher notes so that the same harmonic structure is produced over the keyboard range.

The VCA controls volume shape from a direct control which links variable amounts of ADSR 2 output internally. Instead of a hold switch, there is an initial gain knob which when used on its own will open the VCA to produce sustained volume levels. It can be used in conjunction with the direct and bus control voltages.

### Analogue Delay Line

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Time modulation effects enliven the final sound. They are linked directly to the synth controls to provide the Polysynthi with a special sound characteristic of its own.

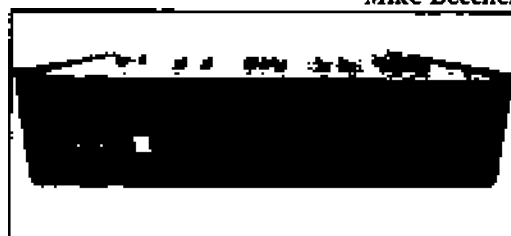
### Conclusion

A polyphonic synthesizer can add much to sound texture. The poly still holds a relatively high price providing a place in the market for the cheaper Polysynthi.

This EMS machine represents a compromise on its use of a single filter/amplifier system. All the controls worked effectively although I have reservations about the keyboard mechanics and found the pitch-bend springs rather heavy. The instrument is very well made inside but would benefit from a few extras on the outside; protective corners, carrying handle, cover or light carrying case.

However, its variety of controls and advanced design make this a low cost machine suitable for creating a wide range of sound textures and through its simplicity of operation should appeal to the live performance musician.

Mike Beecher



Mike Beecher is Director of Music at Wickford School and is a musician specialising in electronic keyboards.

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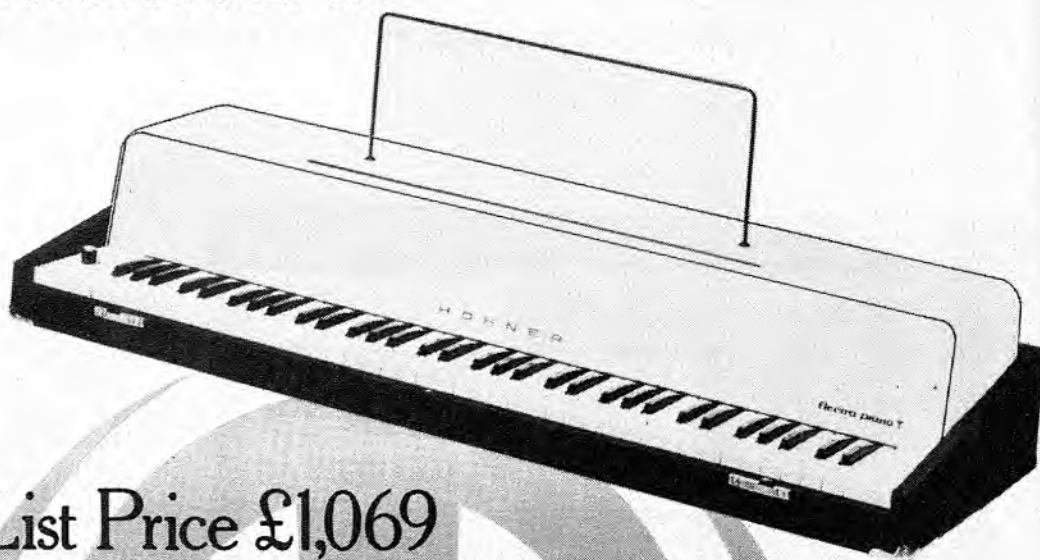


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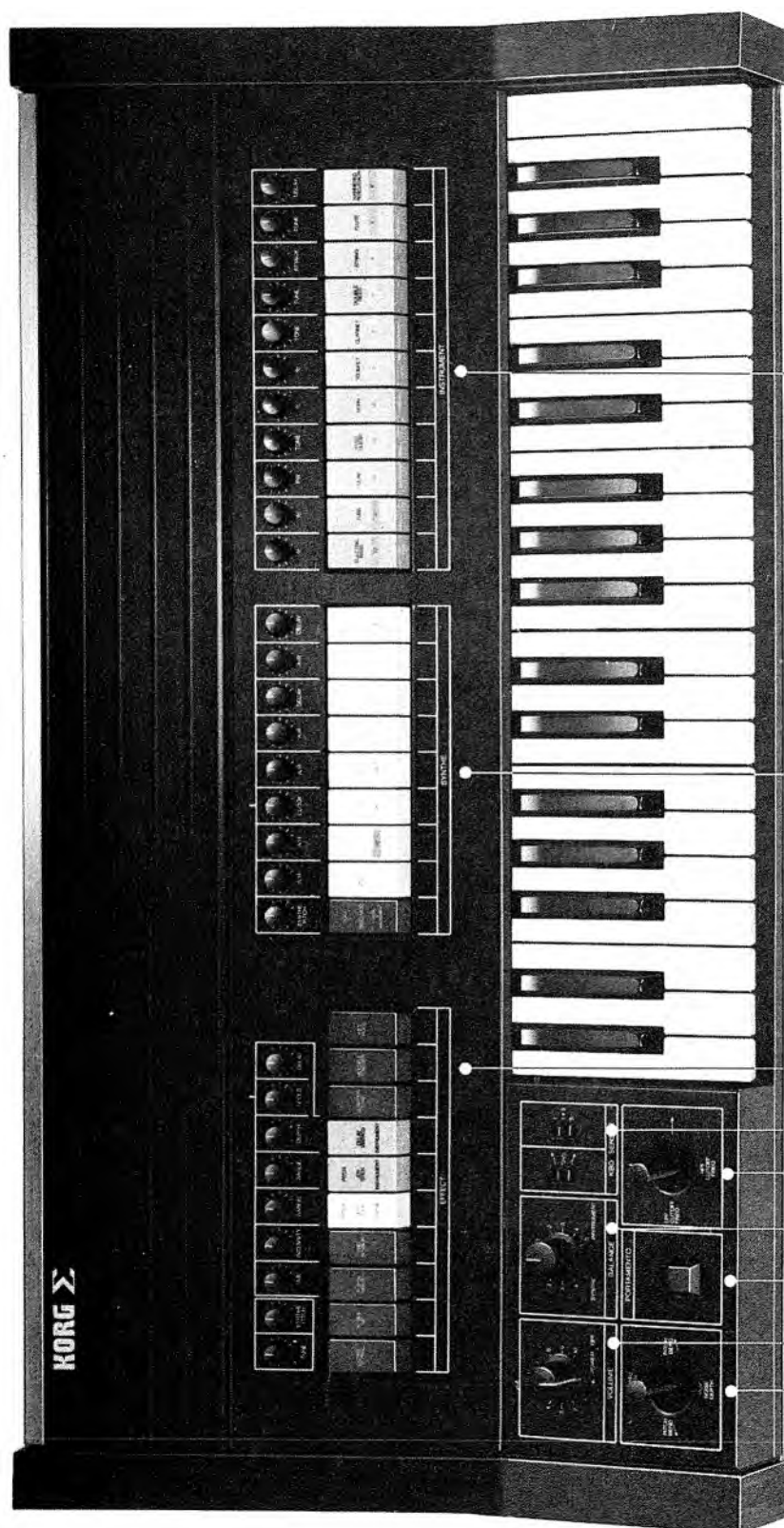
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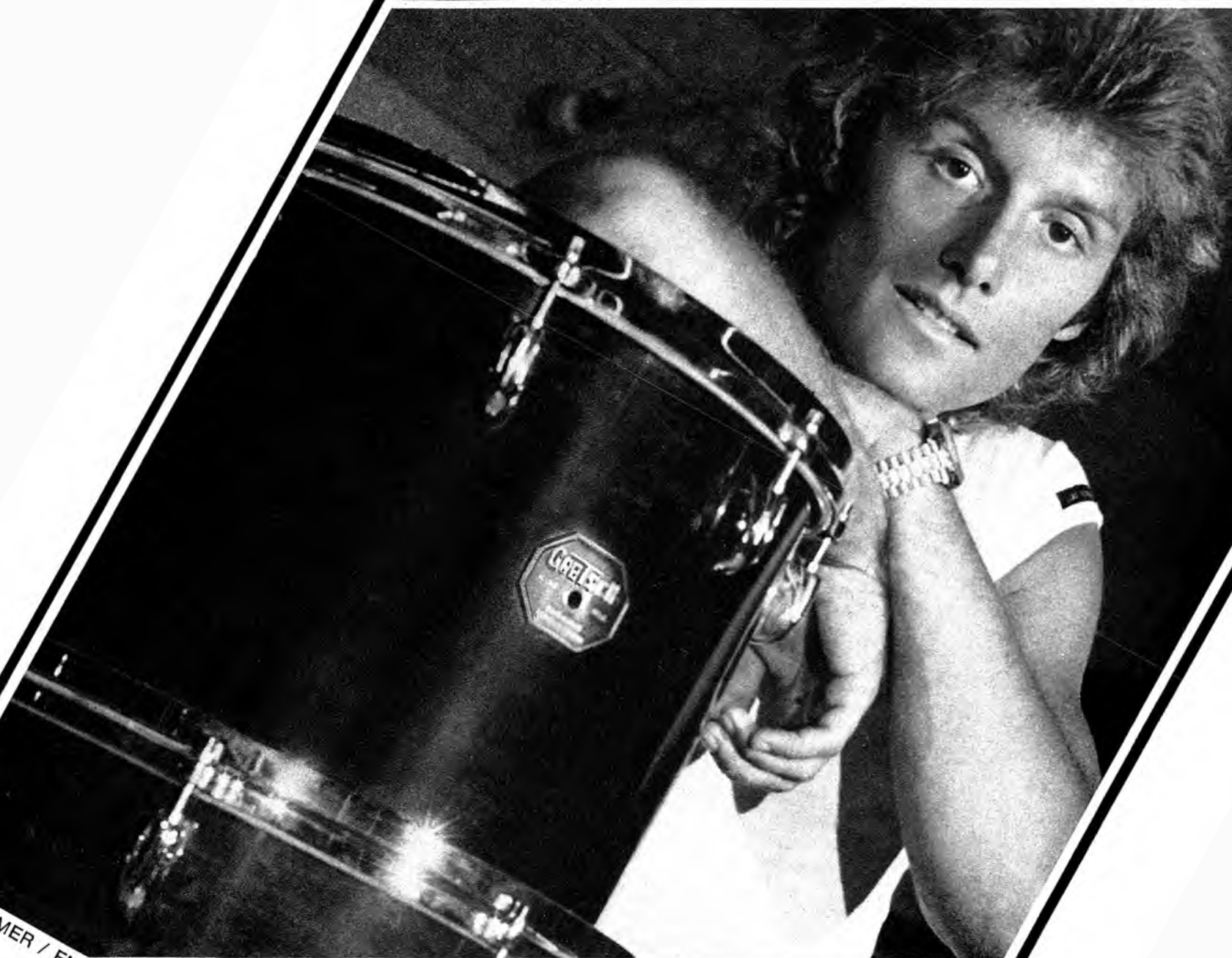
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# Drumcheck

## Olympic

### B1033

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In response to a great many requests I make no apologies for reviewing this month a set which is aimed very definitely at the bottom i.e. the amateur end, of the market. Over the next few months I shall hopefully be including tests on three or four other cheap(er) five drum kits with roughly £400 as the price ceiling for the complete price including tax but sans cymbals.

Now, this month's guinea-pig is the Olympic B1033 built by the Premier drum company in Leicester. The origins of the Olympic marque are lost in time but we do know that there were certainly military drums available in the early Thirties although *set* production as we know it did not start until after the war, around 1948. So, Olympic drum sets have been with us for 30 years or so and have been for the most part accepted by the trade as very much a beginners, or dare I say, a second line set. I say for the *most* part because two or three years ago there was a *Super Olympic* kit available with individual nut boxes which has recently been merged, or have become Premier's Sound Wave outfit.

Anyway Olympic is now back to its original position in the market place with the reintroduction of double ended, head to head nut-boxes on snare drum, bass drum and mounted tom toms — for some reason not fitted to the floor standing drum. The set, however, retains *some* of the Super Olympic's refinements like outrigger spurs and a double tom tom holder which were in turn borrowed from the more illustrious, robust not to mention costly Premier and Beverley ranges. The net result for Olympic is a more solid looking set — indeed, I have heard it said that Olympic shells of 4mm birch are exactly the same as those used by Premier, but visually not quite so perfect. This point, however, is open to conjecture.

The B1033 has a 22 x 14 inch bass drum, a 14 x 5 1/2 inch metal shell snare drum, with 12 x 8, 13 x 9 and 16 x 16 tom toms plus a pair of cymbal stands, snare and hi hat stand, bass drum pedal, sticks, brushes and a *stool*.

#### Bass Drum

The bass drum has only six double-ended, full-shell type, nut boxes with 'T' tension screws and cast 'Gretsch-type' claws. It has wooden hoops inlaid with plastic and is fitted in the catalogue with a pair of felt strip dampers one for each head. The set I saw had only one damper for the batter side. Funnily enough, the drum had a lot more 'balls' than I expected — because the combination of so few tension screws and the thinner Olympic 'gold' heads ought to result in a reasonably thin sound. However, it does have quite a solid thump all things being equal. I must say, though, that better quality Premier heads, say the 'Everplay plus', would definitely result in a better i.e. stronger sound. This recommendation would apply for single or double headed play. It has suddenly crossed my mind that for a beginner it's probably a hell of a lot easier to tune a drum which has fewer tensioners; therefore less variables to get bogged down and confused with. Having said that the rule is that the more tension positions on the head the more even and more consistent the sound.

#### Tom Toms

Three tom toms come with this Olympic set, 12 x 8 and 13 x 9 mounted on the bass drums and a 16 x 16 floor stander. All have the pressed-steel triple flange hoops which Premier adopted as standard

just a few years ago. (To reiterate the difference between the two sorts of hoops. Triple flange hoops favoured by several American manufacturers are press formed and then joined (with the exception of Sonor's which are spun in one piece from a solid plate like their snare drum). The alternative are the one piece *cast* hoops used formerly by Premier and still by Gretsch which give a slightly heavier sound and more 'clonky' rim shot. The triple flanges give a more open breathy sound with more penetration to it.

The smallest rack mounted tom has five slotted tension screws per head, the largest has six and the floor standing drum has 16 in total. The two smaller drums have double-ended cast nut-boxes which I suspect are exactly the same as those used for the snare drum — the difference in shell depth sizes being taken care of with extra long tension screws. These nut-boxes are joined to the shell inside with just a single screw which I would have thought to be insufficient — although to be objective you probably wouldn't notice the casing lifting from the shell unless you used the drums single headed.

The floor tom tom has individual nut-boxes for each head which are joined to the shell in the more usual way with two bolts. The drum stands on three legs, which are of the American type with the double-bend steel rods and rubber feet. These legs are joined to the shell with the same cast blocks as Premier use (with the sensible eye rings inside) but in Olympic's case these are black anodised. These blocks double as spur holders and tom tom receiver blocks although the leg holder has a slightly smarter hole in it. Anyway the shells are made from birch and have solid glue rings 'screamed' i.e. forced into them once formed. (I presume this is the way Premier do it since everybody else who uses glue rings does). The glue ring allows the manufacturer to use a thinner shell and yet still have rigidity. So what of the sound you ask me?

Well, the floor tom sounds much stronger than the other two. Better quality heads i.e. thicker and more resilient would definitely help the sound of the mounted drums to be a little more authoritative. The overall tom tom sound even with the cheaper heads I felt to be promising though and to change just the *batter* head would be the cheapest answer.

#### Snare Drums

The metal shell snare drum supplied with this set is designated 1005 and has eight double ended nut-boxes joined to the shell like the tom toms with a single screw. The shell itself is from chinnish steel which is not spun but made from one sheet of metal bent round and brazed at right angles to its flanges. The drum does not have a strengthening bead (and for my money would be better with), but does have a 45 degree inverse flange with a thickish (by expensive drum standards) bearing edge and a reasonably wide old fashioned type snare *bed* (not a graduated snare touch area like the more illustrious Premier 2000). The 16 strand metal snares are joined to the pressed steel adjustable cam action strainer with cord. This strainer works well enough I must admit but is, with the best will in the world, a little flimsy. Opposite the strainer we have the usual non-adjustable, pressed steel butt end. Inside as per usual was the under-batter-head-operating adjustable damper which although not as thick as Premier's seemed to do its job.

The actual sound of the 5 1/2 inch deep drum is reasonably good — bright sounding, strong and

crisp. I did an A-B test between the 1005 and a Premier 2000. Obviously the Olympic did not have as much depth as the 2000 nor was it as tight — but, "what you see is what you get" and given an hour or so to change the heads and snares for the better I'm confident I could get a very good sound from the Olympic (it reminded me a little of the Ludwig Acrolite).

#### Accessories

Olympic series stands are flush-based like the original Premiers used to be with a large wing type bolt underneath the legs to lock them into the 'out' position. These legs are not cast like those originals but instead are made of steel tubing finished off at the ends with three rubber walking-stick tips. (The centre boss is made from pressed steel on all the stands.) Both cymbal stands are three stage models with their top most extension made from steel rod and the other stages made from modest, small bore tubing. All the height/locking adjustments are via a cast block with a removable nut inside and Premier's old 'L' shaped thumb-screw.

The cymbal tilter itself seems to me to be the same as used by the Premier Lokfast stands. It's a cast splined ratchet tilter with metal bottom washer and felts with plastic sleeving topped off with the usual wing nut. The angle adjustment is by a drumkey operated screw. The stands certainly extend high enough for this sort of set and as to stability I would always advise you to have one leg pointing away from the playing position in line with the tilter's horizontal position. This will make it more difficult to knock the stand over.

Olympic's snare drum stand seems to use the same principle as the Trilok. It has a not quite basket type gripping action — but instead has two

arms fixed and immovable and one arm able to arc in a vertical direction via a thumb screw. The idea works well for a snare drum but I don't know if it would work for a tom tom. Mind you at this end of the market I don't suppose anyone would want to use it for anything other than the purpose it was designed for. The stand's height adjustment has the usual cast block and 'L' shaped screw which once locked into position I couldn't budge. The playing angle adjustment has a pressed steel cage with a simple rubber sandwich-type friction clutch locked into position by a large cast wing-nut. This too I couldn't fault. The drum is held securely and gently in place by white, rubber sheathed, bent steel arms.

The hi-hat too has the same flush based legs, or at least two are, the other leg is articulated and has the one piece footplate joined to it (or rather over it). This rectangular footplate has a ribbed rubber centre edged with what I *presume* to be aluminium. The action of the pedal is not of the centre-pull type but has a double side pull from two diametrically opposite positions. This action is not adjustable but for all that seems pretty smooth considering. I couldn't take it apart but expect it has an expansion spring loaded movement. The height adjustment is as the other Olympic stands and the top cymbal clutch and adjustable bottom cymbal seat seem to be direct left-overs from the old Premier range which work well enough, but for me could do with a slightly larger top cymbal height adjustment screw.

The 1251 cam action bass drum pedal supplied, is unsophisticated and has only two adjustments — three if you count beater height. The expansion spring's tension is, of course, changeable but the third adjustment is, I feel, unusual for a pedal like this. The footplate position is adjustable in three positions relative to the bass drum head: angled to



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# Drumcheck

left or right or, of course, dead centre at right angles to the drum. The footplate is of one piece and matches the hi-hat's exactly. It's actual framework is 'U' shaped and of black anodised steel rod which clamps to the drum's hoop with a pressed steel clamp. This clamp holds the stretcher underneath the footplate to the pedal frame too. The action of the pedal as it is, is a bit sluggish but this is mostly due to the top heavy lambswool beater which they supply. I changed this for a more normal and better balanced felt beater which made a hell of a difference. Also, to change the plastic strap for a thicker piece of industrial belting (or leather) would help a lot to get a more positive feel.

The spurs supplied are the thicker bent-rod outrigger type which Premier favour and which have optional rubber or spike tipped ends. Their retaining blocks fitted to the bass drum shell are the same as the tom tom leg blocks of black anodised steel.

The Olympic double tom tom holder is exactly the same as the Premier one save for one or two purely cosmetic differences, like Premier's it's a hybrid, works well and is sensibly set at the front of the bass drum and allows close together tom tom placement. The down tube stem of the holder is oval shaped chrome steel and located into a black anodised block bolted to the bass drum shell. Two large wing bolts hold the height position securely by pressing on each side of the oval tube which by it's shape effectively stops the tom toms from circling on this pivot around the bass drum. At the top of this tube is a black anodised 'T' shaped casting

(Premier's is chromed) with a pair of substantial screw locked ratchet tilters which hold and contain two knurled (splined really) 'L' shaped bent rods. These thicker-than-tom-tom-leg rods locate into the spur-type blocks and are safely secured with a large wing bolt. It all works very well.

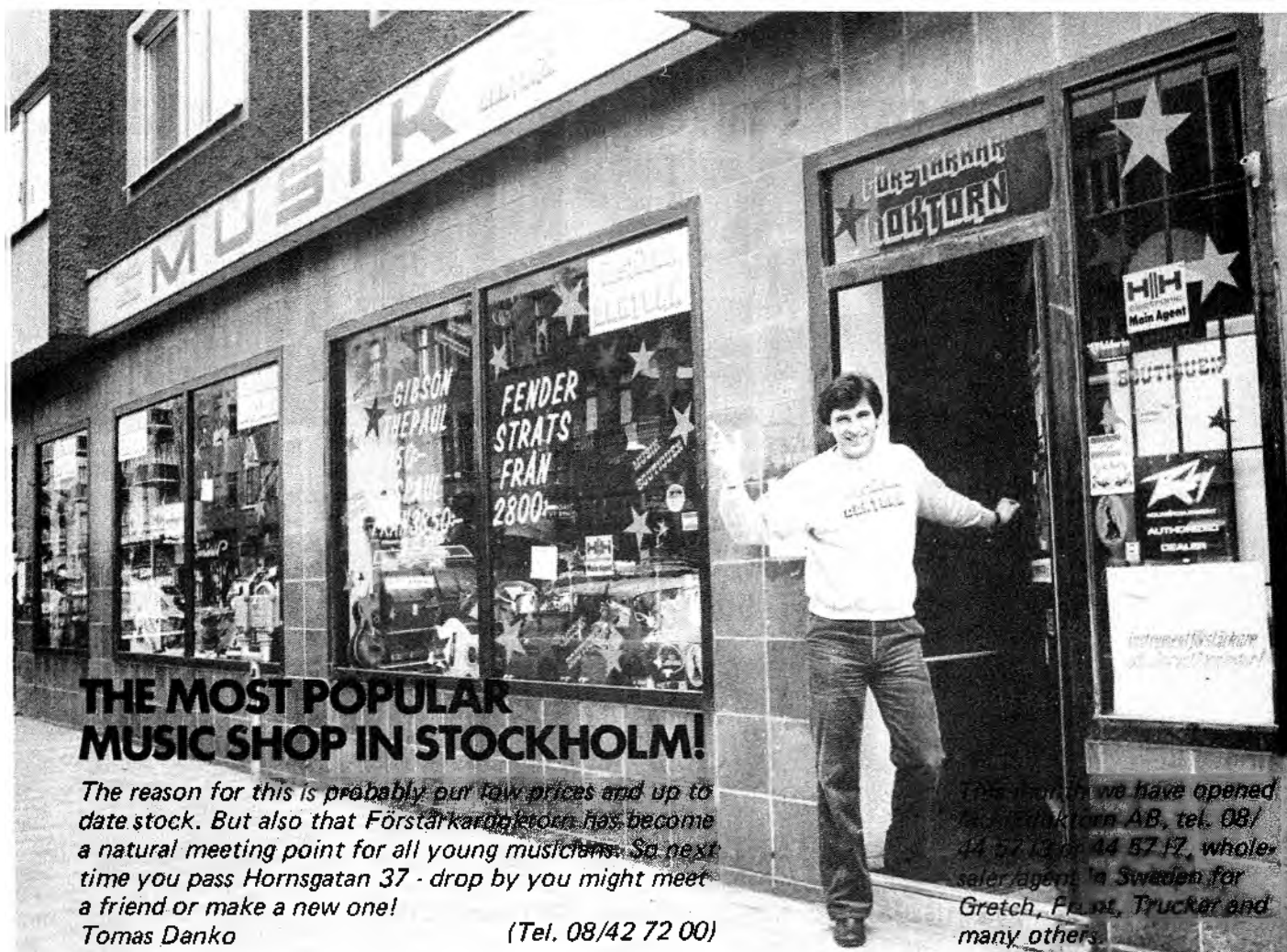
As I said Olympic sets all come with a stool which as far as I can make out is the same as the Premier. It's the three post type with one of the posts serving as the down tube. In my youth I used to find this sort of stool a little unstable but nowadays it seems more difficult to fall backwards off it. It's round squab is comfortable by anybody's standards and it's a definite plus for a cheaper set to have a stool as standard.

## Conclusion

All the drum shells are cleanly finished inside with not a hint of roughness or splitting. The outside plastic finishes are good and professional looking which I know to be an important consideration for the *amateur* buying a new set. Solid black, navy blue and yellow are, I would consider, the best sellers with a very pleasant dark red chasing hard in the popularity stakes. The stands and fittings work well enough for what they are and I'm sure no one would expect them to last forever.

As to the price, for a down market set at £380 it is realistic but not cheap. It's pertinent, I think, to mention that just two years ago the 'Super-Duper' Olympic five drum set was selling at just under £350 (albeit at the lower rate of VAT). Oh well, nothing lasts forever. Unfortunately.

**Henry Roberts**



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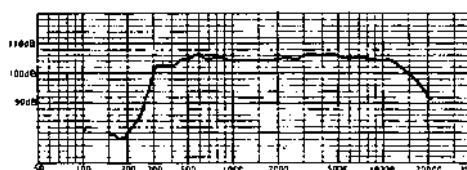
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# CARLSBRO

## BACK LINE



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# CARLSBRO FEAT

## Digital Channel Switching

Carlsbro have tapped computer technology to bring you greater control over the back line amp than has ever been possible before. Imagine having a control panel on your sleeve: this sort of control is now possible with Carlsbro! Using a digital switching circuit Carlsbro allows players to change channels using a remote footswitch. Set channel one up for a clean, bright sound, perhaps a tweak of the Parametric equalizer to give you extra lift around 800 hz; set channel two up with a really dirty sound, lots of overdriven sustain and thickened with ADT (automatic double tracking). Now you can switch between channels using the remote footswitch. The channels can have a different volume level and completely different settings. All of a sudden you are playing two amps instead of one!



## Four-Way Foot Switch

The remote foot switch which allows you to control your amp from out front is attached to your Carlsbro amp by six metres of road-tough multi-core (locking connectors of course!). With the four switches provided you can change channel, control sustain, control reverb and bring in the unique Carlsbro delay line which offers chorus, vibrato and ADT effects. At last you can control your amp from out front.



## Parametric Equalisation

The new range of Carlsbro back line amps have a great sound: in fact they'll give you any type of great sound that you want! This miracle is achieved by Parametric Equalisers which provide ultimate control over the signal you feed in.

A Parametric Equalizer is an equalizer with cut and boost and variable frequency controls. For optimum control the graphic equalizer is good but has limitations. The Carlsbro parametric is a better alternative being ergonomically designed to respond to just two rotary controls. With this unique circuit players can cut or boost plus or minus 20db over all of the relevant points of the frequency spectrum.



## Delay line, Chorus/ADT and Vibrato

Computer technology and Carlsbro design has given the musician one of the most versatile effects circuits ever built. How you choose to use the Carlsbro delay circuit is up to you. You can develop a really rich, thick "chorus" effect and sound like an aural version of double mirror reflections stretching away to infinity; you can set it to provide automatic double tracking effect and play single note duets with yourself; you can select pitch shift to provide the most amazing vibrato ever heard.

To get a "grip" on the potential electronic noise that such sophisticated circuitry can cause, Carlsbro have built a "componder" into this circuit. This system "listens" to what's going on and makes sure that the signal to noise ratio is always correct.

Carlsbro gives the creative musician every tool possible: you can do the job.



## LED Status Indication

To allow the player to "know where he is" at a glance Carlsbro have developed a unique "LED Status" indication system. These unlimited life lights on your Carlsbro amp will show you exactly what "modes" have been selected. Are you playing channel one or channel two, is reverb in or out, is chorus selected on channel two? and so on. Carlsbro harnesses technology for you.





# ANSWERS FOR THE 80'S

## Two Sustains

Carlsbro offer guitarists two types of sustain. The traditional method is available by over-driving the input circuit and amplifying the signal (input volume up, master down). In addition Carlsbro have built their own unique sustain circuit into the amp and this may be controlled from the remote four-way footswitch.

The amount of sustain and its length is controllable from the amplifier front panel. For players who really want to get "down and dirty", it's easy to combine both.



## Band Pass Filters

Bass players have their own set of unique problems and Carlsbro have provided a unique set of answers. Introduced a couple of years ago, the Carlsbro "Band Pass Filters" have become deservedly famous amongst bass players. These filters operate on preselected frequency bands to shape and boost the bass sound into a particular character. This system is the most efficient type of bass sound control yet developed.



## Improved Reverb

On some amplifiers a signal with reverb is an unpleasant signal. On Carlsbro it's a whole added dimension. The reverb circuitry on all Carlsbro back line amps has been revised to ensure maximum bandwidth of the delayed signal. The end result is a clean signal with true hall "ambience".



## D.I. Recording Output

Carlsbro is professional equipment designed for professional musicians. A balanced line, 600 ohm direct injection output allows instant connection to any professional studio or road mixing console. Full patching facilities offer players pre-amp out, power amp in and a variety of effects loop formats.



## Construction

In setting out to build the best back line amps in the world, Carlsbro have not ignored the cabinets and fittings. The amp cases are protected by ultra-tough plastic ribbing on all exposed edges and a new carrying handle is fitted of a super tough nylon. Together they make the amps hard wearing and easy to carry.

The front panel design on the new amps is three dimensional, extruded aluminium panels with recessed controls and ABS mouldings protect all corners. New see-through, kick-proof speaker grills ensure acoustic transparency and all amps come with footswitches and covers.

Special colour coding identifies the family each amp belongs to; green for bass, gold for guitar and orange/red for multi purpose.



The quality of construction of the new Carlsbro back line amps is unequalled. Electrical safety is ensured by the most rigorous assembly checks and basic design which isolates potential problems.

All components are specially selected before assembly and all printed circuits boards and IC's are "plug in" for instant replacement in the unlikely event of failure. Every amp that's built at Carlsbro is subjected to full testing by the most modern and sophisticated test equipment. The result is absolute reliability.

# STINGRAY

## THE STINGRAY PRO

The Stingray Pro is the ultimate guitar amplifier. At its heart is a driving sound delivered at 150 watts. Added to that is just about the finest range of "on line" and "off line" effects and modifiers ever designed for musical instrument use.

The Stingray Pro - available in both Combo and amp-only form is for professionals. Parametrics on both channels, remote digital-switching channel control and balanced line outputs are just some of the sophisticated features.

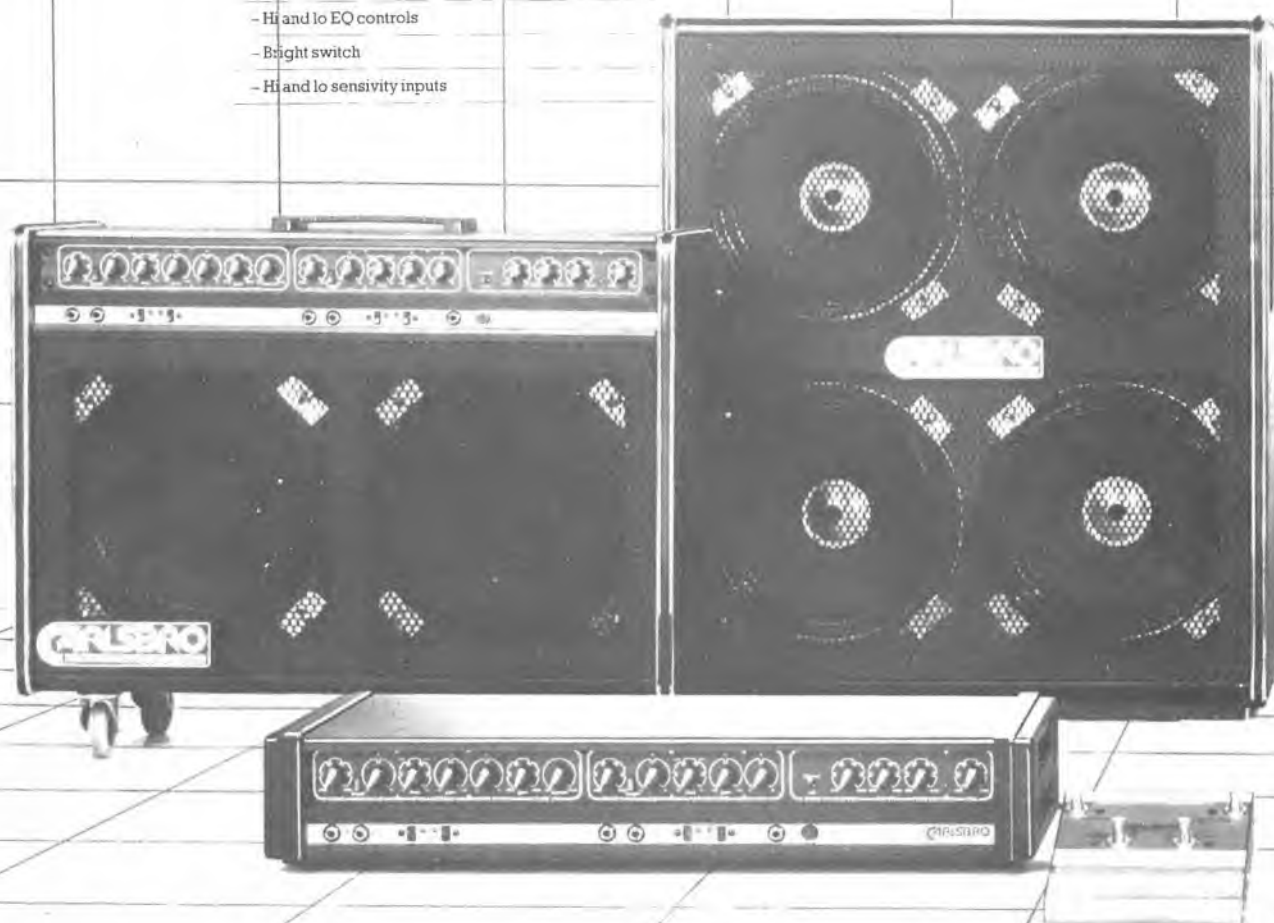
### Features:

- \* Digital channel switching
- \* Delay line providing chorus ADT and vibrato
- \* Two separate sustain systems
- \* I.E.D. Status display
- \* D/I balanced line output and full patching facilities
- \* Specially designed loudspeakers (in combo and 4 x 12)
- \* Accutronics spring reverb
- \* Professional 4-way foot switch
- \* Both channels feature:
  - parametric equalisation
  - switchable effects
  - Hi and lo EQ controls
  - Bright switch
  - Hi and lo sensitivity inputs

## THE 4 x 12 L300

If you stacked the new Stingray Professional head on top of a new 4 x 12 L300 you'd have the best amp/speaker combination in the world. The L300 is capable of handling no less than 300 watts RMS and the four ohm impedance allows the Stingray Professional to develop it's maximum ear-shattering 150 watts RMS.

The cabinet employs the new kick-proof grill and all specially designed Powertone speaker are front "clamp" mounted for the fastest pit stops.





# STINGRAY

## THE STINGRAY LEAD

It would be hard to find a more powerful back line amp than the Carlsbro Stingray Lead 150.

International Musician and Recording World recently rated this amp module as giving around 180 watts and coupled with this fantastic source of power is a really sophisticated tone control circuit.

Parametric equalisation of channel one offers players the chance to shape the sound within very tight tolerances. Two different types of sustain are available and reverb is available on either channel.

### Features:

- \* Twin channels each with Hi and Lo sensitivity inputs
- \* Parametric equalisation on channel 1
- \* Two types of sustain
- \* Accutronic reverb switchable to either channel
- \* Pre-amp and Slave outputs
- \* 2-way footswitch
- \* Hi and lo control on both channels
- \* Bright switch on channel 1

## FULL RANGE FLARE

To handle the ultra-wide frequency range delivered by the Multi-Chorus, Carlsbro have developed the ultimate speaker system, the Full Range Flare 150.

This speaker cabinet is a three way system easily able to cope with its rated 150 watts. Two 12" Powertone Bass 75 watt low resonance speakers with ventilated coils handle the bass frequencies. Mid-range projection is via an RCF long throw horn and the brilliant, high frequency end of the spectrum is handled by two Piezo Electric tweeters. A continuously variable attenuator is fitted for controlling the mid/high frequencies.

The enclosure has been designed with a tuned port, flare front and solidly constructed reinforced construction for optimum bass response. This is the cabinet for all keyboard, disco and PA use.

## THE STINGRAY MULTICHORUS

The Carlsbro Stingray Multichorus is just about the most versatile back line amplifier ever built. Originally designed for multi-keyboard use, this 150 watt amplifier has proved itself a match for any instrument.

The Multichorus has three independent channels. Each channel has a separate Parametric equalizer and a delay line offers a wide range of chorus ADT, vibrato and rotary sound effects.

Logic switching allows the three channels to be linked together in combinations including: three channels together to offer three parametrics in line for ultimate tone shaping, two channels together and one independent offering four inputs on the "twinned" channel with two parametrics plus one completely separate channel) with its own parametric. Obviously the combinations offer everything a musician could want.

### Features:

- \* Parametric equalizer on all three channels
- \* Delay line providing chorus ADT, Vibrato and rotary effects
- \* Logic switching system on channels allows three independent channels to be switched as desired
- \* LED status displays instantly effects "on line"
- \* Accutronic spring reverb
- \* Effects switchable on all three channels
- \* Two way foot switch
- \* D/I balance line output and full patching facilities



# STINGRAY

## 2 x 12 FLARE BASS 150 CABINET

Bass players are always looking for a cabinet capable of delivering real bass. Carlsbro have solved the problem with the 2 x 12 Flare Bass cabinet.

This carefully designed ported flare enclosure has a superb bass response from two Powertone bass 12" low resonance drivers with ventilated coils. The eight ohm impedance matches perfectly to the Stingray Bass and two cabinets in parallel (four ohms) allow the development of a massive 150 watts RMS output.

Naturally this superb cabinet may also be used in P.A. and Disco applications or as an extension cabinet for the Stingray Bass Combo.

## THE STINGRAY BASS

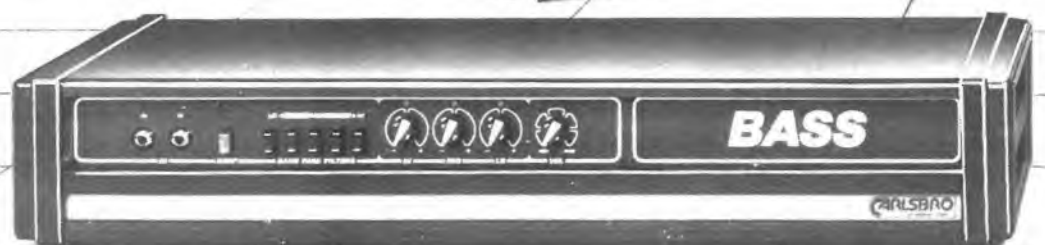
Bass players have always had a raw deal - until now! The Carlsbro Stingray Bass has been designed to solve those awkward bass amplification problems without the need for huge racks of amps.

Available in both amp-only and combo forms, the Stingray Bass has the unique Carlsbro "Band Pass Filters" which allow players to select a particular sound instantly. Any of the famous American bass sounds can be had at the touch of a button. In addition wide ranging tone controls allow you to shape your own Carlsbro sound.

Rated at 150 watts you can take your choice and use either a 2 x 12 Flare Bass enclosure with a separate amp or the combo with a 15" bass speaker in a reflex enclosure.

### Features:

- \* Five Band Pass Filters: 360Hz, 860Hz, 2KHz, 4KHz, 6KHz
- \* Deep switch offering 8dB boost at 40Hz
- \* Three active tone controls
- \* Specially designed loudspeakers
- \* Hi and lo sensitivity inputs
- \* 3 Amp POD and Slave outputs





# COBRA

## THE COBRA SERIES

Small is beautiful and the Cobra Series is certainly that. These are sophisticated small amps designed to offer both the guitar player and the bassist the maximum punch and sound control available in a small package.

The Cobra Bass features the unique Carlsbro Band Pass Filters that offer a wide range of special bass sounds at the touch of a button.

The Cobra Lead has Parametric Equalisation making it the most versatile small amp available anywhere.

### Cobra Bass Features:

- \* Band Pass Filters for instant sound selection
- \* 60 watts RMS output
- \* Hi, mid and lo controls
- \* D/I output socket for slave or recording desk
- \* Deep switch for bass boost

### Cobra Lead Features:

- \* Parametric Equalisation
- \* Hi and lo tone controls
- \* Bright switch
- \* Two separate sustain systems
- \* 60 watts RMS output
- \* Accutronics spring reverb with new input circuit
- \* Double footswitch for remote control
- \* Reverb with the new Carlsbro input circuit





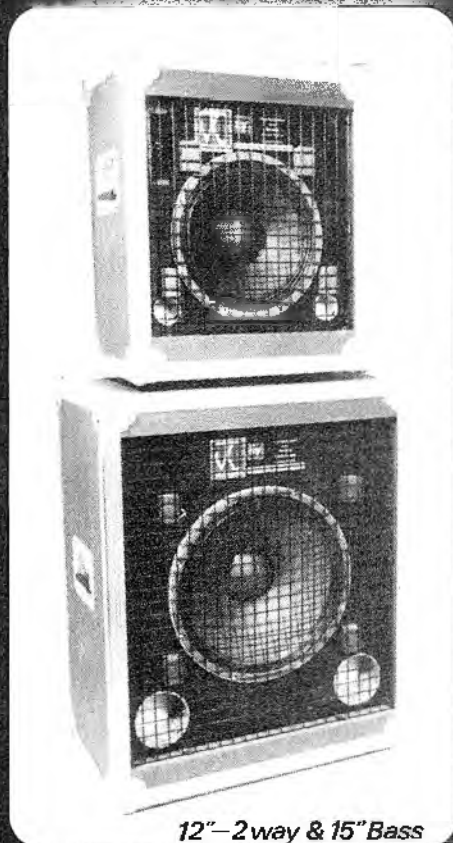


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# The Ultimate No Compromise Sound System

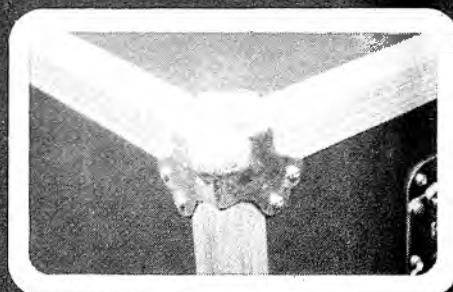
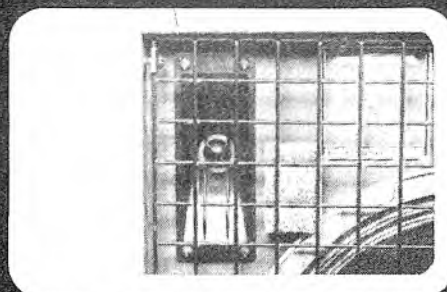


12"-2way & 15" Bass



15"-3way

## The J&C Professional Series



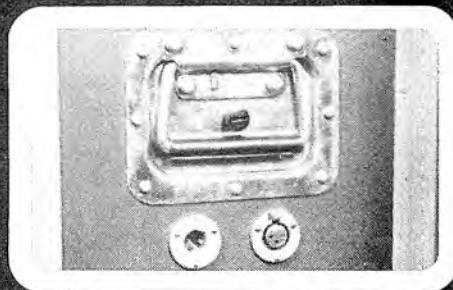
**Our Speaker Systems** are designed for bands working professionally on the road. No compromise has been made in the construction of our speaker systems in order to achieve high power delivery with clarity and depth from rugged good-looking cabinets that will endure the most demanding audio work.

### The Audio Design Brief

- i. To select the finest loudspeaker drive units from Electrovoice and to build them into highly efficient speaker systems capable of handling the full audio frequency range with exceptional clarity and depth.
- ii. The systems would also have to effortlessly deliver high power levels with minimum distortion.

### The Mechanical Design Brief

- i. To build front-loaded reflex-ported cabinets from the strongest materials practically available.
- ii. To use the flight-case principle for the speaker cabinets with 18mm ply-pre-bonded with green fibre-laminate, heavy-duty fittings and heavy gauge aluminium edgings.
- iii. To protect the speaker drive units mechanically by fitting an impregnable black epoxy-coated steel grill in front of the baffle board.
- iv. To fit Cannon XLR Male and Female connectors to all our systems as standard.



- v. To offer optional extras such as complimentary floor stands, wall mounting brackets and push-in type flight case lids.

### SPECIFICATIONS

The 3-way system comprises an EV15B Bass Driver, the EV1823M +8HD mid-horn and two EV T35s. 100 watts, 8 ohms, 101dB @ 1w @ 1m. Frequency Response 40 - 17 kHz.

The 2-way system comprises an EV12L Bass and two EV T35 Tweeters. 100 watts, 8 ohms, 98dB @ 1w @ 1m. Frequency Response 60 - 17 kHz.

An add-on Bass unit/Bass instrument Cabinet loaded with an EV15L. 100 watts, 8 ohms, 101dB @ 1w @ 1m. Frequency Response 40 - 7 kHz.

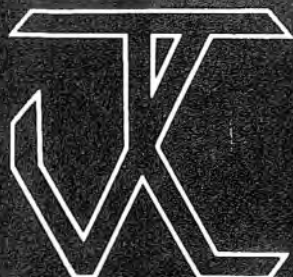
## The J&C Sound Systems

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# Speakercheck

## J.&C. Professional Series Model: -3

The J&C 15-3 is the top model of a new range of loudspeaker systems aimed at the professional user. The range represents a departure from J&C's more familiar product range which has hitherto been based on conventional horn loaded cabinets and fitted with the usual low-cost 12" and 15" drive units, Fibreglass radial horns and piezo high frequency units. Here, we have in a single cabinet that is considerably smaller than the bass section alone of the previous range, a three-way self contained loudspeaker system that, in my opinion, totally out-performs a complete stack of the previous J&C range (See IM&RW February 1979, page 291).

The 15-3 consists of a solidly built bass reflex enclosure fitted with an Electro-Voice EVM-15L low frequency unit, an EV 8HD midrange horn fitted with the EV 1823M compression drive unit and a pair of EV T35 high frequency units — all of which were reviewed as separate components in "Speakercheck" during 1978 and gave excellent results in all cases. In fact, there is a striking similarity between the 15-3 and the Electro-Voice S15/3 reviewed in the July 1979 "Speakercheck" feature, except that different midrange and high frequency units are employed.

A full three-way passive crossover is used and this is of J&C's own design, operating at 800Hz and 4.5kHz at a slope rate of 12dB/octave. The enclosure is built from 18mm plywood and has a pre-bonded green fibre laminate finish. All joints are rebated and the rear panel is internally braced to ensure total freedom from panel resonances. All edges are protected by aluminium angle and heavy duty knuckle corner protectors are fitted which, in conjunction with the recessed snap-back handles, gives a very chunky flight-case style appearance that is both individual and functionally attractive. Male and female XLR-3 connectors are fitted in one side of the cabinet, and a fuse-holder — whose function it is to protect the two high frequency units against overload, is fitted into the recess dish of one of the carrying handles. The front grille is of wide mesh, black epoxy coated steel, which offers good frontal protection while at the same time providing good acoustic transparency. It is altogether very well built indeed and is one of the best looking loudspeaker systems I have found for some time. Considerable thought has obviously been given to each design feature to produce an original and nicely engineered product which is ideally suited to rough use on the road.

There do not seem to be any serious problems from a performance aspect

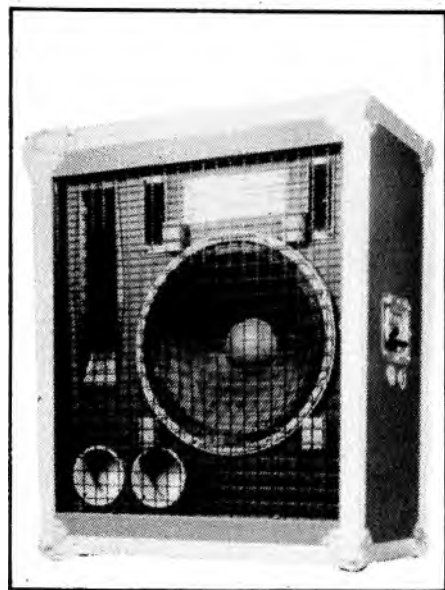
either. The 101dB sensitivity — which exactly confirms the maker's figure, reflects exactly our test result, sensitivity for the EVM-15L drive unit, indicating that there is little if any insertion loss in the passive crossover network as far as the bass section is concerned. Also, the maker's frequency response figure is to all intents and purposes confirmed and apart from the noticeable rise in level over the range of frequencies covered by the midrange horn, this is nicely uniform. The dip shown on the frequency response curve at 700Hz and 2.5kHz is likely to be due to phase cancellations at the particular microphone position we used, but could possibly be due to crossover peculiarities.

The crossover is almost certainly responsible for the peculiar impedance curve we measured, and it should be noted that impedance drops to about 5.5 ohms at between 150 and 200Hz and again at about 7kHz. This is well below the usually adopted 0.8 of rated impedance criteria and certain power amplifiers may not be too happy driving such a low impedance — especially when two 15-3's are used together, in which case, overall impedance will drop to 2.75 ohms on a supposed 4 ohms circuit. This might not be a serious problem, but should be borne in mind when contemplating using these loudspeakers, as the amplifier must be capable of driving down to 2.75 ohms without damage.

Total harmonic distortion is of a low order at just five per cent, and this figure is not exceeded at any frequency at full power input — although it should be realised that we do not feed in 100 watts of sinewave power at the upper frequencies as this would simply blow the HF units straight out of their mountings! The signal applied is filtered in accordance with the recommendations of IEC-268 for equivalent music levels so that the level of signal applied at each band of frequencies relates to the energy levels present in each band in a complex musical signal.

At any rate, we did not blow the HF fuse at 100 watts sine wave when filtered in this way and everything seemed to be OK. The polar response is also reasonable for a complex radiating array, although a somewhat irregular wavefront is developed in the horizontal plane due to phase cancellation effects between the three horns, which in turn is due to the spacing between these units. Using a pink noise test signal in an anechoic environment, this phasing effect can be clearly heard, but it is unlikely to create any serious problems in a concert hall. As might be expected, the vertical dispersion is decidedly asymmetrical due to the fact that it is impossible for all the drive units to be mounted at the centre of the baffle panel. The base of the cabinet is at the 270° position on the vertical polar plot.

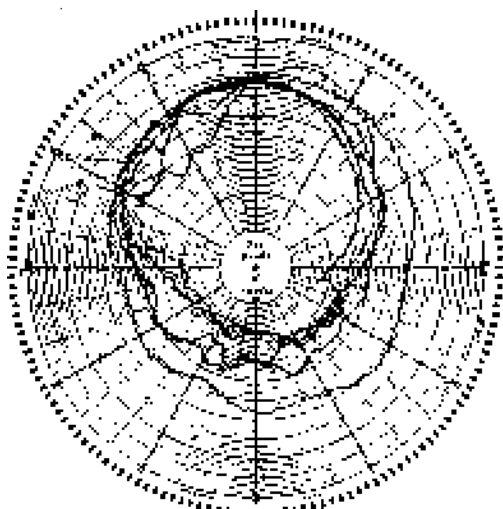
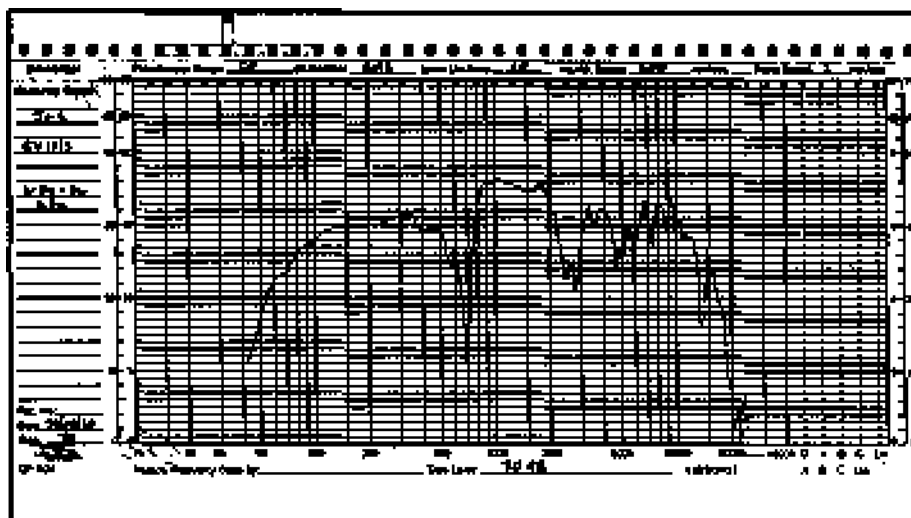
Although the 15-3 might be considered



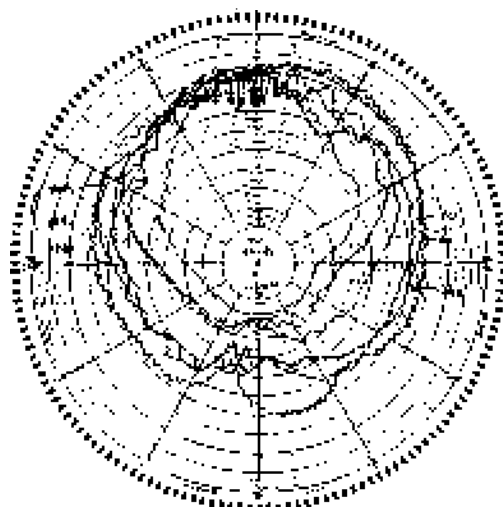


expensive for what on the surface looks like a smallish cabinet, its high sensitivity, wide frequency response and excellent quality throw a rather different light on such an assessment. As I indicated earlier, it will easily out-perform most of the lower priced stacks and is far more convenient to handle due to its compact dimensions. Also, it is equally suitable for use in small clubs, where there is often no room for the musicians on stage once the PA has been set up. A number of accessories, including lock-on doors, tripod stands, cloth-faced and moulded styrene front grilles and wall mounting brackets for permanent installations are available. Also included in J&C's accessories list are matching green Rolls Royce estate cars, although no price or delivery date is given against this particular item.

*Ken Dibble is an ex-musician with a background in engineering and manufacturing sound equipment. He now works as an electro-acoustic consultant.*



Vertical Polar Response



Horizontal Polar Response

## J & C Professional Series Model 15-3

Recommended Retail Price: £943 per pair incl. VAT  
 Dimensions: 650mm (25") wide x 380mm (15") deep x 800mm (32") high  
 Weight: 45kg (approx. 100lb)  
 Drive Unit Complement: 1 x 15" LF, 1 x MR horn with compression drive unit, 2 x HF horns  
 Crossover Frequencies: 800Hz and 4.5kHz at 12dB/oct.  
 Performance Specification and Test Results:

Parameter	Manufacturer's Rating	Test Result
Sensitivity:	101dB @1w @1m	101dB @1w @1m averaged between 200Hz and 10kHz
Useful Frequency Response:	40Hz-17kHz unqualified	50Hz-17kHz @ ~ 12dB
Rated Input	100 watts	Confirmed @100w RMS sine wave
Power:	unqualified	Better than 5% @ 100w RMS sine wave
Distortion:	Not stated	5.5-12 ohms 7CHz
Impedance:	8 ohms	136°V x 206°H @ 500Hz
LF Resonance:	Not stated	84°V x 130°H @ 1kHz
		106°V x 160°H @ 2kHz
		64°V x 98°H @ 4kHz
		66°V x 78°H @ 8kHz
		56°V x 44°H @ 16kHz

included angle @ ~ 6dB

Gary Sunda, Randall Vice President, Engineering says,

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**and it's great!"**

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... passage and grill at the back of the magnet structure.  
Unit is very nicely presented and has a nice, substantial feel to it.  
From a performance aspect there are more surprises. Whereas we have come to expect an almost linear impedance curve from this maker, here we find the normal, rising curve that is characteristic of most loudspeakers of this type. Conversely, RCF's strong point has never been low distortion, but in the case of the L12P/24, we find a figure right down at just 3% at full sine wave power, and this only increased to 5% on a re-test at 150w. There are however no surprises in the sensitivity figures. Somehow, RCF always manage to extract the last ounce of acoustic output from their loudspeakers, and the unit now under review is no exception, returning a figure of 101db, which is up among the very best achieved in this 'Speakercheck' series. This is without doubt, an excellent loudspeaker and is certain to come into its own once the market starts to search for alternatives when the Cobalt shortage really starts to take its toll of the Alnico type magnets, and prices rocket up. At this price, it is a good buy in any event, but seems to have been largely overlooked by the market.

**We couldn't have  
said it better ourselves**

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## General Purpose 12" Cone Drive Units

As we told you last month, this is the first of a new series of Speakercheck reviews of cone loudspeakers. If you intend to follow this series you will need to have last month's issue to hand as the introductory article published in that issue explains in detail the type of tests we will be using and how to interpret our results. It also sets up our proposed programme up to next April. This information is important if you are to be able to properly understand what we are trying to do and to derive all the gen we shall be giving you from the series.

Anyway, to return to this month's tests, we have a collection of 12" units from our "general purpose" category, five of which are from UK manufacturers, one from the USA, and one from Italy. Generally, these are all of a high standard for the lower price ranges and represents notable improvements when compared to the first batch of 12" units we

reviewed in February 1978. This time, practically all have complied more or less with the makers specifications, and we seem to have generally got over the business of misleading or inaccurate specifications and exaggerated exhortations of the performance capabilities of certain products that we found at that time. This is a good thing, for as I have often been heard to comment, no one expects a £30 speaker to compete with a top professional product selling at anything up to £150 and in my opinion, "bullshit-mongering" and engaging in "specmanship" only serves to belittle products, most of which are perfectly suitable for their intended purpose anyway. I would like to think that "Speakercheck" may have made its contribution to this general tightening up on specifications — and if it has, then we shall have served our purpose.

What of this month's results? Surprisingly,

we find that two products from two manufacturers who are usually found well up among the best — ie RCF and Electro-Voice, coming up with problems. In the case of the RCF L12P/03, the difficulty is excessive distortion, and with the EV SP12/C, it is a lacking of low frequency energy and a very high retail price. In fact, both of these are by far the most expensive units tested. Of the rest, you must look at the results obtained and decide for yourself. The Celestion G12/65 at its price must be a good buy indeed, and is closely followed by the HH PL50, and the Goodmans Pro-Power Gr12. The remaining two twin cone units, the Richard Allen HD12/T and the Goodmans ProPower Di12 also gave a good account of themselves, although at lower levels of sensitivity due to the increased weight of the cone assemblies. Next month, we shall look at eight 12" units from the professional category.

Ken Dibble

### RCF L12P/03 (Italy)

Price: around £45 incl. VAT

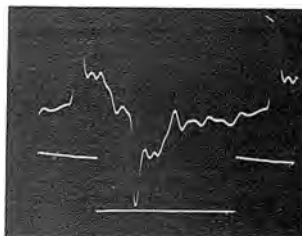
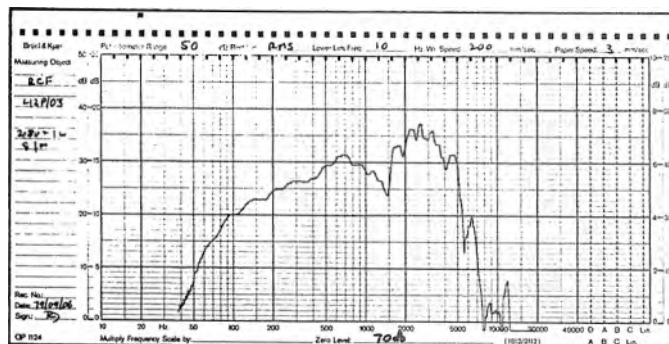
Parameter	Manufacturer's Rating	Test Result
Frequency Response	84Hz - 6.3kHz (-8dB)	Useful to 6.5kHz (-12dB)
Sensitivity	100dB @ 1w @ 1m	100dB @ 1w @ 1m av. 500Hz-4kHz
SPL	Not stated	116dB(A) @ 55w @ 1m pink noise
Power	55w RMS sine wave	Not confirmed — see text
Distortion	Not stated	12% @ 55w RMS sine wave
Impedance	8 ohms	8.8 - 26 ohms
Resonance	84Hz free air	110Hz in standard enclosure

\* Also available in 4 and 16 ohms impedances

Although the L12P/03 is not a new loudspeaker, there are so many models in the RCF catalogue, that there are still many that we have not yet reviewed. The L12P/03 is built on the usual first class cast alloy chassis. This one is of the deeper pattern and comprises a particularly substantial front rim and four wide supporting spokes with a central reinforcing rib. It is suitable for front loading or for conventional mounting from inside the cabinet, although a felt gasket is fitted only to the front face to facilitate the latter method. RCF and HH tend to employ the same chassis for their general purpose units as they do for their professional loudspeakers, so in this category, these models tend to have better chassis than most of their competitors, but this is usually reflected in a higher price. A large ceramic magnet is fitted to the L12P/03, along with a deep, ribbed cone of medium weight carried by a plastiflex treated paper front suspension that is unusually stiff, and has quite the highest free air resonance of any unit tested. A plain, linen dust cover is fitted and the voice coil is terminated by nice thick lead-out wires to clearly marked solder tags. The overall quality of manufacture is of a high order — as we have come to expect from RCF.

From a performance aspect we find a wide frequency response and high sensitivity that is exactly in agreement with the maker's figures, but for the first time ever with an RCF product, we find very high levels of both second and third harmonic distortion such that we cannot accept the maker's power rating figures. This does not necessarily mean that the unit will not handle its rated power, but that somewhere in the mechanical or electrical design of the unit, there is a problem which manifests itself in an unacceptably high distortion characteristic. This unit, again, has a good presence peak in its response, for good bite in the middle ranges despite the absence of a metallic centre dome, and the impulse trace shows considerable overshoot and plenty of overtones, which can be expected to provide a gutsy sound quality and plenty of sustain.

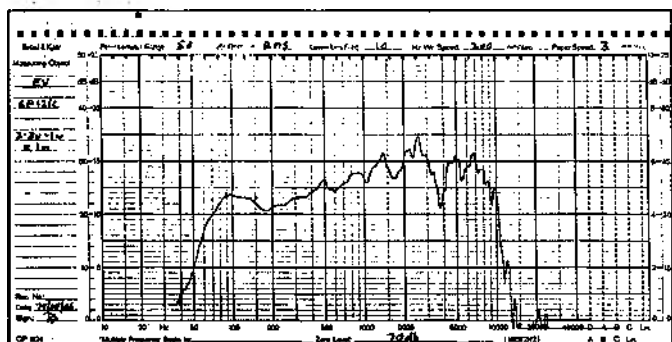
It is indeed a pity that the distortion level is so high, as in all other respects, this is a fine loudspeaker, if a little on the pricey side of the GP unit.



## ELECTRO-VOICE SP12/C (USA)

Price: around £80 incl. VAT

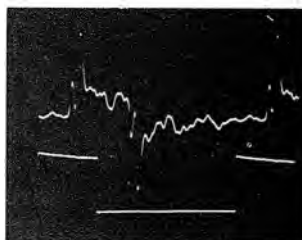
Parameter	Manufacturer's Rating	Test Result
Frequency Response	37Hz - 10kHz $\pm$ 6dB	Useful to 10kHz (-12dB)
Sensitivity	100dB @ 1w @ 1m	98dB @ 1w @ 1m av. 500Hz-8kHz
SPL	Not stated	109dB @ 25w @ 1m pink noise
Power	25w long term av.	Confirmed @ 25w RMS sine wave
Distortion	Not stated	3% @ 25w RMS sine wave
Impedance	8 ohms nominal	7-22 ohms
Resonance	45Hz free air	80Hz in standard enclosure



This is by far the most elaborate of the loudspeaker units submitted for test and is built on the superb eight spoked cast alloy chassis used for the higher power EVM/12 model. A large finned magnet cover has also been borrowed from the EVM range, but in this instance, it encloses a very small ceramic magnet and a very large volume of fresh air. The elaborate cover must have cost more than the magnet it hides and this form of dressing up of a loudspeaker so that it appears to be a really powerful gutsy unit, when it is in reality nothing of the kind, is not a practice I can endorse. Built on a more modest chassis, this level of performance could have been achieved at half the price of the SP12/C — as evidenced by the performance of the Goodmans Di12 also included in this review. Nevertheless, it is a superbly made unit, and is fitted with a medium weight ribbed cone carried by a compliant, all cambric suspension system and has a parasitic centre cone to provide extended high frequency response and a wider, more uniform HF radiation pattern.

While the unit maintains a usefully wide frequency response range, it can be seen from the curve that below about 500Hz, the response level is well down and the unit is therefore likely to be somewhat lacking in the bass registers. Sensitivity is not high either, and is not in agreement with the maker's figures, although it is about average for a twin cone general purpose loudspeaker of this type. No problems however with the power handling, and on a re-test at 50w RMS sine wave, distortion still did not rise above about five per cent, and the unit seemed quite happy at this level. Also, its impulse response is pretty good, with only a momentary overshoot and almost instantaneous recovery, which should result in a clean, faithful reproduction characteristic and good transient response.

As with all EV products, the SP12/C is superbly made and finished, but in this particular instance, the elaborate finish is not reflected in the performance.

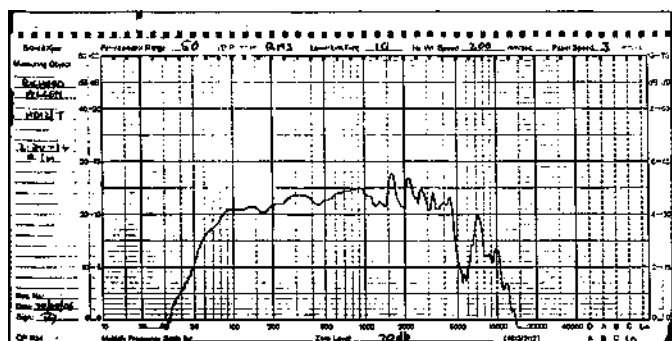


## RICHARD ALLEN HD12/T (UK)

Price: around £31 incl. VAT

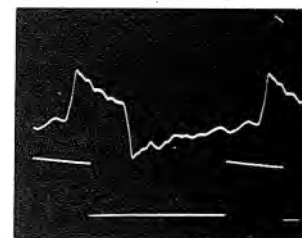
Parameter	Manufacturer's Rating	Test Result
Frequency Response	Graph given	Useful to 10kHz (-12dB)
Sensitivity	96dB @ 1w @ 1m @ 1kHz	94dB @ 1w @ 1m av. 500Hz - 4kHz
SPL	Not stated	110dB(A) @ 100w @ 1m pink noise
Power	100w RMS	Confirmed @ 100w RMS sine wave
Distortion	Not stated	5% @ 100w RMS sine wave
Impedance	8 ohms*	7 - 40 ohms (upper figure estimated)
Resonance	55Hz free air	75Hz in standard enclosure

\* Also available in 15 ohms impedance



This again is not a new model, but is one that we have not hitherto looked at from Richard Allen's many HD12 variants. It is built on a nicely made cast alloy chassis which, although not among the most substantial we have seen, is altogether adequate for the sizes of magnetic structures fitted to this range of loudspeakers. It is suitable for mounting from behind or from the front of the baffle panel and a roll of gasket material is included in the delivery to facilitate the latter. An identifying feature of this range is the bright red felt front gasket fitted and the unusual four mounting lugs attached to the front rim of the chassis. A medium weight parabolic cone assembly, fitted with both alloy centre dome and parasitic high frequency radiator, is carried by a nicely compliant cambric suspension system that has a particularly nice feel about it and should provide well controlled low frequency performance if mounted in a suitable enclosure. The overall standard of manufacture and finish is of a very high order indeed — especially at this price level, and the presentation is unfussy and functional.

Performance-wise, the unit has its strengths and weaknesses. As mentioned above, the frequency response is well maintained down into the lower registers, but is somewhat ragged at the high frequency end and certainly does not compare with the Goodmans Di12 or the Electro-Voice SP12/C in this particular respect. Also, the sensitivity is on the low side, and is, in fact, the lowest recorded for this particular review. Note also that it only generates a sound pressure level of 110dB(A) at 100 watts input, while the EV SP12/C generates 109 for just 25 watts input and the Goodmans, 114dB(A) for 90 watts. However, its impulse response is without doubt the best we have yet recorded for faithful reproduction of the input signal, with very little overshoot and few overtones, indicating that the cone is under almost total control. Such a loudspeaker would be best suited to PA and Disco type application, and if crossed over at about 5kHz into a high frequency horn, should give a good account of itself in terms of reproduction quality, although it will not be particularly efficient. The unit seemed to be quite happy at its 100 watt power rating and in fact, is the only unit in this general purpose category to offer a full 100 watt rating, and it is a pity that this advantage is largely undermined by the low sensitivity figure.



# If music be the food of love play on !

"Quote Shakespeare. What he did not know was that some 'nut' would invent electricity and a whole new generation of musical sounds would suddenly be thrust upon the public's unsuspecting ears. That is why **Rook Music** is spreading its wings. So read on, McDuff.

## A Letter

*Dear friends, fellow musicians and nuts,*

*Happy Christmas (well, why not?), how would you like to wake up on December 25th to find an Aria guitar in one sock and a Randall amplifier in the other? If so, you may not find them in Boots (guitars, not socks, that is), but you will find them at Rock Music's brand new retail shop, so bring your girlfriend, wife (or both) and choose from our extensive range.*

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**Elgam organs**  
**Korg synths**  
**Hama drums**  
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**Randall amplification**

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**and ancillaries**

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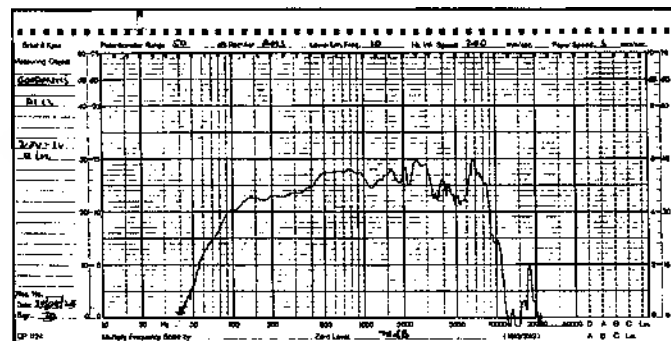
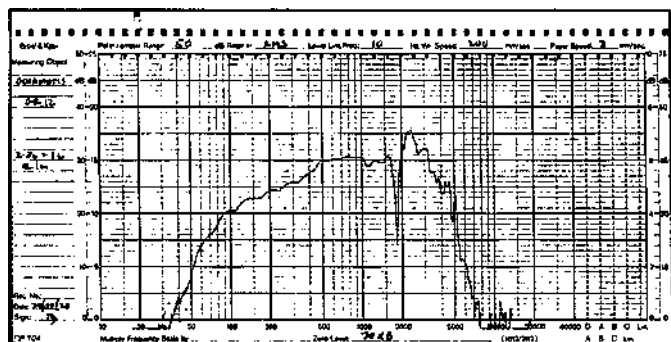


# Speakercheck

## GOODMANS ProPower Gr12 (UK)

Price: around £29 incl. VAT

Parameter	Manufacturer's Rating	Test Result
Frequency Response	Graph given	Useful to 5kHz (-12dB)
Sensitivity	0.6w for 96dB @ 1m	100dB @ 1w @ 1m av. 500Hz - 4kHz
SPL	Not stated	116dB @ 90w @ 1m pink noise
Power	90w RMS programme	Confirmed @ 90w RMS sine wave
Distortion	Not stated	Generally better than 6% @ 90w sine wave, but speaking @ 2kHz — see text
Impedance	8 ohms nominal*	8 - 20 ohms
Resonance	75Hz free air	100Hz in standard enclosure



## GOODMANS ProPower Di12 (UK)

Price: around £30 incl. VAT

Parameter	Manufacturer's Rating	Test Result
Frequency Response	Graph given	Useful to 10kHz (-12dB)
Sensitivity	0.7w for 96dB @ 1m	97dB @ 1w @ 1m av. 500Hz - 4kHz
SPL	Not stated	114dB @ 90w @ 1m pink noise
Power	90w RMS program	Confirmed @ 90w RMS sine wave
Distortion	Not stated	6% @ 90w RMS sine wave
Impedance	8 ohms nominal*	8 - 30 ohms
Resonance	85Hz free air	110Hz in standard enclosure

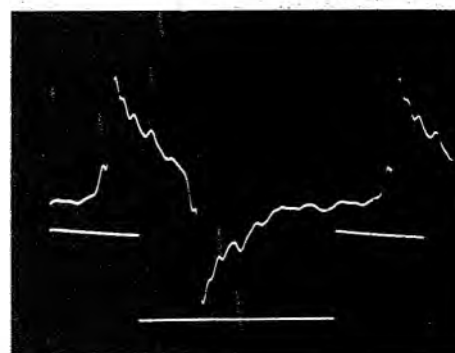
\* Also available in 15 ohms impedance

The new Goodmans "ProPower" range are the successors to the well established "Audium 12P" range, with the GR12 replacing the old 12F G, and the Di12 replacing the 12P-D. The original pressed steel chassis would seem to have been retained, but has now been painted a bright red. While this would hardly qualify as the world's strongest loudspeaker chassis, the pressed steel spokes have been cleverly formed and swaged so as to provide adequate rigidity and strength for its purpose. Although a cork gasket is only provided for mounting from within the cabinet, the chassis design is such that front mounting should not present any difficulty provided that a suitable gasket can be either found or made. The magnets are fairly large and of the ceramic variety, and the black chemical finish to these, in conjunction with the red chassis, gives a pleasing overall presentation. Termination is by means of a pair of solder tags with a red dot signifying the "phase" or "signal" connection. The GR12 is fitted with a medium weight, ribbed cone with treated paper front suspension and an alloy centre dome, while the Di12 has a somewhat heavier, plain cone (hence the lower sensitivity figure), retains a treated paper suspension, and is fitted with a parasitic centre cone to provide extended frequency response into the upper registers. Both units are now provided with underdome ventilation through the back plate of the magnets.

It can be seen from the results tables that both units gave a good account of themselves under test, by confirming the makers power ratings and with good sensitivity figures — especially so in the case of the Gr12, with a figure of 100dB for 1 watt. Also, the frequency response figures are quite acceptable for the intended application. I must however express some concern over the overall response characteristics of the Gr12 in that the abrupt dip shown in the response curve at about 1.7kHz co-incides with a massive peak in second harmonic distortion and what would seem to be a secondary resonance on the impedance curve. Whether this condition is peculiar to our sample or due to some design inadequacy is impossible to say, but it is certainly very odd indeed and is probably due to some malfunction of the centre dome itself.

Note that the impulse response traces for these two loudspeakers are quite different, with the Gr12 exhibiting considerable overshoot and overtones of some magnitude before settling for the second pulse, while the Di12 gives a reasonably faithful reproduction of the pulse, with a greatly reduced degree of overshoot and a rapid settlement. These traces would certainly confirm the maker's intended application for these two units, as the Gr12 will provide rich harmonics and a gutsy musical instrument sound, while the Di12 can be expected to provide a reasonably clean reproduction of the voice, records, etc, and for clean musical instruments like piano, acoustic guitar etc where overtones are not required. This difference in application is further in evidence from the frequency response curves, where the presence peak on the Gr12, so desirable for good attack with an electric guitar is totally absent from which instead exhibits a more uniform response more suited to a 'natural' reproduction.

Not a bad pair of units really. A little on the basic side perhaps, but they certainly performed well and fully confirmed the makers specifications, and at these prices, what more can one ask?



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## **Hi Cel.**

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This cast horn is available with single or twin throats, accepting Celestion DC25, DC50 and DC100 drive units. Using the twin throat with two DC100 units a power handling capacity of 200 watts is available.

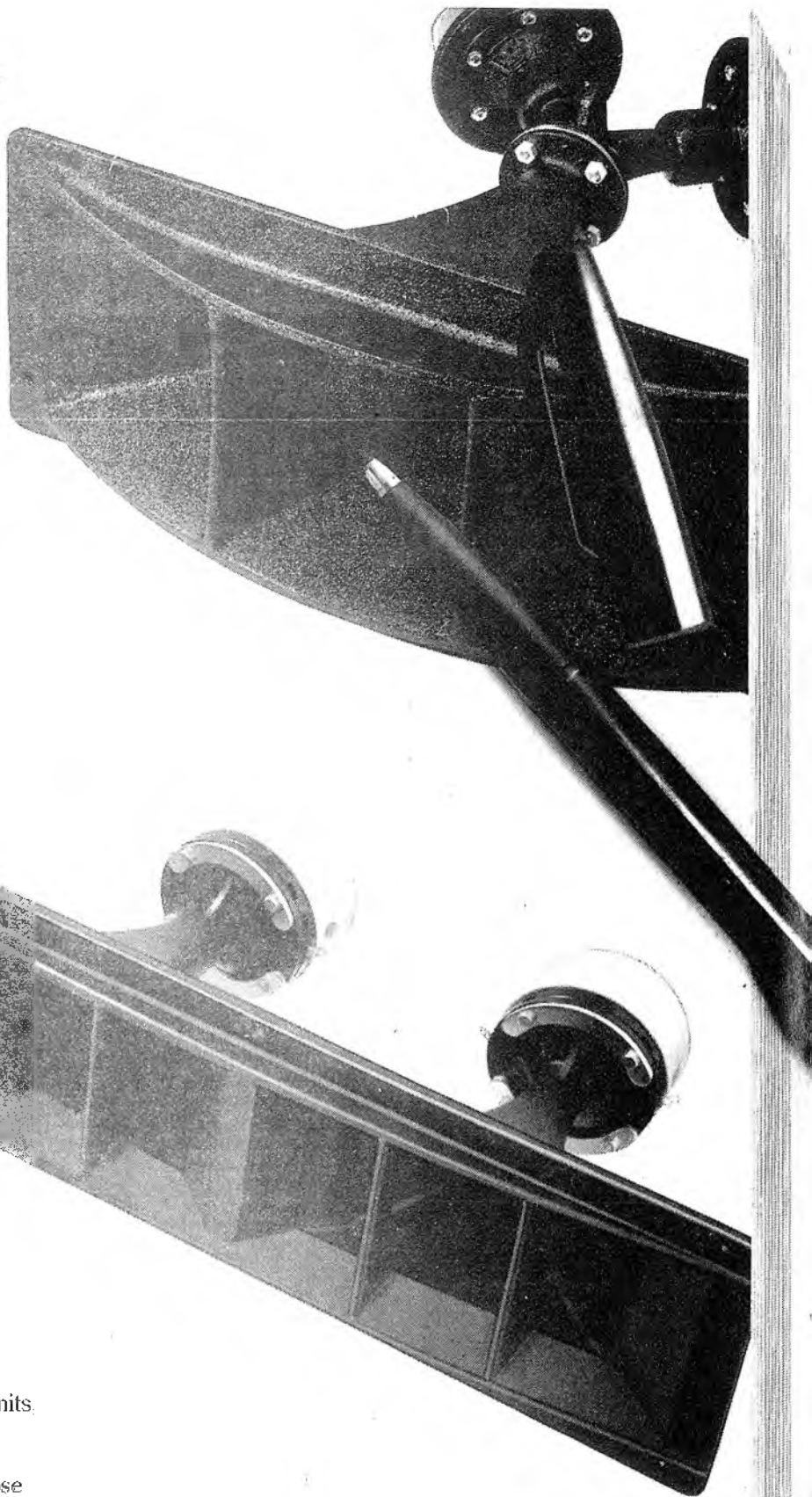
Principal distributors to the trade:

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## Celestion



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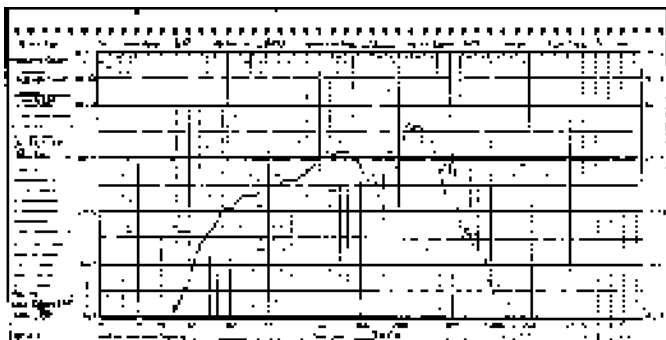
# Speakercheck

## CELESTION G12-65 (UK)

Price: around £20 incl. VAT

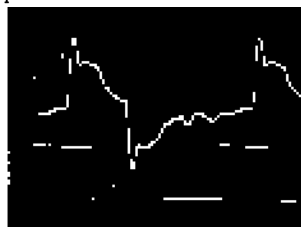
Parameter	Manufacturer's Rating	Test Result
Frequency Response	60Hz - 6kHz unqualified	Useful to 6kHz (-12dB)
Sensitivity	98dB @ 1w @ 1m av.	100dB @ 1w @ 1m av. 500Hz - 4kHz
SPL	Not stated	115dB(A) @ 65w @ 1m pink noise
Power	65w unqualified	Confirmed @ 65w RMS sine wave
Distortion	Not stated	4% @ 65w RMS sine wave
Impedance	8 ohms*	8 - 23.5 ohms
Resonance	75Hz free air	100Hz in standard enclosure

\* Also available in 16 ohms impedance



The old faithful Celestion G12 loudspeaker was the forerunner of most of the vast range of 12" drivers available to the music industry today. At one time or another, it has been fitted by most of the world's leading amplifier manufacturers, and of course, helped to make the Vox and Marshall sounds famous the world over. Today, this loudspeaker is available in no less than 15 different standard versions, ranging from 30 watts to 125 watts rating, in twin and single cone versions, some with domes, some without, with paper or cambric suspensions, to suit practically any application on the music frontier. The sample Celestion have submitted for review is a 65 watt general purpose unit, intended for use in PA columns or in combos. It is built on the long established standard G12 pressed steel chassis which, due to its superb mechanical design, is more than adequate for its purpose. The chassis and magnet are finished in what looks like cadmium plating. A medium weight, ribbed cone is carried by a doped paper front suspension and a linen dust cover is fitted over the 44mm voice coil. The chassis can be front or rear mounted, but gaskets are only fitted for the conventional mode.

Performance-wise, no problems at all. Total compliance with the makers spec good sensitivity, low order distortion and usefully wide frequency response. Note that despite the absence of the customary alloy centre dome, this unit exhibits a better presence peak characteristic than many of its competitors that are so fitted — which goes to show that in many instances, such domes are nothing more than cosmetics, and in fact, frequently cause far more trouble than they are worth. The impulse trace shows plenty of overshoot and overtones, to produce good sustain and a good gutsy sound when driven hard by a guitar etc. I am not so sure that I would want this type of response for PA applications, but there you go. Altogether a very nice unit, obviously built down to a price, with no frills, but well made and presented and capable of a high standard of performance.

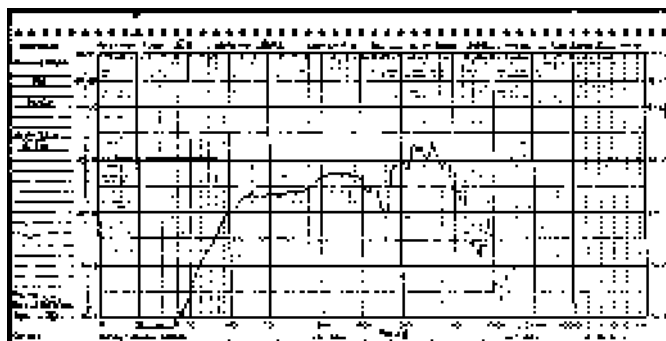


## HH ACOUSTICS Invader PL50 (UK)

Price: around £25 incl. VAT

Parameter	Manufacturer's Rating	Test Result
Frequency Response	50Hz - 60kHz	Useful to 75kHz (-12dB)
Sensitivity	1w for 96dB @ 1m	97dB @ 31w @ 1m av. 500Hz-4kHz
SPL	Not stated	112dB(A) @ 50w @ 1m pink noise
Power	Use with 50w amplifier	Confirmed @ 50w RMS sine wave
Distortion	Not stated	2% @ 50w RMS sine wave
Impedance	8 ohms nominal*	8.5 - 27.5 ohms
Resonance	75Hz free air	110Hz in standard enclosure

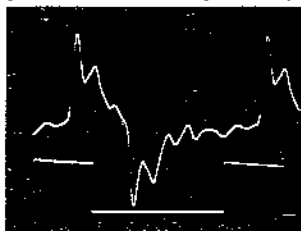
\* Also available in 4 and 16 ohms impedances



Today, HH Acoustics claim to be the third largest producer of loudspeaker drive units in the UK and are generally included alongside Fane and Celestion in the "Big Three". Hitherto, HH loudspeakers have not been available for over-the-counter purchase and have therefore not qualified for inclusion in our "Speakercheck" feature, but by the time this review is published, they will be available at any of HH's extensive dealer network as separate components.

The PL50 submitted here is the cheapest, and offers the most meagre specification of the 10 models offered in the "Invader" range. A further nine models, including a bullet HF unit, a compression driver and a horn are offered in the Professional range, samples of which we shall review in later issues. The PL50 is built on a superb die-cast magnesium alloy chassis fitted with foam gaskets for front or rear mounting arrangements and the delivery includes a set of mounting hardware including bolts, "Tee" nuts and front mounting clamps. This must be a good start. A small ceramic type magnet is fitted, and the overall finish, with a black magnet on a white painted chassis, is of a high order indeed as well as being visually attractive. A conventional medium weight, ribbed cone is carried by a plastiflex treated paper suspension and a silver painted linen dust cover is fitted.

It can be seen from the results table that the unit exceeded the maker's figures in every respect, although the sensitivity is not high and is 3dB down on the Celestion and Goodmans figures. Due to the low distortion levels measured, we re-tested at 100 watts, and still, distortion did not rise above four per cent, so there should be no problems with power handling. Note that here again, we find a nicely pronounced presence peak in the frequency response curve that has been achieved without the use of a metallic centre dome, although for cosmetic reasons, HH have evidently considered it necessary to spray the linen dust cover with silver paint. From the impulse response trace, I would expect a rather cleaner sound quality from this unit, as overshoot on the leading edge of the pulse is considerably suppressed and recovery is rapid. This combination of presence lift and a good transient response is unusual and should produce a clean, biting sound quality, with plenty of punch.

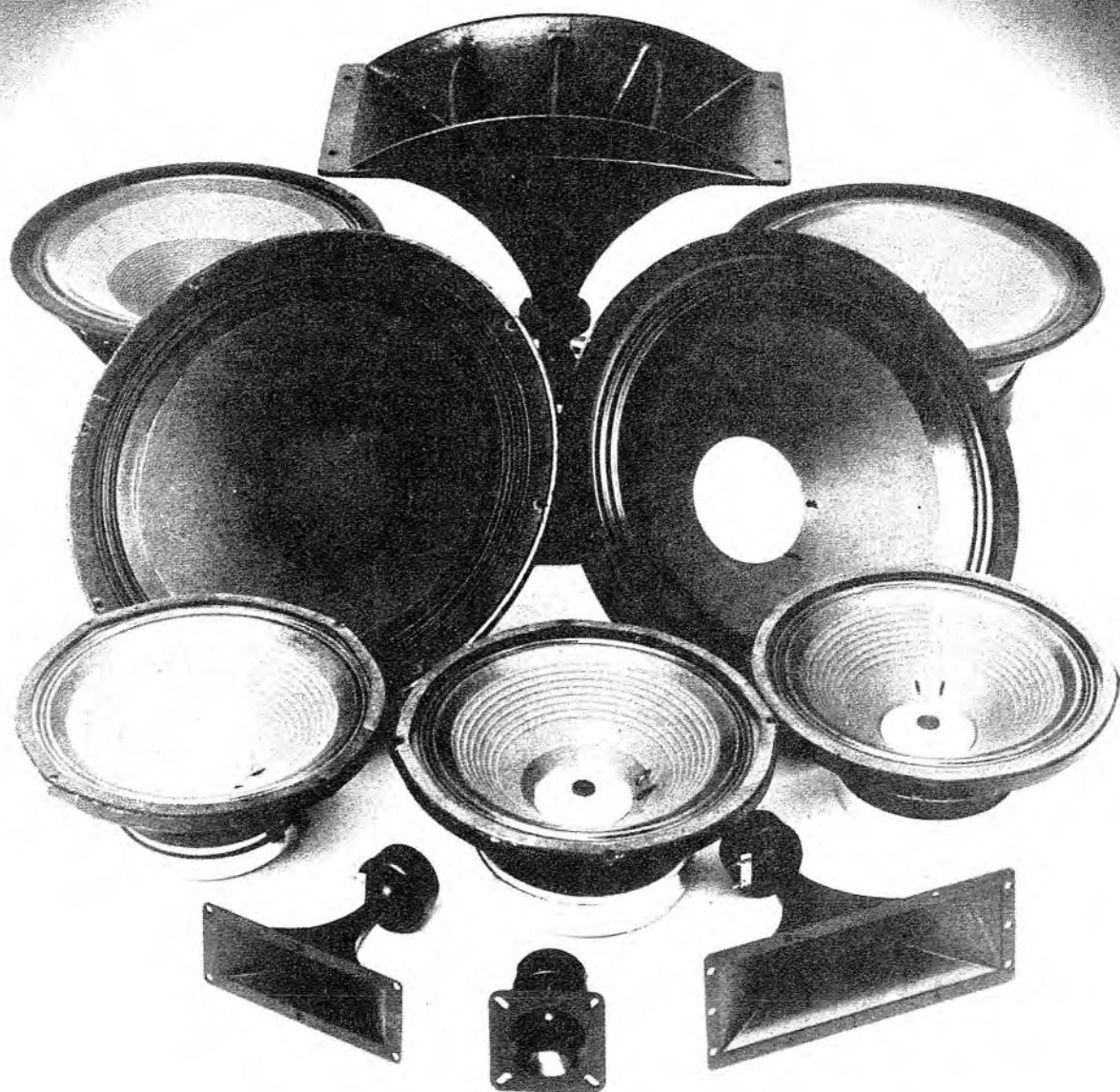




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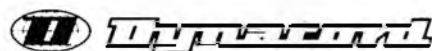
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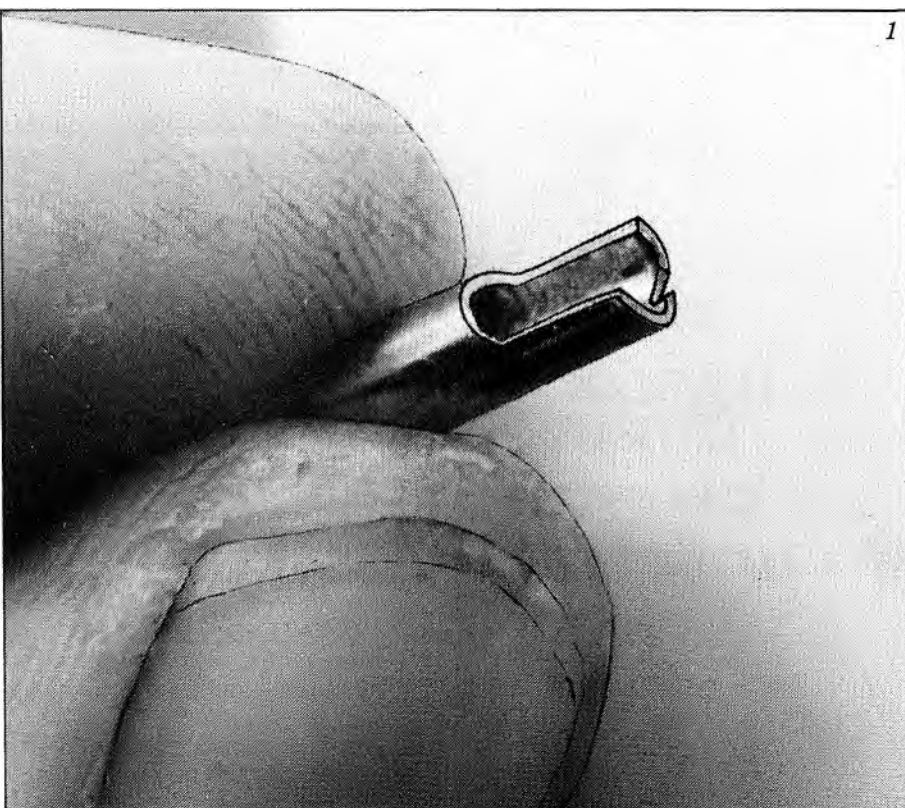
## REMOVING BROKEN SCREWS

One of the more common guitar service jobs is the fitting of new machine heads. The less expensive replacement units are generally supplied with small but quite strong fixing screws. As long as you make pilot holes in the guitar head for any screws in new positions, use the right size and kind of screwdriver with a new and sharp-edged tip, and put a bit of soap on the screw threads, you are unlikely to run into any serious problems. As a rough guide, pilot holes should be the same size as the 'core' of the screw: look at its outline in front of a piece of white paper, ignore the width of the thread each side and pick a drill which looks the same width as the centre core. If in doubt, use a slightly smaller drill if the guitar head is soft mahogany, or one of the similar looking woods on Japanese guitars. If the head is maple, padauk, black walnut, or any other hard, tough wood, choose a drill which is just larger than the core of the screw, but still significantly smaller than the total width of the screw, including the thread each side. It is also considered good practice, when fitting new machine heads, to plug the old unwanted holes with bits of matching wood, glued in and trimmed off neatly when dry. A drop of colourless nail polish will seal the trimmed ends.

Any holes which are too large for the new screws, or which are very close to the positions marked for new screw holes, should in any case be securely filled with a glued-in plug, and the new hole drilled after a few hours' interval allowing for the glue to harden.

Some of the better and more expensive replacement machine heads are supplied with fixing screws, which seem to be very hard and also sometimes rather brittle. They are threaded right up to the head and look like small sheet-metal screws. The primary fixing, on this quality of machine head, is usually a gland nut surrounding the string roller, fitted through the guitar head from the front. It is not necessary to fasten the small fixing screws more than finger-tight, but even with careful assembly, it is quite possible to break the head off a screw occasionally, leaving the threaded part embedded in the head.

If this misfortune happens occasionally, even to skilled repairers, it is likely to occur rather more often in the hands of less experienced people, fitting their first or second set of expensive machine heads. It is not easy to find alternative screws of the right dimensions and most of the screws supplied are quite satisfactory. The only problem concerns the occasional one



which cracks off just under the head. Unfortunately, I cannot see, on inspection, any identifying difference between brittle screws and good ones.

Now it is in the nature of such things, that if a screw is going to break, it will probably break off just below the surface. If there should be a bit left standing above the surface, it will be just enough to enable you to ruin a good pair of pliers and scratch the back of the head, without actually getting the screw out. (You may also encounter this effect with the small screws used to fasten pickup surrounds.) This phenomenon is well known to science, and has several alternative names depending on whether the customer is waiting for the job, and on how many times the same thing happened, that day.

You can't easily drill these screws out, because they are harder metal than most drill bits, and most attempts to dig out the end of the screws leave an ugly hole.

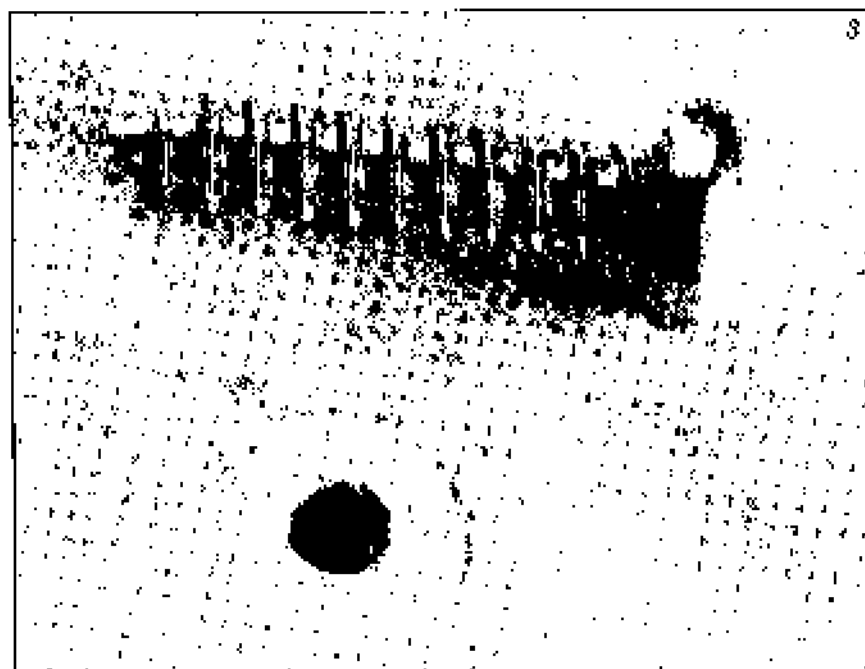
There is a simple solution. You make one small tool, take a little care in using it, and you will be able to remove broken small screws in a couple of minutes. The tool leaves a neat round hole about 4 mm across, which can be filled with a matching plug of wood, and re-drilled with a suitable pilot hole when the glue has

dried. The screw-lug on the machine head will usually cover the inserted wooden plug completely, or nearly enough that no-one will notice it.

Figure 1 shows the trepanning tool used for removing broken screws. It is a small piece of steel tube, with just less than half the width filed away at the end. Use a fine file for finishing, but do not smooth over any of the corners: the tool cuts more easily if you leave a very small burr on the edges. The end is filed square across to leave a sharp D-shaped edge with two sharp corners. In theory this tool should not cut at all, but in practice it works well, and any attempt to give it a normal cutting edge makes it difficult to control.

The inside diameter of the tube should be just large enough to slide over the sort of screw you want to remove. I suppose this would be a clearance of between 0.25 and 0.5 mm. The outside diameter of the tube should not be more than about 4 mm, or the machine head will not cover the wooden plug used to fill the hole. For an average size of screw, this means that you will need a piece of steel tube with a very narrow wall thickness. I do not know where to find small quantities of such tube, but I am sure one of our readers can





provide an answer. I solved the problem by putting a small piece of 4mm silver steel in the chuck of a metalworking lathe and drilling out the centre. Then it occurred to me that I was being unfair to the many readers who do not have access to a lathe. The second attempt, which is the one shown in the photos, (and the one which I have used successfully for several years) was made by centre-punching the end of a bit of 4mm rod "by eye", and drilling out the centre of the rod with an ordinary hand drill which I inherited from my grandfather. The hole in the mark 2 version is not quite in the centre and by making an advantage of this error, the mark 2 version, works better than the accurate lathe-cut version. When you have drilled the centre-hole, choose which part

edge (when turned in the *opposite* direction to an ordinary drill) is at the centre of the thickest part of the tube wall, and the trailing edge on the opposite side, at the thinnest part of the wall.

In this way the leading edge, and the groove which it cuts, will always be just wider than the rest, and the cutter will not bind in the sides of the groove. It is not necessary to make the 'centre-hole' deliberately off-centre. If you do the job by hand and try to get it in the exact centre, it is almost certain to be slightly off. It does not matter in which direction, because you don't file the end of the cutter to shape until *after* the hole is drilled. Look carefully for the thickest and thinnest points, on opposite sides of the tube, and file away. Remember that the (thicker) leading edge is on the opposite

side to what you would normally expect to see in a drill. In photo 1, the leading edge is at the top, next to my finger, and the thinner, trailing edge is next to my thumb. I have made my "screw-remover" cut faster, by filing a small saw-tooth 'vee' in the middle of the D-shaped end, but the remaining parts of the edge are still left quite 'square' across. The saw-tooth probably cuts because of a tiny burr left by the fine, knife-shaped 'needle-file'. The 'vee' *ought* to need re-cutting from time to time to raise a new burr, but mine seems to go on for ever.

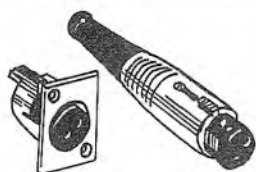
I have not included a picture of a machine head screw, broken off level with the back of the head. If you have bothered to read thus far you probably know only too well what it looks like. This screw-removing tool is NOT safe to use in an electric drill: it will not find its own centre in either direction. Fasten it firmly in the chuck of an ordinary hand drill, place it over the broken screw and guide it around the screw by turning the drill chuck anti-clockwise until it has made enough of a groove to keep itself in place. Then apply more pressure to the drill, and turn the handle (still backwards) to deepen the groove around the screw. Every few turns, lift out the tool and see if the screw is still in place. At this stage it should look like Photo 2, with a neat groove around the screw. You may have to take the groove down to the bottom of the screw, but usually the anti-clockwise motion of the tool will unscrew the broken part, out of the head, before you have reached the full depth. This is why the screw remover is made to work in the opposite direction to an ordinary drill: a clockwise-cutting tool would tend to tighten the stub instead of loosening it. On about the third or fourth time you lift out the tool, the screw will either fall loose in the hole, or come out wedged in the centre hole of the tool. In either case, you have removed it and you can make a neat round wooden plug into the hole. (Fig. 3).

The only difficult part about using this tool is the initial starting of the groove around the screw. Don't treat the screw remover as a drill, but guide it carefully round, until it has a groove to follow. After that, the rest is easy. For practice, drive a small screw into a piece of wood, file off the head, and use the screw-remover to get it out. Because hand-drill chucks are meant for clockwise operation you will need to grip the screw remover tightly in the chuck, and it may need re-tightening at intervals. **Stephen Delft**

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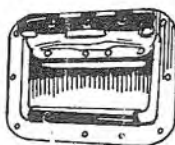
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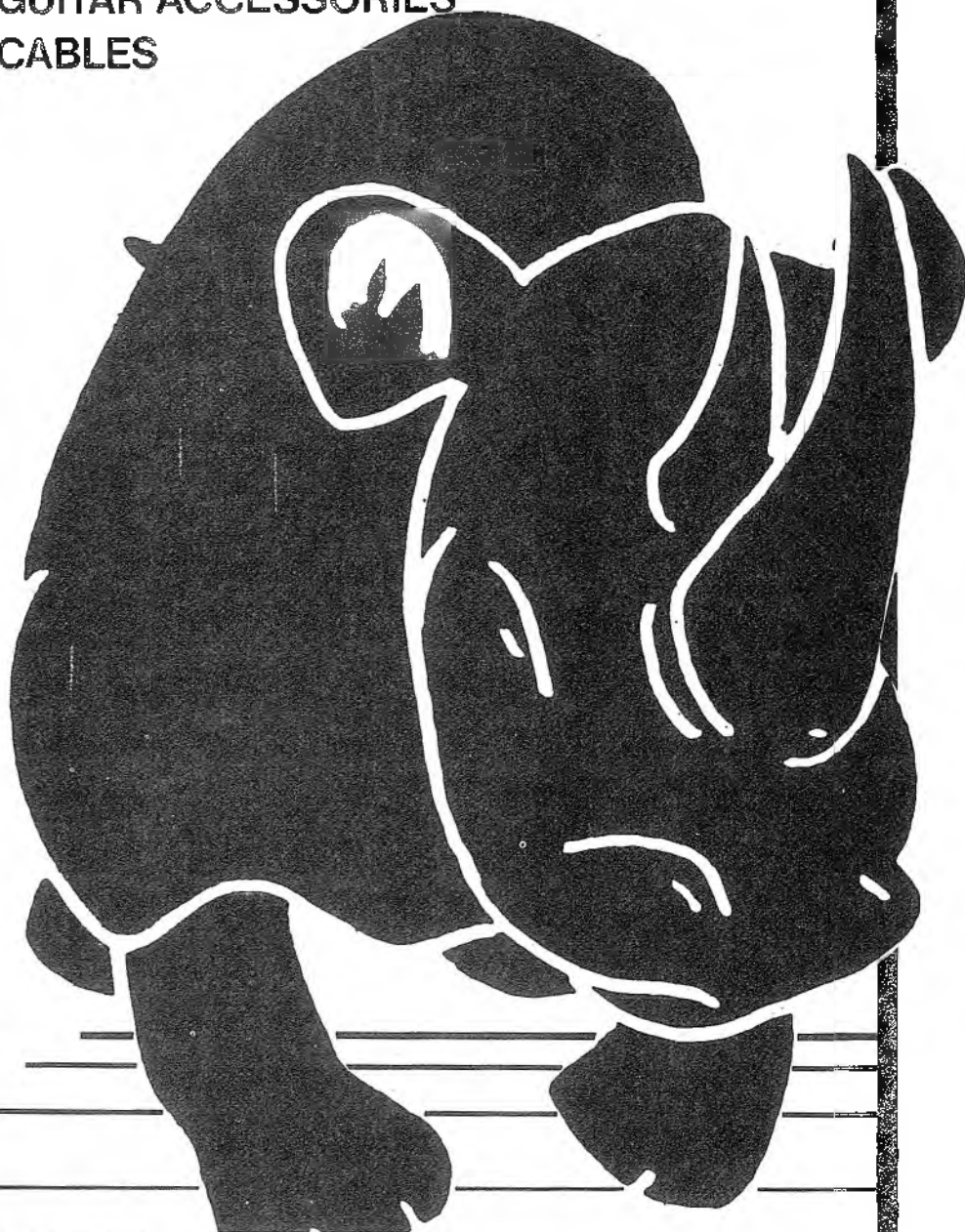


HANDLE's



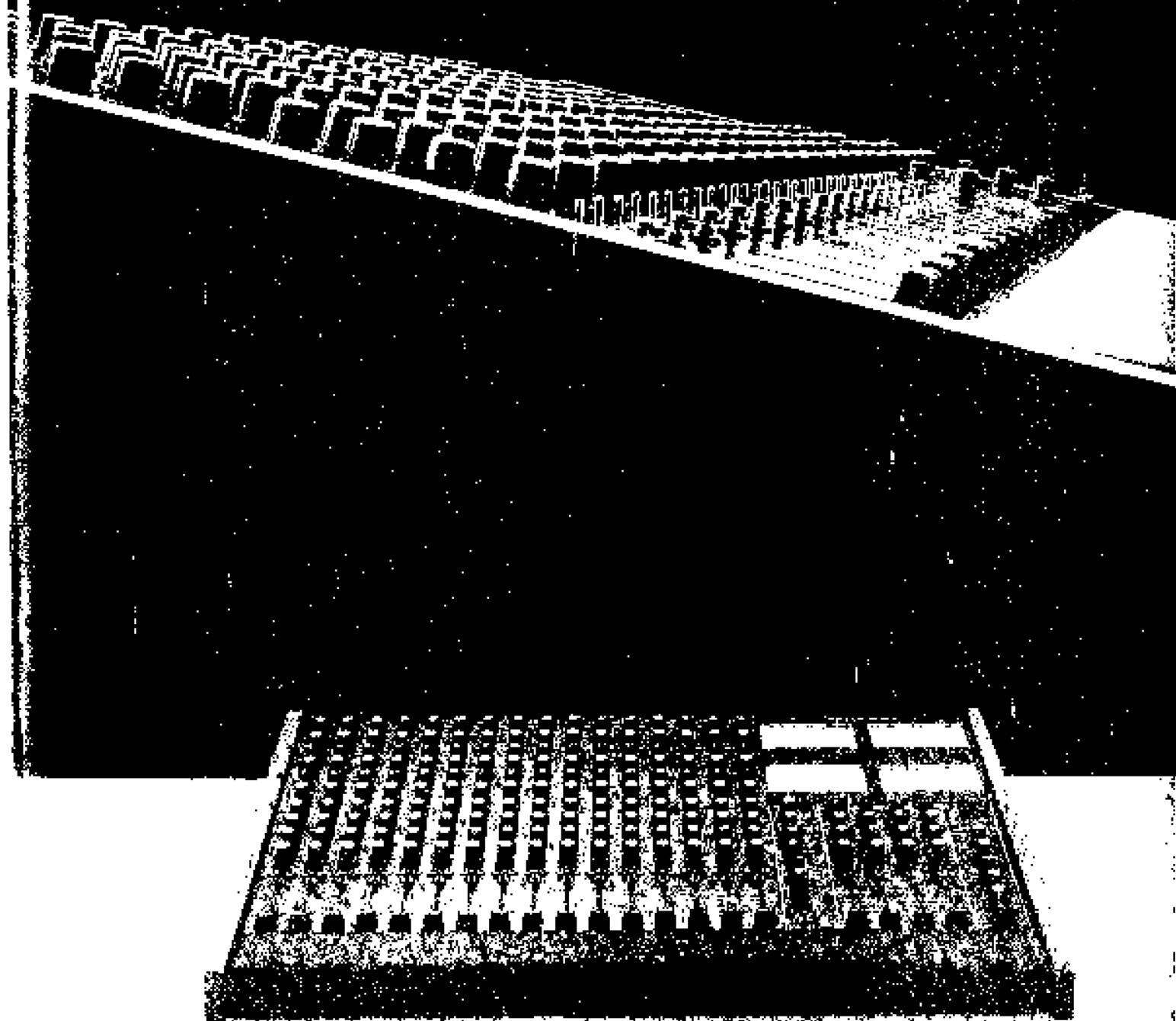
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# THE STUDIOMASTER 16/4 AND 16/8 MIXER



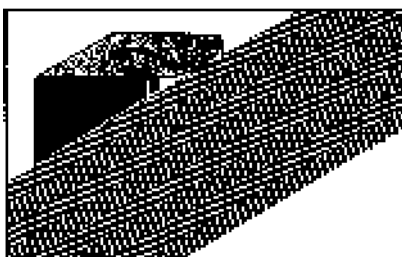


# STUDIOMASTER 16/4 AND 16/8 GUIDE TO MULTI-TRACK RECORDING

## THE MULTI TRACK PRINCIPLE

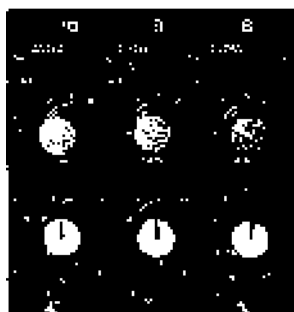


Recording with a four or eight channel tape recorder is like recording with four or eight separate tape recorders working in perfect synchronisation. In the modern multi-channel recorder the recording tape is divided into separate tracks and these can be recorded, played back and re-recorded in perfect synchronisation. The system allows the engineer to record one instrument (or group of instruments) onto one track and then record extra instruments or vocals on each of the other tracks so that during recording the performers can listen to any previously recorded track. On playback each track remains separate and the volume of each track can be individually adjusted (or altered with tone controls etc.) until a satisfactory "mix" is achieved.



## HOW THE STUDIOMASTER 16/4 AND 16/8 WORK

Studiomaster Mixers are designed to match any multi-channel tape machine. Input is easily achieved and procedure for the 16/8 is identical to the 16/4. The input socket for each channel is on the back panel. The mixer accepts professional Cannon-type plugs. Studiomaster mixers accept almost any type of low impedance



input signal and on every channel two controls allow the engineer to match the input level to the mixer circuit. A rotary gain control allows signals to be increased and a small switch introduces a -30dB "pad" which allows even the highest of signals to be controlled. Additionally a tiny red "LED" lamp will light if too much signal is being fed into the mixer.

## EQUALISATION

The mixer allows engineers to shape and modify the sound they are recording. Sounds that start off only mediocre can be considerably improved by "equalisation" and the Studiomaster 16/4 and 16/8 desks offer "parametric" equalisation to provide the ultimate sound control.

"Equalisation" is a term that developed when engineers used to have to equalise for poor room acoustics. Today the term is generally accepted as meaning sophisticated tone control and the Studiomaster desks offer five rotary controls on each channel with both the mid-range and bass controls allowing the engineer to select at which frequency point he wishes to cut or boost the sound.

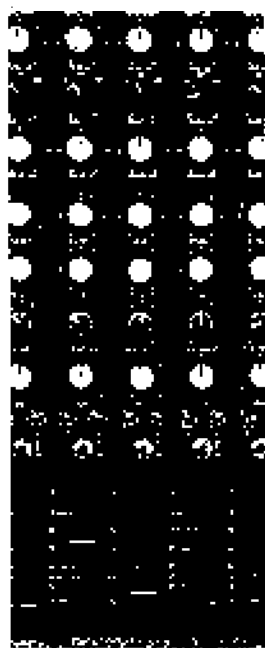


## EFFECTS AND INPUT ROUTING

As the incoming signal passes through the input stage where the incoming level is controlled and through the equalisation stage where the sound is shaped, the signal arrives at the section of the channel where it may be sent "off line" to receive special effects like "echo" or "reverb." When sent to an echo machine the signal returns to the mixer at the main output section (as explained later).

The engineer may select to send only part of the signal for echo and allow the signal to continue through the channel. At this stage he may send the signal back to the performer to hear via the "foldback" control. This graphically titled control allows the engineer to "mix" the sound being fed back to the musician. After this passing through the foldback stage the signal arrives in the "routing" department. At this point the engineer may choose to

"place" the signal in a particular position of a stereo image. This is more usually done on a "mix down" and on initial recording the signal is often recorded onto an individual track which is later positioned for stereo. At this stage the engineer selects which output channel in the mixer the signal will take. This means that he can decide at this stage where he wants the signal to appear on the tape. A clever little button called the "Pre Fade Monitor" button is also provided at this stage. During recording this button can be extremely useful. Pushing this button and selecting PFM monitoring allows him to hear the individual channel and engineers frequently check recording or a mix by using each channel's PFM button in turn to ensure that the signal information is as it should be. Below each input channel is the slide fader. This control governs the volume of each independent channel in relation to the others and the output from this fader is sent to the output section of the mixer.



## MONITORING AND THE OUTPUT SECTION



The engineer can monitor both his performance and the performance of the mixer visually and aurally. Four or eight VU meters are provided depending which mixer is used and these may be switched to indicate the output levels of the synch/playback returns from the tape machine.

In the first mode the meters show the comparative levels of the four or eight output channels and in the second they indicate precisely what is coming off tape. It is important that the meters in the mixer and the tape machine are aligned and this subject is covered elsewhere in this brochure.

## TRACK STATUS

The large output section gathers up all the information arriving from each separate input channel and allows the engineer

to "interface" the mixer with the tape machine. In this section the output level of the four or eight output channels is determined by group faders. Each one of these controls the overall volume of the signals routed to that channel on the input channels. Also in this section are track status selectors which allow this section either to send the signals to the tape machine or to accept them back for re-mixing. When recorded signals are sent back to the Studiomaster desk for re-mixing the four or eight group faders act as volume controls for each separate recorded track. By mixing these the final balance is reached and the slide faders fitted to input channels 1 and 2 convert to provide a pair of stereo faders controlling the final "mixed" stereo signal being sent out to make the master recording.

On a re-mix further equalisation is sometimes required and an incoming signal for one track (or more) is routed back onto conventional input channels to allow equalisation or effects injection

to take place before the signal is routed back to a group fader.

The output section of a Studiomaster mixer also makes a separate monitor mix possible. Engineers usually want to hear an acceptable "mix" of sounds as they go along and to save routing all signals back for proper re-mixing this section allows signals to be mixed for monitoring purposes only. Thus it is possible to listen to one particular mix whilst recording a very different mix.

## EXPANDABILITY

Despite their affordable price, Studiomaster mixers have been designed to meet every professional recording requirement and to EXPAND as the need arises. Special "add on" channel modules are available and using these a standard 16/4 or 16/8 can grow three input channels at a time. The Studiomaster grows with you!

# A SESSION WITH THE STUDIOMASTER 16/4 OR 16/8

## LINING UP THE EQUIPMENT

Before any recording can start it's necessary to ensure all the equipment is lined up. The mixer meters must be aligned with the tape machine meters. To obtain good recording results it is important to record at the right level. Too little will allow tape hiss to come through, too much will cause distortion.

Turn off the monitor send and the foldback send (this is to protect your speakers, headphones and ears!)

Set the track status switches to 'record' and the monitor channel selectors to L.O. (line out).

Switch on the oscillator and set the group L.O. faders so that the meters read 0 VU. (This is approximately the working position for the group L.O. faders).

Switch the recorder to record and adjust the record level controls so that the meters on the recorder read to the recommended level.

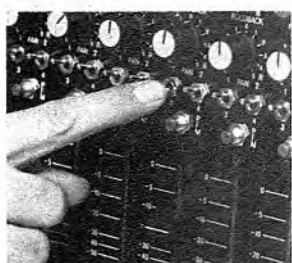
With the recorder rewound to playback the previously recorded tone, set the monitor channel selectors to L.I. (line in). Adjust the playback level controls so the meters on the desk read 0VU again.

To line up the stereo (remix) machine the procedure is the same except the track status switches on groups 1 and 2 must be switched to 'remix'.

## RECORDING THE FIRST TRACK

The first track to be recorded is often a rhythm track, with perhaps three separate signals to be equalised and mixed into one for recording onto a single track.

The first step will be to use the appropriate switches on each channel to route the three signals into one group. At this stage the pan-pots should be left central and for clarity and safety, no other channels should



be routed to any group unless for a specific reason. The track status switches should be set to 'record' and the group faders to their nominal level.

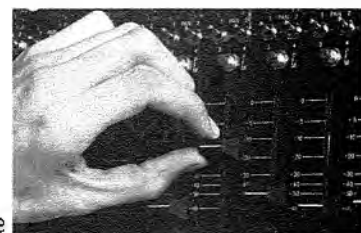
The signal should now be connected with the monitor by setting monitor channel 1 to L.O. The monitor send control on that channel should be set to 7 and the monitor master

level control can be regulated to a convenient volume.

Now the main monitor switch can be set to PFM, and the signal level on each channel can be read by depressing its individual PFM button which will connect its signal to meter 4. Watching this meter, the gain on each channel can be adjusted to the correct level by the input gain controls.

Having balanced the signals within the group, you can set the overall level on the L.O. fader, and start recording.

As the recording proceeds, foldback signals may be sent either from the L.O. mix via the foldback control on the monitor channel, or, for a different mix from the foldback sends on each of the input channels. The monitor level controls may be adjusted at any time, or any channel checked on the PFM system, without disturbing the recording. The channel faders provide control over the balance and the group L.O. fader may be regarded as the recording level control.



## RECORDING A SECOND TRACK

The first track completed, a second track may involve a mix of six drum mikes. Before beginning, it is best to turn off the routing switches used during the first recording to avoid any problems due to channels being left open.



The channels to be mixed should be routed to group two, connected to the monitor by setting monitor channel 2 to L.O. and with the monitor send and master level controls adjusted appropriately, the mix is made using PFM for checking as before.

To incorporate the previously recorded track into the loudspeaker mix and foldback, set Monitor channel 1 to L.I.

The tape machine should be set to synchronize the playing back of track 1 with the recording of track 2. The L.O. level can now be adjusted and recording can proceed.

You may want to assess track 2 independently of track 1. This is done by panning monitor channel one to the left, and channel two to the right. Or the new material may be played louder than previously recorded material.

Tracks are added by repeating the procedures using further groups. The choice of which instruments or voices to



place on each track is up to the individual. It is possible to record on two or more tracks at once; some producers favour the more spontaneous 'feel' this can give.

## ROUTING FOR ECHO OR EFFECT

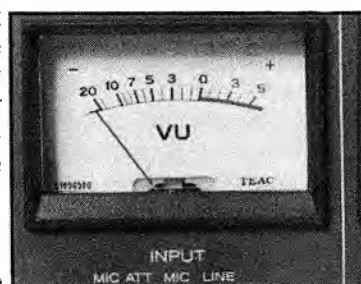
Echo, reverb, and other effects may be added either during the recording of each track by routing the echo to the appropriate group, or during the re-mix. If you decide on the latter (after all, you may need less echo than you think and once it's added you can't take it away) the level can still be tried out on the monitors at the earlier stage, without being routed to the recording machine.



## MIXING

You now have four or eight complete tracks on your tape, expertly recorded by skilful use of your Studiomaster. The final stage is to remix them for a stereo programme.

First, all track status switches should be set to 'remix'. This done, the tape machine is set to 'play' (as distinct from the 'sync' mode) so that the four tracks from the recorder appear on mic channels 1-4 (or 8). These mic channels are routed so that they can be panned across groups 1 and 2, and mixed down in the usual way. Now the monitors are set to 'L.O.' with channel 1 panned left and channel 2 panned right. After rewinding, the playback may be monitored by switching the monitor channels to L.I.



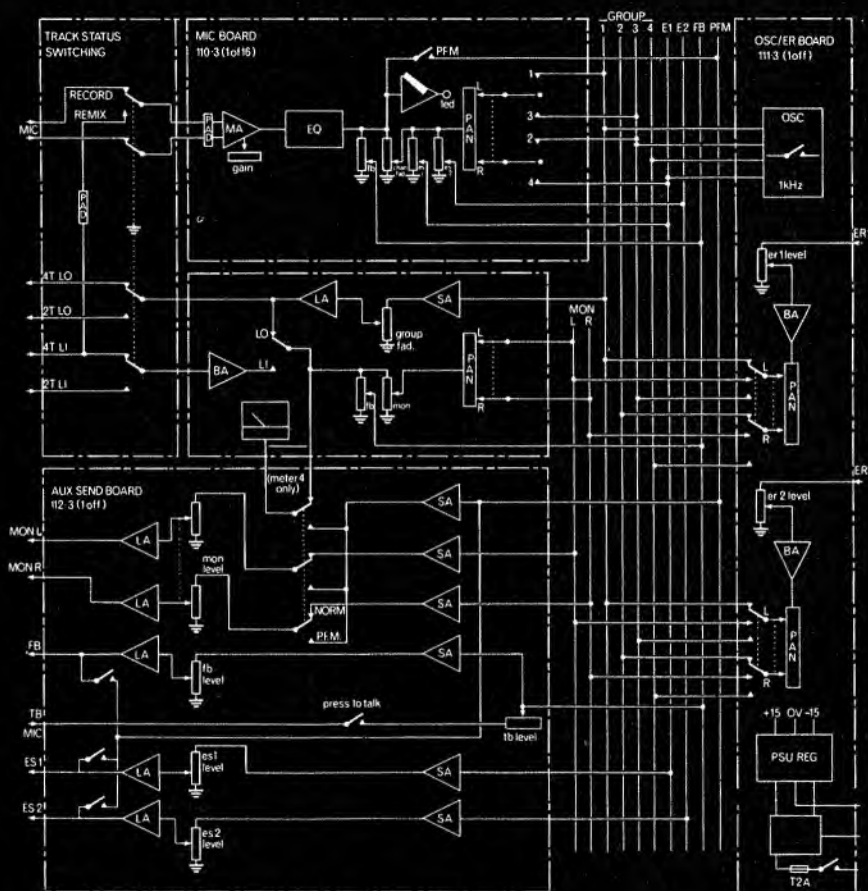
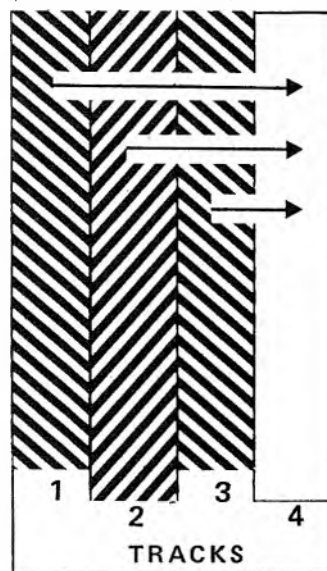
If necessary, fresh material can be introduced into the stereo programme at the remix stage, the extra channel(s) being mixed down in the usual way.

## STILL MORE MULTI TRACK TRICKS

You may feel the need to mix more basic tracks than the four or eight available on your tape recorder. This may be done by recording tracks 1, 2 and 3 in the usual way, and then setting track status switches 1, 2 and 3 to 'Remix' while leaving 4 on 'record'. Tracks 1, 2 and 3 are thus routed to their respective mic channels, and these in turn can be routed to group 4 for recording on track 4. This mix should be monitored with monitor channel 4 set to L.O.

On the tape recorder, tracks 1, 2 and 3 should be set to 'play' (it is unnecessary to use the 'sync' setting) and track 4 to record. The result will be a mono recording on track 4 of tracks 1, 2 and 3. You will therefore be left with the first three tracks to record again. Precisely the same principle applies to an eight-track tape machine.

If still more tracks are required, two of these three can be recorded and then mixed down along with the first mix on to the fourth track, so that three further tracks are available. Obviously, each time a playback signal is remixed and re-recorded, there is loss of quality. The engineer must use his judgement as to what is tolerable.



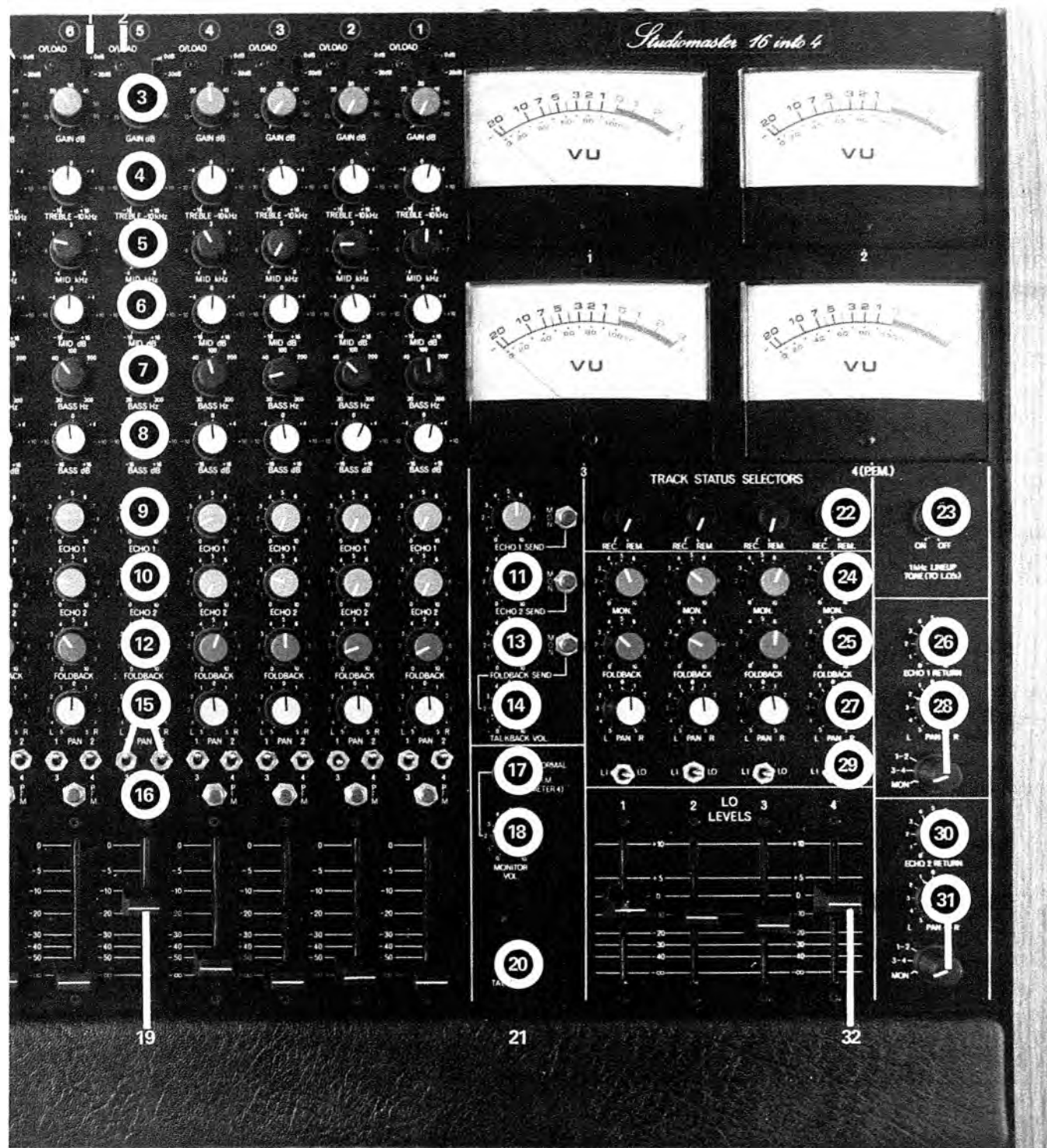
16 into 4 Schematic

MA = MIC AMP (60dB)  
BA = BOOST AMP (40dB)  
SA = SUM AMP (0dB)  
LA = LINE AMP (10dB)

## STUDIOMASTER BLOCK CIRCUIT DIAGRAM



# CONTROL LAYOUT STUDIOMASTER 16/4



- |  |   |
|--|---|
| 1. 30dB input pad.                             | 17. Switch selects monitor mix or PFM buss to loudspeakers.   |
| 2. Overload led (fires 4dB below clipping).    | 18. Loudspeaker (monitor) volume control.                     |
| 3. Input gain control.                         | 19. Channel fader.  |
| 4. Treble $\pm 16$ dB shelving at 10 kHz.      | 20. Talkback (talk to foldback) button.                       |
| 5. Mid frequency control, 400Hz - 8kHz.        | 21. Padded armrest.   |
| 6. Mid $\pm 16$ dB.                            | 22. Switches route tape track ready to record or remix.       |
| 7. Bass frequency control, 30Hz - 300Hz.       | 23. Lineup osc. switch, states 1kHz to all groups.            |
| 8. Bass $\pm 16$ dB shelving.                  | 24. Send to monitor (loudspeaker) mix.                        |
| 9. Echo 1 (postfade) send.                     | 25. Send to foldback.   |
| 10. Echo 1 master + Echo 2 master.             | 26. Echo 1 return level control.                              |
| 11. Echo 2 (postfade) send.                    | 27. Pans send to monitor across loudspeaker mix.              |
| 12. Foldback master (+mon button to PFM buss). | 28. Echo 1 return pan + routing.                              |
| 13. Foldback (prefade) send.                   | 29. Switch selects monitor channel to LO (group) or LI (tape) |
| 14. Talkback volume control.                   | 30. Echo 2 return level control.                              |
| 15. Panpot + routing switches.                 | 31. Echo 2 return pan + routing.                              |
| 16. PFM (prefade monitor) button.              | 32. Group (LO level) fader.                                   |

# THE STUDIOMASTER 16/4 16/8 TECHNICAL SPECIFICATIONS

## Inputs

Electronically balanced with active gain control, switched 30dB pad on input.

Maximum gain	+60dB
Minimum gain	-15dB
Headroom	+20dBm
Input Impedance	>5k Ohms
Optimum source impedance for microphones	=200 Ohms

## Equalisation

Treble  $\pm 16$ dB at 10kHz  
Mid  $\pm 16$ dB at 400Hz to 8kHz continuously variable  
Bass  $\pm 16$ dB at 30Hz to 300Hz continuously variable

All outputs have 10dB gain after their respective output level controls.

Output impedance <10 Ohms

Minimum terminating impedance is 600 Ohms with the exception of Foldback output when the minimum terminating impedance is 8 Ohms.

Maximum output level +20dBm.

## Line Inputs

Line inputs are preset for an input of -10dBm.

They may be very simply modified for an input of +4dBm

Meters 0VU = +4dBm

The following applies from a microphone input to a line input with EQ flat.

1kHz distortion at +4dBm	<0.15%
1kHz distortion at +20dBm	<0.15%
Maximum gain throughout mixer	+70dBm
Maximum input level before clipping	+35dBm
Equivalent input noise (200 Ohms input resistor, 16.7kHz 6dB/Octave filter giving 20kHz noise bandwidth)	<-125dBm
Signal to noise ratio with line output fader down	-90dB
Line Output fader nominal, channel faders down	-88dB
One microphone channel at 40dB gain	-84dB
Four microphone channels at 40dB gain	-80dB
Sixteen microphone channels at 40dB gain	-72dB

## Multicores

The standard 16/4 mixer has facilities for two twelve way mic multicores by way of two multicore sockets on the back of the desk. A 150' twelve channel multicore (twelve balanced pairs) is available on a multicore drum (made of hard wearing ABS plastic) with a detachable stage box with twelve switchcraft D3F numbered 1-12. Similar multicores are available for the 16/8.

## Flight Cases

Flight cases for both the 16/4 and 16/8 are available as optional extras.

## EXPANDER MODULES

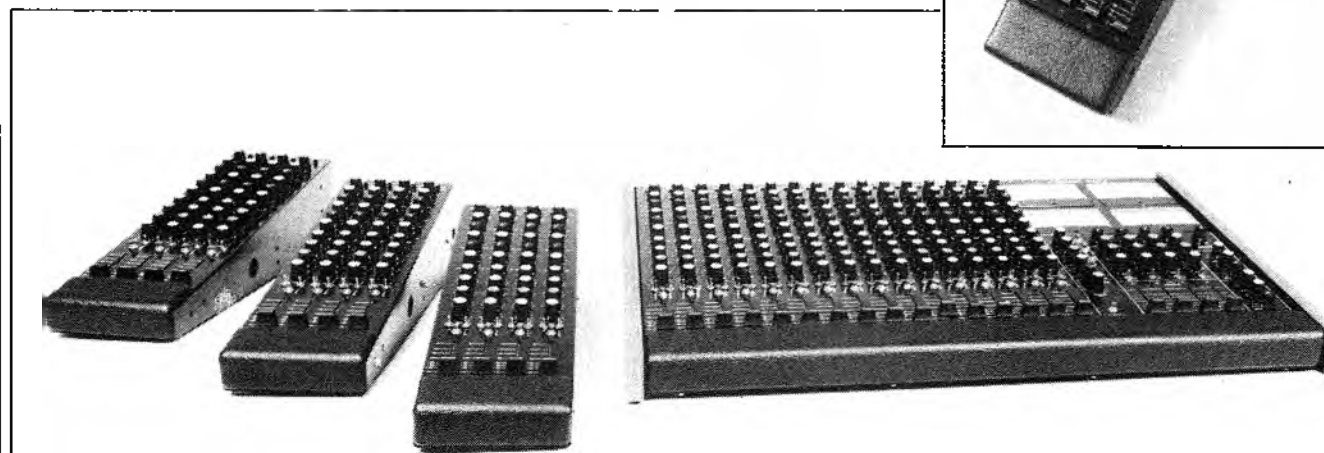
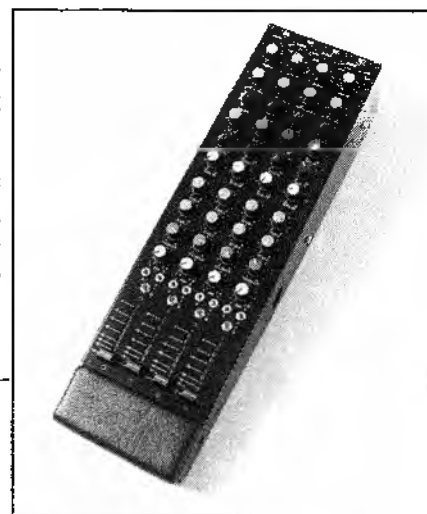
It is a general rule of recording that the more sound sources you can mike separately, the more control you have over the final product. None the less, many musicians prefer to start with only a few mikes, wisely bearing in mind that without high quality (and therefore expensive) microphones the best recording equipment is wasted.

RSD have therefore constructed the 16/4 and 16/8 mixers as basic units capable of accepting expander modules of four mike channels each, so that you can expand your mixer at need up to a maximum of 20 channels. If you expect to need still more input capability, you can request a special modification when buying your Studiometer, which alters its power supply to handle 8 channels over and above this maximum.

Finished in a style identical to that of similar functions on the

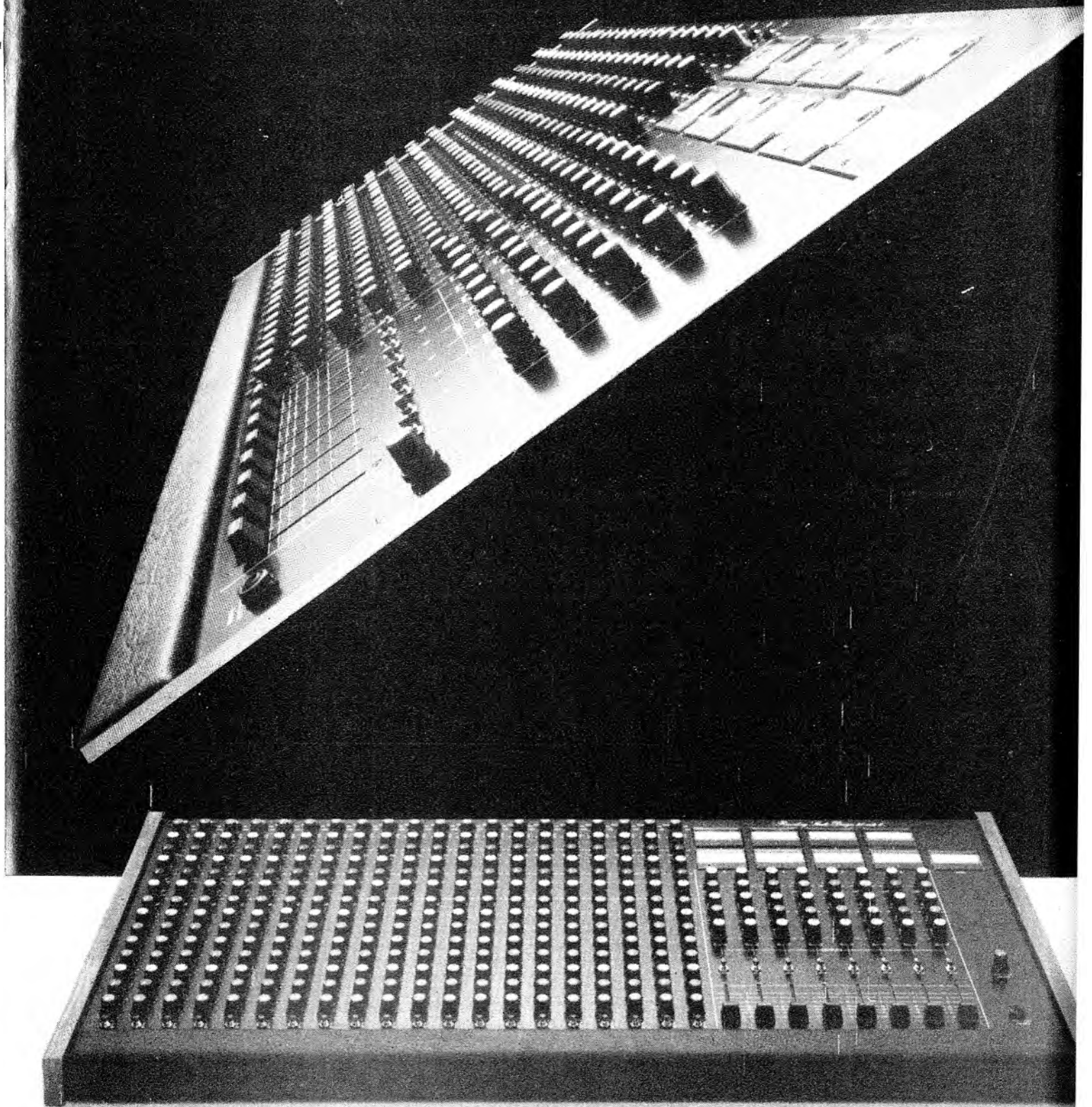
original desk, the input expander modules are extremely simple to fit. Just remove the wood panel on the side of the desk, bolt your expander module in its place, and replace the wood panel on the outer edge of the module. All electrical connections are simply made without complex wiring.

So remember, if ever you want to expand your ideas, your Studiometer is ready when you are.



*Studiometer*

# THE RSD 20/8 MONITOR MIXER





# USING THE RSD 20/8 MONITOR MIXER

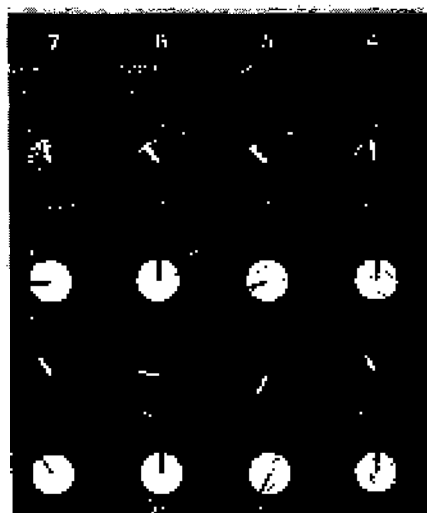
## CONCEPT

The RSD 20/8 is a mixer designed especially for providing on stage monitor mixing. Almost every band member requires a different mix these days and the 20/8 is capable of delivering eight different mixes.

The monitor mixer accepts 20 separate inputs (usually taken in parallel with the main P.A. mixer) and each of these separate inputs may be routed to as many of the eight output channels as required with individual gain controls for all eight outputs provided on each input channel. The result is that the incoming signal may appear at any chosen level in any of the eight separate mixes leaving the board. This system allows total 'on stage' monitoring control and from a side stage position a sound engineer can effect the various monitoring changes that are necessary during the development of most performances.

## INPUT

The input stage of each input channel is flexible enough to take both mike and 'line' input. A 30db 'pad' allows the engineer to reduce sensitivity for tape machine and similar incoming signals. A rotary gain control allows optimum gain level to be selected and an LED warning lamp indicates overload condition.



## EQUALISATION

Parametric equalisation controls are provided with two frequency control selectors and the gain controls. At this stage the incoming signal in each channel can be adjusted to present the required sound in the mixes. Parametric equalisation allows the engineer to select the precise frequency at which he wishes to cut or boost.

## ROUTING

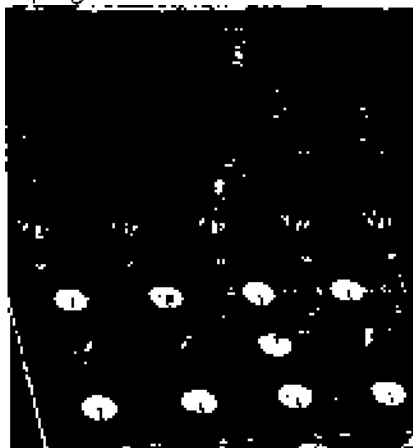
After gain control and equalisation the signal on each channel arrives at rotary controls which route it to all or any of the eight output channels. This is the stage at which the individual monitor mixes are created. If the bass player's monitor is number one 'out' channel and he wants to hear more of the drummer than anyone else the channels with the drum signals coming in are set to high volume on the pots routing the signal to output channel one. Perhaps the keyboard player doesn't want to hear so much drums and the gain controls routing the drum signal to his channel are backed off and so on.



This section is the heart of the RSD 20/8 stage monitor mixer.

## PFM

When all the monitor mixes are made it's often quite hard to hear what's going on on one incoming channel. Often it's hard to tell whether the signal is getting through. For this reason RSD have provided a 'Pre-Fade Monitor' button on each input channel. This allows the engineer to hit the button, select PFM monitoring, mute all other channels and instantly hear what's going through that channel. Often the monitor engineer will listen to several channels at once in this way adjusting the e.q. or gain controls.



## OUTPUT

After each of the 20 incoming channels have been routed in the desired degree to each of the eight output channels the job comes of grouping and controlling the signals for output.



Because the needs of monitoring mixing are so precise all eight output channels are provided with their own parametric equalisers. Understanding that monitor mixes are often done in badly lit stage wings, RSD have carefully selected different colour control groupings for each channel to minimise the likelihood of mistaken adjustment.

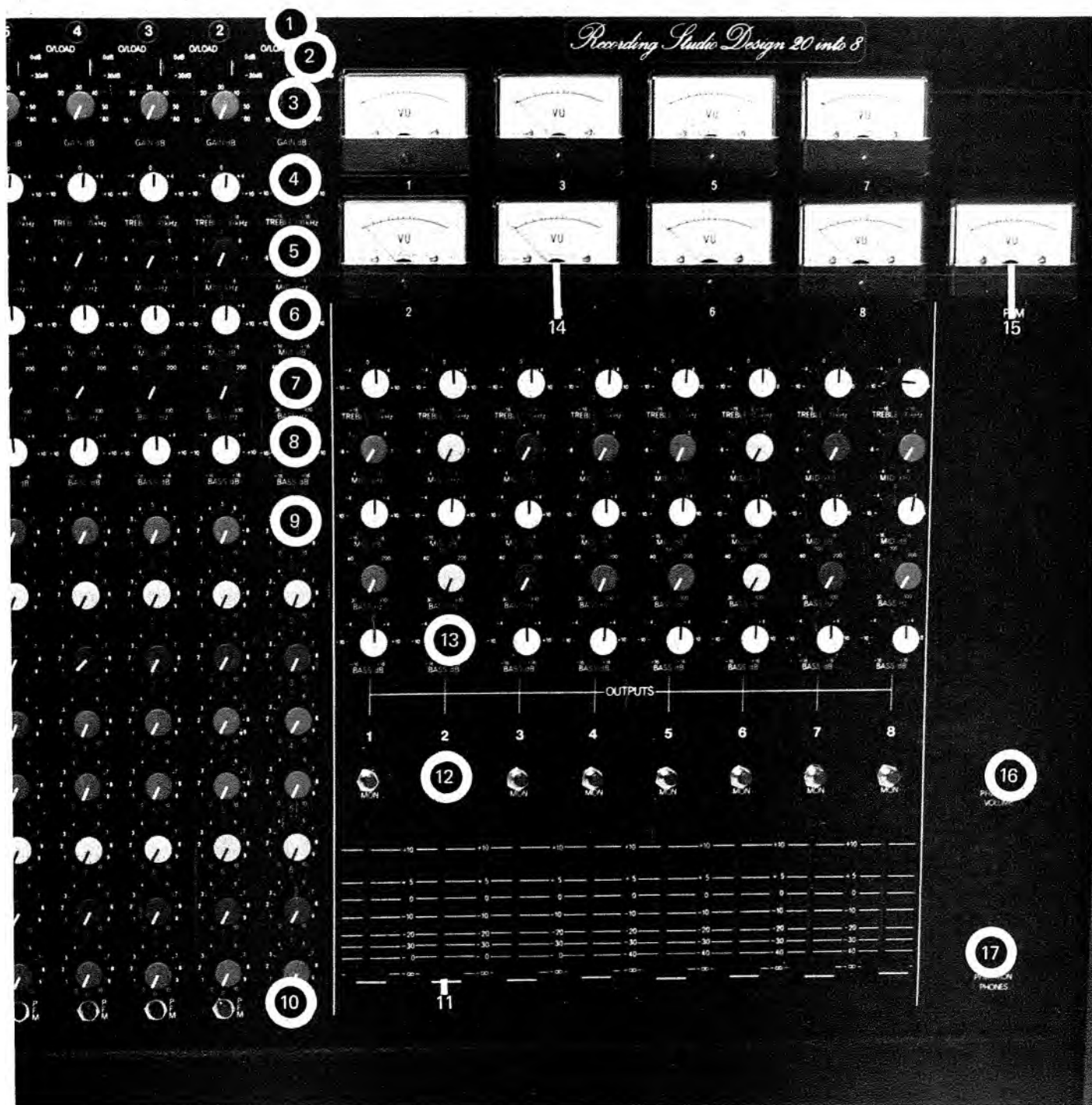
The engineer can select almost any frequency he chooses to cut or boost on each output channel and can thus effect very significant tone alterations. This control section is extremely useful in minimising feedback, the ever present problem in monitoring.

Meters are provided to all eight output channels and slide faders govern the exact signal level sent to the monitor amps. An extra VU meter is provided for checking the levels of individual channels or groups when necessary.

## CONNECTIONS

MIC Inputs are D3F or equivalent wired Pin 1 - Earth, Pin 2 in phase, Pin 3 out phase. Line Outputs are mono jack sockets. Line Inputs are mono jack sockets. Monitor Outputs are 2 x D3M wired Pin 1 - Earth, Pin 3 - Signal for connection to power amplifiers, or a stereo headphone socket for direct monitoring via 600 ohm headphones. Mains Input is via a European 3 pin socket protected by a 2 Amp fuse.

# CONTROL LAYOUT OF 20/8 MONITOR MIXER



1. Input is via Cannon-type plugs or optional multi-core.
2. 'Pad' control cuts incoming signal by 30dB to accept line input.
3. Rotary control for adjusting input gain.
4. Treble control offering cut or boost of 16dB shelving around 10kHz.
5. Mid frequency selector. This control selects at which mid-frequency cut or boost shall be made.
6. Mid frequency control. Offers 16dB cut or boost at mid-frequency has been selected.
7. Bass frequency selector. This control selects at which mid-frequency cut or boost shall be made.
8. Bass frequency control. Offers 16dB cut or boost at bass frequency selected.
9. Eight separate rotary gain controls send channel signal to output faders. Incoming signal may be mixed into any or all of the eight output groups at this section.
10. PFM button allows the channel to be monitored individually.
11. Main output faders. Eight of these control eight separate mono mixes to drive eight separate foldback systems.
12. PFM button allows monitoring of individual output channel.
13. Full equalisation on each output channel is provided as on each input channel.
14. VU meters for each output channel.
15. PFM meter for metering channels individually.
16. PFM/Monitor output volume control
17. Headphone socket.

*Recording Studio Design*

Recording Studio Design Co., Ltd., 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

# THE ART OF MONITOR MIXING

In the early days of stage mixing there were many disasters and many good bands split up because of their appalling adaption to the mixer. The reason was usually poor monitoring.

Good P.A. mixing demands that the members of a band control their back line sound to allow the 'out front' engineer to get the right balance in the main P.A. rig. If the musicians insisted on maintaining the 'pre-mixer' back line levels of the 400 watt stack days the sound swim that would have occurred in front of the stage would have ruined any P.A. mix. So the lads turned down and in doing so ruined the internal balance of the band. Having turned down they desperately needed to hear a representative sample of the sound and this is where a skilled monitor engineer and a totally flexible monitor mixing console were required.

RSD have built precisely this sort of mixer in the RSD 20/8. In most band line-ups, eight separate monitor speakers are more than adequate and the engineer has to understand the monitoring requirements of every musician. Usually the bass player will want an overall mix with extra drums, particularly snare or bass drum,

the singer will want the complete rhythm section with lower solo instruments and the keyboard player will want to hear alternative lead lines above the mix. Every musician has a different idea about where his own instrument should figure in the mix coming out of his monitor and the RSD 20/8 is one of the few consoles available that has been designed to allow the engineer to satisfy every whim.

Despite lower backline levels musicians on stage still want to hear as much monitor sound as possible. There's always the problem of allowing for an audience when undertaking a sound check in an empty hall and engineers can usually expect to push up the output faders a fair bit after the crowds have arrived and acted as acoustic absorption material.

One of the main problems is that individual monitor mixes may change for different numbers and whilst this may be necessary it is not desirable for easy mixing. Equalisation can often save level changes and as the evening wears on and high frequency perception starts to slip (both in performers and audience) the wise engineer will increase top end e.q. without making the normal gain compensation.

Feedback is the constant bugbear of all monitor engineers. The proximity of monitors to microphones ensures this and despite the smoother frequency response provided by most amplifiers these days feedback is usually reached on most monitors before the correct audible level is reached. At this point the output e.q. section on each output channel of the RSD 20/8 proves extremely useful. A few moments will allow the engineer to 'search' for the troublesome frequency point with the parametric e.q.'s and back off enough to allow a few more dB's of gain to be made. This type of e.q. has done more than any other technological development to help bands hear themselves properly on stage!

The good monitor man will work hand in hand with the sound engineer controlling the main P.A. mix. It may be said that whilst the band and the audience rely on the P.A. mixer for successful projection it is equally true that the band relies totally upon their monitor mixer for their quality of performance. Let a band hear what they're doing and you'll have a happy band. Deny them it and you might as well go home.

## TECHNICAL SPECIFICATIONS

### Inputs

Electronically balanced with active gain control, switched 30dB pad on input.

Maximum gain ..... +60dB  
Minimum gain ..... -15dB  
Headroom ..... +20dBm  
Input impedance ..... > 5k Ohms  
Optimum source impedance for microphones ..... 200 Ohms

### Equalisation

Treble  $\pm 16$ dB at 10kHz  
Mid  $\pm 16$ dB at 400Hz to 8kHz continuously variable  
Bass  $\pm 16$ dB at 30Hz to 300Hz continuously variable

### Outputs

All outputs have 10dB gain after their respective output level controls.  
Output impedance < 10 Ohms  
Minimum terminating impedance is 600 Ohms with the exception of Foldback output when the minimum terminating impedance is 8 Ohms.  
Maximum output level +20dBm.

### Meters

0VU = +4dBm

### Line Inputs

Line inputs are preset for an input of -10dBm.  
They may be very simply modified for an input of +4dBm.

### The following applies from a microphone input to a line output with EQ flat.

1kHz distortion at +4dBm ..... < 0.15%  
1kHz distortion at +20dBm ..... < 0.15%  
Maximum gain throughout mixer ..... +70dB  
Maximum input level before clipping ..... +35dBm  
Equivalent input noise (200 Ohms input resistor, 16.7kHz 6dB/Octave filter giving 20kHz noise bandwidth) ..... < -125dBm  
Signal to noise ratio with line output fader down ..... -90dB  
Line Output fader nominal, channel faders down ..... -88dB  
One microphone channel at 40dB gain ..... -84dB  
Four microphone channels at 40dB gain ..... -80dB  
Sixteen microphone channels at 40dB gain ..... -72dB

### Expander Modules

Expander modules are available as optional extras for the RSD 20/8. Each expander module provides a further four input channels.

### Multicores

A low cost multicore system is available for this mixer. It uses 25 pin connectors and 25 way cable with an overall screen.

### Flight Cases

Flight cases made in both fibre covered ply and aluminium are available for this mixer with heavy duty corners and catches.



# THE STUDIOMASTER I2/2B MIXER



# HOW THE STUDIOMASTER 12/2B MIXER WORKS

## INPUTS

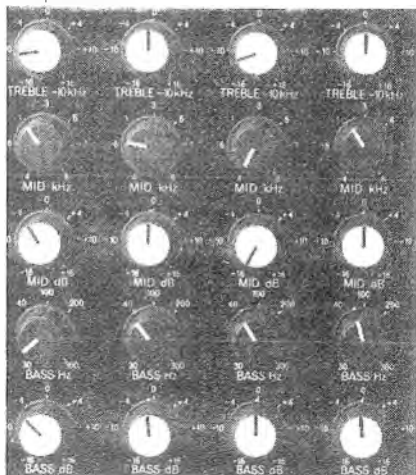
The inputs on the 12/2B are D3F-type and are via professional Cannon-type sockets or by the multicore connector available as an option. They accept low impedance (Lo-Z) balanced line microphones of the type favoured by sound engineers. This system will give a signal unaffected by the length of the mike cables, and will minimize crosstalk and electrical interference.



For versatility, the 12/2B also features pad switching which should be used with any high-output mikes or other equipment needing to be mixed. This reduces gain by 30dB, a very adequate buffer against any signal likely to be fed in. In general, gain is regulated by means of the gain control selector. The correct level may be gauged by using the PFM button to connect the relevant channel with the meter (the gain control then being adjusted to produce 0 VU modulation). It can also be estimated by observing the LED overload light, since the correct signal is the maximum possible before overload and the 'clipping' distortion overload produces.

## EQUALISATION

Equalisation is the name given to a sophisticated system of tone control whereby a musical tone is manipulated or 'equalised' by adjustment of the signal strength at several of its component frequencies.

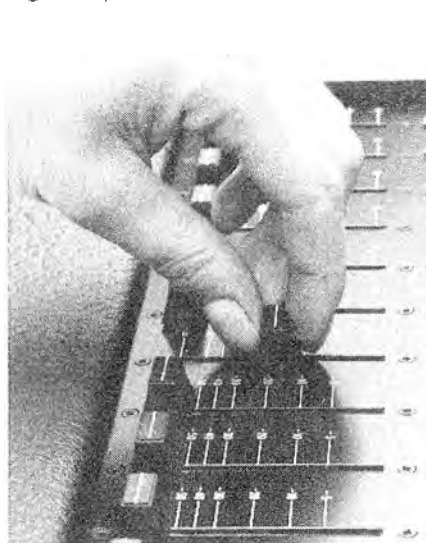


In the 12/2B, this means an impressive 16dB of cut or boost on treble (at 10kHz, shelving), mid (at any frequency between 400Hz and 8kHz) and bass (at any frequency between 30Hz and 300Hz). 16dB is far more than you will usually need, but it is as well to have 'headroom'.

As well as equalisation on each input channel, the 12/2B also has full equalisation both on the output stage and on the foldback master output. The former is invaluable for quick adjustment to the prevailing acoustics of a particular venue, since the acoustics of an empty hall in which the soundcheck is conducted may be markedly different from those of the same hall with a full auditorium. Foldback equalisation means effective control of the on-stage monitor sound and is especially valuable in achieving useful levels without feedback.

## MIXING

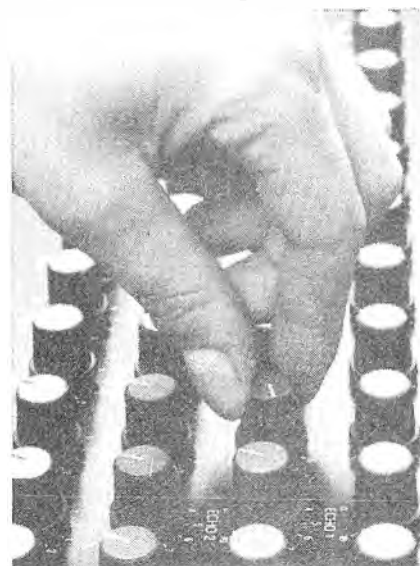
The heart of a mixer's function is to balance input signals and create from them two (in the case of a stereo unit like the 12/2B) composite signals for recording or amplification.



In the 12/2B this is done with the equalized signals, by using the pan selectors. The strength of each channel signal (and thus the contribution it makes to the total sound) should be adjusted on the appropriate fader at this stage, as the total effect is assessed on the monitors. The creation of the 'stereo image' by means of the pan controls is probably the most important part of regulating your sound to your exact requirements and a certain amount of skill is necessary in assessing what you hear as you adjust the signals by reference to the monitors. Once you get it right, however, you will see just how much the potential of your band can be increased by the Studiomaster.

## EFFECTS PATCHING

Each channel has two separate 'Echo Send' controls which route signals to mono jack sockets for connection with external processors. The amount of echo being used can be gauged by setting the monitor selector to the relevant echo channel. Overall level control is by the two Echo Master (Send) regulators.



The echo sends are 'post fade': that is, the signal being processed for the effect has already been adjusted to output level so whatever the channel fader setting, the echo will always be recorded or amplified in the proportion set up by reference to the monitor output. The 12/2B is also equipped for echo to be added to the stage monitor sound via the foldback system.

## VOLUME CONTROL

Volume control is introduced at two stages; on each individual channel to achieve a correct mixing balance, and on the two L.O. channels to give a master fade on the output. All the volume controls on the 12/2B are sliding faders for ease and accuracy, and are calibrated in dB.

The two master faders will usually be used to double as recording level controls or PA volume controls, the PA amplifier volumes having been preset.

The main outputs, like the foldback outputs, are D3M-type and are wired Pin-1, Earth, Pin-2, inphase, and Pin-3, outphase. They may be used in an unbalanced mode simply by leaving one of the signal pins disconnected.

For recording uses, mono jack sockets are provided giving a 'tape out' signal of -10dB (for a main output signal of +4dB). A stereo jack socket is provided for headphones.

# THE STUDIOMASTER 12/2B MIXER OPERATION

## FEEDBACK

An efficient monitoring system should be regarded as essential for any performance, since musicians cannot give of their best unless they know not roughly, but exactly the sound they are putting out.

On the 12/2B the foldback send on each channel provides a signal unaffected by the channel faders (i.e. pre-fade) which is routed through the foldback master send to the on-stage monitor units. As already noted, this signal passes through a full equalisation system.

The mixer also has Pre-Fade Monitor (PFM) buttons which will connect any channel with the monitors whenever desired, without affecting the working status of the desk.

## CONNECTIONS

Mic inputs are D3F or equivalent and are wired Pin-1 - Earth, Pin-2 - inphase, Pin-3 - outphase.

Main outputs and foldback are D3M or equivalent and are wired. Pin 1 - Earth, Pin 2 - inphase, Pin 3 - outphase. (They may be used in the unbalanced mode merely by leaving one of the signal pins disconnected). Echo sends and returns are via mono jack sockets.

The tape out sockets are mono jack sockets and provide a signal level of 10dBm (for a main output signal level of +4dBm) for tape recording purposes.

Headphone output is a stereo jack socket. Mains input is via a European 3 pin plug and is protected by a 2 amp fuse.

## MULTICORE WIRING

The mixer is equipped with a 25-pin connector to enable it to be used with the multicore and stage-box available as extras.

The standard multicore is 150' long and is supplied on a cable drum made of hard wearing ABS-plastic. The detachable stage box is fitted with 12 D3F (or equivalent) connectors numbered 1-12.

This wiring applies to both mixer and stage box, the order of the wiring of the different coloured cores in the cable does not matter as long as Pin 1 is the screen and the wire connected to a certain pin at one end is connected to the same pin at the other end.

# MIXING-HINTS AND TIPS

## EQUIPMENT

If you have the right mixer, try to make sure your other equipment does it credit. Microphone quality is very important. Most musicians take ample care in choosing amplifiers and speakers, but small things are also worthy of attention. A faulty cable with no replacement handy can ruin a performance as effectively as a short in the amplifier circuitry. Proper maintenance of all equipment is a 'must'.

## MIXING

A mixer like the Studiomastrer 12/2B is a very sophisticated tool which needs to be handled with a certain sophistication. The sound engineer should be just that, and not anyone who happens not to be otherwise occupied during the gig.

In a unit with comprehensive facilities like the 12/2B, a little restraint may be demanded. A common fault is to use a facility like 16dB Eq rather heavily - just because it's there. For instance, to overdo the bass on the bass drum boom (resulting in low frequency feedback) or the presence when you're trying to get vocals to cut through by adjusting the mixer instead of tackling the problem at source.

## WORKING WITH DRUMS

Mixing drums is perhaps the most difficult of the sound engineers tasks. A common fault is to take each mike channel individually, adjust it to the desired pitch, turn it down, and go on to the next. Since

however each mike can pick up the sound of all the drums, this method will not yield the best results. The preferred system is to turn all the sliders full on, and adjust each channel down to the required level. Normally, the rule is loudest last, so a possible sequence is bass, floor toms, upper toms, cymbals, and finally snare.

## WORKING WITH GUITARS

The rule here is - don't fight the back line. Many engineers with small bands will attempt to pan the guitar to one side or the other, and fail because the back line is contributing too much to the sound. In this situation, vocals are the only part that can really be panned. In the same way, the engineer should not try to alter the guitar sound from the back line amplification. The guitarist chooses his own sound and the engineer should try to copy it.

## WORKING WITH VOCALS

Mixing vocals is not difficult, providing the vocalist knows what he is doing. If his microphone technique is such that with one breath he's overloading the system and with the next he can't be heard, the wise engineer does not try to correct this in the mixer. He has a quiet word in the vocalist's ear about matters like bass lift, microphone distances, and so on. When mixing vocals the clearest sound will result if microphones not currently in use are turned down.

## WORKING WITH EFFECTS

Many experienced engineers would advise that effects are used discreetly, although it is of course a matter of personal choice. What is not a question of taste is the load sent into the echo or effect unit. It is not uncommon for this to be too great, resulting in considerable distortion caused, for example, by over-driven echo. This can take time to trace to its source. Watch the meters!

## MOVING ON

The last job an engineer should do at a gig is to set everything to flat - so that at the next gig and the next sound-check, he starts with a clean slate. Because halls have such different acoustic properties, there is no advantage in leaving the desk set, after a performance at which the sound was very successful.

## EXPANDER MODULES

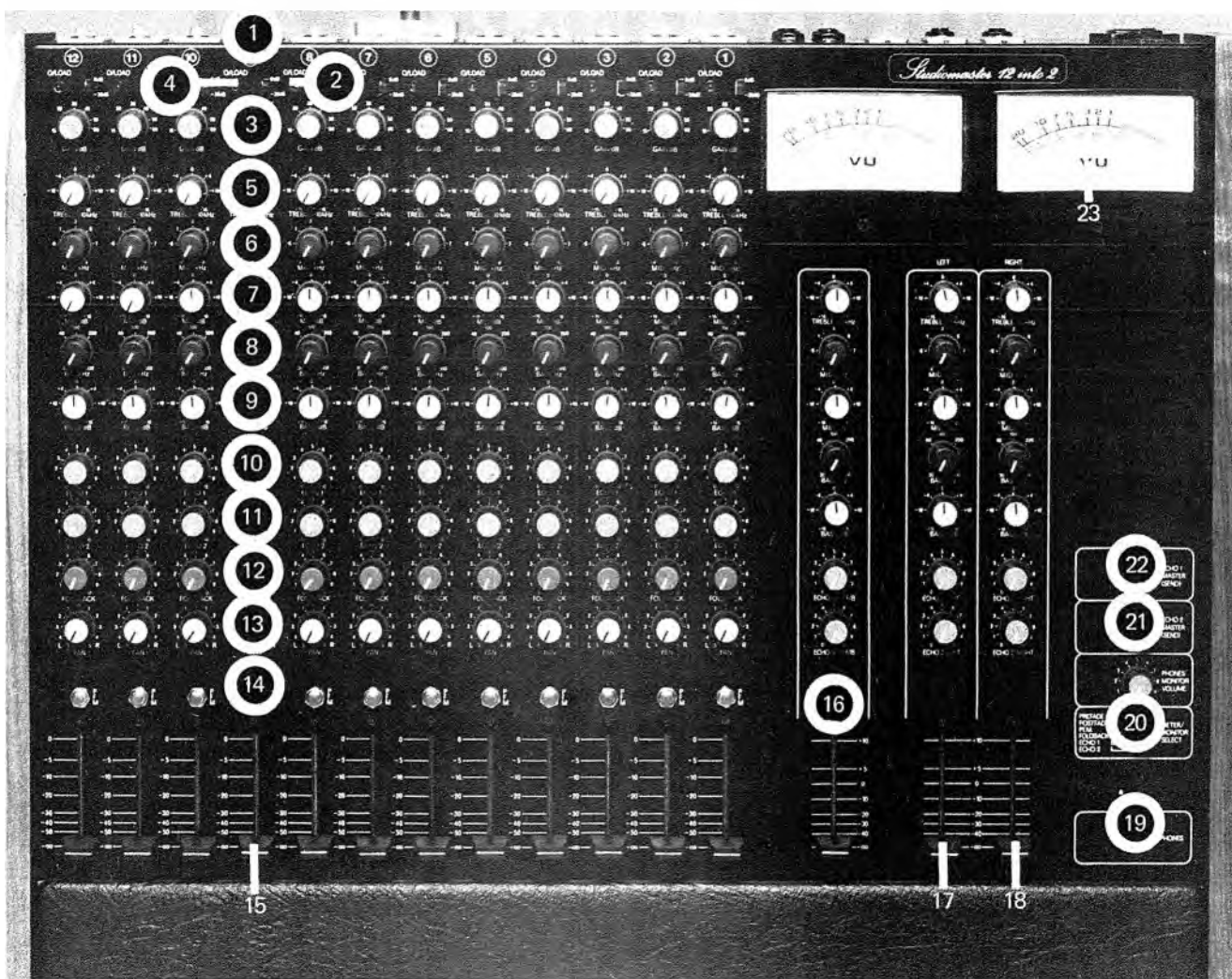
The Studiomastrer 12/2 mixer grows with your requirement and your budget. 'Add on' modules providing four input channels at a time are available and this means that your mixer is always ready to grow.

The 'bolt on' modules connect instantly into the existing mixer circuit without the need for any complex solder joints.





# CONTROL LAYOUT OF THE I2/2 B



1. Input to each channel is via Cannon-type connectors or optional multi-core. Accepts balanced line low-impedance mike or line.
2. Special 'pad' switch reduces gain by 30dB to allow line inputs to be accepted.
3. Input gain control allows input level to be adjusted.
4. Led indicates if input signal is overloading.
5. Treble control provides 16dB cut or boost at 10kHz with a shelving response.
6. Mid-frequency selection control. This control selects the frequency to be adjusted in the mid frequency band.
7. Mid control boosts or cuts mid frequency selected by 16dB.
8. Bass frequency selector. This control selects the frequency to be adjusted in the bass frequency range.
9. Bass control boosts or cuts bass frequency selected by up to 16dB.
10. and 11. Echo sends providing two separate mono mixes from the mike channels for treatment by external echo or reverb devices. The sends are post fade so that as the amount of the channel's

- signal appearing in the final stereo mix is varied by the channel fader the degree of echo or reverb applied will stay in proportion.
12. Foldback control. Provides mono mix for foldback purposes.
13. Pan-pot. This control allows the engineer to 'place' the signal in any position in the stereo mix.
14. PFM Button. This Pre Fade Monitor allows the engineer to hear and meter the channel individually.
15. Main fader to control channel volume.
16. Foldback master output equipped with complete eq section similar to the input channels.
17. and 18. Main left and right output faders.
19. Headphone socket. Capable of driving both 600 ohm and 8 ohm headphones.
20. Monitor select switch selects the signal to be monitored.
21. and 22. Echo master controls govern output level to echo or reverb devices.
23. VU meters scaled so that 0VU = +4dBm.

## TECHNICAL SPECIFICATIONS

### Equalisation

Treble  $\pm 16\text{dB}$  at 10kHz  
 Mid  $\pm 16\text{dB}$  at 400Hz to 8kHz continuously variable  
 Bass  $\pm 16\text{dB}$  at 30Hz to 300Hz continuously variable

### Outputs - (Echo outputs unbalanced mode only)

Gain after fader (unbalanced mode)  $\pm 10\text{dB}$   
 Maximum Output level (unbalanced mode) +20dBm

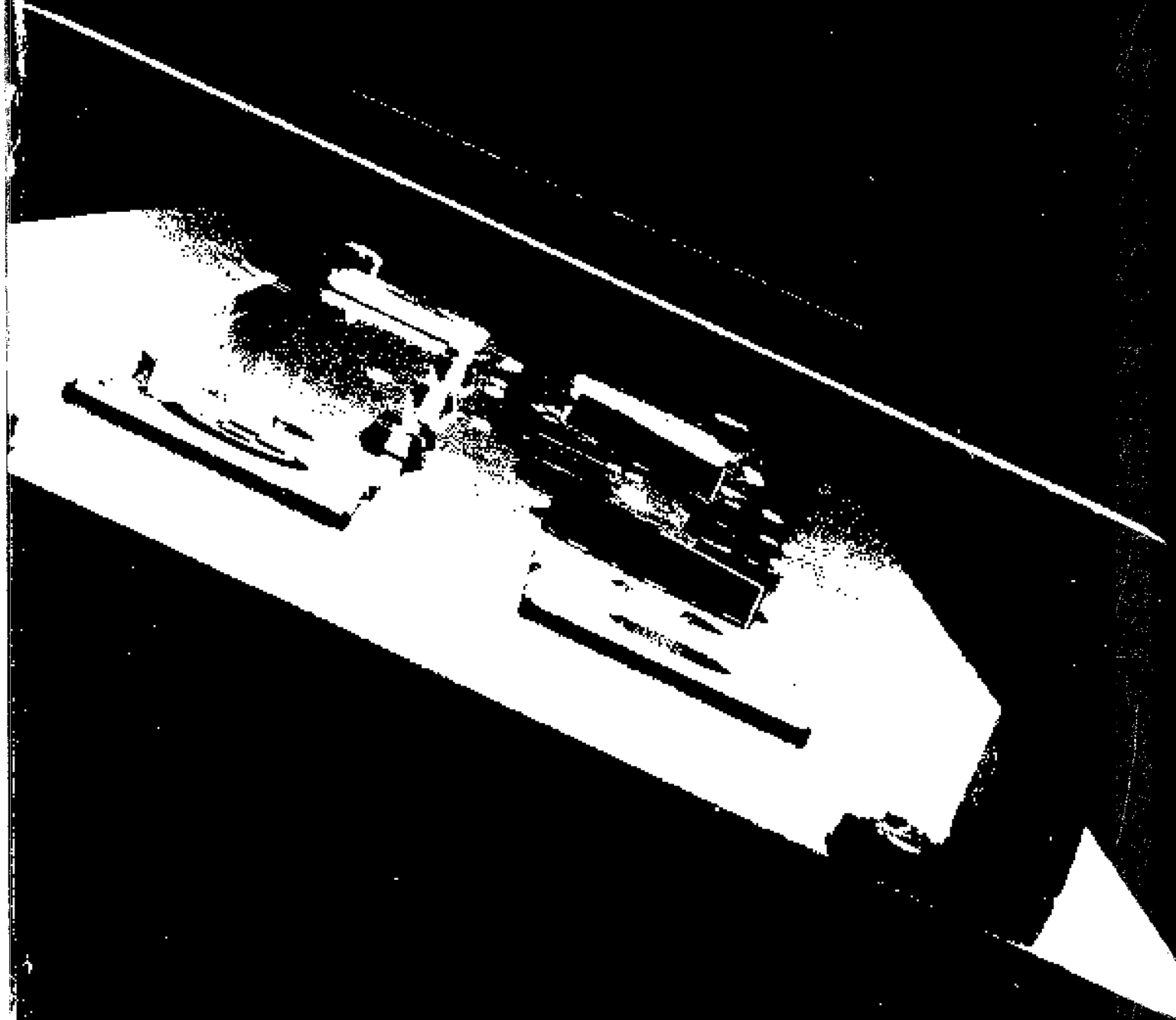
Gain after fader (balanced mode)  $\pm 16\text{dB}$   
 Maximum output level (balanced mode) +26dBm  
 Output impedance  $< 10\text{ Ohms}$   
 VU Meters 0VU = +4dBm  
 Overall frequency response +0.2dB 20Hz to 20kHz  
 Distortion 1kHz +20dBm  $< 0.15\%$

**Inputs** - Electronically balanced, active gain control  
 optimum microphone impedance  $\sim 200\text{ Ohms}$

Maximum Gain  $\pm 60\text{dB}$   
 Minimum Gain  $-15\text{dB}$   
 Hence total gain range 75dB  
 Input impedance 6k Ohms  
 Equivalent Input Noise  $-125\text{dBm}$   
 (Unweighted, 16.7kHz 6dB/oct filter giving effective 20kHz bandwidth, 200 Ohms input resistor)

*Studiomaster*

# THE STUDIOMASTER 800C POWER AMPLIFIER



# THE STUDIOMASTER 800C POWER AMPLIFIER

The Studiomaster 800C is a rugged professional power amplifier capable of delivering two channels of 400 watts into four ohms.

The amplifier is designed to be rack mounted (it will function free standing) and all connections are via XLR plugs.

## PROTECTION CIRCUITS

1. Instantaneous protection circuits protect the amplifier output stages from short circuits and inappropriate load conditions. The amplifier is cooled by two back panel mounted high efficiency fans. Warm air exhaust is via slots in the side panels.

2. Each channel has individual thermal cutouts to remove power from the amplifier if the temperature of either heatsink exceeds 100°C. An L.E.D. on the front panel indicates the event. These cutouts reset automatically when temperature falls to a safe level.

3. There are separate fuses for each DC rail for each half of the amplifier and an AC mains fuse, all rated at 8 Amp, slow blow.

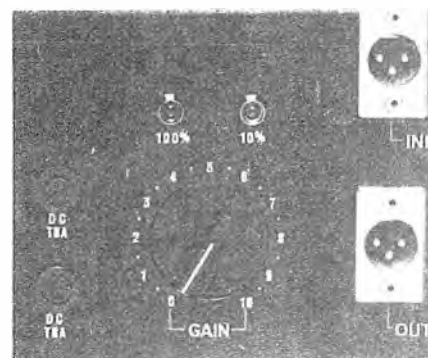
4. In the unlikely event of a fault occurring that causes a DC condition on the amplifier output, a relay disconnects the speaker load from the amplifier after approximately 1 second.

## FRONT PANEL INDICATORS

1. Illuminating mains switch
2. Yellow L.E.D. indicates thermal cutout has operated.
3. Green L.E.D.'s on each channel indicate an output of approximately 10% of full power

4. Red L.E.D.'s on each channel indicate:

- a) Instantaneous clipping of amplifier (100% output)
- b) Short circuit on output or any condition that causes operation of protection circuits.
- c) Any fault condition that causes loss of feed back in the amplifier and/or isolation of the speaker load by operation of the output relay



## CONTROLS

1. Illuminating mains switch.
2. Input attenuator (gain) controls for each channel recessed into front panel

## CONNECTIONS

1. A male and female XLR type input connector wired in parallel on each channel.

PIN 1 EARTH  
PIN 3 SIGNAL

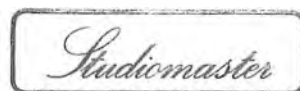
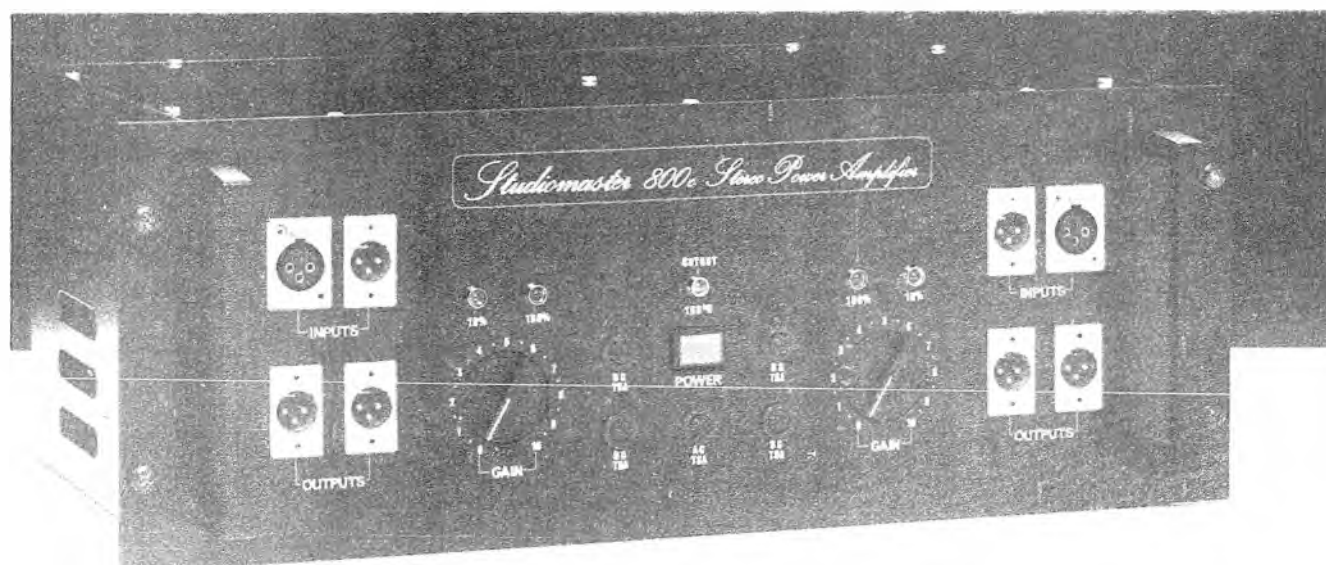
These input connectors facilitate linking of amplifiers with standard male to female links

2. Two male XLR type output connectors wired in parallel for each channel:-

PIN 1 EARTH  
PIN 2 SIGNAL

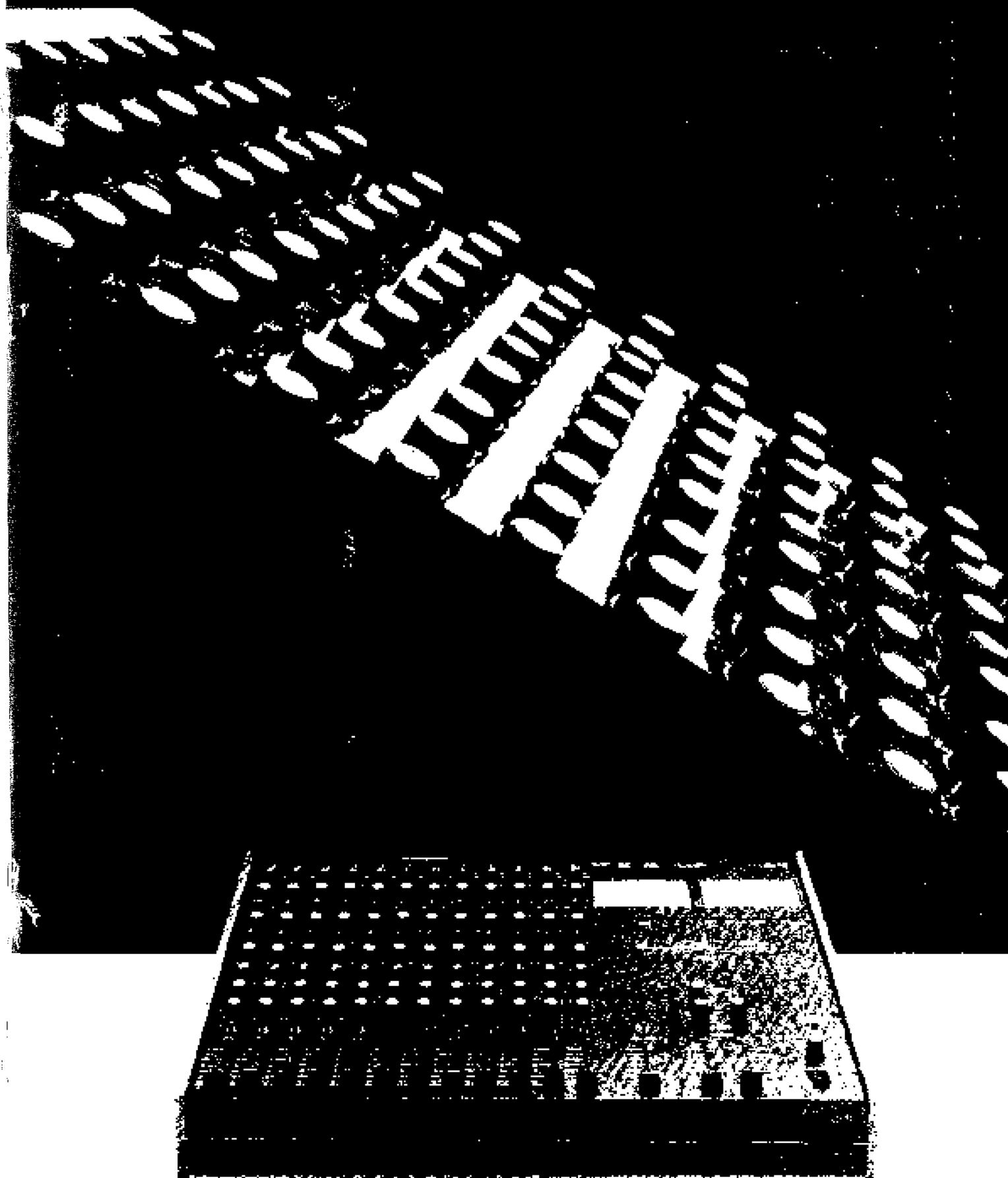
## TECHNICAL SPECIFICATIONS

RMS Power O/P Per Channel at 1kHz	>225W Into 8 Ohms
RMS Power O/P Per Channel at 1kHz	>400W Into 4 Ohms
RMS Power O/P Per Channel at 1kHz	>600W Into 2 Ohms
THD at 1kHz at full power prior to clipping	< 0.05% At 8 Ohms
THD at 1kHz at full power prior to clipping	< 0.07% At 4 Ohms
THD at 1kHz at full power prior to clipping	< 0.1% At 2 Ohms
Input Impedance	>10K Ohms
Input Sensitivity	1.25 Volts RMS for Full Power into 8 Ohms
Frequency Response	+0 -3dB 5Hz to 30kHz
Signal to Noise Ratio	>100dB Ref. Full Power into 8 Ohms
Slew Rate	>15V/μS Into 8 Ohms
Fully Stable into	8 Ohms + 2pF





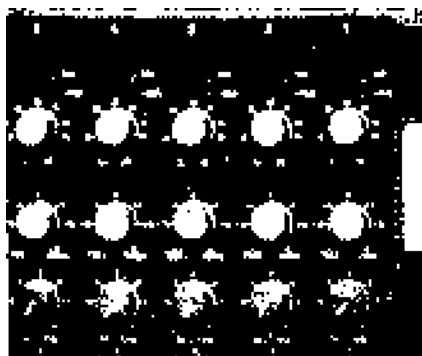
## THE RSD 12/2 MIXER



# HOW THE RSD 12/2 MIXER WORKS

## INPUT

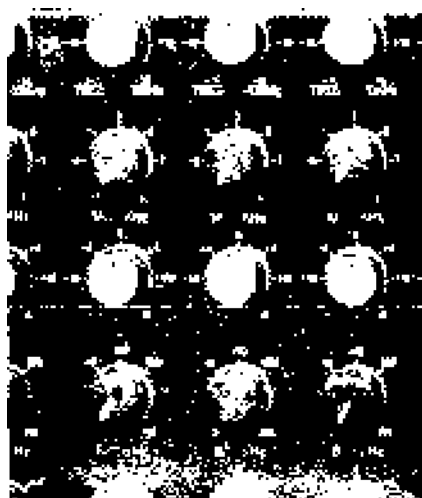
The 12/2 has 12 D3F-type inputs, with a capacity for further 4-input modules to be added on. The sockets are Cannon-type with multicore connection as an optional extra. Low impedance balanced line microphones (for rejection of unwanted crosstalk and interference and for correct operation with long lines) should be used. If microphones or other equipment with unusually high output are used, the 30dB 'pad' should be selected.



After plugging in the microphones, turn up the rotary input gain control, press the 'PFM' button at the bottom of each channel and select PFM monitoring. This routes the incoming signal to the VU meters. When the signal is registering on the meter, adjust the control until the peaks hit around 0VU. If the needle is considerably in excess of 0 switch in the 30dB 'Pad' and turn up the gain control. This allows high input sources like tape machines to be fed into the mixer. When the needle is averaging around 0VU the input level is correctly set.

## EQUALISATION

Equalisation is the name given to a sophisticated system of tone control whereby a musical tone is manipulated or 'equalised' by adjustment of the signal strength at several of its component frequencies.



In the 12/2, this means an impressive 15dB of cut or boost on treble (at 10kHz, shelving) mid (at any frequency between 400Hz and 8kHz) and bass (at any frequency between 30Hz and 300Hz). 16dB is far more than you will usually need, but it is as well to have 'headroom'.

When you have used the bass, mid, and treble controls in conjunction with the monitors (route signals there by means of the PFM buttons) you are ready for the mixing stage.

## MIXING

A mixer's function is to balance various input signals and create from them two (in the case of a stereo unit like the 12/2) composite signals for recording or amplification.



This is done by using the channel volume sliders in conjunction with the pan selectors. First, set the pan knobs central, and use the appropriate volume fader to regulate the contribution each channel makes to the total sound. This sound is assessed using the PFM button on the main outputs. This done, the stereo stage can be created by panning each channel either left or right to the desired degree. At this stage, some re-adjustment of the volume sliders may be required to give the exact effect you want.

## EFFECTS PATCHING

Each channel has a separate 'echo send' control which routes the desired proportion of the signal to the echo send output, for connection to an external effects unit. The total 'send' is regulated by a master control with its own monitor button.

The echo send is 'post fade', meaning that however you adjust the channel faders, the echo will always stay in proportion. Echo return is through a D3F input: it has its own level control, and may also be used for stereo tape relay, special effects, etc.



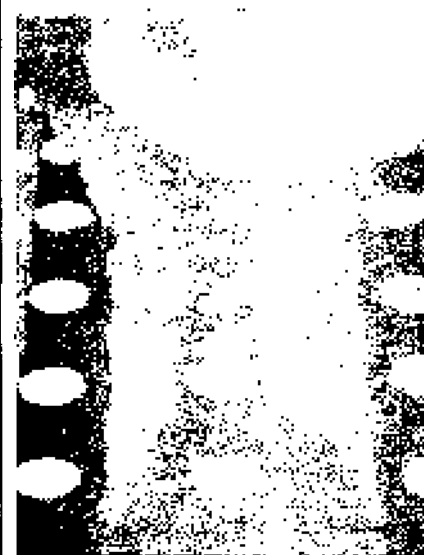
## OUTPUT

The main outputs are D3F or equivalent wired: Pin-1, Earth; Pin-3, Signal. The level is controlled by two master faders.

A stereo jack socket is provided for use with headphones.

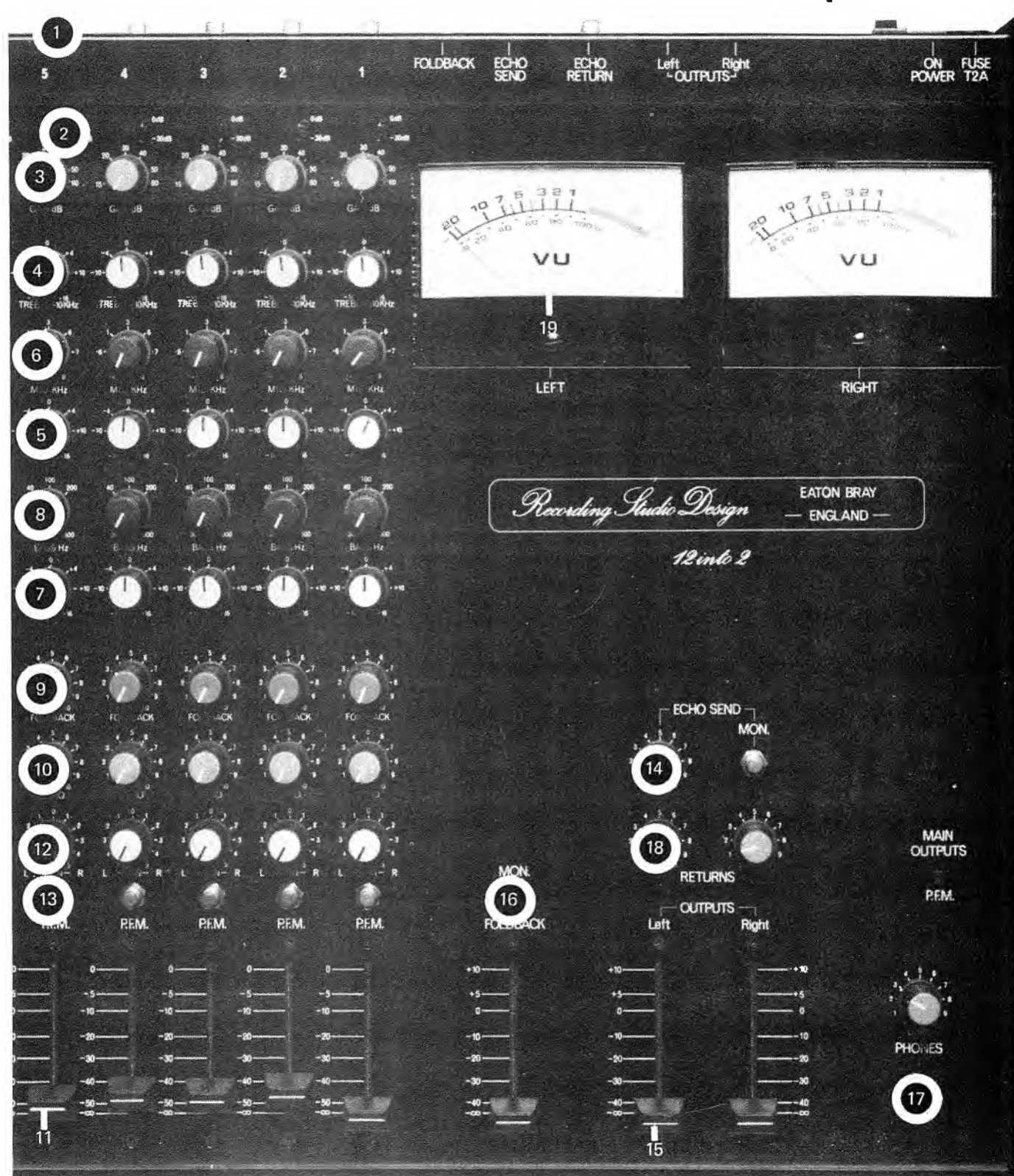
## FOLDBACK/MONITORING

Monitoring on individual channels has already been dealt with. The 12/2 also has a foldback send which provides a mono mix (controlled by its own level fader) for use with on-stage monitoring equipment. In addition there is a monitor



select switch which immediately selects headphones and meters either to the PFM system or to the main outputs pre-fade. This means that the levels can be read at the 'mixing point' and adjusted there to ensure balance and clarity in the final desk.

# CONTROL LAYOUT OF THE RSD 12/2 MIXER



1. Cannon input connectors
2. Input 'pad' switch reduced gain by 30dB.
3. Input gain control
4. Treble control provides 16dB of cut or boost at 10kHz
5. Mid-control provides 16dB cut or boost at any frequency between 400Hz and 8kHz
6. Mid frequency selector.
7. Bass control provides 16dB of cut or boost at any frequency between 30Hz and 300Hz
8. Bass frequency selector control
9. Foldback send for foldback volume control
10. Echo send providing a mono mix after fader to drive external echo or reverb device
11. Main level control fader for channel
12. Panpot allows the positioning of signal in stereo mix
13. Pre Fade Monitor button allows engineer to listen individually to any channel independent of over all mix. Also allows channel to be monitored on VU meters.
14. The echo send master control and the foldback master control Rotary control governs echo with a button for monitoring and slide fader governs foldback with button for monitoring.
15. Main output slide faders left and right.
16. Monitor select switch in simultaneously selects headphones and meters either to the PFM system or to the main outputs prefade.
17. Headphone output socket.
18. Echo return control's separate for left and right
19. VU meters calibrated to read 0VU = 0dBm



# EQUALISATION-HOW TO GET THE BEST OUT OF YOUR RSD 12/2

## CHANNEL EQUALISATION

Having achieved the general sound balance you want, the next step is to create the exact tone required from each channel. Tone equalisation can often add to the 'definition' of your music by skillful emphasis and panning techniques, separating tones of different frequencies and panning tones of the same frequency in different directions, when you wish them to be distinct. However to assess the total effect you must monitor the final (total) signal.

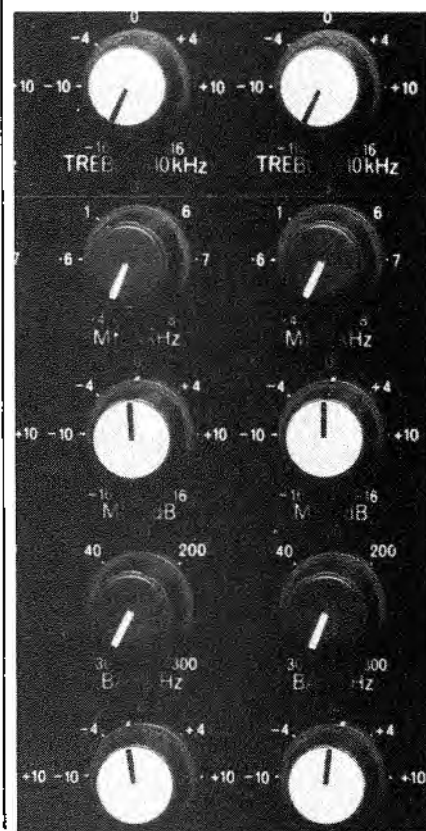
In the case of the 12/2, equalisation is the balancing achieved by the use of five tone controls, which accentuate or diminish selected frequencies throughout the range covered by the input signals, and thereby alter the final tone. Having parametric equaliser simply means a more even, overall control than can be achieved when controlling the signal at only two or three frequencies. Parametric equalisation offers the engineer the opportunity to cut or boost almost any frequency.

## THE FINAL SOUND

Having equalised the channels individually, mix the signals and listen to the sound as a whole. Probably the sound is not what you had hoped for, so, back to the mixing board, and make further adjustments on individual frequency controls until the balance is spot on. If all this is done at sound-check stage, however, it is as well to remember that further fine adjustments may need to be made when the audience are in their places, since the full hall will have different sound characteristics from an empty one.

## FEEDBACK

The RSD 12/2 can be used to counter feedback but adjusting the appropriate equalisation controls. Since feedback often occurs at only one frequency, there is an obvious advantage in a system that enables just that frequency to be cut, rather than the entire channel volume. Used correctly, such feedback control can result in an effective sound gain of several decibels (as much as 50%) although it should be born in mind that you are altering the overall tone to achieve this.



# RSD 12/2 TECHNICAL SPECIFICATIONS

### Inputs

Electronically balanced input  
Active gain control  
30dB input pad  
Max gain (Pad Out) +60dB  
Min gain (Pad In) -15dB  
Headroom 20dB  
Input Impedance - Greater than 6Kohms  
Equivalent Input Noise - Less than -122dBm typically -125dBm  
(Unweighted, 20kHz bandwidth, input loaded with 200ohms)

### Eq-

Treble  $\pm 16$ dB at 10kHz  
Mid  $\pm 16$ dB at 400Hz to 8kHz  
Bass  $\pm 16$ dB at 30Hz to 300Hz

### CH Sends

Foldback Prefade  
Echo Postfade  
Main Stereo Program via fader, pan pot  
PFM (Pre Fade Monitor) Button

### Outputs

Foldback Master, Gain 10dB  
Echo Master, gain 10dB  
Left & Right Master, gain 10dB  
Max Output +20dBm  
Overall frequency response, +0-2dB, 20Hz to 20kHz  
Residual Output Noise -70dBm  
(Unweighted, O/P Faders at 0, CH Faders down 20kHz Bandwidth  
Gain after output faders +10dB  
Hence maximum mixer gain (Eq Flat) +70dB  
Echo return gain +10dB  
V.U. Meters 0 VU = 0dBm  
Input Impedance 10Kohms  
Power supply regulated and protected  
110/120v or 220/240v AC; 20VA.

### Multicores

An optional multi-core cable with stage box easy connection of the RSD 12/2.

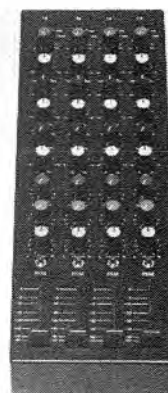
### Flight Cases

For road protection a specially designed flight case is available for the RSD 12/2.

### Expander Modules

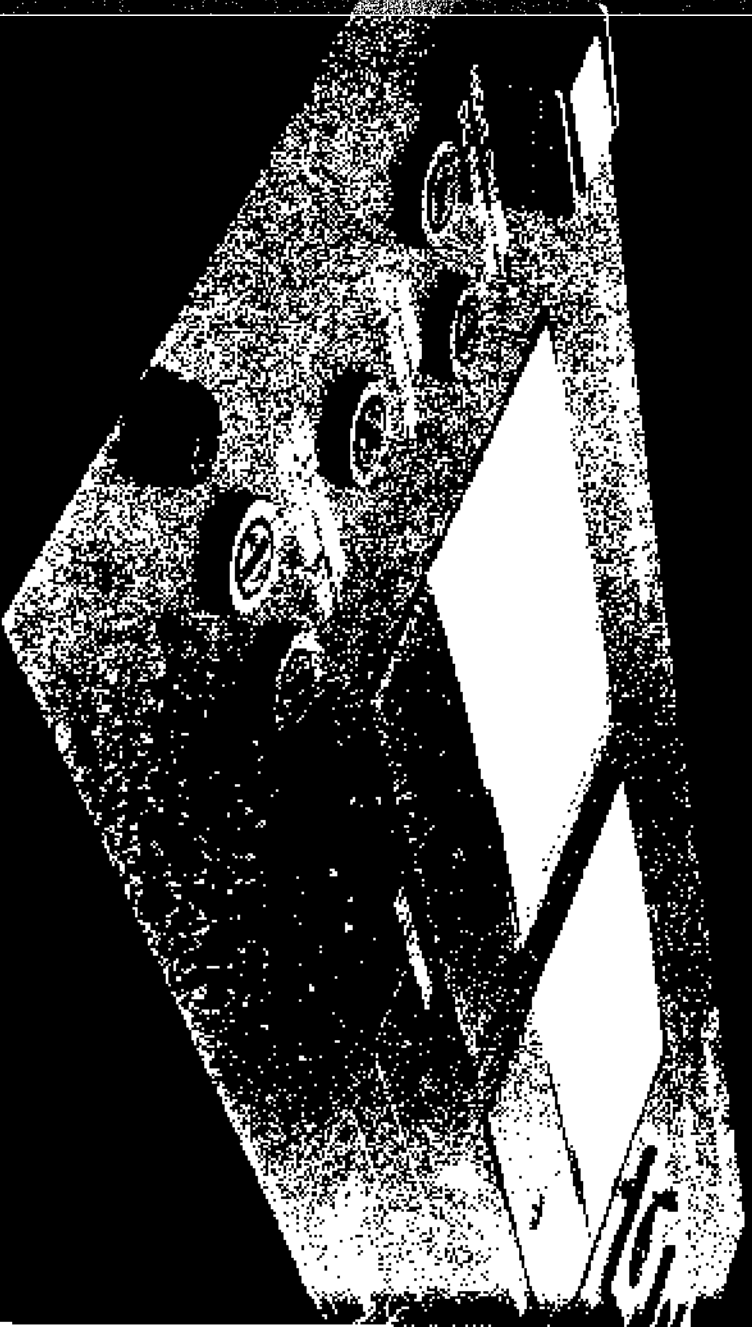
The RSD 12/2 mixer grows with your requirements and your budget. 'Add on' modules providing four input channels at a time are available and this means that your mixer is always ready to grow.

The 'bolt on' modules connect instantly into the existing mixer circuit with simple wiring connections.



*Recording Studio Design*

# THE RSD 800B POWER AMPLIFIER



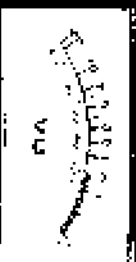
*Handley Audio Design*

*Handley Audio Design*

POWER

POWER  
DELIVERED TO  
LOAD IN

WATT  
AT 1000 Hz



LOAD POWER  
DELIVERED IN

WATT

WATT

*Handley Audio Design* 1000 Hz



# THE RSD 800B STEREO POWER AMPLIFIER

## ABOUT THE RSD 800B POWER AMP

The RSD 800B Stereo Power Amplifier is constructed to meet the most exacting standards of professional stage use. RSD sets out to make an instrument with main features of exceptionally high power combined with a signal-to-noise ratio and distortion level suitable for any application, and with a reliability which is always associated with RSD and Studio-master products. The end result is a power audio unit second to none. The panel layout is simple, dominated by two extra-large illuminated VU meters, and the casing is designed for compatibility with standard international rack mounting, for maximum convenience.

Measuring 19" x 12" x 7" this model is, like many great performers, unostentatious off stage: relatively light, convenient to handle, easy to transport. But just plug

everything in and touch that illuminated power switch, and you're in command of a sound capable of picking the auditorium up and shaking it. Or of putting the nuances of your music across in a way you have never known before. Like many possessors of real strength, the RSD 800b can also afford to be tender.

The Damping Factor is better than 500:1 at 20 Hz (Copy B)

## PROTECTION CIRCUITS

As long as stage equipment receives rough handling, and as long as the completely foolproof design has not been invented, protective circuits are vital to a power amplifier. RSD have built such circuits into all stages of the 800b. This includes full short circuit protection, a thermal sensing cut-out which protects the unit from overheating whatever the reason, and positive and negative 8 amp rail fuses on each channel. The mains input

is also fitted with 8 amp fuse protection and overall cooling is by a 250v boxer fan fitted at the rear.

The 800B is stable with all reactive loads.

## CONNECTIONS

The mains input is by European 3-pin connector with push-button illuminated on/off switch

The audio input is by Switchcraft D3F on each channel with a mono/stereo switch for paralleling inputs if desired.

The outputs are via two D3M sockets wired in parallel on each channel.

The peak catching, illuminated meters are equipped with a VU scale in the usual way.

The casing is finished in mar-resistant matt black enamel on the front panel, and with white and pale green silk screening elsewhere.

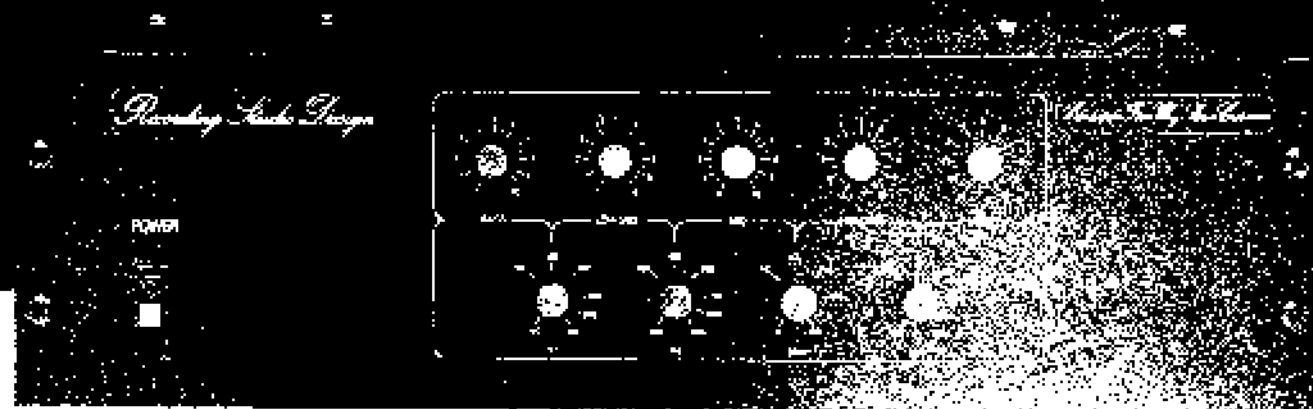
## TECHNICAL SPECIFICATIONS

RMS Power output per channel at 1kHz \_\_\_\_\_ greater than 120 watts into 16 ohms  
RMS Power output per channel at 1kHz \_\_\_\_\_ greater than 220 watts into 8 ohms  
RMS Power output per channel at 1kHz \_\_\_\_\_ greater than 340 watts into 4 ohms  
RMS Power output per channel at 1kHz \_\_\_\_\_ greater than 480 watts into 2 ohms  
THD at 1kHz at full power prior to clipping \_\_\_\_\_ better than < 0.25%  
Sensitivity \_\_\_\_\_ 1.25v RMS for 200 watts into 8 ohms  
Input impedance \_\_\_\_\_ 47k Ohms  
Frequency response \_\_\_\_\_ 5Hz to 30kHz  
Signal-to-Noise Ratio at DC-20kHz \_\_\_\_\_ better than 100dB below 200 watts into 8 ohms  
Damping factor \_\_\_\_\_ better than 500:1 at 20Hz

*Recording Studio Design*



# 3 AND 5 WAY RSD ELECTRONIC CROSSOVERS



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# THE STUDIOMASTER 400C POWER AMPLIFIER

## ABOUT THE STUDIOMASTER 400C

With the 400C, Studiomastr have designed a tough and reliable stereo power amplifier delivering 200 watts per channel into 4 ohms. It is intended for all P.A. applications in professional and semi-pro performances, and can be used either rack-mounted or free-standing. All connections are via XLR plugs.

### METERING

Two metering systems are offered as options on the 400C. Users may choose either VU meters or an 'LED' metering 'chain'. Fast attack and slow decay characteristics in both systems aids monitoring of peak signal levels.

## PROTECTION CIRCUITS

Studiomastr safety is second only to Studiomastr sound. Well aware of the kind of life most amplifiers lead with a small band, we have aimed to produce equipment which not only minimises the chances of a fault developing, but has circuitry which safeguards the amplifier and the users if anything should go wrong.

There are also instantaneous protection circuits which protect the output stages from short circuits and inappropriate load conditions. In the unlikely event of a fault occurring which produces a DC condition on the amplifier output, relay disconnects the speaker load from the amplifier after approximately 1 second. There is an 8 amp mains fuse, and also an

8 amp slow blow fuse on each DC rail.

The amp has an individual thermal cutout to remove power from the amplifier if that heatsink exceeds 100°C in temperature. These cutouts reset automatically when the temperature falls to a safe level. A yellow neon indicates when the thermal cutout is operating.

## CONNECTIONS

Connection is via a female XLR-type input connector wired (Pin-1, Earth, Pin-3, Signal). Two male XLR-type output connectors are wired in parallel for each channel (Pin-1, Earth, Pin-2, Signal).

## TECHNICAL SPECIFICATIONS

RMS Power Output Per Channel at 1kHz	greater than 112 watts into 8 Ohms
RMS Power Output Per Channel at 1kHz	greater than 200 watts into 4 Ohms
RMS Power Output Per Channel at 1kHz	greater than 300 watts into 2 Ohms
THD at 1kHz at full power prior to clipping	< .005% At 8 Ohms
THD at 1kHz at full power prior to clipping	< .007% At 4 Ohms
THD at 1kHz at full power prior to clipping	< .01% At 2 Ohms
Input Impedance	> 10K Ohms
Input Sensitivity	1.25 Volts RMS for Full Power into 8 Ohms
Frequency Response	+0 -3dB 5Hz to 30kHz
Signal to Noise Ratio	> 100dB Ref. Full Power into 8 Ohms
Slew Rate	> 15V/μS Into 8 Ohms
Fully Stable into	8 Ohms + 2μF

Recording Media Services, 2271 Kingston Road, Scarborough, Ontario, Canada.

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Exiebo Italiana, Via S. Frisi 22, 20052 Monza, Italy.

Music Noel, 56 Rue D'Anvers, Luxembourg.

Tal and Ton, Kungsgaten 5, 4119 Gothenburg, Sweden.

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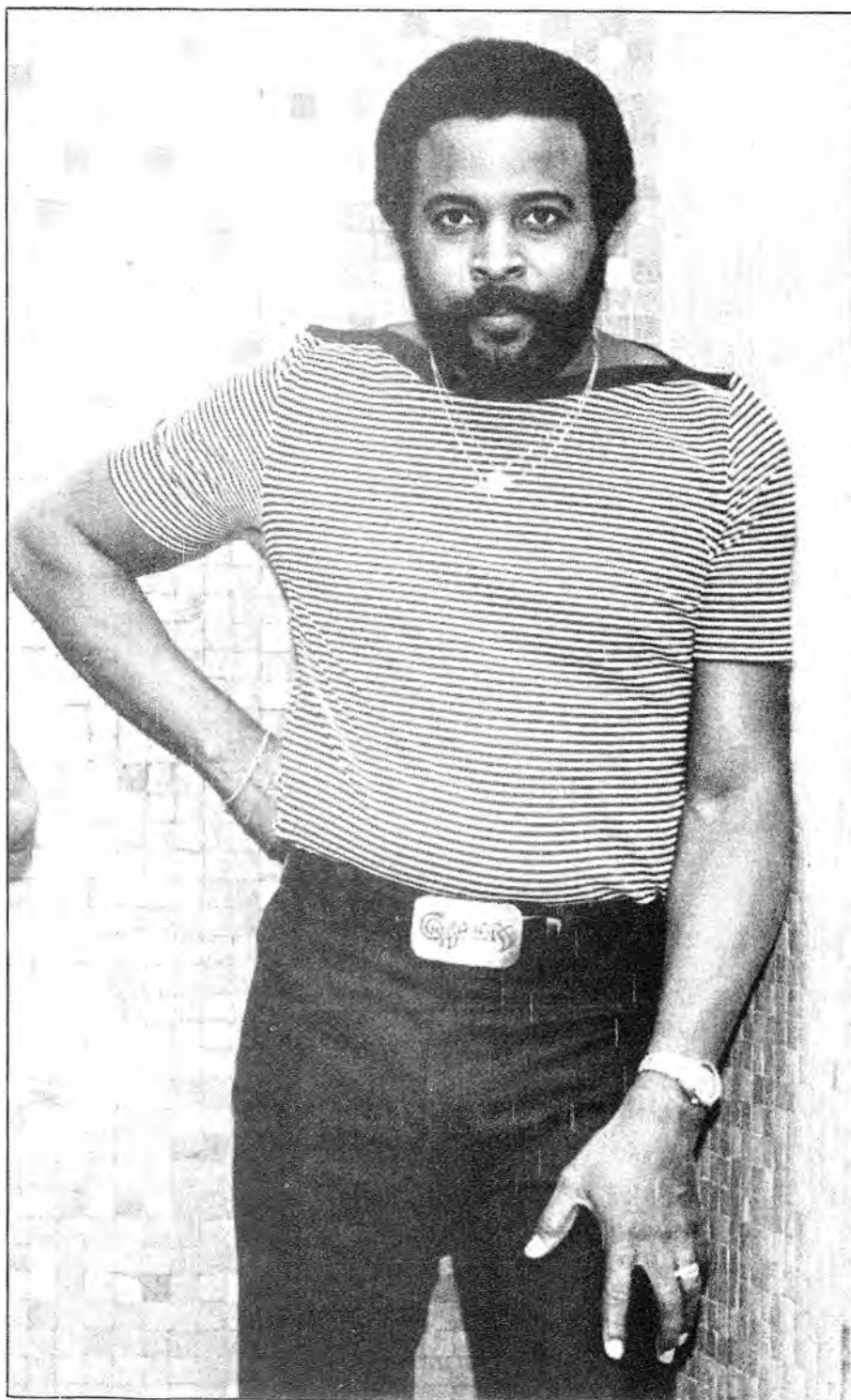
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# Life In The Stix

## 27 Years A Crusading Drummer



**T**wenty seven years may seem a long time for a band to wait for a hit single, but the Crusaders haven't exactly been standing idly by waiting for their first chart success. In fact, a smash hit single is really a bit of icing on the cake as far as Stix Hooper, Joe Sample and Wilton Felder are concerned.

This trio form one of the longest running partnerships in just about any kind of music, and their sudden commercial success is not without a touch of irony. For much of their career has been spent as an instrumental unit, yet it was the sole vocal track on their current album, *Streetlife*, which opened the door to the charts and elevated them from the well respected musicians circuit to Top of the Pops.

In addition to their work with the Crusaders, the three musicians who form the nucleus of the band have done a multitude of sessions over the years, and each has recorded solo albums. The latest of these solo projects is the work of drummer Stix Hooper.

Few people who put *Streetlife* into the charts will remember the early Crusaders, so many the bulk of their work remains a mystery. In what way is Crusaders' music now different from the stuff they were playing over a quarter of a century ago? According to Stix, it's all down to maturity.

"We have matured musically and every way else and I think the music reflects a lot of our experiences. It also reflects the flexibility of the guys in terms of being able to adapt and assimilate things throughout all the changes.

"The band always reflects a contemporary mode, but yet there's that personal identity within the structure of the Crusaders. It is interesting that this can happen. With the Crusaders being a nucleus of three people, even if it expanded to a full orchestra or we added a vocalist or whatever, we always have that sound there."

Mention of adding a vocalist begs the obvious question of why did an outfit who were noted as an instrumental group come to put a voice of their album? "Being basically an instrumental group, there's no instant communication in terms of vocalisation, which is a plus factor in an

international concept. But it's also not as descriptive as it can be.

"On the *Images* album the titles themselves were representative of what you expect to hear. If you listen to a carousel it doesn't matter whether you're in Munich, Tokyo, Bristol or Brighton, it's always the same — threequarter time with horses. We try to depict that musically and we were able to do it on the *Images* album.

"We came up with a concept which was later to become *Streetlife* for our next album and we wanted to express it even further so we thought, 'why not have a lyric?' It was just a little expansion of our music and for no other reason. Even in the music you can only say so much and then you leave it to the person's imagination, but when you've got a lyric you can hit them right there and we thought it would be a nice place to hit.

"Once the song was written we thought about who would be the best person to perform it. We had known Randy Crawford for years and she had been the opening act for us about eight years ago. We had watched her career from afar and when we came up with the song we said, 'that's it' and that's all it was."

In many ways the current success of the Crusaders is a fulfilment of the ideals of the band at their inception, ie acceptance of creative music on a mass level. The original name of the band was the Jazz Crusaders, which signified their intention to break new ground and destroy some of the long held pre-conceptions about jazz.

The very fact that a group of highly respected musicians had come together and were willing to submerge their individual identities and channel all their energies into a group was something different according to Stix. "We wanted a name that represented an entity rather than say Stix Hooper and his group or Joe Sample and his band. We were the group who opened the door in this area.

"One of the crusades we wanted to bring forth was that music could blossom a lot more if each person's contributing factor was on a level par. We also wanted to break down a lot of barriers that were associated with jazz in terms of stereotypes. We also thought that jazz should



not only be accepted on a mass level, but heard on a mass level. It should be programmed and marketed on a mass level.

"It was just a matter of us expanding our group concept in terms of convincing the people in the recording industry, convincing the programmers, convincing the people who had to do the marketing, and so we were very much on a crusade regarding that. I think we wanted to try and create an image for jazz that represented taste, quality and a certain amount of sincerity and honesty aside from the obvious craftsmanship and proficiency that most jazz musicians have always shown. However, because of the things associated with the music it was always put, not only in a certain category, but also a certain setting. It was performed in a local bar and we thought it should be concert music."

Stix admits that their ideas came up against a lot of prejudices, particularly in the jazz establishment. This showed itself from their inception because of the roots of the individual members and the hybrid form of jazz they were playing which did not fall into the main criteria established by certain critics, musicians and fans in

general.

He explained the problem by saying that when they played they improvised and had spontaneity but always the individuality of the group members and their roots would surface. Roots that include R&B, gospel, Country and Western and blues. Either consciously or sub-consciously, the band would always reflect these influences, which would cause the purists to throw up their hands in horror.

"We would have maybe 50 or 60 per cent of the elements that would be in anybody's definition of jazz, but the other 40 per cent would always surface and probably turn off the critic or the guy that's listening. So we did have attitudes which were a little bit diverse. Eventually the problems became much more than the personal problems within the structure of the group, it became the problem of being the Jazz Crusaders. It meant too many things to too many different people."

This diversity could encompass the Dixieland jazz of New Orleans, the "cocktail" jazz of Europe or the New York scene of people like Bobby Short. In America there was the controversy between East and West coast, big man versus small root jazz, hot jazz versus cool jazz and the whole thing, according to Stix, became crazy. Still, the Crusaders managed to carve out their own personal niche in this vast scene.

Probably the biggest prejudice to overcome was the theory that to be a good jazz musician you had to be broke.

"Any material or popular success meant that you had sold out or there was a certain amount of prostitution or insincerity, which was, and is, ridiculous.

"There was one example of a well known critic who had endorsed the late Cannonball Adderley. He had given him all kinds of accolades to show that he represented the epitome of jazz in all areas. However, when he attained some commercial success, not only did he put him down, but even when he changed his approach to music — which is the very essence of jazz to be creative — that was put down, too.

"So we had all those problems and we're having them even now, but there's total sincerity and honesty in everything



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# Life In The Stix

## 27 Years A Crusading Drummer

we do. A sincerity and honesty evident even in *Streetlife*, which has been our most successful album. We incorporated a singer creatively, not because we wanted only commercial success."

Stix emphasised that *Streetlife* was not a conscious effort to cash in on the disco market, and that the structure of the song is totally different to the usual concepts of disco. He explained that it is written almost in Forties style which is almost roboto or out of tempo and has a structured melody with a bridge and a release.

"Not only is it different in song form, but also the rhythmic concept." He added, "I'm not playing four to the bass drum all the time, I'm varying the feeling and the mood. It became successful and people called it disco because disco and dance music are synonymous. So people found they could dance to it, they appreciated not only the pulsation, but they appreciated the variety and dynamics. It was a breath of fresh air not to have pounding drums, there were places where they could be a little freer."

Talk of pounding drums leads to Mr. Hooper's particular role within the band. He began playing drums in a school band and learned to read music at junior high school. From this he developed an appreciation of the classics, and studied all he could about percussion. It was while he was still at college that he began to put together the Crusaders.

On the *Streetlife* album, Stix gives a particular credit to Pearl drums, and he reckons they are the best in the world: "They serve the purpose for me in terms of clarity of sound and purity of sound. They have not only enabled me to be experimental, but also expressive in the way I want to be. On the solo album I'm now being an innovator in the sense that I'm changing the role of the drums, I'm getting into the drums more melodically. I'm going to take the drums to another plane with the help of Pearl. They've been able to design instruments so that the true pitch quality relates to normal vibrations. I'll be going to the factory when I go to Japan to discuss things with them."

Regarding his current kit, Stix says it's probably: "the largest kit in captivity."

He plays a 24 inch bass drum, 16 and



22 inch floor toms and 14 and 10 inch mounted rack toms with a 12 inch on the bass drum to form a pyramid. He has eight tunable octave rack toms going from a low D flat, and a specially made 14 inch wooden snare. His array of cymbals include a 22 inch Chinese with rivets, a 20 inch A. Zildjian with rivets, a 22 inch heavy duty ride, a flat medium thin Paiste, a K. Zildjian 10 inch splash and a 24 inch gong. Synthesized drums interest Stix, and he is working with Robert Moog's company to develop a drum which will give the acoustic sound of the drum as opposed to a synthesized drum that's just purely a sound. "Just to more or less amplify the acoustic sound of the instrument, then if you want to you can add something like a little echo. Right now with synthesized drums you get an attack and that's it."

Being in the business for so many years, the Crusaders have experienced it's many facets and many pitfalls. One is having their music presented in the way they want to. This has led to the formation of their own production company, which, in addition to the Crusaders' projects and those of it's individual members,

encompasses BB King and Randy Crawford.

Says Stix: "We like producing because it keeps you abreast of what's going on musically. Also the Crusaders have always wanted to maintain a grasp of everything. It's great when you go to college and learn your instrument and become a proficient craftsman but then there are other things you need to know about, like how to produce the best sound from your instrument. So when you get into production it's good to know what's the best microphone to use on the drums, things like that."

"Production gets you out of the role of just being a musician. There's nothing wrong with being a musician, but it's nice to know when the Crusaders write a song, we know the best way to record the song, the best way to use it, who's the best engineer, the best studio, etc and when the song is out the best way to market it. I think it's great for a musician to expand his horizon. I mean a guy can write the best work there is but not know the best way to record it. This is why we like every aspect of production."

So after a hit album and a hit single, will the Crusaders be tempted to repeat their successful formula?

"People ask us will we be using Randy Crawford on our next album. Who knows? I mean the next time we might use the London Philharmonic, it's just a matter of us deciding what we want to say and how we want to express it. Our music has an immediacy, and the three of us get bored so easily it's ridiculous. I think that's why the Crusaders have maintained a contemporary aura about themselves. The minute someone says to me, 'Oh I'm comfortable, oh boy I've got it,' then before your know it you're cramping your style. You have to continually change."

"Trying to maintain a certain style has been one of the declines of jazz. A lot of guys closed the door at Be Bop and it's crazy. That's why we didn't take that attitude and why I can feel happy about what's going on with the Crusaders instead of playing in a bar with a glass of beer."

"I feel a lot of integrity in what we've done, nothing has been a cop out."

David Lawrenson

# chappell

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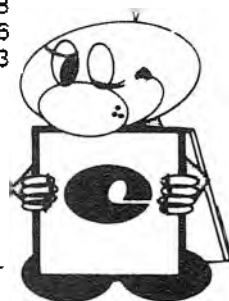
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# In Brief

## Electro-Harmonix Rhythm Box around £65 inc. VAT

This new addition to the ever-growing Electro-Harmonix range must be the most compact pre-set rhythm box yet produced. It weighs a few ounces, and measures only 6" by 4", and less than 1" deep!

As its name implies, it offers 12 pre-set drum patterns, including the usual waltz, tango, three rock rhythms, two swing and three latin. The other two patterns are relative new-comers to rhythm boxes — reggae and disco. The reggae rhythm is an interesting addition but in playing along to it, it didn't quite approximate the beat one normally defines as reggae. Similarly, the disco pattern is a simple 4/4 decorated by pushing accents at the end of each second bar, which again, might not be everybody's idea of a 'disco' rhythm. Nevertheless this beat was found to provide a pretty punchy backing to a variety of numbers. Each rhythm is set on a numbered 12-point pot switch on the left of the fascia panel, and the corresponding index of rhythms is printed above the switch. Unfortunately the pot switching means that, unlike some push-button boxes, rhythms cannot be superimposed. However the positions have been arranged with complimentary rhythms alongside each other, which means that in home recording, patterns can be switched without losing any beats. Each rhythm can of course be altered in volume and tempo by two further pot switches (without pre-set positions) on the right of the fascia.

A very welcome feature is the touch-sensitive stop-start button, operated like a typewriter key, which triggers or ends the rhythm immediately upon touch. The value of this is that upon each touch, the pattern always begins on the first beat of the bar. A socket is also provided for a similar foot switch to start and stop the unit.

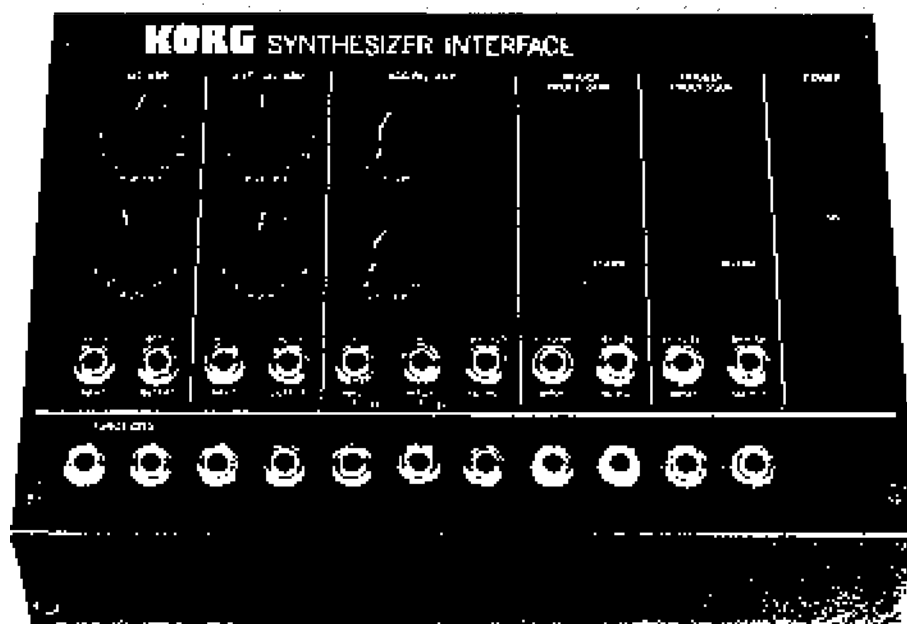
Speaker output is via a standard jack-plug, but the unit is powered from a small jack-plug on the side of the unit. The box comes equipped with a small jack lead into a 2 pin type plug which must usually therefore be inserted into an electric shaver-type adaptor. When the unit was tried out, this arrangement sometimes caused earth-loop hum.

There are probably two main uses for such products: home recording or accompanying solo instruments. For recording, the variety of rhythms, and the touch start-stop proved definite advantages, though it was sometimes

difficult to record at as high a level as one might have wished. As for accompanying other instruments, there were no problems. The patterns are quickly selected, and the compactness of the Rhythm 12 will make it attractive to those who use these effects on gigs. The unit worked well through other effects pedals,

particularly flanging and phasing, although the additional use of a noise-gate is recommended. Whatever your use of a rhythm box, the Rhythm 12 is highly practical, and at a probable retail price of around £65, it represents excellent value.

Stanley Shaw



## Korg MS-O2 Synthesizer Interface £120 inc. VAT

This comprehensive little mains powered unit is presented in a matt black metal sloping box with five interface sections and three linked sets of standard jack sockets for patching purposes. It is one of the first synthesizer interface systems to appear on the British market and fills an important gap in synth technology — linking one synth to another.

Korg have recently brought out a new range of products which stretch into the field of sequencer and microprocessor control, and obviously found the need for this type of interface unit.

For musicians wishing to play other synthesizers from one main synthesizer, this interface will overcome most of the problems encountered. Normally, a suitable control voltage is needed to drive the other synthesizers' VCOs and a trigger pulse is also required to switch on the EGs driving the VCFs and VCAs. This is usually quite straightforward when using two or more synths of the same make because they would use the same type of

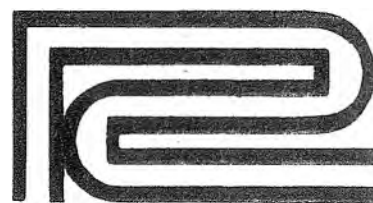
control for their range of instruments.

Among presently available synthesizers, there are two main types of control voltage systems for use with VCOs and other voltage controlled devices and also two types of trigger systems for the EGs. One of these is used by Korg and Yamaha and is termed the Hertz/Volt System, where the VCO oscillator frequency is proportional to the control voltage. The other is employed by most other synthesizer manufacturers and is the Octave/Volt System, in which the oscillator frequency changes one octave for every one volt change in the control voltage. Trigger control generally works from a 'pulse to ground' or between specified voltage levels, the latter being harder to match in practice.

Provided your synthesizers are equipped with the conventional input and output jacks for control voltage and trigger or gate signals, you can use this interface for accurate signal processing. Facilities allow conversion from Hz/V to Oct/V and vice versa. An adding amp boosts voltages for frequency matching when used with VCOs and will take voltages from a foot-pedal, joystick, or 'DC battery plus potentiometer arrangement' for pitch-bend and modulation effects. Two trigger matching sections are given with flashing LED indicators and an array of jack sockets internally linked into three groups allow several machines to be controlled from one voltage source.

Mike Beecher





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# Introducing

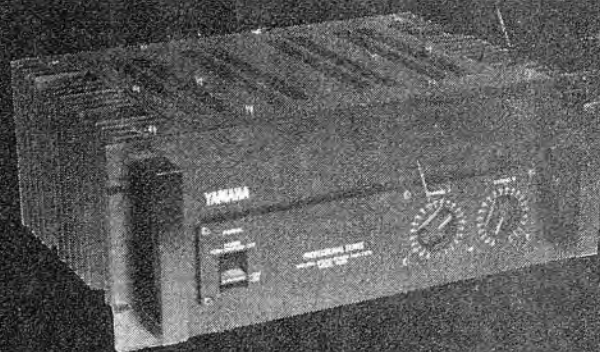


# THE YAMAHA FAMILY



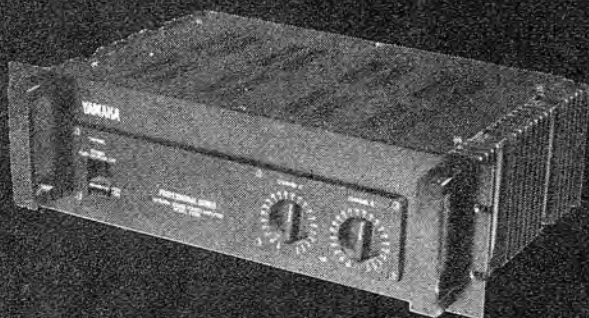
## P2200

Output power  
Average sine wave power output at clipping both channels driven.  
285w into 8ohms. 400w into 4ohms.  
Power limiting operates 630w into 2½ohms.  
Slew rate 45 volts per micro second.  
The P2200 has peak reading meters which display a full 50db of output level with a rise time of 10 milli seconds and a release time of less than 0.8secs.



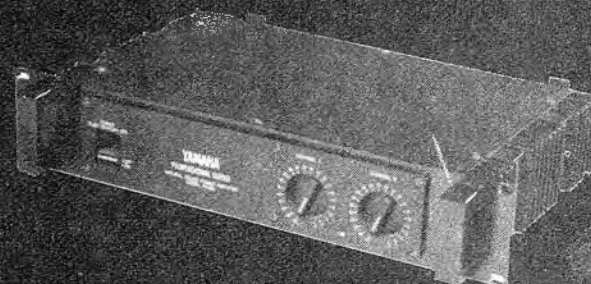
## P2201

Same specification as P2200.  
350w into 4 ohms with less than 0.05% t.h.d.  
Both channels driven over a band width of 20 h.z. to 20 k.h.z.



## P2100

Average sine wave power output at clipping both channels driven. 110w into 8ohms and 150w into 4ohms. T.h.d. less than 0.02% over a band width of 20 h.z. to 20 k.h.z. Both channels driven.



## P2050

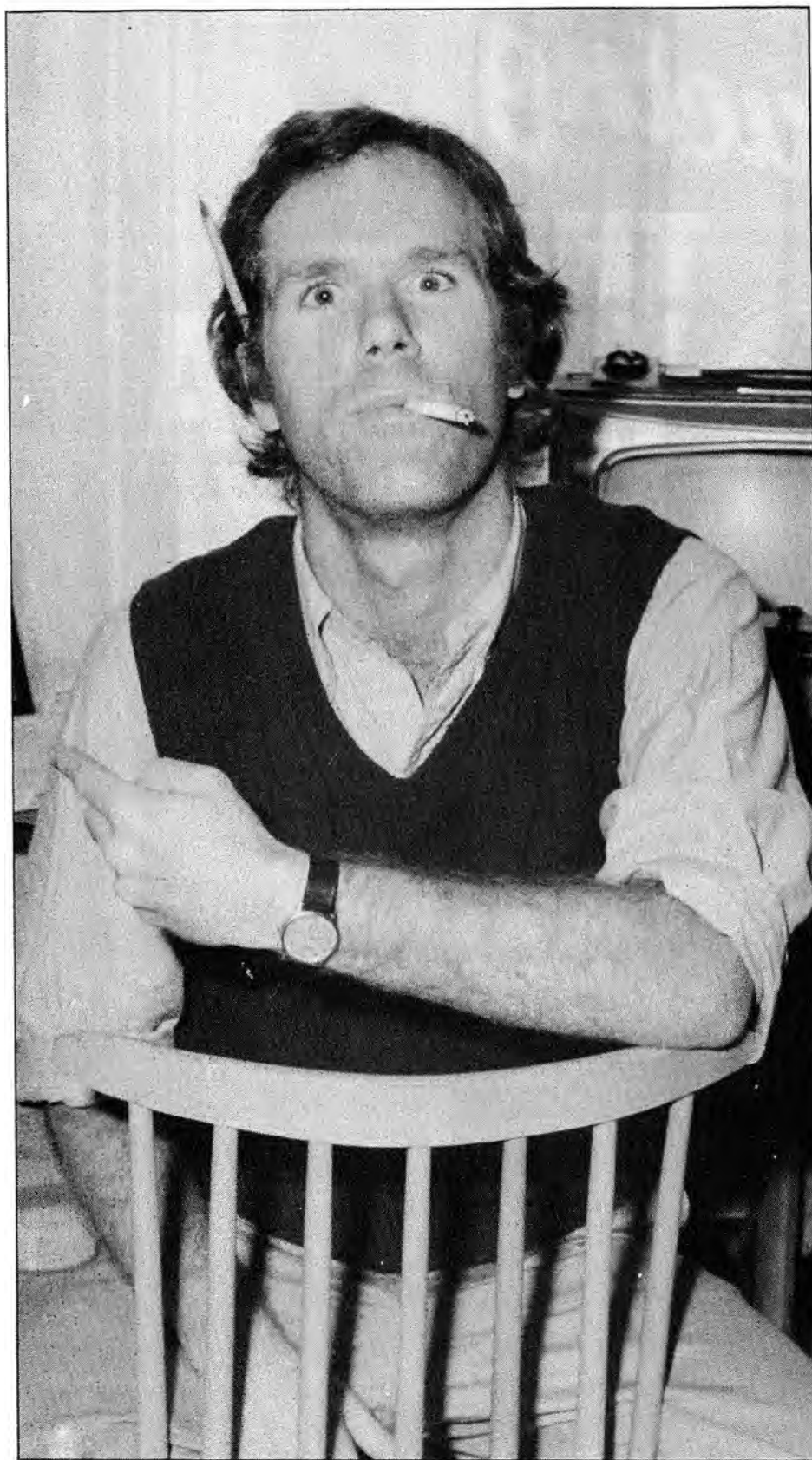
Average sine wave power output at clipping both channels driven 45w into 8ohms and 60w into 4ohms.

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# Loudon Wainwright—

## And Being A Singer-Songwriter In 1979

About a decade ago, when the summers were longer and hotter than they are now, the emergence of a new singer-songwriter was like the emergence of a New Voice, and Loudon Wainwright III tall, lank, bearded, folksinging satirist from North Carolina, was celebrated appropriately.

Today, the beard is gone, but Loudon is still the self-accompanied troubadour who takes the stage with isolation as his principal prop and wrings his songs from a merciless wit, an untrammelled imagination and an unfailing perception. And he still packs his concert halls with audiences who are captive to his characteristic vision of contemporary urban life. I caught him at the beginning of a British tour (the first venues were already booked solid) and asked about his songs, his unique stage act, and the way he sees his work and his career.

"You see," he muses... "I never really thought I'd do this for a profession." He considers rather carefully. At an interview, his peculiar brand of humour is filtered through a certain diffidence. "I started guitar at 14 with folksongs and stuff like that, but at that time I wanted to be an actor... went to drama college for a year and a half, and then dropped out and about 1966-7 was travelling round the USA..."

It was a nice time to be doing that. After a period when he did very little musically, Loudon visited a friend who had a guitar, played around with it for a day or so, and ended up with his first song. "...not a very good song... but good enough so that, well, I got interested, began to play around bars and folk clubs in Boston and New York, and quite rapidly, in fact, I started to make a living at it. Then in 1970 I met the guy who was to become my manager, someone from Atlantic records came to see me at the Gaslight, and as a result I got to make the first two albums..."

Easy. And very impressive albums they were too — yet Loudon has been described as 'despising' recording and certainly not all his records have met with the unbridled success of his live performances. What is his attitude to the studio?

"Well with the first record I was so freaked out that I did, in fact, despise it — it made me nervous and uncomfortable, in fact it still makes me nervous and uncomfortable. I just don't feel very comfortable in a recording studio.

"But I'd like to produce good records, now. My records have never sold very well and haven't been particularly well received by the critics — so that leaves a kind of void in my life I'd like to fill."

"You see, a record is a complete mystery to me and it's also a traumatic thing. I don't know — I think there's some good stuff on some of them..." But he feels satisfied with individual tracks rather than with any production as a whole. So what's the solution to bringing over on record a style of playing that's highly dramatic, geared strongly towards gaining a rapport with your audience, and to a certain extent spontaneous? Do you just hand over production to someone who



likes your stuff, and play away to yourself in an attempt to forget where you are?

"I've done that, and I've also done the opposite and produced my own record completely but...neither is a complete solution. I feel good about some things, and other things make me wince. I think the complete solution is probably not to listen to my own records..."

Out of a hundred or so songs written by Loudon Wainwright III, some 70 have been recorded. He has his own favourites. "Some songs I don't do any more, others, like 'Schooldays', still seem to be relevant." Nevertheless, most of his gigs reach the stage (you can hear it on his live LP) when the audience sets up a shouting match of requests. "The problem is, for some of the older ones I not only feel uncomfortable doing them, but I don't know the words..."

A pause. I am constrained (because journalists are) to ask a question to which I know beforehand there is no satisfactory answer. How do his songs get written?

"I just walk around and see things and things happen to me that I think about...there's no way I know how it's done. I'm a great believer in things like the spiritual or the Muse — when a song comes it almost comes *through* you as opposed to being created by you...a lot of strange things can inspire you to write songs..." He grins. Dead skunks, suicide, swimming, cigarette smoking, being 'in hate', alcoholism, bees, vampires, hanky panky in the gym, marriage guidance, loneliness, breastfeeding...he might well grin. "Of course, they're frequently based on genuine episodes only I certainly employ a lot of exaggeration...reality is not enough."

Where he fits into the songwriting fraternity is uncertain — somewhere in between Tom Lehrer and Woody Guthrie, probably. He himself acknowledges a certain similarity of approach and attitude to Woody Allen — both portray the same exaggeratedly morbid, uncertain, hypochondriacally suggestible personas, and use them to produce irresistible humour.

Wainwright, however, has a self-avowed predilection for shocking people. What is his reaction to the imprecations of bad taste his material sometimes attracts?

"Well, personally I find, for instance, Helen Reddy is bad taste...insulting and tasteless. I find a lot of disco in bad taste — I'm not a person who doesn't like disco, for instance I like the Bee Gees, but my point is that it really depends on your personal taste. People are offended by some of my songs, like, I've actually received letters from religious organisations, and so on, but really, taste is in the tongue of the taster."

"Partly, it's just comedy. People come up to me and say, 'you're singing these songs about quite serious things...broken romance, suicide, alcoholism, really quite serious, and not only are people *laughing* at it but you seem to be actually *encouraging* them to.' And I say yeah, I know, I can't help myself..."

"Of course, sometimes, I think the laugh is rather, a *nervous* laugh, and that's okay, that's fine. I still think a lot of the songs are basically serious, if

anything's that serious, but you know, there aren't a lot of serious things."

Matching his characteristic song writing, Loudon has a characteristic vocal style and a characteristic guitar technique. Concerning both, he notes that he has never had a music lesson of any kind. Vocally, he feels he's been influenced by "a lot of good singers...I'm not only the Woody Allen of Rock but someone once described me in a review as being like the male Melanie. I hadn't seen that one myself, I thought it was great, except it's a rather depressing thought being both of those people."

As for his guitar playing, what does he think of George Gershwin's description of it as 'string percussion'? "I use it very simply — I think George is right in as much as my guitar technique is not particularly advanced, but highly evolved as accompaniment — which is as valid a direction to progress in as any."

"Well it's very simple and just basically strumming — I sing in about three different keys and that's about it — it's certainly not complicated. The guy who most impressed me was Rambling Jack Eliot; you know, he does Woody Guthrie songs and has a really rhythmic righthand, kind of bashing as opposed to intricate melody lines — I've never really been interested in broadening my horizons as a guitar player..."

"It's simple yeah, and also I...always feel I'll bang my guitar to death, it's kind of riddled with holes and...scratches and chips and so on..." He paused, as if reminiscing half-humourously on the stage Wainwright "Yeah, I hit it a lot — it's kind of a moving sound, hitting the guitar sort of style as opposed to just standing still singing..."

Bearing 'The Red Guitar' in mind, the little song in which Loudon himself added the Pete Townshend of Folk to his growing list of sobriquets, one might be excused for wondering what sort of a lifespan his instruments have.

"The Red Guitar? Oh, that was the one guitar that died prematurely — I usually have a lot of respect for guitars — I don't destroy them. I have several guitars that I've more or less retired, because they do take a certain amount of beating..."

He doesn't account himself a collector of guitars although he greatly prizes a 1930's D Angelico arch-top — one of the models he's 'retired'. He now uses the Martin D-21 ('quite a good guitar'). The Red Guitar, dead, but immortalised in song, was a Gibson Hummingbird, while the Blond Guitar which briefly succeeded it was an Epiphone. Did he ever get it back?

"No — some junkie broke in...sold it for some heroin...I'm sure it was a junkie." He doesn't say why he's sure. Probably, like many people with a lot of imagination, he pictures the situation so vividly as to be all the evidence he needs.

To most of Loudon's British admirers, and he agrees he has a considerable following here, he's strictly a solo artist. But that's only partly from choice. Like a lot of performers he was daunted by the business aspects of touring with a backing group.

"I did set up a band. I played last year

with one for a while, but it got to the point of being too expensive and there were a lot of other problems so I disbanded...the band." He chuckles approval at the idea of disbanding a band.

"I was very pleased with the way it was moving along musically though. It made a totally different act — what would happen was that the band who were like a separate entity unto themselves would do the support, and then I'd come on and play for 40 minutes, and then we'd both join up at the end. And it was great — I'd just put the guitar down and do like lead singer stuff, which from a physical point of view gave me the whole of the upper half of my body as well as the lower half — so I was like running around and it was fun."

"Actually, it needed a bit longer to get really together, really interesting — but we were paying out ten thousand dollars a week...rock'n'roll is an expensive proposition..."

Forming a band is not the only direction in which Loudon Wainwright III has temporarily extended his interests. Over the last 10 years he's also done a certain amount of acting (the attention paid to his M.A.S.H. appearances he regards as disproportionate, but suffice it to say his drama training has not been wasted). Does he intend to develop this side further, in the immediate future?

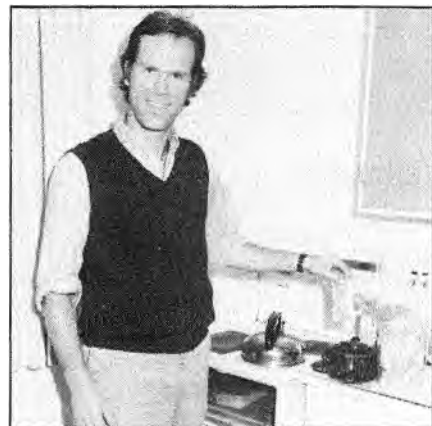
"I think I'm at the point where I'm beginning to hopefully branch out...I'd call myself a kind of semi-success at the moment, I have a respectably good following for which I'm very grateful but being the kind of egomaniacal, selfish, power-hungry, mad person that I am I want more, more, MORE..." Quite suddenly he's metamorphosed into his dervish-like on-stage self. "Next I want Wembley, you know, I want the WORLD..."

He relents a little "Well, maybe I don't want Wembley, but I don't think you're ever really satisfied. I like being on the road, but I'm definitely interested in other stuff so if anybody's reading this..." (He leans abruptly toward the microphone)... "Woody, if you want a song for your new movie..."

As for the next album "Yeah — if I can find the right producer and the right musicians, I'm writing all the time and getting some good new songs, so maybe in the spring..."

And I'm sure many of those who have heard the material from his recent tour will be looking forward to it.

Paul Ashford



Pictures by Matthew Taylor

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Calrec design and manufacture microphones that provide the valuable 'ears' for your professional recordings.

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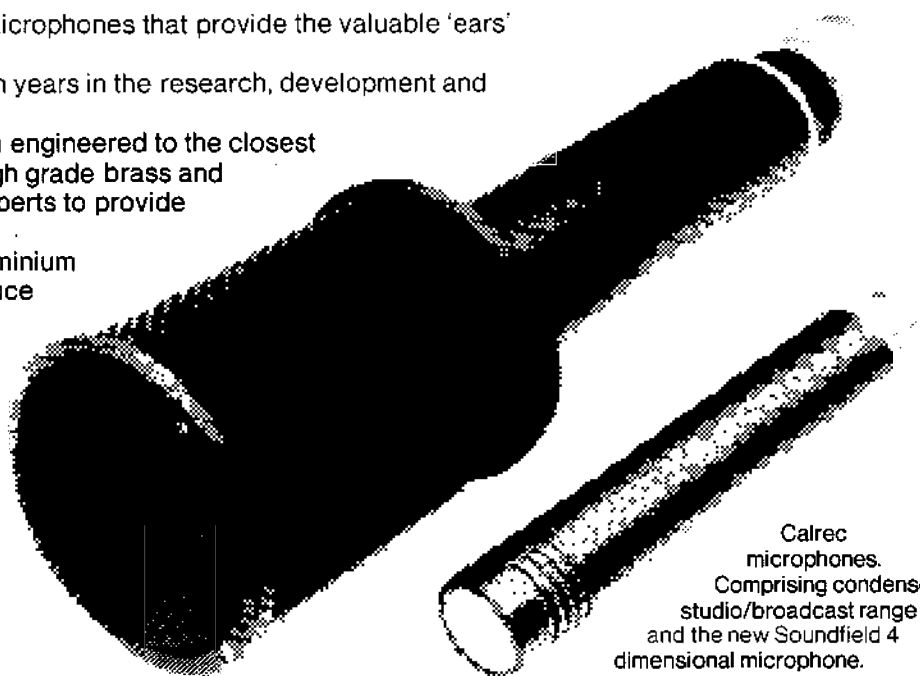
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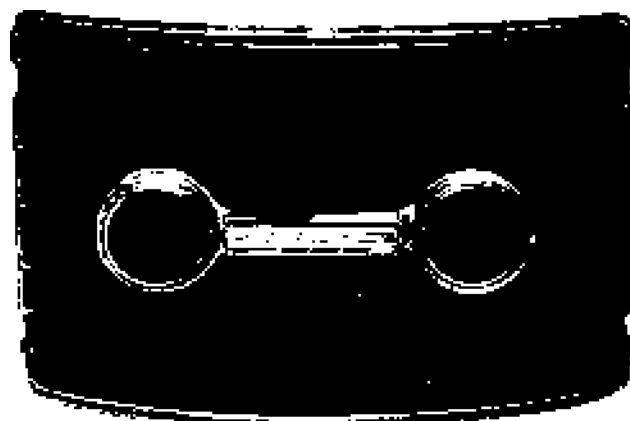
**QUESTION:** WHAT DO EACH OF THESE MEN HAVE IN COMMON?

DALE ANDERSON (Hollywood)	JOHN HARTMAN (with The Doobie Brothers)	JOHN BALDWIN (Boise St. University)	JOEL LEACH (Univ. of Ca-Northridge)
MARK BARNETT (Las Vegas)	FARREL MORRIS (Nashville)	LOUIE BELLSON (International Drummer)	GORDON PETERS (Chicago Symphony)
TONY CIRONE (San Francisco Symphony)	ARTHUR PRESS (Boston Symphony)	IRV COTTLER (with Frank Sinatra)	EMIL RICHARDS (Hollywood)
TOM DAVIS (Univ. of Iowa)	GORDON STOUT (Concert Marimbist)	VIC FELDMAN (Hollywood)	GAR WHALEY (Author, Teacher)

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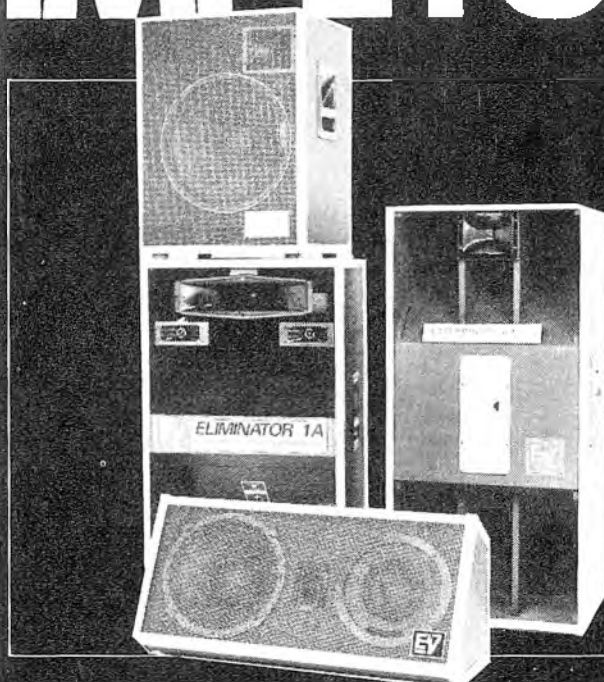


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# ELIMINATOR

**NO1** **Winter '79-80**

## EV GETS FRESH IMPETUS IN U.K.



**The world-famous range of Electro-Voice loudspeakers, microphones and accessories is about to get a marketing boost in the UK market.**

British musicians have favoured the fabulous "Eliminator" range of loudspeaker enclosures for many years and international stars as diverse as Status Quo and Boney M have trusted them for reliability and accuracy of reproduction. The present range of Eliminator loudspeaker enclosures (see inside) offers a cabinet for every purpose. Increased Eliminator production means British musicians now have the chance to see and try the Eliminators at their local Electro-Voice dealer.

Electro-Voice are as famous for their microphones as for their speaker enclosures. The PL range of mikes is considered to be one of the toughest in the world and there is a mike in the range for almost every stage application.

The "driver units" manufactured by Electro-Voice — both the chassis speakers and compression drivers — enjoy a superb reputation among musicians and recording studios. The chassis speakers are particularly popular units with musicians who want to improve the performance of their back line amps, or PA enclosures. Studios all over the world rely on Electro-Voice loudspeakers for their ability to stand high sound pressure levels hour after hour, day after day.

Increased Electro-Voice production — both in European headquarters in Nidau, Switzerland and in the USA plant — will mean that British musicians will at last be able to see try and play all the Electro-Voice products they can handle within the next few months!

## TAPCO Expands After EV Aquisition

Tapco was considered to be one of the world's most exciting music electronic ranges even before it became part of the Electro-Voice stable.

Since the Gulton acquisition at the end of 1978 the experienced marketing resources of Electro-Voice have been placed at Tapco's disposal and the result is better international distribution and marketing of the new Tapco range of mixers and related products designed especially for the working musician.

The existing structure of EV internationally was perfect for the handling of the Tapco range. Despite producing loudspeakers, enclosures, microphones and accessories of the highest quality, EV did not produce a range of mixers and obviously there was a place for such a high quality range as Tapco. The "small" mixers (six channel) as well as the conventional 12 channel desks are superbly engineered both technically and ergonomically.

Tapco and E-V have mutually reinforced their hard won reputations.





# Get LIVE With



**PL91 Dynamic**  
*Cardioid Microphone*

The performer's choice — a well-tried E.V. Microphone whose design has been up-dated to keep up with trends and technical developments. Born out of an in-depth understanding of the performer's needs, the PL91 offers powerful bass boost when held close, super highs, and an overall 'open' sound that makes it a joy to work with. Features high output (-57dB), locking on-off switch, and tough casing with exclusive Memraflex steel grill to stand up to a hard life on the road. And with all this — surprisingly modest in price!



**PL11 Dynamic Microphone**

'The dual-purpose Dynamic' — a Continuously Variable-D directional microphone built to a patented E-V design as an instrumental mike that can double as a vocal mike. The Variable-D system eliminates boost to bass frequencies in close-up use, giving a crisp, clear sound at all times. The PL11 is the natural choice for vocalists who favour a high-intelligibility sound, for sound engineers who need the excellent pick-up of brass and overhead percussion, and for groups who want a unit that picks up 'off mike' instruments with the same fidelity as 'on mike' ones.

Lo-Z. system with -56dB output

# PL Mikes By



**PL95 Dynamic  
Cardioid Microphone**

The concert mike — a high-low profile, total instrument & vocal special — a wide and two-piece construction gives an exceptionally wide, flat frequency response. Ideal for high-fidelity reinforcement systems. Clear, strong, full-bodied, with no roll-off below and a secure, unobtrusive sound when in position to get more gain before feedback than any other dynamic microphone. Tested for 10,000 hours, rugged construction of 50dB integration for 100,000 hours of performance and ultra-fast aging.



**PL76 Condenser  
Cardioid Microphone**

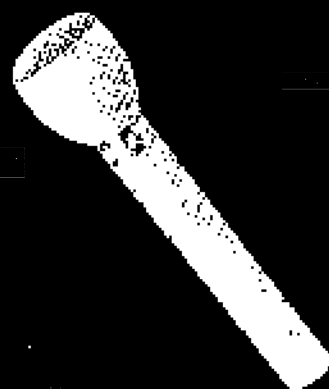
The hot one — a super-high-output microphone designed to give your studio condenser refinement in a package built for the road. The PL77 is a microphone that can transform a vocal style — that rare breed of instrument that plays an active part in your development of your musical techniques. Powered by 4.5V battery for lowest noise and distortion. Compatible with most Lo-Z or Hi-Z inputs, the output level being 50dB.



**PL77 Condenser  
Cardioid Microphone**

The Phantom PL76 — not just a response, but a valuable addition to the scope of the PL76 to the option of phantom power. At the touch of a switch you can run the FET impedance conversion circuit off the 4.5 volt battery, or bypass to direct control from the appropriate phantom-equipped mixer. Alternatively, where such a mixer is not available, the AC24 series remote supplies will provide a suitable power source.

Like the PL 76, this unit features superior feedback control, solid bass for close-up work, integral dust filter, and die-cast casing with Memraflex screen.



**PL5 Dynamic  
Omnidirectional Microphone**

The professional instrument mike — an omnidirectional model ideal for high sound reproduction such as are incurred in close miking amplified guitar, bass, drums or wind-instruments. The PL5 is a wide-band omnidirectional instrument microphone & of exceptional value because it has a cardioid when does not distort in the low frequency range of 100Hz.

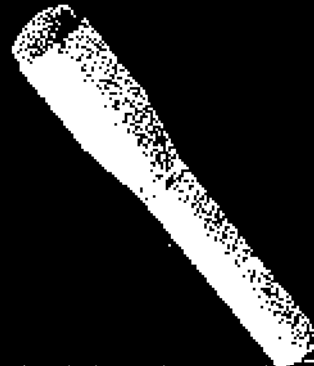
Superior design and filter and low sensitivity to cable drop handling noise. Improves the rugged, road-resistant construction of a high performance microphone, and is built for a life of 10,000 hours of use at 55dB.



**The PL6 Dynamic Super  
Cardioid Microphone**

The clear one — an unusually loud (—55dB) instrument mike featuring the patented Continuously Variable-D circuitry to preserve clarity at all distances from the sound source from several inches to several feet. As an 'extra tight' super cardioid model, the PL6 also minimizes feedback.

With its characteristically broad, smooth frequency response the PL6 is highly recommended for miking brass, reed, percussion, or piano.



**The PL9 Dynamic  
Omnidirectional Microphone**

A multi-instrumental — the best omnidirectional instrumental mike available today. The unusually flat frequency response graph starts at a high level at 10Hz and stays in there all the way to 18,000Hz. This is a mike for any or all instruments, either for drums, for full orchestra, or for any of the 'problem' instruments which require sensitive mike work to capture their true frequency spectrum.

The PL9 operates on a Lo-Z system, with a level of —55dB, and — not the only one — to those whose output on no instrument is part of their professional output — it is considerably less expensive than its nearest rivals.

# ELECTRO-VOICE Gets

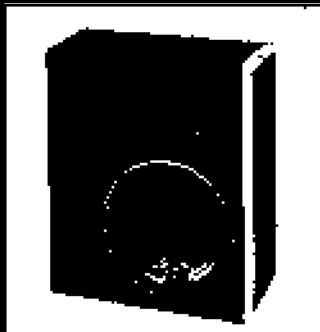
## The Stage Systems

The S12-2, like all the Electro-Voice stage systems, is designed so that the performance your audience hear is the best you can give them — not just the best your equipment can give them. Because these units are accurate. Startlingly accurate to anyone not familiar with Electro-Voice, and amazingly uniform across the wide (120°) dispersion arc, the higher frequencies coming over loud and clear throughout your audience. So your performance will not be blunted by this equipment, and with the response curve essentially flat to 75Hz, it won't be dampened in the lower registers either. You have accuracy — what more could you ask? Well, maybe handling convenience, so note the unusual compactness, the durability and even such features as recessed handles that add the finishing touches to these great concepts in system design.



## The S15-3

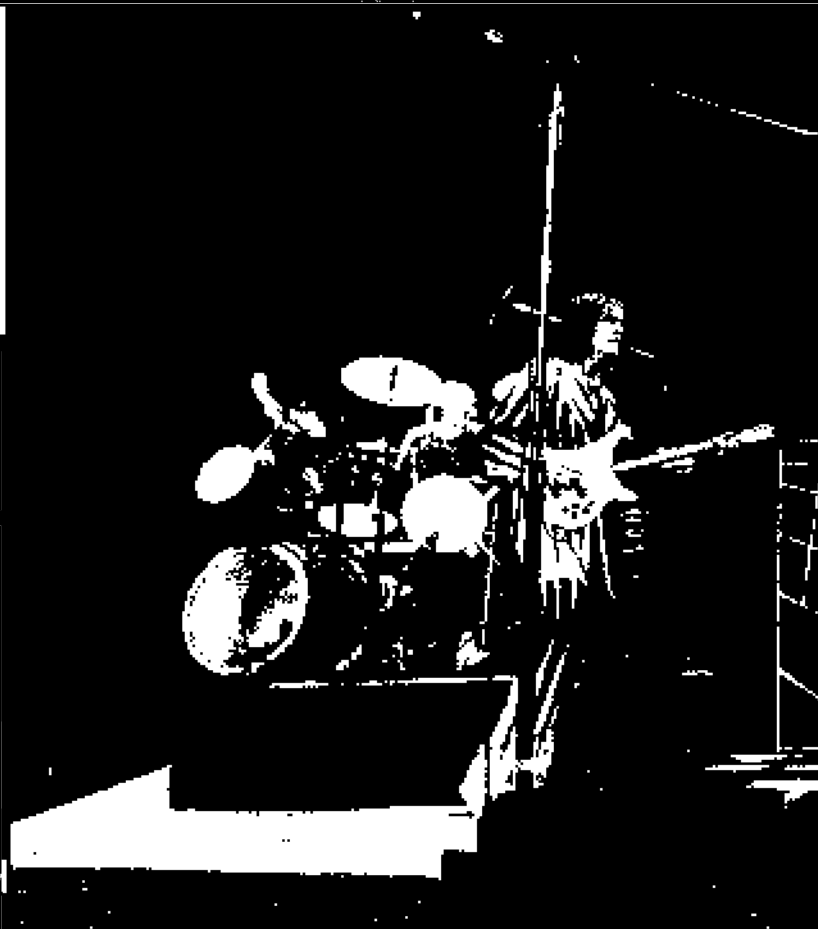
Built to the same basic concepts as the S12-2, this system offers all its advantages with the added quality and depth to be expected of a 3-way system. Again, it is



extremely compact, a feature that has been reconciled to high quality by the enormous boost to efficiency given by the computer design models of A.N. Thiele and R.H. Small, whose research has been turned into practical engineering by Electro-Voice. With the S15-3 the company pioneered vented mid-range drivers designed to the new principles, and in doing that they pioneered quality in compact enclosures.

## The S18-3

The S18-3 is designed as a wide-frequency system especially



## The Celebrated Mathmatically Designed for

### The Eliminator 1A

A very popular Eliminator with a single folded horn, giving a rounded bass sound from the EVM 15B woofer and also featuring the T35 Tweeters. Standing about three feet high and weighing in at around 100 lb., it delivers the sound that has put the Eliminator range in a class of its own.

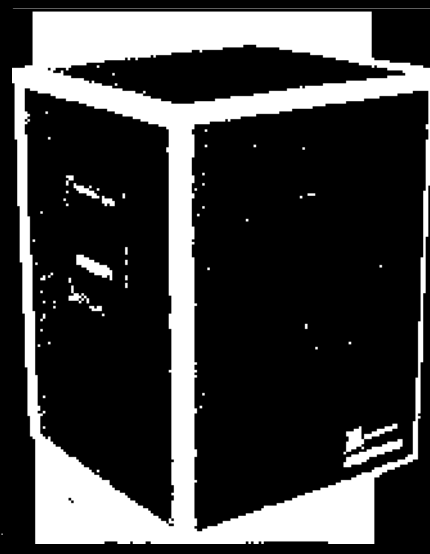
Usable frequency response 55Hz to 16kHz.



### The Eliminator 4

Employs an ST350A high frequency unit, with the EVM range woofer. A special feature is that two different low frequency response curves can be selected by the use of a port cover and the addition of a simple low level equalizer (step down mode). As in all Eliminators, there is a high-frequency Auto-Limiting System to protect the Tweeters.

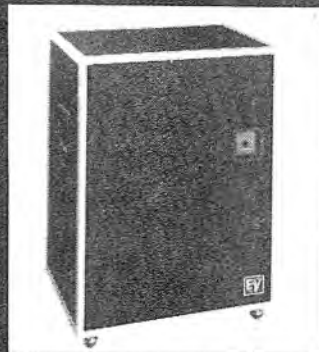
Usable frequency response 63Hz to 16kHz.



# Your Message Across



for use with keyboards such as synths, which demand an unusually wide range. Accordingly, it employs the EVM 18B woofer to bring across the fullest possible bass (right down to the subterranean 40Hz regions). This also makes it an ideal disco unit.



As a keyboard system, the S18-3 has, however, more than its tremendous range to recommend it. A front mounted midrange and tweeter level control means that the performer can adjust the high end of the system while playing, and the S18-3 is also 'bi-ampable' so you can be sure to exploit its possibilities to the full. It is finished in the same style (and with the same attention to handling details) as the other stage units, and like them is equipped with High Frequency Auto Limiting to protect the tweeter.

## New — for Bassists

Electro-Voice have always liked Bass Players, anyone familiar with the range can tell you that. So when a new line in bass enclosures comes out of the company's workshops, a lot of musicians will look to it to establish a new standard for Bass sound.

The B115M and the B215M are distinctively styled 2-way bass speaker systems for studio use and a 'light' high-quality stage sound, and for the 'heavier' more solid rock bass sound respectively. They may be extraordinarily sensitive and accurate in reproduction (making them suitable for quality Hi-Fi use), but they are also tough customers able to take the strains and stresses of band work in their stride. Based on the EVM range of speakers coupled with the Vented Mid-Range cone speakers, they ought to be! The B115M has one EVM 15L speaker, and the B215M has two. This not only gives the larger unit a heavier bass, but means it can be stood on its side ('feet' are provided) for an alternative sound.

Yes, a lot of musicians will look at this equipment to establish new highs in the low frequency field — and Electro-Voice guarantee not to disappoint them!

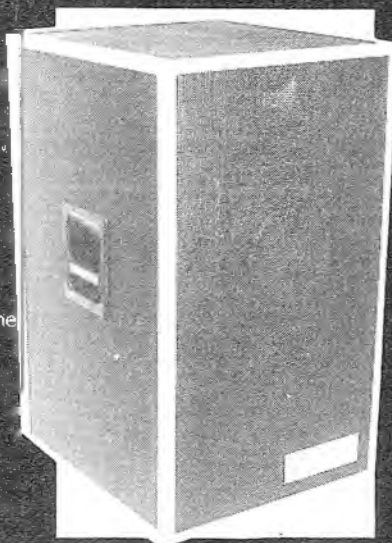
## ELIMINATORS

ALL ROUND improvement

### The Eliminator 5

The Eliminator 5 is similar in size and specification to the Eliminator 1A, with the difference that the mid-range is served by one of the very sophisticated VMR units, giving the more mellow sound of a cone system. A ST350A tweeter is fitted. The aluminium front profile recalls the rest of the Eliminator range but the black painted front grill is designed on the same distinctive lines as the new B-systems.

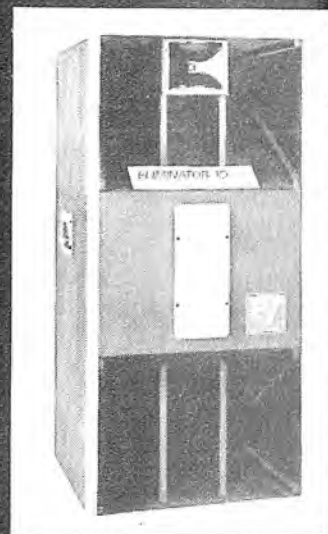
Usable frequency response 55Hz to 18kHz.



### The Eliminator 10

With the Eliminator 10 Electro-Voice have achieved an all-horn stage speaker system without the 'honky' sound often associated with such systems. This Eliminator which is bi-ampable, owes its excellent sound to an EVM15L feeding a folded horn at the low end, an amazing new horn coupled to the E V 1829 for superlative midrange reproduction, and the well-tried ST350A tweeter for high frequencies.

Usable frequency response 60Hz to 16kHz.





# Praise For EV Drive

## Model DH1012

### High Frequency Driver

In a compression driver like the model DH1012, the results of years of research and development in the field of high-efficiency conversion can be seen or rather heard. This model combines unprecedented acoustic power output with a wide frequency range, attained through such features as drawn aluminium diaphragm with high stiffness-to-weight ratio for extended response, polyamide diaphragm surround for large excursions without fracture, extremely large, efficient magnet structure (a frequent comment on Electro-Voice units), and many other's.

## Model DH1506

### High Frequency Driver

Like the others in the very advanced DH range, the DH1506 combines high efficiency with wide-range response and unequalled standards of construction. Built for the most demanding applications, the DH1506 is noted for the clarity of its response in the octave above 10,000Hz, and is recommended as a wide-range driver in systems designed for sound reinforcement, stage and studio monitoring, and discos. It also makes a very successful midrange driver in high-performance multiway systems. The diaphragm and magnet structure have similar innovative design features to the DH1012, and like it the DH1506 has a rapid heat transfer aluminium voice coil and the Electro-Voice Lexan glass-filled phasing plug to minimize the problems from foreign particles in the magnetic gap.

## The Model 1823

### Compression Driver

Rated at 60 watts RMS, the model 1823M is suitable for all kinds of application which call for a tough unit capable of precision and fidelity when it comes to reproducing music. The near indestructible phenolic diaphragm, the sophisticated arrangements for dissipating heat and the weather-resistant construction of the unit as a



whole makes it the obvious choice for really demanding work. As for the musical capabilities of the 1823M, particularly when combined with the Electro-Voice 8HD or SM120A horns, critical acclaim has been sufficiently far-reaching to leave us with nothing to add!



control over the full frequency range from 800Hz to 16kHz. A range of horns shaped for excellent low-frequency response and a very uniform beam-width and directivity.

### T35 Tweeter

The famous T35 is thought to be the most widely used high-output tweeter in the world, its popularity being due to the 10dB increase in efficiency over a conventional direct radiator or dome tweeter, just as the superiority of Electro-Voice technology shows through at the extreme low end of the frequency range with the EVM units, so the horn tweeters are unequalled at the high end, the lightweight moving system giving precise definition in this part of the range. Another feature is the quality of the stereo imaging as the highs are spread throughout the room by the refraction horn.

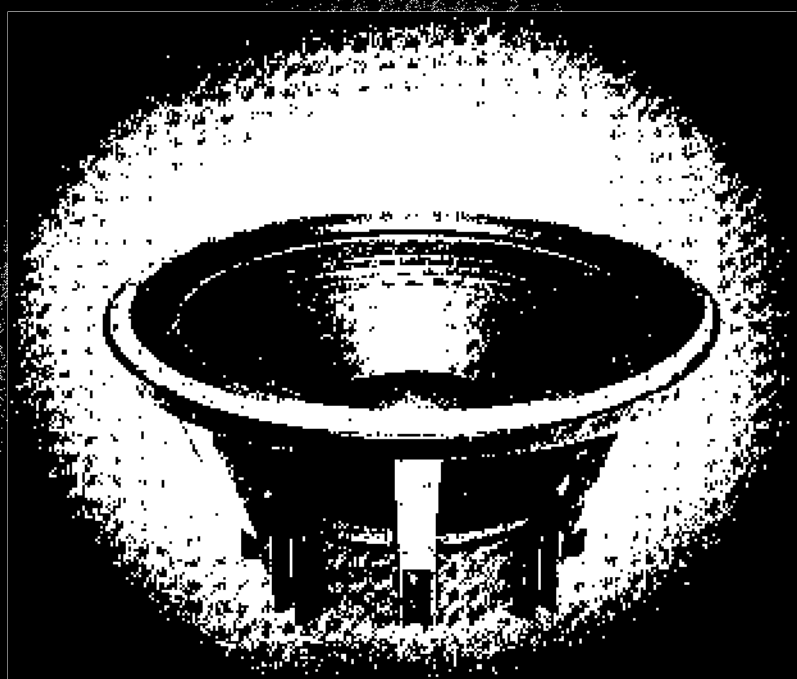


### T350 Tweeter

In the T350 Electro-Voice have taken the best ideas of the T35, and incorporated them in a re-designed unit giving more than twice the output of the smaller model, with improved dispersion, clarity, and 'spaciousness'. The mellow veils and excellent stereo imaging that characterize the T35 are brought a further step towards perfection by this deluxe unit.

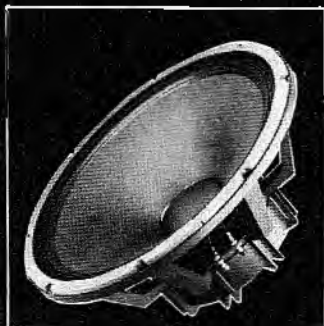
### EVM-18B Series II Cone Driver

This big, robust eighteen-incher with its massive magnet structure and fatigue-resistant cone suspension has certainly had its share of accolades as a high-output subwoofer unit. Noted for its perfect bass reproduction even more than for its unparalleled workmanship in construction and presentation, the 18B has become first choice for musicians



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who are content only with the very deepest, fullest, warmest bass sound available. 200 watts. 40-6000Hz. \*

## **EVM-15L Series II Cone**

Perhaps the most popular loudspeaker among the Electro-Voice cone drivers. Like all the range it features husky diecast aluminium frame, edgewound voice coil, heavy duty curvilinear cone and heat radiating back cover. Effective for all kinds of instrument amplification and especially valued as the low frequency section of a large PA rig and as the speaker for a 'bright' bass guitar sound. 200 watts. 50-5000Hz. \*

## **EVM-15B Series II Cone Driver**

A specification similar to the 15L, but designed for a 'rounded' traditional bass sound. As a Series II model, it has the updated voice coil standard to this range, featuring beryllium copper flatwire leads. 200 watts. 50-5000Hz. \*

## **EVM-12L Series II Cone Drivers**

A moderate diameter loudspeaker designed especially for a brilliant lead guitar response. With a performance rivalling larger speakers from other makers, this is constructed to the same Electro-Voice standards as the others in the range, making it very sturdy for a 12-inch model. As with all E V component speakers it comes with the handy SMH-I Mounting Kits for front or rear mounting, and comprehensive specifications/instructions. 200 watts. 80-7000Hz. \*

\* Predicted response in appropriate E V enclosure.

## Speakercheck

Having assessed Electro Voice equipment under stringent laboratory conditions and in the light of his considerable expertise with acoustics, *International Musician's* well known consultant KEN DIBBLE felt that his praise could be unstinting

### **The EVM-15 II**

'The Electro-Voice EVM-15II has the lowest effective resonance, the lowest distortion, and by far the smoothest response...'

'Considering its unusually smooth frequency response curve this unit would be ideal for the bass section of a large PA rig or as a bass instrument reproducer

...this is certainly a very fine loudspeaker indeed.'

### **The EVM-18B**

'From a performance aspect it is faultless...the sensitivity of 101dB is very good indeed.'

### **The ST350/A**

'Altogether a very nice unit — expensive, but for my money is capable of a performance that justifies the expenditure.'

### **The T35 and T350**

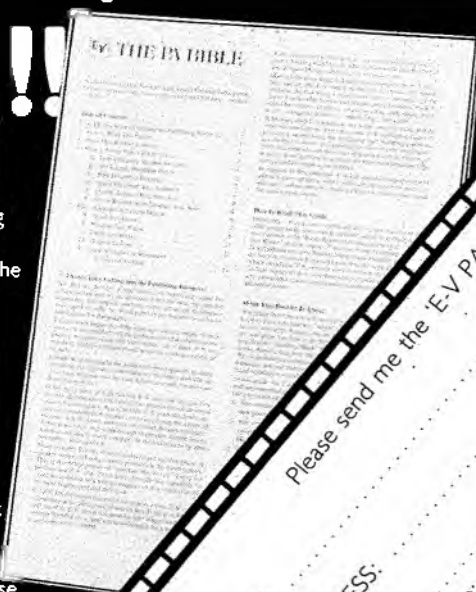
'...a pair of very nice horns, beautifully made and presented, both returning excellent results under test.'

### **The 1823M/8HD combination**

'The overall performance of this combination is very good indeed and it is superbly made and presented...'

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The E V Tapco 6000 is a compact, sturdy studio or concert mixing deck of uncommon sophistication and versatility. Featuring like other E V Tapco mixers the unique Autopad circuitry which effectively provides automatic distortion-free adjustment of just about any input level to a signal suitable for the unit, the 6000 is a 6 into 1 mixer with an input stage giving high quality with high or low impedance mikes, guitars and other 'pickup' instruments, drums, keyboards, monitors, tape machines, tuners — in fact, you name it! The output, with two high level and two adjustable output sockets, is suitable for any type of amplifier. At high level, the 6000 can deliver more than five times the signal needed to drive a power amp at full output — 'headroom' you may occasionally need.

Feeling that other equipment is often the scapegoat for shortcomings in fact traceable to the mixer, E V Tapco have designed a number of innovations to make this inexpensive unit suitable for the professionals by whom it is often used.

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This product with its quality engineering, brilliant technological conception, and overall attention to detail, shows what the combination of Electro-Voice and Tapco engineering will mean to the music industry. Today, the C-12, tomorrow — well, who needs tomorrow?

## Also from E V Tapco

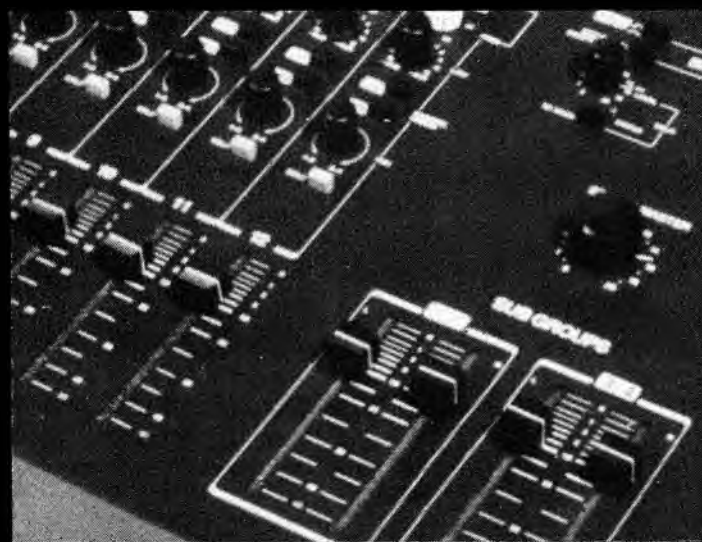
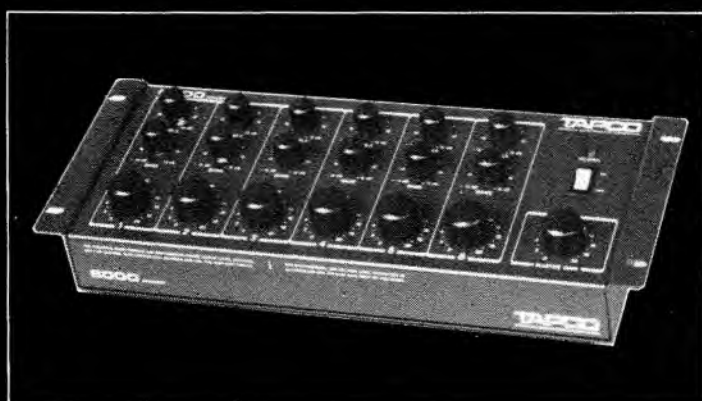
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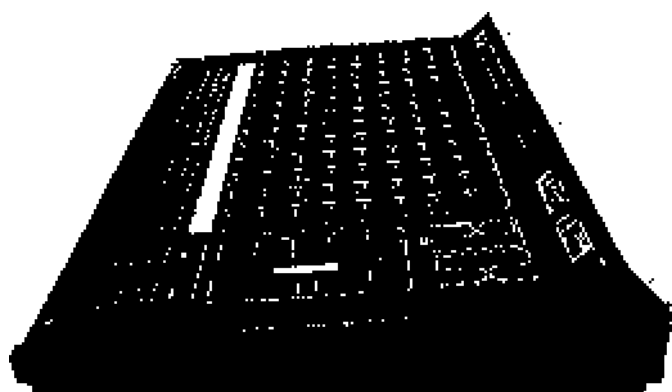
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In our introduction to this new series in last month's issue, we took a lighthearted look at the historical development of the microphone. I hope that you enjoyed looking at our "picture gallery" of the early microphones — I must admit that I quite enjoyed doing the research for that particular feature. Now however, we must get down to the main purpose of this series and consider the microphone in a more serious vein.

Microphones are usually referred to by one of a number of descriptive terms. Such expressions as "cardioid"; "stand mike"; "hand mike"; "low impedance"; "condenser"; "neck mike"; "dynamic mike"; "balanced line"; "ribbon mike"; "high impedance"; "studio mike"; etc etc will be familiar to us all. Unfortunately however, none of these descriptions is sufficient to define any particular type of microphone. Expressions like "moving coil"; "condenser"; "ribbon" etc. refer to the basic principle on which a microphone works, while "cardioid"; "omnidirectional"; "figure-of-eight" etc. refer to its directional characteristics. Terms like "low impedance"; "balanced line"; "phantom powered" etc refer to the type of circuit to which a given microphone can be connected while descriptions such as "stand miked"; "hand mike"; "neck mike"; "lapel mike" define how the microphone is intended to be mounted and "studio mike"; "PA mike" etc give an idea of its intended area of application.

It will therefore be clear that in order for a specific type of microphone to be defined, it will be necessary to use a number of these terms together — for example, low impedance, cardioid, moving coil mike suitable for stand mounting gives a fairly clear definition. The addition of the word "studio" into the statement would indicate that a microphone of particularly high quality was required, while the term PA would imply that a microphone of a more robust construction, possibly with some form of "pop" filter was needed. Most microphones are specifically designed for a particular application and it is important that the correct mike is selected for a given purpose. In order to understand the special characteristics of the various microphones available, we shall consider each type individually. We shall concentrate on the types that have relevance to the music business and only briefly mention certain other types so as to provide a reasonably complete picture.

## 1. Carbon Microphones

This type relies for its operation on the fact that when granules of carbon are compressed together, the resistance of the granule assemblage will change. The microphone consists of a "button" (as it is

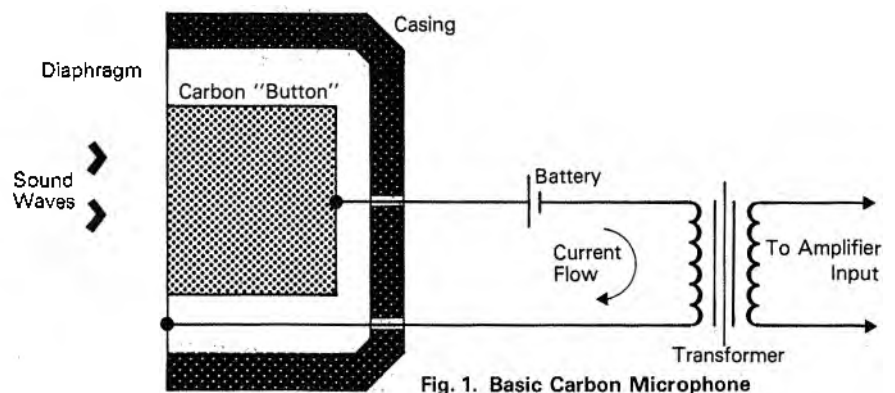


Fig. 1. Basic Carbon Microphone

termed) of carbon granules placed underneath a diaphragm in such a way that as the sound waves activate the diaphragm, the granules in the carbon button are compressed and released alternately in sympathy with the diaphragm motion. This creates a resistance element which is varying in accordance with the sound waves. This carbon button is then wired in series with the primary winding of a transformer, across a small battery as shown in Fig. 1. The principle of operation is that a small electrical current is made to flow around the circuit, which in effect consists of one fixed resistance (ie the transformer winding) and one variable resistance (the carbon button).

As the diaphragm is set in motion by the sound waves incident on it, the resistance of the carbon button changes in sympathy and so the current flow around the circuit is varied. This changing current results in an alternating voltage being generated across the transformer winding which is representative of the diaphragm motion. The transformer serves to match the impedance of this energizing circuit to the input impedance of an amplifier, and also to isolate the battery voltage so that this does not get fed to the amplifier, but remains within the microphone circuit. This type of microphone suffers from poor frequency response in that it is not generally responsive to either high or low frequencies, it has comparatively high distortion and has the disadvantage of requiring a battery. Therefore, its use is generally restricted to communications applications such as telephones, head-set boom mikes etc where its response is ideally suited to high intelligibility speech and its robust mechanical properties are of great advantage. Carbon microphones are not used for music or recording applications and will therefore not be discussed further in this series.

## 2. Crystal or Piezo-electric Microphones

This type of microphone is not too different from the Carbon, except that the crystal or piezo-electric generating element behaves as a miniature electrical generator in its own right and does not

require any energizing current. The material used for this generating element is usually a crystal of Rochelle Salt sandwiched between two metal plates and the general arrangement is shown in Fig. 2. A crystal microphone has a very high impedance — often in the order of megohms, has a high output voltage and is cheap to manufacture. These factors mean that it can be fed directly to an inexpensive low gain amplifier without the necessity of an impedance matching transformer resulting therefore in a low cost amplifying or recording system, and this will explain its popularity in domestic tape recorders and cheap "toy" PA systems.

For most other applications there are a number of drawbacks including poor frequency response, the necessity of using only very short cables due to the very high source impedance and susceptibility of damage from high temperatures and high humidity levels. For these main reasons then, despite the low cost factors, the crystal microphone is not generally used in music or for serious recording.

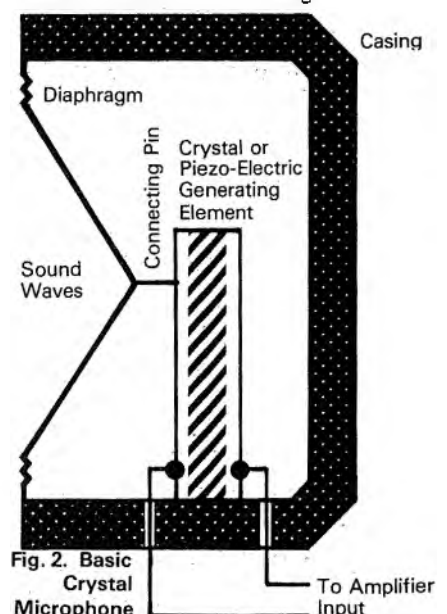


Fig. 2. Basic Crystal Microphone

## 3. Ceramic Microphones

These are, to all intents and purposes, identical to crystal types, except that a different piezo-electric generating

# Meet The Mike

element is used which is considerably less prone to the temperature and humidity effects just mentioned. Also, it is possible to manufacture a ceramic element that offers a superior frequency response to that of the ordinary Rochelle Salt crystal. However, its response characteristics are still nowhere near suitable for live sound or recording to any degree of quality.

## 4. Dynamic or Moving Coil Microphones

This type of microphone is basically a miniature loudspeaker working in reverse. It consists of a diaphragm and voice coil assembly operating in a magnetic field in

temperature or humidity.

The smoothness and range of the frequency response characteristics can be improved by the use of two diaphragms, one to handle the low frequencies, the other the highs, using a crossover network to separate the two in much the same way as the frequency range of a loudspeaker can be extended by the addition of a high frequency unit and crossover network. By this means, a dynamic microphone can achieve a frequency response that is virtually flat from 20Hz to 20KHz. For these reasons, along with that of convenience in manufacture, the moving coil microphone is by far the most widely

used today and most live performance microphones are of this type.

that its entire length is free to vibrate within the magnetic field. This is illustrated in Fig. 4. As can be imagined, the impedance of a strip of aluminium ribbon is very low indeed and in fact, is something less than 1 ohm. Therefore, it is essential that an impedance matching transformer be incorporated into the microphone casing so that a usable output impedance can be presented to the amplifier.

As with the moving coil microphone, such a transformer is frequently provided with taps at the various popular impedances. A ribbon microphone offers an exceptionally wide and smooth frequency response and in fact, almost all the early studio microphones were of this type — see last month's issue. Its main disadvantage is simply that the ribbon assembly is somewhat fragile and therefore prone to damage, and also, that the ribbon is prone to "blasting" and "popping" due to its relatively high compliance and for these reasons, it has generally fallen from favour of recent years. However, with careful design it is possible to overcome these difficulties and there are just a few excellent microphones of this type available for live performance and studio applications.

Next month we shall finish off this part of the series with a look at capacitor and electret microphones, and then move on to consider directional characteristics and their implications.

Ken Dibble

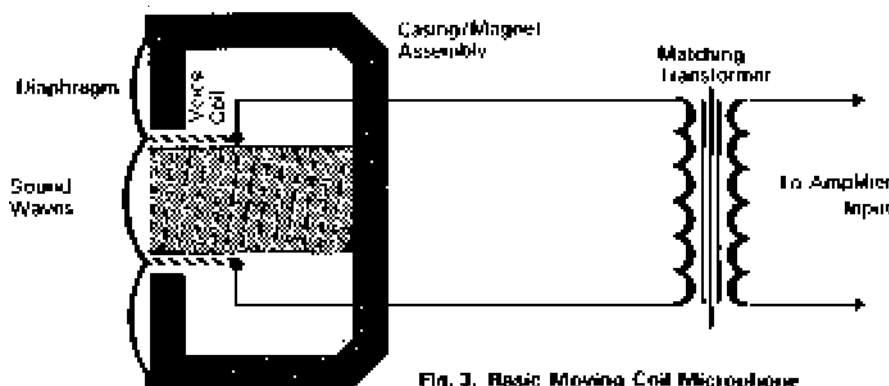


Fig. 3. Basic Moving Coil Microphone

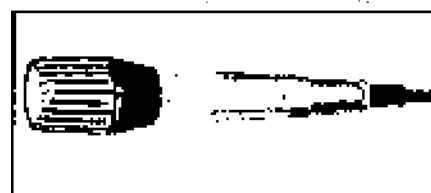
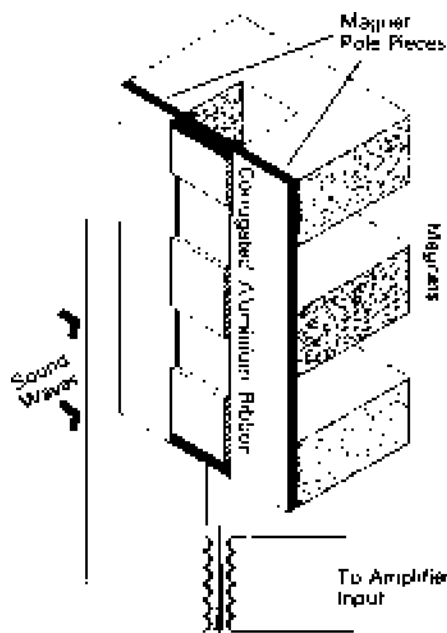
just the same way as a cone and voice coil in the case of a loudspeaker. The general arrangement is shown in Fig. 3. The principle of operation is electromagnetic induction. Put simply, this means that every time one of the turns on the voice coil cuts through a line of magnetic force, a minute voltage is generated in the coil. The fact that there are, in practice, many turns of wire cutting many lines of force, results in an electrical signal that is of sufficient amplitude to be fed down a cable and amplified. The impedance of the voice coil is very low — usually about 25 ohms, and so a transformer is necessary to raise this to an impedance that can be accepted by an amplifier input stage. Sometimes this impedance matching transformer is incorporated into the microphone casing, and sometimes it is incorporated into the input stage of the amplifier.

Many microphones of this type are fitted with a multi-ratio transformer, tapped at a number of impedances ranging between 50 ohms and 50K ohms so that the microphone can be matched to practically any amplifier input impedance. Moving coil microphones offer a number of distinct advantages over the types so far considered. They can be designed to provide a smooth uniform frequency response over most of the useful part of the audio frequency band — say between about 40Hz and 16KHz, distortion is low, output voltage is sufficiently high, the low source impedance will permit long cables to be used without significant losses, and perhaps equally important, it is robust and reliable in operation and is not seriously affected by extremes of

## 5. Ribbon or Velocity Microphones

This type also relies on electromagnetic induction for its operation, but in this instance the signal voltage is induced into the diaphragm itself instead of into a coil of wire. The diaphragm consists of a very thin and delicate ribbon of aluminium foil suspended between the poles of a magnet. This ribbon is fixed only at the two ends so

Fig. 4. Basic Ribbon Microphone



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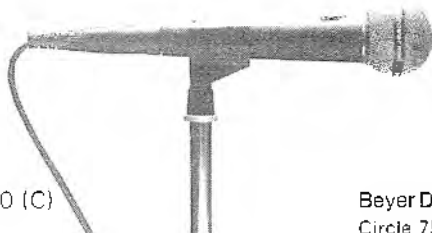
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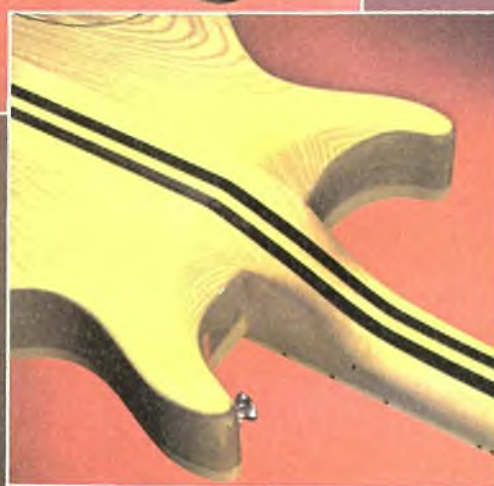
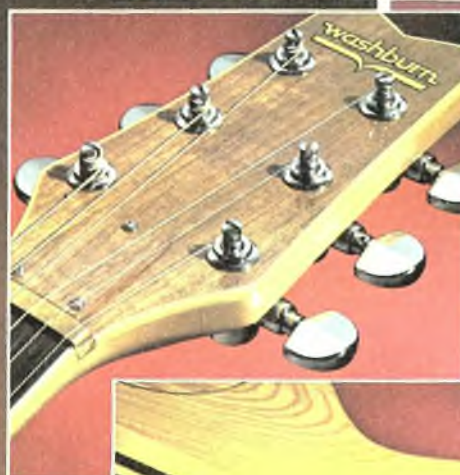
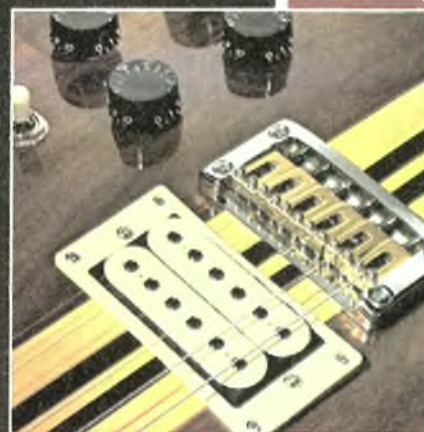
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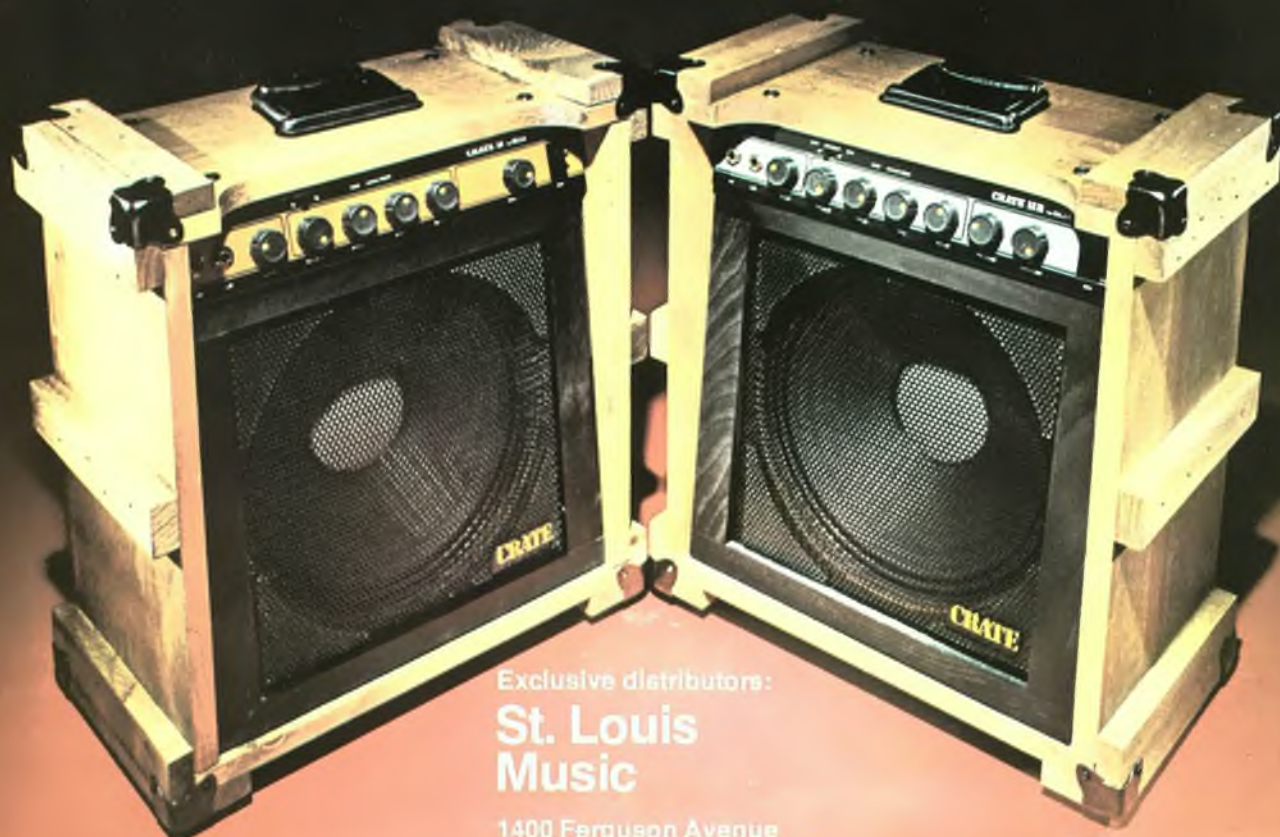
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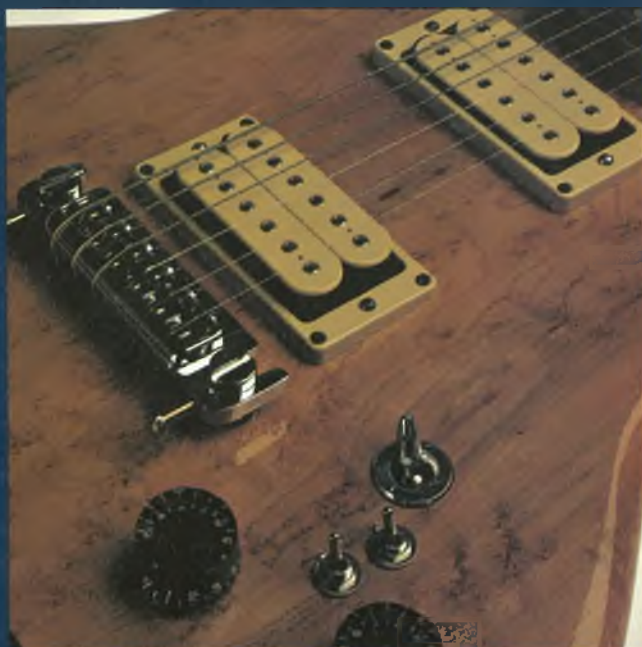
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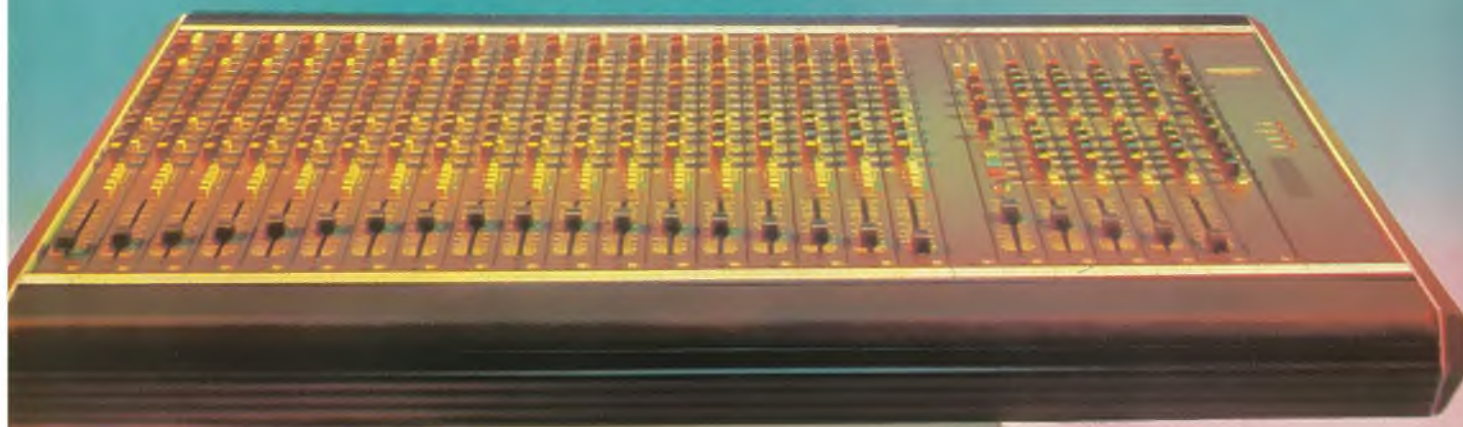
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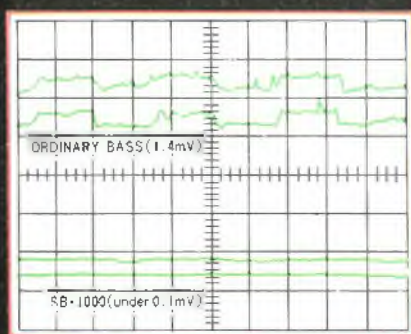
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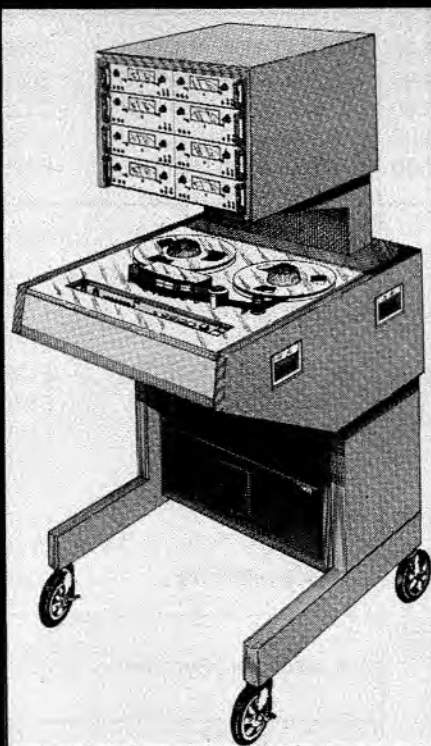
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## STUDIO DIARY

### Whos BEEN RECORDING WHAT, WHERE ...

During the last month the studios seem to have been having a slightly quieter period than normal following the busy summer months. However, they have all managed to keep themselves occupied — after all, who has ever heard of a studio where the staff are not constantly run off their feet? Abbey Road has had in its usual share of bands, including the Electrotunes who have been working with producer Tony Squires, and their engineer was Pat Stapley... Laying down some new tracks for an album was **Roy Harper**, with Peter Jennings producing and Haydn Benda engineering... Pat Stapley was also called in to engineer for **Rodger Playner** — but what were they recording?... A band called **Nightfall** decided to start work on an album with their producer John Reed and engineer Peter Vince... other artists booking time included **Graham Fellows** and **Dennis Hegarty**... and finally, in a completely different vein, the **Swingle Singers** were in with producer Hugh McDonald and their engineer was John Kurlander...

Over in Basing Street Roxy Music were starting their new album with Rhett Davies (who worked with Dire Straits) engineering and producing... Peter Bardens seems to have made himself at home here since he is still in (having worked through September) recording for Arista Records. The work is co-produced by Peter himself and Norman Mighell who also looked after the engineering... **Marrianne Faithful** has moved over to Basing Street from the Roundhouse where she was recording last month and... an Italian band called **Carmello La Biaonda** had the privilege of working in the newly refurbished Studio 2 with its recently acquired MCI computerised mixdown. They were mixing a disco album for Baby Records of Milan and our own Chrysalis Records... There seems to have been a lot of work going on here for television including such well known names as the Pretenders, Sister Sledge and **Manhattan Transfer**... **Buggles** have also been in getting it together for a new album... **Eno** has been in with Rhett Davies producing... The Mobile has also been very busy recording the **Slits**... and it was also taken to **Ronnie Scott's** to record **Louis Belson**. **Howard Kilgour** was the engineer...

Over at DJM Studios in Theobalds Road, XTC have been in to mix some tracks with engineer Hugh Padham... Producer Dale Griffin has been working with **Slaughter** and **The Dogs** on a mixing session, with Keith Bessey engineering... John Cooper has been engineering on a few overdub and mixing sessions,

including one for the **Four Tops** (self produced)...

Deep in the heart of Oxfordshire at Manor Studios **Mike Oldfield** came in to get down some ideas for his new album...

**Public Image**, producing themselves, were working with engineer Nick Cook...

**XTC** seem to have managed to fit some time in here as well — mixing with Hugh Padgham again... Mixing seems to be this month's 'thing' — other sessions included Interview with Mick Glossop who was also engineering on the **Skids** mixing session... Other albums coming from here will include the **Motors** who were produced by Jimmy Iovine...

Down at Rampart Studios, Simon Humphries was producing and engineering for a mixing session of the **Jags'** new single... the **Who** were in writing some songs for the film **McVicar**... and **Rikki Sylvan** was in to mix an album — a session which he engineered and produced himself. What a talented man!...

Down in the Surrey studios of Ridge Farm **Loose Change**, a band signed to Phonogram, were making headway on their album... **Dave Stuart** (of ex-National Health fame) was laying down some tracks, possibly with a single in mind. The session was engineered by Mike Dunne. He produced it himself... The Studio has been especially quiet this month because the staff have been putting in a lot of time rebuilding things in the studio itself. The only other information they were able to give was that EMI has had **Dennis Douville** working on some mixes...

Roundhouse Recording Studios have had a fair selection of artists in during October. Engineer Mark Dearnley has been extremely busy working on sessions for the **Mad**, **Goldie** and **Ritz**.

Surrey Sound Studio in Leatherhead has been looking after **Wishbone Ash** who have been finishing off their album with Martin Moss engineering. They were producing themselves... Also working

on an album was **Bill Bruford**. Once again, the engineer was Martin Moss...

Over at Air Studios, last month's artists seem to have settled in, since most of them are still there! **Japan** have been finishing their album off with John Punter producing and Colin Fairley engineering...

**UFO** recorded an album out at the luxurious Air Montserrat Studio and they brought it over to the London Studios to mix (with the great George Martin himself producing)... The **Pretenders** were also finishing off their work with producer Chris Thomas... Jon Kelly has been acting the double role of producer and engineer for both **Ali Thompson** and **Kate Bush**, whose new album is now on its way... **Roger Greenaway** was producing a band called **Brooks**... **Laurence Juber** from **Wings** has been in working with Mike Stavrou... Other visitors to the studios have included **Zoot Alors** and **Mike Oldfield**...

Trident Studios have been playing host to our synthesizer consultant **Robin Lumley** and **Dave Greenslade** who have been recording an exciting new album which was engineered by Colin Green with Robin producing... **Martin Ford** was producing **Steve Joseph's** new single (engineered by Steve Short)... **Colin Blunstone** was in laying down tracks for his new album with **Rod Argent** producing with, once again, Steve Short at the controls... another album coming out from here is by **Roots**, a band signed to the Essex label. Their producer was John Brand and the album was engineered by Dave Rees... Trident's new cutting service has proved to be very popular — discs cut so far include an album but **Random Hold** (produced by Peter Hamill)... **Tony Banks'** new album and single... **Warm Jets** (single)... and the **Tourists'** new album, produced by Tom Allum...

At Marquee, the studio is still closed for refurbishing but they hope to be open again by the beginning of November. Meanwhile the mixing room has been very busy making up for this. Mixing and overdub sessions have included an album by **Michel Gilberti** — produced by Patrice Fabienne and engineered by Phil Harding... They tell us that they have been working on something "really heavy" but they won't divulge further... A little bit of studio news from here — **Larry Bartlett**, the whizz kid engineer, has landed himself in hospital with a leg injury sustained while playing soccer (they all send their condolences). He recorded the single "Don't Be A Dummy" by **John Ducaan**.

Janet Angus





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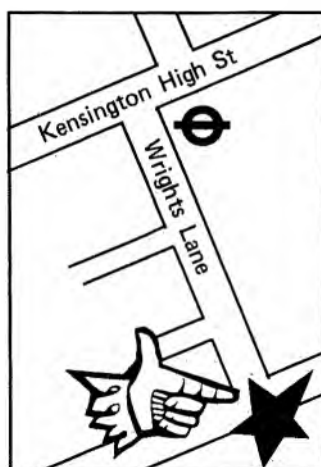
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The most important part of any PA set up has got to be the mixing desk and that's why we have chosen an RSD 12/2/b. Superbly made and giving an incredible array of facilities, the best thing about this desk is that its possibilities are really limitless. Add on modules allow any number of other channels to be utilised in addition to the basic five band EQ, full foldback, echo facilities and VU monitoring of the desk.

To power your system you want a good beefy amp that is above all reliable. The RSD 800B is just that, giving 340 watts per channel into 4 ohms and is ideal for both studio use or PA.

For the speakers we have gone for the Dynacord Mosquito S range. This particularly versatile system is suitable for just about every kind of use, from stage monitoring to conventional theatre PA work. They deliver 180 degrees of sound dispersion while smooth response and high technology cabinet design ensure the lowest possible feedback characteristics. We are giving away a pair of these speakers complete with hardy flight case.

The microphones in a PA are probably the smallest items, but they invariably make the biggest impact. For our system we've collected a couple of Beyer products, which must be among the best.

Before you carry off this beautiful hardware

down to your next gig, you have to explain a few well known phrases and abbreviations. Complete the set of questions below and send the answers to International Musician and Recording World, Grosvenor House, 141/143 Drury Lane, London WC2. Please mark your envelope "PA Competition".

*Below are three answers to the competition questions. Please circle the one you think is correct.*

**1)What is Groundlift?**

- a)Drum riser
- b)Hoist for PA
- c)Means of preventing earth loops

**2)What is EQ?**

- a)Extra Quality
- b)Equalization
- c)Equal energy per octave

**3)What is Snake**

- a)Multi core
- b)Mains cable
- c)Guitar leads

**4)What is Talkback?**

- a)Stage monitoring
- b)Transmission line
- c)Echo unit

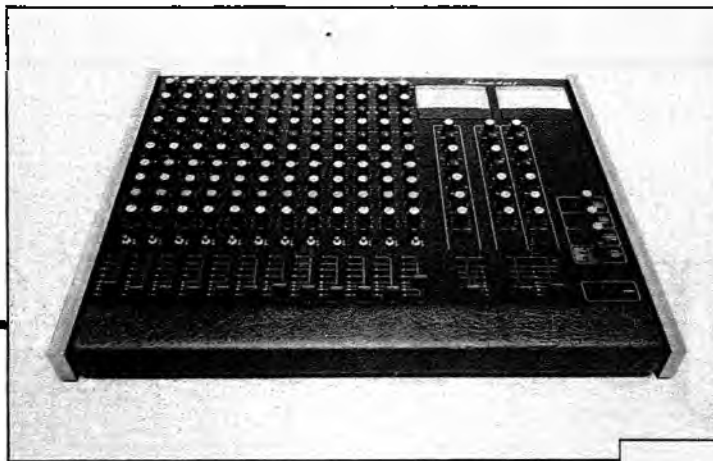
**What is meant by Crossover?**

- a)Multi application
- b)High voltage rail
- c)Frequency dividing network

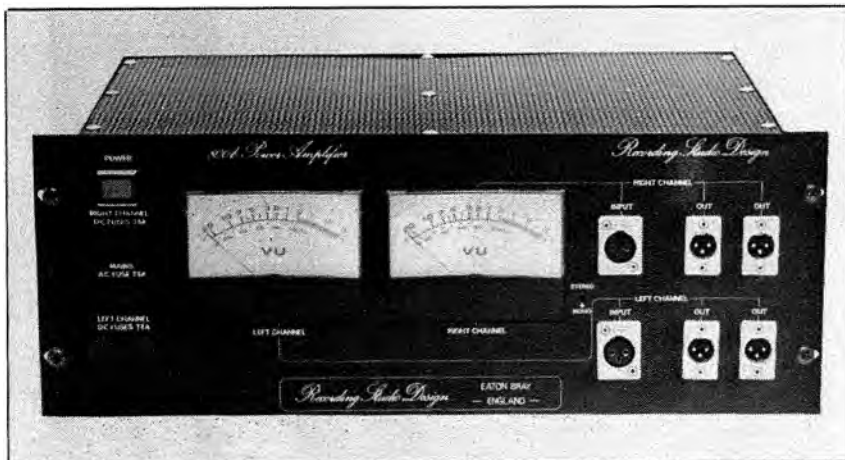
**6)State in not more than 20 words what you consider to be the most important factor in achieving a good live sound and why.**

All entries must reach this office by the end of November and the winner will be announced in a forthcoming issue of IM&RW.

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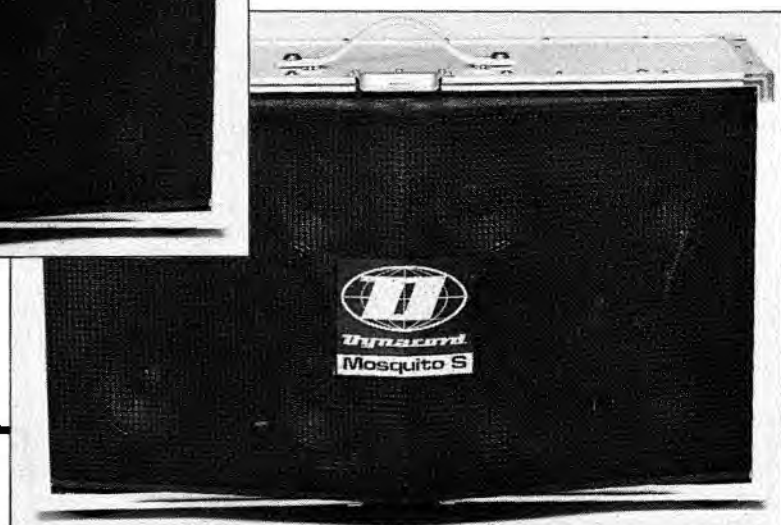
RSD 800B



Beyer microphone



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# Joel Dorn

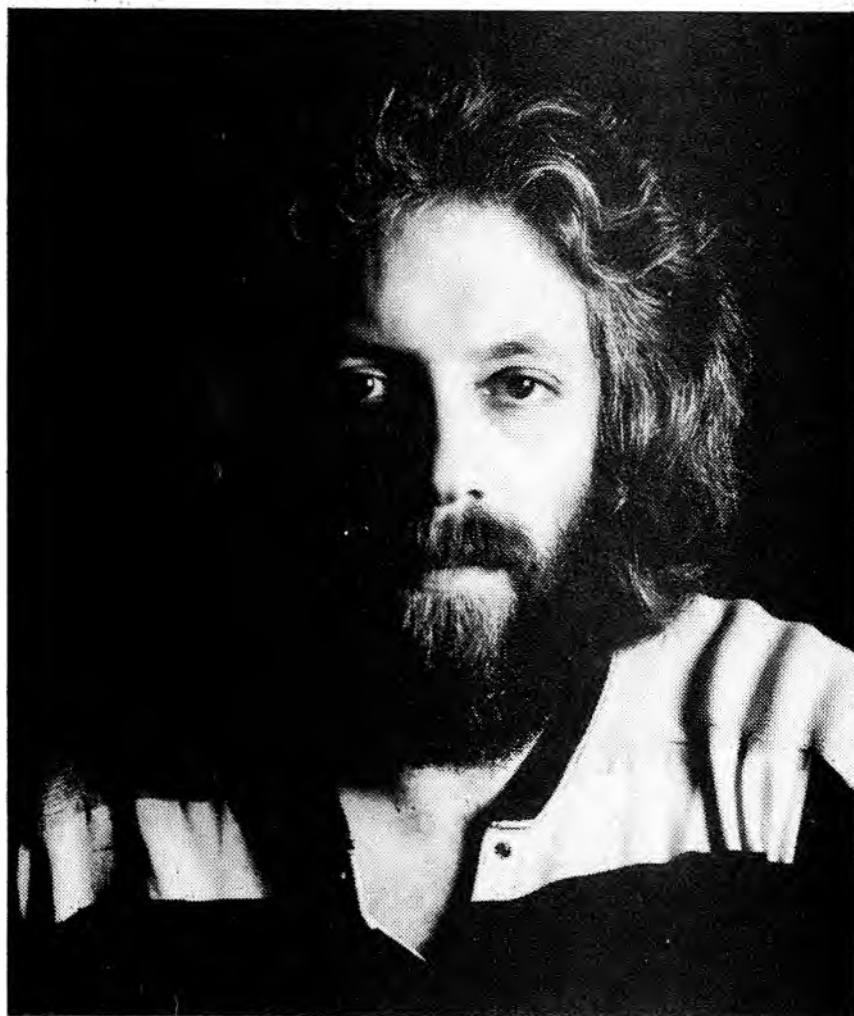
As both a staff man for Atlantic Records and an independent producer, Joel Dorn has consistently demonstrated an uncanny ability to seek out and successfully produce the kind of artist already written off as non-commercial or "un-recordable" by more conventional business minds.

Prompted by an instinctive gut feeling for talent and a strong sense of historical continuity in contemporary American music, Dorn has produced an incredible variety of artists that include Hubert Laws, Rufus Harley (one of the few jazz bagpipe players), Rahsaan Roland Kirk, Yusef Lateef, Les McCann, David "Fathead" Newman, Max Roach, Herbie Mann, Freddie Hubbard, Ray Bryant, Marion Williams, Bette Midler and Roberta Flack. And that's just during his tenure at Atlantic. Since branching out as an independent producer in the mid-Seventies, his seemingly disparate roster of artists has included the ever-elusive Leon Redbone, Don McLean, Asleep at the Wheel, Roomful of Blues, Steve Goodman, Dory Previn and Peter Allen.

Giving this interview at his "homebase," Regent Sound, New York, Dorn was able to talk to *International Musician* while simultaneously taking care of at least 20 major deals on the telephone.

He discussed the changes in record company attitudes in the last decade, especially the major labels' general reluctance to take chances nowadays. Dorn showed no bitterness; just a mature, seasoned outlook that bespoke his years of experience in the studio.

"That doesn't happen anymore. In the old days a label would have its 'bread and butter' acts, then they'd take on a show music catalogue, a folk catalogue or a classical catalogue. There's more 'bottom line' thinking nowadays. The newer generation of record people is more media-oriented, more hit-oriented, more tour support/total merchandising oriented. Years ago when I first came to Atlantic, the jazz operation there was a thing of love. It was Nesuhi's (Ertegun) baby. We used to sit and correct punctuation on the liner notes and make sure the colour separations were perfect on an LP that we knew was legitimately gonna sell 3,000 copies. There was a commitment because they (Ahmet &



Nesuhi Ertegun and Jerry Wexler) were heavily involved in the whole spectrum of black music. I'm not trying to single Atlantic out it's just that that doesn't happen in the business any more. The John Hammonds and Goddard Liebersons and those kind of people are gone from the day-to-day operations of a record company. The record business is a *business* now — a business in the more traditional American sense. Just like the movies were magic in the beginning and now they're just a bunch of accountants."

Dorn insists that he wanted to be a producer since his early teens. In fact, he started a correspondence with Nesuhi

Ertegun at that time, suggesting acts to sign or records to be made. What music provided this kind of precocious enthusiasm?

"When I was 13 I heard Ray Charles and that was the beginning of the end of my life, as it was. I was reborn in my grandmother's kitchen in West Philadelphia. My parents had gone out for the evening and I put on this disc jockey — Georgie Woods, a legend in Philly — and he played a song by Ray Charles called 'Ain't that Love'. That was it... all over. And from there it was all R&B, jazz and seminal rock and roll. I was fortunate — I'm 36 — to come up at a transition point in jazz when be-bop was turning into that Horace Silver, Art Blakey, Cannonball Adderley kind of thing. So I went from the end of Diz and Bird to the beginning

THE PRODUCERS

# RECORDING WORLD

of Miles — and at the same time rock'n'roll was born!"

Since there was no accepted way to become a producer in those days, Dorn made the wise decision to pursue a radio career as a form of entry into record company studios. Achieving near mythic status as the legendary "Master Announcer," he developed one of the early commercial heavies of the day like Lou Rawls, Richard "Groove" Holmes, Hank Crawford, Stanley Turrentine, Nina Simone, Gloria Lynne and Arthur Prysock with personal favourites like Curtis Mayfield, Bobby Bland, Ben Webster and Coleman Hawkins. Dorn created a programme that had a significant impact on both the listening audience and the record companies. With this added leverage, he soon got the break he was looking for.

"Nesuhi told me if I could find an artist worth recording, he'd let me record him and we'd see what would happen. I was lucky. Mongo Santamaria was in Philadelphia and the owner of a local jazz club called me up and said, 'There's a flute player down here, I've never heard anything like him in my life.' He knew I was looking for an artist. I had hit on some of the bigger cats, but I was 19 and they looked at me like I was nuts. So I went down and heard this guy, flipped out and called Nesuhi saying, 'I got the guy, let's go.' The flute player was Hubert Laws. That's not a bad way to start."

From there Dorn did an album with Bobby Timmons for Prestige Records and one for Verve with Curtis Amy. Fittingly, he was given the chance to record a rather unusual act, Rufus Harley, and the resultant LP, *Bagpipe Blues*, sold well enough to get him hired on to Atlantic as a full-time staff producer. Even though he had a few albums under his belt at that time, Dorn readily confesses to being scared stiff during those early sessions at Atlantic.

"I won't say I didn't trust my native instincts, but I didn't know what to do in the studio. I'd been going to any studio I could get into and watching people, so I didn't go in not knowing anything, but relative to what you would really have to know to make a record, I didn't know anything. At one point I got a little paranoid for a minute and pushed the talk-back in the middle of a take, saying 'Stop. Let's take that again.' I felt like I had to do something so I did that. The

engineers were helpful 'cause they had been through this 42 times before and they'd seen idiots like me come and go. So they would say things like: 'OK, good. The reason you don't hear any bass is because the bass player stopped playing'."

Discussing influences on his approach to producing records, Dorn is categorical. "There's only *one* influence. I don't have to tell you who the influence on all living producers is. Who's the only person — I'm not that influenced by producers, I'm more influenced by photographers, writers and movie directors — that's an influence the rest of the world? It's *Spector*! There's no other producer."

Although this is an attitude shared by many other record people, it seemed curious that Dorn hadn't been more influenced by the classic sound of early Atlantic jazz and R&B records, given his correspondence with Nesuhi Ertegun.

"There was the 'R&B sound of Atlantic,' that great bass and drum sound, which is fine, but that didn't get me as much as the fact that they were working with an eight-track when everybody else was using three or four. But for a *sound*, it was Spector. I still listen to his records at least once every couple of weeks. I put them on just to get my bearings."

Having dispensed with the question of influences, Dorn attempted a retrospective of his meteoric career at Atlantic — no easy task since it encompassed such a variety of artists and individual styles.

"The major acts were undoubtedly Roberta Flack and Bette Midler. I hooked up with both of them within six months to a year of each other. But the thing that really blows me out was that I was able to sign a lot of my friends, artists like Roland Kirk, Yusef, Les McCann and David Newman."

Even though he was a staff producer, Dorn was rarely assigned a specific act to produce. His rapidly emerging production aesthetic and the fact that Nesuhi Ertegun was increasingly reluctant to go into the studio left the responsibility for signing and producing jazz artists at Atlantic squarely on his shoulders. True to Dorn's nature, most of the major signings he was responsible for had unusual circumstances surrounding them. Roberta Flack, whose single "First Time Ever I Saw Your Face" was probably his biggest popular success,

was no exception.

"Strangest story in the world. Got a call from Roland Kirk one day and he says, 'My bass player's wife is in Washington and she's a real good singer.' So I asked him what she sounded like and he says, 'Well, you better sign her.' So I repeat, 'What does she sound like? Give me a clue.' So he says, 'Well, she's a real nice coloured lady.' So I say, 'great Roland, but...' He says, 'All right. I told you. Do what you want.' We never talked about it again."

"About a year later, Les McCann's playing Washington and he calls me up: 'Sight unseen man, *sign her*. Just do what I'm telling you.' I went to Nesuhi and told him that Les had just found the best singer he'd ever heard in his life. I explained that she was singing with a trio, all ballads, and I could put some strings on it. So he told me to take the shot and sign her. We made a deal without even hearing her."

"So she sends me a tape recorded in the club where she worked in DC. A guy named Tony Taylor, a local club owner and promoter, had sent this tape to every record company in the world and she'd been turned down by all of them, including Atlantic, which I didn't know at the time. When we went in to make the first record there was a lot of tension and nervousness and things didn't really work out. I remade the album and we titled it *First Take* because once, during the earliest sessions, she sang and I said, 'OK, we're just getting the sound down: do it again.' She looked up at me with an expression of amazement and said, 'We just did it. What was wrong with that one?'"

Even though the sequence of events leading up to Flack's signing were odd to say the least, the story behind the album and single's "delayed" mass acceptance by the public is even more bizarre.

"Quality was still a consideration at Atlantic then. All of her tunes were six or seven minutes long and we cut the LP with no real commercial intentions. We just wanted to cut it because it was pretty, or we dug it, or whatever. So Clint Eastwood is drivin' to work one day and he hears 'First Take' on KBCA, who just happened to be playing a two-year-old album by Roberta Flack. She'd sold about 130 to 140,000 albums at that point and was working her way up into an FM jazz thing. He called us on the rights to the song for a

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movie he was making, 'Play Misty For Me', and we let him have it for about 500 bucks. Next thing we knew there was an *avalanche!*

"When the film came out, a Programme Director from New Orleans, Bob Mitchell, went back to the album and started to break the single on his own. But the song was 5:04 and we had to get it down to 4:05 to ensure airplay. So I edited it down and sent it to him. His secretary called me back — I don't remember the lady's name, but I'd like to give her a hug and a kiss — and said, 'Look, you edited that song wrong. You killed the story — here's how you should edit it.' She told me exactly how to edit it over the phone. I had done it completely wrong. Sometimes you get much too close to a thing."

Dorn got the word about Bette Midler from several people in the business, one of whom was Doc Pomus, within the space of three days. Deemed "too visual" and therefore un-recordable by several record companies, Midler was doing a show at New York's Upstairs at the Downstairs to enthusiastic audiences. Dorn went down to see her and "it took exactly three seconds to know that I wanted to make a record with her." Although Dorn produced Midler's first album and hit single "Boogie Woogie Bugle Boy" (another unlikely choice for hit), much of it was re-recorded by another producer because Bette was having second thoughts about what she wanted the record to sound like. Dorn is still reticent about describing what actually went down at those sessions and when asked whether producing Midler was tough going, he passed over the subject with the terse reply: "Did you ever try and rollerskate up Mount Everest?"

Although Dorn never really got involved with rock'n'roll at Atlantic, he did produce one track ("Please Call Home") on the Allman Brothers' *Idlewild South* album.

"Tommy (Dowd) was producing them and Duane and I were good friends. King Curtis, Duane and I would hang out every once in a while. In fact, Duane was a Roland Kirk freak and he wanted to record with him. Anyway, the Brothers were in New York and they wanted to go into the studio but Tommy couldn't make it, so he called and asked me to do a couple of tracks with them. We did 'Please Call Home' and another turn — it was fun."

Although Dorn worked primarily with "jazz" acts at Atlantic, nothing sets him off more than people who attempt to

define musicians like Rahsaan Roland Kirk and Yusef Lateef by using that narrow and oft-maligned four-letter word.

"I've always felt that Kirk and Lateef had gigantic scopes. I mean, what is 'jazz'? It's just another dumb work like 'R&B' or 'box'. What do these terms really mean? Here's Yusef Lateef who's working on a doctorate at the University of Massachusetts. He's teaching at the City College of Manhattan. His interests range from the most obscure Tagalog music of the Philippines to Coleman Hawkins, so he was open to lots of things. I tried to show the scope this man had and that he could play anything. We always had basic stuff on his records — the flute songs, the love themes, the hard-blowing tenor things, the 'out' things — but we always tried to show he had a lot more to offer than just being a 'jazz musician.' And Kirk too. Every Kirk LP was a different concept. That was thrilling for me. Those albums with Kirk and Lateef — I don't think I'll ever feel that way again. It just opened my head up, because Kirk would come in and *make* me listen to a Jelly Roll Morton cut or a Sidney Bechet cut. He showed me something I can't thank him for."

After a long and fruitful run at Atlantic, Dorn decided it was time to leave and establish himself as an independent producer. He immediately started work on Don McLean's *Homeless Brother* LP and has been producing a fascinating roster (Leon Redbone, Peter Allen, Asleep at the Wheel, Dory Previn, Bonnie Koloc, Steve Goodman and others) of artists over the last few years. Asked about his personal criteria for singing and producing a new act, his answer is both vague and specific.

"The most essential thing is *the most essential thing*. But it's just *something*. You take a person like Rod Stewart and maybe in the beginning of his career his material wasn't the best — but his voice was. There are very few Joni Mitchells; someone with a great voice, great perspective, great material and a great sense of what to record and how to record it. It's a bonus to get all of those assets, but if you get one and the artist has the ability to adapt to the others — like someone with a great voice who doesn't have a good sense of their material — you just give them what they need and hope they can go."

Although Dorn has had his share of hit singles, he never really made an overt attempt to record one.

"I always hope to have a hit single but in many cases the artist I'm dealing with is not a hit singles artist. If you were a record company president and I walked into your office and said, 'Hey, I could sell a quarter of a million LPs if I have this guy Leon Redbone sing 'Shine on, Harvest Moon,' you'd order up some thiorazine.'"

Joel has worked in the same studio (Regent) and has used the same engineers (Bob Liftin, Vince McGarry) for years. The technical side of recording is not a fascinating topic for him, something made clearer when he tries to describe his "sound".

"I have a way I like records to sound in general and, with certain things, specifically. I just did an album with Asleep at the Wheel — essentially a country swing, Bob Wills type of thing — and we did one track that I wanted to sound and feel like a King Pleasure record. I have a basic sound I start with, and it's not really a 'state-of-the-art' sound. It's a sound that I hear and it's not always a 'big' sound. There's a feeling. I dig the feeling of something 'cause I've got a studio with engineers and we can work at it and get the 'big drum' or 'big bass' and stuff like that. When I'm involved in *that*, I go after *that*. I try, but sometimes there's another thing that I hear. It's a feeling, a colour, a projection. Sometimes I have to use more technology to get less of a 'state-of-the-art' sound."

Commenting on the current status of music, Joel Dorn shows sympathy for any music he claims is "hooked up," or directly tied to an ongoing music tradition. This open-minded attitude even extends to disco music: "The people are already down with it. The critics are the ones who can't handle it." Asked about the bland "middle-of-the-road" trend in jazz music today, he leans across the desk for emphasis and wraps up the interview with a characteristic flourish.

"MOR jazz ain't bad if it's balanced with the real thing. Wes Montgomery was no worse a player on 'California Dreamin' than on 'Fried Pies.' I don't mind any commercial success for anybody. What I miss is the *giant* Keith Jarrett, Gary Burton, Chick Corea and John McLaughlin are all magnificent players. You can't fault any of those people on anything. What do I miss? I miss Bird. I miss a Trane, a Coleman Hawkins, a Prez. The Jesus who dies for everyone's sins publicly. The person who *turns it around*. That requires giving it all up."

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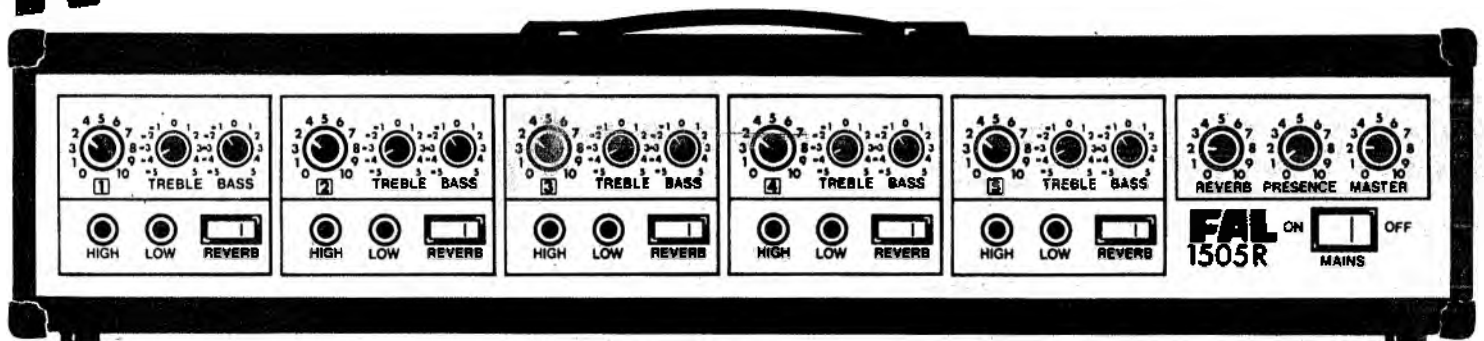
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# RECORDING WORLD

## PYE STUDIOS

Some studio complexes are built from scratch. They are conceived by a designer dreaming of Star Wars technology, fashioned by architects inspired by creative environment research, and developed by experts in logistics, ergonomics and aesthetics.

And some studios just grow, evolve, develop and, while incorporating some or all of the above elements, still manage to impress the onlooker with their organic feel.

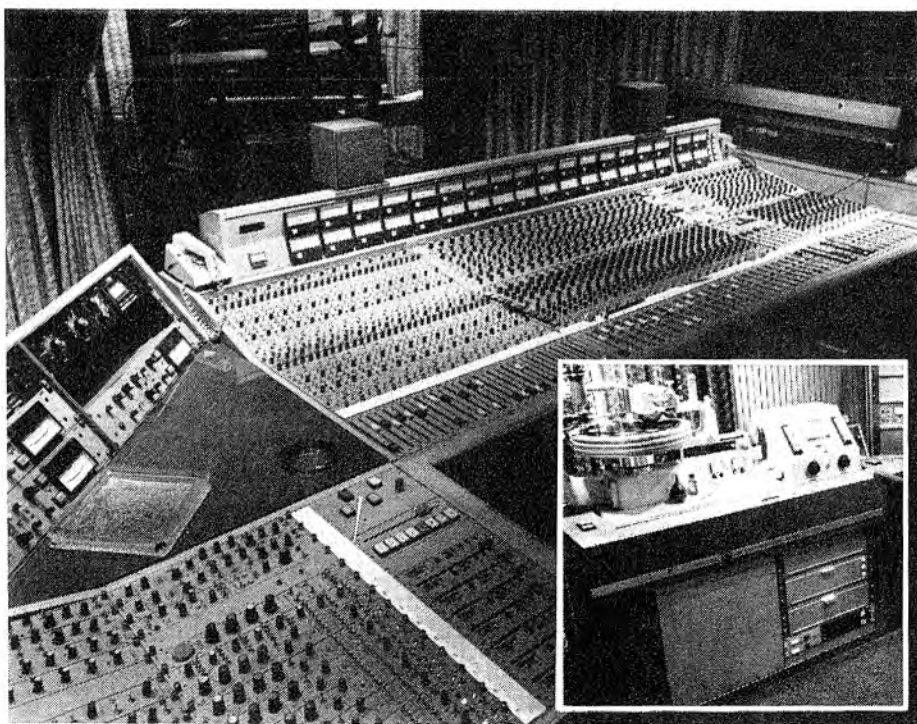
Such is Pye Recording Studios. It's fairly old as studios go, and "old" isn't synonymous with outdated, and used to be rehearsal rooms before the first recording equipment was installed about 12 to 15 years ago. Since then it's undergone two facelifts, and if "feel" is generated by the sheer number of artists who've passed through and performed within a studio's portals, then Pye must be dripping with it.

Noel Jesuadian, manager, says: "A studio can have the most advanced and up-to-date equipment that money can buy, and still not work. Feel counts for lot. Here at Pye we have the best balance of the two."

There are a pair of studios at Pye, aptly named One and Two. One is the oldest and biggest. In addition there are two cutting rooms, used by notables in the league of Leo Sayer and Paul McCartney. A lot of the work handled here isn't generated by Pye, and though the complex is wholly owned by the record company, about 60 per cent of total throughput is client work. At the last count, Pye was producing between 17 and 25 of the top 75 British singles.

Studio Two is the more modern of the pair. It was designed and built by Eastlake Audio two and a half years ago.

"When Eastlake first set up in London," explains Noel, "their designs set the trend for a lot of other people. They tended to move away from boxlike rooms." And this is the case with Studio



Two, which is symmetrically shaped but doesn't give that impression due to the abundance of soft angles in ceiling and walls. Untreated wood panelling, as well as lava rock walls, has been used to counterpoint the technology inherent in the studio equipment. Beige and brown are used to create an impression of warmth.

The console is a computerised Cadac with 44 inputs and 22 outputs. It has one Studer 24 track tape machine, a Studer four track and three two track recorders from the same company. The studio occupies an L-shape around the front and left hand side of the control room, from which it's separated by sliding glass doors — soundproofed, naturally. Monitors are the Eastlake JBL's. The area is fairly small, but very modern and bang up to date.

Studio One is the workhorse of the Pye set-up. Whereas Two is great for fine knob twiddling, One is where most work gets turned around. The control room is much larger and sparser looking in design. The walls are merely painted and give an altogether more functional atmosphere, rather like comparing the bridge of the HMS Hood with that of the USS Enterprise. The studio is much larger, too. One engineer reckons that at a pinch 60 musicians could be fitted into the area. Monitors are Lockwood Majors.

One was rebuilt six and a half years ago, and fitted with a 16-track Neve console, which almost immediately was converted into a 24-track. The recorders used are a single Studer 24-track, one Studer four

track and a pair of Studer two track machines.

Neither of the recording studios has built-in effects units. Rather, these units are floating, and are used in each control room as the need arises. Eventide harmonisers, flangers, digital delays, and phasers are employed. A variety of mikes are used, including Neumanns, Beyers and Sennheisers.

Both of the control rooms house Amcron DC300A amplifiers. A Bechstein Grand piano and a Fender Rhodes are the only two instruments that Pye provide, everything else has to be humped in. Which isn't too difficult. Anything that can't be humped downstairs into the basement area that the studio complex occupies, can be taken down in the goods lift, which is accessible from the street and has a loading platform.

When the artist isn't recording, he isn't as pampered as at some set-ups. There's a lounge, with a colour TV on its way, a pin-ball machine, a coffee machine and a crisps and peanuts dispenser.

There are two cutting rooms at Pye. Each is similarly equipped with Amcron amps, Neumann VMS 70 cutting machines and the ubiquitous Studer two track tape machines, one in each. Lockwood monitors are employed in each room, too.

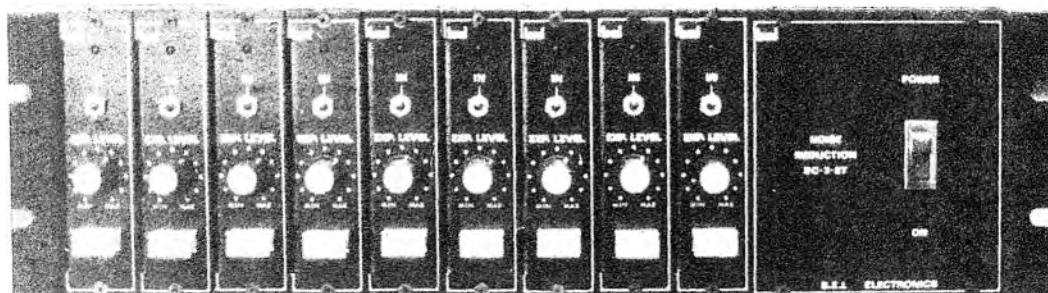
Studio Two cost £55 an hour to use, while Studio One is cheaper at £50 an hour. Pye is a lead's stretch away from Marble Arch, and if you're interested the man to contact is Noel Jesuadian.

STUDIO OF  
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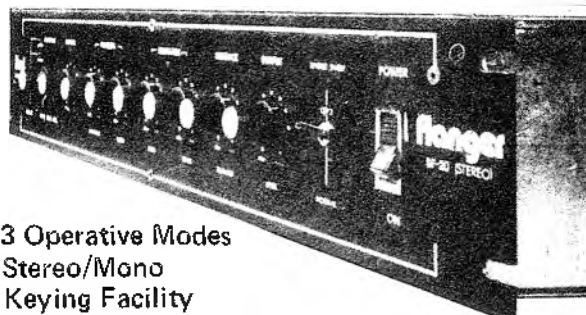
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# RECORDING SYNTHESISERS

## Part 4: TIMING TRACKS

In the first three parts of this series, I outlined the various ways in which mono, stereo or 4-track tape recorders can be employed to record your own music using the multi-tracking technique. In this article I describe how to set about recording timing tracks which act as the rhythmic foundation for the parts added subsequently.

### Cueing

Let us suppose you have to record an arrangement in four parts, in which the bass starts first, playing alone for two bars before being joined by the other instruments. If the bass part is synthesized and recorded first, then when any other part is recorded, you can pick up the tempo from the bass part before you have to start playing the new part. The bass part acts as a *cue* in this instance.

However, if the arrangement was such that two or more parts had to start *together* at the very beginning, there would be a problem. Let's call the two parts starting together the first and second parts. When the first part had been recorded, there would be no cue when you were attempting to record the second part; you would have no way of picking up the tempo or of anticipating the first note of the previously recorded part. The solution in this situation is simple and obvious: start by recording the first or second part (whichever you prefer) but lead in with a few bars in strict tempo, repeating the same note on each beat or each alternate beat. Fig. 1 shows how to play a cue in the general case where, although the two instruments do not start at the same time, there are insufficient beats (in this case three) between their entries to establish the tempo. Each time a new part is

recorded, these extra notes at the start will act as a cue. When all the parts have been recorded, the cue can be physically removed by cutting the tape. If you do choose to tap out every beat, leave at least one beat's rest before the music proper starts, so that editing out the cue is not critical, and there will be no risk of spoiling the first notes of the arrangement.

### Click track

It is very difficult to maintain a strict tempo for a long time (ask any drummer!) and it is often helpful to start by recording what is called a 'click track', keeping this track separate from the others until the stage is reached when it is no longer required, when the track can then be re-used.

As an example, suppose you had to make a four part recording and you were working with two stereo machines and one synthesizer. To make the click track, you could connect the LFO square wave output directly into the input of (say) the left track of one of the tape recorders, as shown in Fig. 2, and the rest of the synthesizer could be used at the same time to synthesize one of the instrumental parts. By monitoring the left track, you would hear the clicks produced by the steep edges of the LFO's square waveform, the 'tempo' being set by adjusting the LFO frequency control. Having set the tempo, you would start recording (on both tracks), *play a cue in front of the instrumental part* (this would be essential! — see above), then continue to the end of the piece. The subsequent stages of recording the three other voices would then follow the procedure already described in Part 2, at each stage *both* the

click track and the music track being transferred to the other recorder, until the stage was reached when the click track was no longer required. In situations where the first part to be recorded is more or less rhythmically continuous (i.e. there are no long rests in which you might lose the tempo), there is no need to record the clicks, and in this case the synthesizer's LFO can be used simply as an electronic metronome which is heard but not recorded when the first track is laid down.

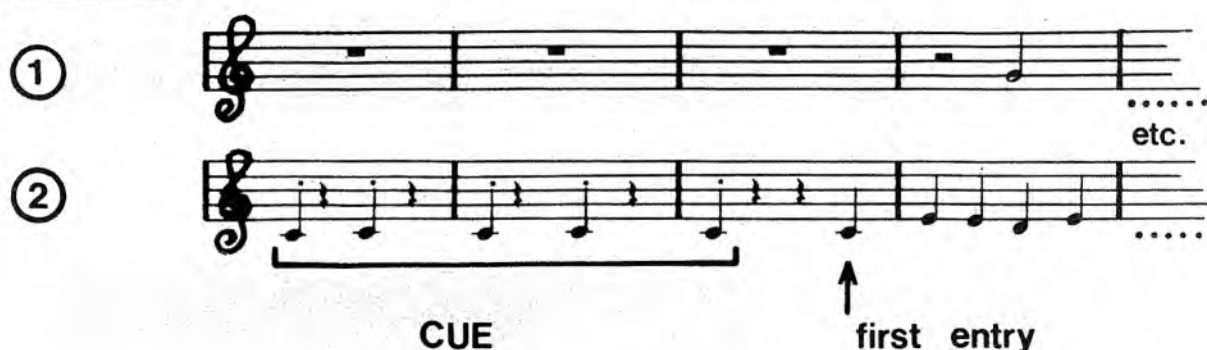
### Electronic rhythm

One of the more subtle difficulties of multi-track recording is getting the right 'feel' into the performance of the separate parts, particularly in the early stages, and an electronic rhythm unit of the kind commonly used by organists is very helpful in this respect. The rhythm unit need not be particularly sophisticated, because the synthesizer can be used to improve the rhythm patterns and sounds enormously as I will be describing later in the series. The electronic rhythm track would be recorded in the same way as a click track, being retained until the final part had been recorded, then modified if necessary.

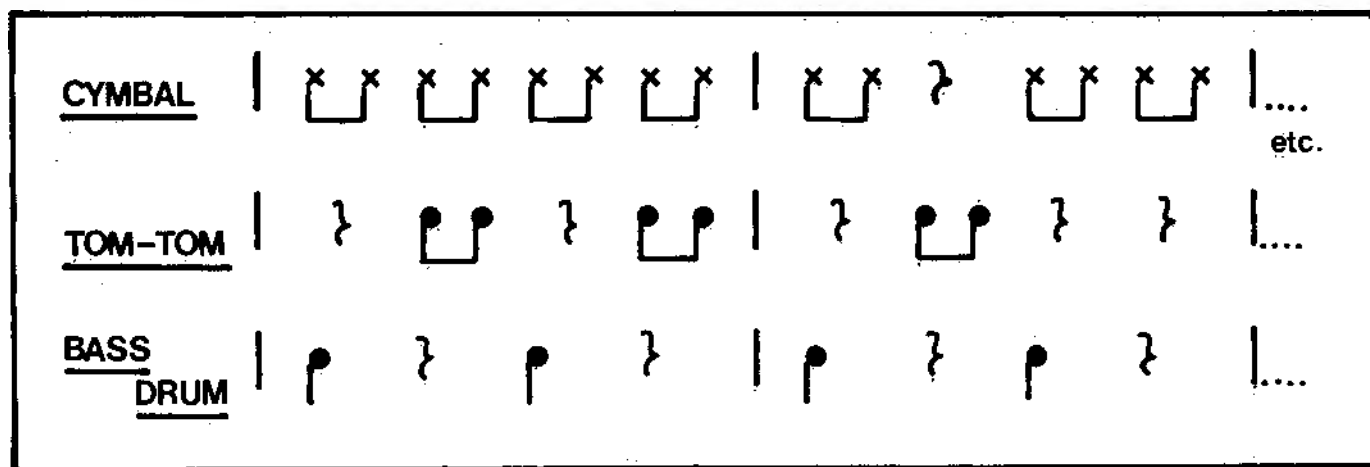
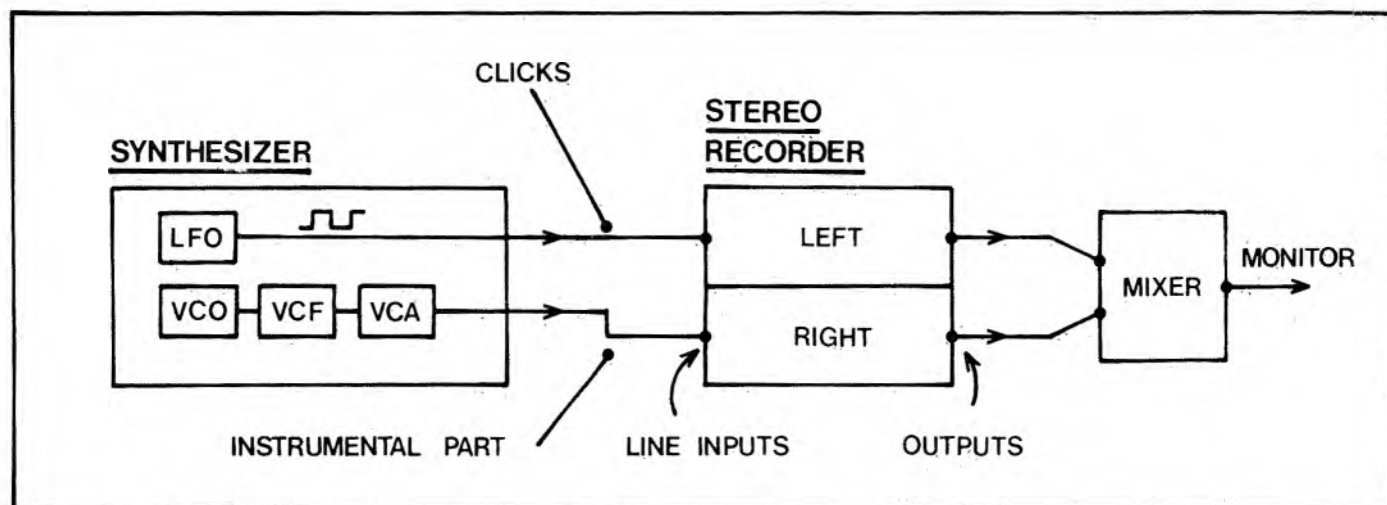
An alternative approach involves using the synthesizer itself to generate a rhythm pattern: synthesizers can easily produce percussion sounds and it is possible to

Fig. 1 When making a multi-track recording, a cue should always precede the start of the music. It is easiest to begin by recording the part which makes the very first entry, leading in with a few bars in which notes are tapped out on every beat or on alternate beats.

### INSTRUMENT







"multi-track" a percussion section in exactly the same way as the other instrumental voices. Fig. 3 shows, for example, the various instrumental parts in a relatively simple rock rhythm pattern, which could be recorded one part at a time using the synthesizer to generate each percussion sound, and of course a temporary click track could be used to keep the parts in time. Actually by using the LFO to trigger the ADSR module, a synthesizer can produce (for example) bass drum beats or cymbal crashes at equally spaced intervals, so a click track is not always necessary when multi-tracking a percussion section. Next month I will be explaining how a synthesizer can be set up to produce percussion sounds and automatically generate simple rhythmic patterns without necessarily involving a sequencer.

Fig. 2 Simultaneous recording of a click track and one instrumental part as the first stage in making a multi-track recording.

Fig. 3 A basic rock rhythm pattern in three parts. Using only a simple synthesizer, an effective percussion section can be multi-tracked in exactly the same way as any other instrumental ensemble.

by  
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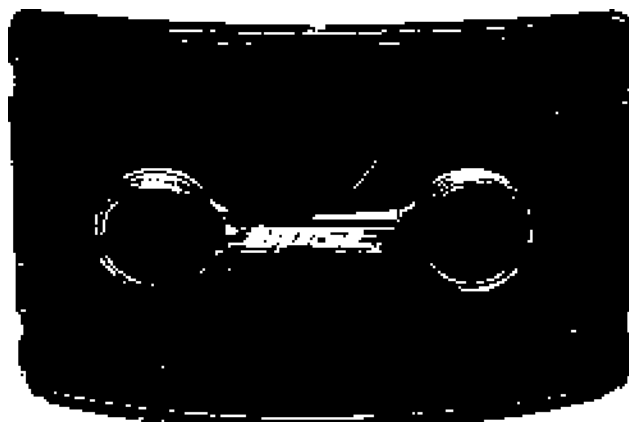
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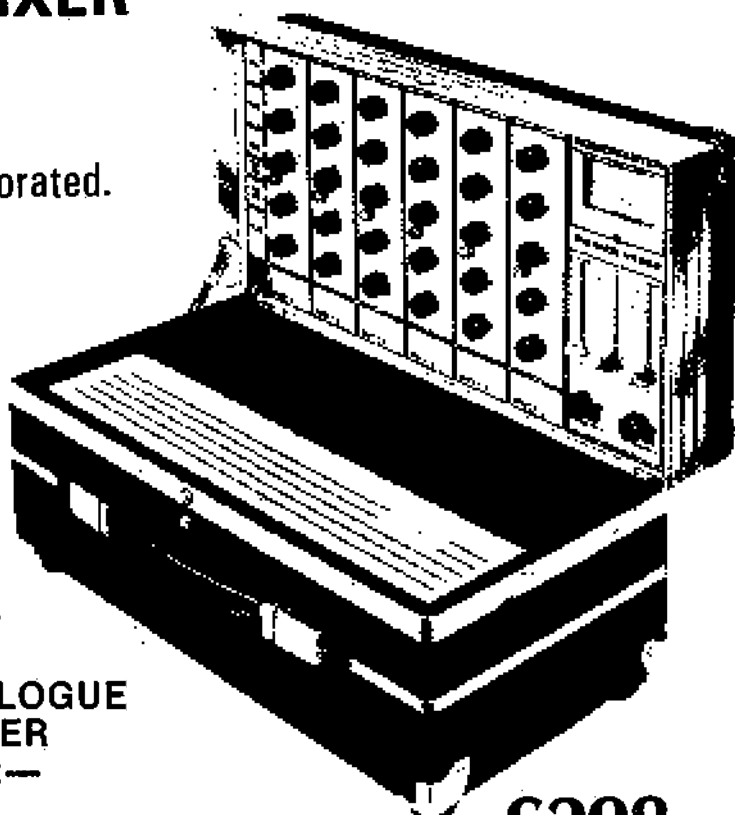
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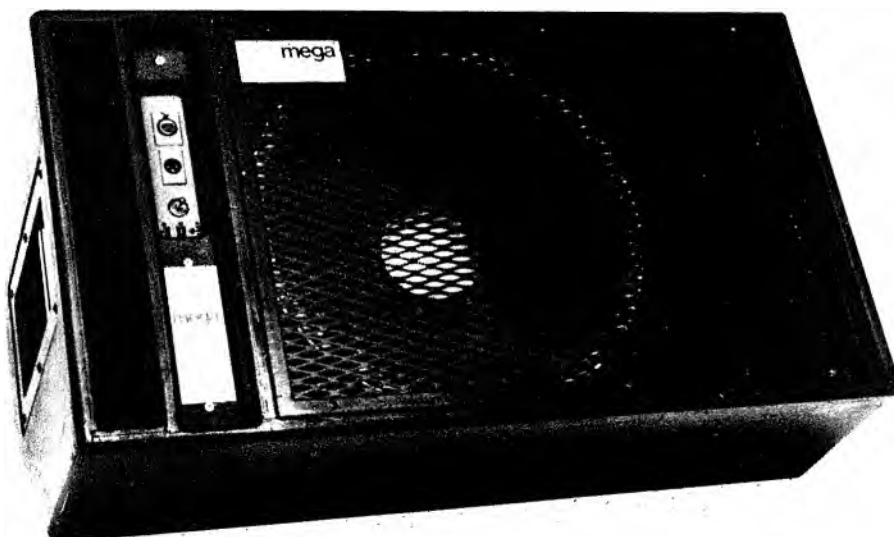
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# Queries

## Student Power

I want to form a band with fellow students but the cost of amps/PA is a major obstacle.

Could one use the inputs of a PA mixer/amp to amplify bass, guitar, etc? Could the output of an instrument amp be put through PA speakers?

*Tim Stebbing,  
Scarborough,  
North Yorkshire.*

*Mark Sawicki replies: I would not recommend using one mixer/amp to amplify all instruments, although I agree that the cost of separate amps/PA is a major obstacle in the formation of student bands.*

*You could optimise the cost/performance ratio by using an inexpensive combo amp to start, with perhaps two inputs on it. Most combos are equipped with more than one input, and acquiring one is not so difficult. As far as PAs are concerned, the most economical type for you is the mixer amplifier type which combines both power slave and mixer functions in one box. However, even a mini-system such as I've described doesn't work out cheap these days.*

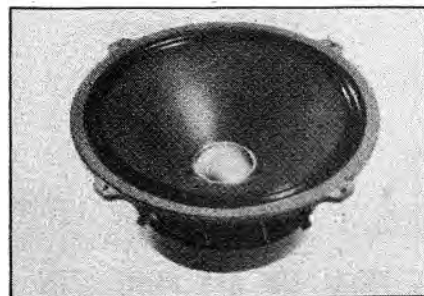
*You could always buy second-hand gear, but make sure you have somebody who knows about sound gear with you when you buy.*

## Bass Intentions

My intention is to make a cabinet to take a 15 inch speaker for bass. I have designed the cabinet to two parameters, the speaker must be angled up, and the cab must fit my car.

My amplifier is a Fender Bassman 135, so I need to use a 15" speaker that can take 135 watts. However, the cost must stay between £40-£50.

*D. Heath,  
Chislehurst,  
Kent.*



*Ken Dibble replies: There are a number of 15" speakers now available that will handle 135 watts of bass guitar, and which fall broadly within your price range. These include: Celestion G15-150, the HH Acoustics 1500E, 1500B and B15/L, the Richard Allen HD12/P, the RCF L15P/03, the Fane Classic 150 and Crescendo 15E etc. These immediately spring to mind, there are probably others.*

*Though you may have designed your*

*cab to fit your car, may I suggest that you check the recommended cabinet size details for whichever speaker you decide to use. The internal volume must be of a certain size irrespective of the shape or direction in which the drive unit is facing. For a 15" speaker the volume of space needed in the cab is likely to be between 80 litres and 130 litres (3000 to 8000 cu ins). You must use at least 18mm chip-board or plywood for the cabinet and all the joints must be sound and airtight.*

## Honky Tonk

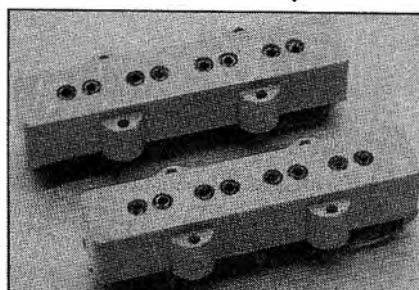
I play a pre-CBS Fender jazz bass but there is one slight problem about its sound.

My amp a Fender Bassman 100 and 2x15 Custom Sound Cabinet has been checked and found to be OK. After trying many makes of strings, round or flat wound I still seem to end up with a slight honky tonk sound even on open strings!

Lately the pots have been renewed with 250K's and .022uF tone control capacitor.

Would fitting DiMarzio jazz bass pickups help me cure the problem and do they hold any advantages over my aged originals? Can I achieve a Music Man Stingray bass sound without fitting a pre-amp and lastly are they easily available in this country as far as pre-amps go?

*Robert Gallone,  
Whitley Bay,  
Tyne & Wear.*



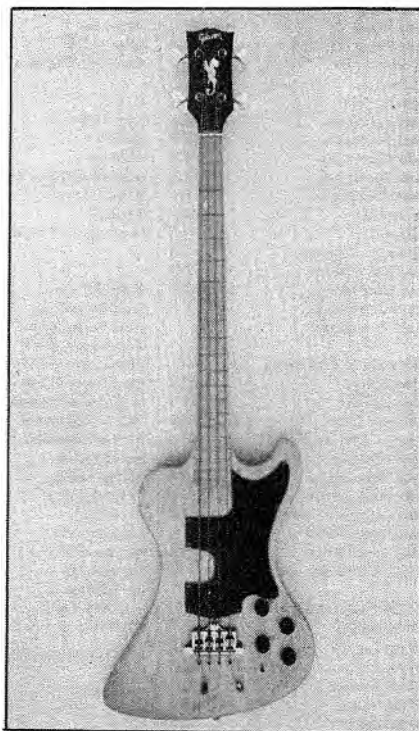
*Stephen Delft replies: I am not quite sure what you mean by a Honky Tonk sound. If you mean that there is too much treble or not enough warmth, you might consider either a different amp or an MXR pocket sized equalizer. Or you might consider writing to Chandler Guitars who make guitar pre-amps. I haven't tried them but you might find them helpful. As far as I know the Music-Man pre-amps are certainly not available in any way, except in Music-Man's bass's. I doubt whether the DiMarzio pick-ups would sound noticeably better than your old originals, — though they may well sound better than new originals.*

## Active electronics

I have been playing bass in local groups for the last three years. Myself and another member of my group have become interested in obtaining the RD Active Electronic bass and six string Gibson guitars. But before we purchase an RD we should like to know if there is any truth in the rumour that the "Active Electronics"

in the RD is capable of ruining valve amps such as Marshall, therefore, could you please supply us with any important information concerning the RD.

*Paul Stanley,  
Hardway,  
Gosport,  
Hants.*



*Stephen Delft replies: You ask whether the electronics in the RD guitars can damage valve amps. As far as I know the answer is "no". It depends on the valve amp of course. I would also consider that if you use the attack circuitry, you may be driving the amp rather more heavily than you would think from the apparent loudness. I would suggest if you are worried about this matter, that you write directly to Norlin and ask them for a statement on this. Then if any trouble does occur, you have them over a barrel. I don't think it is likely, but if you want assurance, ask Norlin.*

## Lacking punch?

Can you please help me? The PA system we are using at the moment just doesn't seem to be giving the correct output of power at all. Could you please help me by telling me what crossover frequencies are best for the speakers we have, or if we are doing something else wrong along the line.

It is a three way stereo system. The bottom end is powered by a Peavey CS800 amp each channel into 2x4560 bins with JBL K140 speakers. The mid by a MM AP 360 amp each channel into one Gauss 2841 speaker (8 Ohm) and the top is powered by a Crown D150A each channel into one Altec 808A driver (8 Ohm). The crossover is a three way MM When we first tried the system it lacked a lot of punch at bass end. The crossover was adjusted to

# Queries

400 Hz from 300. Even after this was done the bass doesn't get nice and meaty until the overload lights on the Peavey are flashing away, and the mid and treble on the crossover are nearly full on to obtain correct balance.

I have phoned MM, JBL & Cetek but I always seem to get put through to the tea lady or a salesman.

Ian Tindale,  
Dallington,  
Co. Durham.

Ken Dibble replies: I am afraid that I cannot be specific in respect of your problem, as the troubles you are experiencing could be due to a number of contributing factors. The first thing to check out is that your amplifiers and loudspeakers are working in phase. In other words, a positive going input to each amp should produce a positive going impulse at the positive output terminal, and this should be wired to the positive terminal of the respective loudspeaker. Check also that a positive pulse applied to the positive loudspeaker terminal does in fact produce a forward or positive going movement from the cone. You may need some technical assistance in checking this out, but it is important. Whilst you are at it, check also that all three outputs from your MM crossover are in phase with each other. The K140, whilst not specifically intended for use in a 4560 type bin, should even so give a really good account of itself. It is not a particularly sensitive loudspeaker, but certainly has a lot of "thump" to it. One possible reason for this not happening could be the quality of the 4560 itself. There are a lot of manufacturers now making these, and some of them are not really up to the quality necessary. Inferior timbers, insufficient bracing, second-rate joints etc are often encountered on some 4560's. Depending upon the type of horn you are using with your Altec 808 units, I would use crossover frequencies of about 400Hz and 1kHz with the components you are using. It might well be worth trying the rig using just the 4560 and 808 units, and crossing over at 800Hz. Often, the mid-range cabinet is more trouble than it is worth, and the front flare on the 4560 is good up to 800Hz as a mid-range flare. I hope that this will be of some help, but I would really need to see your rig before being any more specific.

## Too clean

I would be grateful for some information on an old Selmer Zodiac AC 50 watt combo which I purchased second-hand a few years ago.

It is at present fitted with a pair of 12" 8 ohm "Vox" speakers which I suspect were not the original type of rating fitted to this amp. It also has an extension loudspeaker socket on the back of the chassis to drive a 15 ohm speaker.

The problem is that I am trying to get a

more valve type distortion/sustain sound from the amp, and being a valve amp even with high volume setting on both the amp and guitar, it still has a very clean sound. Like that used for country music.

I also have a pair of Goodmans 12" 15 ohm speakers which I think are rated at 50 watts and wonder if it would be advisable to fit them along with new valves to try and achieve the sound I am looking for.

G. Purdie,  
Kelso,  
Roxburghshire.

Mark Sawicki replies: Selmer amplifiers at the time of construction were designed for a clean sound of course and the distortion/sustain you require are the sort

of things one can achieve with amps that have a "Master" control fitted. In other cases, the best solution is to insert a little pre-amp/sustain box between your guitar and the amplifier, which will produce some of the gain you require in order to overdrive your amplifier slightly.

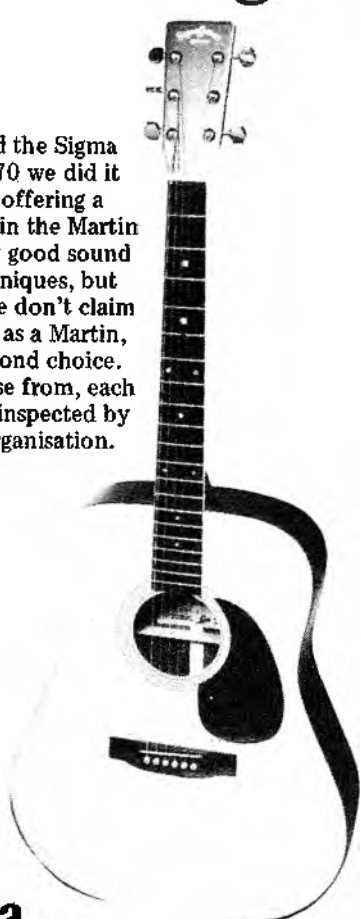
There are hundreds of various effects boxes on the market but I would not like to recommend anything as it is such a personal thing. Best to go along to your local dealer and try out a few with your own amp in tow. Don't replace the speakers if they are OK, as the Distortion/Sustain sound is usually produced in the amp and not by overloading the speakers.

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# Albums

## Rev Gary Davis

## Richard & Linda Thompson

## Weather Report

## Herbie Hancock & Chick Corea

## Reverend Gary Davis

*The Best of Reverend Gary Davis in Concert (Kicking Mule)*

In truth, the late Reverend plays at his best; the mood relaxed, the audiences receptive, and the material a selection from all sides of his vast repertoire. His indomitable humour figures strongly in this selection of concert performances and they are appreciably different in character from recordings made towards the end of his life when his voice, at least, was perceptibly weaker.

The album includes several spirituals and in particular "Twelve Gates To The City" is given a boisterous rendering which is a tremendous showcase for Gary Davis' powerful yet often tricky guitar playing. "It's a Long Way to Tipperary" is a further demonstration of how Davis-style ragtime-blues refreshes the tunes other guitars can't reach, and really sets the scene of the live performance. However, for an example of the great man at the peak of his powers, "Soldier's Drill" (perhaps better known under Stefan Grossman's title of "Soldier's March") takes a lot of beating. Here and elsewhere you get a fine example of something he shares (curiously enough) with Jimi Hendrix: the ability to set up a genuine dialogue between voice and guitar. Few others in any style of playing have made the instrument that articulate.

If you are a confirmed disciple, you won't be disappointed with *The Best of Reverend Gary Davis in Concert*. And personally, if I were choosing a definitive example of his work for a record collection, I think this would perhaps be the one.

**Paul Ashford**

*Produced by Stefan Grossman.*

## Richard & Linda Thompson

*Sunnyvista (Chrysalis)*

There's a family feel to this album, but Richard and Linda's togetherness evokes the ideal world of the cornflake advertisement rather too strongly for my taste. The lyric lines protest against more or less anything from a standpoint which might be rock music's version of "The Good Life".

But if this kind of criticism can be levelled at tracks like "Civilization" and "Sunnyvista", you would be justified in assuming that nothing with Richard Thompson in it could be all bad, or even all mediocre. There are moments on this album when it recaptures the zest of a Fairport production (insofar as you can get that sans Swarb). Richard's guitar playing is bright if unspectacular, and the list of contributors takes a tidy chunk out of the Who's Who of British folk.

However, for my money, the credit for giving this material that extra touch that turns it from a rather middle-of-the-road production to something arranged with originality and flair, goes to John Kirkpatrick's accordion playing. I mentioned in another review what a delightful rock accompaniment can be produced by the right vamping on a squeeze-box, and this is just another example. May there be many more!

**Paul Ashford**

*Produced by John Wood and Richard Thompson.*

*Recorded at Olympia Studios, Chelsea.*

## Weather Report

*8.30 (CBS)*

Among the proliferation of fusion acts over recent years, Weather Report have always stood out from the rest not only because of their undoubted musicianship, but also because of their sheer brash style and panache — never afraid to project their showmanship or poke a little fun at themselves from time to time.

All this has been particularly true of their concert appearances, so it's perfectly valid for a band like this to release a live double album, recorded at various recent US concerts.

The whole set bubbles with tremendous verve and energy, even old faithfuls like "Birdland" and "In A Silent Way". The ever imaginative Joe Zawinul keyboards shine throughout, and even Jaco's bass solo is mercifully short, while Wayne Shorter's cute solo wandering through "Thanks For the Memory" is an irreverent joy.

So this is an album which can equally be recommended to recent converts looking for a best of Weather Report compilation, or to older fans who will surely relish hearing old favourites improved by the additional vigour and conviction of live performance.

**Stanley Shaw**

*Produced by Joe Zawinul.*

## Herbie Hancock & Chick Corea

*An Evening with Herbie Hancock and Chick Corea in Concert (CBS)*

Arriving at one of the Herbie Hancock/Chick Corea concerts in London last year was rather like going to church. A hushed, reverential audience sat apparently entranced by two figures on stage facing each other across two concert grands. Yet, devoid of the trappings of the studio, electronic instruments and distractions of other musicians, it was perhaps more evident than ever what extraordinary virtuosi these two men are. Indeed, for once, the recording is even more useful to the student than attending the gig, because Herbie Hancock appears throughout on the left speaker and Corea on the right, so it's possible to segregate their contributions.

What came across at the gig, confirmed here, is that Chick Corea displays more feel and lyricism than perhaps one expected, and was tidier and more purposeful in his solo passages. But, of course, this being a CBS release, one gets a lengthy Hancock solo outing, but unfortunately not a corresponding Corea one.

Still, the duet interpretations are the crux of the matter, mixing structured themes to wander into more experimental areas. The starting off points range from Corea's "La Fiesta" through Gershwin's "Lisa" even to "Someday My Prince Will Come." The meanderings get a bit too much in places and the overall effect is rather flat, lacking in pacing and dynamics. Side Four is a lengthy 35 minutes, and the sound level is somewhat lower, though this doesn't detract too much. In conclusion then, an important and worthwhile release, but one for the devotee rather than the half-hearted listener.

**Stanley Shaw**

*Recorded at concerts in San Francisco, Los Angeles, San Diego and Ann Arbor, February 1977.*

*Jaco Pastorius*







Jimmy Pursey Cliff Richard

## Sham 69

*Hersham Boys (Polydor)*

This album was undoubtedly made as a farewell offering from Sham, the band having decided to split some time ago. However, almost co-inciding with its release, they announced plans for more gigs. So whether this will be the final offering from Jimmy Pursey and Co., is hard to say.

After listening to the first side of the album, I was tempted to agree with their original decision to call it a day. Following the excellent *That's Life* album, the first crop of tunes on *Hersham Boys* was a let down. It was no more than uninspiring rock 'n' roll. Even the old Yardbirds' classic 'You're a Better Man Than I' failed to make any real impression.

However, the second side is something else, the title track is the old Sham at work, brash, noisy and with lines which become East End football chants. 'Lost Highway 46' is another good rocker with Pursey in fine arrogant voice and a nice touch of what sounds like a harpsichord. The side ends with 'What Have We Got' which sounds as though it was recorded at their supposed farewell gig, and once again the breathless chanting Pursey, tears his soul out for his fans.

As a bonus there is also a 12 minute version of 'Borstal Breakout' and 'If The Kids Are United', on a separate disc. If this is to be their last album, then we should salute a great live entertaining band, if not, then maybe JP had better think long and hard about his next piece of vinyl.

David Lawrenson

Produced by Jimmy Pursey and Peter Wilson.

## Cliff Richard

*Rock 'n' Roll Juvenile (EMI)*

If you are looking for perfection in the production of an album, then Cliff's latest is about as near as you are likely to get. Everything about *Rock 'n' Roll Juvenile* is class, from the playing, singing and arranging through to the production.

Cliff's voice has never sounded better, but the contribution of Terry Britten, who had a hand in writing all but two numbers and plays just about everything, cannot be underestimated. The range of material is quite superb from the nice up tempo riff on 'Monday Through Friday' to the understated funky 'Doing Fine' with great guitar from Britten.

Subtle synth sounds and a superb sleazy sax are features of 'Cities May Fall', there's so much going on during this track but it never sounds cluttered or overpowering. 'Sci Fi' on side two also has some excellent synth effects, while 'Carrie' has Cliff's plaintive vocals sounding not unlike Robert Plant, would you believe!

The album closes with the brilliant 'We Don't Talk Any More' which is a showcase for the multitude of talents belonging to Alan Tarney. This album must be a contender for the year's best piece of vinyl.

David Lawrenson

Recorded at Pathé Marconi Studios, Paris.  
Engineers Tony Clark and Haydn Bendall.  
Produced by Cliff Richard and Terry Britten  
(except 'We Don't Talk Any More', Bruce Welch).

## Blondie

*Eat To The Beat (Chrysalis)*

Blondie had a tremendous task in following up their hugely successful *Parallel Lines* album, which must have been one of the outstanding pop LPs of the last 12 months. They have come pretty close with *Eat To The Beat*, and look to have many more hit singles following the opening track 'Dreaming' into the Top Ten.

They have proved that good pop music doesn't have to be mindless and moronic. In all departments they are a great outfit from Debbie Harry's distinctive vocals and Clem Burke's solid Dave Clark-type drumming to Chris Stein's interesting guitar work. On this album they show they are not afraid to experiment with new sounds and ideas, and although it doesn't immediately come on quite as strong as their last album, it nevertheless should enhance their reputation as one of the best pop outfits around.

David Lawrenson

Recorded at the Power Station, Electric Lady and Media Sound studios, New York. Produced by Mike Chapman.

## Various Artists

*More American Graffiti Soundtrack (MCA)*

The follow-up to the film *American Graffiti* is by all accounts pretty poor. As yet, it hasn't been released here, but the soundtrack to the sequel has, and as far as I'm concerned the film has already been worthwhile in providing such a great collection of music as this.

Over four sides, the selection of music is staggering, going from 'Heatwave' by Martha and the Vandellas, to the Byrds' 'Mr. Tambourine Man' through to 'Season Of The Witch' by Donovan — and that's only the first side.

Where else would you get the Supremes, Cream, Dylan, Aretha Franklin, the Zombies and ? and the Mysterians — you guessed it, on Side Two. The rest includes 'Pipeline' by the Chantays, 'Cool Jerk' by the Capitols, 'My Guy' by Mary Wells and 'Hang On Sloopy' by the McCoys. I've never seen such a great compilation album, who cares what the film's like?

David Lawrenson

Produced by Kazanjian and Sidney Ganis.  
Mastered by Larry Boden, MCS/Whitney  
Recording Studios.

## Sham 69

## Cliff Richard

## Blondie

## Various Artists

Debbie Harry



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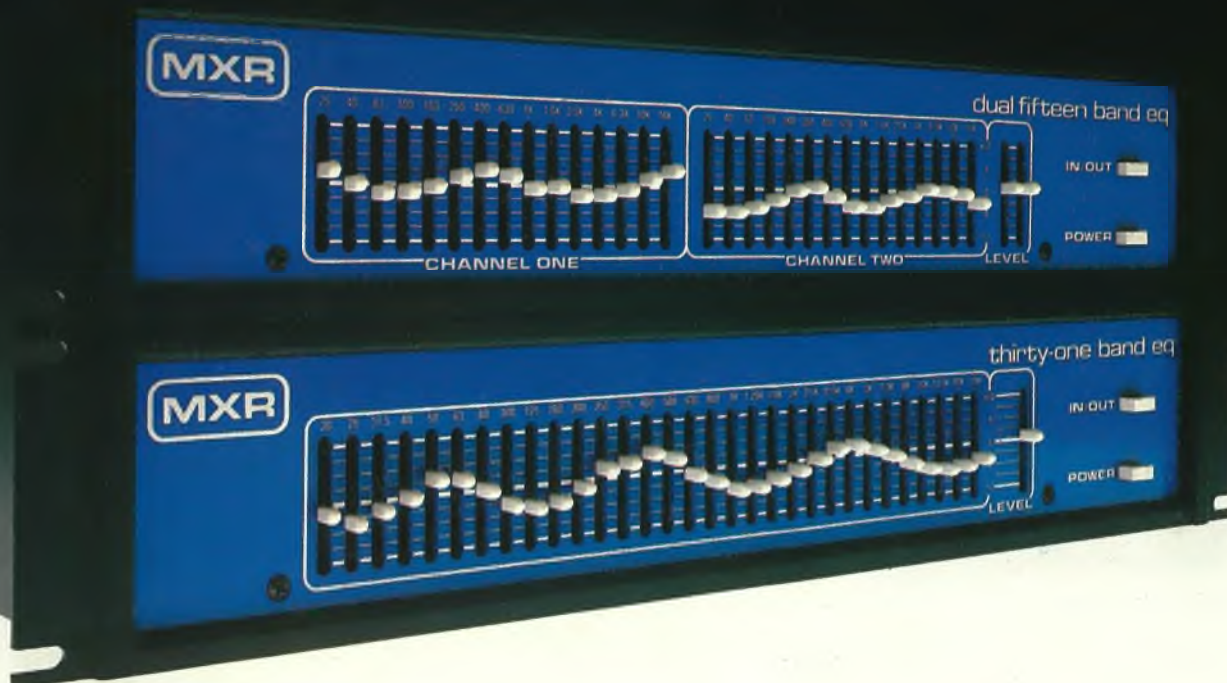
The Thirty-One Band Eq divides the frequency spectrum even further. A single channel unit, the Thirty-One Band features frequency bands set one-third of an octave apart, generally regarded to be the optimum amount of resolution.

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# Albums

## Quadrophenia Soundtrack

*Quadrophenia Soundtrack* (Polydor)

For someone who never really felt that the Who's *Quadrophenia* album made a good double set, this soundtrack of the film is a great bonus. Apart from conjuring up memories of the film, and hence those incredible days of the Sixties, this two record set is a great collection.

It has all the best numbers from the original *Quadrophenia* such as "5.15", "Bell Boy" and "Love Reign O'er Me", plus a couple of real R&B stompers, "Zoot Suit" and "Hi Heel Sneakers" delivered in appropriate Maximum R&B style, and rounded off by a side of classic Sixties Soul numbers like Booker T's "Green Onions" and the Chiffons "He's So Fine".

A great set to have, even if you didn't like the film.

**David Lawrenson**

*Sides 1, 2 and 3 recorded at Rampart Studios, Battersea. Overdubbing and remixing at CTS Wembley and Rampart.*

## Merle Haggard

*Serving 190 Proof* (MCA)

Merle Haggard, already established as an American working class hero, became a cult figure to the rebellious youth of the late Sixties America — filling the same background niche as Johnny Cash and Woodie Guthrie — reform school, stolen cars and trucks, bogus cheques, freight car hopping, casual work in oilfields and honky-tonks (and in Merle's case, three years in San Quentin).

His eight or so years of hard on-the-road entertaining paid off in 1969 when America woke up to him. It was the year of college violence, anti-war demos and "spaced-out" hippies and Merle's massive hit with "Okie From Muskogee" (we don't smoke marijuana in Muskogee, we don't take our trips on LSD' . . . remember?). But he shys away from the political pedestal, preferring to sing about the feelings of millions of common working people — drifting, wine and sex, loneliness, frustrations with bosses and the hard process of people living and dying — the "real people" as Steinbeck's Ma Joad called them.

At a time when country music is 'twixt old and new, "Hag" provides a binding identity — the key link between the past and present. His keen intimate insight into where the direction is going is founded on knowledge and respect for the roots of C&W and to this he lends his sentiment and his own soulful cowboy touch — with a smooth voice in a class along with the "greats" like Jimmy Rodgers and Hank Williams. This directness and professionalism (200 days per year touring makes it almost slick!) elicits the adulation of audiences who see him as more than just a performer.

Whatever "aura" of American folk life he conveys, "Hag" tells it best: "Never been nobody's idol, but at least I got a title and I take a lot of pride in what I am." To fully appreciate this miniature picture album of country life, get in your Chevy pick-up, sling a case of Budweiser in the trunk with your rifle and head out with "Hag" on the ray-dee-oh.

**Mike Feasey**

*Produced by Fuzzy Owens, co-produced by Jimmy Bowen. Engineered by Hugh Davies and Gene Thompson at Capital Records.*

## Buzzcocks

*A Different Kind Of Tension* (United Artists)

The Buzzcocks rose to prominence during the early punk days with their critically acclaimed EP "Spiral Scratch" when Howard Devoto was still in their ranks. Now, after a string of naggingly catchy and classy singles and two albums, *A Different Kind Of Tension* falls into our collective laps.

The Buzzcocks themselves have established quite a reputation individually — John Maler being one of New Wave's most respected drummers. The songs on the first side of the album are kept short and concise and therefore work really well. On the second, however, the songs are longer and occasionally seem to drag.

For this reason the tracks on Side One tend to be my favourites. I am afraid I wasn't very impressed with the title track — Peter Shelley repeats opposites (be good, be evil, be sane, be mad, etc., etc.) all the way through, which may be awfully "deep" but to me seems a bit pointless and even a bit pretentious. The last song "I Believe" is spoilt by the long fade-out. It would have been much better had they kept it short in the same vein as the first side songs.

Overall, however, this is a very well played and written album and well worthy of a place in any musician's record collection.

**Janet Angus**

*Recorded at Eden Studios, mixed at Genetic Sound. Produced and Engineered by Martin Rushent.*



Buzzcocks

## Quadrophenia Soundtrack

## Merle Haggard

## Buzzcocks



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So, in the light of the many different modification devices available today; if musical accuracy is important to you, see your MXR dealer. Sometimes it's the little things that count.

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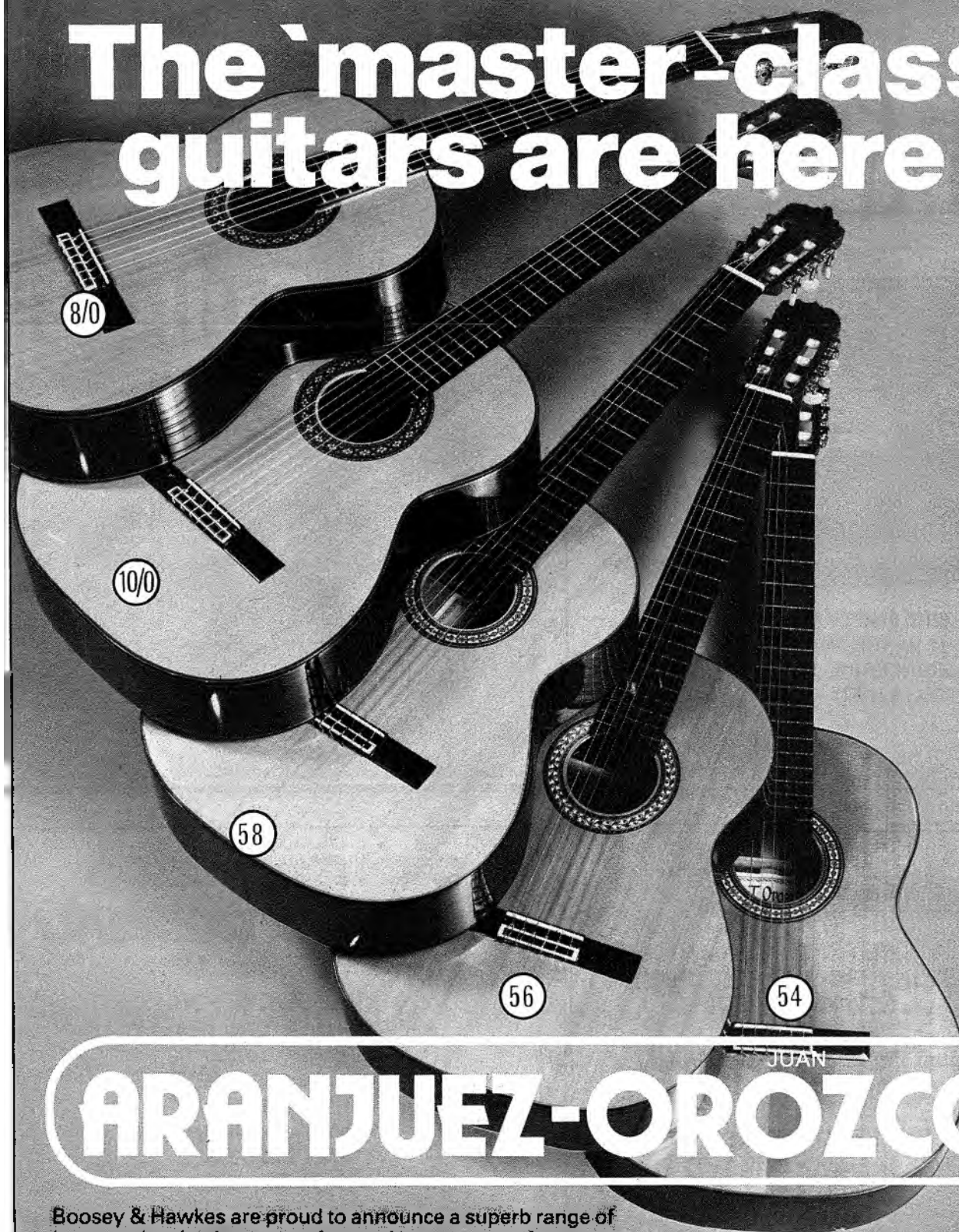
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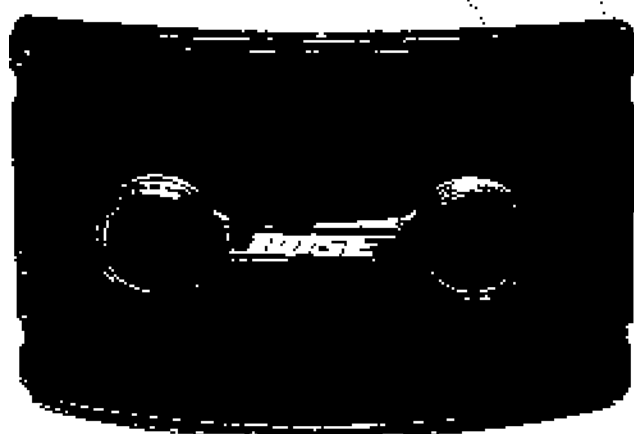
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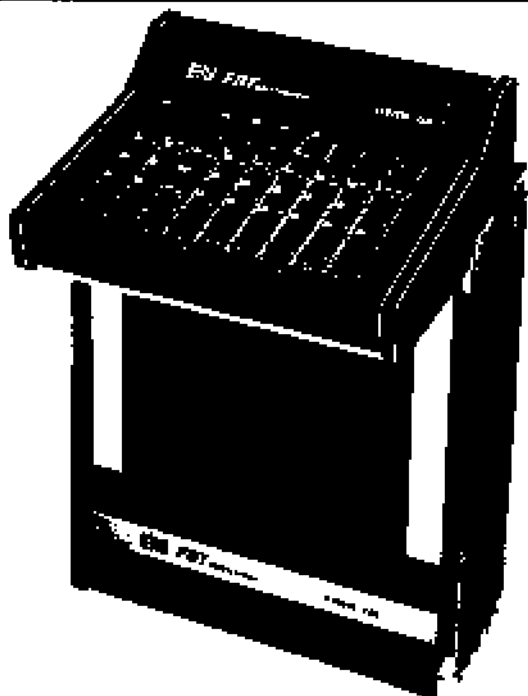
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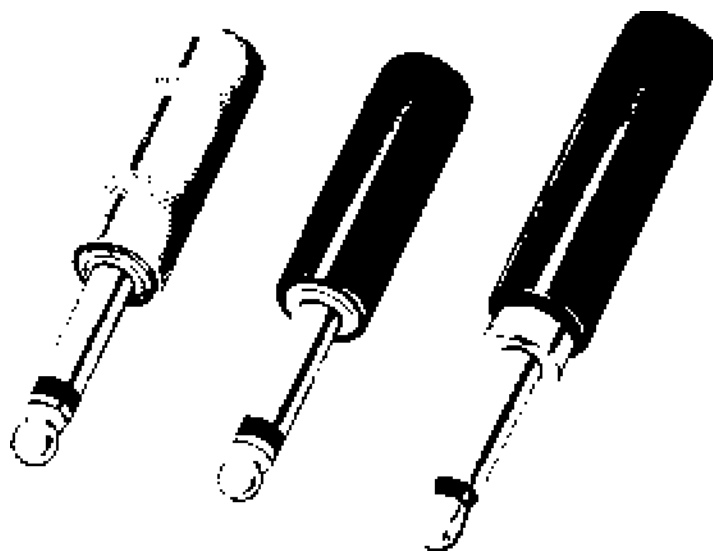
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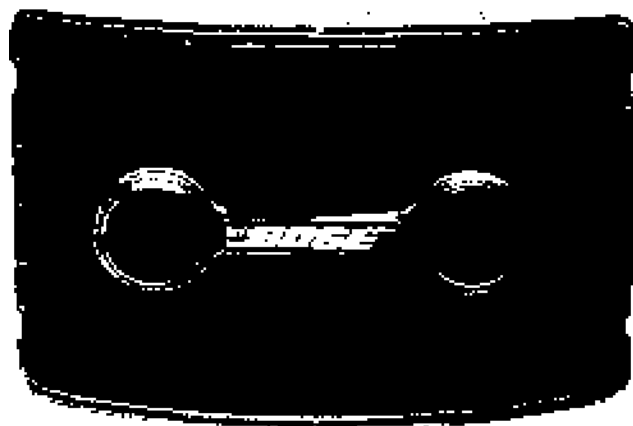
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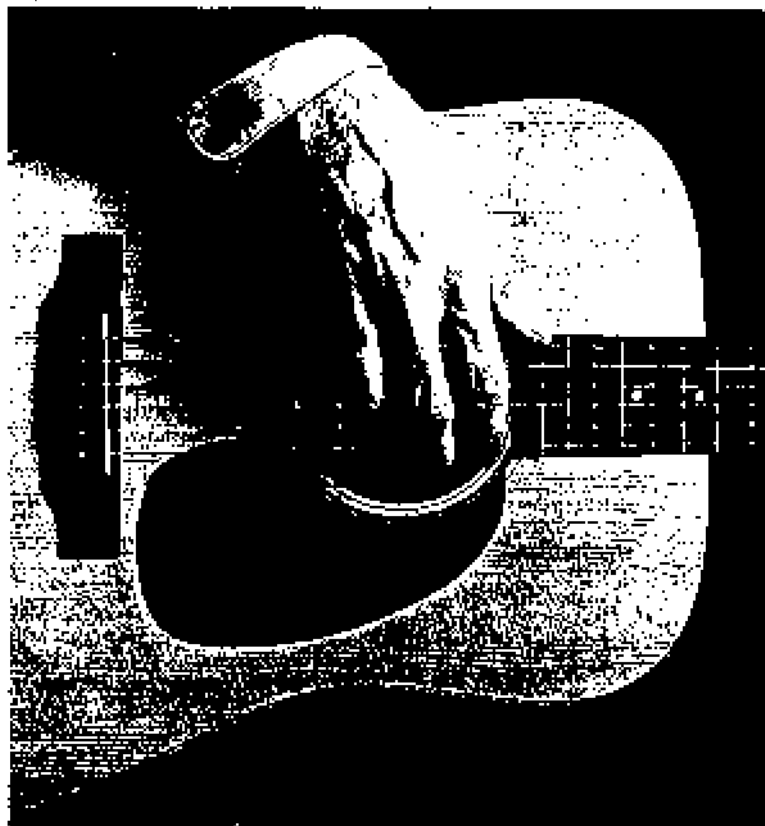
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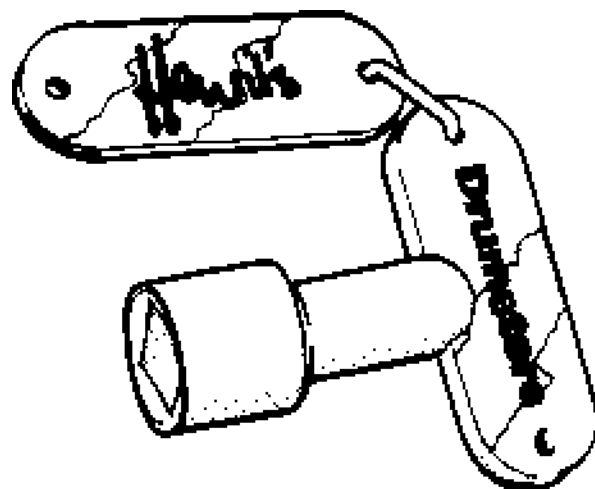
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# HI-FI FOR MUSOS

James McGill

**W**ith that dreary annual institution of Christmas unavoidably approaching it must be time you started thinking on the cheapo giveaways you will need to donate in return for cheapo gifts received. You might wisely at this time also spare a thought on exactly whom to hit and for what in order that you may open an early campaign of hints. No-one need buy you mindless bagatelles if you keep your wits about — there must be a number of things worth having but which you never get round to buying in the usual run of things.

Most categories of hi-fi accessories are, essentially, very alike in what they do and what they have to offer. In common with other undifferentiated goods sectors — perfume, cigarettes, brand-packaged foods — promotional expertise behind the brand image is the real key. But the fact is once you own a system there are always useful ancillaries to be added — headphones for recording/private listening, speaker stands to cut that floor-coupling boom, an FM aerial for gremlin-free reception and — why, a scratch eliminator for your older discs.

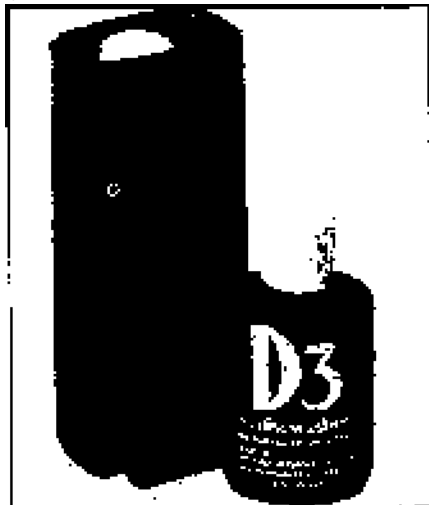
And then there are the accessories to care for your precious discs, to keep your tapes playing and recording at optimum and generally to "tune" your system for better results. Much of this is easy if you know how. Some of the fuss is quite unnecessary. It is possible to do actual harm with misapplied kindness — any rock musician knows all about overkill. There is, of course, also the small matter of throwing money away.

A simple argument for the huge demands necessary to support an undifferentiated market — the heavy marketing, the promotional waste, the often bewildering range of choices and conflicting claims — is that it must fill a very real market need. There must, at the end of the day, be something to it all. Here are a few examples of money well spent out of the options available — once a need is identified value is all that remains. Prices quotes where available.



Among your material possessions your disc collection represents a valuable asset if you are into music. They never quite make music like they used, to so much of any collection is ultimately irreplaceable. Without any need for fussy or meticulous attention your discs, given a little simple respect, should stay playable for decades using the sort of gear available today. The ground rules are as follows: set up your record deck correctly, and stay away from autochange. You should refrain from handling the playing surface with your fingers, return a disc to its sleeve before reaching for the next and stack them upright away from the heater. A simple formula and really not too much trouble. A proprietary cleaner which suits you and does not involve any fiddling about is liable to get used — here lies another key.

The clicks and bangs produced as the tiny diamond crashes over boulders in the disc microgroove forces abrasive particles into the groove walls and can do permanent damage. The vinyl medium readily attracts airborne grit, organic and fume pollutants, fluff and other loose contaminants when it is in a charged condition.

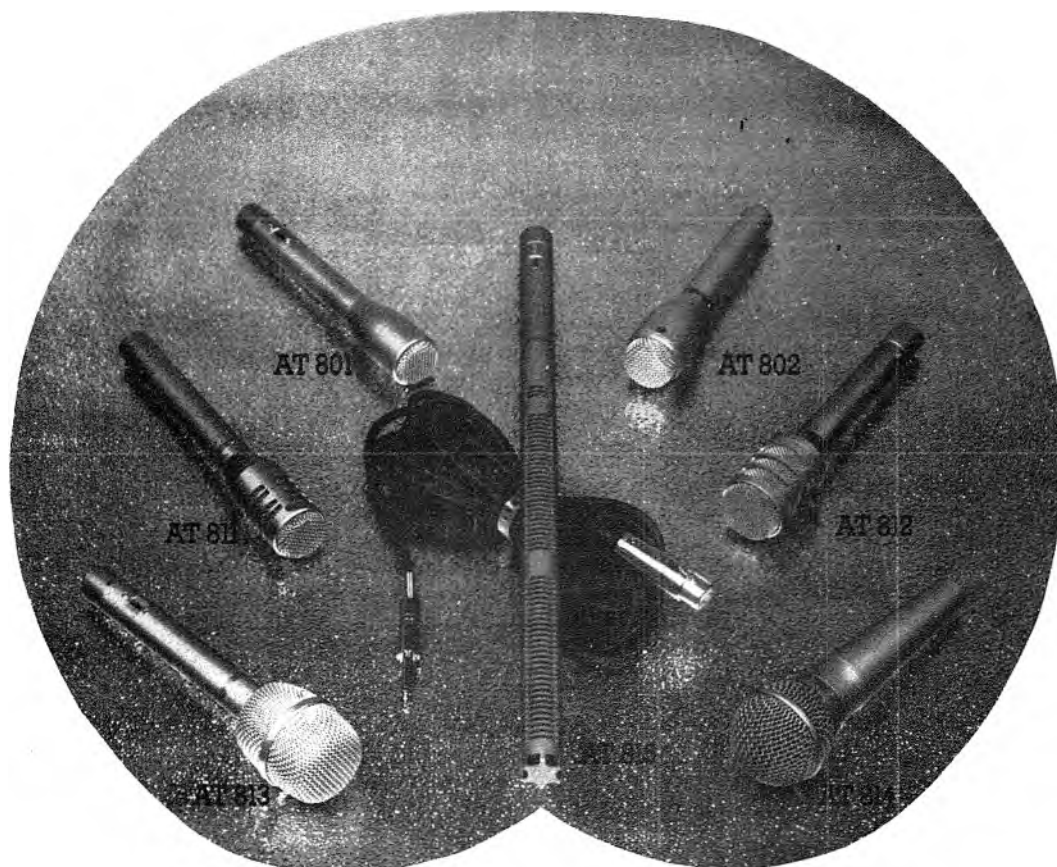


With one or two notable exceptions wet cleaning simply washes a thick sludge to the groove bottom where it may never again move. Dry cleaning induces static which not only makes cleaning difficult but attracts further dirt. Relaxing the electrostatic grip on dust is one of the first tasks of regular cleaning. The presence of moisture on the disc surface allows some of the electrostatic charge to conduct more freely to the surrounding air and without exception the simpler cleaners recommended use this method.

The *MetroSound Ioniser* and *Watts Disc Preenner* are good examples of a very popular idea. These carry moisture and should be topped up regularly to keep the cleaning pads barely damp. More elegantly packaged the *Discwasher D3* has its fabric pile "oriented" in one cleaning direction and lets go the collected dust in another. Like the *Watts Parastat* this is supplied with a container of "anti-static" fluid which is applied to the pad surface when static is a problem. The *Manual Parastat* is a fibre brush sandwiched between two nylon pile pads.

The *Pixall* and *Nagaoka* roller cleaners represent another approach where a tacky surface with a high surface tension — this means the sticky stuff does not come off on the disc — is rolled over the record surface. The *Pixall* uses a renewable drum of coated adhesive tape which you peel and cut away for a new cleaning surface. A tap-washable rubber elastomer is used with the *Nagaoka* which does not lose its surface tackiness in the process. Apart from the fact that this clumsy sounding principle works surprisingly well the presentation of both units is to be applauded.

Tackling static has become a sophisticated technology all of its own, and various successful approaches to the problem are on the market. While humid cleaners do cut down the static charge in a disc they do not cut this down enough to eliminate the "frying" crackle every disc user has known. The *ZeroStat* anti-static device employs a piezo-electric crystal which when squeezed directs a stream of ions (charged particles) of many thousands volts potential. This is not as drastic as it sounds.



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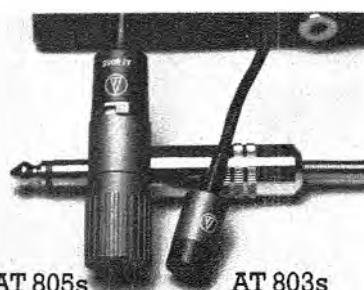
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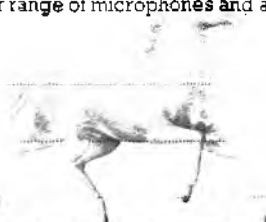
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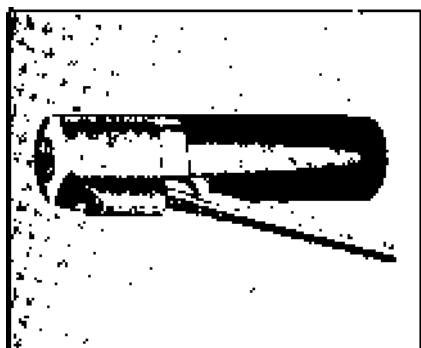
Pulling the trigger slowly produces a positive charge in the vinyl. Releasing it charges the disc with negative ions and bingo — the disc is neutralized temporarily and may be cleaned or played as the case may be. From one of the largest producers of disc and tape accessories the *Watts Xstatic* works along similar lines as are the many static-gun devices which arrived in the wake of the Zerostat.

A more recent design out of the Nagaoka range employs an electronic device to produce the neutralizing ion stream.

Over recent years the use of dry lubricants has been yet another approach towards static elimination. The *Milty Permostat* appears the most successful to date, having proved its ability to neutralize a disc for periods of years, by its present record. Healthy skeptics who wish to test its effectiveness are invited, as I was, to polish the disc in the hope of generating static, roll it on the carpet and tip an ashtray over the treated surface. That done we can rest assured the process really works — totally inert of charge, no pickup.



For £4.65 a Permostat kit — comprising a fluid spray dispenser and pad with which to buff the disc — will treat approximately 25 records. Refills cost £3.15. Costs therefore average out at around 15p per disc. With an occasional wipe and usual handling care... you can even use it for your acrylic covers... and the telephone... and mirrors...



Tracking cleaners which traverse a disc like a pickup arm have been with us for some time. Used in conjunction with a static pistol or Permostat a tracking cleaner or hand-held device is a simple and very effective means of keeping your records in optimum condition. The *Groovac MkIV* comprises a small vacuum pump and a hollow tubular arm with carbon fibres and an earthing lead at the nozzle — this in itself is quite a complete system against dirt and static.

In common with most tracking cleaners one disadvantage with the Groovac is that it will not by itself get to the heart of the

matter: picking up that fine debris which does all the harm.

At its price of under £20 the Groovac MkIV suffers from this problem to a lesser degree. But in use with some sort of device for combating static the well-heeled hi-fi user has both an elegant and attractive cleaning system which is foolproof.

Systematic research over recent years has shown how easy it is to harm the delicate signal passing out of a pickup cartridge. The immunity of a disc player to unwanted interference and the matter of



compatibility between arm and cartridge are both subjects which have been tackled earlier in this series.

One aspect of the subject which has only been touched upon so far is the influence of the turntable mat itself. We are all familiar with "needle chatter" — the sound of a stylus tracking the groove. Mechanical excitation of the vinyl creates resonances in the material and in any air pockets between a disc and the platter mat. Acting in degrees as a reflector, absorber or transmitter of these vibrations the mat can influence these colourations which the cartridge passes on as signal.

As there is a delay usually involved these delayed resonances are not always welcome. A keen ear might notice the better reproduction of ambience in a recording played on a deck where the mat has the right acoustic properties and forms a secure coupling with the disc. Sharpness of the stereo imaging, the transients produced by a drum kit, piano or plucked instruments will — all other things being equal — benefit from this small attention to detail.



The subject of mats — like the matter of special cables and connectors, cartridge load "tuning" and specialised headshells — is an advanced course for older students. Before these sort of considerations become really important a user will need to have taken care of the many first order priorities of hi-fi performance. In a turntable system these sort of considerations, loosely speaking, come in with a handful of decks between £60 and £100 and a few above this price. SP25 owners are therefore permitted to talk among themselves while we proceed.

According to the material used for a mat it can have a sharpening or dampening effect on musical detail. Basically a mat needs to deaden any resonances induced in the metal platter and also absorb some of the vibrations produced by the stylus in the groove. Common to all mats is that they need to be flat in order to support a disc across its whole surface. Mats with raised patterns — pimples and ribs and astral hieroglyphics — are rarely a good thing even if they make the removal of 45s that much easier. With the accessory mats you are liable to buy you should find the centre record label section recessed to ensure the disc lays flat.

Of our chosen examples the *Hiraoka Disk 22*, at £13, is a heavy (730 grammes) and hard textured matrix of natural rubber and high-density filler. Its slightly concave "dish" towards a recessed centre allows natural gravity — or a record clamp for warped discs — to keep vinyl and mat closely coupled. Made in France the *Spectra* (£17) is much lighter, built up in a laminated series of different materials, and supple where the Disk 22 is stiff. The idea behind the complex material formulations used in mats is that the absorption or damping is more uniform across a wider span of interference frequencies. The Spectra also has a rather tacky surface which allows the mat to form to the warps in a disc.

With platters flimsy enough to ring rather easily the Disk 22 appeared more useful while the mass it adds also helps towards a better rotational stability. But in both cases the midrange with our test decks — a Thorens TD126 Mk2, Michell Focus One and Dual CS604 — seemed to recede a little compared with their standard production mats. It soon became evident that this was a more natural balance, with lower distortion at the midrange and good control in the presence or "sheen" region — the midband eq boost applied to many rock recordings is a fact to be accounted for, after all.

The *GA Audio Soundisc* is a glass mat which again, unsurprisingly perhaps, is quite heavy. Priced at £10 the Soundisc does not appear to tame the midband and treble in the sense a more pliable material does though clarity and imaging in the midband was noticeably affected. Even heavier, the *Nagaoka GL602 Crystal* mat weighs in at 1 kg and is ground from a tempered glass which has a treated contact surface.

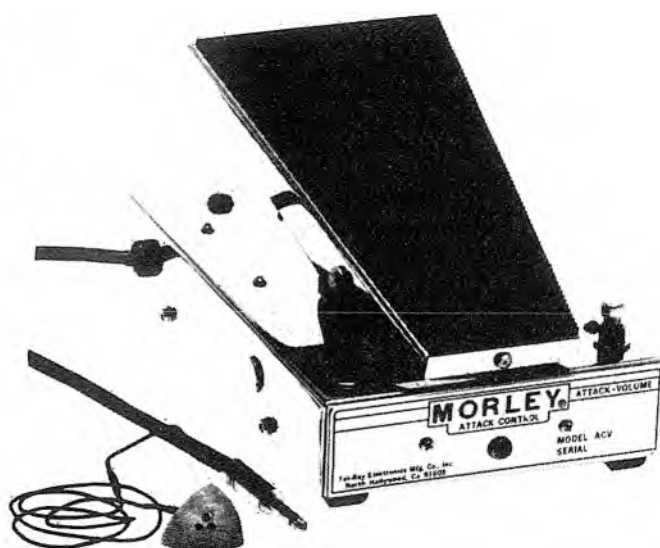
The theory here is that a glass mat inhibits vibrations in the first place rather



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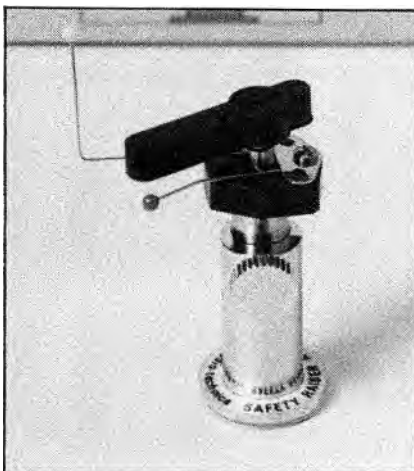
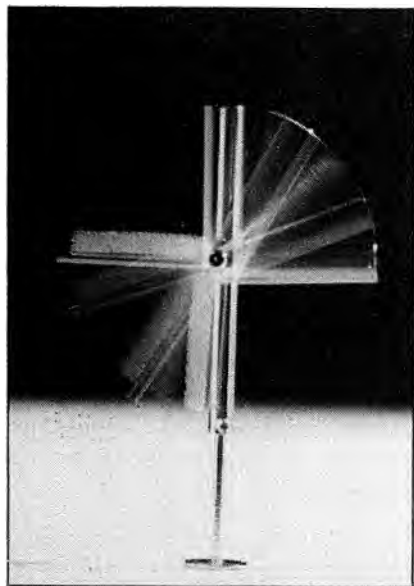
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than damping after the event. Secondly, a material harder than the vinyl will not "give" and deform with the disc. An additional "Crystal Stabiliser" weight sits atop the centre spindle to ensure the disc lays flat. While the mass and non-resonant properties of the 602 are undeniable advantages, the sort of deck which should justify an accessory cost of £68 — the asking price for this combination — should really be in no need of this sort of help.

Again, the "firming up" at the bass end, an enhanced midrange separation and improved detailing in the treble, need to be offset against the nasty practices of disc equalisation — it could all prove too rich a combination.

A system lacking in high frequency or a listener with preferences for a lot of treble could opt for this means of achieving a subtle end rather than opting for a change of cartridge or the use of good tone controls.

Out of their superbly executed range of record care and tape accessories, each representing all that is admirable in Japanese production technology, the GL602 remains at its price very much a diversion for the man who has everything.

Still on the subject of record decks it goes without saying that some form of auto mechanism is included in the asking price for the device. A good auto mechanism which will not impede the free movement of an arm across the disc is not

only a higher production expense but the additional mechanics involved leave a user with more to go wrong.

Where a user has an eye on cost a sound and well-engineered manual is often the answer. An add-on arm lift is now all you need to be able to luxuriate in that special afterglow which comes only when you need not jump up straight away to forstall that end-of-side "click, click" as the run-out groove plays footsie with your stylus.

Monitor Audio introduced their elegantly simple *Stylift* a couple of years ago. A simple adhesive pad, fixing its base close to the arm, pivots the arm acceleration across the run-out groove, simply overbalances a counterbalance on the device, and then gathers its catch smoothly off the disc.

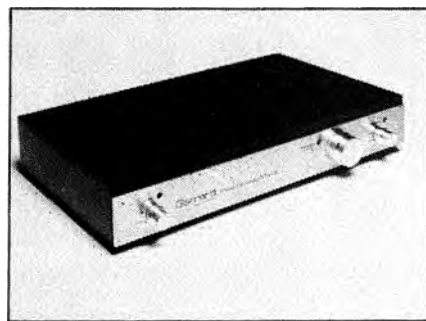
The *Metrosound M106 "Q-up"* (£6) has adjustments to vary the force needed to trip the lift action and force of the lift itself.

A more recent introduction is the *Audio Technical AT6006A "Safety Raiser"* (£10), a very precise piece of engineering. Even in a device so simple the standard of mechanical execution is inspiring. Unlike the two other devices the Safety Raiser is designed to fit into virtually any tight space close to the arm pivots, and though a real fiddle to set up in just the right position, is a device which is not out of place with the best or most expensive of record decks.

All the cleaning in the world will not get rid of a scratch in the disc. *Garrard's MR101 Music Recovery Module* is the simple answer to buying a new record to replace the damaged article — if such a replacement is available for purchase, that is. What the MR101 does when it encounters a scratch is to delete the music. The brief moment of silence is not noticeable in the normal manner of things as it occurs over only a few thousandths of a second at a time. To allow the circuits to identify the annoyance and blank it out a delay of some 3 milliseconds (three-thousandths) is applied to the audio signal. The "control" signal has no delay applied and is therefore ahead of the programme signal passing to the amplifier.

The device recognises a record scratch by virtue of the fact that these often involve a vertical displacement of the stylus and also have a time duration much shorter than even the sharpest of musical transients. At the front panel is a sensitivity control to vary the threshold at which the circuit cuts in and also a bypass circuit which routes the signal straight to the amp if desired. A high sensitivity setting will blank out very light scratches while a lower setting allows the circuits to pick up only on clicks loud enough to annoy. Too high a sensitivity, it was found, begins to lop off musical transients.

It has to be remembered that the MR101 is not a treble/"scratch" filter in the usual sense in that it does not address itself to the continuous noise background of dirty or beaten up discs — the latter problem particularly is best cured by taking the disc off the player. At £90 the compact (38cm across) MR101 is a very occasional luxury.



The Electro-Harmonix **MICRO-SYNTHESIZER** is a powerful guitar processor which creates today's most popular lead synthesizer voicings, as well as exciting simulations such as steel guitar, organ, and violin. Four completely independent and continuously mixable voices — Guitar, Octave above, Sub-octave, and Distortion—are modified with envelope and multiple filter controls to achieve a flexibility and variety of sound you'd never expect to find at anywhere near the price. Now that Electro-

Harmonix has opened its London Distribution and Repair Center, the complete line of E-H audio enhancement devices can be shipped rapidly throughout the United Kingdom and to the Continent. So stop in at your local music store and stretch out on the **MICRO-SYNTHESIZER**. You'll discover that, without laying out heavy bread or surrounding yourself with a wall of electronics, you can transcend the inherent limitations of guitar and explore infinite horizons of sound.



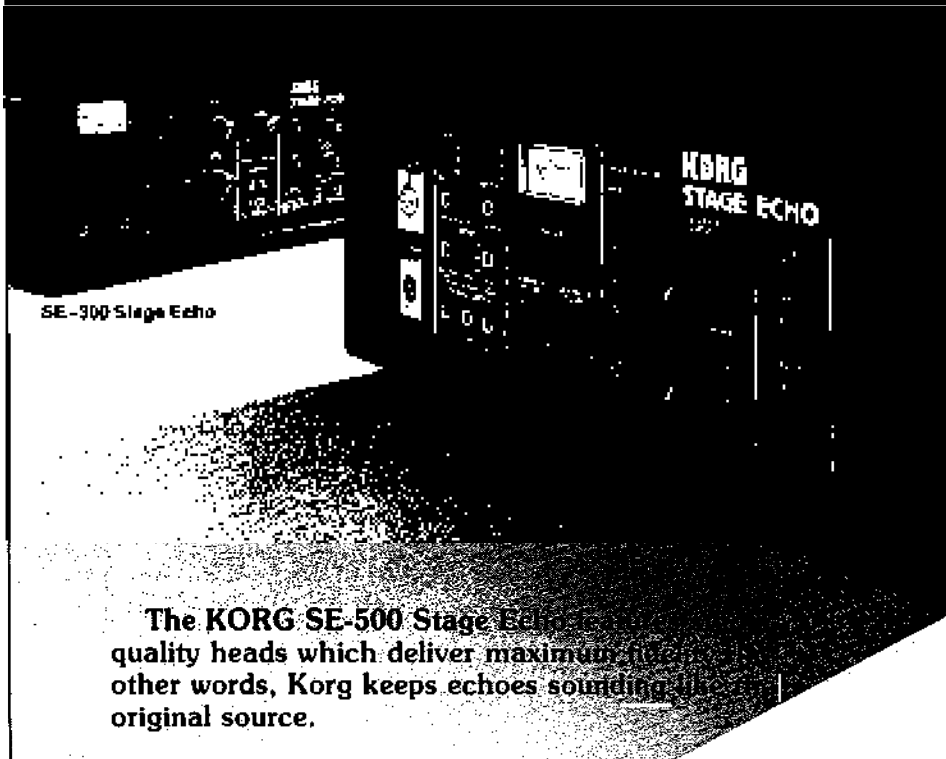
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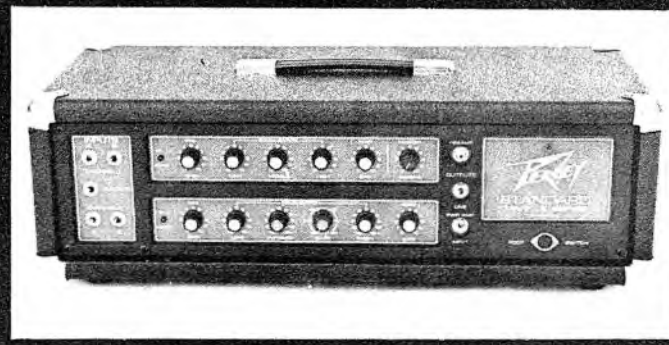
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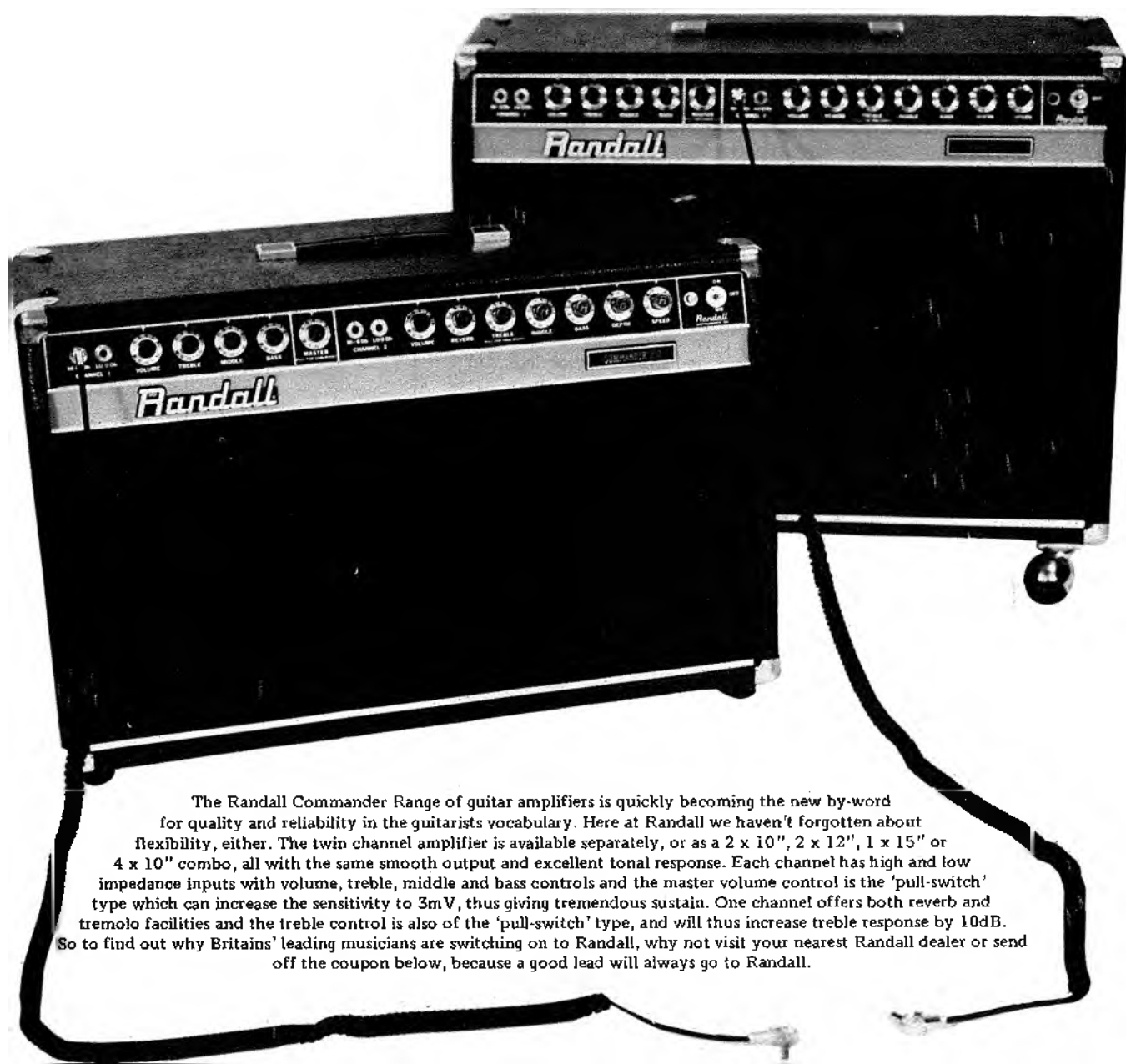
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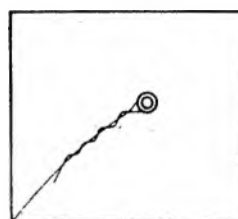
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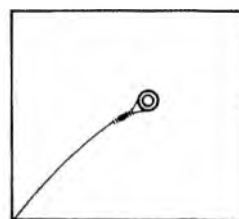
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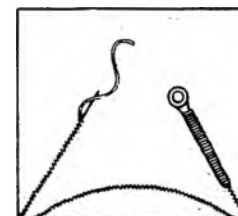
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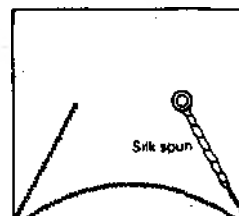
Usual method



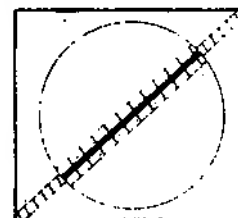
Sounder method



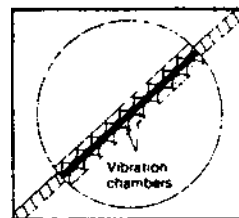
Usual method



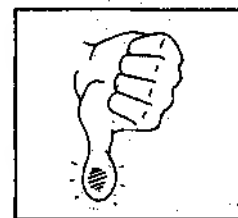
Sounder method



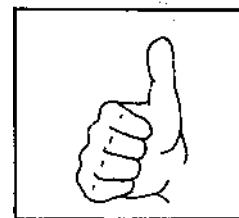
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Usual result



Sounder result

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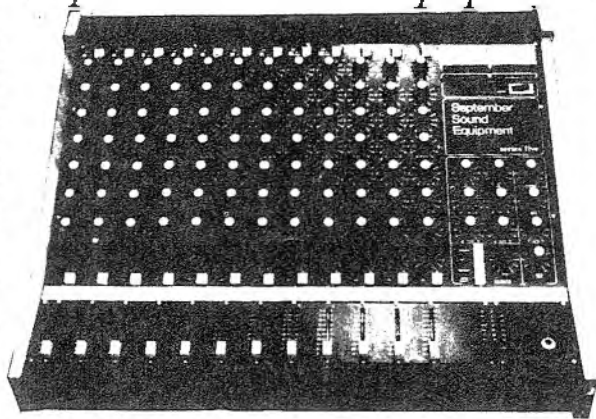
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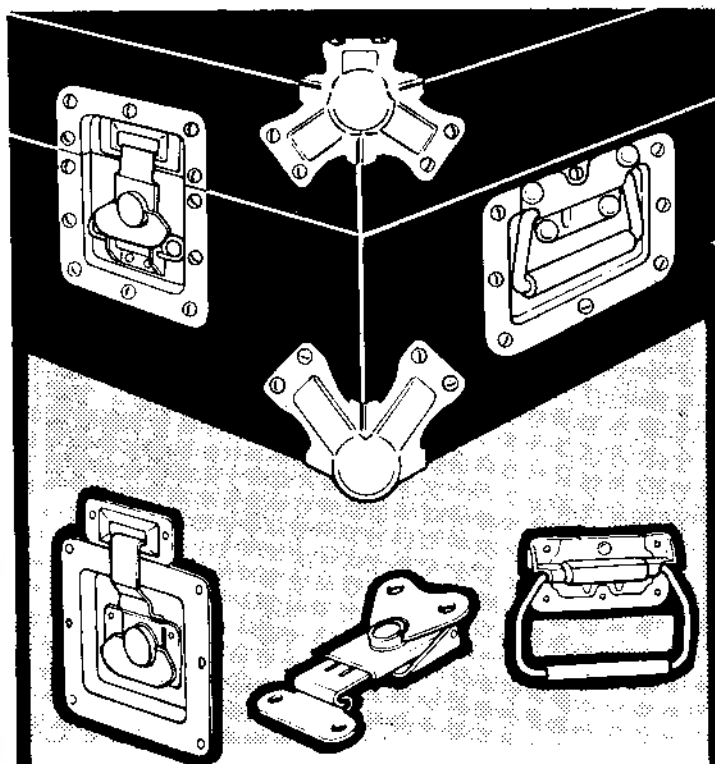
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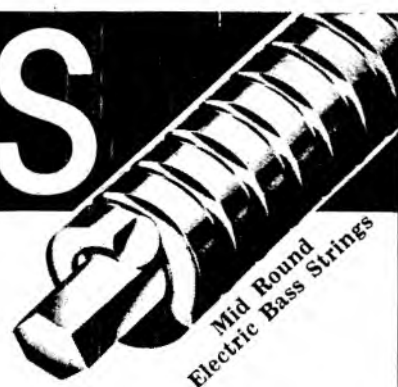
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**CASTLE RECORDING STUDIO**  
93 Castle Hill Road, Hindley, Wigan, Lancs.  
0942 58777  
8T. Cap 20, £10p/h. R-R, CP. Ka. R-C, D-T. S. VS. Ac(ba). SM(ba). Mix.

**CSS**  
Central Sound Studios,  
91 St. James Street, Manchester M1 4PH.  
061 236 5552  
8T. Cap. 20 £10 p/h. D. tf. R-R, St. CP. Ka. A-Cr. Mix. DC. dt. M. S. SM. Reduction on block bookings. Production and publishing done.

## LIVERPOOL

**AMAZON RECORDING STUDIO,**  
Stopgate Lane, Simonswood, Liverpool L33 4YA  
051-546 6444  
S12  
1.) 24T, Cap 35, £35p/h. D. TF, R-R.(3). CP. Ka. R-C, D-T. OTC (£3p/h). M. S. VS. Ac/ba. SM/ba.  
2.) 8T, Cap 10, £10p/h. tf. R-R.(3). CP. Ka. OTC. (£2p/h). M. S. Ac/ba. SM/ba.

**AUGUST SOUND STUDIOS**  
16 Benson Street, Liverpool 1.  
051 708 0006  
16T p/d neg. 8T £10.50 £86 p/d (inc spool & tape) Cap 8. tf. R-R, R-C, CP. Ka. (Bachstein Piano, Hammond organ, Moog Synth.) NO OTC M-S. AC ba. SM.

## LONDON

**ALBEY ROAD STUDIOS (EMI)**  
3 Albeley Road, St John's Wood, NW8 9AY  
01 286-1161  
Studio 1 + 3 £55 p/h 24T  
Studio 2 £52 p/h 24T 2T £46 p/h  
Cap 120 tf. R-R, R-C, CP. Ka. DC (Playback Lacquers) d-t. Q. OTC. M.S. (Custom Disc Pressing, Electronic process, Mono to Stereo, 2 Mobile recording units operating in any country).

**AIR STUDIOS**  
214 Oxford Street, London W1.  
01-637 2758  
S12, Cap 35/70 £50p/h. D. Ka (piano). Dc/ba. Q. OTC. S. fof. Mix. Comp Mix.

**ALVIC STUDIO**  
13 All Saints Road, Wimbledon, SW19.  
01-542 5686  
4T Cap. 8 £6.00 p/h. ba. tf. R-R, CP R-C Piano, M.S.SM. ba. Drums. Amps

**ANEMONE SOUND FACILITIES LTD.**  
D'Arblay House, 10 Poland Street, London W1V 3DE  
01 439 9611/2  
8T rates negotiable Cap 10 KA Synthesiser and amps. D & DBX CP R-R R-Cd-t D & DBX M.S. cassette high-speed duplication.

**ARCHIPELAGO STUDIO,**  
1 Moreton Terrace Mews South, Pimlico, London SW1.  
01 834 9303  
8T £7 p/h Cap 15. t-f. R-R. 1 St. Ka. RC. Mix. M. S. ba. SM.  
Ampex 8T, Revox 877 mixing down, Allen & Heath 16 into 8 mixer all effects, space echo Reverb, compression, graphics, ADT, Full

range studio equipment, amps, drums, guitars, synths, etc. String and vocal sect. Neuman mikes.  
JBL Crown and Bose P.A.S. for hire £50 p/d. 2000 watts 400 w foldback.

**BASING ST & ISLAND MOBILE STUDIOS**  
8-10 Basing St., London W11.  
01 229 1229  
Studio 1 24T £48 p/h up to 6pm, £55 p/h after 6pm, weekends and holidays. Cap 80  
Studio 2 24T £48 p/h up to 6pm £55 p/h after 6pm, weekends and holidays. Cap 20  
Island Mobile: 24T and 16T. £500 p/d. R-R-C-Cr. £10 p/h D. OTC.

**BERWICK STREET RECORDINGS**  
8 Berwick Street, London W1.  
01-734 1888/5750  
24T Cap 16 £40 p/h D. tf. R-R, CP. Ka. Rcd-t. M. SNM

**BMS STUDIO**  
145 Wardour St., London W1.  
Tel: 734 5784/5572  
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Acoustically treated studio and large control room. Full production and copying facilities. Session musicians available.

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01-359-5275  
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**B.T.W. RECORDING STUDIO,**  
125 Myddleton Road, Wood Green, London N22.  
01 888 6655/449 6110  
4T £6.50 p/h. 8T £9 p/h. tf. R-R. Ka. dt. M. S. SM. OBX noise reduction. Alice 12-48 desk, Tanox and Auraton monitors.

**CBS RECORDING STUDIO**  
31-37 Whitfield St., London W1  
01 636 3434  
Studio 1 £52 p/h 24T Cap 75  
Studio 2 £52 p/h 24T Cap 25 & automated desk  
Studio 3 £49 p/h 24T Cap 12.  
DC. R-R-C-Cr, D All studios multi-track

**CENTRAL RECORDERS LTD.**  
9 Denmark Street, London WC2H 8LP.  
01-836 6061  
24T Cap 20 £36 p/h D. tf. R-R, CP. Ka. Rcd. dt. OTC £6 p/h. M. S. Ac/BA. SM.

**DECIBEL STUDIOS**  
19 Stamford Hill, London N16  
01 802-7868  
24T £27 p/h. p/d neg. Cap 20 D. tf. (1 Ampex 1 Studer) R-R, CP. Ka (Yamaha Grand and Synth). R-C, d-t. Q. OTC. £2.  
M.S. fof. Ac ba. SM.

**DICK JAMES MUSIC**  
James House,  
5 Theobalds Road, London WC1X 8SE.  
24T, Cap. 30, £50p/h, £45p/h. 2 St. D. tf. R-R, CP. Ka (Steinway). RC. Mix. R-Cr. Comp. Mix. dt. Q. OTC £15p/h. M. S. AC.ba SM.ba.

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131A Anerley Road, Crystal Palace, London SE20.  
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8T Cap 8 £8 p/h. R-R, RC. Mix. R-Cr. Drums, synths, piano, amp, DDT varispeed, 16T into 8 mixer. 1/2" Box.

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181A Long Lane, London SE1  
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8T £6 + £5 1" Tape hire. £30 per 6 hours. £50 per 8 hours, everything included. Cap 8. tf. (Brenell 8 track - Revox 2T). R-R, CP. Ka. (Piano, Organ). R-C. M. S. SM. ba.

**FAST BUCK STUDIOS.**  
Lamb House, Church Street, London W4.  
01-994 3321  
8T Cap 10 £8 p/h. £60 p/d. D. T-F. R-R. 1St. CP. KA. RC. Mix. R-Cr. DC. d-t. M. S. VS. BA. SM. Desk-Sound Techniques, Brenell Mast track, Revox, - AKG, Bayer mikes, tannoy speakers, graphics, drum machine tape and elect. Elka string machine, synths, guitars, drums, parking, easy access.

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01-836 7608  
16T £15 p/h neg p/d Cap 30 tf. R-R, CP. Ka (Grand Piano) NO OTC. MS. fof. VS. SM.

**GOOSEBERRY STUDIOS**  
19 Gerrard Street, London W1  
01-437 6255, 01-734 2257  
JBL £16 p/h (discounts available on sliding scale). 8T £13 p/h Cap 6 D. tf. R-R, CP. Ka Hammond L100, Roland SH2000, Fender Rhodes) R-C, d-t. OTC. M.S. SM ba

**R.G. JONES**  
Beulah Road, Wimbledon SW19  
01 540 8881 Telex 8814917  
24T £40 p/h 16T £35 p/h Cap 40 R-R-C-D OTC, Studio 2 - Stereo only £7 p/h.

**KONK STUDIOS.**  
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21 Denmark Street, WC2.  
01 835 6689  
16 Track £28p/h. Cap 18. Copyshop £12p/h.

**MARGRITTE MUSIC**  
15 Holloway Lane, Harmondsworth, West Drayton.  
01 897 9670  
16T £20 p/h 8T £10 p/h. Cap 12.  
DC/ba. tf. DBX. SM. Ka. R-R-C. all rates negotiable Fender, Marshall and more available.

**MAJESTIC STUDIOS**  
146 Clapham High St., London SW4  
01 622 1228/9  
24T £48p/h Cap 50 46T £65p/h R-R, DBX, CP, OTC £7p/h

**MARQUEE STUDIOS**  
10 Richmond Mews, Dean Street, W1.  
437 6731/2  
24T/16T £44p/h. p/d neg. Cap 35, D. tf. R-R, R-C, d-t. CP. Ka (Steinway). £8p/h. OTC. MS. S. (Remix & Studio with MC1 500 series automated consoles. Live recording facilities to adjoining Marquee Club).

**MILNER SOUND LTD**  
117c Fulham Road, London SW3  
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8T Cap 14 £14 p/h tf. R-R, CP. Ka. R-C. Dc. d-t. M. S.

**NOVA SOUND RECORDING STUDIOS LTD.**  
27-31 Bryanston Street, London W1H 7AB.  
Enquiries Pat 01 493 7403  
24 + 16T. Cap. 36D. St. CP. RC. Mix. dt. M. S. ba. Steinway Grand Piano no charge. 24 hour car park.

**PATHWAY STUDIOS**  
2A Grosvenor Avenue, London N5  
01 359 0870  
8T £8 p/h. Cap 6, R-R, CP, R-C d-t.

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38 Hertford Street, W1.  
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Studio 1. 8T £14p/h. Cap 8. D. tf. R-R, R-C, R-Cr, d-t. CP. Ka. (Steinway grand, ARP 2600 Synth). OTC. £4p/h. (6.00am - 9.30pm. Weekends & Bank Holidays). M. S. SM. ba.  
Studio 2. Self op. £12p/h. Radio productions and commercials.

**RAMPART STUDIOS.**  
115 Thessaly Road, London SW8  
01 720 5066  
Cap 40 8am-6pm 16 and 24T £45p/h 6pm-8am 16 and 24T £55 p/h flat rate w/ends 16T £40 p/h 24T £45 p/h Bank holidays incl. D & DBX Bosendorfer, Rhodes, Hammond B3 Q.M.S. tf. R-R, R-C, R-Cr, d-t, SM, ba

**REDWOOD RECORDING STUDIOS**  
15 Neals Yard, WC2.  
01 240 0668  
8T £18p/h. Cap 8. tf. R-R, R-C, R-Cr, d-t. CP. Ka. (Rhodes, ARP Odyssey, Roland String Synth, Daneman Piano). Q. OTC. (+25% of hourly rate) M. S. SM.

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16T £16 p/h Cap 20 R-R-C OTC. Sound Techniques Desk 18 x 16

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**ROCK STAR RECORDING STUDIO,**  
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16T. 3M machine, Scully mixdown  
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16T. Cap. 15 £16 p/h. D. R-R. RC. OTC. M.  
S. AC. ba. SM.

**ROX BOX STUDIOS,**  
92 Devonshire Road, Chiswick, W4.  
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4T. £5p/h. p/d. neg. Cap 7. R-R. R-C. CP.  
M. S. SM. ba. (Fender, Marshall, HH, Amps).  
Rehearsal Studios £2.00 p/h.

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8T. Cap 15. Days £7.50 p/h. Evenings  
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1 St. CP. KA. RC. Mix. DC. M. S. BA.  
SM.

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8 Track £9.50 p/h. 4 Track £6.50 p/h.  
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S. AC. SM.

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145 Wardour Street, London W1.  
Tel: (01) 734 5784/5572  
8T £18 p/h. no OTC (eves and weekends).  
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Clavinett, Yamaha Synth. Bechstein pro.  
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Reverb. Studer 8-T.

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Grand.

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Ideal for overdubs, mix downs, voice  
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All transfer facilities available.

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Steinway Piano and Hammond Organ  
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DC. dt. M. S. AC. ba. SM.

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Studio rooms can be arranged  
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p/h p/d. R-R. CP. R-C. R-Cr. d-t. Ka. O.  
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28 Dartford Avenue, Winton, Eccles,  
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Ka. D-T. Q. OTC. £3p/h. M. S. AC(ba). SM.  
Mix.

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8T Cap 10 £10 p/h, £75 9 hours. R-R.  
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Speakers, Allen + Heath Mod-3 Bannell  
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Reverb Quad 406-303 AKG-Beyer mikes  
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061 226 5369 contact Steve Foley.  
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Middlesex.  
09328 66531  
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SM.

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Pearson Buildings, 26/28 St. James Street,  
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8T £9.50 p/h, p/d, ba. Cap 6 R-R. R-C. Ka.  
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piano, Syn. string machine full select.  
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AOT phasing, stereo reverb, expander  
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(Cassette + 1/4") Ka (Rhodes. ARP OMNI,  
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SM/ba

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0905 820566  
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Ac. SM

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S. SM.

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p/d	per day
D	Dolby
tr	Transfer facilities
R-R	Reel to Reel
St	Number of Studios
CP	Coping
tba	to be advised
Ka	Keyboards available
R-C	Reel to Cassette
Mix	Mixing Facilities
R-Cr	Reel to Cartridge
DC	Disc Cutting
Comp. Mix	Computer Mixing Facility
d-t	Disc to tape
Q	Quad
OTC	Overtime charge
M	Mono
S	Stereo
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AC	Accommodation
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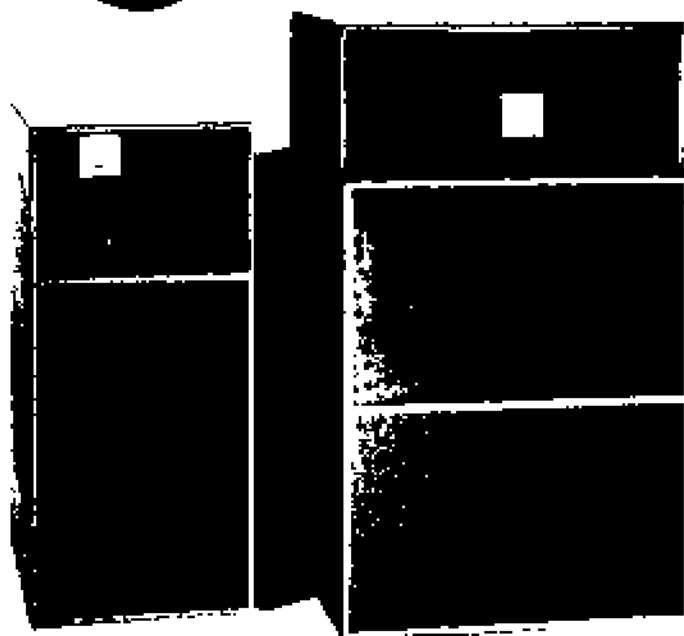
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- Light-weight, contoured body for perfect balance and tireless playing.
- Volume control located for convenient operation by picking hand.
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- Wide cutaway for easy access to 22nd fret.
- Body finishes available: Natural, Sunburst, Walnut, Black and White.

## Neck

- One-piece rock maple construction.
- 25½" scale with 22 frets.
- Available with flat 12" radius fingerboard (Sabre I) or oval 7½" radius fingerboard (Sabre II). Sabre I has jumbo frets, Sabre II has standard frets.
- Rock-hard Melamine nut for long wear and precision notching.
- Patented flat truss rod which allows more strength while providing thin neck size (800/1000ths inches front to back).
- Neck tilt adjustment for adjustable angle without the use of shims.
- Head designed so that strings pull straight across nut.
- Patented Music Man tuning keys (manufactured by H. Schaller). Tapered string post forces strings to lie flat against head for improved tension over nut.

## Pickups

- Two humbucking pickups with 12-¼" magnets.
- Narrow pickup design provides increased picking space between pickups.
- The two pickups are each of individual sizes so that magnets are positioned directly beneath each string. There is no volume loss when string is bent away from magnet.
- Pickups are vertically adjustable for perfect tone balance.

## Electronics

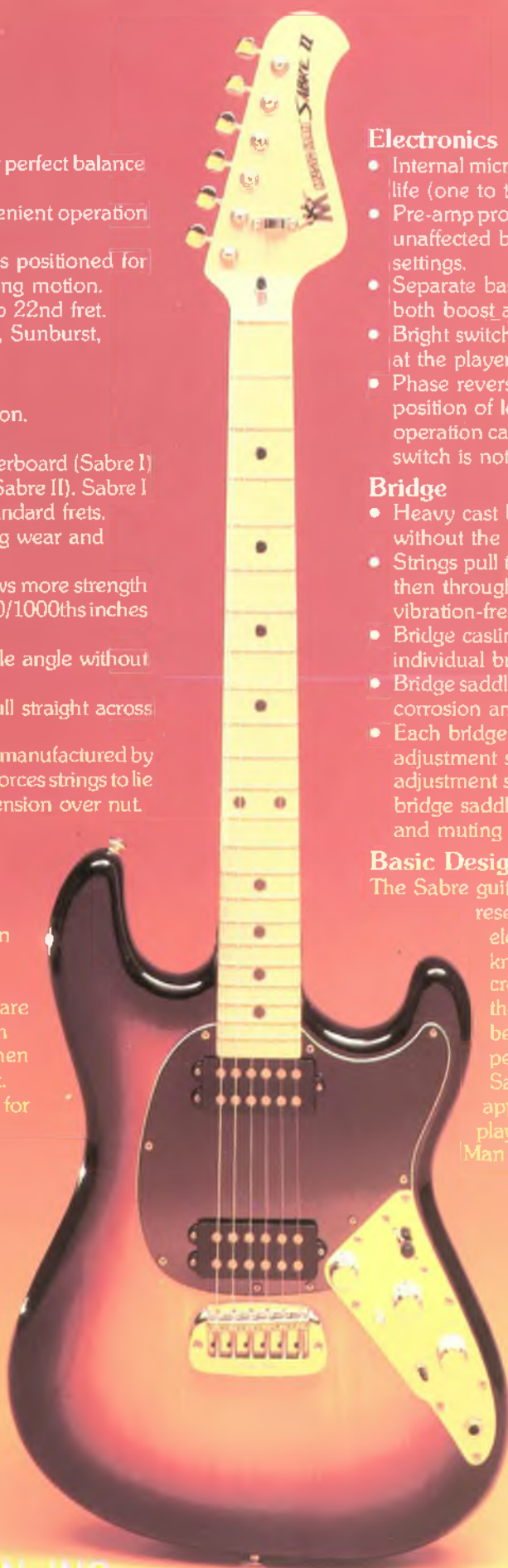
- Internal micro-powered pre-amp for long battery life (one to three years).
- Pre-amp provides low impedance output. Tone is unaffected by long cords or low-volume control settings.
- Separate bass and treble tone controls provide both boost and cut.
- Bright switch conveniently adds additional highs at the player's fingertips.
- Phase reversal switch for pickups works in any position of lever switch. Instant out-of-phase operation can be obtained even though the lever switch is not in the two-pickup position.

## Bridge

- Heavy cast bridge provides excellent sustain without the need of a heavy body.
- Strings pull through from inserts in rear of body, then through bridge casting, resulting in rigid, vibration-free assembly.
- Bridge casting provides recessed well for six individual bridge saddles.
- Bridge saddles are made of stainless steel to resist corrosion and ensure long life.
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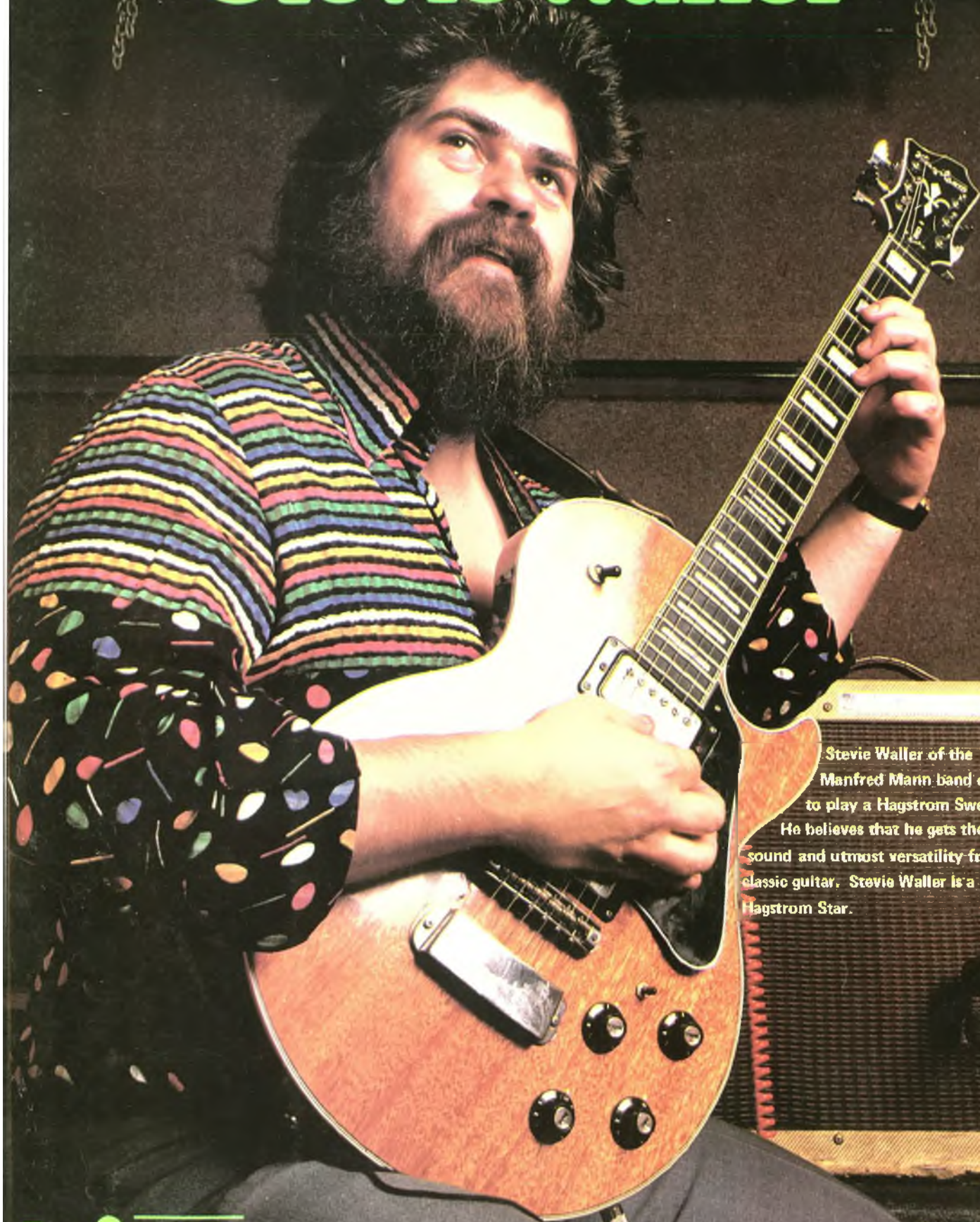
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