

JULY 1969

# TAPE

RECORDING MAGAZINE

2<sup>1</sup>/<sub>2</sub>



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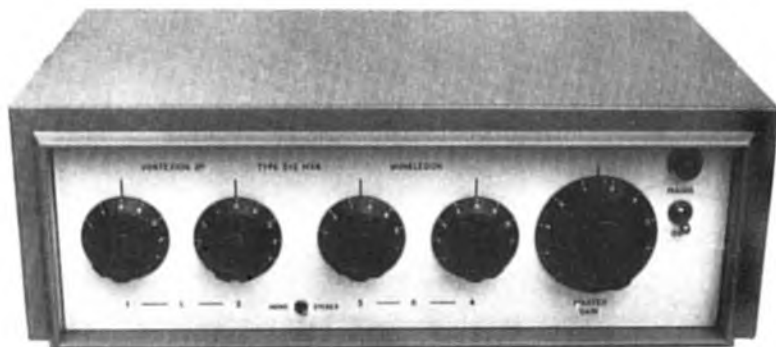
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Philips 4407... ..	35	15	10	5	13	4	103	15	4
Akai 1710W ...	37	15	7	6	2	1	111	0	5
Sanyo MR939 ...	38	13	6	6	2	3	112	0	2
Telefunken 204TS... ..	41	13	0	6	18	10	124	19	0
Grundig TK247 ...	45	10	9	7	2	4	130	18	9
Philips 4408... ..	46	19	5	7	8	9	136	3	10
Sony TC530 ...	49	12	3	8	1	8	146	12	3
Beocord 2000K ...	53	5	0	8	17	6	159	15	0
Beocord 2000T ...	55	5	0	9	4	2	165	15	0
National Console-Aire ...	61	16	8	10	5	4	185	0	0
Ferrograph 722/4... ..	65	3	1	10	15	0	194	3	1
Akai M9 ...	68	12	4	10	16	8	198	12	4

## 4 TRACK MONAURAL

Fidelity Braemar... ..	11	12	8	1	17	4	34	4	8
Ferguson 3226 ...	15	9	0	2	11	7	46	6	0
Grundig TK140 ...	16	10	1	2	11	1	47	13	1
Philips 4307 ...	16	15	3	2	13	1	48	11	11
Ferguson 3238 ...	20	12	0	3	5	0	59	12	0
Ferguson 3216 ...	22	16	0	3	12	2	66	2	0
Wyndor Vanguard ...	25	4	0	4	4	0	75	12	0
Tandberg 1541 ...	26	15	3	4	10	0	80	15	3
Reps HW10 4-T ...	28	16	9	4	11	2	83	10	1

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Sony TC355... ..	33	7	6	5	11	3	100	2	6
Akai 3000D... ..	35	0	3	5	10	7	101	6	11
Beocord 1500 ...	42	15	0	6	18	4	125	15	0
Ferrograph 702/704 ...	58	8	5	9	11	8	173	8	5

## MAINS TWIN TRACK

Fidelity Braemar... ..	10	9	8	1	15	0	31	9	0
Ferguson 3224 ...	11	12	8	1	16	10	33	14	0
Grundig TK120 ...	14	0	3	2	3	9	40	5	3
Beocord 1100 ...	28	5	0	4	14	2	84	15	0
Brenell Mk. V/3 Std. ...	36	8	2	5	16	7	106	16	8
Brenell Mk. V/3 Mtr. ...	39	8	3	6	4	6	114	1	9
Ferrograph 713 ...	51	6	3	8	10	0	153	6	3
Ferrograph 713H... ..	53	14	6	8	17	6	160	4	6

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National RQ-113S ...	7	13	5	1	5	7	23	0	3
Philips 3302 Cassette ...	11	1	7	1	15	0	32	1	7
Sharp RD505 Bat./Mns. ...	13	12	8	2	5	0	40	12	8
Telefunken 300 ...	15	15	0	2	12	6	47	5	0
Sony TC210... ..	16	0	0	2	13	4	48	0	0
Telefunken 301 ...	17	17	0	2	19	6	53	11	0
Telefunken 302 ...	19	12	0	3	5	4	58	16	0
Sanyo MR151 Stereo Uher 4000L ...	30	4	1	5	0	0	90	4	1
	44	13	1	7	8	4	133	13	1

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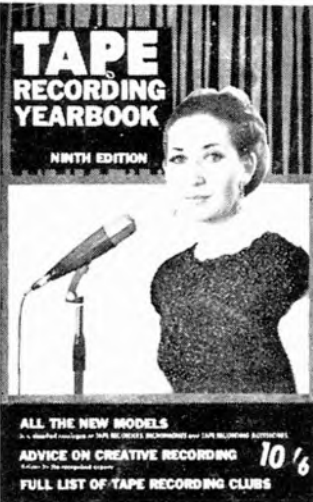
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# TAPE

RECORDING  
MAGAZINE

Incorporating TAPE RECORDING & HI-FI MAGAZINE  
and STEREO SOUND MAGAZINE

Vol. 13      No. 7      July 1969

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We apologise for the late publication of this and recent issues. The delay has been entirely due to a printers' industrial dispute which of course is outside our control. It is hoped that following a recent settlement normal publication dates will be resumed in the near future. In the meantime we would ask readers to be good enough to bear with us.

**COVER PHOTOGRAPH:** At Madame Tussaud's in London the Battle of Britain is being re-created as a son et lumiere spectacle, and the entire show is controlled by tape. Here we see the interior of a Heinkel bomber as it would have appeared to the Nazi raiders. Full story on page 234 this month.

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DENYS G. KILICK**

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# Tape trends and tape talk

By Douglas Brown

THE TAPE RECORDER has been recommended as an aid to marriage harmony. The message is: when circumstances keep you away from your wife, send her a tape.

The Westminster Bank recently asked young men engaged in the export drive to fill in a questionnaire as part of a national competition. The 14 award winners almost unanimously agreed that one of the greatest hazards facing the export salesman is the disruption of family life, wives' loneliness during the husbands' frequent absences and the difficulties of planning ahead for holidays and social events.

One of the £1,000 top winners, Mr. Colin Brook, offered a recipe which he has proved in practice. Every week, when he is abroad, he sends home a tape recording to his wife and children.

\* \* \*

ALTHOUGH some enthusiasts look down their noses at it as the least creative form of tape recording (they are wrong), tape-spondence is probably the most significant growth area of amateur recording activity.

The Tape Corresponding Group of the Federation of British Tape Recordists and Clubs is now well launched and the individual membership of the Federation now outstrips the membership organised in local clubs. There is a growing interest in the Federation overseas, particularly in the form of applications from Australia, and there is friendly contact with the Australian Tape Recordists' Association.

The A.T.R.A. itself now boasts 500 individual members "down under" and one of the most successful fields of activity there, is the regular circulation of Round Robin tapes. There are 45 separate Round Robins at present, 11 mono two-track, 12 mono four-track, nine stereo, eight international, one junior and four covering specialised fields.

It is particularly in the specialised fields that we might have expected to see a greater growth of Round Robins in this country. Enthusiasts for cinema organs have tried this in the past, and I have heard of several other efforts. But wouldn't it interest social workers or teachers or yachtsmen or amateur politicians to exchange ideas on tape?

\* \* \*

THE BRITISH FEDERATION is holding its annual general meeting this month and, in one respect, it will be a sad occasion. Alan Stableford has indicated that he will not stand again as chairman of the organisation.

The name of Alan Stableford has been closely associated with amateur recording in Britain since it began in the '50s. He helped to found the club

movement and the British Contest. For years he was the principal British spokesman at the international Federation and Contest sessions and I have many precious memories of the interesting and enjoyable hours spent in his company in many countries. Though it took some of our more solemn European friends quite a long time to understand and appreciate Alan's special brand of British humour, he became an extremely popular figure who has been greatly missed in more recent years.

Personal misfortune has made it impossible for him to participate in the same way recently, but his many friends everywhere will hope that circumstances will so evolve that he will soon be again fully involved.

\* \* \*

THE FINAL JUDGING in the British Amateur Tape Recording Contest and the selection of "The Tape of the Year" took place in London earlier this month. Full results will be published in our next issue.

John Borwick, John Crabbe, Donald Aldous, John Bradley, Fred Judd, Brenda Marriott and I judged the individual categories and the "Tape of the Year" was selected by a panel composed of Anne Duchene, Eric Robinson, Timothy Eckersley, Matthew Norgate and Christopher Nupen.

The prize presentations will be staged at the Audio Fair at Olympia in October. More details later.

\* \* \*

THE FEDERATION has announced its own annual tape recording contest—for four-minute tapes on the theme: "Say what you will, the countryside is still. . ." Closing date is July 31st. Fuller information can be obtained from the Contest Secretary at 33 Fairlawnes, Maldon Road, Wallington, Surrey.

\* \* \*

APOLOGIES to those impatiently awaiting the first in the new series of Tape Recording Handbooks. Publication was delayed beyond the promised May date, but orders are now being dealt with. Other titles will follow approximately at monthly intervals.

\* \* \*

IN TAPE TRENDS last month I gave details of an International programme for sound and sound recording amateurs being broadcast by Prague radio. Information has now been received that the broadcasts will in future take place at 09.00 hours GMT on Saturdays only on the single frequency of 9505 kHz. As previously mentioned the programme is timed to run for 30 minutes and the address for contributions is: Radio Prague, Magazin für Ton und Tonbandfreunde, Prague 2, Czechoslovakia.

## WHEN OUT AND ABOUT WITH A BATTERY PORTABLE REMEMBER THE SCOUT MOTTO

# BE PREPARED

**B**E prepared" say the Boy Scouts. For the sake of this motto their organisation and its individual members have had to endure a great deal of witless ridicule. Yet in those two words is expressed the philosophy that will lead to success in more than one field of activity. When using portable battery operated tape recorders "being prepared" accurately sums up the expert approach to the job.

It is not surprising that in this magazine we find ourselves continually referring back to discussions on the fundamental nature of sound itself. Since we are concerned with recording sound then the more we know about its properties the more likely we are to succeed. Without attempting to delve deeply into technicalities it will be readily understood that one of the more obvious properties of sound is that of *impermanence*.

A sound is made, it exists for a certain space of time then gradually dies away and is not heard again. Not ever. Perhaps the sound can be repeated, but it will not be that first sound, only another and probably slightly different version of it. It's rather like striking a match to produce a flame. Once a particular match has burnt and its flame has disappeared it is finished. Another match from the same box will perhaps produce a similar flame but it will not be the same one. If our first match happened to be the last in the box then as it burnt away it might offer us a once-and-for-all chance — until the opportunity arises to buy another box.

So it often is with sound recording, except that all too frequently we find we are doing the equivalent of striking the last match with little or no prospect of acquiring another box. Once a sound



**Yes, we do know that Scouts now have a new look, so we apologise to the Scout Association for our irreverence. To prove how seriously Scouts take their recording activities see the report of the £1,000 Scout recording contest on page 237.**

is heard it will pass for ever into the wasteland of eternity with its energy dissipated into the surrounding space. No power on earth can bring it back. The most we can do is to "steal" some of its energy to set up electrical impulses in a microphone which in turn are amplified and then registered as a magnetic trace on tape so that a loudspeaker might artificially reproduce a noise that is recognisably similar to the original.

Does that seem a little hard? Perhaps so, but it clearly describes what sound

recording is all about. Let's not kid ourselves. The audible impulses produced at the loudspeaker do *not* recreate the original sound at all; they merely simulate its properties and give us a—more or less—realistic impression of hearing that original sound again. The better the impression the better the recording.

But to return to this quality of impermanence, I do want to stress how important it is in relation to the way in which recording projects are undertaken. The most direct analogy is perhaps with action photography. Once a particular movement has started it must finish at some point. If the photographer fails to expose his film during the course of that movement he has lost it for ever. Obviously a different approach is required to that needed for, say, photographing a building which as a concrete (no pun intended!) entity will be standing four-square in front of the photographer for the rest of the day, tomorrow, next year and the year after.

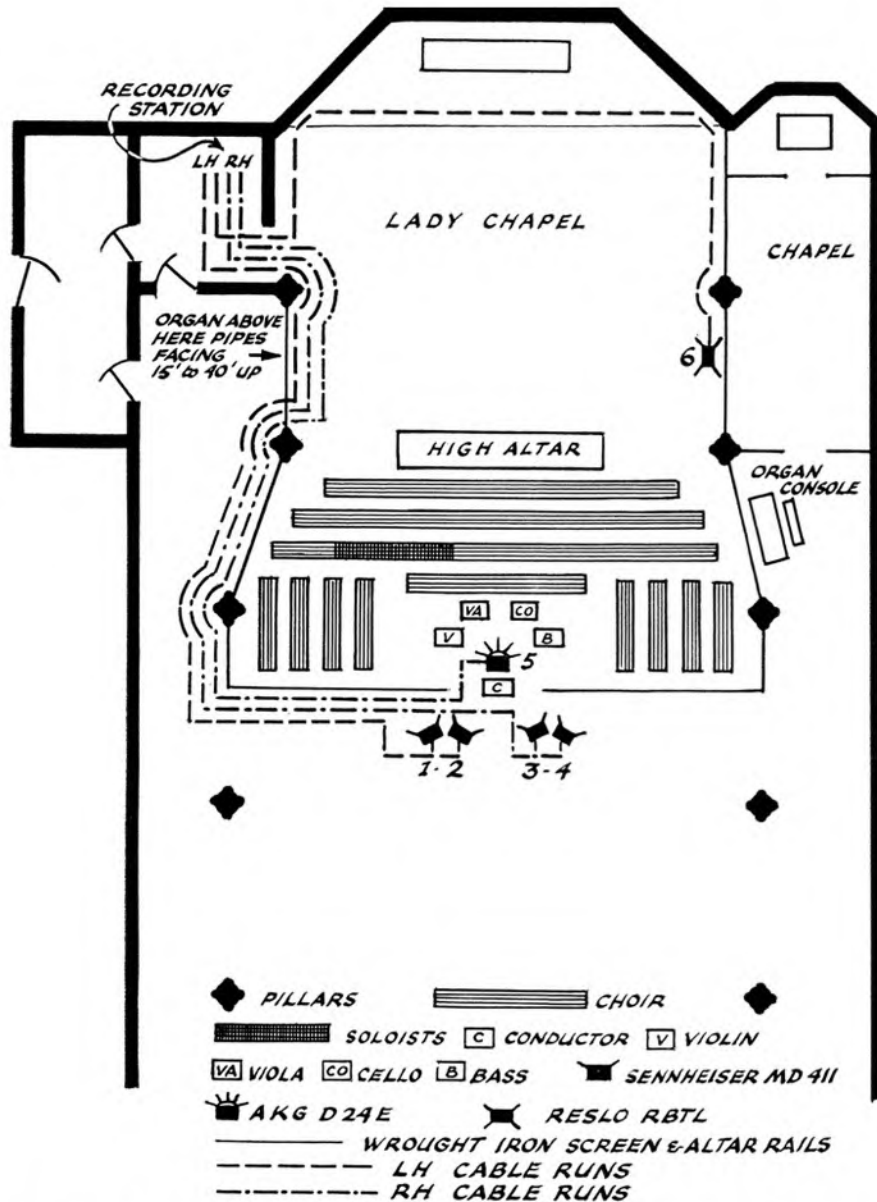
The perfect tool for dealing with this elusive nature of impermanent sound is the portable recorder. It might be cassette or it might be spool to spool; the type makes not the slightest difference. Slung on its shoulder strap such an instrument is—or should be—ready for instant use at the flick of a switch. The carrying of such a machine is one way of being prepared.

This in itself is not enough. If it was we would all of us be producing brilliant recordings all the time. No, the first basic rule of preparedness is for the recordist to be at the right place at the right time. This is not as easy as it sounds. In the cases of fixed events taking place at published or advertised times there is obviously no problem. Unfortunately

Please turn to page 229



# ACTION



Detailed layout of the church in which our "Action" team undertook their second attempt at live stereo recording. Cable runs and microphone positions are clearly marked, together with performers' locations.



## OUR ACTION TEAM DESCRIBE THEIR NEXT EXPERIENCE IN LIVE STEREOPHONY

# THE SECOND ATTEMPT

By Basil Dawson and John Claxton

**I**N describing our first experiments with live stereophonic recordings in May we had to admit to partial failure. But as incurable optimists we feel it more appropriate to think of that episode as a partial success. One thing was certain—to gain experience in stereo recording we would need more live programmes on which to exercise our somewhat dubious talents. Perhaps our next endeavour would give us better results; at least it was unlikely that we should find ourselves having to cope with sound sources scattered up and down the length of a large building as happened last time.

It always amazes us when “enthusiasts” complain that they can never find subjects to record. We have found there are always plenty of musical events taking place locally and as a rule a proper approach to the organisers will result in the necessary permission to record. Often we are given not only this bare authority to use our equipment but a great deal of interest and willing co-operation as well.

So we began to look around for the possibility of another session. These things are frequently a matter of pure chance. By sheer good fortune a relative happened to spot a poster advertising a forthcoming recital by the London Bach Society. It was to be given at the Church of St. John the Divine, Kennington, a church with which one of us has been fairly closely connected for some years. When this information reached us we considered whether we dare ask permission to record; the London Bach Society uses a number of professional performers. However, through the good offices of the vicar we were put in touch with the secretary of the Society and after explaining the circumstances permission was given exceptionally by the conductor and the performers for a private recording to be made.

We looked forward to this event with great enthusiasm for we were well aware of the extremely high standards of this nationally known choir. There was no

doubt in our minds that this would be the finest performance we had yet had the opportunity to tackle. A mass by Anthony Milner which had never before been recorded was to be performed at the recital and it was, of course, necessary for us to obtain the composer's consent.

Dr. Steinitz, the conductor, was most helpful. Thanks to his interest in our operations we were able to attend at the first of the two rehearsals held in the church. This was invaluable since it enabled us to see the layout of the choir and performers and so plan the disposition of our microphones, cable runs and recording station. The second and final rehearsal in the church was to be on the same evening as the recital, preceding it so as to allow about three-quarters of an hour interval between them.

When working in churches the verger is always a power to be reckoned with. He is responsible for allocating space as well as ensuring that microphones and cables do not interfere with either the pleasure or the safety of the public. Usually vergers are cheerful people ready to give willing assistance to recordists and the present case was no exception.

On the afternoon of the recital we arrived with all our gear at the church where by pre-arrangement the verger was waiting to let us in. Using the sacristy for our recording station we set to and established all the equipment before the choir came. All the cable runs were carefully laid along and attached to the altar rails and the wrought iron screens so that no aisle or passageway was obstructed. We also had to make sure that the cables themselves were not obtrusive. They do say that practice makes perfect and from past experience we were able to get ourselves into the “ready-to-go” condition by the time the first members of the choir began to arrive.

The choir itself was some fifty strong arranged in rows on the sanctuary steps in front of the high altar. They stood in a three-sided box formation around the

conductor who was positioned at the entrance to the sanctuary. The solo voices were to be in the middle rows of the choir slightly to the left of centre. A small instrumental ensemble comprising violin, viola, cello and bass were arranged in a semi-circle in front of the choir and around the conductor. The organ chamber in this church is situated at a high level in the north-east corner of the building which means that it faces out from the left side into the Lady Chapel. This is to the rear of the high altar as is shown in the accompanying diagram.

The building is large and very resonant. Choirs like this bright quality, it makes singing easier—but it is a veritable nightmare for recording because of this exceptionally resonant acoustic. To add to our difficulties a considerable amount of traffic rumbles around the building and all too much of this extraneous noise breaks through to form an audible background.

Because of these complications we decided on fairly close positions for the microphones. As the spread of the choir across the large sanctuary was very wide we used four Sennheiser MD 411s (cardioids with an unusually narrow acceptance angle) in two “Siamese” pairs, each pair being mounted on a single stand some eight feet high. These two stands were placed about six feet apart just behind and to either side of the conductor. One of each pair was angled slightly inwards and, because the choir was ranged upon a series of steps, in the horizontal plane. The other ones of each pair were angled outwards at nearly 45 degrees and very slightly downwards as the sections of the choir at the sides of the box formation were at ground level. The slight angling inwards of the first two of each pair prevented any “hole-in-the-middle” effects.

As the instrumentalists were seated they were not properly covered by the

*Please turn to page 229*

**W**AS it George Bernard Shaw who once observed that Hell would turn out to be a place full of musical amateurs? Indeed, I know many recording enthusiasts who have to be physically restrained when called upon to recount how they made that first audition demo for the now famous pop group—Soapy Bubbles and the Detergents. Certainly, few subjects arouse such violent antagonism as modern music, and I hope that I will not be regarded as some sort of gibbering lunatic by asserting that behind the continuous barrage of cacophonous rubbish churned out daily by Radio One there lurks an immense amount of genuine musical ability—distorted though it often is.

My interest in recording pop music was born when one of our local “rock” groups, called the Reform (now incidentally one of the top teenage attractions in Ireland) were asked to produce a short tape for possible broadcast on Radio Eireann. Through some misunderstanding the group were given only 24 hours to prepare and forward the tape, and it was made quite clear that no payment was envisaged—even if the tape were broadcast by RTE.

The group’s drummer is a friend of mine, so I was asked if I would like to produce a recording at 24 hours’ notice—free of charge. I must confess that I did not jump at the opportunity, but after being persuaded that a spot on a radio programme would be a big boost for the outfit—not to mention my own ego!—I eventually agreed to place myself at the mercy of three 50-Watt amplifiers and one large drum kit for two hours on the following evening.

That same night I checked out the equipment thoroughly. About a year earlier a friend of mine had converted his garage into a small studio. Then we had invested in two tape recorders with a view to doing some serious song-writing, an aim—alas—by now long forgotten. However, a separate control-room, adequate sound-proofing and a good lay-out made it an easy place to work in, and certainly the excellent equipment could hardly be blamed for some of the ghastly recordings which I produced from time to time.

For this particular session I had two Vortexion recorders, one CBL stereo and one WVB mono, both geared to operate at either 7½ or 15 ips. A Vortexion 4-channel mixer, three Shure Unidyne microphones, and a small Sony mixer incorporating three cheaper mikes completed the bill.

Although I often have fantastic dreams of owning 24-track recorders—each as big as a house—I must admit that the Vortexion is really well-suited to the home studio, as it is both rugged and

# RECORDING THE REFORM

## A RUSH JOB THAT RESULTED IN A BROADCAST

by James D. Liddane

dependable. The quality of carefully multi-tracked tapes never ceases to amaze me, and the machines rarely give any trouble.

When the group arrived the next evening for the recording they were accompanied by enough equipment for a broadcast to the Outer Hebrides. In the midst of the confusion I was casually informed that nobody had remembered to find out if Radio Eireann had any technical requirements. I had often heard whispered rumours that RTE executives gazed with jaundiced eyes upon those unlucky souls who dared supply anything less than 15 ips full-track, and I was inclined to believe this. Unfortunately I had no full-track facility, and even the speed presented difficulties as I have always maintained that the excellent echo facility on the Vortexion has to be used at 7½ ips for optimum effect. In the end I decided to cheat, and make the master at 7½ ips—while I presented Radio Eireann with a 15 ips copy!

Setting up the group’s equipment and balancing the instruments took the best part of the first hour. An initial test showed that it would be next to impossible to attempt the recording in one take, and so I decided to lay down a backing-track of three guitars and drums first, adding the vocal tracks later.

I started by placing one microphone about three feet above the drums, with the remaining two Shure mikes stationed about 18 inches away from the two guitar amplifiers; I must stress that there can be no hard and fast rule for the positioning of mikes, as one must take into account not only the room acoustics, but also the type of sound required. However, I do find that the drums have to be recorded very carefully. If you intend to add extra tracks you must aim for a low-pitched drum tone, otherwise the cymbals will distort and your percussion will become “ringy” after a few dubbings. Amplified guitars (lead and rhythm) present less difficulty, though amplifier hum can be very disconcerting and is noticeable even in the higher-price range of guitar/amps.



The Reform. An early picture of the group taken before the broadcast referred to by the author.

I always prefer to record the bass guitar directly into the mixer. This produces a more precise (and more modern) bass sound, which is however not suitable for anything other than pop music. My first attempts to do this resulted in some confusion. The bass-guitarist sat in the control-room with me, playing his bass guitar, while outside his co-musicians performed—unable to hear a note from his instrument. The drummer was particularly affected by this innovation as both instruments tend to complement each other; however, in the end good musicianship prevailed and recording commenced in earnest.

The problems involved in trying to perform a backing-track without being able to listen to—or be guided by—the vocals are immense. Certainly a musician tends to over-concentrate on keeping a steady beat, and this can destroy the spontaneity of a performance. Again, the more repeats there are the more nerve-racking it is for all concerned, and yet the basic track of the first song—a medium-paced American ballad called *Never My Love* was completed within half an hour.

# RECORDING THE REFORM

by James D. Liddane

Continued from previous page

Immediately after each take I cleaned the heads thoroughly—something which caused no end of amusement among the group! Even if drop-out becomes patently obvious only when half your recording disappears into a deathly silence, the no-less annoying symptoms of its preliminary build-up can be very noticeable on multi-tracked recordings unless you keep the heads spotlessly clean.

When I had finished playing back the initial track the lead-guitarist decided to add an improvised guitar solo, using a fuzz-box. We brought the unit into the control-room, fed it into the mixer and tracked on this embellishment while the rest of the group went outside to have a quick smoke. The leader of the group was so impressed with the results of this dubbing that he asked if I myself could add on some piano. However, in keeping with the style of the song—which was rather dreamy and wistful—I chose to use a small xylophone (originally bought for 9s. 6d.!) and which—if properly played—can produce a really beautiful and inexpensive sound.

It was now time to attempt the vocals. The instruments were cleared away and the four boys gathered around to complete the job. The vocal parts had been arranged so that one member sang the lead part, two sang background treble, while the fourth sang what was to be an intermittently prominent bass line. Giving one microphone to each of these three units we commenced work.

Up to this, the recording had been more or less uneventful. All at once, however, difficulties arose. Within seconds of starting the machine, a continuous hum commenced. This turned out to be a loose mike connection, damaged while moving the microphones into new positions, and was easily fixed. Next, the lead singer complained that he would be unable to sing along with the backing-track due to the simple fact that he couldn't hear it properly. Attempts which I made to move the monitor speaker nearer the vocal group produced a wealth of impressive feedback, and earphones

were out as I had the only set. Eventually a great deal of manoeuvring between speaker and mikes produced a sound acceptable to everybody, and so recording re-commenced.

On the third attempt the vocal track was completed and the results were quite impressive. The musical arrangement was good and the final sound of six instruments and four voices awed even the boys themselves. Having listened to the playback on earphones and at maximum treble, I came to the conclusion that despite the four trackings the loss of quality was negligible; accordingly I suggested to the group leader that if he could arrange some extra vocal parts quickly we might add them on.

With the lead-singer taking the same part again (to provide a lead-vocal balance against the new harmony) we repeated the process, adding three new parts, and ending up with a final recording of *Never My Love* sung by seven voices accompanied by six instruments. While my musician friends seemed mainly thrilled with their torrent of harmony, I



The author, nearest camera, pictured with former song-writing partner Michael Collins. The studio is in a garage adjoining Mr. Collins' house in Limerick City.

was thanking my lucky stars that I had taken so much care of the heads between each take. I had originally intended to record in one take, and certainly the prospect of so simple a recording might well have encouraged me to forget about head-cleaning. Luckily I had resisted the temptation, and the clarity of the recording to which we were now listening proved the efficacy of this simple procedure.

We were now completely relaxed. In less than thirty minutes we had the other song—a pop hit called *Young Girl*—in the can. Echoing, editing and copying took another half-hour, and only three hours after the last note had sounded the tapes were on the road for Dublin.

A few days later the recording was broadcast, along with some biographical details on the group. For days after I was busy explaining to all and sundry how I had masterminded the whole performance. In fact I never even heard the programme. While I slept happily one morning last August the nation heard my first broadcast. I like to think that it was a Day to Remember; nobody else does!

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Recording time with 1.5 hours in total at  $3\frac{3}{8}$  ips  
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## THE SECOND ATTEMPT *from page 225*

four Sennheisers. We also had to consider the solo vocalists who were predominantly on the left-hand side. Also on the left were the ranks of organ pipes. It was felt that had we attempted to recreate the actual spatial disposition of these important sound sources in our stereophonic recording we would have had a somewhat lopsided effect with far too much content on the left-hand channel. To balance up the two sides we placed an AKG DE24E (which although cardioid has an acceptance angle of well over 180 degrees) on a very low stand immediately in front of the conductor at the centre of the semi-circle of instrumentalists and we fed it into the right-hand channel. The organ was obviously on the left and would have to appear there in our recording, so we covered it by one face of a Reslo RBTL. This we mounted on the wrought-iron screen on the other side of the Lady Chapel with its other face pointing into an empty chapel. (see diagram). By using this position the live axis of the Reslo was at right angles to the back of the choir and so could be considered dead as far as any direct pickup from the choir was concerned.

Each pair of Sennheisers was wired in parallel and the left pair was fed to the auxiliary input of the left-hand

pre-amp of the Truvox PD 202 recorder via a microphone pre-amp unit whilst the Reslo was fed to the left-hand microphone input of the Truvox by way of a line transformer. The right-hand pair of Sennheisers and the AKG were taken to separate inputs of a two-channel mixer, the combined output being fed to the auxiliary input of the right-hand pre-amp of the Truvox.

Unfortunately a major disadvantage of this arrangement is that there is no single control by which the overall level can be uniformly adjusted; a minimum of three controls have to be adjusted with the inevitable danger of disturbing balance. Under these conditions it is essential to set all levels in advance at such a point as to give proper balance at the maximum signal strength to be encountered so as to give full modulation. From then on all should be left well alone.

This was our undoing. At present John is building a stereo mixer so that we can achieve uniform overall adjustment from just one knob, but until this equipment is completed we shall continue to run the same risk. The trouble arose from the extreme range of dynamics in the performance. Having set our levels for the loudest fortissimo passages it was found on play-

back that the quietest sections were seriously under-recorded. Under-recording tends to make the inherent noise of the system much too obtrusive and it will spoil a recording just as effectively as distortion from over-recording.

Because the standard of the performance was so very high and our balance between voices, instruments and organ so excellent we were disappointed at the final result. Perhaps we were too critical, for both Dr. Steinitz and Anthony Milner have expressed their appreciation. In fact they went so far as to congratulate us on the standard of our work even after having had its inadequacies pointed out to them. Each requested and was provided with copies from our master tape, and more copies were made for soloists and members of the choir, so even after our main task had been completed we were still kept very busy.

Looking back on our London Bach Society recording we are conscious of the improvements over our first stereo effort. But we are still some way from the high standard we set ourselves in the first place and we are determined to continue with yet more live recording sessions until we have attained a quality of which we can be truly proud. And in doing so we are giving ourselves and other people a great deal of pleasure.

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## BE PREPARED *from page 223*

these are the easy subjects, the ones in which there might perhaps be little merit or satisfaction. A little thought will soon demonstrate how the recordist can advantageously arrange to put himself in a very favourable position to obtain truly unique and interesting recordings.

Make up your mind what sort of recordings you are going to take and then consider what is likely to be the best time of the day for maximum sound activity (and minimum extraneous noise) at the recording site. If comment on the sound is needed it will probably come far more spontaneously and naturally from an outsider, and best of all as an ingenuous remark from a child. Often it's a good idea to plan for two separate visits; the first to take the actual recording required and the second timed to coincide with the probable arrival of parties of children so that their innocent wit can be used to illuminate what might otherwise be a factual sound report.

No amount of forethought will prevent catastrophe if at the critical moment batteries fail or tape runs out. And if any reader imagines that such elementary precautions are not worthy of mention let me hasten to add that there can be few really experienced recordists who have not suffered this indignity at one time or another. I know I have to my cost.

Before setting out with a portable machine special care should be taken to check the state of the internal batteries and also to ensure that at least one spare set is readily available. It is preferable to use bulk erased tape, and spare spools must be carried in an accessible place. Personally I like to use a big old shooting jacket with voluminous "poacher's pockets." In here I can safely stow all the various bits and pieces whilst still keeping my hands free to operate the equipment.

Unless some simple code is adopted it is only too easy to accidentally re-record over a previously recorded tape. It's a singularly stupid thing to do, but kicking yourself after it's happened doesn't help at all. The great thing is to prevent it. My own method is simplicity itself. Unrecorded tapes are always tucked into the polythene bags supplied by the makers inside their cardboard containers. When a recorded tape comes off the machine it is *not* put back into its bag but the polythene is merely folded round it. So if my tape boxes get muddled I have only to glance inside to see at once whether the tape is recorded or blank. Any more complicated system is quite unnecessary; under operating conditions in the field one needs to keep everything just as simple as possible.

Familiarity with your portable machine

and microphone is of vital importance. You should be able to operate the equipment with your eyes closed. You should know at roughly what setting of the gain control you will get an averagely full modulation from any given sound without having to check the record-level indicator. All too often these are in the form of very tiny meters that are difficult to see even under relaxed and ideal conditions. When the critical moment comes to take the recording all your concentration will be needed in handling the microphone and observing the sound source. Fiddling around with level controls and indicators is almost certainly going to spoil the result.

In just the same way you should never be in such a position that you are distracted by wondering if the tape is about to run out or whether the batteries are about to give up the ghost. If in doubt insert new batteries and lace up a new tape before starting and then forget all about them.

By following this advice you will find when out of doors with portable equipment that you are indeed prepared—prepared for any eventuality and prepared to take advantage of that good fortune that seems to smile only on a select few. So here's good hunting and good recording throughout the summer months to come.

**E**LECTRONICS, as used for composing music, represent in essence a new extension of resources. I have, in these articles, been concentrating on the application of some of these resources—using the basic requirements, a tape recorder and a sound generator—to the articulation of types of musical motion with which I have been concerned. I have previously described a process related to the setting up of a continuous, modulated sound stream. In this article I shall lead to a demonstration of the use of impulse patterns which were outlined last month. In order to clarify my intentions it will be useful to speculate, for a moment, on motion itself.

The heart beat can be thought of as the body's simple harmonic motion and the natural motion of walking as an extension of this. These are the basic measures against which we measure all other forms of motion. The body, through the central nervous system, is the source and destination of all perception of motion and response to it; the combinations of gesture, speed and direction, of which it is capable, suggest the variety of motion which can be executed and responded to. The difference between walking and dancing demonstrates the beginning of these possibilities.

Dancing begins when the length of one's natural walking—or running—step is altered, increased or decreased to any degree—or even when one walks so as to achieve an exactly equal sense of weight with each step. A consideration of the range of motion which the differences between walking and dancing imply leads directly to a consideration of what occurs when we relate our own motion to that of others. What, for instance, is the pattern of relationships set up by the walking or dancing gestures of a group of people? We can go further and consider what occurs in, and how we respond to, the infinite variety of motion which surrounds our daily lives. It is possible to suggest here a range of relationships and responses in terms of a scale of consonant and dissonant motion which can be compared to the consonance and dissonance (in the technical acoustic sense of the presence or absence of beats) which arise from the combination of two frequencies. In this way the types of motion which surround us can be thought of as constituting a "vibrato" of varied velocities and directions; and, because all motion causes changes of air pressure, different amplitudes, pitches, timbres and durations.

### Non-musical Motion

It is relevant to note that music has the capacity to contain simultaneously a great variety of non-musical motion. This is often demonstrated in a film. The

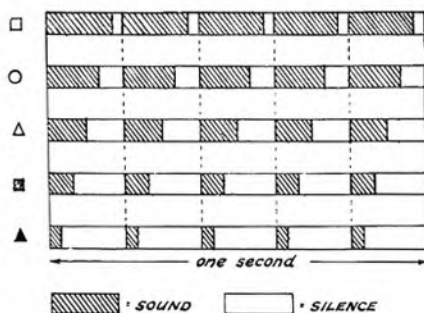


Fig. 1. A change of ratio between sound and silence applied to five sets of pulses at a rate of five pulses per second.

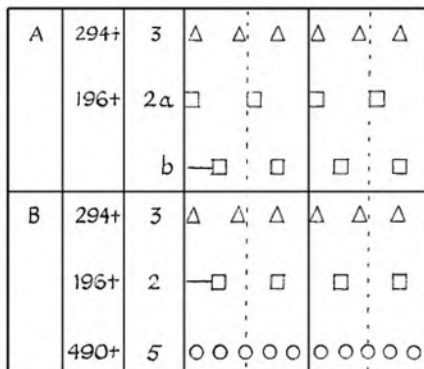


Fig. 2. An initial experiment in the articulation of motion.

music which accompanies a sequence can, at the same time, accommodate the motion of a man walking, the motion of smoke billowing from a nearby chimney, passing cars going at different speeds. This capacity then can be applied to the articulation of musical motion itself. The types of sonic motion I have in mind are related to this diversity and range of motion to which I have pointed. An approach to this diversity implies the use of complex temporal relationships. These can only be achieved through an extension of durational ratios and, therefore, of rhythmic intervals—the factors of time which exist between successive sounds.

### Drum Music

The music which most clearly demonstrates a wide range of rhythmic interval is found throughout the southern part of Africa. Particularly relevant in this respect is the drum music, for this by nature consists of pulse sequences and these are what I shall be dealing with later. African music exhibits a response to motion and therefore an organisation totally free of the simple periodic divisioning of European music. European music, with its basis in harmonic structure, has emphasised the simultaneous sounding of parts within a uniform metrical and rhythmic scheme. African music, which is not tied to harmonic considerations,

# PROJECT ALPHA

By Cyril Clouts

stresses the individual motion of each part by means of pulse patterns. These differ in each part and rarely coincide. In this music the rhythmic intervals which are set up between two or more out of phase pulse patterns display an astonishing variety. This is amplified by the use of drums of different pitch for each pattern and by changes of timbre, arrived at by striking the drums in various places with different parts of the hand. The result is a powerfully dynamic poly-rhythmic organisation of great complexity in which the articulation of motion is a primary goal. A result of this kind is not surprising when one considers how integral bodily gesture is to the articulation of pulse in African music. It can be noted that the degree of accuracy with which a complex pattern is maintained by a group of drummers can be very closely compared to the precision of timed attack made available by tape cutting.

Following from these speculations, to arrive at an articulation of motion such as I have in mind a new flexibility of means is required. In describing processes related to the use of impulse patterns I shall be emphasising processes related to duration and sequence. However, motion is bound to all dimensions of sound and an extension of all these is necessary for its true articulation. An overall extension of means has been the concern of composers for a long time. The following is a brief list of the types of extension I mean:

**1. Pitch:** To truly depict motion it is necessary to actually be able to move more freely within the audio spectrum itself. This implies the flexibility offered by smaller (or larger) divisions of pitch than are made available by the universally accepted equal tempered scale. This scale represents a compromise which, when introduced, accommodated the desire of composers to be able to modulate in all major and minor keys. This compromise was arrived at by abolishing the acoustically truer intonation of pitch (the distinction for instance between C sharp and D flat) in favour of the limit of the twelve fixed equal divisions of equal temperament.

# PROJECT ALPHA

By Cyril Clouts

Continued from previous page

A new flexibility of pitch is now required. This is made possible by the sound generator which offers the use of any desired distinction of frequency.

**2. Timbre:** Just as pitch can be classified according to scale, it is possible to think also in terms of a "scale" or gamut of timbre. The timbre scale we are accustomed to is related to instruments tuned, or adjusted in playing, to the twelve divisions of equal temperament. For the articulation of motion with which I am concerned, a wider scale of timbre will often be required as an agent of differentiation and flexibility. Electronic resources are a direct path to such a wider scale through waveform synthesis and the types of modulation offered by devices such as filters, gating circuits, envelope generators, etc. In addition, instruments are being adapted to new needs and can themselves be modulated by the same means as waveforms. All classes of sound, in fact, and their transformations, no matter what their diversity, are open to exploration. Diversity is the key to the processes I am dealing with.

**3. Amplitude:** Within the need for a greater flexibility of means it is possible to think in terms of using highly differentiated amplitude patterns as a means towards articulation of motion. The capacity of potentiometers in association with mixers offers a wide scope for the exploitation of a scale or gamut of amplitudes.

I have referred to the need for the use of an extended range of rhythmic intervals in order to arrive at the desired types of motion. This is related to the principles of sequencing mentioned in connection with African music—a process by which two or more parts exhibit a minimum of coincidence within a group of time units or along any time length. In a piece consisting, for instance, of three sound sources, or parts, such a process would imply the simultaneous articulation of different durational ratios—say 2:3:5—by each part in one and the same vertical time unit. In this way one begins to arrive at a system which will ex-

tend the variety of intervals of duration.

A second problem attached to the depiction of motion is to find the kind of sequencing which would give full value to it. If, for instance, a continual change of pitch and duration were used, contours of accent and line would result which would detract from these types of motion. However, a process which approaches the direct depiction of motion derives from the use of sets of pulses, each of uniform pitch and, for our present purpose, timbre and amplitude. My concentration in this article on processes related to pulse patterns derives from a long concern with them. An illustration of this will be suggested by the titles of two pieces which I composed between 1963 and 1965: *Orders of Motion: Walking and Dancing* and *Intervals of Motion*.

### Pulse Patterns

An initial consideration connected with the setting up of pulse patterns, and with all aspects of the extension of rhythmic intervals, has to do with the ratios which exist between sounds and any silence which succeeds, or precedes them. When a uniform spectrum is transformed into a pulse by cutting it into equal lengths of similar shape divided by silence this aspect will require attention. Varying the proportions between sound and silence is a primary means of differentiating between two pulses, either of the same or of different rates. **Fig. 1** demonstrates a change of ratio between sound and silence applied to five sets of pulses, each moving at a rate of five per second. The symbols have been chosen to represent the decreasing ratios and, in the later diagrams, also the varying content of different pulses in terms of pitch, timbre and amplitude. It should be noted that the decrease (or increase) of a sound's duration will affect its timbre and amplitude owing to the change of value each changed duration gives to the growth pattern and steady state. In addition, differences of duration which are too small will not be perceived; to arrive at perceptible differences it is necessary to sufficiently vary the proportions between different pulse lengths. Impulse

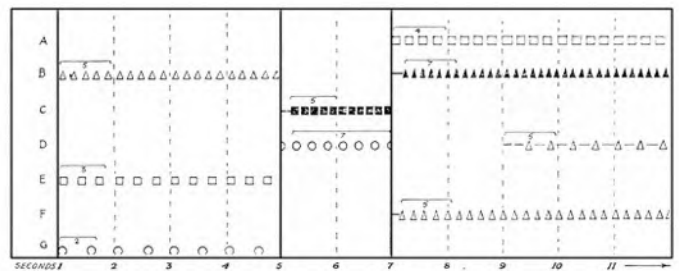


Fig. 3. Three groups of changing velocities of pulse, pitch and timbre.

patterns can be shaped differently according to the angle of tape cut used. These are not necessarily highly critical to the alteration of attack of timbre; however, without the use of devices which produce clearer differentiations, tape shaping can be used and the possible variations noted.

The making of loops containing the desired set of sounds and silences is a method of setting up pulse sequences. Loops of sound can be dangerous to use as they produce a facile effect of repetition. However, in this case, loops act as sources and are used as a means of arriving at uniform pulse streams of any desired length. At least one additional recorder is required to experiment with loops in this way. The stereo recorder which has been used as a basis for these articles will act as the destination of all impulse streams carried from the source loops on the second recorder. When two impulse patterns are to be combined the first will be recorded on track 1 of the first recorder. With the use of the sound-on-sound feature this can be transferred to the second track in combination with the new impulse pattern from the second recorder.

**Fig. 2** presents a simple initial experiment in the articulation of motion. The diagram shows two ways—one in phase, the second out of phase—of combining two simple pulse patterns. Two time units of equal duration are shown. Along the top line in **Fig. 2A** each unit contains three pulses of equal duration. Below it two equally spaced pulses occur in each unit. The combination of the two pulses results in a simple 3:2 ratio which will produce coincident sounds at the beginning of each time unit. The synchronisation of a coincident pattern of this kind presents a problem which cannot be wholly satisfactorily solved with the equipment available. The first pattern is allowed to run on the first machine in the playback mode, whilst on the second machine the second loop is held back by the brief pause control. This is released at an appropriate moment and the two rhythmic patterns will grad-

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**H**OW much time and trouble should be devoted to any single recording? That's an interesting point to which there is no easy answer.

I sometimes wonder if many amateurs realise how very hard professionals have to work to reach the high standard demanded of them. Take a gramophone record, for instance. An ordinary LP has some twenty minutes of programme time per side. How long would you be prepared to spend on two twenty-minute programmes?

In the professional world the absolute minimum time allowed is six hours—two three-hour sessions. But it is very rare indeed for anyone to make a good record within that time limit. Twice as long would be more reasonable, but in special cases a hundred or more hours might be spent before recording is exactly right.

I was discussing this point of view with a professional singer recently. The very last thing a professional performer wants is to be described as "amateur," and yet the true meaning of the word indicates working for the love of the thing rather than for financial reward. In spite of her resentment against this uncomplimentary word "amateur" she had to admit that working for pleasure regardless of time in order to achieve a difficult goal is one of the greatest satisfactions of her singing life. To me such an outlook expresses all that is best in the amateur.

Restrictions on time inhibit perfection. We in the amateur world are free from the tyranny of the clock, free to exploit our ideas to their furthest limits. All that is needed is patience and determination together with an understanding of the difficulties. It is quite wrong to assume that competent professionals achieve excellent results very quickly with little effort, whereas incompetent amateurs work hard for poor results. It is just not true. All too frequently the amateur can—or could if he were to give himself the chance—achieve better results than the professional because he can afford to devote more time to the job. It's as simple as that.

So next time you are taking a recording of a solo vocalist with piano accompaniment and feel after a couple of evenings' work that the project is too difficult to achieve the results you had imagined you might care to bring to mind a similar experience of my own recently. After spending some twenty hours on such a recording we scrapped the lot as useless and started the whole thing all over again. Now, after what must be nearly a hundred hours, we have reached the standard we require. Not that this involves perfection, because ultimate perfection is nowhere to be found in the world of recorded sound. But we do have some tapes we are going to be very proud of.

# CROSS TALK

## By Audios

Perhaps the worst enemy for the enthusiast working in comparative isolation is discouragement. Don't be put off by either real or imagined difficulties. Perseverance will overcome them for you, just as it has for every serious amateur and professional enthusiast in the past. And when things go wrong and you have to keep on trying and trying again you will find yourself in the company of people like myself, cursed awkward creatures who just won't take no for an answer.

**T**HIS month I am going to try an experiment. At the moment of writing these words I am preparing to leave for a week's holiday in Germany. I thought it would be amusing to set out my recording aims in this paragraph here, and then (honestly!) report on what actually happened in another paragraph further down the page. Thanks to the weird and wonderful workings of our editorial cycle this is just about possible.

So, before going away I can tell you that I intend taking the Bush TP60 Compact Cassette machine with me as my portable recorder. (Must remember to get a supply of spare batteries tomorrow.) The microphone will be as supplied and the equipment is standard in every way.

One of the most interesting sound sources to be found in the Rhine valley is the singing that takes place in the local village beer and wine houses. It always goes with a real swing even if the tune-fulness leaves something to be desired! I am looking forward to convivial evenings devoted to "work" of this kind.

There are many tourists in the Rhine valley during the holiday season, and they come from all the countries of the world. I shall hope to record some of their impressions, both of their homes and their holidays. Then there is the famous Lorelei song which is traditionally sung when boats on the Rhine pass by the rock. This is an absolute must—preferably with plenty of atmosphere in the background from typical boat and water noises. It could be a dramatic recording, but usually when one is convinced that a real winner is about to turn up the actual result tends to be disappointing. So although I have great hopes for the Lorelei recording I shall not be surprised if it does not come up to expectation.

Lastly, there will be the local people themselves. A kindly, happy community, they should provide some first-class recorded material. With, of course, the

sounds from the German railway which I believe runs somewhat too close to the rear of the hotel!

As I said before, these hopeful words are being written just before I go away. Today is Thursday and I leave on Saturday. My truthful report on the realities of the events will be written in about twelve days from now. I'm keeping my fingers crossed!

**B**ACKGROUND music is hardly news. We have suffered from this innocuous musical wallpaper for a good many years but even the daily Press regards the phenomenal manner in which it is spreading to be worthy of mention. Latest development is a proposal by the National Provincial Bank to install background music systems in two of their branch offices.

Do you ever stop to ask yourself as you listen to the background music in the supermarket who pays for all this entertainment? As usual it's the consumer. The provision of background music is an overhead which comes out of profits. So you are being sold music whether you like it or not, and you are cheerfully paying for it whether you like it or not. But perhaps we should regard background music as an essential of life, together with things like street lighting, garbage collection and education. But then, of course, it would add a farthing on the rates and we should all complain like blazes.

**A BITTER** blow was recently dealt to owners of Fi-Cord 1A portable recorders when Fi-Cord International Ltd., of East Grinstead, stopped importing replacement batteries. But now, thanks to the persistence of one of our readers, Mr. Jennings of London, I can tell you where suitable replacement cells can be readily obtained. They are stocked by Henry's Radio Ltd., of 303 Edgware Road, London, W.2, and they cost five shillings each or four shillings each for a set of four plus three shillings post and packing. When ordering be careful to specify the 500 MA hour capacity as a smaller version (which would have the wrong physical dimensions) is also stocked. Many thanks Mr. Jennings—hundreds of 1A owners will be grateful to you.

**W**ITH seven days' sunshine and relaxation behind me I can now report on the results of my recording activities in the Rhineland. The little TP60 machine did its duty manfully, and we have brought back audio memories of a delightful holiday that will be treasured for many a long year to come.

Of course we had our failures—the excellent brass band that gave an impromptu performance on top of the Lorelei rock was the one I regret most. The recorder was lying in a drawer back at the hotel at the time! But we do have recordings of singing and jollity, not to mention serious (if somewhat inebriated) discussions with people of many nationalities. Believe me, there could be no more vivid reminder of our many happy hours spent in this convivial part of Germany than these "sound pictures." Of course recorded quality is not always good—it doesn't matter; the great thing is we have been able to capture the atmosphere and sense of occasion in a way that could never be achieved through the use of film, either still or cine.



# BATTLE OF BRITAIN

continued from previous page

**T**HE year is 1940. With the might of the Nazi war machine poised on the Continent the fate of the free world trembles in the balance. In the United Kingdom, the last bastion of freedom in Europe, a nation awaits the inevitable onslaught of the aggressors. Short of supplies, short of machines and short of men, the fighter pilots of the Royal Air Force find themselves engaged in the most remarkable action of the war. The Battle of Britain is fought and won by the now legendary "few."

They were desperate times. And yet even as the battle raged the entertainment broadcast by the BBC reached a new high level. The Tommy Handley ITMA show, Garrison Theatre, Elsie and Doris Waters, Vera Lynn and many others assumed a new significance as part of the sound of battle. With the confident tones of Winston Churchill's voice ringing in our ears we were certain of victory.

Now at Madame Tussaud's in Baker Street, London, a new spectacle entitled *The Battle of Britain* has just opened. Its object is to recreate the sounds, the sights, and the atmosphere of those tremendous days. In 1969 the Battle of Britain is being fought all over again, but this time for entertainment and pleasure instead of for death and destruction.

The scale of the project is appreciated when one learns that a whole year has been spent in preparation, research and technical work. The main commentary comprises over 120 items, all recorded on tape and edited to the nearest half-second. The three-screen visual presentation which is synchronised with the main commentary consists of 480 slides projected three at a time by six modified

Kodak Carousel SAV projectors arranged in three groups of two, one of each group standing by ready to project immediately the other ceases. Thus the screen presentation changes practically instantaneously although slide changing takes place at its normal pace. All the changes are initiated by control pulses recorded on the second channel of the commentary tape using a multiplex system of pulse code modulation. This complex arrangement is technically capable of controlling 56 projectors every quarter second from a single tape channel and so has a much higher capacity than the needs of either the present or any planned future application. But with 480 slides per eight-minute programme, or 80 slides per projector, there is a change of presentation every three seconds with an average time of six seconds for every slide change. These figures might appear to be bewildering when related to a single show—they are truly staggering when one realises that at Madame Tussaud's the show goes on non-stop for ten hours every day, 364 days a year!

The technical side of the project including all the audio recording, was carried out by Theatre Projects Sound Limited with David Collinson in charge of all the complicated editing work. For *Battle of Britain* he has assembled a 15-minute "radio" programme with recorded extracts from ITMA and other programmes featuring Suzette Tarri, Henry Hall, Gracie Fields, George Formby, etc., with a background of sound effects such as Heinkels passing overhead, bombs exploding, sirens, ack-ack and machine-gun fire and even electronic gunfire to simulate tracer bullets. The eight-minute main commentary includes the recorded voices of Churchill



David Collinson with his equipment in the exhibition control room

and Hitler as well as extracts from contemporary news bulletins. It is interesting to note the actual timings of some of the effects recordings as finally used. For instance one group of effects is programmed as follows:

Stukas .....	12	seconds
Spitfire start .....	3	»
Spitfire take-off .....	5	»
Spitfire in flight .....	8	»
Heinkel .....	5	»
Messerschmitt and machine gun .....	5	»
Spitfire passing .....	3	»
Bomb explosion .....	2	»
Stirling bomber .....	4	»

The total programme time for these nine effects is only 47 seconds. By keeping these extracts very short the producer has been able to convey an impression of swift and violent action; a

# BATTLE OF BRITAIN 1969



Battle. Graphic displays include the Fall of Western Europe, Dunkirk, models of all the participating aircraft, the Blitz and an animated map showing the principal targets of each day's raids and the British and German aircraft losses. With the dramatic sounds of the Battle and the brilliantly arranged slide sequences the visitor is taken right back to those fateful days of 1940.

As with the other Madame Tussaud's son et lumière spectacles—*Heroes Live* and *Trafalgar . . . as it happened*—the nerve centre of the entire operation houses Truvox tape recorders which play back the audio programmes and also reproduce the pulses for slide changing. For *Battle of Britain* two four-track Truvox Series 100 machines are fitted with Casino endless loop cassettes and are built into Electrosonic sound and vision multiplex control consoles. These Truvox tape decks and the Kodak slide projectors have been found to be among the very few reasonably priced equipments capable of standing up to long periods of continuous use. In addition the Truvox decks have proved particularly suitable for endless loop cassette work since their smooth running does not depend on pressure from the take-up spool which is absent with endless loop cassettes. The decks were purchased in bulk from Truvox and incorporated in Electrosonic consoles (built to Theatre Projects specification), nine of which are

now in continuous use at Madame Tussaud's.

Because of the unusually hard use and the demand for continuity of presentation, maintenance forms a major part of operation. Both operation and maintenance are the responsibility of John Tune, of the Tussaud's staff, whose department inspects the "effects" equipment daily, cleans it regularly and takes it out of service on the rare occasions when it is in need of repair. Simple mechanical maintenance such as the replacement of pinch wheels is carried out by Tussaud's staff on the premises. In more complex cases the faulty unit would be replaced with a stand-by and returned to the suppliers for repair, but in *Trafalgar* only one breakdown was reported in a whole year—and that was finally traced to a faulty cassette.

The exhibition will be open for at least 18 months and should be visited by all recording enthusiasts as an outstanding example of one of the uses of the medium of recorded sound. Those of us who lived through the events at the time will be vividly reminded of the tragedy, humour and valour of this great period of our national history. To younger visitors it will be a revelation that will bring home the truth and reality of the victory that enables them to enjoy the peaceful safety of this year of 1969.

lesson that could well be learned by many amateurs who tend to sustain sound effects in feature programmes very much longer than is really necessary. Audience appreciation time gets shorter and shorter and for fast moving action one has to think in terms of "under ten seconds" if the whole is to move at a lively pace.

A full-scale model of a Spitfire—the most famous fighter of all—dominates the exhibition area, and there are just two wax portrait figures—of Churchill and Hitler. Other displays include the cockpit of a Heinkel bomber (our front cover illustration this month), a representation of a shattered shop window showing behind the broken glass some of the fashions in ladies' hats of the period, and the 11 Group plot table with the build-up of the heaviest raid of the

# Let's cut the crackle! Telefunken 204 TS.

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It speaks for itself!

Whatever you put in, comes out unmolested. No irritating hums, buzzes or crackles find their way onto the track.

But what you want is facts not words.

It complies with the very, very stringent German tape recorder standards.

Separate controls for recording and playback, including sound level meters.

Single selector switch for all operating functions.

Three speeds.

Signal to noise ratio  $\geq 50\text{db}$  at  $7\frac{1}{2}\text{ips}$ .

And it can be used as a straight-through stereo amplifier as well!

Another fine example of the Telefunken philosophy: dedication to faithful reproduction.

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# NATURE NOTES FOR JULY

BY RICHARD MARGOSCHIS

NO doubt that you will have read in a recent issue that the Wildlife Sound Recording Society is co-operating in a repeat of the recording competition sponsored by the 3M Company, manufacturers of Scotch tape. There is one very important change this year which should wet the lips of everybody interested in field recording. The winning tapes of the three sections will be further judged to select an overall winner—the Wildlife Sound Recording of the Year. For this there will be a very special prize, valued at around £170, a Tandberg Series II field recorder plus a parabolic reflector. This is very encouraging news and I know that the machine is a worthy prize because I use one myself and find its A/B monitoring facility a great help.

The three sections remain the same: Individual bird species, Mammals and rarities. This year recordings entered in all three sections must have been made in the British Isles, which is taken for this purpose to include Eire.

I have thought for a long time that considering the number of schoolboys and girls who go out birdwatching there must be many youngsters who are interested in this work. There is now a chance for them too, because a special section has been added for young people up to 17 years of age on October 31, 1969, and the prize is a Bush TP60 cassette recorder. So if you have an eligible child do let him or her have a go, even if it has to be within your own garden using your mains machine. Be sure to fix them up with a long microphone lead—do not let them take a long mains cable into the garden! The recording must, of course, be their own unaided work.

The closing date for all sections is November 31, 1969, and you can obtain entry forms from Mr. W. R. Bowles, Public Relations Executive, 3M House, Wigmore St., London, W1A 1ET, or you

can write to me for them c/o *TAPE Recording Magazine*. Be sure to ask for sufficient data sheets because you have to complete one for each entry and the number of entries you can send is not limited—heaven help the judges!

What sort of entries are likely to get through to the final judging? Now this is really a very difficult question to answer, for whilst we shall obviously be looking for good quality it is not the be-all and end-all. I have already told you that last year a recording of outstanding quality failed because of its balance. The content of the recording is something which is taken into consideration very much more than you might realise, especially when it comes down to selecting the one from the last few.

The winner last year of the individual bird species is a good example. The subject was the curlew and anybody who knows this bird will have a good idea of the variety of calls it can make. Of the five judges there were three expert naturalists and they remarked upon the fact that in the two minutes that Magnus Sinclair's recording lasted they heard pretty well every call a curlew is known to make and for a few seconds we also heard the call of the lark, at very low level but just enough to help set the scene. I have no doubt that this recording was a clip from a very much longer one.

On the other hand Norman Wylie-Moore was out recording nightingales when a vixen walked past him, barking all the way! He was lucky, and he realised it immediately, kept his head and made sure that he captured what turned out to be the winner of the mammals section. So you see, both skill and luck can enter into the matter.

Something that tells a story on its own can go a long way. The experience I related last month of how the sheld-ducks protected their young from the hovering kestrel is an example. I had another instance a couple of days ago that might have developed into a similar story.

I was walking along a hedge when I heard the alarm call of a wren and from it I could tell that the little bird was really agitated, but I could not believe that my presence alone was the cause. Investigation revealed a kestrel sitting on a stump right by the wren's nest and I didn't quite know what to do. The situation was resolved after a moment's watching, for the hawk *hopped* away and I realised that it had a damaged wing.

In both these instances a call from the kestrel would have improved the story. It could be added now, of course, by mixing in a call from stock, but would it then be true to form? In any case, so far as the competition is concerned, you can remove but not add any sounds.

Finally a warning, if you do enter a recording of an animal that is obviously agitated be sure to give a good explanation because one very sensible rule says that no recording entered shall be the result of provocation of the animal by the recorderist.

## DUTCH TRIPS FOR SCOUT TAPE PRIZEWINNERS

**T**WENTY members of the Scout Movement, including Scouts from Belfast and Newcastle and Venture Scouts from Hitchin (Herts.), have won free trips to Holland for their entries in a £1,000 Scout tape recording contest sponsored by Philips Electrical Limited. These and the other prizewinners who will receive Philips tape recorders and special visits to a recording studio, were selected before an audience of over a hundred at a final judging session held at Baden-Powell House Scout Hostel, London, on May 24, 1969. The judging panel was formed by Mr. Len Freeman and Mr. Colin Beard of Philips Electrical Limited and Miss Audrey Milan, Mr. John Moore and Mr. Don Grisbrook of The Scout Association.

### PRIZEWINNERS

#### CUB SCOUT

*Individual:* Michael Black, 1st Shelford and Stapleford, Cambs. *Subject:* "I AM

A BLACKBIRD." *Prize:* A party of eight to visit a Recording Studio.

*Pack:* N. H. Graville for 36th N. Central Leeds Cub Scout Pack. *Subject:* "PETER DID." *Prize:* Cassette Tape Recorder.

#### SCOUT

*Individual—Joint 1st Prizes:* Alan Slipper, 73rd Newcastle-upon-Tyne Scout Troop. *Subject:* "AN EXPEDITION ALONG HADRIAN'S WALL." Robert Camlin, 78th Duncairn, Belfast. *Subject:* "BELFAST TOWN HALL." Gerard Watts, 7th Hitchin, Hertfordshire. *Subject:* "VISIT TO LAVENDER FIELDS." *Prizes:* Two from each Troop to Holland.

*Patrol:* David Warren, 2nd Falmouth, Cornwall. *Subject:* Activity: "FROM STATION TO CHURCH." *Prize:* Cassette Tape Recorder.

#### VENTURE SCOUT/RANGER GUIDE

*Unit:* G. Platt for Milbourne V.S.U.,

Hitchin, Herts. *Subject:* "MAID OF HITCHIN." *Prize:* A party of six to visit Holland. E. R. Rees for 5th Cardiff Park End Ranger Service Unit, Cardiff. *Subject:* "INTERVIEW WITH LYNN DAVIES." *Prize:* Cassette Tape Recorder.

#### ADULT

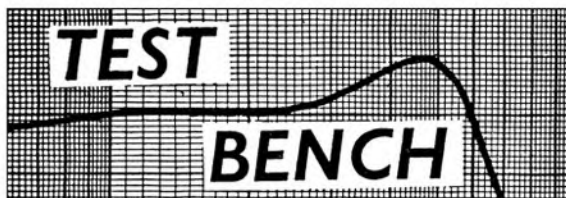
*Individual:* Ken McKenzie, 2nd Harrington, Co. Durham. *Subject:* "THE JUNGLE BOOK." *Prize:* Two people to visit Holland.

#### OPEN SECTION

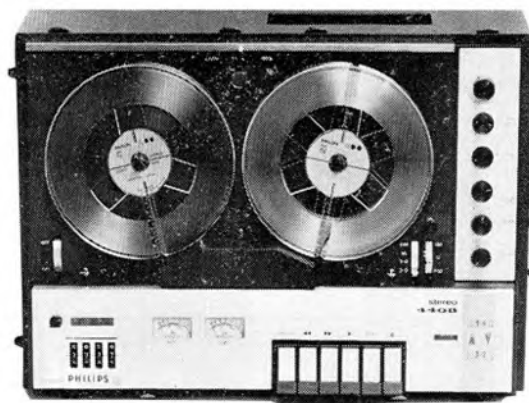
C. Platt for Milbourne V.S.U., Hitchin, Herts. *Subject:* "THREE MARCHES." *Prize:* A party of six to visit Holland.

#### CONSOLATION PRIZES

Consolation prizes of 5 in. reel of double-play tape: John Clarke, 15th Wallasey, Cheshire. *Subject:* "THE ARROWE PARK JAMBOREE." Simon Ward, 2nd Thingwall, Cheshire. *Subject:* "VARIOUS INTERVIEWS IN LONDON."



# PHILIPS 4408



INVESTIGATED BY R. HIRST AND D. KILLICK

## MANUFACTURER'S SPECIFICATION Philips 4408

Voltage: 110, 127, 220/250 Volts AC 50 Hz. Dealers can convert for 60 Hz supply.

System: Four-track, suitable for stereo and mono recording and playback, and duoplay and multiplay.

Speeds:  $1\frac{7}{8}$ ,  $3\frac{3}{4}$  and  $7\frac{1}{2}$  ips.

Frequency Response:  $7\frac{1}{2}$  ips, 40 to 18,000 Hz within 6 dB;  $3\frac{3}{4}$  ips, 40 to 15,000 Hz within 6 dB;  $1\frac{7}{8}$  ips, 60 to 8,000 Hz within 6 dB.

Maximum Reel Size: Seven inches.

Fastwind Time: 1,800 feet tape within 200 seconds.

Power Output: 2 x 6 Watts.

Power Consumption: 55 Watts.

Inputs: 2 x 2 mV/20 kOhms, diode; 2 x 100 mV/0.5 mOhms, record player; 2 x 0.20 mV/2 kOhms, microphones.

Outputs: 2 x 1 V/50 kOhms, diode; 2 x 6 W/4-8 Ohms, loudspeakers; 600 Ohms approx., headphones.

Dimensions: 19 x 13 x  $8\frac{1}{2}$  inches.

Weight: Approx. 28½ lb.

Price: £136 3s. 10d. including purchase tax.

Distributors: Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

**T**HE Philips Organisation has an enviable reputation for giving excellent value for money in their wide range of tape recorders, and so this month we are examining one of their prestige models, the 4408. A 4-track 3-speed mains stereo machine, it is a complete record/playback equipment including final audio output stages and a pair of detachable "lid" speakers. Although it employs the two-head system, an erase head and a single record/playback head, it offers full duoplay and multiplay facilities; in addition it has at least one very unusual feature, automatic place finding, which we have previously found only on much more expensive recorders.

As usual our investigation started in the laboratory and the measurements are

## PHILIPS 4408 TEST CHART

Frequency Hz	Overall Response dB			Playback Only dB	Signal/Noise Ratio dB	Distortion	Crosstalk dB
	$7\frac{1}{2}$ i.p.s.	$3\frac{3}{4}$ i.p.s.	$1\frac{7}{8}$ i.p.s.	$7\frac{1}{2}$ i.p.s.			
40	-0.1	-1.4	-2.8	-0.3	54	5%	50
50	0	-0.9	-1.5	0			
63	-0.1	-0.9	-0.8	-0.1			
125	-1.4	-0.1	-0.3	-1.2			
250	-0.8	-0.3	-0.3	-0.7			
500	-0.8	-0.1	-0.6	-1.0			
1000	0	0	0	0			
2000	+0.2	-0.5	+0.3	0			
4000	+0.9	-1.3	+0.9	-0.5			
6000	+1.2	-1.5	+1.3	0			
8000	+1.4	-1.6	+1.0	+0.8			
10000	+1.6	-2.1	-5.0	+0.8			
12000	+1.6	-2.7		+0.5			
14000	+1.2	-3.5		-0.2			
16000	+1.2			-0.2			
18000	+1.0			-1.0			
20000	+0.5			-1.4			
Wow and Flutter				0.13%	0.18%		

NOTES.—The Overall Response figures relate to record and playback. Playback Only relates to the reproduction of a 70 microsecond test tape at  $7\frac{1}{2}$  i.p.s. (I.E.C.).

For Signal-to-Noise Ratio the tape was recorded at peak level and then the input signal was removed from the record amplifier. By reference to the signal level recorded and the resultant tape noise, the noise voltage was read off, with the tape still in motion. Distortion is quoted against a 1,000 Hz signal recorded at the correct maximum level as indicated by the manufacturers and the figure is an R.M.S. value (see text).

Wow and Flutter is also R.M.S., the test frequency being 3,000 Hz. Test equipment used includes: Bruel and Kjaer Signal Generator, B & K Frequency Analyser Type 2107, B & K Level Recorder Type 2305, Marconi Distortion Factor Analyser and Gaumont-Kaylee Wow and Flutter Meter.

published in tabular form above. The replay response was obtained by reproducing a 70 microsecond calibration tape and it will be seen that the curve is flat to well within plus or minus 2 dB. For some reason the manufacturer quotes figures in his specification with a tolerance of "within 6 dB". This could be misleading as it might be interpreted as indicating a variation of up to 6 dB above and below the straight line. It really means, of course, a maximum deviation of 6 dB, that is plus or minus 3. All our

response figures are very much better than that, maximum deviation on replay being as little as minus 1.4 dB at 20,000 Hz.

It is surprising how often really good quality domestic equipment reaches this exceptionally high standard nowadays. One would not expect to achieve better results from a fully professional machine costing perhaps five or even ten times as much.

Since Philips market their own brand of recording tape it was surprising to

note that the instruction manual did not emphasise the fact that best results will be obtained by using it. This is not just sales talk, but a simple statement of fact—it could of course be qualified by adding: “or any other brand of tape with similar electro-magnetic properties”. We raise this question at this point in our review because the kind of tape used will affect all the other measurements: overall response, signal-to-noise etc. Aware of the fact that users are likely to want to experiment with other brands of tape we used the new E.M.I. Afonic for the rest of our technical investigation. Readers might therefore like to read these notes together with the report on Afonic tape that was published in our May edition.

Looking first at the overall response figures we can see that the exceptional performance on replay is maintained. There are signs of a tiny falling off at the extreme upper limits of the two slower speeds, but it is too trifling to be worthy of comment. In all respects response figures can be classified as first-class.

With a measurement of 54 dB below peak recording level the signal-to-noise reading is very acceptable, although this level has been slightly better in some other transistorised machines at somewhat higher prices—it has also been worse! Any figure higher than around 50 dB could be taken as indicating very unobtrusive background noise. Please remember that these figures are *unweighted* and are taken over the full audio bandwidth. By introducing filter systems to “tailor” the system noise to correspond to the hearing peculiarities of the human ear one can always obtain higher figures but we feel that this method lends itself to misunderstanding so we do not use it.

Our first real problem with this machine occurred when we came to measure distortion. Taking a 1,000 Hz sine tone from the line-out socket it was found that clipping of the waveform took place on the positive half-cycle. Such a trace indicates the presence of harmonic distortion. As a double check the same process was carried out at the external speaker socket with a reduced output level of 500 milliwatts. All signs of clipping vanished! This is quite inexplicable. If distortion occurs at an early stage of amplification it *should* still be present at a later stage. It is not. Subsequent listening tests did not confirm the presence of audible distortion and we report these facts merely as a matter of policy in the interests of absolute honesty in our reviews. The five per cent distortion figure quoted in our table was obtained from the speaker socket because of the difficulties mentioned above, which could

of course be peculiar to the actual sample examined.

Crosstalk between stereo channels is slightly better than 50 dB at 1,000 Hz—excellent—and wow and flutter of 0.13 per cent at 7½ ips and 0.18 per cent at 3¼ ips is well up to the mechanical efficiency expected of equipment today. The separate tone controls, treble and bass, give cut or boost of 12 dB at 10,000 and 100 Hz respectively, a very adequate degree of control at the external speaker sockets. Our final technical check was on the power output, and here we found the review sample to be well below specification. According to our measurements the output is a little over 3 watts RMS per channel into an 8 ohm load, whereas the manufacturer claims 6 watts. We should like to point out that the usefulness of audio power is directly related to the efficiency of the loudspeaker to which the amplifier is coupled, and as we mentioned in a recent review of a cassette machine even half a watt can make a very cheerful sound in an efficient transducer. The snag is that most efficient loudspeaker systems tend to be both relatively large and costly.

Our general opinion at this stage of the inquiry was one of really excellent value for money, the only dubious point being the strange anomaly of visual distortion traces at the line out socket which somehow miraculously disappeared at the speaker socket. This is a mystery which intrigued rather than worried us, so we passed optimistically on to the practical user investigation.

The 4408 is presented in a fairly large, “suitcase” type format with a carrying handle at the upper end. The unusually large size is due to the fact that the lid if formed in two parts each housing a completely separate and detachable loudspeaker equipped with suitable leads and plugs ready for immediate connection. Once these speakers are removed (as they must be when the machine is in use) all resemblance to the suitcase has gone.

We are left with a tape recorder of distinctive contemporary lines finished in a smart black and silver trim. The rotary Gain, Volume and Balance controls are ranged along one side of the main deck plate; as so often happens they are somewhat smaller than the ideal size for convenient and accurate use. The microphone Gain is a split control, one half for each of the two stereo channels, and individual operation of the two parts of the control is difficult. A separate Radio/Phono Gain is provided—giving a mixing facility with the microphone input—Treble and Bass are separate but ganged together for each channel, as is Volume, so a Balance control is also provided.

A pair of mode switches of unusual rotary design select Parallel, Stereo and Mono 1 and 4 and Mono 3 and 2 on one and Duoplay and Multiplay on the other. These are geared to function indicators on the front raised escutcheon plate where, for instance, the word “STEREO” is displayed when that mode is engaged. In addition illuminated track indicators show 1 and 4 or 3 and 2 or both, according to the selection; the illumination is green for playback and red for record. The greatest trouble has obviously been taken to make this (to some people!) complicated mode selection as simple and as unmistakable as possible. Rarely have we seen a more detailed system.

Tape transport is controlled by six very positive piano-type keys, each thoughtfully provided with a lip so that when the machine is used vertically the operating pressure can be applied directly downwards—more evidence of thoughtful design.

The pair of VU type meters (accurately described as such in the manual) are amongst the best we have seen on domestic equipment. In spite of the fact that they are on the small side they are very easy to read, being brilliantly illuminated as soon as power is switched on and having a black needle that moves positively over a very clearly marked scale. To the left of these is a four-figure rev. counter (protected by a transparent cover) and immediately below that is the automatic place finder. This is in the form of a duplication of the rev. counter dials, but in this case they are intended to be rotated by hand. One sets these figures to any desired reference (which will have been previously obtained by reading it off the rev. counter) and then when the Fast-wind in either direction the machine will stop at precisely that point. We found it to be accurate to within one digit and as such is one of the most useful and sensible “gimmicks” on any machine. It is a joy to set this place finder to a point two-thirds of the way into a seven-inch spool of long play tape and to find that the machine throws itself into Stop at just the right moment. After getting used to this gadget we wonder how we could have managed so long without one.

Mains On/Off and Speed Change—7½, 3¼ and 1½ ips—complete the deck controls, but there is also a lever for pulling away the pressure pads when an endless loop cassette is being used and a special tape guide for use with a separate slide synchroniser.

Input and output sockets—strictly DIN—are mounted on a recessed panel at the rear and the mains cable (fixed) exits via a trap in the underside. One last

*Continued overleaf*

excellent feature is found in the extendable supports fitted with heavy rubber buffers to protect furniture when the machine is used vertically. When in this position, by the way, the spools are retained by spring-loaded half spindles which merely have to be pulled outwards and rotated half a turn to secure.

Our only criticism relates to the front escutcheon panel. This is a thin aluminium trim plate and lacking proper fixing it flexes and bends under the slightest pressure. We would also query the fact that this built-up console in front of the head assembly not only obstructs access for head cleaning but also makes editing more difficult than necessary.

For subjective tests we carried out our usual procedure of reproducing pre-recorded tapes of known good quality, dubbing across from 15 ips masters played back on another machine and finally recording and playing back from a VHF radio source. Since the machine is equipped with its own pair of stereo speakers we listened with these first. At once the question was raised: Is it really such a good idea to provide such a machine with speakers which, by their very nature, are bound to be well below "hi-fi" standard? It is a difficult problem and we can sympathise with the manufacturer. He has done the very best he can for

those who wish to purchase their recorder as a complete audio unit. But for those who already own good loudspeakers, or who demand better audio quality, we would have liked to have seen an alternative version offered without the lid speakers included. They cannot possibly do justice to the very high quality potential of this machine, and therefore in many cases will be adding to the cost unnecessarily. But you can't please all the people all of the time and no doubt Philips adopted what they considered to be the best compromise. The difference in sound quality between these two little boxes and a pair of full range transducers is, of course, dramatic. One would not expect otherwise.

When using these better quality speakers we were at once impressed by the clarity of the sound produced by the 4408. Such background noise as could be detected was in the form of unobtrusive hiss at such a low level that even the quietest musical passages retained their brilliance. Recording on the machine presented no difficulties at all, and we really appreciated both the visibility and the action of the meters.

In view of the technical report on distortion at the line-out socket we used an external amplifier and carefully checked to discover if we could hear any degrada-

tion of the signal. On many different kinds of music, particularly solo piano, brass and percussion we could detect no unusual effects at all. As the output here is as high as 1 Volt we fed this into a particularly sensitive input on a high grade amplifier so that the speakers were really "belting it out" even though the amplifier volume control was well down towards zero. Under those conditions, with the amplifier on the point of overload, any distortion present should stick out like a sore thumb. It didn't!

Motor noise was minimal, tape transport control positive without being vicious and all the various signalling and safety devices worked faultlessly. The general impression was of a quality product performing its tasks with effortless ease.

So to summarise the 4408 we can describe it is a remarkably efficient domestic stereo machine of elegant appearance. Some of its features would not appeal to the professional but that is hardly relevant in the consumer market. It will give a great deal of pleasure and reliable service in the home of the enthusiast and music lover whilst at the same time offering an ease of operation that might—perhaps dangerously!—encourage the daff side of the family to make use of it. Once again Philips have produced a quality product they can be proud of.

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# TEST BENCH

## ADDITIONAL NOTES ON THE

# SONY TC355



SONY TC355 TEST CHART

**I**N our edition cover dated March, 1969, we reported in our Test Bench series on the performance of the Sony TC355 tape recorder. We commented that our technical investigation revealed an unusually steep rise in overall response—maximum plus 10 dB at 22,000 Hz—and a similar though less steep rise—maximum plus 5.1 dB—in playback response, and we offered to publish any remarks that Sony (U.K.) Ltd. might care to offer.

Since that date we have been in close touch with this firm, and upon our advice they appointed independent consultants to examine samples of the TC355 and to submit reports that could be considered in conjunction with our review. When these were to hand a joint meeting was arranged with Mr. Michael Brown and Mr. George Frewin representing Sony, Mr. James Moir, C.Eng., F.I.E.E., and Mr. Hugh Ford, C.Eng., M.I.E.R.E., M.B.C.S., consultants, and Mr. Denys Killick and Mr. Robert Hirst representing *TAPE Recording Magazine*.

Before mentioning the conclusions reached at this meeting we should like to make it quite clear that all these steps were taken in the friendliest spirit of co-operation, all the parties being equally devoted to the single task of establishing beyond doubt whether or not there were basic faults in the machine that needed to be corrected, and if so what steps should be taken to put matters right.

When the three engineers came to compare their various technical findings there was a divergence of opinion to a greater or lesser extent on a number of matters. A most interesting side product of the meeting was to see how different measurement methods tended to produce different results, and there followed a long technical discussion on the pros and cons of the various schools of thought. There were in addition substantial areas of agreement, and broadly speaking they covered the following points:

**Overall Frequency Response.** It was agreed that the curve showed a rise above flat when high bias tapes were used. The independent consultants had carried their

Frequency Hz	
40	.....
50	.....
100	.....
250	.....
500	.....
1000	.....
2500	.....
5000	.....
7500	.....
10000	.....
12000	.....
15000	.....
18000	.....
20000	.....
22000	.....

Overall Response dB	Playback Only dB	Signal/Noise Ratio dB	Distortion
7½ i.p.s.	7½ i.p.s.		
+ 1.5			
0	+ 2.7		
0	+ 2.6		
+ 0.5	+ 0.1		
0	+ 0.1		
0	0	57	4%
+ 0.5	+ 0.2		
+ 0.8	+ 0.2		
+ 0.6	0		
+ 0.6	+ 0.1		
+ 1.2	+ 0.4		
+ 1.0	+ 0.3		
+ 0.3			
- 0.6			
- 1.8			

**NOTES:** The measurements quoted above were obtained in the usual way with the exception that for Signal-to-Noise and Distortion the input level was 10 dB above 0 VU. For the sake of any readers who might wish to repeat this evaluation for themselves it must be mentioned that at such an input level the needles in the built-in VU meters are hard up against their stop pins and therefore an alternative method of assessing input signal strength must be used. Sony equipment is distributed by Sony (UK) Ltd., of Clockhouse Lane, 11, Ascot Road, Bedfont, Middlesex, and the recommended retail price of the TC355 is £100 2s. 6d. including purchase tax.

investigations further than our review and submitted tables showing how the rise in response varied in relation to the tape used, and in one case to the mode set on the machine. Some of these figures with high bias tape showed a greater rise in response in the mono mode than we had published in our Test Bench review, and as a result of our findings machine alignment has been modified. However, provided Sony PR150 or 3 Ms Scotch 215 tape is used the desired result of a flat overall frequency response is obtained.

**Playback Frequency Response.** The consultants showed a very much flatter curve than we had published. This is a difficult point to argue since we are unable to repeat the measurements with the individual calibration tape used. There then followed a discussion on variations to be found in these so-called "standard" tapes and it was agreed that margins of error were quite possible. Mr. Hirst, technical reviewer for *TAPE*

*Recording Magazine*, accepted that his figures as published in the review could have been in error due to tape variations.

**Other Measurements.** Difference was very small, mainly within the limits of difference of the various measuring systems used. Our own comments about the accuracy of the Record Level Meters were questioned but we reminded the meeting that in spite of many manufacturers' claims so-called VU or PPM meters are not true VU or PPM meters at all, only following that type of instrument more or less closely. Subsequently it was found in the case of the Sony TC355 that the VU characteristic was more closely followed than in many others and could therefore be relied upon to give a true indication on music and speech. It must be remembered that it is common practice for the zero mark on a VU meter to be some 10 dB below the maximum record indication on a PPM, which of course affected the signal-to-

noise reading given and therefore approximately 10 dB could be added to the original published figures. In our reviews we follow the same basic measurement methods and so the reader—whose protection is our main consideration—has the benefit of comparative values even if these are not always absolute in respect of any one individual review.

The meeting concluded on a very positive and optimistic note, with the representatives of Sony (U.K.) Ltd. giving assurances that as a direct result of their investigations following our published findings their quality control procedure

has been completely reviewed, a minor modification has been made to the machine alignment procedure and the handbook has been amended to make quite clear what tape is suitable for use on the recorder. In their own words: "The consumer will now get a closer tolerance product." As such we regard the outcome as highly satisfactory from everyone's point of view, and we should like to congratulate this firm for taking such prompt, extensive and efficient action to safeguard their customers' interests.

Finally, a second machine was sub-

mitted for our further technical investigation and we are happy to publish an abbreviated Test Chart showing the new response, overall and replay, at  $7\frac{1}{2}$  ips, signal-to-noise ratio and distortion figures. These readings were taken using the recommended tapes and as will be seen they are excellent. As we have so often said editorially, the right tape must be used to get best audio quality.

We never doubted that the TC355 was an excellent machine, and now the appropriate action has been taken it will assume its rightful place amongst the élite of its contemporaries.

## PROJECT ALPHA

from page 231

ually "drift" into synchronisation for a limited period only.

In Fig 2, section A, the numbers 3 and 2 represent respectively the third and second harmonics of a fundamental, in this case G (98 Hz). As such they outline the interval of a fifth. They are intended to suggest the possibility of associating a combination of pulse patterns with a particular interval. It can be added here that another possibility would be to relate patterns to timbres. The numbers in the first column represent the frequencies, in Hertz, associated with each harmonic. The plus sign signifies a degree of complexity of content for each pulse pattern; for instance, the content of a pattern could be a synthesised spectrum using the frequency associated with the pattern as a fundamental. Sine and square waveforms could be combined to form such a synthesis. Beat frequency could be used to transform the timbre content.

The third line (2b) in section A of this diagram shows a duple pulse similar to the one above it but, in this case, the pattern is out of phase with the triple pulse in the top line. The interval which separates the two is represented by the short horizontal line. A combination of 3 and 2b will result in a continuously out of phase relationship. Section B indicates a similar out of phase motion together with the addition of a third pattern, containing five pulses per unit, which will coincide with the triple pattern at the beginning of each unit. The new pattern is associated with the fifth harmonic of the fundamental, the interval of a tenth.

This section demonstrates the first stages towards the setting up of a group of pulse patterns of varied pitch and timbre. In this way it is possible to make different groups of varied complexity and overall length and to juxtapose these

to arrive at a system containing continually changing velocities of pulse, pitch and timbre as a means to the depiction of motion. Fig. 3 shows a simplified version of this kind. The dotted verticals define units of duration of one second. The diagram presents three groups of patterns, four, two and five units long respectively. An arrow indicates the continuation of the last group and the letters represent a set of frequencies. Apart from the more complex differentiations of pulse rate, what was said about the processes depicted in Fig. 2 applies here also. However, three additional factors are indicated by the pulse which begins on line D in the middle of the third group of pulses: (1) It illustrates the possibility of extracting individual pulses from a pattern to form a new pattern. In this case, as indicated by the short lines, each alternate pulse is absent from the set of five per unit. (2) It illustrates the possibility of introducing a pulse at a later position within a group, and also of extracting one from a group. (3) This suggests the use of amplitude change as a means of articulation. The new pattern, for instance, could be made to emerge from zero amplitude into the system of velocities. Different pulses could be treated in the same manner. By fading one or other out at various stages, further changes of overall pattern could be made along the length of the piece.

It is, I think, worth noting that in a realisation of a piece of this kind it is possible to think in terms of using a multi-playback system in which pulses would emerge from different positions within the performing space. Each source of a pulse could be associated

with a modulating device which would alter its timbre.

## Parallel Motions

It is possible to see a strange parallel between the particular depiction of motion I have outlined and the activity of the recently detected pulsars, the immensely dense stars which emit bursts of energy at precise intervals. Perhaps Pythagoras, Boethius, Bruno and Kepler were not deceived when they spoke of the music of the spheres!

I shall repeat what I said in a previous article: a new perception and understanding of motion is part of the awareness of the time. To clarify what is meant by this it will be helpful to show its application in another field, the cinema, the invention and development of which is one of the primary expressions of the new awareness. There is a remarkable sequence in *The Seven Samurai* made by the Japanese director, Akira Kurosawa, which demonstrates the cinema's capacity to depict motion. It consists of six shots of slightly varied duration. They show six men, one in each shot, responding to the sounding of an alarm which signifies that the village they have agreed to defend is being attacked. The narrative content of each shot is identical: each of the samurai is shown running at full speed across the screen from left to right. The properties within each shot are made to vary. The figures are shown at slightly varying distances, each one proceeds at a different angle of direction. This means that the location of entry and exit (the attack) changes with each shot. In addition, the gesture of running differs with each figure. The result is a sequence of visual impulses which exhibits a breathtaking quality of attack and motion. Fig. 4 presents a diagrammatic version of this sequence in terms of the change of angle at which each figure crosses the screen.

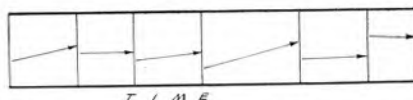


Fig. 4. A movement and time scale taken from another medium, the cinema.

3 $\frac{3}{4}$  ips STEREO

Equipment used for review tapes: Amplifiers—Quad valved and Wharfedale transistorised. Loudspeakers—Celestion and Jordon-Watts. Tape Recorders—Akai 3000 D and Tandberg 64X.

**RACHMANINOV.** Piano Concerto No. 2 in C Minor, Rhapsody on a Theme of Paganini. Agustin Anievas, piano, and the New Philharmonia Orchestra conducted by Moshe Atzmon. E.M.I. H.M.V. TD-ASD 2361, 3 $\frac{3}{4}$  ips,  $\frac{1}{4}$ -track, Stereo. 47s. 4d. including purchase tax.

Of the four concertos written by Rachmaninov the second in C minor is undoubtedly the most popular. With dramatic sparkle and lyrical contrast it is a work that appeals to all who have a feeling for the lighter classics. Without demanding intellectual effort from the listener it is both moving and entertaining at one and the same time.

The concerto opens with some magnificent fireworks from the piano, and these few bars at once reveal the technical strength or weakness of the recording. In this case one is aware of the grandeur of the instrument; here we have no pale mechanical imitation, but the real thing. All is now pleasure and enjoyment. Or is it? Unfortunately I did detect just the very slightest hint of distortion here and there; this does not occur during the heavily modulated passages, or at least it is not obvious in the louder sections of the work. Just occasionally an unpleasant, rasping, sandpaper-like sound betrays that all is not quite perfect. What a pity! The fault probably arose during high-speed copying, and if so may not be present in other production batches.

In the record business we tend to demand perfection, and this album does fall short of the highest possible standard. But the degree of distortion is unlikely to worry any but the most critical listeners. It raises the important issue: what comes first, the music or the hi-fi? In terms of musical content the album is delightful. As the tensions build up to the climax of the concerto one is carried away on the wings of the music. By comparison the tiny technical imperfection is petty indeed.

On the other side the *Rhapsody on a Theme of Paganini* offers a pleasing contrast whilst still maintaining the dramatic mood. In spite of careful listening I could detect a minimum of distortion on this track, so there was little to mar the enjoyment of this favourite of the concert repertoire.

Taken all-in-all this Rachmaninov album has much to offer provided one is not too pedantic; apart from the reservation mentioned quality is exceptionally good with the soloist well in the foreground whilst still preserving a nice balance between piano and orchestra. As such it would make a valuable addition to any library of popular classical music.

**MOZART.** Concerto No. 20 in D Minor and Concerto No. 23 in A Major. Daniel Barenboim, piano, and The English Chamber Orchestra conducted by the soloist. E.M.I. H.M.V. TD-ASD 2318, 3 $\frac{3}{4}$  ips,  $\frac{1}{4}$ -track Stereo. 47s. 4d. including purchase tax.

What a composer was Mozart! With no fewer than twenty-five concertos to his credit one can say that the classical concerto owes its very beginning to him. Of that twenty-five we have on this album numbers 20 and 23.

These Mozart concertos differ from later compositions by other composers where there was often a marked tendency to think in terms of large orchestras with music on the heroic scale. A Mozart composition is far more delicate, bordering almost on the chamber ensemble rather than the augmented symphony orchestra. Consequently the soloist is required to show a certain restraint in his dynamic range; balance between piano and orchestra is critical and a modern instrument would be quite capable of dominating and then overpowering its limited orchestral accompaniment.

It is for this reason that under ideal conditions the soloist also conducts. The amount of conducting he is required to do is rudimentary—there are few tricky entries and it is not difficult to carry the work along in this way. By adopting this technique Daniel Barenboim is reverting to the true performance style of the composer.

Recorded quality in this album is good. The engineers were presented with quite a problem to preserve this very delicate piano/orchestra balance, and they have tackled the job with a truly sympathetic feeling for the subject. Heavy hands could so easily have ruined the whole effect.

Do not look in this album for brash emotion, facile drama or glib cliché. It is pure Mozart at his best; of supreme intellectual appeal whilst at the same time demanding no great mental effort from the listener for enjoyment. As such the album will be appreciated by people with a wide range of divergent musical tastes.

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Franck Pourcel and his Orchestra. E.M.I. Columbia TD-TWO 222, 3 $\frac{3}{4}$  ips,  $\frac{1}{4}$ -track, Stereo. 41s. including purchase tax.

Let me say at the start of these notes I like the Pourcel sound. It has, for me, the distinctive quality of elegant smartness, the polished sheen, perhaps even the mature sophistication that is reminiscent of a Parisian fashion house. Never a rough edge, never a sharp corner. The whole glides gracefully from beginning to end leaving an impression of skilful accomplishment and just a hint of perfume in its wake.

Choice of numbers is a happy combination of frivolity and thoughtfulness, giving us: *The importance of your love, The lark. Rain and tears, Congratulations, Chall-ha-dichall, Le Ruisseau de mon enfance, A man without love, Les cerisiers sont blancs, Hernando's hideaway, If I only had time, L'oiseau and La, La, La.*

The label is inscribed "Studio 2 Stereo," a trade name for the Columbia super-quality/super-stereo recordings. Like most of these new technical creations it does give really excellent quality sound with that added brilliance to lift the whole thing out of the common-or-garden rut.

I shall not tire quickly of hearing this so very pleasant collection over and over again. That's the whole point of Pourcel—and he will stand listening to—and when you come to think of it that is a compliment indeed. Most modern albums pall quickly; Pourcel does not. So a very strong recommendation for this delightful collection.

**SGT. PEPPER'S LONELY HEARTS CLUB BAND.** The Beatles. E.M.I. Parlophone TD-PCS 7027, 3 $\frac{3}{4}$  ips,  $\frac{1}{4}$ -track, Stereo. 41s. including purchase tax.

There can be few who have not heard this album in one form or another, and now we have this issue on 3 $\frac{3}{4}$  ips  $\frac{1}{4}$ -track stereo tape. It is interesting to compare quality with the same album on cassette and disc. Certainly the tape version clearly shows the advantages of this medium with a clarity of reproduction that is a credit to the engineers. Whether you will like the programme enough to buy it is perhaps another matter.

*Getting Better All The Time* is one of the numbers. Question: are they? The Beatles, I mean. Capable of flashes of brilliance in both composition and performance there is unfortunately still an underlying basis of *thump, thump, thump* that is as dated as last Sunday's newspaper. If the Beatles are to maintain their position in the seventies they will have to concentrate on the more adventurous aspects of their work.

The repertoire includes: *Sgt. Pepper's lonely hearts club band, With a little help from my friends, Lucy in the sky with diamonds, Getting better, Fixing a hole, She's leaving home, Being for the benefit of Mr. Kite! Within you without you, When I'm sixty-four, Lovely Rita, Good morning good morning and A day in the life.*

So you know it all. Recording is good—the album can be bought without misgivings.

**SARAH VAUGHAN.** The New Scene. Mercury STX 61079, 3 $\frac{3}{4}$  ips,  $\frac{1}{4}$ -track, Stereo. 88s. including purchase tax.

"In the recording world today there is definitely a 'new scene'—a scene of young gifted musicians. . . . Sarah's musical love and understanding enable her to 'make the scene' with these numbers in such a way that no nuance is lost and fresh insights emerge to surprise the listener."

Those words are quoted straight from the sleeve notes, and they describe perfectly what goes on in this collection. I endorse them one hundred per cent. They are so very right.

Take *What now my love.* Sarah turns the whole thing inside out, endows it with the sparkle of her own personality and then delivers the packaged product as something newer than today. A real musician with great depths of sincere emotion, she epitomises all that is too often lacking in "the scene" that she now enters with this and similar albums.

Numbers include: *One two three, What now my love, Love, Who can I turn to, Call me, With these hands, Michelle, Sneakin' up on you, Everybody loves somebody, The shadow of your smile, Dominique discotheque and I should have kissed him more.* Hardly a selection to send one into ecstasies—but in the hands of Sarah Vaughan we have a new flavour and a new intimacy brought to tunes we know so well.

In every way a flawless album. Recording is sympathetically good. Our soloist is sympathy itself. Strongly recommended.



Summer's here. And time's ripe for dreaming up new ways to make the most of holiday hours ahead. So get out and take a good look at the wonderful range of Philips cassette machines.\* All ready to play your kind of music wherever you go. Next, start picking a few musicassettes to go with the player of your choice. And have a fun summer.

## Pick of this month's releases



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**Gentle on my mind**  
DEAN MARTIN  
CRP 369



\*Illustrated above is the Philips Cassetophone. It runs on batteries and costs only £13.18.

# MUSICASSETTE

## REVIEWS

**LEROY ANDERSON.** Concert in Manhattan. Philips CPP 1070. 55s. 11d. including purchase tax.

As one of our most prolific writers in the popular idiom Leroy Anderson has achieved a fame that spans the globe. There cannot be a country where at least some of his tunes are not known and loved. All this collection needs for instant success is a good orchestra and competent recording—it has both.

Amongst the old favourites are: *Sleigh ride, Blue tango, Fiddle-fiddle, The syncopated clock, The typewriter, The girl in satin, Bugler's holiday, Belle of the ball, Promenade, Sarabande, Plink plunk plunk, The waltzing cat, China doll* and *Song of the bells*.

Resisting the temptation to display over-much technical dexterity the studio staff have concentrated on the simpler and more satisfactory task of giving us a straight recording without frills. Just what was needed. This kind of music speaks for itself and does not require gimmickry to bolster it up. And how it all goes with a swing!

I would vote this to be one of the most pleasant cassettes I have heard recently, giving it top marks for sheer uncomplicated enjoyment. There are times when one wants to forget the more involved aspects of everyday existence; at such moments this album provides just the right relief, recommended as an antidote to many of our contemporary troubles.

**THE WALLY STOTT CHORALE.** Choral in concert. Philips Living Presence Stereo LPC 13001. 55s. 11d.

Recently I have had to complain of rather muddy quality on some cassettes, so it was very pleasant to find that this album offered really sparkling sound with plenty of presence and realism, not to mention excellent stereophonic effect. A glance at the label revealed the reason why. Without noticing I had picked up one of the new Philips "Living Presence" issues, and that just goes to show that the improvement is genuine, not imagined.

Happily the upgrading of standards in the audio department is matched by the performance and expert arrangements offered by the Wally Stott Chorale. Instead of his usual ensemble of a large orchestra and small choir we now have the reverse—a very large augmented choral group with restrained instrumental accompaniment. And, by Jove, it's more effective than I can tell.

The programme gives us: *Shadows, Trains and boats and planes, Country girl, Pat-a-pan, A time for love, The eagle and me, The dance of the Sugar Plum Fairy, He's gone away, Two for the road, Love is blue, My man's gone now and I'm on my way*.

They are all Wally Stott's arrangements, apart from *Shadow*, and I must admit that is one of the most effective tracks. In this number the stereophonic effect has been utilised to the full, giving depth of perspective in space as well as directionality. The result is a very appropriate "audio shadow." Quite uncanny. My other favourite, *The eagle and me*, is again a delicately handled choral arrangement. In fact they all are.

Production of this album obviously called for the greatest skill by director, musicians and technicians alike. Its brilliant success is a credit to all concerned. Strongly recommended.

**EYDIE GORME'S GREATEST HITS.** CBS 40-63260. 55s. 11d. including purchase tax.

All too often the "Greatest Hits" title warns the listener that he is about to be served up with the same old stodge for the umpteenth time. Such suspicions are quickly dispelled by a glance at the numbers offered here, which include: *Matchmaker matchmaker, Amor, What did I have that I don't have, I wish you love, Sabor a mi, Yes my darling daughter, Blame it on the bossa nova, Softly as I leave you, Mas amor, If he walked into my life, Don't go to strangers and I want to stay here*.

There is some very happy, lusty singing here, with an infectious enjoyment that quickly captivates the listener. Against these entries on the credit side there's also a loss of quality that gives the voice a "boxed-in" feeling. Sibilants are heavily accented, so I wondered if the trouble arose in the reverberation department? At all events recording could be better—indeed should be better. In this day and age the cash customer has a right to demand something approaching technical perfection.

More difficult to correct are the weaknesses in the voice itself. Significantly, the sleeve note writer takes great pains to emphasise the fact that Eydie Gorme *really can sing*—a statement that would at one time have been quite superfluous on a vocal record. Truly a sign of the times! In fact she has a most unfortunate vibrato which both develops and distracts on sustained notes. On my review copy the penultimate band, *Don't go to strangers*, has some excruciating distortion which miraculously disappears on the final item. So, taken all round, this is a somewhat mixed bag from several points of view. Nothing I have said should be taken to detract from the warmth and humanity of the artiste, which, in spite of all the faults, does shine through. This girl has such a personality it would need nothing short of a brick wall to keep it out.

After listening to this album a number of times I confirmed my first reaction—a feeling of having just missed what could have been a really great record.

**TONY BENNETT.** *Yesterday I Heard the rain.* CBS 40-63351. 55s. 11d. including purchase tax.

Have you ever cast suspicious glances at your equipment and wondered what horrible troubles could be causing such degraded sound to come out of the loudspeaker? When I get such disturbing thoughts I always reassure myself by reproducing programme material of known good quality as a check. On hearing Tony Bennett's voice as it appears on this cassette I lost no time in finding my test recording.

Many studios are adopting the useful technique of recording in a fairly "dead" acoustic so that precisely the right amount of the right kind of reverberation can be added later. It's one way of controlling an otherwise uncontrollable aspect of recorded sound. But it seems that it doesn't always come off, and I suspect that the enclosed, wooden quality of Tony Bennett in this album is one of their failures. Instead of bringing him into the foreground one gets the subjective effect of a voice at the end of a long tube. Mind you, I doubt if such subtle quality changes

would be noticed if the cassette was to be reproduced under what we might politely call "low-fi" conditions.

The Tony Bennett offering includes: *Yesterday I heard the rain, Hi-ho, Hushabye mountain, Home is the place, Love is here to stay, Fool, of fools, I only have eyes for you, Sweet Georgie Fame, Only the young, There will never be another you and Get happy*.

Apart from the reservations made, a pleasant enough album which deserved to have better technical treatment.

**THE THIRD FACE OF FAME.** Georgie Fame. CBS 40-63293. 55s. 11d. including purchase tax.

According to the notes the idea behind this record was originally to produce a satirical comment on the music scene of the nineteen thirties. In the event its scope was broadened and the result is a wholly satisfactory collection with a half-smile shining through the lot.

Our programme includes: *The ballad of Bonnie and Clyde, When I'm sixty-four, Ask me nice, Exactly like you, Someone to watch over me, Blue prelude, Bullets Laverne, This is always, Side by side, St. James' Infirmary and Mellow Yellow*.

The choice shows far more imagination than some other selections, and together they make a finely contrasting entertainment. Treatment of *Bonnie and Clyde* is really commendable; Georgie Fame removes the whole episode from the nasty vulgarity of cheap gangsterism into the never-never land of humour. Which is a good thing. And *When I'm sixty-four* has real meaning and more than a touch of pathos.

No faults to report in the recording. The voice is firmly placed in the centre with a musical backing that has been handled with discretion and feeling.

There's a considerable range of expression in this album and Fame brings off each number with accomplished ease to charm the listener's ear. With a school-boyish let's-have-fun air about it this cassette offers real enjoyment. Recommended.

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Model 9104, a Compact Cassette machine powered by five 1½ volt batteries, costs £31 10s. plus 11s. 7d. purchase tax surcharge. A standard cassette type equipment it employs a single control for record (with a safety interlock) playback, fast wind and rewind and a recording level/battery condition indicator. A 2½ in. round loudspeaker is built in and power output is said to be 400 mW. Weight is approximately 2½ lb. and the machine is supplied with blank cassette, microphone with remote stop/start control and direct recording/playback lead. Size is 8 in. wide x 4 in. deep x 2¼ in. high.

A more sophisticated Compact Cassette machine, Model 9115, is a mains/battery version at a recommended retail price of £42 7s. 5d. plus 15s. 7d. purchase tax surcharge. The built-in loudspeaker is 4 in. and the claimed output is 800 mW from batteries or 1 watt from mains. Features include a transistor controlled motor, piano key controls for recording, fast rewind, start, fast wind and stop, tone control, recording and volume playback control, recording level/battery condition indicator, recording socket for microphone, radio, record player or second recorder and playback via built-in or second loudspeaker or separate amplifier with loudspeakers. Supplied complete with blank cassette, moving coil microphone and direct recording/playback lead the weight is approximately 4 lb. 14 oz. and dimensions 10 in. wide x 8 in. deep x 2½ in. high.

First of the three reel to reel mains machines is Model 9106, a single speed (3½ ips) half-track automatic at a recommended retail price of £37 plus 13s. 1d. purchase tax surcharge. Maximum reel size is 5½ in. stated power output is 1½ watts which drives a 4 in. round loudspeaker. Controls include rocker switches for recording, fast rewind, start, fast wind, and pause, stop bar, pause release button, volume and tone controls. Amongst the many attractive features are automatic recording control with manual over-ride and illuminated recording level meter, three digit tape position indicator with zero reset, recording socket for microphone, radio, record player or second recorder. The machine is supplied with a free-standing moving coil microphone, a 5½ in. reel of long play tape and empty reel and direct record/playback lead. Weight is approximately 12 lb. and



dimensions 5½ in. wide x 10½ in. deep x 4½ in. high.

Next in line is Model 9123, a two-speed (1½ and 3½ ips) 4-track machine fitted with a 6 in. x 4 in. high efficiency loudspeaker and a claimed power output of 4 watts. Suitable for reels up to 7 in. in diameter the 9123 has facilities for stereo playback, duo play and multiplay using a stereo pre-amplifier and accessories. It also has facilities for mixing and monitoring via built-in loudspeaker or headphones and also for simultaneous playback of two parallel tracks. Controls include push buttons for recording, fast rewind, start, fast wind, pause, stop bar, separate track and speed selector switches, recording level control for radio or record player input, recording level control for microphone input, playback volume control and tone control. Weight is approximately 16 lb. and size is 16 in. wide x 11½ in. deep x 6½ in. high.

The top model, described as "Hi-fi," is a three-speed (7½, 3½, 1½ ips) 4-track stereo equipment reference 9137 priced at £101 19s. 4d. plus £1 16s. purchase tax surcharge. Fitted with two 6 in. x 4 in. speakers (8 ohms impedance) claimed power output is 4 watts per channel. Controls include piano keys for pause, fast rewind, record, fast wind, stop, start; volume/on/off, stereo balance, bass and treble, record level controls for radio or record player input and for microphone input, separate track speed and multiplay/duo play selector switches. Maximum reel size is 7 in. and other features include automatic tape end stop, mixing parallel playback, two illuminated VU-type level meters, monitoring and playback via built-in speakers or headphones, four digit tape position indicator, etc. The machine can be used either horizontally or vertically and may also be used as a public address system amplifier. Supplied with a monophonic cardioid microphone, 7 in. reel of long play tape, empty reel and direct record/playback lead the weight is approximately 24 lb. and the size is 18½ in. wide x 13½ in. deep x 7½ in. high. All the mains machines are designed for a power supply of 110/127, 220/240 volts, 50 Hz AC only (convertible to 60 Hz).

*Pye Group (Radio and Television) Limited, Post Office Box 49, Cambridge CB4 1DS.*

## LAFAYETTE MODELS AVAILABLE

A COMPLETE range of audio equipment by Lafayette is now being distributed in this country by Barnet Factors Limited. The catalogue includes a stereo tape deck,



a number of amplifiers and integrated tuner/amplifiers, loudspeakers, etc.

The Lafayette stereo tape deck, Model RK 870, is a four-track stereo and mono record/playback equipment operating on three speeds, 7½, 3½ and 1½ ips. Features include automatic equalisation for the three speeds, separate record volume controls, two record/playback VU level meters with pilot lights and record mode indicator lights. The tape transport system includes a pause control which is said to facilitate precise editing.

The rear panel preamp outputs, auxiliary inputs and front panel microphone input jacks are all readily accessible and the machine will accept spools up to 7 in. in diameter. Cased in oiled walnut with silver metal trim the cost is £58 6s. 1d. plus £16 0s. 11d. purchase tax.

The amplifiers range from the very simple low cost Stereo 10, a model with input stages for high impedance crystal or ceramic cartridges and separate volume controls for each channel with a stated output of 5 watts per channel IHF music power at a retail price of £11 19s. 6d., to the Model LA-85T with a quoted output of 60 watts RMS and a host of sophisticated facilities at a recommended retail price of £49 10s.



Typical of the stereo tuner/amplifiers is Model LR 500T with a claimed output of 40 watts RMS at 4 ohms. This equipment includes automatic FM stereo switching and indicator light, illuminated tuning meter for accurate FM/AM tuning, fused output transistors to protect against shorts and overload and what are claimed to be exclusive front and rear panel tape output jacks. The speaker mode switch activates main and/or remote speakers or both, plus the headphone only position; the stereo jack is situated on the front panel. Recommended retail price of the LR 500T is £74 2s. 3d. plus £20 7s. 8d. purchase tax.

Other models include AM/FM tuning units without integrated amplifiers, communication receivers and a number of service test instruments.



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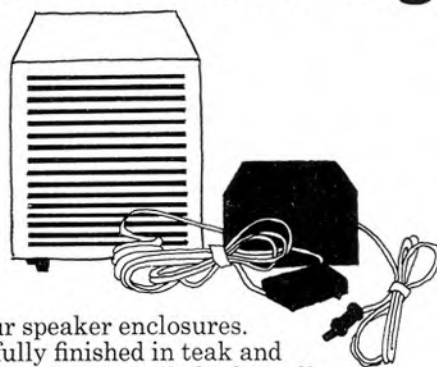
Watch out for the new series of TAPE HANDBOOKS that will shortly be available from TAPE BOOKSHOP, Prestige House, 14/18 Holborn, E.C.1. We are planning to issue one exciting new title each month. Full details in next month's issue.

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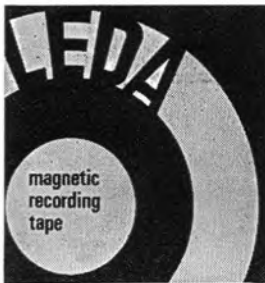
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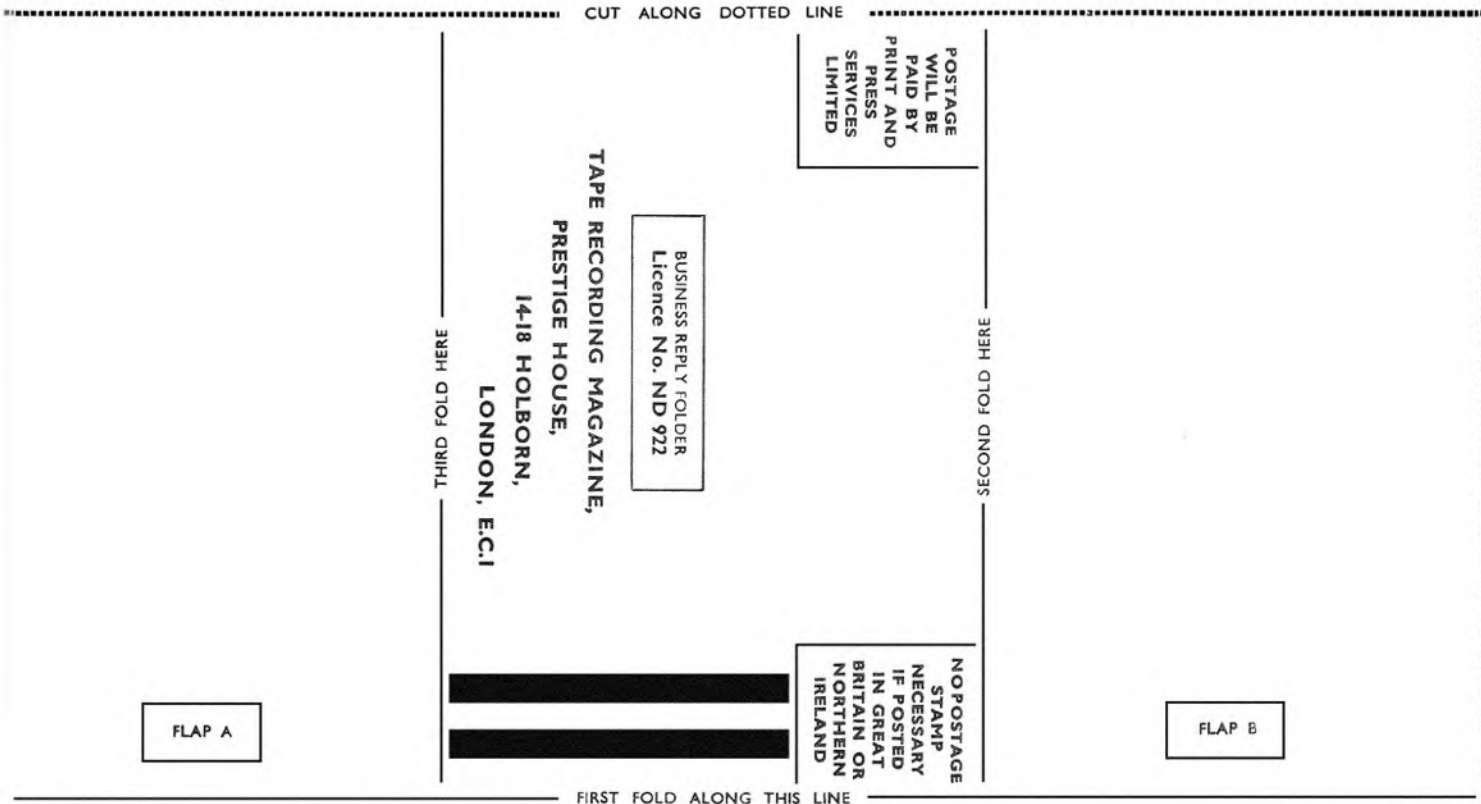
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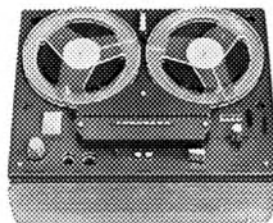
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