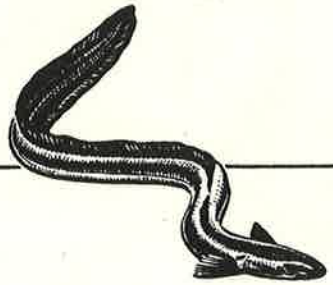

The National Anguilla Club

BULLETIN

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EDITORIAL.

At the last G.M., it was suggested that the editorial column should occasionally be filled by members other than the present editor himself. It gives me great pleasure to be able to put this recommendation into practice, and to present below a piece from a member who needs no introduction to you.

Alan Hawkins.

CONFESSIONS OF AN EEL-CATCHER

"Would you like to try your hand at writing an editorial, Ernie?" came the question a while ago.

Who, me?, thought I, what on earth could I say? Then, on reflection, it seemed that I could say a few words -largely about myself, I am afraid, to express my appreciation of the work of the Club, and the good it has done me.

Since becoming a member of the National Anguilla Club, I have become a very serious eel-fisherman. I've enjoyed attending the Club meetings, and reading many times over the many thousands of words written in the Bulletin. I have also been prompted to attend the two National Angling conferences, and very rewarding experiences they were. But this is now, and a while ago there was never so disillusioned a man as myself as regards catching eels, and never one whose attitude was more negative, in approach, methods, tackle and ideas.

So having admitted this to all of you, let me now thank you all for having helped me to make a change through the stimulating experience of being a member of this Club, and to become a much more positive angler.

Another season is with us at last. I say at last, because on the 27th April there fell four inches of snow overnight not many miles from my home, and then, bang! five days later the temperature reached almost 70°F; -which is, gentlemen, what fishing in this country is all about. The warmth of the sun has stirred me to new endeavours, just as I hope it is warming the chilled waters and stirring the quarry into life again. Indeed, in my mind's eye, I can already see the beautiful eels (for I think then beautiful) beginning to rouse from the mud, and can visualise the long dark vigils ahead, with their thrills and disappointments and the sleepless nights.

For I am sure all of us look foreward to each season as if it were our first despite all the shatterings disappointments of previous years, Who amongst us does not resolve to give it all up in the gloom of November, and to take up some pursuit such as golf? And who does not see his dark resolutions evaporate in the face of the first sun of Spring? I am not sure any more if I still want to know the answer to the question as to why I go fishing for eels. I know that I love to fish for them; it might even be true to say that I am obsessed by them, and while I remain associated with the thirty odd dedicated members of this Club, I see no chance of my preoccupation dwindling away.

Therefore, let us hope for the improbable, and let me wish you all the very best of fortunes in the weeks ahead, and may this season be the one in which you all catch the fish you have been waiting for.

E. W. ORME

QUESTIONNAIRE ON RODS: SUMMARY OF RESULTS.

by Terence Coulson.

Twenty-one members contributed to the rod questionnaire distributed during December, 1969, providing details of facts and opinions about 62 rods, an average of about 3 rods per member. This number (62) does not allow much detailed analysis, and in particular is too small to lend itself conveniently to description in terms of medians and IQR in some of the analyses.

To make more effecient use of the data therefore, averages have been taken in terms of the arithmetic mean (instead of the median); and the measure of spread used is the standard deviation or S.D. (instead of the IQR). Members not familiar with the S.D. need only remember that it marks the spread above and below the mean which includes $\frac{2}{3}$rds of the data. For example, if the mean is 10 and the S.D. is 5, then $\frac{2}{3}$rds of the data lie between 5 and 15. Again, if the mean is 20 and the S.D. is 6, then $\frac{2}{3}$rds of the data lie between 14 and 26. There is no mystery or magic about the S.D: it is just a measure of spread which happens to be more convenient for present purposes than the IQR.

One important aspect of this survey is that it describes the average and spread of the tackle on which the results in the recent "Report" were obtained.

1. Named Rods.

The data cover a wide variety of rods, the most popular being the following:-

Test-curve (T.C.)	Rod	Number (N)
$1\frac{1}{2}$	Mk IV Carp	8
$2\frac{1}{2}$-3	Mk IV S/U	7
$2\frac{1}{2}$	Aiken's S30	4
4	Chapman's Dennis Pye Pike	3
$\frac{3}{4}$-$6\frac{1}{2}$	All other	40
		62

2. Materials of construction.

	N
Hollow fibreglass	28
Solid fibreglass	6
Built cane	26
Steel	2
	62

3. Type of butt.

	N
Stiff false butt	20
Reverse taper butt	1
No false butt	37
Not reported	4
	62

4. Length of rod.

N	Range	Mean	S.D.	$\frac{2}{3}$rd limits
62	6'4"-12'6"	9'11"	1'2"	8'9"-11'1"

5. Test curve (lb:oz)

N	Range	Mean	S.D.	⅔rd limits
61	¾-6½	2:15	1:2	1:13-4:1

6. Line B.S. in lb and as a multiple of T.C.

N	Range	Mean	S.D.	⅔rd limits
62	5-22½	13.9	3.16	10.7-17.1
61	2.7X-6.8X	5.01X	1.19X	3.8X-6.2X

N.B. Where a range of line B.S. was given, the mean was used for the purposes of these analyses.

Discussion

From the above preliminary analyses, it is apparent that the "average" rod used by members is (in round figures) 10' long with a T.C. of 3lb. and used with lines of 14lb. B.S. (approx 5X the T.C.) In other words, the Mk IV S/U type of rod could be said to be the average choice.

It is clear from member's comments that many rods are not so much "chosen" for the job, as used because they happen to be available; that is, many are longer or shorter, or stiffer or softer, than the member would select given a free choice. Nevertheless, these compromises probably tend to cancel out, so that the above averages give a reasonable guide to the concensus of opinion on the combination of length, T.C. and line most suited to general eel-fishing. The extent to which more detailed requirements modify the choice is dealt with below.

However, an average may represent an expression of close agreement; or it may conceal a state of virtually complete disagreement. In the present case, there appears to be quite close agreement about the desirable length of rods, ⅔rds of the rods lying within ± 12% of the average length of 10ft. There is much more diversity of choice in the matter of test-curve, where ⅔rds of the rods extend over a range of ± 40%; as will be seen later this is partly accounted for by the variety of purposes the rods are used for, but it remains true that there is less close agreement about T.C. than about length.

The generally accepted theory about line strength is that it should be about 5 times the T.C. with a latitude of about ± 33%. Members seem to agree on average with this factor of 5,-or, at any rate, not to disagree. Moreover, the "⅔ limits" are well within the generally accepted latitude. Some members, however, allow themselves the use of lines as light as only 2.7X the T.C., ie. 46% below the "recommended" level, which some anglers would consider to involve serious risk of breakage on the strike.

7. Reel position: inches from butt and % of rod length

N	Range	Mean	S.D.	⅔rds limits
62	6"-40"	23"	6"	17"-29"
62	5%-30%	20%	5%	15%-25%

Discussion

Some members appear to fit the reel at a standard distance from the butt; others at a standard fraction of the rod length. Whichever way the data are analysed, however, there is fairly close agreement; ⅔ of the cases fall within reasonably narrow limits, and because of the close agreement on rod length, there is not much fractional difference between the two practices.

There are not enough data to examine the interaction of reel position with type of butt, material of construction and performance.

8. Casting performance versus T.C.

A. Total weight less than 2oz.

	N	Mean	S.D.	⅔rds limits
Poor	8	3:10	1:5	2:5-4:15
Fair	33	3:2	1:3	1:15-4:5
Good	20	2:7	0;12	1:11-3:3
	61			

B. Total weight more than 2oz.

	N	Mean	S.D.	⅔rds limits
Poor	3	1:5	-	-
Fair	8	2:4	0:12	1:8-3:0
Good	44	3:4	1:1	2:3-4:5
	55			

Discussion.

A rough rule-of-thumb guide to the casting performance of a rod is that it throws best a weight of about 1/16th its T.C. Thus, a rod of 2lb T.C. would work best with a weight of about 2oz. No doubt, some variations arise between rods of the same T.C., but of different lengths, butt construction, taper, etc., but the above is generally accepted as a rough guide.

It would therefore be expected that the rods members classed as "good" for casting less than 2oz. would have an average T.C. of less than 2lb. -say about 1½lb, typically a carp-type rod. In fact, however, the average is 2:7, and some members classed as "good" for this purpose rods with T.C. upwards of 3¼lb. Indeed, there is very considerable overlap amongst the three classes in table 8A, suggesting that different members have very different ideas of what qualifies as "good casting".

Turning to table 8B, several members made it clear that they would not use their lighter rods (typically, the carp rods) to throw weights of more than 2oz. As a result, only 55 of the 62 rods are covered by this table, and their are only three entries in the "poor" class. However, no fewer than 44 (70%) of the 62 rods were classed as "good" for casting weights of more than 2oz., but the average T.C. and ⅔limits for these 44 rods fit in reasonably well with the above rule-of-thumb.

It is striking that a more rational picture emerges on the heavier rods, and it may be that members are inclined to accept as inevitable that the rods we tend to use for eel-fishing cannot be expected to give the best casting performance with light weights, and therefore accept lower standards of performance as "good" which would be more realistically described as "fair". Possibly, a definition of "good" in the questionnaire would have helped.

9. Use/Performance versus T.C.

	N	Mean	S.D.	⅔rds limits.
Good for worm.	15	1:13	0:8	1:5-2:5
Good for light DB.	21	2:13	0:13	2:0-3:10
Good for heavy DB.	23	3:14	0:13	3:1-4:11

Discussion.

There is much closer agreement about the suitability of rods for their uses than about casting performance, with relatively small S.D.s and no overlap in the ⅔rds limits for worm and heavy DB. Not surprisingly, there is a moderate overlap between the ⅔rds limits for light DB. and the other two.

Broadly, the concensus might be expressed in the following way: -that rods in the Mk IV carp class are acceptable for worm fishing, though a little on the light side; that rods in the Mk IV S/U class are about right for light DB. fishing; and that rods in the D.Pye Pike class are about right for heavy DB.work. The overlap in the limits implies that the Mk IV S/U type of rod might be tolerable for all three classes of use.

10. Performance in landing eels versus T.C.

A. eels less than 3lb.

	N	Mean	S.D.	⅔rds limits
Poor	0	-	-	-
Fair	11	2:6	1:2	1:4-3:8
Good	48	3:1	1:2	1:15-4:3
	59			

B. eels greater than 3lb.

	N	Mean	S.D.	⅔rds limits
Poor	5	1:6	-	-
Fair	9	2:12	1:3	1:9-3:15
Good	31	3:3	1:1	2:2-4:4
	45			

Discussion

The tables reveal a marked reluctance to class any of the rods as being actually "poor" in dealing with the eels; but it is striking that the mean T.C. of the rods classed as "good" was practically the same for eels both above and below 3lb. This and the great degree of overlap in the ⅔rds limits suggest that members have very different ideas about what constitutes "good performance" in this context. Clearly, some members are prepared to accept relatively light rods giving little control over even moderate eels and necessitating lengthy "playing"; whilst others expect their rods to give forceful control and enable the fish to be brought rapidly to bank. This seems largely a matter for personal taste, providing the choice is made rationally and on the basis of actual experience of a range of tackle.

What does appear to be implicit in the analysis is a general agreement that considerable compromise is needed between the requirements of casting performance relative to the type of bait used, on the one hand, and performance in landing the eels, on the other hand.For example, carp-type rods are well within the limits of rods classed as "good" for worm fishing; but are outside the ⅔rds limits of the rods classed as "good" for landing eels even below 3lb. In effect, members have said that, using worms, carp-type rods are quite good for fishing for eels, but are no good for actually catching them!

For landing the eels, very few members favour rods with a T.C. as low as 2lb. and the average of rods pledged to be "good" in this respect is rather more than 3lb. ie. the Mk IV S/U type of rod is generally considered to be acceptable for landing performance, but a little on the light side.

(continued overleaf)

Final comments.

Obviously, there are numerous factors which are not taken into account in the above. For example, the action of a rod is by no means completely described by its length and T.C., only: the steepness of the taper, whether simple or compound, the material of construction, etc., all affect the performance. It is also obvious that the various requirements of an eel rod conflict to some extent, necessitating compromises; and whilst there is reasonable agreement in a general way about these compromises, there is considerable variation in detail. No doubt, this reflects in part the specific sorts of eel fishing different members lean towards. For example, members concentrating on canals will not need to take casting performance so much into account; members fishing open waters with clear banks and few snags need not place so much weight on the landing performance; and so on.

In addition to describing the sort of tackle on which the Club's results have been obtained during the last few years, the data provide individual members with an oportunity to check whether their own choice of tackle is, or is not, in line with the general practice in the Club. This is not to say that members whose choice differs from the average should necessarily change; but such members may find it interesting to make a critical review of idiosyncracies highlighted in this way.

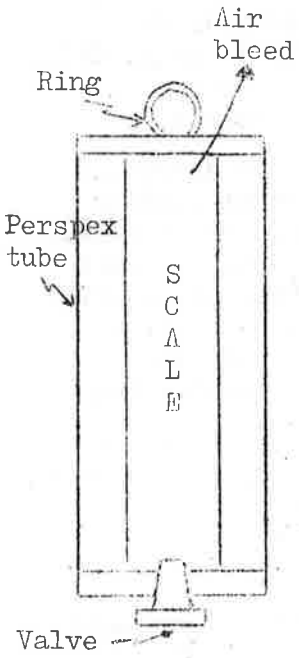
It is also hoped that the survey will provide the basis for more cogent discussions of tackle than have taken place in the past. The writer would be glad to provide supplementary analyses of the data, on request, to assist such discussion.

*

TACKLE REVIEW - THE "SOUNDER 25".

by Alan Butterworth.

I thought members might be interested in this useful depth-guage I purchased via a yachting firm recently. It is, as its name implies, a depth-guage, of American manufacture and working on the pressure-valve system. It is about 3½ inches long and weighs about 3oz. The gadget is cast out (the weight and shape make long casts easy), allowed to reach the bottom and then drawn in and the depth of water in the tube is read against the scale which is calibrated in feet. To empty, the valve is depressed, the tube inverted, and the water shaken out of the air-bleed hole.



The scale is calibrated logarithmically and can be read accurately up to about 50ft, although it does read up to a maximum of 150ft. The perspex tube is extremely robust, and should stand up to normal usage extremely well

On testing it recently on a local water, it gave results consistent with those already known, and on a water of about 2 acres an accurate idea of the depths was found within an hour; obviously doing away with laborious plumbing and also the need for a boat.

As far as I can see, there are only two snags with it: -firstly that on hitting the water the valve may be depressed by the initial force to give erroneous readings, and secondly that, if the instrument is drawn fast along

the surface, water is liable to enter via the air bleed hole. The first can be rectified by fitting the instrument in a perforated case, although, in fact, there did not seem to be any trouble in practice from casting impact; the second snag can of course be overcome by reeling in a bit slower.

The instrument is available from: -

Thomas Foulkes
Dept. B070
Lansdowne Road
Leytonstone
LONDON E 11.

The price is 30/-, plus 2/6 p&p, and may at first sight appear a trifle expensive, but it is of American manufacture and it simplifies the otherwise tedious and drawn out job of depth finding.

*

THE EFFECT OF MOONLIGHT ON EEL-FISHING PROSPECTS.

by Terence Coulson.

One of the things I found rather disappointing when I was preparing the 1969 'Report' was the uncertainty about the effect of bright moonlight on the eel's feeding. I had to struggle to squeeze any sense at all out of the data, and even then the picture which emerged was neither very clear cut nor very convincing.

It was disappointing because I, for one, very much want to know whether or not bright moonlight lengthens the odds. I couldn't turn a full moon into a new moon, it's true; nor yet conjure up a dense blanket of cloud. But I could certainly choose my holidays to coincide with the times of new moon, and I could try to escape the effects of bright moonlight by fishing in the shade of trees and so forth.

The question is, would such steps be worthwhile taking? Does moonlight have a significant effect,or not?

We know from the zoological literature that moonlight tends to inhibit the movement of silver eels. However, to quote Prof. Bertin, the metamorphosis of yellow to silver eel is as profound and as far reaching in its effects as the metamorphosis of leptocephalus into elver, and it is therefore quite unjustified to assume (as many angling writers have in the past) that because moonlight inhibits silver eel's movements it necessarily inhibits yellow eels' feeding! It's fair to say, perhaps, that the known effect on siver eels suggests that it would be worth while investigating possible effects on yellow eels, and we shouldn't be very surprised if the investigation gave a positive answer; but the point is that it is a question for investigation, and not a foregone conclusion.

Moreover, it is just the sort of question that our data scheme is designed to answer in unequivocal and factual terms

From the analyses of the consolidated data in the 'Report', it seemed that the small eels were not much affected by moonlight, but the larger eels probably were affected. Still, there were a lot of "ifs and buts" about it, and we would like to be on surer ground.

Now, one of the limitations of combining all the data together is that we are relying on all the random factors "averaging out". When there are enough data, this is doubtless what will happen; and in any case, while we have only limited amounts of data, the best chance of making sense of it is to lump it all together in the hope that the "averaging out"is reasonably effective. Nevertheless, we have no guarantee about just how long we shall have to go on before the "averaging out" process really does its job.

In the meantime, we have many waters in the data which do not contribute to the results under both dark and bright night headings. It needs only one or two fast rate-of-catch waters to produce biggish catches on bright nights, and a few slow rate-of-catch waters to fail on dark nights to obscure for a long time any marked evidence of an inhibiting effect due to bright moonlight.

However, now that the Water Summary sheets have been completed for the period 1967-1969, there is an alternative way of looking into the problem. That is, by selecting only those waters which have contributed results on both dark and bright nights, and analysing the pattern of results taken individually. In this way, we shall certainly eliminate much of the random material in the data and at least stand a chance of seeing a clearer picture.

It's an important point to realise that, in the end, all of the questions we are interested in will need to be investigated by this "water-by-water" method; but, of course, it requires very much more data than the "lumping in" method used in the "Report".

At any rate, working from the Water Summaries, I have been able to apply the method to this question of dark versus bright nights, and the results are very interesting (one might say, it throws a bit of extra light on the problem!). In all, there are 30 waters with RH/E values under both dark and bright nights. Of this 30, there are 7 which show a fater rate-of-catch on bright nights; and 23 which show a faster rate-of-catch on dark nights. On this evidence, therefore, it looks as though the eels are generally caught more freely on dark nights.

How much more freely? Working out the ratio of "bright rate:dark rate" for all 30 waters, we find that the ratios range from 0.18 (bright rate faster) to 5.34 (dark rate faster), and the average (geometric mean) ratio for the 30 turns out to be 1.36.

In other words, in these 30 waters, dark nights have produced eels about a third faster than bright nights, on average.

This seems a more clear-cut picture than the one which emerged from the consolidated data, and suggests that the balance of results in all other waters obscured what is, after all, quite a marked effect on the eels taken overall. However, there are seven waters which are contradictory, and the ratios are pretty widely spread about that average of 1.36, so the next question to ask is how confident can we be that this apparent advantage for dark nights is something real, and not just fortuitous?

If members with no particular interest in maths. will bear with me for a moment, I'd like to make the point that to a statistician, these questions of how much confidence one can place in a conclusion, or how significant a conclusion is, are not just "feelings" - they are questions to be worked out mathematically and the answers given in actual numbers. Nobody who isn't interested in statistics need worry for a moment about how these calculations are actually carried out: just make a mental note that "significance" isn't a matter of guessing, that it can and should be expressed as a number (often, a percentage) so that one knows exactly where one stands with it. Just to illustrate the idea, I am sure everyone will see that the confidence that one can have in getting "heads" on the spin of a coin is 1 in 2 or 50%; the confidence one can have in throwing a 6 with a die is 1 in 6 or about 17% and so on. See the idea?

In our present case, the calculation shows that we can be about 98% confident that there really is a difference between the rates of catch on dark and bright nights; or putting it the other way round, there is only a 2% chance that a difference as large as the one found could have arisen fortuitously.

A statistician would say that the difference lies somewhere between 'significant' and 'probably significant' - he needs a confidence of 99.9% before he speaks of 'highly significant' - which just shows how cautious statisticians are, and how much more difficult than anglers to convince of anything! I imagine that most anglers would be entirely content to act on a basis of a 98% confidence. Incidentally, this is probably the first time that it has ever been possible to present an angling conclusion with a factual statement of its 'significance'. Indeed, virtually all of the old wives' tales which comprise angling lore are so woolly that the question 'what confidence?' can't even be asked, let alone answered.

Coming back to our 30 waters, there are 14 of them which allow us to carry out the same exercise on the 2lb. -plus eels - that is, using the RH/2 values (instead of the overall RH/E). Of the 14, there are 3 which give a faster RH/2 on bright nights, agaihst 11 which were faster on dark nights. The bright rate:dark rate ratios range from 0.40 (bright faster) to 4.64 (dark faster) and the average ratio is 1.57.

In other words, in these 14 waters, 2lb. -plus eels were caught over half as fast again on dark nights as on bright nights, on average.

This fits in with the tentative ideas given in the 'Report' - that the larger eels are more influenced than the smaller ones - but again the question arises: is it significant? Applying the same mathematical test we again find it lies between 'significant' and 'probably significant', in fact we can be about 97.5% confident that the advantage with dark nights is real and not fortuitous i.e. there is only a 2.5% chance that a difference as large as that found could have arisen fortuitously.

Obviously, there is yet another question of significance to ask: namely accepting that there is this difference between dark and bright nights, is the apparently greater susceptibility of the larger eels significant? In this case, the calculation shows that the difference between 1.36 and 1.57 is 'not significant'. This amounts to bringing in a verdict of 'not proven' i.e. the apparent difference between large and small eels with respect to moonlight might be real, but the evidence does not yet justify our placing any confidence in it.

The full table of data is presented for anyone who may wish to study it in more detail. One interesting question to ask is whether the 7 'contradictory' waters (R. Gt. Ouse, Cowick, Kilpin, London Rd., Roswell, Slaugham and Castle Howard) really do have something different about them, which cancels or reverses the effect of moonlight? Or is it fortuitous, so that the 7 will tend to fall into line as more data are accumulated? If it is a real difference, what might it be due to?

Well, there is nothing certain in angling or statistics, and it will be interesting to extend this method of analysis to more waters when the 1970 data have been added. It will also be useful to apply the method to some of the other questions we are interested in - the effect of cloud cover, etc., in due course. In the meantime, we can summarise the above discussion very briefly as follows.

Dark nights produce eels about one-and-a-third times faster than bright nights, presumably implying that the eels are less willing to feed in brightly moonlit conditions. The effect appears to be more marked with the larger eels, so that dark nights produce 2lb -plus eels over one-and-a-half times faster than bright nights, but the strength of the evidence for this is not yet conclusive. Affew waters do not fit the pattern (at least, not yet) but the evidence of a real difference between dark and bright nights is such that there is only a 2-2½% chance of the difference having arisen fortuitously.

	All Eels							2 lb.-Plus Eels						
	DARK			BRIGHT				DARK			BRIGHT			
	E	RH	RH/E	E	RH	RH/E	Ratio	E2	RH	RH2	E2	RH	RH2	Ratio
Gt. Ouse	59	538	9.13	23	169	7.35	0.81	7	538	76.8	1	169	169	2.20
Yorks Ouse	19	24	1.26	9	39	4.33	3.44							
Thurne	5	36	7.20	2	77	38.5	5.34	1	36	36.0	1	77	77	2.14
B'worth Low	11	195	17.7	1	48	48.0	2.71							
Butlers	75	1569	20.9	17	532	31.3	1.50	10	1569	157	1	532	532	3.39
Cowick	6	170	28.3	3	81	27.0	0.95							
Culver'pe	1	7	7.0	4	68	17.0	2.43							
Hatchett	11	318	28.8	4	173	43.3	1.50							
L. Helen	16	765	47.8	3	414	138	2.89							
Kilpin	2	71	35.5	4	25	6.25	0.18							
Kingsmead	9	781	86.8	2	243	122	1.41							
Llangorse	4	110	27.5	1	44	44.0	1.60							
London Rd.	14	242	17.3	13	185	14.2	0.82	5	242	48.4	4	185	46.3	0.96
Roswell	14	414	29.6	22	328	14.9	0.50	1	414	414	2	328	164	0.40
Sandbeck	25	179	7.16	4	33	8.25	1.15							
Slaugham	2	17	8.50	5	13	2.60	0.31							
Stickney	17	394	23.3	3	197	65.7	2.83	7	394	56.3	2	197	98.5	1.75
Thrapston	4	228	57.0	1	74	74.0	1.30							
Abberton	20	53	2.65	6	20	3.33	1.25	12	53	4.42	4	20	5.00	1.13
Adcocks	6	57	9.50	3	88	29.3	3.08	3	57	19.0	1	88	88.0	4.64
Baldtn. E.	15	298	19.19	5	124	24.8	1.25	5	298	59.6	2	124	62	1.04
Bottomless	18	119	6.61	3	62	20.7	3.13							
Carters	2	5	2.50	2	6	3.00	1.20							
Castle Hd.	20	1151	57.6	7	123	17.6	0.31	7	1151	164	1	123	123	0.75
Fenhouse	13	458	35.2	4	220	55.0	1.56	8	458	57.3	1	220	220	3.85
'Greystone'	6	165	27.5	1	58	58.0	2.11	6	165	27.5	1	58	58	2.11
Dringhouses	4	110	27.5	1	91	91.0	3.31							
Sibsey	2	48	24.0	3	113	37.7	1.57	1	48	48.0	2	113	56.5	1.18
GUC (low)	7	98	13.0	4	54	13.5	1.04							
GUC (main)	14	1307	93.4	4	516	129	1.38	10	1307	131	3	516	172	1.31

Comment

I am sure all members would wish to join me in thanking Terry Coulson for so ably clarifying an issue which has probably been the subject of more dispute amongst eel-fishermen than any other, and at the same time for so clearly demonstrating the immense value of the type of water-by-water analysis employed in the above article.

Having heard the views of many anglers on this subject in the past, (being myself uncommitted until now, and therefore the ready target for conversion to a particular point of view), anglers have seemed to fall into two camps: -those who believed moonlight made no difference, and those who said it made a very great difference indeed. Never, I believe, have I been informed that it made a moderate difference of about $1\frac{1}{3}$ to $1\frac{1}{2}$ times.

On consideration, however, it seems that whereas there can be no question that the difference revealed in the above study is real, there could be grounds for arguing that the average value shown may be something of an understatement. As the editor understands it, cloud cover has not been included in the data for the above piece, and in comparisons of 'dark v. bright' nights this is a factor which may well not average out in a meaningful sense. Thus cloud may effectively turn a 'bright' night into a dark one, but have little effect on one already 'dark'. (There is some evidence for just this effect, for 2lb. -plus eels at any rate in the 'Report', p.64). Thus it may be that some of the nominally 'bright' nights in the data might have been better recorded as 'dark', and that some of the relatively fast rates-of-catch on 'bright' nights may have been influenced by the presence of cloud.

To give a concrete example, it may be reasonable to indulge in a little special pleading for one of the anomolous waters, -Kilpin. The editor was responsible for the capture of the 4 eels on the 'bright' night which forms part of the data. He sat at the pond until approx. 01.00 hours without a fish, until a particularly violent storm blew up. As the first spots of rain descended, the eels started feeding like mad, and in the resulting confusion of vain attempts to keep dry, sudden and frequent collapse onto the now slippery bank, and lost baiting needles etc, more runs were missed than fish landed. As soon as the storm ceased, the fish went off. Of course, this particular set of events could simply have been coincidence; alternatively then can be adduced as evidence to support the line of argument developed above, and incidentally, that expounded by Brian Knott on Thunder in a previous issue (NAC Bull. 7,1. Feb. 1970)

This, of course, is not to be taken as implying any criticism whatever of the article under discussion. It would be entirely wrong to start taking into account extraneous factors such as cloud cover before examining the more straightforeward case first. What it does mean is that we should await with the greatest interest a future water-by-water account of the effect of cloud cover, -as indeed we should look foreward to any such fine articles by Terry Coulson.

.....(Ed.).

A RUN ON THE BLIND SIDE.

by Alan Hawkins.

Part 1.

At the old ticket forge, somewhere in Yorkshire, three conspiratorial figures were bent over their latest creation; -heads hunched foreward and brows furrowed in concentration.

"You know," said Alan, thoughtfully, "we can't go on like this much longer; we spend so much time making these things that we have hardly enough left to use them. It's a far cry from the old days. I still remember the first one I ever did, -there were only five words on it. All it said was "Permission to fish Gungemire Pit."

"No night fishing," said Chris abstractedly as he painstakingly inserted a row of letters onto the antique printing frame.

"And no Sunday fishing," added Arthur.

"What?" asked Alan. "Oh, I see: -well while you are about it don't forget no dead-baiting, no live-baiting, no gorge-baiting, no groundbaiting, no keepnets, no landing nets, no wading, only one rod to be used at any one time and,"-he concluded triumphantly, -"all fish to be returned alive to the water immediately."

"You've forgotten something," said Chris.

"Have I?" said Alan, crestfallen, "Yes, I believe you are right, now let me think..."

"None of the above rules to apply in matches?" saud Arthur, helpfully and beginning to mount his favorite hobby-horse.

"No, not that," said Alan hastily, to ward off the coming tirade. "No umbrellas, that's it, no frigging umbrellas!"

"No what?" said Arthur in a tone of disbelief.

"Umbrellas," said Chris. "It's an interesting story. You see, there was this specimen hunter chap sat on the island with more gear than the average rag and bone man has on his cart after a good day. He had positively the biggest umbrella that anyone has ever seen, with a plastic drape round it, and all his pots and pans hanging from the ribs. Well, anyway, along came the most tremendous storm. All the matchmen packed up and ran, but not this chap He had not caught anything in the good weather, so he thought he would try the bad. You remember that storm, don't you," he enquired, "The one that took half the roofs off the houses of Leeds. It took this bloke's umbrella all right, up into the air and across the lake it went. Well, the cattle were in a pretty jumpy state anyway, what with the thunder and lightening to say nothing of the wind, and the sight of this thing bearing down upon them, -like a giant clattering airborne jellyfish, -was the last straw. You have never seen such a stampede, some of them were half way to Scarborough before the farmer caught them, and the damage they caused was unbelievable.

The upshot was that the Club pretty nearly lost the water altogether, and had to promise never to let even the smallest brolly near the water again before the farmer could be brought round."

"Of course," said Alan,"this was quite a long time ago now, and things have changed a bit since. You can have an umbrella now, provided it is properly supervised and you are fishing in a match with Club officials to keep an eye on you."

"If I ever owned a water," said Arthur, "there would only be one thing on my tickets."

"What would that be, Arthur?" asked Alan, always the perfect stooge.

"No bloody match-fishing!" said Arthur.

Part 2.

"I am not," said Arthur, "fishing two rods in your water, Mr. secretary, sir, for I know you only allow one. I know it looks as if I am, but in fact on the end of this one is my thermometer to measure the temperature."

"And I've got one on too," said Alan hastily, to forestall the inevitable enquiry. "I am checking Arthur's," he added, helpfully.

"I suppose you have another thermometer to check the other two," said the secretary, in a voice heavily tinged with sarcasm and looking pointedly at Chris.

"No," said Chris, "On my second rod I have the very latest electronic constant-recording depth guage." Realising that credulity was being stretched, he adroitly changed the subject by reeling in his other rod. "Yes," said Chris, "the wire trace is to cut through all the weeds, -you know how carp tangle you up and, -well, would you believe it, another tiny roach has become foul hooked on the end of my line."

"It has taken a lot of practice," said Alan, "to tackle up so quickly at dawn, for we have only just started and would not dream of fishing at night."

Several of the avenues to an easy victory being now blocked, the secretary tried another tack.

"And in the sack?" he enquired,

"Ah, the sack," replied Arthur in a tone of deep significance.

"The sack is moving!" said the secretary.

"Not at all," said Arthur, sitting on it. "It's the best thing I know for keeping the cold out. A fleeting look of dismay was seen to cross the otherwise poker-face of Chris.

"You after Chub?" said Alan.

"No," said the secretary.

"Tench," asked Chris.

"No."

"Carp?"

"No," said the secretary. "I want to catch roach.

"There is," said all three together, "a huge shoal of roach on the other side of the lake, they were splashing about all over the place a few minutes ago."

"Is that so?" said the secretary, gazing across the flat calm of the water, on which not a ripple disturbed the surface.

"And I caught three of nearly two pounds there last week," added Chris, plausibly.

"It's worth a try," said Arthur. Alan agreed.

"Actually," said the secretary thoughtfully, "I think I will try for tench, after all."

"There are tench there too," said Chris. "I caught a lot of them there while I was fishing for roach, last week.

At that moment the oily tranquility of the lake surface was disrupted by a monstrous tench which rolled ponderously right in front of the assembled group.

"Carp" said Chris.

"Pike," said Arthur.

"Gudgeon," said Alan, not being very quick-witted.

"I thought it was a tench," said the secretary, doubtfully.

As these last words were spoken, Arthur arose abruptly from the sack, which, whatever it had been before, was now decidedly empty. He performed a short dance upon the bank and, grinning the while, vanished suddenly into the bushes.

"Taken short," said Alan nervously. "It's all those pork-pies." Chris looked anxious.

"If you don't go soon, you will miss the best feeding time," said Alan, standing in front of his rod from which the line was peeling off at a terrific rate.

"You've got a run," said the secretary. "Don't you give it a long time, for a carp!"

"It's a big bait," said Alan, foolishly.

"Strike it!" cried Chris, maliciously.

With a look of concentrated evil at his mate, Alan struck, and was amazed to find whatever had taken his six-inch roach was on the end.

"Bloody eel," said Chris a few hectic minutes later, we don't want those. Funny how a great big five pound fish like that came to take a bunch of maggots. Better put it back."

"Surely not," said Alan, hopefully. "Think of the damage it does to the fishery,"

"We put everything back," said the secretary. "Immediately."

"Quite right," said Chris.

"Judas," said Alan.

"Do you think your mate is OK," said the secretary, gesturing vaguely towards the bushes which were violently in motion, and from which emanated a vast roaring sound.

"He gets like that," said Chris, "better leave him alone, he can be dangerous."

"Where's that eel?" asked the secretary, turning round. "Did you put it back?"

"Yes," said Alan, sitting on the sack.

"Well, I think I will fish over there," said the secretary. "You lot have made so much noise that it is certain nothing will be caught here."

"I know," said Chris. "It's enough to put a shark off, but I have no car of my own and have to come with them."

"Arthur," said Chris a few moments later, "You can come out now, he's gone; and where is my goddamned eel?

"Up my goddamned trousers!" said Arthur.

Part 3.

When a man is left far behind by the society in which he lives, he may reasonably be expected to cling to the few things that have not changed. When one of the things happens to be a pub, abd the man a fisherman, he may cling with unusual tenacity. At any rate, the solitary customer was not entirely unfamiliar with his surroundings and on this Sunday morning had been there since opening time. Honesty compells us to admitt that it would have been a far more noteworthy circumstance if he had not been there since the doors opened.

The was a time when he was not a permanent fixture in the furthest corner of the darkest room, and he could still remember it, even though the local residents had long since come to look on him in the same way that they did the faded carpet and the battered wooden chairs. And indeed, only last week he had been an hour late, which would have been an astonishing event had any other of the regular customers happened to have arrived within an hour of opening time. They had not, and the matter had gone unobserved, but it was no less a remarkable thing for all that, and one worth exploring in some detail. To understand it fully, we must go back a few years to the beginning of this sad history

At that time, almost every Saturday night during the summer, and occasional mild nights near power-stations during the winter, this man spent in an absorbing quest for the biggest eel swimming in British waters. It would be fair, perhaps, to comment that his results were hardly ever commensurate with his efforts, but he was happy, and so harmless was this eccentricity that one might suppose he would have gone on enjoying it until he grew too old to lift his tackle any more. Alas, this was not to be, for under the mounting pressure of increasing anglers on decreasing water it become gradually more difficult to find anywhere to pursue his obsession. Through this he struggled on, and being at that time glib of tongue and stealthy of movement was able to enjoy a less restricted existence than certain authorities would have wished him to do. It was the aquisition by large commercial interests of all the waters worth fishing that was the end for this man. For, being in it solely for profit, fishing was subjected to the unnatural confines of office hours, and dogs with sharp noses (not that they needed to be particularly sharp when this character had enjoyed any recent success) and sharper teeth patrolled the banks at the times he would have wished to be there. For some time yet he struggled on, and by dint of incredible efforts in selecting the right spots he occasionally caught small eels during the day, What ended this was economics, economics that said it was wasteful to allow an undisciplined body of anglers to roam the banks at will. Instead, tickets were issued for ten yard pegs, and having arrived at the pitch, there one stayed. Larger profits were made like this, all was under neat control and every inch of the bank could be earning to the full. At first this was only practical on uniform waters where all the swims were the same, for not even the most ardent of hearts will buy a ticket if he has a more than probable chance of drawing a pitch that is totally impossible. But with the aid of giant excavators and dredging machines there soon followed a dreary conversion to uniformity that whose main attraction had once been its variety. It was not a happy day when he visited the Hampshire Avon and fished a canal.

It is not denied that there were those who prospered under this new regime, and welcomed each change as a step nearer total equality of oportunity in competitions which formed the major part of angling by this time. This majority we will leave well alone (for they are well) and return to our minority who is not.

It was about this time that our unfortunate subject gave up fishing altogether and entered a state of suspended animation (ably supported by frequent doses of ale) until such time as the wheel might turn again, and freedom be his once more. In the years which followed his hope became dimmed

as restriction followed restriction, so that when all private tackle was banned by the major companies, he surrendered his without a murmur, keeping only a few illegal items as souvenirs of an age now past. And so he might have gone on in his gentle downhill path, were it not for the announcement of a new form of angling which appeared so terrible in its implications that he was stirred from his slumbrous state to go and see for himself. It was called Electro-Magnetic-Fishing.

Amid the bright throng in their multi-coloured shirts he was an oddly conspicuous figure clad in a drab mottled coat of various neutral tones and multitudinous pockets (which on former occasions would have bulged with a treasury of miscellaneous tackle and which were even now not entirely empty). The decrepit hat pulled over his eyes gave him a somewhat furtive appearence, although it was no more than a futile attempt to cover his aching head against the fury of the sun, and he took no part in the betting on results going on all around. Instead, he stood patiently clutching his little plastic ticket punched full of neat round holes (for what reason he had not the slightest idea, and rather less interest),-a small pathetic figure waiting his turn to pass through the turnstile in the concrete barrier to the mecca within.

Once inside he was conducted to his pitch on the "river",which even in his bemused state could be recognised as an artificial circular canal whose flow was maintained by pumps, by a character in an unusually flamboyant shirt who announced himself as the referee. He murmured a few words to the soul of the extinct baliff and looked around.

The only remarkable thing about the peg our subject occupied was its exact similarity to all the other pitches; -the gentle flow rippled the plastic weeds in his swim in time with all the other identical weeds every ten yards along the bank. The tackle he was handed was splendid in its non-entity. A rod of medium length, neither long nor short, supple nor stiff, and a line of an indeterminate strength. A few floats and weights completed the ensemble, except for one strange article. This was a small metallic sphere, about the size of a marble, and according to the book of instructions thoughtfully provided by his chair, was both hook and bait.

As he read slowly through the instructions (for he did not read much these days; in truth he did not do anything much), the horrible truth slowly dawned. There were no real fish in the water at all, instead in each swim there lurked an artificial model of a generalised fish, which homed into the little sphere on radio signals and grabbed it by magnetic attraction. Thus, it was said, equality was guaranteed for all. Gone were the days when real fish obstinately formed a shoal and congregated in one swim and left another empty.

Oh, it was all very clever! One pressed a button marked 'Chub' and another marked 'Cheese', flung the sphere out on a ledger tackle and along came the replica and behaved just like a chub. Sometimes it pretended to be a little chub and came in easily. Occasionally it turned into a very big chub and fought quite hard. Each time it was landed a little dial added up the weight of the fish it was supposed to be. Should the model break one up, then there was a button marked 'Retrieve' which brought the artificial fish tamely into the edge to give the bait back, and the dial subtracted points for the angler's ineptitude. Tiring of chub, one could fish for bleak, and the thing would charge round frantically just under the surface seizing the ball as soon as it was cast in, -provided of course that one had pressed the button marked 'Maggot' and had suspended the magnet on a float tackle, -and because bleak do not fight very hard would swim obligingly towards the angler as soon as he reeled in. The variations were almost endless, and would be more so, said the booklet, when the company's new computer was ready.

But our friend soon tired of these toys, and while the referee's attention was diverted by the angry protests of one who claimed to have been broken up while fishing for gudgeon, and that it was not fair, he quietly drew from his pocket one of his most treasured possesions. Under the guise of pretending to

pour out a cup of tea, he replaced the magnet by large, carefully sharpened stainless-steel hook, and the float by a ledger weight. Then, with ever so frequent a crafty glance round, he stealthily drew from another pocket a huge worm and with fingers that shook a little, threaded it upon the hook. He pressed the button marked 'Bleak' to keep the thing harmlessly cruising the surface while greater events took place beneath. Then, after an eternity of indecision, while he felt all eyes to be upon him, he summoned up his courage and swung the tackle out as quickly as he could to the centre of the stream.

It was not until near the end, when despair was once again intruding upon his weary mind, that he felt a slow pluck on the line. Instantly all those half forgotten skills sprang back into life and with a wildly beating heart he payed off the line on a steady run. After a carefully judged interval he struck hard, and was rewarded by a vicious jagging which arched the rod over as no plastic imitation could do. He lept off his chair and played the fish with a skill which attracted the attention of all around, and eventually landed it with hands that were visibly shaking.

Perhaps it was not a very big fish, but it was joy to this old man who gazed at it in rapture as it struggled at his feet, deaf to the outraged cries of the referee behind. After a journey of three-thousand miles from the Sargasso sea, what was a mere concrete wall to a determined elver? And there was consolation in that.

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ELECTRIC BITE ALARMS.

by Terence Coulson

In the last issue, Alan Hawkins wrote a splendid review of the material he had received on the subject of "buzzers". However, it was pretty obvious that the material members sent in to contribute to the review was rather "old fashioned": it could equally well have been written 10 or even 20 years ago! In fact, it is possible nowadays to make bite alarms which have a number of very real advantages over the kinds reviewed in the last issue, using more modern ideas and components. There are also several corrections to offer, and a number of vital points about the construction and use of these alarms which were not covered in the review and may not be widely known. I think, therefore, that it might be useful to try to bring this subject up-to-date. It would be quite possible to write a full size text-book about it, but I shall try to condense the essential points about function, design, construction and use to reasonable length.

Let me say, first, that I am convinced anglers generally give too much attention to tackle, be it rods and lines, or gadgets like alarms; and too little to the fish and their feeding habits. Nevertheless, I think it is important to have good bite alarms, because if they are so crude that they cause the fish to reject the bait, or so unreliable that they fail to detect the bite, all else is wasted.

Types of sensor.

Let us start by trying to classify the types of sensor that are possible, and for the sake of simplicity I shall confine attention to types which allow the fish to run, if it chooses to do so. The purpose of the sensor is to convert a movement of the line into an electrical impulse, and to that extent they might all be classified as "electro-mechanical"; however, I think the point of the following classification will become apparent. There are, I think, four basic types of sensor.

1. Mechanical sensors By this I mean sensors in which the physical movement of the line is made to throw some sort of switch which brings the electrical circuit into operation. There are two varieties, a) unbiassed, in which the switch is one-way, once-for-all i.e. the switch is thrown, the alarm sounds and remains sounding until the device is switched off or reset; the alarms Alan Hawkins referred to as "Carpcatcher type" are of this variety; and b) biassed, in which the switch which is normally open is closed by movement of the line, but returns of its own accord to the open position when the action of the line ceases; antenna types are of this variety, the bias being provided by the spring of the contact strip.

2. Electromechanical sensors This type of sensor converts the movements of the line directly into audio signals, by arranging an antenna connected to a microphone diaphragm or gramophone pick-up. The signals are led to a loudspeaker, either directly or via amplifying and/or frequency changing circuits. Devices of this sort are perfectly practicable but are best suited for detecting fast runs in conjunction with a fixed-spool reel. I am told that a device of this general type was marketed some time ago under the name Bennetec, although it was designed only to light a warning lamp and not to produce an audible alarm.

3. Electronic sensors In principle, at least, it is possible to make sensors which do not interfere mechanically with the line at all, but detect its movements, as it were, just by looking at it. Proximity devices (eg, resting the line between the plates of a condenser in a tuned circuit) could be used. I suspect that a practical device would need some assistance from a scrap of silver paper folded over the line, but the mechanical interference would still be negligeably small.

These four types - mechanical unbiassed, mechanical biassed, electro-mechanical and electronic - can all be constructed in a great variety of ways, good, bad, and indifferent. We shall touch on matters of construction shortly, but for the moment, I want to draw attention to the basic properties they have, regardless of constructional detail, particularly with regard to "sensitivity".

What is "sensitivity"?

When I was writing about floats for "Fishing" in 1964, I tried (I suspect for the very first time) to define the idea of sensitivity. The manuscript I submitted defined it as "the extra force the fish is subjected to as a result of giving the required indication". I had second thoughts about that, and asked the editor to change it so that it said "work" instead of "force", but a somewhat garbled version finally emerged!

The trouble is that, in reality, it is very difficult to decide exactly what we do mean by the word "sensitivity". My second thoughts in 1964 arose because I think we should take into account not only the force the fish has to apply, but also the time for which it has to apply it - or, if you like, the distance it moves while applying it, which amounts to the same thing. In physics, work is defined as force times distance, so you can see why I wanted to improve that definition.

If you think this is empty theorising, consider this: how do you compare the sensitivity of mechanical unbiassed and biassed types? Is a short, sharp snatch more sensitive than a continuous slight drag? Or less?

I don't know the answer to these questions, and I suspect there isn't an answer. Or, at least, that the answer is "it all depends". But I pose the question, and make the point, because I want to warn you about jumping to superficial conclusions on this subject of sensitivity.

In broad terms, however it is obvious that the electronic type of sensor which only "looks at the line" has the highest basic sensitivity; the mechanical types have the lowest basic sensitivity, because the line (and the fish which is pulling it) has to do physical work to throw a switch, and in the biassed types, it has to do continuous work to keep the switch closed; and, of course, the electro-mechanical types can be made intermediate in sensitivity, since they require only that the antenna shall move - not that it shall press the contacts of the switch together.

Does this mean that it is the ultra-sensitive electronic types of sensor that we should be using? The answer to this is an uncompromising "no" and understanding fully the reason for that answer is central to the whole question of choosing sensor types, and constructing and using them.

The role of sensitivity.

I want to convince you that the notion that "the best bite indicators are the ones with the highest sensitivity" is quite wrong.

Whatever the exact definition of sensitivity, there is no real problem about making alarms as sensitive as you like, right down to the electronic sensors which might be said to be infinitely sensitive in the sense that they introduce no extra resistance to the movement of the line. Any practical eel angler should know, however, that offering a certain amount of resistance is one of the essential jobs the alarm must do, and one that was completely free of all resistance would be a thoroughgoing pest.

It is not that one wants the extra resistance during the eel's run, of course: the less resistance at that stage, the better; but one needs it before the run occurs. One needs it to control the line. Most bite indicators perform this function, and floats are sometimes called "controllers" for this reason. Without control, a number of disastrous things can and do occur. Firstly, the line lies completely slack, and therefore one's chances of detecting a twitch bite are seriously diminished because the twitch can simply take up some of the slack in the distant part of the line without giving any movement at the sensor. Secondly, with no control, any significant drift in the water, a floating leaf catching against the line, etc., even the effect of wind on the line between rod tip and water - all these things can, and not infrequently do, combine to draw line off a fixed-spool reel. This steady taking of line can produce false alarms; or with sensors requiring a fast line movement, it simply produces progressively more and more slack. Thirdly, using fixed-spool reels in gusty conditions demands control to prevent coils of line being blown off the spool, and tangling in the grass, the reel handle etc.

If these points seem obvious, let me say that I have known more than one angler spend lots of time making super-sensitive alarms, and then immediately start devising gadgets to reduce sensitivity and get a bit of control back. There is no point in this sort of conflicting activity; indeed it tends to give the worst of both worlds. For example, using a seperate line-clip with an antenna type of alarm merely combines the disadvantages of the unbiassed and biassed type of sensor!

Note that these are practical points relating to ordinary conditions. Obviously, in dead still water during a flat calm, one could use a nil-resistance sensor. Equally, if the eel insists on giving a tearaway run fit to make blue sparks come off the line, it doesn't matter much what sort of alarm one is using. In general, however, we need some resistance at the alarm. How much? As little as is necessary to control the line at the time: in other words, the amount of resistance must be finely and easily adjustable.

I therefore recommend anyone who is hankering after greater and greater sensitivity to forget it! No inventions are needed; it is already known how to get super-sensitivity - electromechanical and electronic sensors will give it, and it is just not what is wanted. What is wanted is a moderate and adjustable degree of resistance combined with as near 100% reliability as possible. Mechanical sensors can give all that the eel angler requires, and the constructor's ingenuity will be far better rewarded if it is concentrated on making first-class devices in this class than in devising fancy ultra sensitive novelties.

General constructional considerations.

I do not propose to give precise constructional details because it is a matter for the individual constructor to use his own ingenuity in adapting bits and pieces he has available at home, at work or in local shops. There are, however, a few general points worth noting. Most or all of these points are covered in some detail in three articles I wrote for "Fishing" some time ago, and intending constructors might find it useful to refer to them (issues dated 21.5.65, 22.10.65, 29.10.65).

Half the troubles I see my friends' bite alarms suffering from arise from poor contacts in the low-voltage electric circuitry. Some components such as on/off switches, bulb holders, etc., will need to be bought. Buy the best quality you can and above all make sure that they are intended for low-voltage service - a switch made for 250 v. work will not necessarily give good service in a 4½ or 9 v. circuit. Solder all joints in the wiring and never rely on bits of wire twisted together and such-like crudities. Minimise the use of plugs and connectors as far as practicable; the one place a connector is essential is at the battery, and a proper battery connector must be used. Do not mess around making your own contact points; use proper relay contacts which have low contact-area - and keep the contact points clean and polished (never grind them with a coarse abrasive).

Most of the other half of the troubles are due to the inherent unreliability of buzzer and bell units, but I shall leave that for comment at the end of this article.

The few remaining troubles arise from miscellaneous causes. Assemble the components neatly and compactly in a robust box and see that the box protects delicate parts such as the antenna. If you cannot find suitable boxes, do not hesitate to mould them yourself out of fibreglass/resin: it is not difficult and full instructions are given in those articles of mine in "Fishing". It is absolutely vital that the antenna should be light and rigid, and the best material I have encountered for antenna-construction is fine alloy tubing available in model shops; the stuff sold as 20-guage is about right. These antennae can easily be bent for weather-proofing purposes (see below) by first pushing a piece of thick monofil up the bore and removing it after the bending operation, thus preventing the cross-section being flattened with consequent loss of stiffness. Make certain the antenna is soundly attached to the contact strip, e.g. by first soldering a piece of stiff wire to the strip and bonding it into the bore with Araldite. Never attempt to adjust the setting of the alarm by bending the antenna or the contact strips at the waterside; instead, make the whole contact-block/antenna

assembly moveable so that it can be pre-set in position, and fix a screw with a big knurled head to adjust the contact gap. These adjusting screws work best if you solder or bond in a self-locking type of nut for them, so that the adjustment stays put in use. Knurled heads can readily be made by bonding the screw-head into a suitable bottle-cap or toothpaste-tube cap using Araldite or other resin. Use sound insulation, especially the seperators of the contact strips; and rubber grommets where the cable passes through the walls of the box. Use plenty of cable, so that the battery and alarm can be kept dry under your brolly (and close to your ear!) and so that the cable can be laid out where it will not be trampled on or tripped over.

Other things being equal, the higher the voltage, the more reliable the operation, so prefer 9 v. to 4½ or 6 v. Use large Power Pack types of battery (PP9 is a reasonable choice) so that you are not constantly worrying about the battery running down. Weatherproof the whole sensor unit especially to stop water getting on the contact points, because no battery will stand hours of discharge through partial short-circuits caused by moisture.

I do not suggest that this is an exhaustive trouble-shooting list. But it covers the essentials, without which any angler is asking for trouble. I would like to lay even money round the Club that attention to all the above points would transform the effectiveness of members existing alarms; and I am confident that time spent on these points would be infinitely better rewarded than inventing and making weird novelties.

Design and Use

(1) UNBIASSED SENSORS

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(a) The NAC Type Alan Hawkins referred to these devices as "Carpcatchers type". In fact the sort of gadget exemplified by Brian Crawford's design (NAC Bull., 6,2. (August 1969) p. 14) incorporates two fundamentally novel features never used by the CCC, which arose from discussions at Castle Howard. I suggest therefore - as, indeed we agreed at the time, - that this type of sensor should be called the "NAC type".

The novel features are (i) that the contacts be mounted sideways-on and level with the reel; this has the dual merit of preventing water droplets running down the line and onto the contact-points, and of preventing coils of line being blown off the reel; and (ii) that in this position, the device be fitted with a hood to protect the contacts from direct wetting by rain. These two ideas transform the gadget completely from the old CCC type, and raise it to an altogether different level of usefulness and reliability.

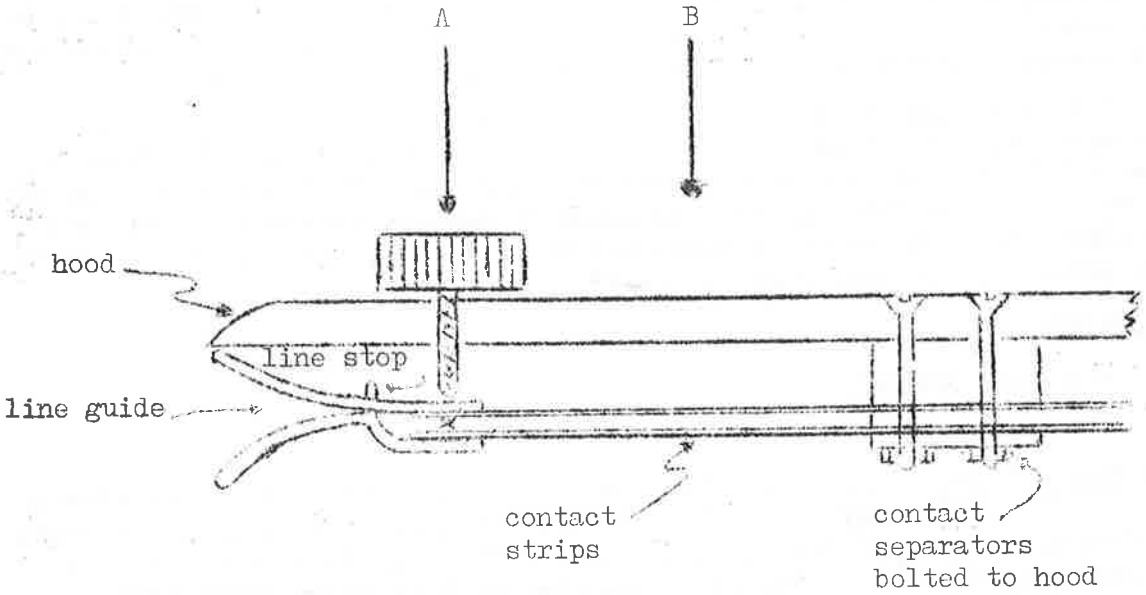
Brian Crawford has tried out this device and found it satisfactory. My own experience with essentially the same design is that while it works admirably most of the time, it suffers from one very serious defect which is capable of losing the user far too many fish. The defect is, simply, that in putting the line directly between the faces of two large-area contact-points, there is constant danger of particles of dirt etc. being left behind when the line is pulled out by the bite, which prevent the contacts closing properly. This can be partially overcome by increasing the pressure of the contact-strips, but this increases the pluck the fish feels during the take. Moreover, Brian's design makes no provision for adjustment and (as explained above) it is important to be able to adjust the resistance to the minimum needed for control in the conditions and with the line thickness at the time.

An improved design which I can recommend involves the following modifications: (i) the contact strips are extended with short, stiff strips of metal ending in "jaws" which hold the line, i.e. the line is not held between the faces of the contacts and thus cannot introduce dirt.

(ii) this now allows the use of ordinary relay contacts, with points of small surface area with their advantages;

(iii) an adjusting screw is fitted so that the tension in the strips is under control: the adjustment should always be made to the minimum needed to hold the line in the conditions, whilst ensuring that the points close properly when the line is removed.

The essence of the design is made clear in the diagram (below); it could of course, equally well be made "douhle barrelled" like Brian Crawford's if this is desired, although this loses some versatility. Fit an on/off switch in the sensor head.



The tension adjusting screw may be fitted at position "A" as shown when the lower contact strip is a flexible one. With a flexible upper strip and a stiff lower strip, the screw should be positioned at "B".

FIGURE 1.

(b) The Microswitch Type There is another way of ensuring that dirt and water do not interfere with the operation of the device which involves what I believe is a completely original design. I have had the idea in mind for a long time and have recently constructed a few prototypes, one of which does everything I expected of it.

The design uses a component known as a microswitch. These devices are easy to obtain from "radio surplus" shops ex-equipment at about 4/6. They consist of a totally enclosed switch operated by a tiny plunger, the tip of which protrudes from the case. They are called "micro" switches because of the small mocement of the plunger needed to trip the switch; the type I have used needs only one thousandth of an inch up-and-down movement to trip the switch off and on, and there is therefore no need for any lever systems to operate them from the thickness of eel-fishing lines. (Many microswitches are fitted with lever systems which can readily be modified to magnify the effect of the line, if desired, but the "nip" on the line is thereby increased, of course).

Many microswitches are provided with two pairs of terminals, one pair giving "normally open" mode and the others "normally closed"; others, however have only one pair of terminals and thus offer only one mode of operation. It is the "normally closed" mode that you require. Construction is a matter of personal ingenuity, but mine is made similarly to the previous type as illustrated (Fig. 2, below). The spring strips have no electrical connections, and function only as a line guide; one is perforated in a position just behind the adjusting screw, whilst the other is fitted with a tiny peg which passes through the perforation, serving to locate the position of the line over the plunger of the microswitch.

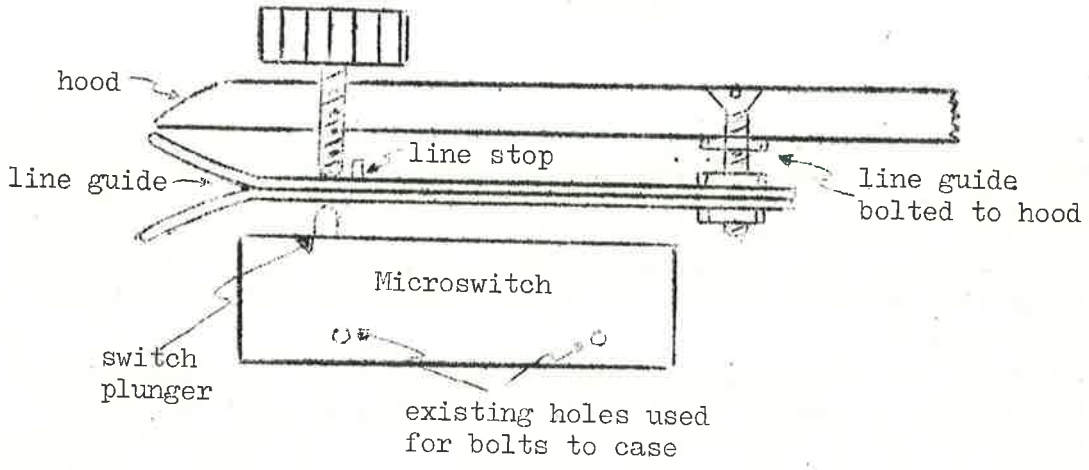


FIGURE 2.

(2) BIASSED SENSORS

(a) Fore-and-Aft Antenna Types As Alan Hawkins pointed out in his review, one might well suppose that antennae moving in the same direction as the line (instead of at right angles to it) would be more efficient. Indeed, if (as Alan suggested) friction between line and antenna was the sole cause of the movement, this would be so. However, it is really only in the imaginary physicist's case, using a theoretical "thin string", that friction is the only (or even the main) cuase of the movement. In the practical case with fishing lines, there are two other causes of movement: (i) a "triangle of forces" effect, arising because there is a slight resistance to the line coming off the reel, even with a fixed-spool reel, and because the antenna/rod-rest assembly puts a kink in the line (Fig. 3, overleaf): (ii) the line has a degree of stiffness and comes off a fixed-spool reel in the form of a spiral; successive turns of the spiral bear against the antenna and mechanically push it over. In short there is much less practical difference in efficiency between fore-and-aft and side-to-side types than might be supposed.

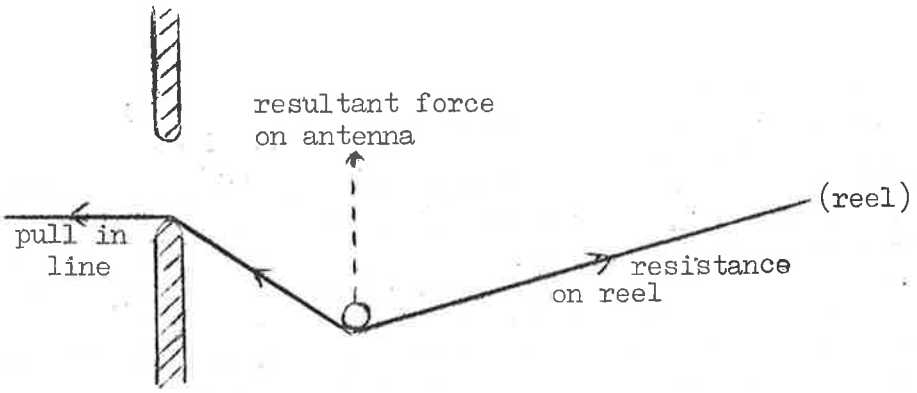


FIGURE 3.

As far as I know, I was the first person to publish details of a fore-and-aft antenna sensor (Fishing, 21.5.65) and I caught lots of fish including eels using it. However, I do not now think this type of design offers any material advantage in sensitivity; one can get all the sensitivity needed in still-water eel-fishing with side-to-side types plus some other advantages; and in dealing with moderate drag on the line, I think the unbiassed types have the advantage.

Nevertheless, the fore-and-aft types can be used to do one potentially useful thing: namely to give a "self-cocking" facility, so that the angler only has to lay the rod in the rest and does not have to go foreward to place the line round the antenna. This can be a real merit in close-range fishing, reducing the risk of disturbing the quarry. This self-cocking trick is easily done. You need two high stand-off rings fairly close together on the rod. The alarm is set between them as illustrated (Fig. 4, below). I see no merit in a vertical Y-shaped antenna; a straight, horizontal antenna as shown (Fig. 4) works perfectly well, is more easily constructed and less easily damaged.

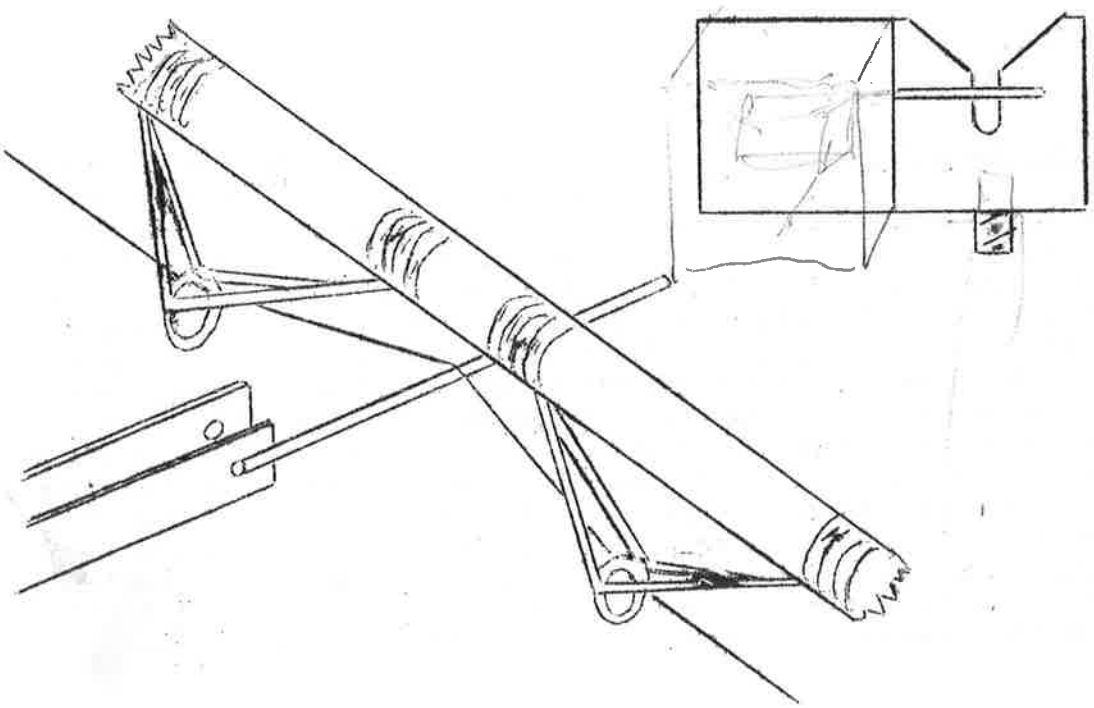


FIGURE 4.

(b) Side-to-Side Antenna Types So much has been written about these, the "traditional" type of bite alarm, that one might think there is nothing worth adding. Perhaps the most important thing to say is that a perfectly ordinary and straightforeward job, well made in line with the constructional points given above, will serve the eel-angler admirably and better than all manner of bright, new ideas.

To make a good one, it is important to understand the principles which govern its sensitivity. It almost works in the way Alan Hawkins suggested in the review - but not quite! The correction is important, as it has some immediate practical implications. The diagram (this volume, p. 15, Fig. 3), should show H1 as the distance to the point of contact with the line (not to the tip of the antenna). In other words, you cannot make the device more sensitive just by lengthening the antenna; the sensitivity only changes if the point of contact with the line changes. Accepting this, the question remains, how does it affect sensitivity? Let us get it quite clear that by lengthening H1 relative to H2 (i.e. increasing the H1/H2 ratio) we produce two rather conflicting effects:-

(i) we reduce the movement at the contacts,

(ii) we increase the pressure with which the contacts are brought together.

The precise resultant of the balance of these two effects on the performance of the sensor is rather a moot point! I am prepared to say bluntly that the useful range within which you can control the performance of the sensor by altering the H1/H2 ratio is quite limited.

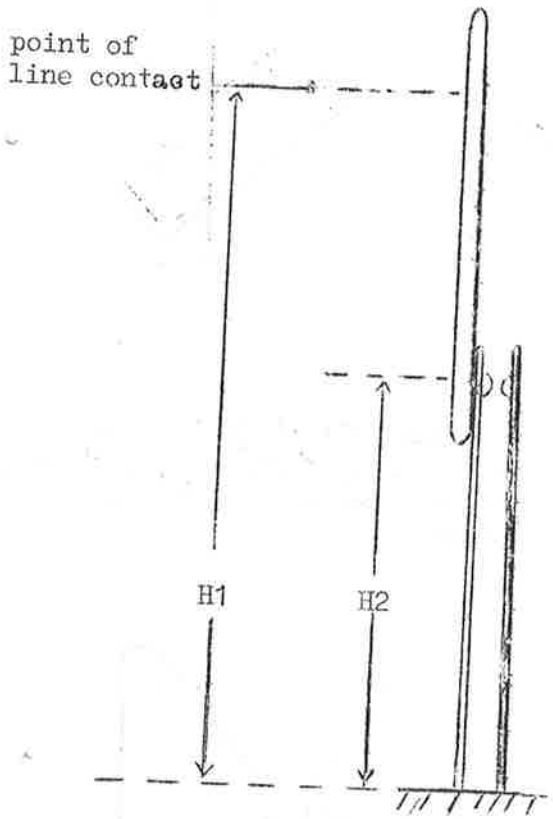


FIGURE 5.

There are two other things which are even more fundamental to the sensitivity: namely, the stiffness of the antenna contact strip: and the presence of means to adjust the contact gap. Provided the gap can be adjusted in use, a fairly wide range of H1/H2 ratios and strip stiffnesses can be made to work satisfactorily (stiffer strips needing longer antennae). It is easier for practical reasons to use relay contact strips, and to place the adjuster on the "fixed" strip i.e. the one that does not carry the antenna.

For some odd reason, the one factor which affects the performance of antenna-sensors more than any other never once seems to have been mentioned in all the literature of angling. I refer to the angle the sensor head makes with the axis of the rod. This is far and away the most important "adjustment" the angler has at his disposal, and it needs no screws and knurled heads: you simply grab hold of the bank-stick and twist it! The effect on sensitivity is profound. The diagram will make this clear (Fig. 6, overleaf); it shows the sensor head viewed from above. (1) shows the sensor set square to the rod-axis, the line (which is not drawn in the diagram) taking a moderate bend round the antenna and through the line guide; (2) shows the head rotated anti-clockwise - the line now has virtually a free passage, without touching either the antenna or the line guide; (3) shows the antenna rotated clockwise - the line now takes a sharp bend round the antenna. From the fish's point

of view, the anti-clockwise rotation reduces the resistance it feels and thus increases "sensitivity", whilst the points must be set very close and there is little control; the clockwise rotation increases the resistance and lowers the "sensitivity" but the points must be opened and there is considerable control. Thus, this simple adjustment gives a wide range of possible operating characteristics

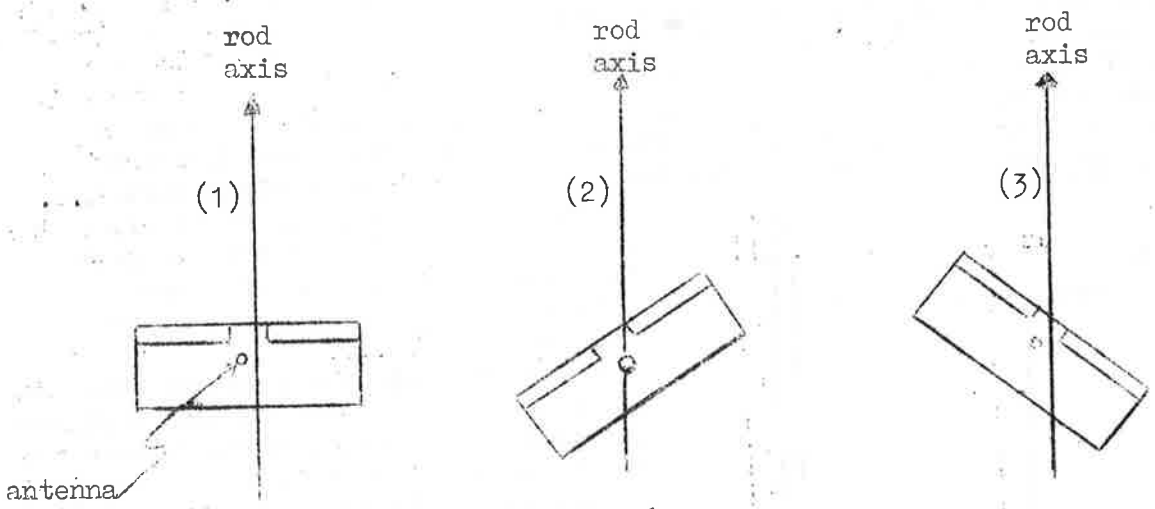


FIGURE 6.

All my antenna sensor heads have provision to move the whole contact assembly relative to the line guide, both laterally and by rotation, as shown in the diagram (Fig. 7, below), although in practice I prefer a vertical antenna so that I can lift the rod free without snatch.

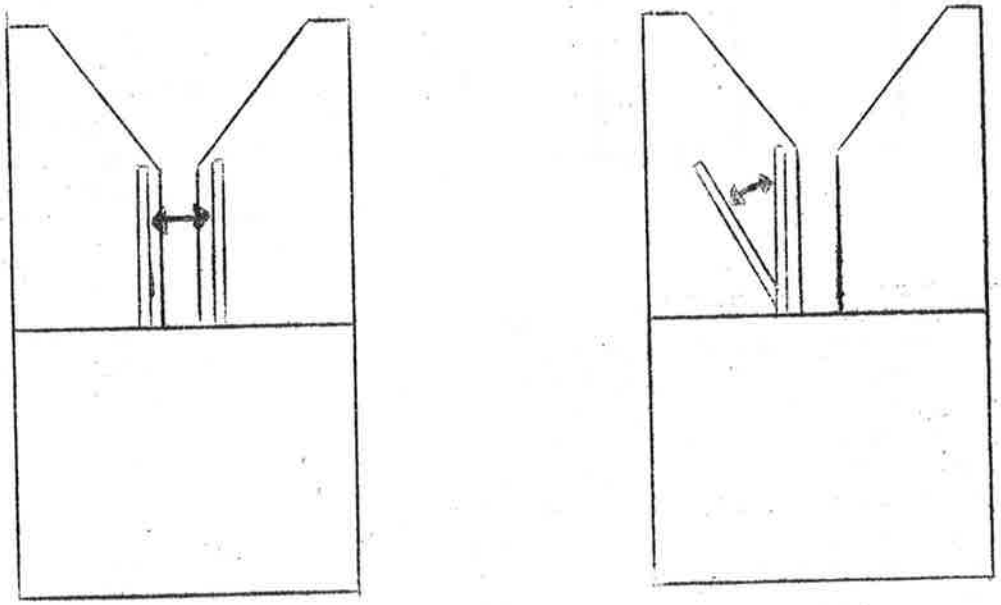


FIGURE 7.

Having preset the assembly to suit the sort of fishing and the intended line stiffness, the pre-set is left alone at the waterside, but adjustment of the bank-stick in combination with the contact-gap adjustment allows a very wide range of conditions to be dealt with. Twisting the bank-stick allows you to compensate for fine v. coarse lines and for the amount of resistance to drag needed; the contact-gap adjuster then gives you the maximum true sensitivity in the circumstances. If your sensor doesn't allow these adjusments, or if you don't carry them out, then sensitivty is bound to be a worry, and you will probably find yourself trying to invent "improvements". If you can and do carry them out, sensitivity just ceases to be an issue.

Weatherproofing

It is important to ensure that the ingress of water does not put the sensor out of action. The two unbiassed sensors and the self-cocking biassed sensor present no problems in this respect in normal conditions. In recent years, I have found that ordinary antenna-sensors can and do suffer badly in rain unless steps are taken to prevent water getting onto the points and giving rise to electrolytic corrosion

My advice on this would be: whatever you do, don't use any of the designs shown in Fig. 4 (this volume, p. 16) ! Unless the antenna is much too stout to be as light as it should be, these designs are asking for breakages. Put a crank in the antenna, but enclose it in the sensor case, as illustrated (Fig. 8, below); (see also the comments under constructional considerations, above).

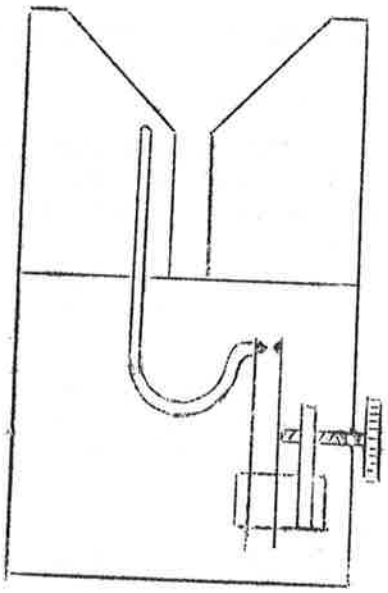


FIGURE 8.

Having done this, give the insides of the sensor box, save only the contact points, of course, a coat of waterproof laquer.

These too steps will solve your weather-proofing problem; but if you are a fanatic, you can make a sensor which will literally work under water. Want to try? Then get a gadget known as a "reed switch". These are on/off switches totally sealed into a glass capsule, and operated from the outside by bringing a magnet close. They are quite cheap and readily available in the shops. Make up you sensor head with the antenna moving a tiny scrap of magnet which, when brought close, operates the reed switch. You can mount the antenna on a clock balance wheel assembly, and use the hair-spring and its adjuster to control sensitivity. You can now seal all the electrical parts completely. For myself, I use my sensors on the bank and not under water, so I do not go to these extremes.

The alarm system

The alarm and sensor interact so much that in my view it is not practicable to try and consider them apart.

If I had my way, all buzzers and bells would be gently but firmly taken away from anglers, crushed with a big hammer, and deposited in a dustbin. Buzzers and bells are totally unsuited for use in bite-alarms. They suffer from either complete or (worse still!) intermittent breakdown far too frequently, they fail to respond when the battery voltage begins to drop or if the switch fails to make perfect contact, and they use too much electricity

causing batteries to run down rapidly and giving rise to sparks and corrosion at the contact points.

THROW THEM AWAY!

Instead, invest in an encapsulated transistor oscillator and a 2 inch loud-speaker. Total cost, about 30/-d. Pricey, but worth every penny. This remedies all the faults listed above, and you will enter a new phase of relaxation and confidence in your bite detection.

The "Morse Code Practice Oscillator CO.1" made by Encapsulation Ltd. is available commercially at about 22/6d. It draws about 0.1 amp at 9v. (against 0.5 amp. for the best buzzer I know) and comes complete with instructions. The unit produces (if you want it to) far more noise than any buzzer when coupled to a suitable loudspeaker (which should preferably be 3 ohms, although 8 ohms will just about serve) and is tuned to 400 cycles per second, the frequency the human ear is most sensitive to.

Rememder that the indicator lamp uses current too, and if you want your battery to last, choose a low-wattage bulb. Mine are 6 v., 0.04 amp, used with a series resistor of 86 ohms and a 9 v. battery. Following this advice throughout, you will not need to worry about bites running your battery down, heaven forbid! - it will work all season, and probably all next season, too. Indeed, the PP9 I bought in April 1969 and used all last season is still going strong.

Economy and elegance

Finally, it is uneconomical and inelegant to use two or three completely independant alarm systems. The obviously desirable design is a single master alarm, operated by two, three or as many sensors as one wishes.

This is how my systems work. Three wires (actually a three-cored screened cable, the screen serving to protect the wires) leave the "black box" which houses the battery, on/off switch, oscillator and loudspeaker, and is kept under cover beneath the brolly. The three wires can be connected up to as many sensors as desired, each sensor being fitted with its own pilot light - in parallel of course - to show which alarm is operating when the alarm sounds in the dark.

At our last AGM, I issued a friendly challenge to members to work out how this was done with the bite detectors I exhibited at the time, so I was tickled when Alan Hawkins wrote in his review that it was impossible! In fact, it is quite easy to provide this facility.

The problem is that, if the sensor heads are connected up in parallel with the alarm, then all the lamps will light when any one of the sensors operates. There is no way to prevent this without intriducing another component. The component could be a second pair of contacts or a slave-relay in the sensor head, but I would not recommend either of these possible solutions. It is easier and more reliable to do it simply by wiring in a tiny semi-conductor "diode" or rectifier, as shown in the diagram (Fig. 9, opposite). These devices have the property of offering a high resistance to the passage of electricity in one direction, but not in the other. Inserted in the circuit as shown, therefore, the diode prevents a pilot light being lit by current passing "backwards" through it from one of the other sensors; the lamp is effectively isolated, and can only be lit when its own sensor contacts are closed.

that is,in the direction of the arrowhead (assuming a positive to negative current flow. To follow the action of the circuit, consider that antenna 1 has detected a bite. The current then flows from the positive battery terminal, through antenna 1 contacts, through lamp 1 and back to the negative battery terminal, completing the lamp circuit. There is also a circuit through D1, the buzzer, and back to the negative battery terminal, completing the buzzer circuit.

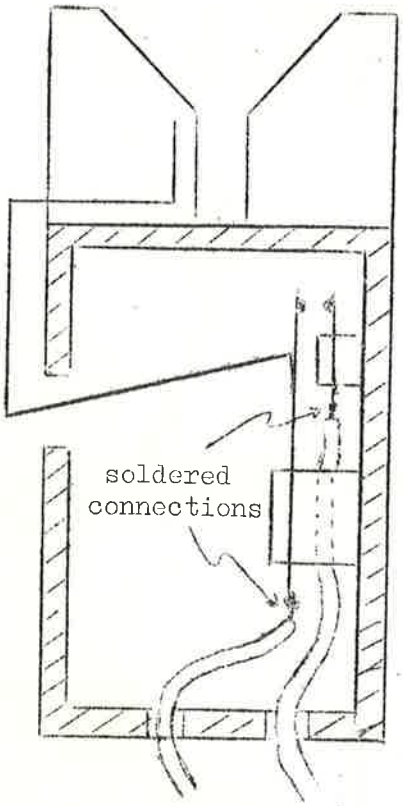


FIGURE 1.

The purpose of the diodes now becomes apparent, as the current cannot "double back" from the buzzer and illuminate lamps 2 and3 because it cannot pass through the diodes, D2 & D3 in the "wrong" direction, i.e. against the arrowheads. The same thing happens whichever antenna detects a bite, with one diode conducting and the other two blocking.

Fig. 3 (overleaf) is a sketch of the actual unit, made up in a 6" x 6" x 2" cast aluminium electrical conduit box, which is ideal as it is extremely robust and also rust-proof. The lampholders are bakelite M.E.S. batten type with short pieces of $\frac{3}{4}$" polythene tubing pushed over them to prevent stray light from illuminating the wrong windows. The battery connectors finally bring me to point (3), terminal corrosion. I suspect this to be caused by high contact resistance, coupled with an electrolytic action between the battery tags and the case contacts, which are dissimilar metals. This would be aggravated by ingress of moisture. In the prototype this trouble was obviated by the use of Lucas "Lucor" connectors (the type used in car wiring) which if first flattened slightly with a pair of pliers, are a perfect fit for the standard $4\frac{1}{2}$v. battery tags.

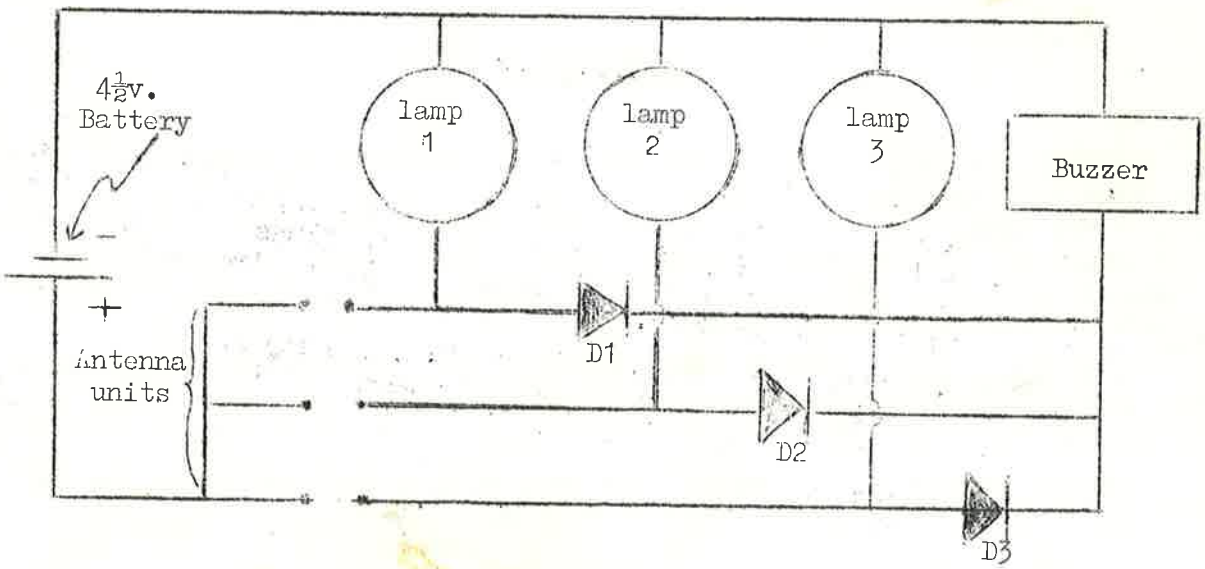


FIGURE 2.

The diodes used in the unit were unmarked surplus types, but any general purpose diode, Mullard OA80 etc., could be used provided it has a sufficiently low foreward resistance and adequate current rating. As with any semi-conductor device, the battery must be connected the right way round or the unit will not work. With the buzzer mounted on the underside of the lid as shown in Fig.3, the lid acts as a sounding board, greatly increasing the sound.

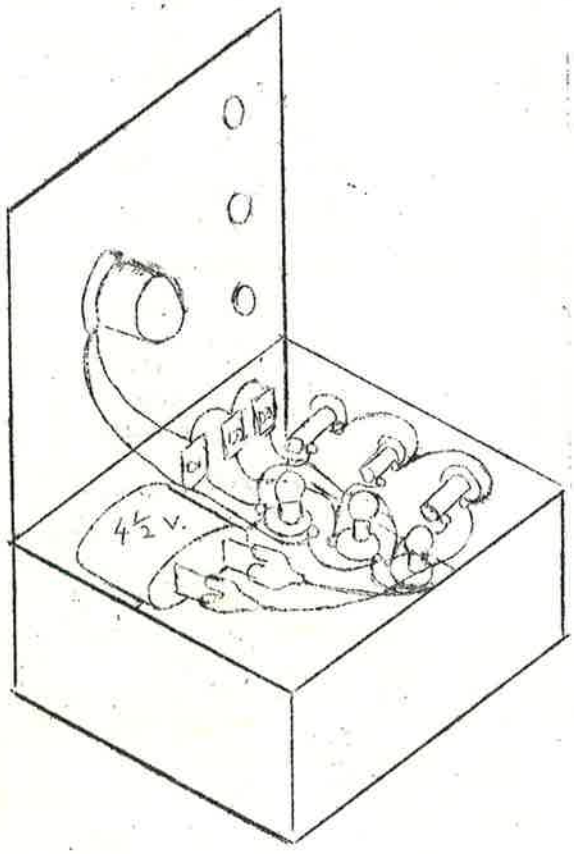


FIGURE 3.

Although I have not attempted it, I think it would be possible to build the unit in a standard "Heron" buzzer box, or at least a two-way version of it, as the extra diodes take up very little room, being smaller in fact than the lamps. In the prototype, standard audio "jack" plugs and sockets were used, as these are very convenient in use, even in the dark, but any similar plugs and sockets could be used.

Finally, I would like to suggest that G.P.O. relay spring contact sets are ideal for making experimental bite indicators, as the contacts are silver, or silver-faced and should resist corrosion under the most adverse conditions.

If any member has any query about this unit or similar equipment, just drop me a line and I will do my best to help.

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