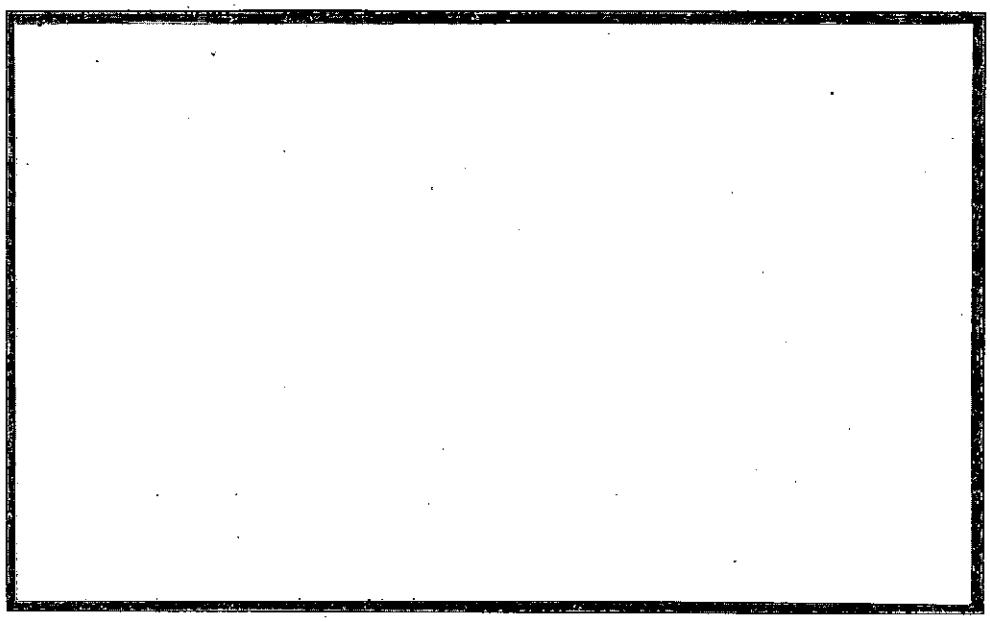
T6405C5/4

Institute of Freshwater Ecology



Natural Environment Research Council

INSTITUTE OF FRESHWATER ECOLOGY

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Field trials of the Armfield electronic guage board.

Report: November 1990.
Dr A.F.H. Marker and G.D. Collett.

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Report date:	November 1990
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IFE Report Ref:	ERG/T04052c5/4
TFS Project No:	T04052c5

1. INTRODUCTION

The Institute of Freshwater Ecology's Eastern Rivers Laboratory is carrying out long term research into the ecology of the River Great Ouse, initially in its middle reaches between Bedford and Earith. This highly managed and regulated river system contains a range of interlinked channels, through which flow is controlled by a series of locks, weirs and sluices. During the winter of 1988/89 the Institute negotiated a special price with Armfield for an electronic gauge board. The gauge board was modified to include a movable light shield to minimise interference from algal growth; we had thought it possible that , when a thick algal mat developed at the water line, spuriously high water levels could be logged when the water level subsequently dropped, leaving the algal mat temporarily wet; This report provides an assessment for Armfield after eighteen months use.

2. METHODS

The electronic gauging board was located on a side channel of the River Great Ouse, near Godmanchester (Huntingdon). The side channel, known locally as Lees Brook, leaves the main river upstream of Brampton lock and rejoins the main river 2 km down stream, below Brampton lock, but above Godmanchester lock. The gauging site (Fig.1 Nat. Grid Ref. TL230702) was chosen, in part, for its seclusion which minimised potential human interference. A stake was driven hard into the river bed by the river bank, which provided considerable protection from drifting macro-detritus. The logging system was a modified "Windermere Profiler" (Rouen, 1989) which was simultaneously measuring water and air temperature. For the first summer the gauge

sensors were cleaned at monthly intervals. Subsequently, they were not cleaned, except for the removal of entwined macro-detritus.

3. RESULTS

Variables were generally logged for periods of three or four days each week. Displayed logged depth data were compared with true visual readings from the gauging board at the beginning and the end of each run (Tables 1 and 2). For most of the time variations in water height were small, due to the prolonged drought conditions during 1989 and 1990 and the nature of the discharge pattern in this regulated river. However the following interpretations of the data may be made:

1. Differences in water height between the logged and river values were small and generally well within the quoted 2 cm error. The values shown do not reflect mean depth of the river since the gauge was located in shallow water. Approximately 1.5 m should be added to obtain the mean depth on a particular date.
2. Cleaning the sensors appeared to have little effect and prolonged immersion without cleaning had little effect.
3. Differences between air and water temperature appeared to have little effect.
4. The effect of wave action is unknown since the location was sheltered and the channel width relatively narrow.

5. Only one data set in the eighteen months was badly adrift (1.2.90) and was associated with high water levels. Water level was relatively stable at this point (the end of the water height trace shown in Fig. 2) and it is probable that the drift was due to poor calibration at the top end of the scale, rather than wet detritus above the water line.

6. Due to the extended drought conditions we have been unable to test the effect of rapid changes in water height. Moreover, rapid changes are unlikely to occur so far downstream in this type of managed river.

4. REFERENCES

ROUEN, M.A. 1989. The design and development of the "Windermere Profiler". An instrument for measuring how various environmental variables vary with depth in lakes, reservoirs and rivers. Freshwater Biological Association Annual Report, 1989, pp 93-106.

Table 1. 1989. Water levels (in cm) observed directly on the gauge board (RD) are compared with the logged data (LD); air temperature (AT) and river water temperature (RT) are also shown . Values are shown as two sets, at the start of a logging sequence and the end.

Date	Start				Finish			
	LD	RD	AT	RT	LD	RD	AT	RT
26.05.89	55	55	15	18	--	--	13	18
09.06.89	61	61	19	15	58	56	22	19
16.06.89	--	--	24	22	59	59	16	22
30.06.89	62	62	18	19	69	69	18	19
07.07.89	57	57	22	21	60	60	19	20
14.07.89	60	60	23	21	60	60	18	21
21.07.89	67	67	30	23	58	60	22	24
28.07.89	58	58	24	23	56	56	15	20
04.08.89	59	59	25	20	55	55	18	20
11.08.89	60	60	23	21	60	60	22	20
18.08.89	59	60	18	20	56	56	27	21
25.08.89	59	58	16	20	57	58	19	19
29.08.89	60	60	11	18	55	54	17	17
08.09.89	58	58	18	18	60	60	16	16
22.09.89	60	60	17	17	57	56	12	16
28.09.89	59	58	16	16	56	54	12	15
05.10.89	59	58	13	14	56	55	14	13
12.10.89	59	58	17	13	56	55	12	12
19.10.89	55	56	18	13	60	59	11	13
26.10.89	59	58	12	13	57	57	16	11
02.11.89	57	55	11	11	61	58	4	9
09.11.89	--	--	10	8	59	57	9	9
16.11.89	61	60	10	8	60	59	7	8
08.12.89	60	57	2	4	58	56	2	4
15.12.89	83	82	7	6	89	88	4	7
21.12.89	--	--	12	--	128	124	5	--
28.12.89	70	68	8	--	59	55	3	--

Table 2. 1990. Water levels (in cm) observed directly on the gauge board (RD) are compared with the logged data (LD); air temperature (AT) and river water temperature (RT) are also shown . Values are shown as two sets, at the start of a logging sequence and the end.

Date	Start				Finish			
	LD	RD	AT	RT	LD	RD	AT	RT
05.01.90	65	63	7	--	90	88	4	--
12.01.90	61	60	9	--	61	59	9	--
19.01.90	65	64	9	--	58	58	12	--
26.01.90	71	73	4	--	65	65	7	--
01.02.90	97	95	8	--	177	171	9	--
08.02.90	160	157	7	--	88	86	6	--
15.02.90	95	94	6	--	65	64	11	--
21.02.90	--	--	12	--	61	60	11	--
01.03.90	60	61	2	--	58	56	9	--
08.03.90	57	58	10	--	61	60	5	--
16.03.90	56	56	17	--	58	58	12	--
22.03.90	61	60	12	--	62	60	9	--
29.03.90	57	58	12	9	62	61	11	11
05.04.90	56	57	12	10	64	62	2	9
12.04.90	54	53	19	11	58	57	12	10
19.04.90	--	--	8	10	60	60	9	11
26.04.90	56	56	13	13	60	59	9	14
04.05.90	55	55	15	18	56	55	13	18
18.05.90	57	57	10	17	58	57	10	15
25.05.90	55	55	10	16	--	--	15	16
04.06.90	58	58	17	18	59	58	9	17
11.06.90	58	58	12	16	62	60	12	16
19.06.90	53	52	13	15	55	54	17	17
22.06.90	59	58	13	17	58	58	18	17
28.06.90	55	54	18	20	--	--	13	18
09.07.90	56	55	12	16	60	58	13	17
12.07.90	52	52	25	20	55	55	17	21
20.07.90	54	54	23	22	59	58	13	21
26.07.90	48	48	22	22	53	53	20	20
02.08.90	51	51	29	23	49	48	16	22
09.08.90	49	50	22	25	52	50	23	23
16.08.90	53	52	20	20	59	59	14	19
23.08.90	53	53	26	20	54	52	19	21
31.08.90	52	52	14	20	51	50	18	20
07.09.90	55	55	14	17	--	--	14	17
21.09.90	55	56	10	14	57	57	12	13
27.09.90	57	56	17	13	63	60	8	13

Fig. 1. Map illustrating site location (red asterisk). Scale approx. 8cm = 1km

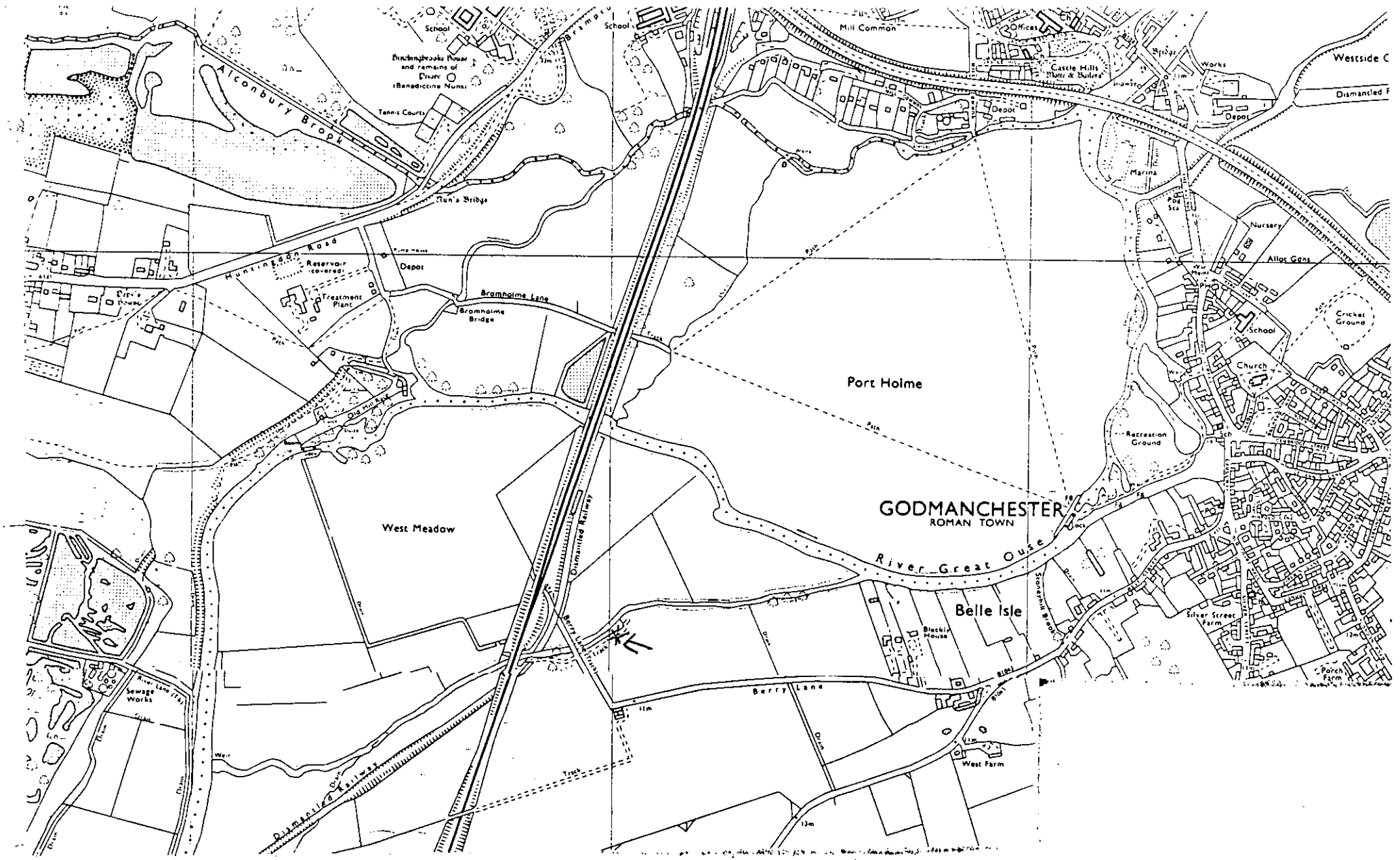
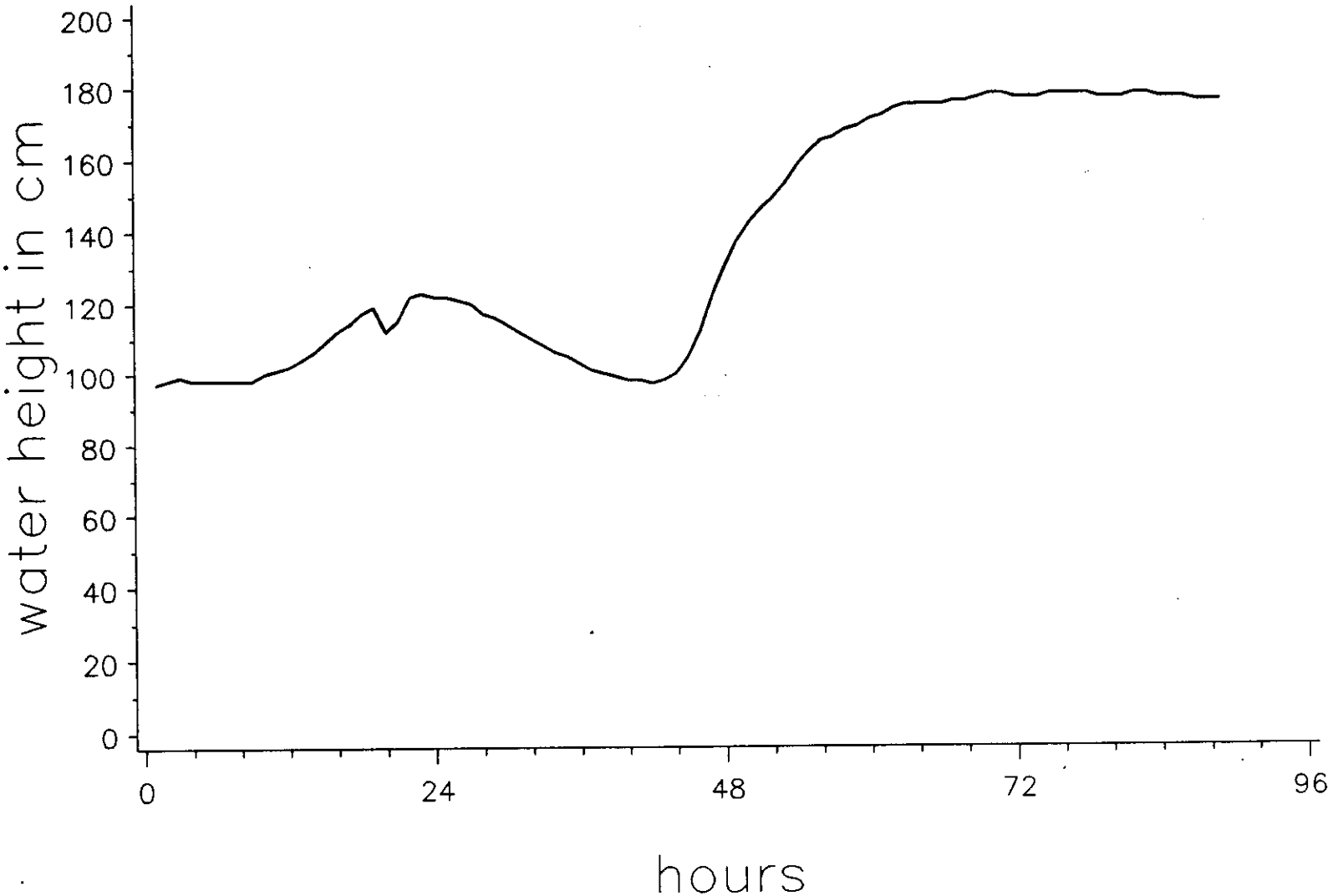

Alconbury Brook
Huntingdon Road
Reservoir (covered)
Treatment Plant
Depot
Bromholme Lane
Bromholme Bridge
Port Holme
West Meadow
GODMANCHESTER
ROMAN TOWN
River Great Ouse
Belle Isle
Berry Lane
Disused Railway
Sewage Works
Mill Common
Castle Hills
Marina
Nursery
Allot Gans
Cricket Ground
School
Church
Recreation Ground
Silver Street Farm
Porch Farm
West Farm
Blackis House
Tennis Courts
Westside C

Fig. 2. Changes in water height as recorded on the "Windermere profiler" during a high discharge period.


water height in cm
200
180
160
140
120
100
80
60
40
20
0
0
24
48
72
96
hours

APPENDIX

Copy of the original quotation.

armfield

Armfield Technical Education Co. Ltd.
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West Street,
Ringwood, Hampshire,
England, BH24 1DY.

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Int: +44 425 478
Fax: UK: 0425 470916
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To	FRESHWATER BIOLOGICAL ASSOCIATION EASTERN RIVERS GROUP C/O INST. OF TERRESTRIAL ECOLOGY MONKSWOOD EXP. STN, ABBOTS RIPPON HUNTINGDON. PE17 2LS
Our ref — Please quote on all correspondence.	ATE 3468
Date	19-1-89
Customer's Order No.	ER47 Date 20-12-88
Quotation No.	HH 107A Date 16-12-88
Conditions of Sale ATE F12/86 and BEAMA	A
Terms of payment	NETT CASH 30 DAYS
L/c No.	N/A Validity N/A
Purchased on behalf of	SELVES

Quantity	Cat. Ref.	Description		Value
1	H9-2DC	Electronic Gauge Board Complete with signal cable, mounting clips and protective (light) cover for top 1m of board.		
		Special discounted price Nett ex works	£	200.00
		Delivery	£	TBA

Electrical Supply:
Calibration: S.I. units unless otherwise stated.
VAT: will be added to above total at prevailing rate/~~not applicable~~.

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