ACCN AMATEUR COMPUTER CLUB NEWSLETTER VOL I ISS 3 AUG 1973

THE OLD & THE NEW

Messrs. J.Aslet & C.Byne are members of a group in Huddersfield who have two 803's running and are to take delivery of a third. Mr.Aslett writes;

" When I moved to Huddersfield I purchased a 803 and with help removed it to the house. The group began to form and we were so impressed by it , even though it was made in '61 -62 that when early this year another 803 computer became available we installed it alongside the small machine with some special hardware we designed and built ourselves.

Once an extension is built a third 803B will be installed,this machine has just been removed into storage , to await this event.

We would not have engaged in this activity if the cost had been high but so far for three systems, plus a large quantity of spares has cost less than £400 ; the price of a good HI FI.

We carry out all our own maintenance which is the main reason for sticking to 803 B's which we have found fairly simple to understand & fault find.

Machine 'C' 803B 4K floating point with single channel paper tape station reading 500 cps punching 100 cps. Creed 75 teletype.

Machine 'T' 803B 8K double channel paper tape station (2 readers, 2 punches, on-line teleprinter). Creed 1000 high speed printer. 2 magnetic film handlers, transfer rate 4.18 Kcps organised as 4096 blocks of 64 words, about 100 films. Software floating point.

Machine 'M' 803B 8K floating point and fast shift. Single channel paper tape station, on line printer, 3 mag film handlers.

Also two 5 channel paper tape preparation positions with page printers. Graph plotter is to be added shortly to machine 'M' along with a line printer.

Standard software; Algol, FORTRAN and language H (version of COBOL), full set of application programs, either in Auto code or machine code.

Inhouse designed interface for machines 'C' and 'T' to work together in an interactive mode.

Datel 600 terminal equipment linked to 'T' for 8 channel input by remote users (fitted for input from Open University terminals in Huddersfield) "

"I suppose his amateur computer club is a nice hobby for him but sometimes I wish he just collected stamps."

(Reproduced by kind permission of Electronics Weekly)

"My home-made PDP8 is now working. If anyone should like to come and see it working, they should phone me at work at;

01 589 5111 ext 2411

The state of the I-O devices is variable and these are not guaranteed to be in a working state. The machine lives in Hemel Hempstead but has been and could be brought to London for a demonstration."

John Florentin

FIVE QUID CPU

Microcomputer central processors will be £5 each (large quantity prices) within two years forecasts Intel Corporation.

INTEL , who make the 8008 8 bit 'CPU on a chip' plan to introduce the next type - the 8080 - which will be 8-bit parallel CPU with a 2 microsecond instruction cycle and 64 kilobytes of directly addressable memory. Features will include unlimited nesting of sub-routines, expandable to 256 I/P and 256 output ports, and an ability to be used with any type of memory.

THE AMATEUR COMPUTER CLUB

IS OPEN TO ANYONE INTERESTED IN THE DESIGN, CONSTRUCTION OR PROGRAMMING OF COMPUTERS AS A HOBBY. FOR MEMBERSHIP OF THE ACC AND A SUBSCRIPTION TO VOL I OF THE NEWSLETTER SEND 50p - 75p FOR OVERSEAS MEMBERS-. VOL I WILL COMPRISE AT LEAST 5 ISSUES PRODUCED AT 2 TO 3 MONTH INTERVALS.

M LORD 7 DORDELLS
BASILDON ESSEX

BOOKLIST

The books listed below have been suggested by various members, thanks to them for their help.

COMPUTER STRUCTURES, READINGS AND EXAMPLES Mc Graw-Hill 1971
C Gordon Bell & Allen Newell

GAME PLAYING WITH COMPUTERS
D.Spencer Spartan Books New York '68

UNDERSTANDING DIGITAL COMPUTERS
R Benrey Iliffe Books 1965

DIGITAL STORAGE SYSTEMS
W Renwick Chapman & Hall 1971

TEACH YOURSELF COMPUTERS
University Press

ELECTRONIC COMPUTERS MADE SIMPLE
Doubleday

DICTIONARY OF COMPUTERS
Penguin 1972

DICTIONARY OF ELECTRONICS
Penguin 1972

ELECTRONIC COMPUTERS
Penguin 1971

ELECTRONIC COMPUTERS MADE SIMPLE
W.H.Allen 1971

COMPUTER PROGRAMMING MADE SIMPLE
J.Maynard W.H.Allen 1972

FASTER THAN THOUGHT
ed. Lord Bowden Pitman Paperbacks

Macdonald Computer Monographs

This excellent series provides the reader with an up to date survey of the state of the software art. Not for beginners.

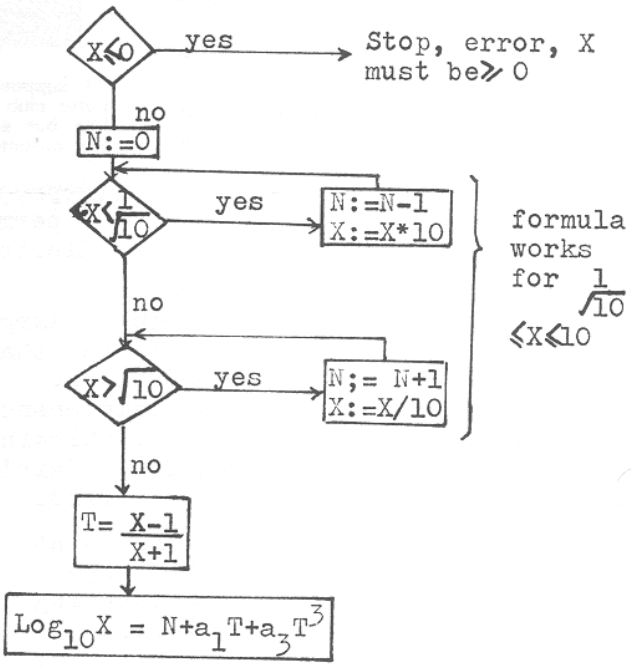
1 **List Processing** by J. M. Foster
2 **A Comparative Study of Programming Languages** by Bryan Higman
3 **Recursive Techniques In Programming** by D. W. Barron
4 **Basic Machine Principles** (*Second Edition*) by J. K. Iliffe
5 **Time-Sharing Computer Systems** (*Second Edition*) by M. V. Wilkes
6 **Assemblers and Loaders** (*Second Edition*) by D. W. Barron
7 **Automatic Syntactic Analysis** by J. M. Foster
8 **Compiling Techniques** by F. R. A. Hopgood
10 **Executive Programs and Operating Systems** edited by G. Cuttle and P. B. Robinson
12 **Computer-Based Library and Information Systems** (*Second Edition*) by J. P. Henley
13 **Computer Handling of Chemical Structure Information** by M. F. Lynch, Judith M. Harrison, W. G. Town and Janet E. Ash
14 **Optimum Packing and Depletion** by A. R. Brown
15 **The Programmer's Introduction to LISP** by W. D. Maurer
16 **Quick COBOL** by L. Coddington
17 **Introduction to Operating Systems** by A. J. T. Colin

GI are now selling their C500 single chip calculator I-C for £13.70 (one off) through Semicomps, Semiconductor Specialists and SDS Components Ltd.

7-BIT ASCII CODE

Octal Code	Char	Octal Code	Char	Octal Code	Char	Octal Code	Char
000	NUL	040	SP	100	@	140	`
001	SOH	041	!	101	A	141	a
002	STX	042	"	102	B	142	b
003	ETX	043	#	103	C	143	c
004	EOT	044	$	104	D	144	d
005	ENQ	045	%	105	E	145	e
006	ACK	046	&	106	F	146	f
007	BEL	047	'	107	G	147	g
010	BS	050	(	110	H	150	h
011	HT	051	)	111	I	151	i
012	LF	052	*	112	J	152	j
013	VT	053	+	113	K	153	k
014	FF	054	,	114	L	154	l
015	CR	055	-	115	M	155	m
016	SO	056	.	116	N	156	n
017	SI	057	/	117	O	157	o
020	DLE	060	0	120	P	160	p
021	DC1	061	1	121	Q	161	q
022	DC2	062	2	122	R	162	r
023	DC3	063	3	123	S	163	s
024	DC4	064	4	124	T	164	t
025	NAK	065	5	125	U	165	u
026	SYN	066	6	126	V	166	v
027	ETB	067	7	127	W	167	w
030	CAN	070	8	130	X	170	x
031	EM	071	9	131	Y	171	y
032	SUB	072	:	132	Z	172	z
033	ESC	073	;	133	[	173	{
034	FS	074	<	134	\	174	|
035	GS	075	=	135	]	175	}
036	RS	076	>	136	↑	176	~
037	US	077	?	137	←	177	DEL

ALGORITHM for $Log_{10}X$ — R Mount



where $a_1 = 0.86304$

$a_3 = 0.36415$

error $\leq 6 \times 10^{-4}$

There exist polynomial approximations for most standard functions. Many useful ones, including the above example, can be found in 'Handbook of Mathematical Functions' by Abramowitz and Stegun (Dover 1965). Such expressions are so simple that they are extremely fast to evaluate , further for increased precision a new expression is needed.

MEMBERS : AT 1/8/73

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W.Henry	74 Onslow Parade, Belfast
J.Houghton	9 Park Close, Tetbury, Glos

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M.Johnson	131 Clifton Drive, Blackpool
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P.Jones	17 Broxton Rd., Clutton, Tattenhall, Chester
A.Judge	1 West Green Court, Berkeley Ave., Reading, Berks
M.Kempton	24 Greta Rd., Skelton, Yorkshire
B.Kershaw	64 Featherstone Rd., King's Heath, Birmingham
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R.Palmer	90 Stort Tower, Harlow, Essex
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E.Williams	7 Greenmeads, Woking, Surrey
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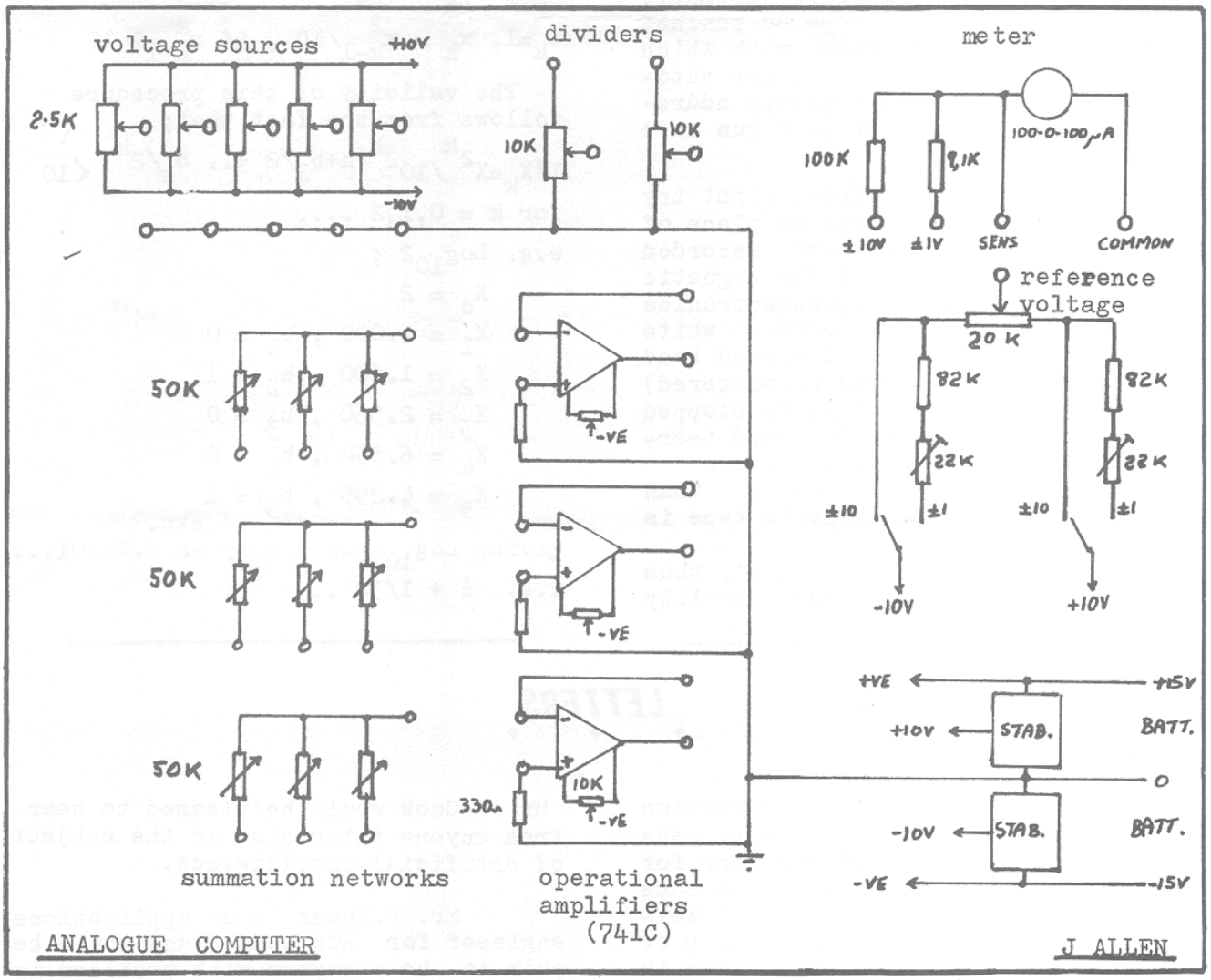
Note; this list does not include the names of some members who had indicated that they would prefer not to have their names included, neither does it include members of the armed services. Supplementary lists will be printed from time to time.



LET'S GET TOGETHER

At least those of us in the London area. Reasons are;

- to regularise the club (elect officers, spread the work load etc.)
- to be sociable.
- to discuss a suggestion from Mr. P. Lockerby that we offer the services of ACC members to the Science Museum, who are arranging a permanent exhibition of computers.

So anyone interested please get in touch with me (business telephone no is 02 68 3040 ext 275)

mike lord

OPEN UNIVERSITY

PM951 Computing & Computers course.

Course material available - apply to 'The Director of Marketing , The Open University, PO Box 81, MILTON KEYNES'

To apply for the course (£70 in '74), write for prospectus to ;- 'The Post-experience Student Office , The Open University, PO Box 76, MILTON KEYNES'

Applications opened 7 May 73, final date for return of application forms is 26 October.

RANDOM NOISE • BY PAL

What does one call a 'computer fan'? Can anyone suggest an appropriate name? My own attempts at word coining leave much to be desired. For example what can a ROBOPHILIST be but a lover of muggers . Is an AUTOPHILE a car fiend, a Narcissist or an information retrieval system ? BOOLOPHILE ? LOGICOPHILIST ? CYBERPHILE ? any suggestions ?

Here's a tip for anyone with access to a teletype or similar automatic printer. Make loop of tape or punched cards coded for addresses with which you frequently correspond , for automatic label making or envelope addressing which will in the long run save you hours.

The experimentally minded might try using old magnetic tape in place of punched paper. 'Holes' are recorded by scraping away some of the magnetic coating, and read by optoelectronics or reading heads. (Try recorded white noise , the signal at the read head will drop when a hole is encountered) A punch requires the tape be stopped for each punch stroke to avoid tearing, a scraper doesn't, therefore 'scraped' tape records faster than punched tape. And as magnetic tape is employed a single deck can accomodate magnetic tape or 'scraped tape', thus providing a measure of compatibility and space saving.

ANOTHERLOG

To find Log_{10} in binary. M.Walsh

$Log_{10}X = n+b_1/2 + b_2/4 + b_3/8 + ...$

First shift the decimal point of X so that we have $1 \leqslant X/10^n < 10$ which gives us n.

To get b_1, b_2, b_3 etc we now set

$X_o = X/10^n$ and for $k \geqslant 1$;

$b_k=0$, $X_k = x^2_{k-1}$, if $x^2_{k-1} < 10$

$b_k=1$, $x_k = x^2_{k-1}/10$, if $x^2_{k-1} \geqslant 10$

The validity of this procedure follows from the fact that;

$1 \leqslant X_k = X^{2^k}/10^{2^k}(n+b_1/2 + .. b_k/2^k) < 10$

for k = 0,1,2 ....

e.g. $Log_{10}2$;

$X_o = 2$

$X_1 = 4.000$, $b_1 = 0$

$X_2 = 1.600$, $b_2 = 1$

$X_3 = 2.560$, $b_3 = 0$

$X_4 = 6.554$, $b_4 = 0$

$X_5 = 4.295$, $b_5 = 1$ etc.

giving $Log_{10}2$ in binary as 0.01001...

i.e. $\frac{1}{4} + 1/32$ ..

LETTERS

M.Hatt, who gave us the information on the 'Open University' course, says that anyone thinking of applying for the course who would like to see some of the texts and course books is welcome to call round in the evening or at weekends. He is also willing to lend his Cossor 1035 Mk II 'scope.

Mr. P.Lockerby writes; "There exists a possibility that I may soon be building, or rebuilding, a complete computer installation for my own benefit. If anyone in my vicinity is interested in lending a hand or forming a local building group would they please get in touch. If you require specific data concerning teletypes, PDP 8 series computers , and/or any general computer-oriented data I may be able to assist as I have access to a host of literature including operator manuals, workshop manuals etc. (mainly DATA 100 equipment)"

Mr. H.Cook would be pleased to hear from anyone interested in the subject of artificial intelligence.

Mr. P.Whear is an applications engineer for RCA COSMOS and would be able to help anyone with problems in this area.

Members may be interested to hear that 2.4K' of ½" mag tape is available from Forum Stores (callers only) ,in the grounds of Taunton College, for 15p.

L.J.Harvey is trying to design a sattelite tracking monitor, involving an analogue display system. He would be grateful for any information as to suitable literature, and for anyone's opinions on the feasibility of digital systems to perform the same function.

LIFE IS JUST A GAME

The game of 'Life' was invented by John Conway, a mathematician at Cambridge University. A description of the rules of the game may be found in 'Scientific Americal' , October 1970 and February 1971.

The game simulates the survival, death and birth of cells in an organism. The rules of the game are simple;

1. Neighbours. Every cell is surrounded by 8 positions in which neighbours can be located. In the diagram alongside the X has 8 'H' neighbours.

```
HHH
HXH
HHH
```

2. Survival. Every cell with 2 or 3 neighbours survives to the next generation.
3. Death. Every cell with more than 3 neighbours dies from over-population. Every cell with less than 2 neighbours dies from isolation.
4. Birth. Every empty cell position adjacent to exactly 3 neighbours will be filled by a new-born cell at the next generation.

In order to play the game with paper and pencil I advise the following technique to avoid errors; Represent the cells by X. Draw the initial pattern on squared paper. Now redraw the pattern on another piece of squared paper and use this copy when applying the rules of the game. Consider every cell in the pattern and determine if it will die according to rule 3, and if it does place a ring around the X. Consider every empty position in the original pattern and determine if birth will occur according to rule 4 at the next generation and if it does place a O in the cell position. When applying the rules of the game it is important to remember that you are processing the pattern as it exists at the current generation. Deaths and births occur at the next generation and so do not affect the application of the rules at this generation. Now draw the cell pattern for the next generation by copying the pattern onto the first piece of paper, replacing X's by X's, ringed X's by spaces and O's by X's. The procedure can now be repeated to find the next generation.

Cell patterns will die out completely, reach a stable form or oscillate.

You might like to try the following starting patterns;

```
XXXXXXX (14 generations)

XXXXX
X   X  (32 generations)
```

The game can be played with paper and pencil but it is quicker by computer.

In particular the use of a visual display to show the changing patterns is fascinating.

There is a publication devoted to the study of this game, 'LIFELINE', published by Robert T Wainwright, 1280 Edcris Road, Yorktown Heights, New York 10598 USA.

example;

generation	permanent record	working copy
1	X XXX	OXO XXX O
2	XXX XXX X	O XXX XXX OXO
3	X X X XXX	X XXX O O XXX O

and so on

A R Hare

Inputs for the next issue by October 1st. please.

The amount of information in each issue of the ACCN , and the number of issues per volume, are limited mainly by the cost of printing. Does anyone know a cheap way ?

The June issue of Scientific American carried the article 'An Advice-Taking Chess Computer'

Computer Automation Inc has produced a 16 bit, 4K computer on a single PC card measuring 15 x 17 in. Price is £495 (200 off). Mounted in a cabinet with power supply & control panel it comes to £995 for a single unit.

A NIBBLING MACHINE *

Mr. G.Burkill has sent some details of the machine he is building;

"The core store will contsin 4096 4 bit words. The 4 bit size is small, I know , but it has economic advantages and is ideal for working in BCD. In addition there are 5 12bit registers. One of these is the accumulator which is concerned with almost every instruction executed. The others are numbered 00, 01, 10 and 11 and are the main registers for storing data being worked on. One however is the program address register.

The 4 bit instruction format is restricted, but is as follows; 2 bits contain the number of the 12 bit register to be operated with. A third bit specifies whether the operation is to be 'Add to Accumulator' or 'dump from Accumulator'. The last bit is the mode, when zero the operation is to be carried out with the register specified in the first bits; when 1, it is to be carried out with the number in the core store at the addr which the register specifies.

However, to increase the instruction set we forbid the mode to be '1' when working with one of the 12 bit reg.

This leaves 2 spare instructions, corresponding to an add and dump with this reg. One of these instructions is used to shift the accumulator 4 spaces right. This is a useful instr. since the core store uses only 4 bit words. The other spare instr. is used as a prefix to a 'double length' instruction, the second word of which is decoded into one of 16 possible actions, which include shifting, jumping, clearing the accumulator, incrementing one of the registers etc

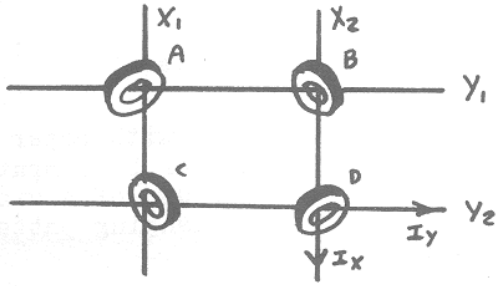
I do not claim the machine to be a powerful one, I acknowledge it's simplicity , however it has proved cheap and I expect to get a lot of use out of it."

* A nibble is half of a byte, i.e. four bits.

CORES FOR STORES PART 2

To proceed with the design of our store, it is reasonable to assume that co-incedent current selection will be used. The only reason for departing from this would be to obtain ultra-high speeds. A full explanation is given in most books on computer technology, but to summarise briefly it means that there are 2 drive wires running through each core, arranged at right angles to each other as shown in the diagram of a basic 2 x 2 matrix alongside.

Thus if one half of the current required to 'switch' the core is passed through an X wire, and the same amount of current through a Y wire; say X_2 and Y_2 as shown, then only one core (D in this case) will be switched.



To determine an appropriate value for Ix and Iy (and we only want an approximate value at this stage as the store can be 'tuned' by adjusting the currents for optimum performance when it has been built), we refer back to the graph of V_{sp} against I_{dp} as found in the last issue of the ACCN. We want to choose a current $I_x + I_y$ that is large enough to switch a core but which is still sufficiently small that I_x or I_y by themselves cannot cause a core to switch.

For the example given in the last issue of the ACCN, it would seem that a value of about $\frac{1}{2}$A for Ix, and the same for Iy, would be about right as their sum (1A) provokes a healthy reaction in terms of sense voltage from a core while the individual currents of $\frac{1}{2}$A hardly move it.

To get an approximate minimum time for the current pulse (and again we can 'tune' the completed store for best performance) a figure of two times the time from the application of the drive current until the sense output voltage pulse has died away is reasonable.

So, we now know 'how much current & for how long', at least approximately. In the next article in this series we will look at some suitable circuits .