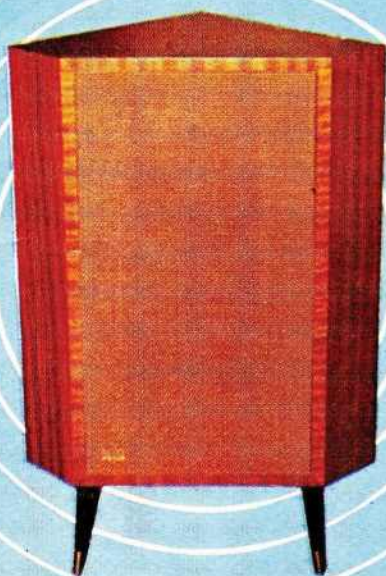


**AMATEUR**

# TAPE RECORDING

Vol. 6 No. 7 FEBRUARY 1965

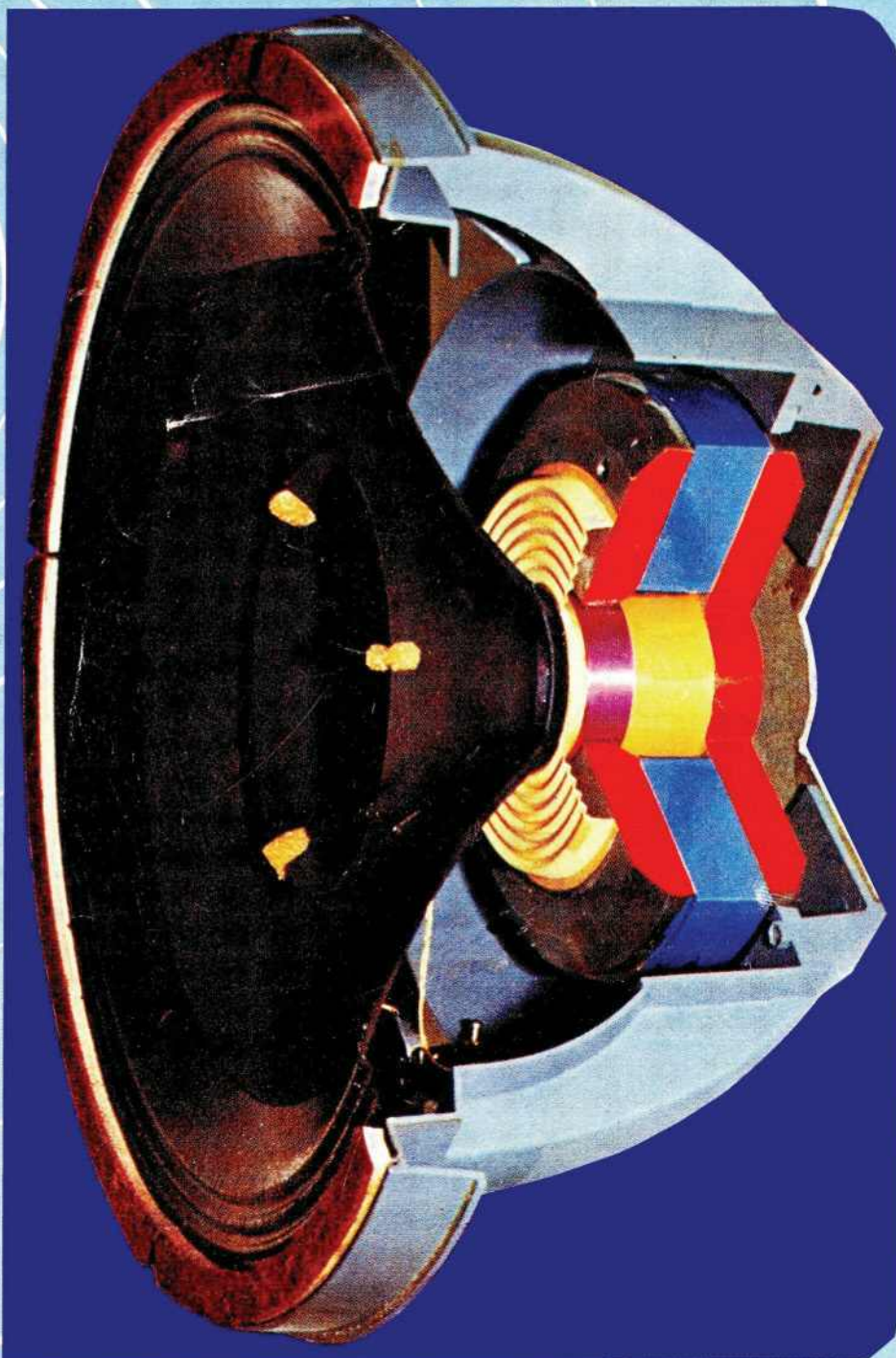
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### On the Cover

The beautiful symmetry of a good loudspeaker is clearly shown in this cut-away model of a well-known speaker. For more information about loudspeakers, see Page 8.

VOL. 6, No. 7

FEBRUARY, 1965

## The Shape of Things to Come

**M**OST reluctantly, we have to announce an increase in the price of ATR commencing this month. This is mainly due to increased costs in production and printing, which for a long time now we have borne ourselves. We feel sure that our readers will accept this small increase of 6d. per month because it brings with it good news. ATR is shortly to have a larger page size, more colour and a very substantial increase in informative articles by top writers in the field of tape recording, hi-fi and video.

To begin with, our next issue will carry the first of a series of exclusive stage by stage build-it-yourself articles on the VKR500 domestic television recorder. Details of this will be found elsewhere in this issue, for this amazing recorder is now available in kit form. To back this venture into practical video recording will be authoritative material on the various aspects of television recording for the amateur, plus of course our regular features on loudspeakers, tape and transistors, and the lighter but nevertheless informative tape and travel adventures of Bob Danvers-Walker.

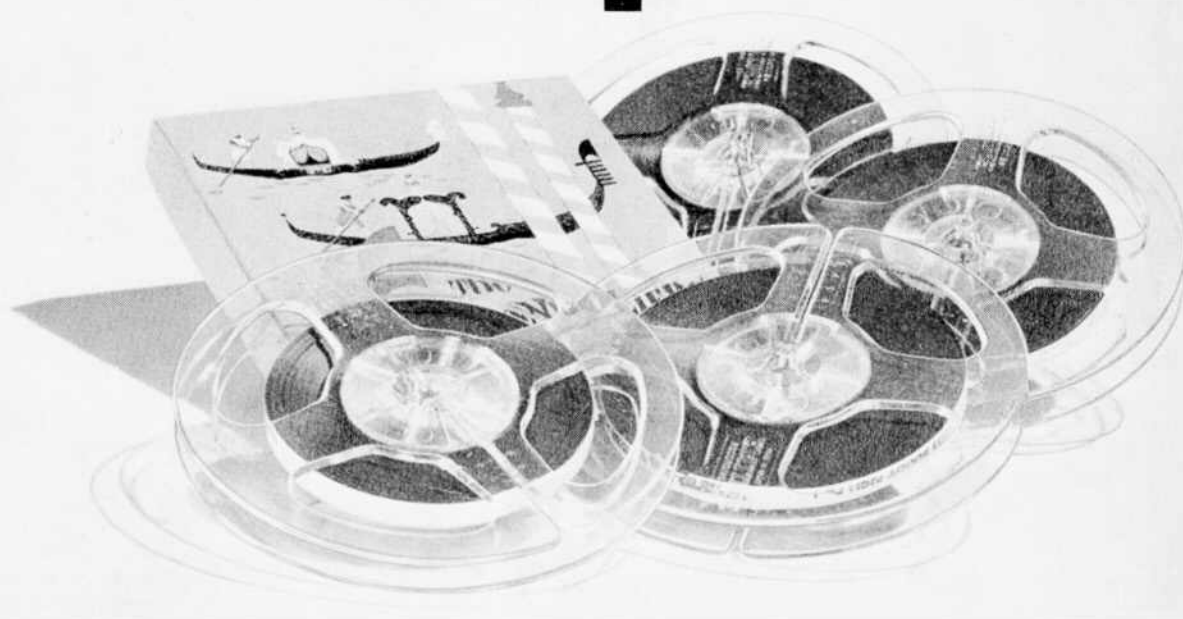
Meanwhile your Editor has been taking a look at the possible development of commercial and local broadcasting. Already Manx Radio in the Isle of Man is on the air with programmes, local news, views and advertising, and the sanction of more local broadcasting stations such as this could open up tremendous possibilities for all tape recording enthusiasts. It is the keen amateur with experience in making documentaries, interviewing visiting personalities, recording local events and news items, etc., who may well be able to provide valuable programme material for local broadcasting.

So one way and another we see a great future for amateur tape recording divided now into two highly creative forms—Sound and Vision. F.C.J.

---

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**59** The silent voice of Nat King Cole in 'Walkin' Blues'. You'll Never Know, I'll Be Home, You Say You Love Me and 8 more.



**1** Tchaikovsky Swan Lake. John Hollingsworth conducts the Symphony of London in a great performance of this well-loved ballet music. Also in stereo.



**10** Tchaikovsky Violin Concerto. Evgeny Svetlanov conducts with Walter Gieseler and LSO in a superb performance of this melodious work. Also in stereo.



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**108** Mel Torme's velvet voice in 12 top numbers. Body and Soul, Round Midnight, Blues in the Night, That Old Feeling, Where Can I Go Without You, etc.



**14** Tchaikovsky's Symphony No. 5. Sir Malcolm Sargent and LSO combine to give this famous symphony a dramatic and colorful rendering. Also in stereo.



**44** Leopold Ludwig and LSO combine to give this famous symphony a dramatic and colorful rendering. Also in stereo.



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**112** Last Ballet Music: Dance of the Hours, Aida, Hymn to the Sun, Vienna Symph. conducted by Aliberti. Also in stereo.



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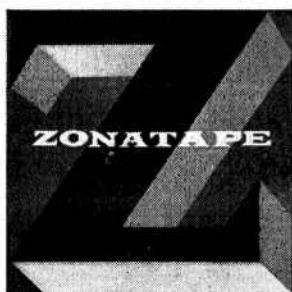
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# THE LOUDSPEAKER

## PART 2

by D. Barnett.

**B**EFORE considering the relative merits of the various basic types of loudspeaker system, it is necessary to define what performance is required from a good hi-fi speaker. Broadly, these are as follows:—

(1) The sound waves radiated by the loudspeaker should be faithful reproductions of the electrical waves fed into the speaker. (2) The unit should have reasonable sensitivity and should not introduce any distortion.

Different forms of distortion are examined in detail below.

### FREQUENCY DISTORTION

When a speaker fails to produce every frequency with the same sound output, frequency distortion takes place. The sound output of a speaker is measured and plotted as a graph against frequency. This is a frequency response curve and an example is shown in figure 1. The perfect speaker would give a straight line response.

The sound output is shown measured in decibels (dB). This is a measurement relating differences in power, current or voltage. In this case the output is power. If  $P_{in}$  is the power input of a unit and  $P_{out}$  is the power output, the change in power can be measured as  $20 \log \frac{P_{out}}{P_{in}}$  decibels.

It is sufficient to know that if the power is doubled then the output can be said to be 3 dB up. The decibel is a very convenient measure for the acoustic engineer because it relates net gains and losses. In fact, a change of 1 dB in sound level is barely audible, and 2 dB is just perceptible.

The frequency range of a speaker will depend upon the size and design of the unit. The 8" unit measured in Fig. 1 has a range of 40 c/s — 15,000 c/s while a larger 12" unit might give 30 c/s — 16,000 c/s. It can be seen in the curve that at 40 c/s the sound output is 6 dB down on the average. Similarly at 15,000 c/s the output is also 6 dB down. Thus the frequency range can be stated as being 40 c/s to 15,000 c/s  $\pm$  6 dB. Many manufacturers publish response curves as a guide, but it is often dangerous to interpret these curves unless sufficient information is known, regarding loading the speaker power input, etc.

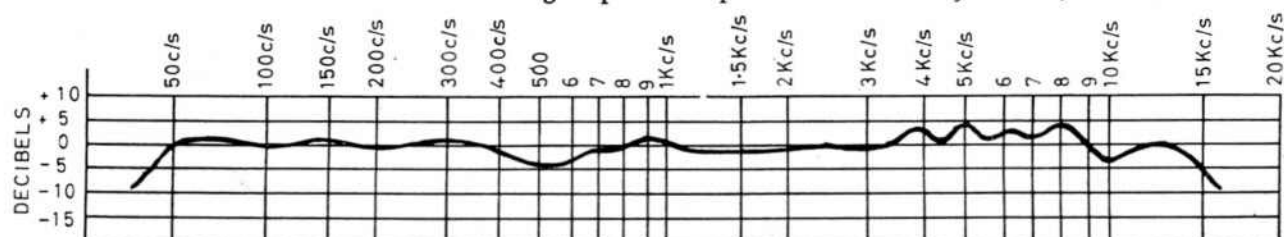
### POLAR RESPONSE

A loudspeaker does not reproduce the same frequency response regardless of the position of the listener. Directly in front of the speaker, the top response will be at its best, but as the angle to the axis is increased then the high frequency output reduces. A typical polar response curve is shown in Fig. 2. Reasonable response would be expected at least until 30° off axis.

### HARMONIC DISTORTION

When a signal is applied to a speaker, it is obvious that the sound output will be of the same frequency as the signal. However the speaker will also reproduce some other frequencies. For example if a 100 c/s signal is applied to the coil then the sound output will be mainly 100 c/s, but also some 50 c/s, 200 c/s, 300 c/s, etc., sound output could be measured. These extraneous

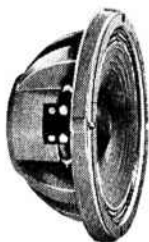
FIG. 1: Frequency response curve of an 8 inch dia. hi-fi Loudspeaker. (Speaker on infinite baffle in anechoic conditions. Constant voltage input. Microphone 18 inches away on axis).





# CHOOSE THE BEST! CHOOSE GOODMAN'S

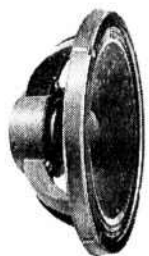
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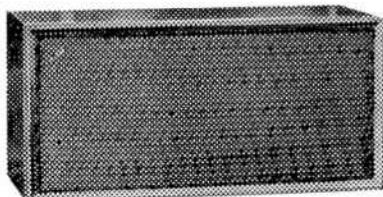
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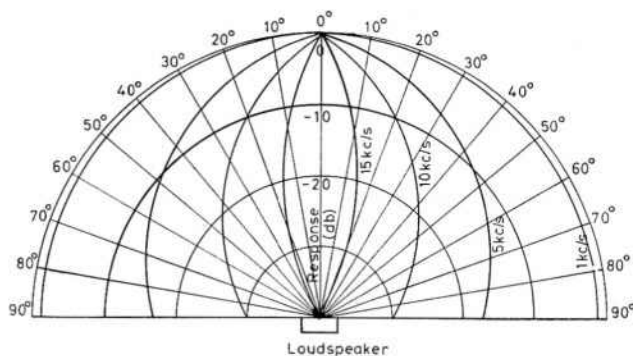


FIG. 2. A typical polar response curve.

frequencies are known as harmonic distortion. The output below the signal frequency is sub-harmonic distortion. The total harmonic distortion should be a very low percentage of the true signal output.

### INTERMODULATION DISTORTION

When more than one signal frequency is applied to a loudspeaker it is possible that the sound output will contain frequencies other than those of the input or harmonics of the input. These additional frequencies are caused by interaction of the various signal frequencies and are termed intermodulation distortion. This distortion, like harmonic distortion is caused by non-linearity in the loudspeaker suspension system.

### TRANSIENT DISTORTION

This occurs when the loudspeaker is unable to follow abrupt changes in the input signal. Figure 3 shows the output of a speaker after switching on and off a steady signal. It can be seen that the speaker is producing sound output after the signal is switched off.

To sum up, we would expect a good hi-fi loudspeaker to have:—

1. A smooth response
2. Broad directivity
3. Low distortion in the useful frequency range
4. Good transient response
5. Adequate power handling and sensitivity.

### BASIC LOUDSPEAKER TYPES

#### (1) Single Cone — Full range

This is the most simple speaker mechanically, but must be very carefully designed to cover the conflicting requirements of bass and top reproduction.



Bass reproduction will mainly be determined by the size of the speaker and the required power handling of the unit. The resonance of the speaker which will limit the bass extension can be reduced by lowering the stiffness of the suspension. This will however, reduce the power handling and possibly make the unit mechanically unstable. Another method of lowering the resonance is by increasing the cone weight but this then reduces sensitivity. Thus a compromise must be made by the designer.

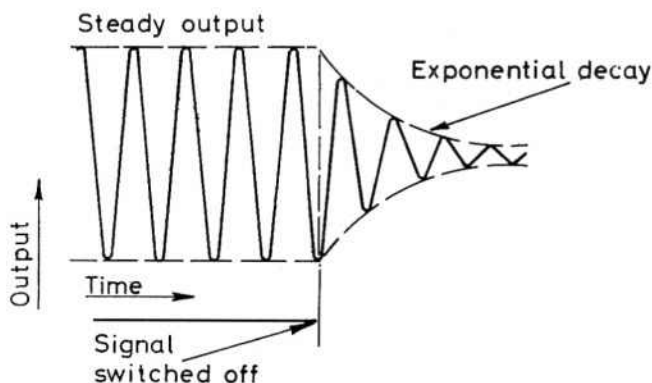
Top reproduction can be assisted by using a light aluminium coil and also by careful design of the cone profile. The most effective shape has proved to be according to a hyperbolic law (see Fig. 4). Normally this type is used for the smaller 8" or 10" speakers to give a frequency response of about 40 c/s to 15,000 c/s. These are ideal for use with tape recorders. They require only small enclosures and are reasonably inexpensive.

## (2) Single Cone — Limited frequency range

It is easier for the designer to develop a speaker that will only handle a limited frequency range because the conflicting requirements above no longer apply. Thus large speakers, 12", 15" and 18" dia. can be designed to handle only the frequencies below 1000 c/s and bass extension can be made to about 20 c/s.

Similarly units can be designed to cover either middle or top frequency ranges. Fig. 5 shows a system using three separate speakers. The advantage of this system is that the percentage distortion for an individual unit can be kept low. The disadvantages are cost, because two or more speakers would have to be used, and also distortion is introduced by using a crossover. The crossover is an electronic network that feeds each speaker with the signal frequencies that the unit can handle.

FIG. 3. Output of a loudspeaker after switching off a steady signal.



## (3) Twin Cone — full range

The normal full range single cone speaker can have extended top response by using an additional light high frequency cone. This utilises a mechanical cross-over so that the main cone handles the low frequencies and the second cone the high frequencies.

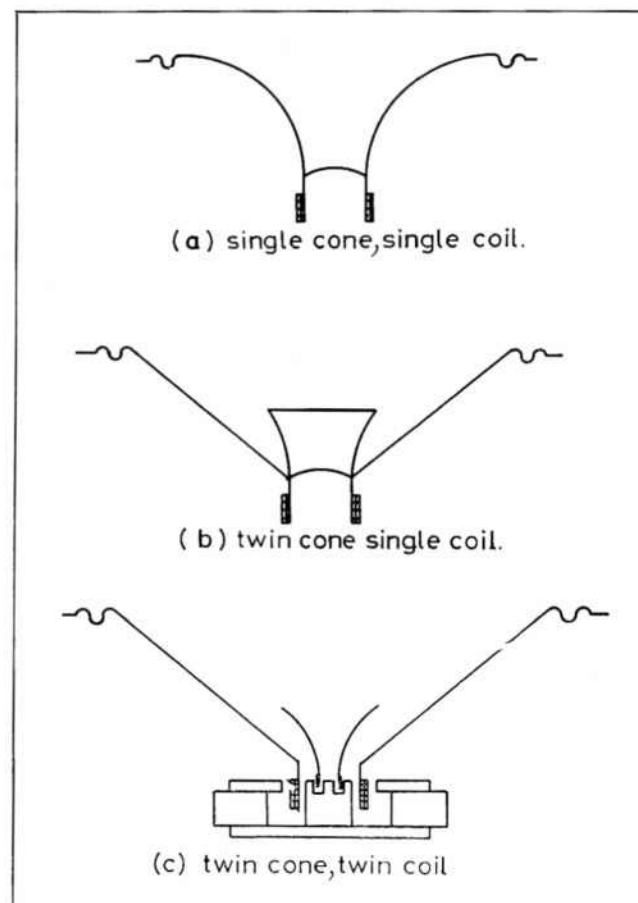
## (4) Twin Cone — Twin Coil

A section of one of these speakers is shown in Fig. 4. This is really two separate speakers built concentrically. An advantage of this is that all the sound is produced from one point as opposed to a larger spread with a two- or three-way system. This is a matter of personal preference.

It can be seen that there are many basic types of loudspeaker system, all of which are satisfactory provided they are well designed. Certain types are better

*Continued overleaf.*

FIG. 4. Cone and voice coil configurations.



## THE LOUDSPEAKER (continued)

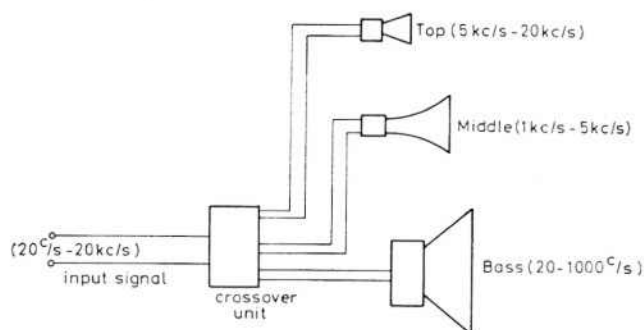


FIG. 5 Three loudspeaker system ensures low overall distortion.

for some applications than others, and one form of distortion may be more noticeable in some systems than others. All speakers have their strong points and their weak and every application must be considered on its merits.

In the next article we shall consider the various types of enclosures in which the speakers can operate.

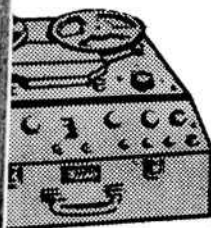
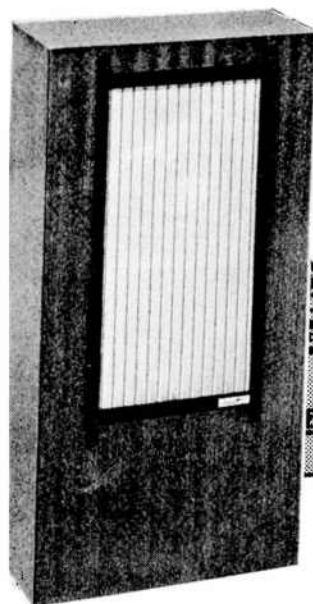
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Our first exclusive video construction feature—Building the VKR 500 television recorder from kit—together with comments on practical video recording.

Bob Danvers Walker discusses the problems and pleasures of recording aboard the luxury liner Queen Mary.

Plus expert features, including Gordon J. King on Tape and Transistors, N. S. Rutherford with a new series on the elements of video recording and D. J. Barnett on Loudspeakers. Also news of our final Hi-Fi Contest winner, and details of the latest developments in audio and sound recording.

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# RECORDINGS TO REMEMBER

**Russ Allen reviews some of the latest releases on tape and disc.**

Coming in on the end of the Shakespeare Festival, **"Strike up the Bard"** Columbia 33SX 1637 presents the Ken Jones Orchestra, plus (and a very delightful idea this). The Elizabethan Consort of Viols. Geoffrey Emmott's Recorder Consort and Elaine Delmar.

Lots and lots of fun from the title through to the very last note. Some inspired thought too that has resulted in delightful arrangements, well played and not a dull track.

Miss Delmar has one of those interesting husky voices and her five songs are all fine.

Shake Keane, one of my favourite jazzmen, solos on trumpet and flugel horn, good solos from others too and especially the leader's piano and a swinging rhythm section.

Make this a must for your New Year shopping.

What will doubtless become the "in" version of the Bernard Shaw classic, **"My Fair Lady with the UN-original Cast"** Capitol T2173 Shelly Manne, His Men and Orchestra with vocals by Jack Sheldon and Irene Kral. Arranged by Johnny Williams. Rec, July and August '64 Hollywood, California.

**From the trite to the tremendous—Ellington's original opus "My People".**



This may well shatter any prissy illusions you have but it's 'Pygas' brought coolly up to date.

I'm filled with admiration for all concerned. Dismayed, perhaps a little and aware too of a certain lack of decorum. If G.B.S. turned in his grave when they musicalised Pygmalion, then I wouldn't be surprised to hear he'd risen at the sound of this.

Scandalous, but dizzily exciting.

**"Salt and Pepper"** Sonny Stitt and Paul Gonsalves. HMV CLP 1808 Rec' Sept 5th '63 with Hank Jones, piano, Milt Hinton, bass, Osie Johnson, drums.

A duel between two top tenor men which never sparks into battle. Two contenders for a championship giving a sedate exhibition of their favourite clichés. Salt and pepper is insufficient and a couple of large tablespoons full of curry powder might have made this a more palatable dish.

**"I've grown accustomed to my bass".** Johnny Hawkeworth. Col. 33SX 1654.

Britain's best known bassist going his own way with various small groups and featuring himself a plenty.

Some amusing and pretty little melodic exercises on familiar tunes, 'Misty', 'Two Sleepy People'. Some dexterous technique displayed, but little if any jazz soloing as we get from Ray Brown, Red Mitchell or even Spike Heatly.

Balancing and recording leave something to be desired and in "Sounds Like That" the recording suddenly slows down before returning to it's proper speed.

Musically very good and of interest to all aspiring bassists.

**Jazz at Storyville. Vol. II.** Realm RM 188. Wild Bill Davison, cornet; Eddie Hubble, 'bone; Frank Chase, clarinet; Johnny Vine, drums; John Field, bass; George Wein, piano.

This is Dixieland, it says, recorded live, with applause, and some rather bewildering announcements crediting the leadership to both Wein and Davison. Who cares anyway, the jazz is the same. It's not breathtaking but lots of fun and conceitedly reminded me of the noise the old Wally Fawkes Troglodytes made.



**Russ Allen with recording artists Dorita y Pepe.**

Six people playing for their own amazement and the hell with everyone.

Davison and Vines play fine and though the recording isn't all that hot it hasn't been helped by the thuddy old bass used by Field. Jolly good stuff though this!

Saga have sent me a number of pre-recorded tapes for review and I am delighted to report their high quality, both recording- and performance-wise.

To begin, as we did with discs, we'll have a show, **"West Side Story"**, West Side Story Orchestra conducted by Lawrence Leonard with singers, George Chakiris, Bruce Trent, Lucille Graham, Mary Thomas, Joyce Berry and Maureen Fuller. STG 8022

This seems to have come along rather late, but if you wish, to revive memories of what a superb show, and even more superb film, (still showing at some cinemas).

The recording here doesn't compare with the soundtrack of the film either vocally or instrumentally but this is not to say it's not good, it's just that the film soundtrack was so fantastic.

What a book! What a show! What a film! Those tunes, "Maria", "Tonight", "I feel pretty". Great great lyrics. Quite my favourite show.

**"Music from the Films"**, London Variety Orchestra conducted by Gilbert Vinter with solo piano by Joyce Hatta. STG 8092. Starting with the Warsaw Concerto ("done" so often), and continuing through the "Cornish Rhapsody", "Legend of the Glass Mountain", to "Slaughter on 10th Avenue", this recording surprised, by managing to make me

enjoy what I'd considered, old pot boilers.

Frankly, not my kind of music, but whoever arranged it and Vinter, have made a most sympathetic treatment.

**Serge Prokofiev. Violin Concerto No. 1 in D. op 19.** STG 8020. David Oistrakh with the Soviet State Symphony Orchestra. Overture, Romeo and Juliet. Hamburg Pro Musica, conductor Hans Jurgens Walter.

Two great Russian romantics make a superb coupling. No carping on performance and it's great music, especially the Prokofiev, and who better to perpetrate it than the Russians themselves. Oistrakh is brilliant.

The Romeo and Juliet has been recorded so often as to be over familiar, but I still like it.

**Brahms IV Symphony in E minor op. 98.** The Royal Danish Orchestra, Conductor, John Frandsen. STG 8010. No quarrel at all with the interpretation. Plain straightforward, good recording, with no tricks and this is as it should be.

**Beethoven's Violin Concerto in D major. op. 61.** Alan Loveday with the Royal Danish Orchestra. Con' George Hurst, STG 8019.

Forty-five minutes of good music. One of the great advantages of tape recording is that there is not the need to accelerate in order to get it to fit.

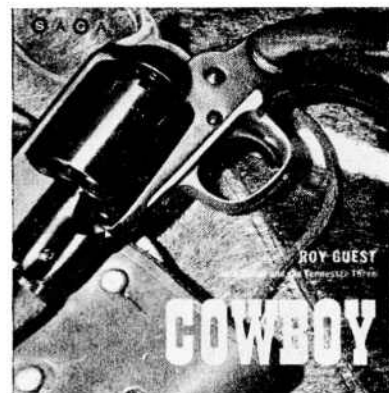
Not my favourite recording of this, but a highly satisfying performance.

**Music of Johann Strauss.** The Musical Arts Symphony Orchestra. Con' Leonard Sorkin. STG 8081. Delightful! Strauss must surely be the most abused of all composers. Items like the 'Blue Danube', 'Emperor Waltz', 'Tales from the Vienna Woods', have been scraped out by every drearily incompetent café group in the world, not to mention Olde Tyme dance bands.

What a pleasure then, to hear them played as they should be.

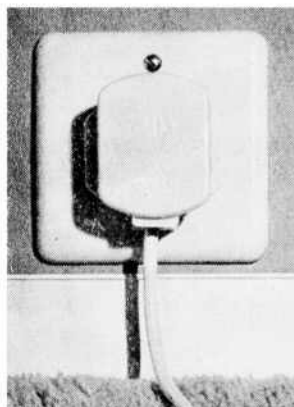
Completely different from the foregoing is "Cowboy", Roy Guest with the Tennessee Three and Jack Fallon. STG 8103. A collection of 16 American Cowboy songs with suitable Hill-billy type accompaniment.

Guess you could call this folk music, hoot'nanny, that is, and if you like that "Singalong" show on B.B.C. you'll sure like this. The instrumental bits are more exciting than the vocals.



**Hoot'nanny folk music with some exciting instrumentals.**

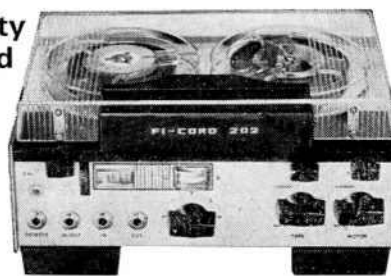
When you read this, then will be upon us the year 1965 and who knows what dreaded musical invention will be thrust upon us by the Honourable well paid D.J.'s of radio and T.V. One good thing is, that if you have a tape recorder or a radiogram then you need not despair. God Bless you Merry Ladies and Gentlemen.



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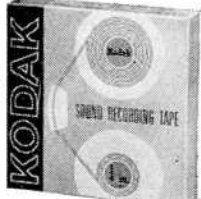
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## Kodak T-100 Standard Play Tape



# TAPE AND TRANSISTORS

## PART 10

by Gordon J. King.



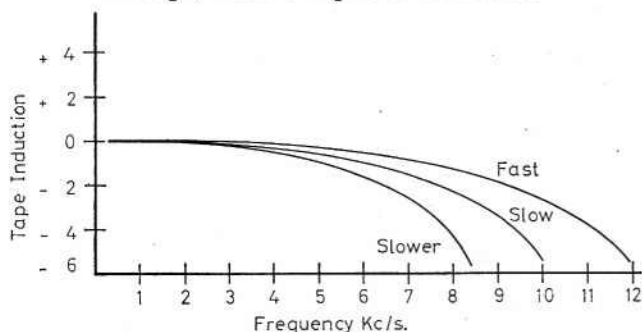
A MAGNETIC tape record is ideally made via an amplifying channel which is delicately balanced and equalised so that the recording corresponds to a stipulated characteristic. If that recording is then played back through a reproducing amplifier of matching characteristic, the resultant audio signal fed to the loudspeaker will be ideally balanced with regard to frequency and amplitude. Pleasant sounds will be reproduced.

Such recording and reproducing characteristics have been recommended by the CCIR (Comité Consultatif International des Radiocommunications), and tape records are made to their pattern. The characteristics differ over the tape speeds adopted. Any tape record made to these characteristics, therefore, will play back nicely through a reproducing channel which is tailored to the same characteristics. A recording made to some other characteristic and played back through a properly CCIR equalised channel will not produce the correct sound (though the reproduction may well be tolerable). Similarly, a recording made to the CCIR characteristic and played back through an incorrectly equalised reproducing channel will not produce the correct sounds.

### THE NEED FOR EQUALISATION

The reason why it is necessary to record and playback to a stipulated characteristic is because the amplitude (strength) of the audio signal produced at the end of a playback channel fails to follow the loudness of

FIG. 1. Here is shown approximately how the tape induction falls with increasing frequency. The effect is due to the self-demagnetisation of the small magnets on the tape, and also in part to head losses.



the original programme sound at all frequencies when the overall record/playback amplification is arranged so that sounds of all frequencies are amplified equally.

The "unbalance" of signal amplitude with frequency varies with tape speed, with record bias amplitude and with record and playback heads of different type. If the audio signal amplitude over the record/playback channel were constant at all frequencies, at all tape speeds, with all heads and at all levels of h.f. bias, then there would be no real need for equalising characteristics; apart, perhaps, from employing record pre-emphasis and playback de-emphasis as an artifice for improving the signal/noise ratio, as in FM radio channels.

When one records on tape, the sounds produce, in effect, what are small magnets on the oxide side of the tape. The strength of these magnets is governed by the loudness of the sound, while their length is governed by the frequency of the sound. The higher the frequency, the shorter the magnets. The overall effect is called "magnetic induction". We do not need to get too involved with this process, but it is as well to have it clearly in our minds, for it will assist in the understanding of equalisation requirements, later.

Unfortunately, the shorter the magnets become, the more difficult it is for them to retain their magnetism. Thus, the very short ones tend to lose their magnetism (or some of it), but thanks to high coercivity tapes, this problem is not now so bad as it used to be. Coercivity, incidentally, is a measure of the tape's resistance to demagnetisation.

### TREBLE LOSS ON RECORD

This demagnetisation effect means that the level of recording on the tape, say, from signals of constant amplitude over the audio spectrum, starts to fall above about 2,000 c/s (depending upon tape speed, because the faster the tape is passing the record head, the greater the length of the magnets produced at any frequency). The general effect is shown by the curves in Fig. 1.

To counter this treble fall-off, it is necessary to feed into the record head signal currents of amplitude which increases with frequency. Greater magnetic force is then applied to the tape at the higher frequencies so that the loss of magnetism at these frequencies results in an induction which is much more constant over the audio

spectrum. The record amplifier is thus given treble lift, and the amount of lift that it is given must, of course, be related to the tape speed, greater lift being required at the slower tape speeds. Fig. 2 gives some idea of how the response of the recording channel may be caused to rise at the treble end to provide reasonably constant tape induction over the audio spectrum.

So far, then, we find that in the transistor record channel we need low noise preamplification of the programme signal, a treble-boost circuit, switchable over the tape speeds, and some means of feeding the programme signal current into the record head. For a minute, let us leave the preamplification and treble-boost networks and concentrate on the signal current feed to the record head.

Assuming that the record head has no appreciable losses, the strength of the magnetic field produced across the gap is directly proportional to the strength of the signal *current* in the head winding. This means that if the head is fed through an equalised record channel, the strength of the magnetic field across the gap will rise with increase in frequency of a constant amplitude signal, and the tape induction will be constant as shown in Fig. 2.

## CONSTANT CURRENT

The problem, then, is that of feeding the head from a *constant current* source. A record head is composed mainly of inductance created by the head winding on the metal pole pieces. There is, of course, the resistance of the wire making up the winding and the capacitance between the turns and from the winding to the pole pieces. But these are small compared with the inductance.

A typical value for a high impedance record head is 800 mH. Now, to d.c. this would present only its wire resistance value, but to signal frequencies it has a reactance (also measured in ohms) of a value equal to  $2\pi fL$ , where  $f$  is the frequency and  $L$  the inductance.

At 100 c/s an 800 mH head has a reactance of 500 ohms, but the reactance of the same head rises to 50,000 ohms at 10,000 c/s! If this head were connected to a constant *voltage* source, the current in the winding would vary over a ratio of 100-to-1 from 100 c/s to 10,000 c/s. This would be crazy, for at 100 c/s the magnetism across the gap due to a signal of given amplitude would be 100 times greater than that due to a signal of the same amplitude at 10,000 c/s. Apart from fantastic over-recording at the bass end of the spectrum, there would be the opposite to the required treble lift.

We probably know that in valve-type tape recorders this problem is overcome by feeding the head from the anode of the record output valve through a high value resistor, as shown in Fig. 3.

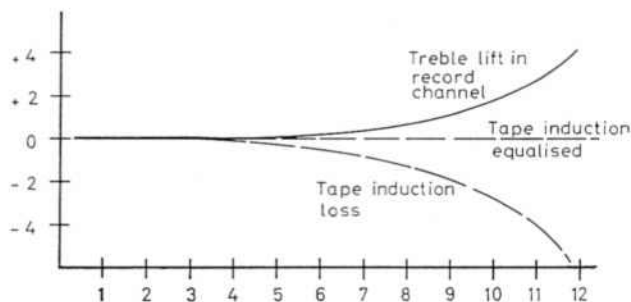
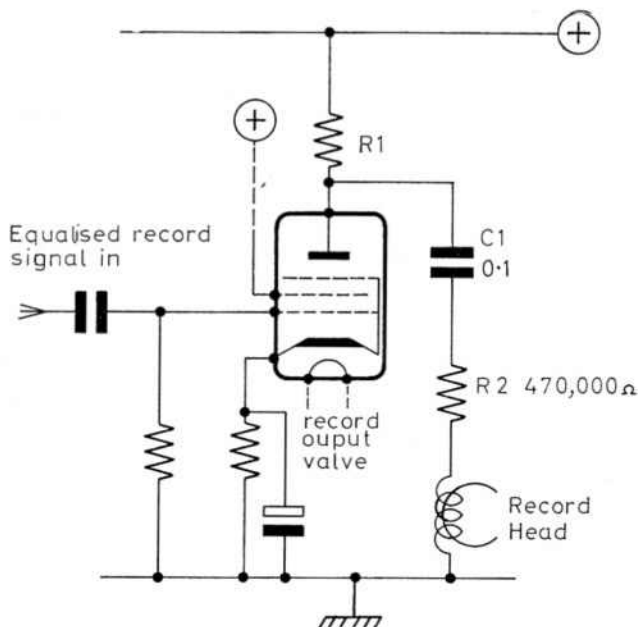


FIG. 2. Here is shown how treble lift in the record channel gives extra strength to the small recorded "high frequency magnets", so that after their reduction in magnetism, due to the self-demagnetisation effect, the tape induction holds reasonably level over the audio spectrum. In practice, there is still some falling off at the treble end due to head losses.

## SWAMP RESISTOR

Here C1 simply isolates the d.c. voltage at the anode of the valve from the head, R1 is the record output valve load resistor and R2 is the head feed resistor. R2 can be looked upon, in effect, as a "swamp" resistor, since its job is to swamp with its own high value the changing reactance of the head with frequency.

FIG. 3. When a valve is used in the record output stage, the high signal swing at the anode allows the head to be fed through a high value swamp resistor to provide a signal of constant current at all frequencies through the head. Here C1 is the isolating and coupling capacitor and R2 is the swamp resistor.



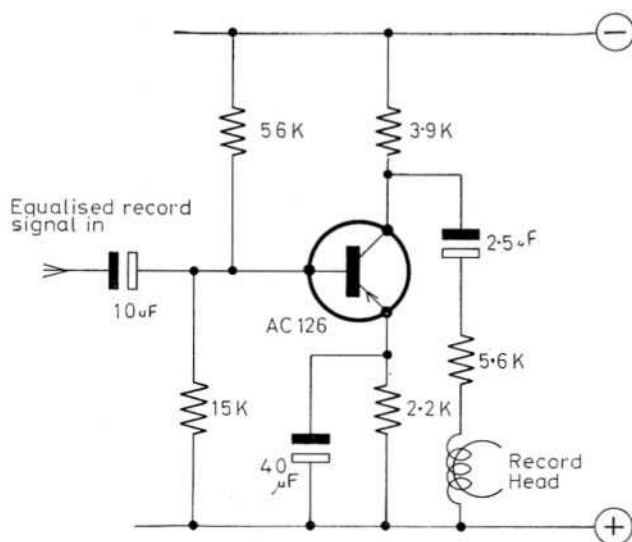
With the resistor in circuit, therefore, we get an approximate change in effective "resistance" from 100 c/s to 10,000 c/s of 470,500 ohms to 520,000 ohms. This represents the very small ratio of about 1.2-to-1. Thus, irrespective of frequency, the current in the head winding due to a constant amplitude programme signal will be the same at all frequencies. We know, of course, that the current will be that much greater at the treble end due to the purposely introduced treble boost.

In the above computations we have assumed that it is possible to add pure resistance (that of R2) to pure inductive reactance. This just cannot be done, of course. Although these two components are each measured in "ohms," they have to be added vectorially. Nevertheless, the foregoing description has revealed the principle of the swamp resistor without bringing in too many mathematics. In any case, owing to the large value of R2, the value of total effective "resistance" derived by simple addition is not very much different from that derived from the calculation of "impedance," where the addition of vector magnitudes is featured.

## VOLTAGE SWING

This method of constant-current feeding from a valve anode is all very well and is feasible because of the relatively large swing of signal voltage here. This voltage swing results from the use of a high-tension line of 200 volts or so. Transistors work normally on much smaller voltages than valves, and the h.t. line of a transistor tape recorder may be at most 22 volts, and that is when

FIG. 4. When a record output stage features a transistor, the limited signal swing at the collector makes it impossible to employ a high value swamp resistor, but a head of lower inductance is often used, and this is fed through a lower value resistor with similar constant-current effects.



the recorder is mains-operated. Battery operated recorders may have an h.t. line of only 9 or 12 volts (sometimes 18 volts), meaning that the signal swing at the collector of the record output transistor is considerably limited.

Nevertheless, some models adopt the swamp resistor method of feeding the head, as shown in Fig. 4. The resistor cannot have such a large value as its counterpart in valve-type recorders, but this is often compensated for by the use of a head with a lower inductance and by compensating networks between the record output transistor and the head.

## CHOKE FEED

An alternative, rather clever arrangement is shown in Fig. 5. This is useful where the line voltage is low. Instead of a collector load resistor, the collector of the record output valve is loaded with an l.f. choke L1. The record head is then fed direct from the collector (no swamp resistor) through a high value electrolytic isolating capacitor. In effect, then, the head is in parallel with the choke, since from the signal point of view the positive supply line is at the same potential as the negative line.

The action of the circuit is as follows. At low audio frequencies L1 has a small reactance, as does the record head. The signal voltage developed across L1 is thus correspondingly small, and this limits the current through the low value reactance of the record head. As the frequency of the signal increases, the reactance of L1 and the head rises. A progressively greater signal voltage is developed across L1 but this fails to cause a rise in signal current through the head owing to the rising reactance of the head itself.

Quite an efficient coupling to the head is thus achieved, and all is well provided the insulation resistance of the coupling capacitor C1 is high. If leakage develops in this component, the head is put across the supply voltage through the leakage resistance, current permanently flows through the head and it becomes polarised, thereby upsetting the bias, the recording and the signal/noise performance.

Both circuits of Figs. 4 and 5 are in the "earthed emitter" mode, and from past descriptions of this type of circuit, we should now know how it works. The potential-divider base resistors across the supply line give the base a little negative bias (negative because the transistor is a p-n-p type) and push the emitter junction into the forward conduction. The d.c. conditions are set for class A amplification, and the emitter resistor holds the transistor away from thermal runaway. The capacitor across the resistor stops degenerative feedback.



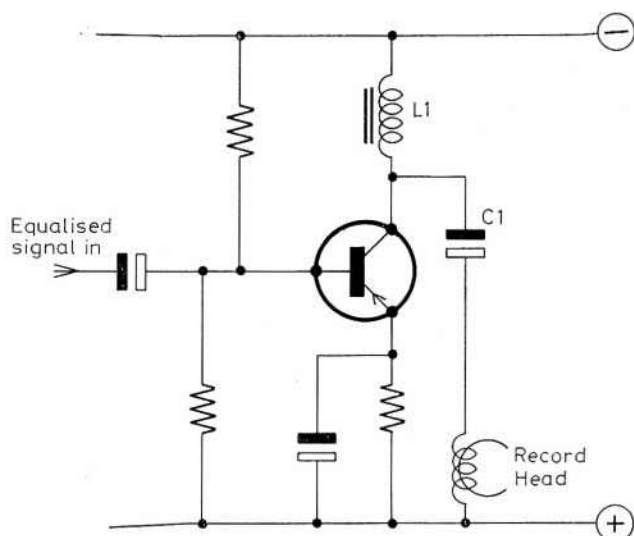


FIG. 5. Here a choke is used as the collector load. As the reactance of this varies with frequency in a similar manner to that of the head, constant signal current is caused to flow in the head (see text).

### DEGENERATIVE FEEDBACK

Such feedback is sometimes purposely arranged by leaving the capacitor out altogether, by using a value lower than that necessary to prevent feedback at low frequencies (the feedback then increases at the lower frequencies and this is sometimes used as compensation) or by introducing a small amount of un-bypassed resistance in series with the emitter, along with the by-passed thermal stabilising resistor.

The application of feedback of this kind to an earthed-emitter stage causes the input impedance to increase above that of a similar stage without feedback. This method is sometimes employed to stabilise the input impedance. It will be recalled from early articles in this series that the earthed-emitter circuit has the highest power gain of all the configurations, that it has a medium output impedance and an input impedance in the region of 500 to 1,000 ohms.

In complete tape recorders, as we shall see in later articles, the record output stage acts on playback as a voltage amplifier or driver to the audio output stages.

### NEXT MONTH

Next month we shall look at the equalising circuits recording and the programme preamplification section.

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# VIDEO TAPE NEWS

**L**AST month we heard for the first time about the Wesgrove VKR500 TV tape recorder in kit form. Since then I have paid a visit to Wesgrove Electrics Limited in Worcester to see both the TV tape recorder kit and the finished product. Brief details of the specifications have already been announced, but here are further points of interest concerning the VKR500.

It comes in kit form (Fig 1), costs £97 10s. 0d., and can be constructed and put into operation by anyone with a reasonable knowledge of electronics and a few items of test equipment. It is necessary to know how to use an oscilloscope for instance, to check the various waveforms through the video amplifiers, etc. It is also necessary to know how

and where to locate certain parts of the circuit in a standard TV receiver which provides the signals for recording and becomes the medium for vision and sound replay. So before rushing to order this excellent TV tape recorder kit, consider first whether you have sufficient knowledge, experience and test equipment to make a successful job of it.

The VKR500 employs the well known direct recording principle and caters for a bandwidth of 2Mc/s. for vision, plus an F.M. sound channel, on standard  $\frac{1}{4}$ " wide tape. The circuits are entirely transistorised and the whole of the video and audio circuitry is assembled on a single printed circuit board. One of the most important circuit features is non integrating sync regeneration which ensures stable operation of the VKR500.

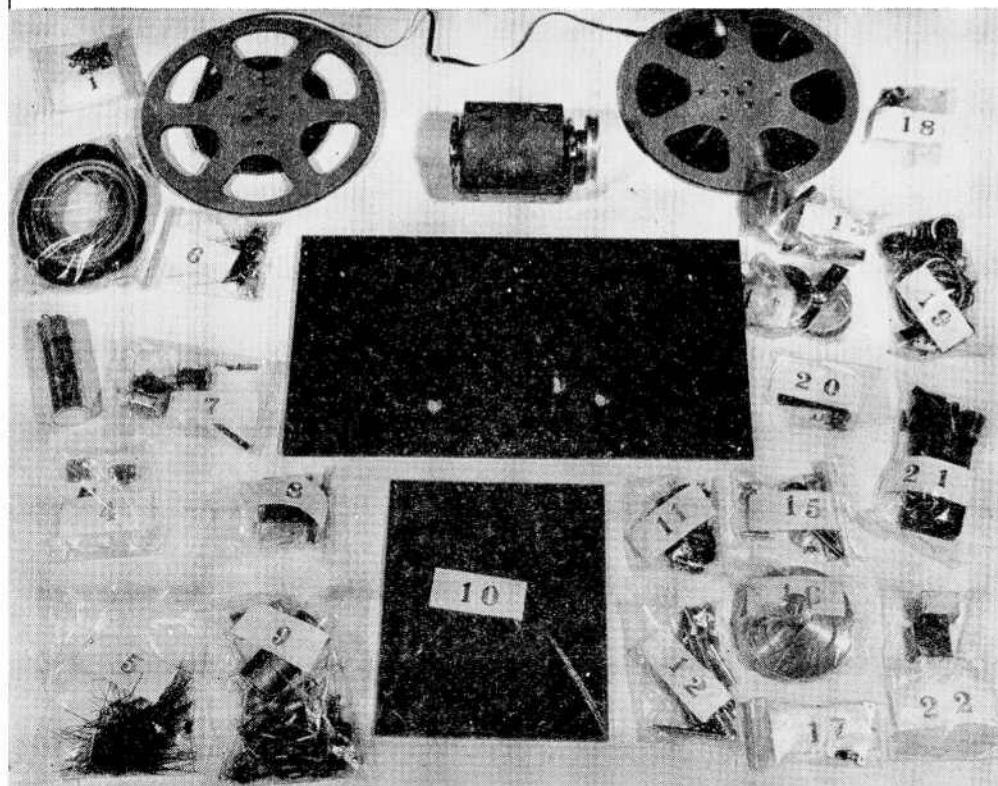


FIG. 1.  
The complete  
VKR 500  
domestic video  
tape recorder  
kit.



The recorder is designed with closed circuit television in mind or for use in conjunction with a standard domestic television suitably modified. This means that the VKR500 will record and play back signals from a TV camera or off the air television programmes. A complementary video camera will also become available in kit form. Incidentally the necessary modifications to a standard TV receiver do not in any way affect its normal operation.

Although the electronics are a little complex the printed circuit design makes assembly and wiring a fairly simple task. The deck mechanics are also well thought out and providing the instructions are followed to the letter, this part of the construction should present no difficulties. As Fig. 2 shows there is little more in the VKR500 than in a large sound recorder.

### PERFORMANCE

A complete VKR500 (as shown in Fig. 3) was set up for my benefit and TV recordings made from off the air programmes. The replay quality of the various recordings showed without doubt that the VKR500 has con-

siderable possibilities although the recorded pictures show slight deterioration when compared with the original. Unfortunately television tends to emphasise small recording faults that from a sound only recorder would scarcely be noticed.

It is fair to add that a good deal depends on the quality of the picture signal before recording. You cannot expect to record a poor signal and get a perfect picture any more than one would expect to get hi-fi audio from a poor quality sound signal. The photograph of Fig 3 is untouched and shows the clarity of a recorded vision programme.

The running time and the overall video frequency response depend on the selected running speed. For best quality and definition a speed of 12.5 feet per second (150 ins. per second) is considered necessary. The running time of 7.5 ft. per second (90 ins. per second) comes out to half an hour per track or a total time of one hour per 11½" spool of triple play tape. At 7.5 ft. per second the definition is of course reduced in the same way as the upper frequency response of a sound recording is reduced at low tape speeds. I discussed the

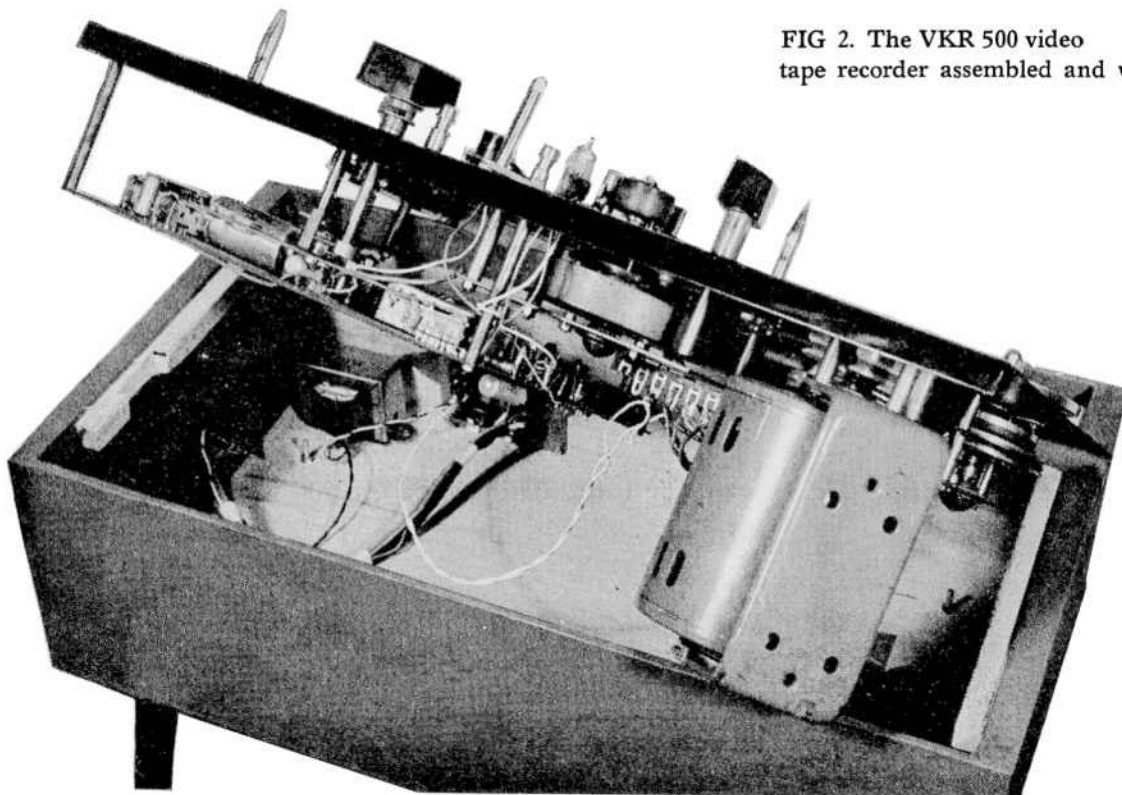


FIG 2. The VKR 500 video tape recorder assembled and wired.

possibilities of quadruple play tape and it seems likely that this might be used successfully and would of course provide a greatly increased playing time.

The sound channel is carried on the same track, or part of the track, carrying the video recording. A frequency modulated carrier system is used which provides good sound quality, in fact the F.M. system is necessary as the high tape speeds introduces various problems when attempting to directly record ordinary audio signals. The sound signals can also be taken from the sound channel on the standard TV receiver and replayed through the low frequency audio amplifier in the normal way.

FIG. 3. The VKR 500 video tape recorder in operation (actual picture from recorder, photo un-retouched).

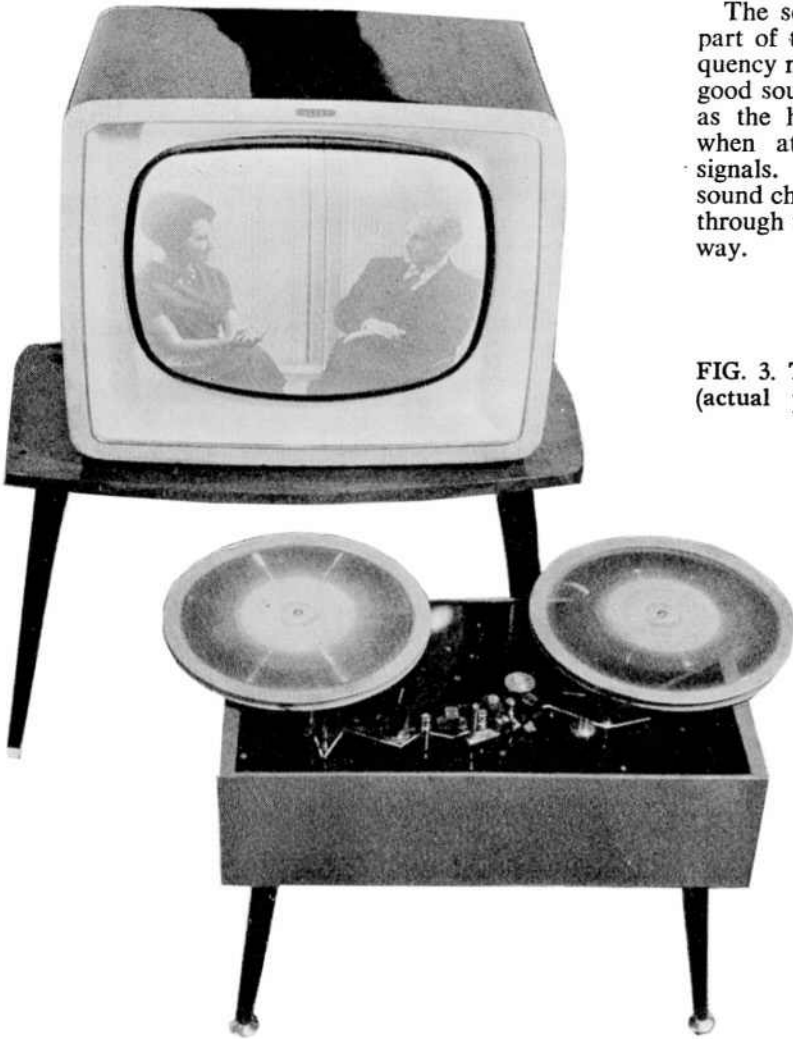


FIG. 4. Filing by Television: New Ampex Videofile system replaces filing cabinets with television recordings which can be viewed and updated with the touch of a button. Ampex is building an initial Videofile system for National Aeronautics and Space Administration.



Commencing next month in "Video News" I shall be covering the stage by stage construction of a VKR 500 kit. In addition "Video News" will be featuring articles dealing with video recording techniques and some of the problems one is likely to encounter in this very new and interesting application of magnetic tape.

## VIDEOFILE

News from the professional field of video recording is always interesting and Ampex have just introduced a "Videofile" which makes it possible to file and store documents on video tape. The files can be presented to the user on a video screen or as printed copies. (Figs. 4 and 5).

Potential applications for "Videofile" are in insurance companies, records, medical histories, and large engineering drawing files. Other potential users are telephone companies, electric power companies and other utilities such as transport, etc.

## AMPEX SLOW MOTION PLAYBACK SYSTEM

Slow motion playback for observation and analysis of motion in detail is now being offered

as an optional feature with Ampex portable Videotape recorders.

Ampex VR-1550 closed circuit recorders and VR-650 broadcast models previously offered stop motion playback permitting sustained viewing of a single frame. The new feature permits playback at any degree of speed from half-speed to full stop motion with a single front panel control. It is available as an optional feature with new recorders and in kit form for recorders now in use.

The precise actions of a surgeon may be recorded during an operation for subsequent detailed study. Students may repeatedly observe the development of chemical and physical processes during experiments played back in slow motion. Industrial trainees may review in detail steps involved in operating a machine. A football coach can examine the tapes of game action, running and re-running plays in slow motion or stopping the tape to look at a selected frame.

The suitcase-size Ampex recorders record television and sound on magnetic tape for immediate and repeated playback through television receivers. They are presently in use by schools, broadcasting stations, and medical, industrial and government facilities throughout the world.

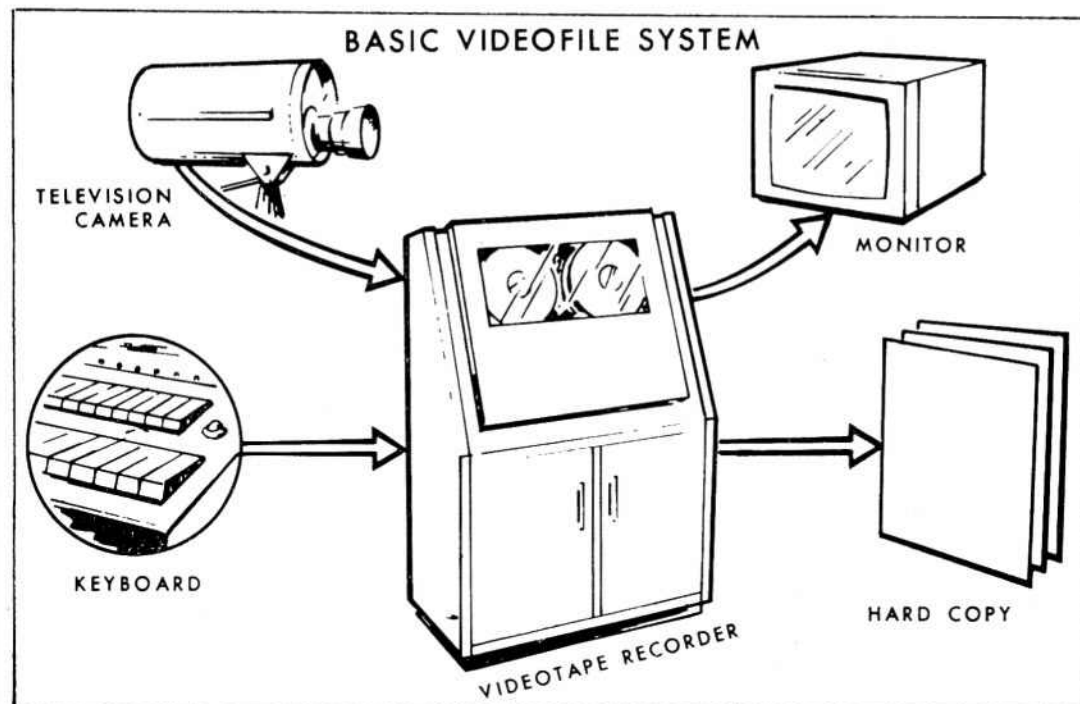


FIG. 5.  
The Ampex  
Videofile  
system.



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Ferrograph in the end!"***



**"I knew you'd get a 'Ferrograph' in the end!"**

***"Yes, I must admit it's simply superb. Y'know, when you told me that the 'Ferrograph' was really outstanding, I was just a little sceptical. Now I'm not. You were absolutely right—it's a first-class engineering job. These 'Ferrograph' people certainly know their stuff."***

**"They should do—they manufactured the very**

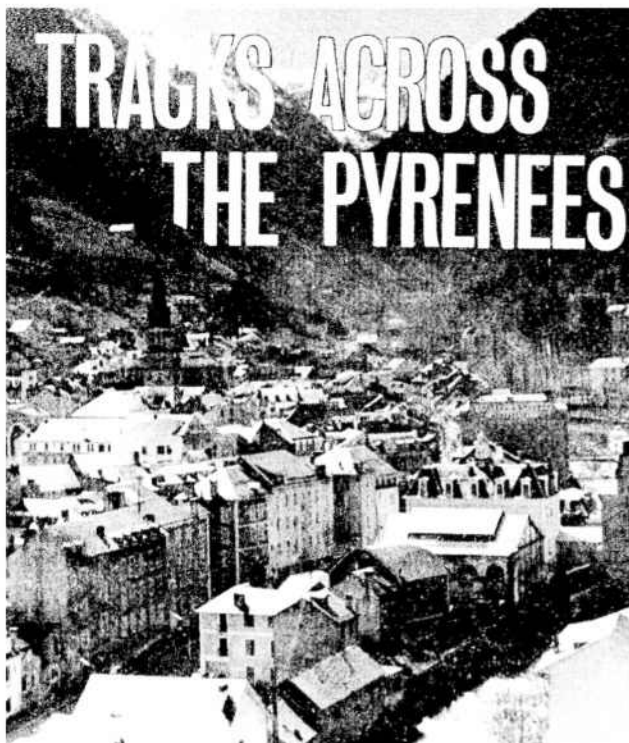
**first British tape recorder way back in '48."**

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A view of Cauterets taken from the top of the Téléférique which passes over the Town on its way to the mountain tops.

**T**HE one kind of track my dictionaries don't describe is the tape track. A series of visible marks left by the passage of anything such as a wheel rut, wake of ship, foot prints, the line of travel or motion, a course for racing or a railway line — all these are defined as TRACK; but not the invisible trace on a spool of magnetic recording tape.

Now in a sense my mission to the Pyrénées, where France comes to a halt against the alpine curtain separating her from Spain, was to explore *the visible mountain tracks* and imprint an impression of them on the *invisible magnetic track*. But first of all a few generalities. As a travel broadcaster I have to compress into as short a time as possible as much experience as a holidaymaker might seek to do in his two or three weeks vacation. Of necessity this entails a lot of pre-planning, negotiating and an almost exhausting programme of activity within the average week I am abroad. During my four, six or eight days "on location" I have to cram into as many hours of each twenty four as much experience as possible so as to bring back a diversity of sound impressions. Usually most holiday centres offer many attractions. These I must sample and report upon. I must acquaint myself with prices, rates and fares. Standards of hotel accommodation and quality of food, sports, amusements, entertainments, places of historical interest, tours, sunshine record, swimming facilities — all have to be enquired into for the script I will have eventually to write.

*In the current series of "Holiday Hour" broadcasts on the BBC the author presents a programme about the Hautes Pyrénées. How he procured some of his recordings during his assignment in France forms the subject of this article, written exclusively for ATR readers by*  
Travel Broadcaster

**BOB DANVERS-WALKER**

Since regional music and traditional folklore is so typical and representative I must arrange with the local authorities for me to be in a certain place at a certain time to record it; even plan my visit at a high season of festivity. Interviews, a wide range of "effects," off-beat sounds to conjure up a typical scene — all these are the essentials of a radio programme on travel. From the moment I start my journey at the airport, the quayside, the railway station, the coach station, the driving seat of my car or the saddle of a scooter or a horse, I start recording. A diary of events, a log of sounds, a notebook of details—these are the end products of a radio reporter with a tape recorder. Time has a habit of running away from you. Unless I end each day with at least three or four good sound impressions I begin to worry. That's why it is essential to pre-plan the operation as thoroughly as possible. All sorts of factors can bring about failure: the weather can foul up, a planned performance or interview prove disappointing or negative and scarcity of material and abortive effort are ever present hazards. So now let me pick out of my tape index some of the moments in the Pyrénées where ingenuity, knack and do-it-or-bust methods helped me out.

The B.U.A. "Viscount" from Gatwick took off on its regular Thursday flight at 09.40 hours and at 13.30 hours touched down at Tarbes. Already I had made six takes — the public address system announcing the flight departure; the voice of the hostess over the intercom aboard the aircraft; take off; steady flight; the Captain's introductory speech; and finally the "fasten seat belts and extinguish cigarettes" chat from our hostess prior to landing. All very routine stuff but sometimes it comes in useful. My motto is tape it; you can always roll back and erase. During four of the six days in France I made my base at Cauterets about 60 kilometres South of Tarbes because here I had laid plans to record a floral carnival, a fireworks display, a Pelota match between teams representing France and Spain, dance music in the Casino; excursions by the Téléférique (cable car) up to the still snow-capped peaks of the mountains towering above the town, a folklore dancing festival in nearby Argelès and above all, the exciting sightseeing flights by helicopter over the Pyrénées to Spain. Every one of these helped me to build up a grand collection of tapes. Yet even so I still kept an ear open for the off-beat, unexpected sounds such as the peculiar rasping note of the myriads of giant grasshoppers (*sauterelle*) inhabiting the dizzy heights of the mountains and the tinkle of cow bells worn by cattle grazing in pastures 6,000 feet up where the Eidelweiss, the purple Aconite and the golden stemless Carline colour the slopes. I made an amusing recording too of the old boys of Cauterets

playing their favourite game of Boule de Pétanque one Sunday morning. The bowling pitch is usually a dusty patch crudely marked out and fringed with as fine a collection of old Frenchman as you'd find anywhere. As the players get warmed up so the badinage increases. Big moment is when one of the players casts his heavy iron bowl into the half dozen surrounding the 'Jack' and, with a metallic crash, sends the balls scattering in a point-scoring throw. A sensitive, concealed microphone and with the recorder carried in a nonchalant "I'm-doing-nothing-only-looking-on" manner is a necessary subterfuge if you want to succeed.

For the man with a tape recorder there is always the chance that he will capture a rare interview, a moment of history or a dramatic incident. I believe I got a valuable recording right there in Cauterets. Having been there once before I had the advantage of knowing men like George Barege, Jean Meillon and Jean Mortéra who could put me in touch with Underground Resistance men of the last war who ran the escape routes for R.A.F. air crew shot down or Special Service men parachuted into enemy occupied territory. This was a most celebrated region for clandestine operation. One

To capture the sounds of the cable car, Bob had to travel on the roof platform



February, 1965



The remains of an avalanche behind him, Bob rides on to the glacier-bound Cirque de Gavarnie

night they introduced me to Captain Gerard de Claren who was "one of the first members of an intelligence resistance working from France across the Pyrénées. He organised over 60 frontier crossings and was responsible for the escape of 332 people of whom many were of British nationality. He was instrumental in passing a large volume of couriers containing military intelligence to the Allied Command under extremely dangerous and difficult conditions exhibiting a high degree of courage and determination." I put this reference in quotes because they are the words of the Citation which earned him the King's Medal for Courage in the Cause of Freedom. Jean Meillon too was engaged in this work. An interview with them both is a treasured tape in my collection of rare recordings.\*

Cauterets claims to offer the only helicopter flights among the mountains and valleys in the Pyrénées and, for that matter, anywhere among the mountains of France during the summer. I made two flights above the great saw-toothed massif over the frontier to Spain, looking down onto such famous peaks as the Vignemale and the Port de Marcadau. Nestled among them are remote habitations linked only by mule to the 20th Century. We dropped down into valleys and eased our way through gorges, the vertical mountain faces close on either side of us echoing back the thrashing beat of our rotor blades. I never really expected the recording to be successful, but during the flight as I sat beside the pilot Pierre Légas I got him to describe the scenes as we passed over lakes and glaciers set among what has been described as matching the most majestic landscapes in the world. The Beyer M.66 unidirectional microphone I was using on my Fi-Cord 202 successfully contained the almost overpowering engine and rotor blade noise and the voice got on top without distortion. By contrast the





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Bob touches down at the Heliport at Cauterets after a flight over the Pyrénées to Spain.

almost completely silent Téléferiques are even more complicated when it comes to getting a sound track. Undaunted I obtained special permission from the Director of the Cable Car service to ride on the roof of one of the cabins which travels 12,000 feet to an altitude of over 6,000 feet in ten minutes. I did the same thing on the Pibeste Téléferique since it was the only way I could get the whine of fast-running pulley wheels over the cable — a sound I wanted for my programme.

Apart from rock climbing and mountaineering there is of course another method of getting into the rarefied realms of the Pyrénées; that's on mule or horse back. I sampled that too and satisfied my love of riding at the same time. For this I spent two days in Gavarnie right slap up against the gigantic natural amphitheatre known as the Cirque de Gavarnie, an ice-girt massif across which runs the frontier between France and Spain. What a staggering sight this is, forming the most dramatic rock formation in the Pyrénées. Here it was that I came across three Englishmen rock climbing their way on an expedition to seek out pictures of the Izard and the Chamoix. I joined them later to record impressions of their holiday. Having previously flown over this region in the helicopter I was now able to see features of this locality at closer range. I now stood amid the lunar-like craters and found myself caught by the mesmeric smell experienced by alpinists drawn to dizzy altitudes on the roof of the world. Tracks plotted through the seemingly impenetrable peaks by Les Montagnards were pointed out to me. These same tracks have now been translated into sound; the spoken word of a mountain guide, the hoof beats of a sure-footed mount, the beat of a helicopter's rotor blades, the sigh of pulley wheels over a Téléferique's cable — these are the sound tracks across the Pyrénées.

*\* Editor's Note* — It is worth noting that during the early part of the War Bob Danvers-Walker was engaged in radio propaganda work at a Station in Normandy. His broadcasts, aimed at Dr. Goebbels and made under the supervision of the French Ministry of Propaganda, were recorded off the air by the Germans and Bob's name was placed on the Gestapo "Black List."



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February, 1965

29

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# SOUND SCENE

## TAPE RECORDER SPEEDS UP RAILWAY INSPECTIONS:

**E**ARLY in 1966 British Railways services between London (Euston) Manchester and Liverpool will be entirely electrified, and the British public can look forward to astonishing improvements in the time taken to traverse the 183 miles which separate London and Manchester and the 193 mile London/Liverpool journey. One of the inspecting engineers on this project is Mr. E. G. Evans, who works from Euston House and uses a Fi-Cord 101 which makes his job easier and, incidentally cuts the cost of acceptance inspections.

Quotes Mr. Evans "We always have to operate when traffic is light so that a section of line can be closed,



Fig. 1. Mr. E. G. Evans, a British Railways inspection engineer, dictates his report on the B.I.C.C. electrical installation in Linslade Tunnel, Bucks. Use of the small, battery operated Fi-Cord 101 tape recorder has both speeded up and cut the cost of his inspection reports.

and this usually means working week-ends. Further there is the problem of taking notes out of doors in wet weather and in tunnels, where of course there are always water drips to make a mess of your notebook. (Fig. 1). The Fi-Cord 101 has solved all this. I carry it in the pocket of my duffle coat and just take it out when I need to dictate. If it's raining I leave the tape recorder in my pocket and use a remote control microphone." The Midland region of British Railways now uses ten Fi-Cord 101's.

## MASTERTAPE SPLICING KIT (Fig. 2).

The new Mastertape splicing kit which retails at 21s. contains a tape splicer and cutter, five different coloured leader tapes and metallic strip and jointing tapes. National retail distribution of all Mastertape products is carried out by the Vidor battery van fleet so your local tape or radio dealer should be able to get this kit quickly even if he does not have it in stock.

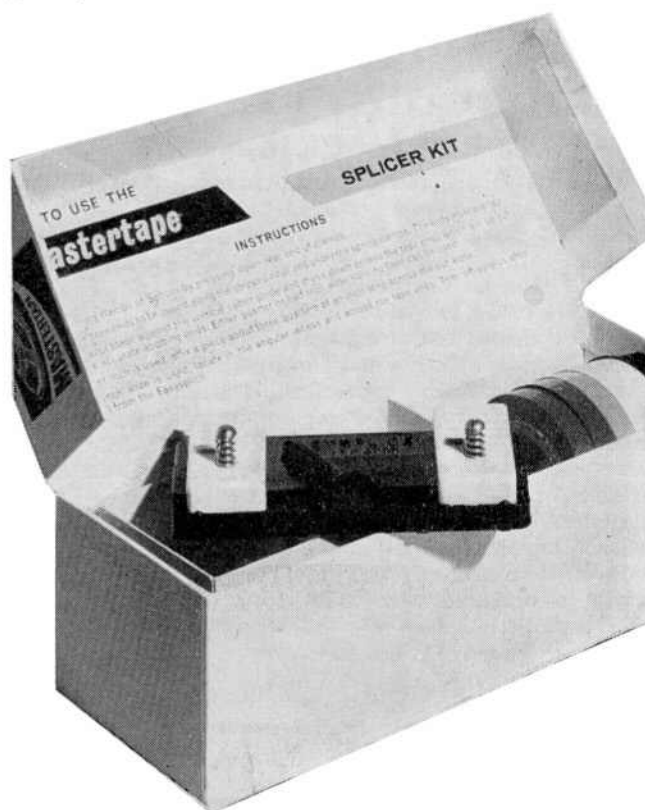


Fig. 2. The new Mastertape Splicing Kit.

## JORDAN WATTS LOUDSPEAKERS:

The range of Jordan Watts loudspeakers shown in Fig. 3 should cater adequately for all hi-fi enthusiasts, even those who have 100 watt amplifiers! The large one at the back will handle 100 watts. The name of the maker is not inappropriate! The smallest one called the mini-12 will handle 12 watts and retails at £16 12s. 6d. Next up in size is the A-12 with a full range reflex enclosure (12 watts) at £22, followed by the A-25 for 25 watts at £36 15s. 0d. The 50-watt model costs



£64 6s. 3d. but if you really are interested in the 100-watt model the prices will be given on request from Boosey and Hawkes Sales Limited, Sonorous Works, Deansbrook Road, Edgware, Middlesex. The 100-watt model is available to special order only. Alternatively, contact Besson and Co., Ltd., Besson House, Burnt Oak Broadway, Edgware, Middlesex. Both are distributors of Jordon Watts loudspeakers.

#### MUSIC ON TAPE NEW TAPE RECORDS :

The Music On Tape catalogue is worth sending for and the same tape record company have recently released their latest minitape tape record album of "Top of the Pops." The album contains 12 titles selected by a juke-box-jury style ballot and is available at 10s. 6d. for a tapespeed of  $1\frac{7}{8}$  i.p.s. or 15s. for  $3\frac{3}{4}$  i.p.s. (3" spools). A regular month by month issue of Pick of the Pops minitapes will also be available, each issue carrying six current hits from the charts. These will retail at 6s. 11d. ( $1\frac{7}{8}$  i.p.s.) and 10s. 6d. ( $3\frac{3}{4}$  i.p.s.). Further details and current catalogue from Music on Tape Limited, 9 Kew Green, Richmond, Surrey.

#### NEW ROGERS AMPLIFIER (Fig. 4) :

Rogers Developments (Electronics) Limited recently announced the Cadet Mk. 3 stereo system comprising the Cadet stereo power amplifier and control unit. The model in chassis form retails at £29 10s. 0d. but there is also an integrated version in a case at £32 10s. 0d.

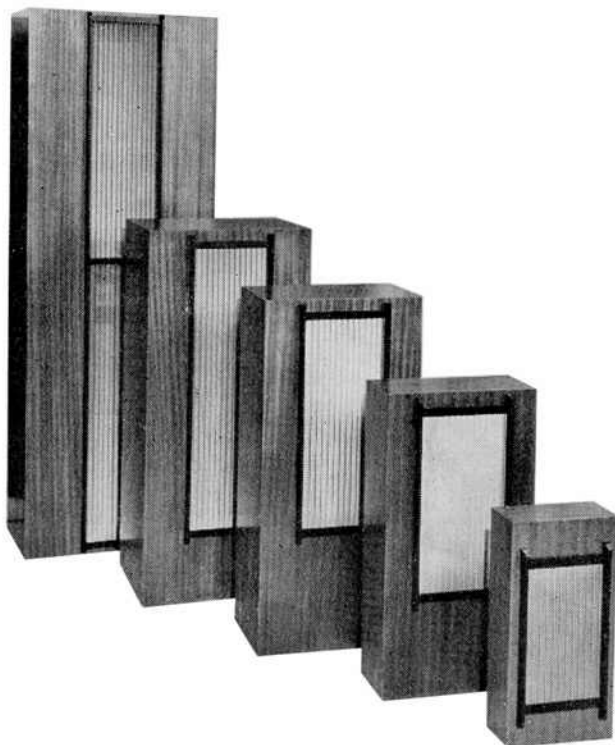


Fig. 3. The Jordan-Watts range of loudspeakers covering 12, 25, 50 and 100 watts.

The Cadet Mk. 3 amplifier provides 10-watts output per channel and has inputs for records, tape and radio. The various functions are obtained by means of push button controls and there are of course separate bass and treble controls, filters and balance control. Overall frequency response  $\pm 0.5$  dB 20-20,000 c/s. Outputs 3 to 5 and 12 to 16 ohms.

An F.M. tuner to match the Cadet 3 amplifier is also available as well as a new compact Hi-Fi speaker system. For further details and fully illustrated brochure write to Rogers Development (Electronics) Limited, 4-14, Barneston Road, Catford, London, S.E.16.



Fig. 4. The new Rogers Cadet Mk. 3 Stereo amplifier control panel.

#### WHEN AND WHERE TO RECORD :

A most comprehensive list of "Principle Events for November 1964 to December 1965 in Great Britain and Northern Ireland" is available from the British Travel and Holidays Association, Queens House, 64/65, St. James Street, London, S.W.1.

This 66 page list costs 5s. and gives full details of hundreds of events which will be taking place all over the country during the year. These lists are a mine of information as to what, when and where, as they include ceremonies and pageants, carnivals, fairs and fetes, exhibitions, music and drama, festivals, concerts, Royal engagements, old customs, shows, sports meetings, circuses and a host of other events all in date order. Note that these lists are issued quarterly and the February edition is due out shortly.

#### RECORDING HEADS — NEW FERRITE TECHNIQUES

Ferrite magnetic recording heads giving far less head wear, increased packing density and lower head noise than conventional heads are now being produced by Mullard Limited.

These heads have been designed for, and used in, all fields of magnetic recording, including audio, analogue and data recording, digital recording on magnetic discs, drums and tapes using fixed, floating or "in contact" systems and video recording.

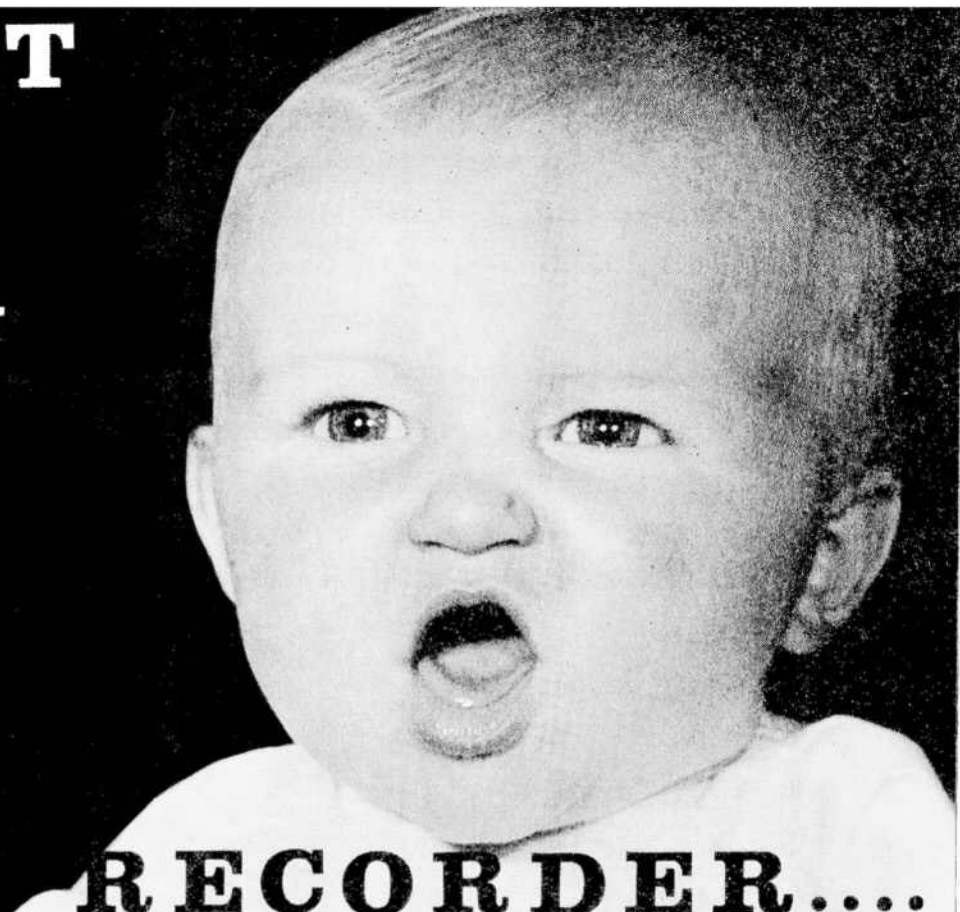
For professional audio recording 7mH record and 75mH replay heads can be offered with up to four tracks for use with standard  $\frac{1}{4}$ " tapes or 8 track for use with  $\frac{1}{2}$ " tapes.

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Mono under £50	...	<input type="checkbox"/>
Mono over £50	...	<input type="checkbox"/>
Stereo	...	<input type="checkbox"/>
Battery	...	<input type="checkbox"/>

**HI-FI**

Amplifiers and Tuners	...	<input type="checkbox"/>
Speakers and Enclosures	...	<input type="checkbox"/>
Turntables and Arms	...	<input type="checkbox"/>
Portable Radios	...	<input type="checkbox"/>
Record Players	...	<input type="checkbox"/>

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# TAPE RECORDER OF THE MONTH

## Tandberg Model 9

**THIS** month I have chosen the new Tandberg Model 9 half track mono recorder which well and truly deserves being singled out for this A.T.R. feature. It is of course in the higher price bracket but most definitely an 'enthusiast's' tape recorder. It is versatile and has an excellent electrical and mechanical performance, plus all the facilities that enable one to make and play recordings approaching the coveted professional standard.

The Tandberg Model 9 was demonstrated for me by Mr. Dakin, the dealer representative for Tandberg recorders, in the quiet of his own home. Under these conditions such things as hum and noise, had they been present, would have been painfully obvious. One doesn't need instrumentation proof to back up the efficiency and performance of the Tandberg Model 9 in this respect.

In quiet home surroundings it silently speaks for itself with a noise level at around -50 dB, a much more important factor than wide frequency response or even some element of distortion. The Tandberg Model 9, however, scores on all points for it has a wide frequency response and very low distortion (see specification). It scores too on mechanical performance and I am assured that every Tandberg that comes into the U.K. via Elstone Electronics must pass some very critical tests to ensure this. In fact every recorder undergoes a complete specification check before being despatched to dealers or customers alike.

What, I asked Mr. Dakin, could Elstone provide by way of after sales service? Perhaps I shouldn't have asked this because I already knew the extent of the Elstone service to dealers and Tandberg owners. However, here's what they provide (quote) "No matter what the fault every Tandberg recorder returned by a dealer or owner undergoes a full specification check before being sent out again. This means that the entire mechanical and electrical performance is checked and any adjustment made as required. Elstone carry a full range of spares for all Tandberg machines and their works engineers are actually trained at the Tandberg factory where they return from time to time for information and instruction on new models etc. The average service turn round is 48 hours."

### SOME MODEL 9 FEATURES

With the Tandberg Model 9 come radio leads and empty tape spool but no microphone or tape. The price at the time of writing is 69 guineas but this may be increased slightly after February 1965 because of import tax. Now why have we



selected the Tandberg 9 as tape recorder of the month? Simply this; it fulfils the requirements for high quality recording and lends itself to the kind of work that most enthusiasts like to do with tape recorders. For instance the removable head cover makes editing an easy task, the temporary stop control is fast acting both on stop and go. It has three speeds which nicely cover a range of requirements, namely top quality recording and playback at  $7\frac{1}{2}$  i.p.s., long play music recording, still with excellent quality, at  $3\frac{1}{2}$  i.p.s. and  $1\frac{1}{2}$  i.p.s. for extra long play speech or acceptable music quality.

When the Model 9 was demonstrated for me I was able to listen to music over its own loudspeaker at  $7\frac{1}{2}$  i.p.s. and  $3\frac{1}{2}$  i.p.s. Aurally there is little difference at either speed and the slight lack of bass through the internal loudspeaker is taken care of by a bass lift switch giving 12 dB lift at 70 c/s. The Model 9 was also demonstrated for its hi-fi potential by coupling it to an external amplifier and large loudspeaker. I don't think any hi-fi enthusiast could ask for better reproduction.

One thing about the Model 9 that will interest those with little space to spare is the compactness of this recorder. Having no projections it would go onto a bookshelf or fit nicely as a complete unit into the smallest of hi-fi cabinets.

The specification calls for no comment but one thing is guaranteed, the Tandberg Model 9 will perform to it. Now I also discovered that Elstone Electronics, the sole U.K. distributors, arrange demonstrations of this and other Tandberg recorders through local dealers from time to time. Admission to these demonstrations is by ticket only, available from the local dealer concerned. I suggest that interested readers might like to contact their local dealer or Elstone Electronics. One of these 'hi-fi concerts' as they are called might be scheduled for your area. Any Tandberg dealer on the other hand will arrange a full demonstration for you.

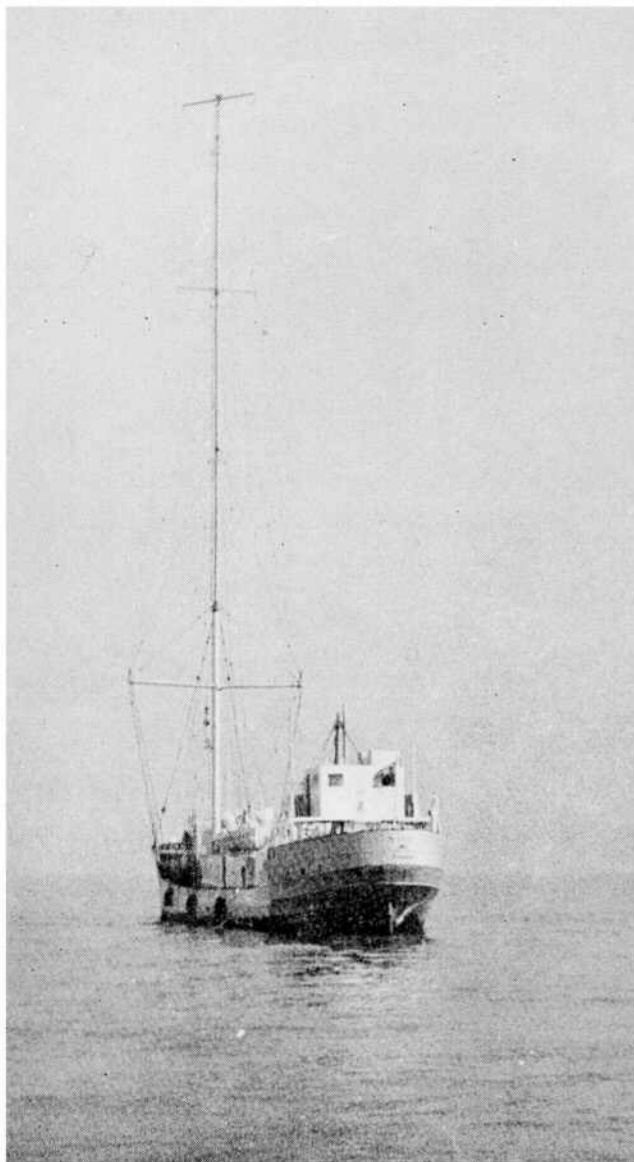
Readers requiring further technical information should write to Elstone Electronics Limited, Edward Street, Templar Street, Leeds 2. Their brochure on the Model 9 also carries prices and details of suitable and recommended microphones, tape, carrying cases and other accessories. Finally why do I recommend the Model 9 or any other Tandberg for that matter? Because I have been using a Model 6 for a long time with every satisfaction and no breakdowns and because the demonstration kindly provided by Mr. Dakin of Elstone Electronics, left no doubt as to the capabilities of the Tandberg Model 9.

F.C.J.

### BRIEF SPECIFICATION

**Power requirements:** 200/240v. 50 c/s. (110v. 60 c/s. when motor pulley is changed). **Power input:** 50 watts. **Recording level indicator:** EAM86 with damped backward movement. At max. recording level indicator "eye" should be just closed. **Recording tape:** Max. reel diameter—7". **Tape speeds:**  $7\frac{1}{2}$ ,  $3\frac{1}{2}$  &  $1\frac{1}{2}$  i.p.s. **Fast forward and rewinding:** Tape counter: 4-digit. **Frequency response:**  $7\frac{1}{2}$ " per sec.—30-20,000 c/s. (plus or minus 2dB, 40-16,000 c/s.).  $3\frac{1}{2}$ " per sec.—30-14,000 c/s. (plus or minus 2dB, 40-10,000 c/s.).  $1\frac{1}{2}$ " per sec.—50-7,000 c/s. (plus or minus 2dB, 40-5,500 c/s.). **In amplifier position:** 40-16,000 c/s. plus or minus 2dB. **Wow:**  $7\frac{1}{2}$ " per sec.—Better than 0.15 per cent.,  $3\frac{1}{2}$ " per sec.—Better than 0.2 per cent.,  $1\frac{1}{2}$ " per sec.—Better than 0.3 per cent. **Distortion:** A 400 c/s. signal recorded at correct recording level will give less than 5 per cent. distortion at playback. **Noise level:** 50dB, below max. recording level. Max. recording level corresponds to 5 per cent. distortion. **Erase and bias frequency:** 85-90 kc/s. **Inputs:** High impedance input (radio, phono, TV, Aux.) 0.5 megohm. **Microphone input:** 1 megohm, 1.5 to 7.5 millivolts. **Output:** 3 watts (3.5 volts across 4 ohms); output may be connected to any high impedance amplifier. **Speaker:** Built in 7"x 4". **Speaker selector switch.** **Input/output contacts:** Jacks for external speaker or ear phones and for connection to radio recording and playback. **Momentary start/stop lever.** **Amplifier for microphone or gramophone.** **Dimensions:** 15ins. long, 11ins. wide, 6ins. high. **Weight:** 20.5 lbs., with carrying case: 25.5 lbs.





Caroline (above) and (below) loading stores



## Fred Judd enjoys A Date With

**I** DOUBT if there are many people who have not yet heard of Radio Caroline, and certainly most of you who are within receiving distance of either of the two Caroline transmitting ships will have tuned in to 199 metres at some time or other.

Curious to discover just how a pirate radio station works, and how much tape recording comes into things, I contacted Caroline House in London to arrange a visit to one of their vessels, "Caroline South".

My first sight of "Caroline" confirmed what I had been told by the shore-based members of Radio Caroline staff. Caroline quite creates an impression of femininity with her tall slender radio mast and the glint of silver and white on her hull. Although the real name of this little ship is "Mi Amigo", I could quite understand why she is fondly referred to as "she". Certainly as I saw her glinting in the wintry sunlight, Caroline looked a very charming "pirate".

Getting out to Radio Caroline however, is not as simple as you might think. As she is moored at anchor about five miles east of Frinton, (i.e., outside British territorial waters) Caroline is officially classed as foreign soil. This means that before embarking from Harwich one has to go through the full Customs formalities, and show a passport.

Once through the red tape though, I enjoyed the journey in the 100-foot long diesel tender vessel "Offshore 1". Besides carrying visitors such as myself, the Offshore 1 brings Caroline her daily supplies of food, water, mail, and of course new records. To the disc-jockeys and crew, the arrival of the tender at about 1 o'clock is the high-spot of the day, and lunchtime listeners to Caroline will often hear the disc-jockey on duty announce its arrival over the air!

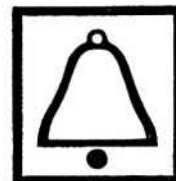
As we lay alongside Caroline, I watched the stores and engineers being taken aboard, and the water hose being laid across, and I caught my first glimpse of three

Noel Andrews recording interviews for his programme





# Caroline



of the off-duty "dee-jays" huddled together on deck in deep discussion.

Caroline may not fly the "Jolly Roger", but like the rest of the offshore radio stations, she is referred to as a "pirate" radio station. In fact she is, if anything, the opposite, for although, being outside British territory, she is not obliged to pay the copyright fees generally required of a British station, she does in fact pay them entirely voluntarily.

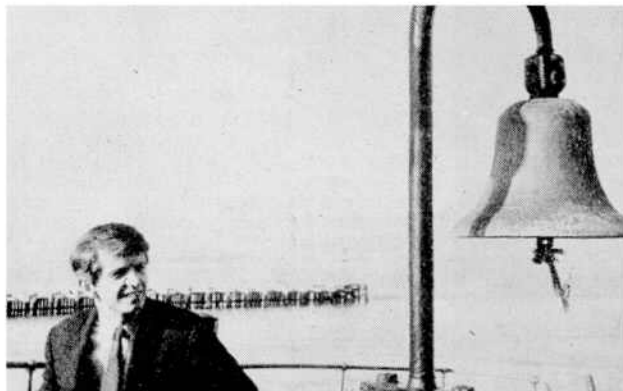
The fact that Caroline North (in the Irish Sea) and Caroline South have succeeded in capturing a multi-million audience rather proves that there is a terrific demand for non-stop music programmes.

For a long time now there has been a clamour for commercial radio, possibly on a local broadcasting basis. This in itself would be of direct interest to all tape recording enthusiasts, particularly the clubs and societies, for local broadcasting could indeed provide tremendous scope for recorded local news and events, documentaries and even programmes of various kinds. By proving the existence of a need for such programmes, offshore radio stations will probably go a long way in gaining public and official support for local radio. You will remember that in a recent ATR editorial I stated "Undoubtedly there is a need for non-stop music of one kind or another and it seems the British Post Office is taking a short sighted view of the situation. Authorised commercial broadcasting would obviate the necessity for business groups to operate transmitters without licence".

But to return to Caroline itself, I found the ship a happy and comfortable one. The only time when happiness and comfort go (literally) to the winds, is when there is a force eight gale blowing!

I made an all-round tour of the ship, taking particular note of the control room and announcer's studio, and was duly impressed by the record library and the living quarters. Finally I took a look at the 10 Kilowatt transmitters and the power plant.

Director Ronan O'Rahilly and the Caroline bell



February, 1965

There are two transmitters — one in general use and the other held as a standby — and the entire equipment is run from generators on the ship. Incidentally, this accounts for the generator noise sometimes heard when announcements are made — sound proofing is not the easiest thing on a small ship.

Tape is used only for the commercials on Caroline, all other announcements being made on the spot from the announcer's studio. Cueing is a split second business, and as soon as the record title is announced on goes the record.

The disc-jockeys write their own scripts and build up each programme from a pretty sizeable record library. However, one new programme with a difference is The Andrews Show. In this Noel Andrews, brother of Eamonn, will be interviewing housewives all over the country, and here of course, tape is indispensable. Noel himself uses the Uher 4000 portable recorder (reviewed in ATR some months ago), and he obviously agrees with us on its capabilities. The show itself is sponsored by a manufacturer of liver salts — the name's the same! And if the trend towards this kind of programme continues, it may well be that use of tape will increase considerably.

All programmes naturally rely on the magnificent 140-foot high vertical transmitting mast. This is a masterpiece of rigging, for the ship itself is only just as long as the mast is high, and the entire structure has to withstand the full force of the North Sea gales.

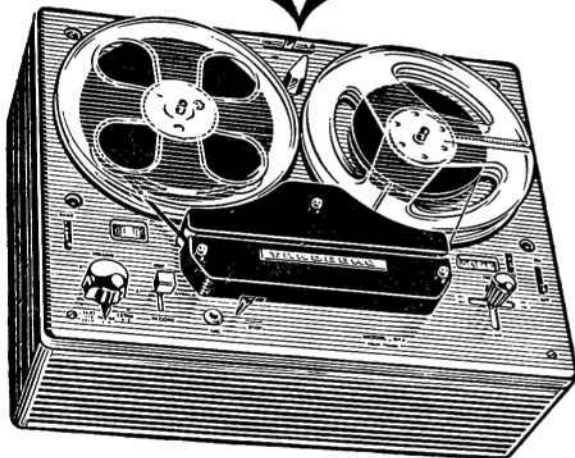
My date with Caroline lasted but one hour, and shortly after 2 o'clock I was aboard the tender en route for Harwich. Throughout the whole visit my Fi-Cord 202 had been dutifully and unobtrusively working for me, and I let it continue running. During the journey we were accompanied by the soft thud of the 480 h.p. diesel engine, the quiet rush of water against the bow, and the cries of a flock of hungry seagulls following in our wake. All were sounds too good to be missed.

Preparing to cue in after an announcement.



35

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# Tandberg

## MODEL 8

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**Tandberg Series 8 in teak cabinets.**

**2 speed  $3\frac{1}{2}$  & 1.7/8 I.P.S.**

**Model 843 4 track, 59 gns.**

**Model 823 2 track, 54 gns.**

**Model 921 2 track, (3 speed) 69 gns.**

For further information on any Tandberg Models please write to Elstone Electronics (address below).

### NO PRICE INCREASES BEFORE FEBRUARY 1965

The 15 per cent import levy imposes a severe strain upon all links in the chain of manufacturer, distributor, and retailer. It is not known how long the present "temporary" situation will prevail, but we hope to maintain present prices until at least 1st February, 1965.

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# STARTING AFRESH

## New Championship Battles Ahead

**T**HIS month sees the start of a new ATR League Championship year, and I must confess I am a little disappointed by the considerable drop in the number of club reports I have received. You will notice that the "old faithfuls" didn't forget, but particularly noticeable for their silence have been the Scottish clubs. Maybe they haven't yet recovered from Hogmanay!

But by way of encouragement, this seems as good a time as any to "recap" on the way the ATR League system works. Firstly it depends on each club sending in a report, once a month, of its recording activities. I then have the task of selecting the best ten of these as our Top Ten. Of these, the top club is awarded 15 points, the second 14, and so on, the tenth club receiving 6 points. However, as and when space permits, we like to feature many more than ten clubs, and any additional club mentioned in these pages earn four points, and even those we can't squeeze into print earn themselves two points. So you see, your efforts are never wasted.

So there you have it. To succeed you must not only do well, you must be seen to be doing well. More power to your pens (as well as to your recorders) in the new Championship battles ahead.

### CLUB OF THE MONTH

Undoubtedly top of the clubs this month is **International Tape and Cine**. Their latest edition of Tape and Cine Reel is a winner — full of news of their latest film competition and soundtrack trophy, with some very lucid information on cueing in soundtracks. Winning film, entitled "Playground" was the work of I.T.A.C. founder Roger Pirie, as was the winning soundtrack for his film entitled "Zoo." Fourteen entries from 10 members in three different countries made the competition the best yet, and second place went to Australian Stan McMurtry who is the club's new Chairman.

### WORTH THE MONEY

This is certainly the opinion of the **Boston Soundhunters**. When an Extraordinary General Meeting had to be called to consider raising the annual subscription, it was agreed — without dissent — to double it to thirty bob.

However, Soundhunters were disappointed when members of a Russian Youth delegation to Boston refused them individual interviews, but a group discussion and communal singing were tape-worthy, and our comrades were presented with a recorded memento of their stay.

### RECORDING MEDIUM

One of the lady members of **Thornton Heath T.R.C.** has put her portable to most intriguing use. Being interested in the local Spiritualist church, the lady recorded a medium during a trance —

with, I understand, dramatic results. The medium now demands to be recorded at every session, so it looks as though club members may be in for some very interesting recordings.

A lecture from Derek Chatterton of the British Council (he runs the Overseas Students' Tape Club) proved very enjoyable. Everyone present was impressed by the first efforts of the students from 19 different countries, some of whom had never seen a tape recorder before! Mr. Chatterton will be repeating his visit later on in the year, with recordings by the same students nearing the end of their course.

### TWINS IN TAPE

What happens when there are twins in a tape club? Even more confusing, what happens when one is Chairman? Members of **Derby T.R.C.** have this unique problem, with the Flecknoe twins. When Chairman D. Flecknoe was invited to contribute to the club's "What's My Line" feature (in which members talk about their jobs) twin brother T. Flecknoe made it "What's our Line" as both are in business together.

Ladies' Night was a great success with excellent recordings, some of choral singing in which members had participated, and an intriguing quiz on the town of Derby. Final surprise for the men was the recorded play in which all the women took part — the main theme was drink!

### MEMBERS PLEASE!

**International Vision and Sound** is appealing for more members, for both tape and cine sections. Expansion is such that more people are needed to complete all the proposed projects. Particularly welcome are the over-25's.

Portables are greatly in use for continuity work, and the club's meeting hall, being extremely reverberant, is being used to demonstrate the techniques of microphone placement to members.

Two new sound projects for this year are the recording of London's bird-life, and a special feature on "Sounds of Night." So if either of these projects interest prospective members, contact Secretary Tony Stevens at ELGar 6210.

### WEATHER WARY

Work in the clubroom of **Hinckley T.R.C.** has dropped off slightly, due mainly to the damp and cold weather in

those parts putting members off from turning out at nights. However, following the publicity received from the local carnival, various organisations in the town have requested the tape club's help. The ladies of the club were left to demonstrate the uses of recorders and talk about the social work to the local young mothers' club, while both sexes took part in programmes arranged for the local photographic society and the Y.M.C.A.

### AID FOR THE RED CROSS

Once again members of the **Walthamstow and District T.R.S.** came to the aid of the Red Cross, this time by installing the relay system at Red Cross H.Q. in Grosvenor Square for the 21st Birthday of the Women's Press Club. Guests included Rupert (Maigret) Davies and Miss Molly (Aggie) Weir who have both been recently concerned in Red Cross publicity. Besides hearing from the Walthamstow club about this, I had a charming letter from Red Cross Press Officer Miss Kathleen Farr, commending the excellent work put in by Tony Norton and Don Cooper, not only in installing the necessary equipment, but in recording the proceedings.

### LADIES' AGAIN

Another Ladies' Night — this time at the **Rugby A.T.R.S.** A cine film, with recorded commentary, of South Africa, a short playlet, a quiz, and a talk by one of the ladies on why she joined the tape club, formed an interesting and entertaining programme.

The club recently had the benefit of the publicity from a story about themselves in the **Rugby Review**, a local advertising medium. Coupled with the story were advertisements of local retailers, and the whole had a local circulation of something in the region of 27,500 homes. Should help recruiting!

### AMBIGUOUS

A rather ambiguous report from the **North London Tape and Hi-fi Club** gave me the false impression that Bill Gardner had succeeded Richard Collinson as secretary. In fact, the new secretary is J. Wilson, of 50 New Kent Road, London, S.E.1.

### CALLING HARLOW

After a disappointing inaugural meeting of the **Harlow Tape Club**, Secretary E. J. Hill, 41 Brays Mead, Harlow, Essex, is trying to double the present membership of nine. Mr. Hills would also welcome hints from other clubs, particularly on the running of hospital programmes and the organising of club meetings in general.

Owing to shortage of space, this month's Top Ten list will be published in the March issue.



# THE TAPE DIRECTORY

Particulars of Tapespondents are given in the following order:— name, age, occupation, address; special interests, taste in music; type of machine, spool sizes, speeds; area of tapesponding required.

## AUSTRALIA

**FRANK ERIC STEINBERG**, 46, Ground Engineer (Aircraft), and Watchmaker, P.O. Box 222, Mackay, Queensland. Colour photography, recording; classical guitar, symphonic and concert music. Sony 464 4-track, 7 in., 33, 7½. Anywhere, preferably female.

## SOUTH AFRICA

**R. J. WAY**, 60, Retired, 69a Carden Street, Redhouse, E. Province, South Africa. Fishing, talking; light and pops. Grundig TK 46, 7 in., 1½, 33, 7½. Anywhere English speaking.

## H.M. FORCES

1942877 **S.A.C. MARTIN ASHBY**, 19, Radio Mechanic, 280 Signals Unit, Royal Air Force, B.F.P.O. 53, Cyprus. 35 mm. photography, half frame slides; pop. Sony TC-200, 7 in., 33, 7½. Anywhere English speaking, female preferred.

D/M 936033 **DEREK J. HILL**, 29, Officers' Cook, Cook's Mess, H.M.S. Tartar, c/o B.F.P.O. (Ships), Singing, acting, dancing; pop and light. Elizabethan 4-track, 5½ in., 33. U.S.A. and anywhere in B.W. Indies.

## CHANNEL ISLANDS

**BENNY ORD**, 26, Cattle farmer, Les Iffs Farm, Lower Trinity, Jersey, C.I. Tape recording, 35 mm. photography; trad. jazz, pop, light classics. Stella 4-track, Cossor transistor portable, 7 in., 1½, 33. Anywhere.

## BEDFORDSHIRE

**DAVE BESWICK**, 34, Clerk/Storeman, 63 Ashton Road, Luton, Beds. Spiritualism, sound effects; classical. Cossor 4-track mono, 7 in., 1½, 33. British Isles, Kenya, anywhere English speaking.

## CAMBRIDGESHIRE

**BARRY HOWELL**, 18, Photographic and tape sales assistant, 69 Windsor Road, Cambridge. Photography, "A" level German; jazz and pops. Vortexion WVA, 7 in., 33, 7½. Germany, females preferred.

**ERIC LEWIS**, 47, Hospital porter, 55 Maids Causeway, Cambridge. Travel, military bands, plays, general recording; theatre organ, military bands. Elizabethan Avon twin-track, Philips portable EL 3586, 5 in., 1½, 33. Anywhere English speaking.

## CHESHIRE

**FRANCIS FARRELL HEATON**, 38, Aircraft design engineer, 32 Wellington Road, Broughton, Chester. Quaker, people, folks and families, gadgets, hobbies, laughs and nutty notions, low budget T.R., aviation, all religions, all places, writing, science fiction, first hand spookery, etceteras past, present and future; Beatles, Bach Bizet, etc. Philips 3514 Starmaker, 5 in., 4-track, 33. Anyone age 4 to 104 within 12,000 miles!

## DEVON

**DAVID FLETCHER**, 20, Railway clerk, 49 Shortwood Crescent, Billacombe, Plymouth, Devon. Tape recording, films, railways; pop and jazz. Elizabethan, 5½ in., 33. U.K. or overseas.

## DORSET

**TIMOTHY JOHN DOWELL**, 21, Accountant, 5 Dorchester Road, Grimstone, Dorchester, Dorset. Photography; classical, Civic de-luxe, 7 in., 1½, 33, 7½. Germany.

An ATR service to promote friendships through tape correspondence

## ESSEX

**JOHN HILLS**, 32, Caretaker, 41 Brays Mead, Harlow, Essex. Short wave radio, photography, taping; popular. Fidelity Playmaster, 5½ in., 33. Anywhere, home or abroad.

**WILFRED W. BURTON**, 32, Joiner/yacht builder, "Maid of Brix", 47 Dorothy Gardens, Thundersley, Benfleet, Essex. Toc H, 35 mm. colour photos with tape, aircraft, all woodwork (models to furniture); any but mod jazz or opera. Elizabethan LZ 29 4-track, 7 in., 1½, 33, 7½. Anywhere, English speaking.

**FREDERICK CHARLES NORRIS**, 46, Commissionaire (Security), 49, Kingshill Avenue, Collier Row, Romford, Essex. People, all religions, all colours, classes, creeds, races; organ, hymns, light. Grundig TK 40, 7 in., 1½, 33, 7½. Anywhere.

## HAMPSHIRE

**DAVID C. HART**, 28, Chiropodist, Chapelside, 7 Sarson Lane, Ampport, Andover, Hants. Films, reading, theatre, tape recording; classical music and organ. Ferrograph 5A/N, 8½ in., 33, 7½. U.K. only, male contacts only.

## HERTFORDSHIRE

**CYRIL BARNES**, 34, Printing works manager, 5 Martins Drive, Cheshunt, Herts. Tapesponding, motoring, chit-chat; light classics, pop. Repts 10 Mk. II, 7 in., 1½, 33, 7½. Anywhere English speaking, especially U.S.A.

## KENT

**STEPHANIE D. T. LUKER**, 16, Student, 14 Trinity Place, Upper Deal, Kent. Art, poetry (esp. 1914-18 war poems), reading, the sea; classical, Mario Lanza, early Elvis. Fidelity 4-track, 5½ in., 33. Anywhere, especially U.S.S.R. Either sex, 16-20 years.

## LANCASHIRE

**RON EVANS**, 33, Traffic clerk, 437 New Wellfield Street, Warrington, Lancs. Tape, records, field hockey, photography; most, including jazz, swing, classical. Truvox R 94 4-track mono, 7 in., 1½, 33, 7½. Benelux (English speaking), U.S.A., Australia, N.Z. Female, photo appreciated.

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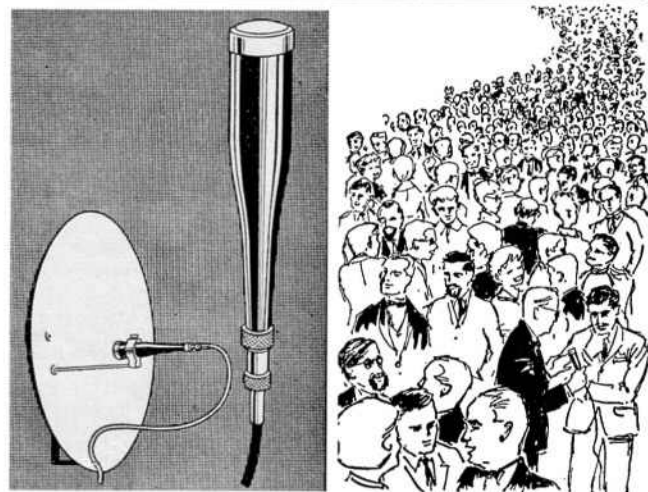
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