POCKET REFERENCE GUIDE

DATATAKER DT100, DT100F, DT100I DATA LOGGERS

A concise reference to
input, output, data storage
and communication.

DATATAKER

ANALOG INPUT CHANNEL TYPES

TYPE		COMMAND	UNITS
Voltage		nV	mV
Attenuated voltage (see Poke 8)		nV&	V
J thermocouple	See Poke 34 & 35	nTJ	Deg*
K thermocouple		nTK	Deg*
N thermocouple		nTN	Deg*
R thermocouple		nTR	Deg*
S thermocouple		nTS	Deg*
T thermocouple		nTT	Deg*
RTD by voltage drop (see Poke 33)		nBV	Deg*
RTD by resistance		nBR	Deg*
LM335 and AD590		nMA	Deg*
LM35		nMC	Deg*
Strain gauge (see Poke 38)		nS(g)	uStrain
Current		nI	mA
4-20mA current loop		nLA	Percent
10-50mA current loop		nLB	Percent
Frequency		nF	Hz
Period of frequency		nP	uSec
Resistance		nR	Ohms
Zero volts reference		24V	mV
100 ohm reference		24R	Ohms
Internal temperature		25MA	Deg*

n Channel number or sequence, differential or single ended.

eg. 1V 1..5R 7+F 10-. 15+TK

* Units of temperature are defined via Poke36

g Strain gauge types require specification of a gauge factor

DIGITAL INPUT CHANNEL TYPES

TYPE	COMMAND	UNITS
Digital byte (8 bits)	0D	Digital
Digital bit (1 bit)	nD	Digital
Accumulating counter (High speed)	0C	Counts
Accumulating counter (Low speed)	nC	Counts
Resetting counter (Low speed)	nCR	Counts
Repeat 1 scan counter (Internal)	9C	Counts
Repeat 2 scan counter (Internal)	10C	Counts
Ave/SD/Min/Max scan counter (Internal)	11C	Counts
Phase encoder up-down counter (Inputs on D7 D8)	12C	Counts

n Channel number or sequence eg. 1D 1..5CR

OUTPUT CHANNEL TYPES

TYPE	COMMAND
Digital state (8 bit)	0D = x
Digital state (1 bit)	nD = b
Digital pulse (8 bit)	0D = x(d)
Digital pulse (1 bit)	nD = b(d)
Counter preset (16 bit)	nC = m
Analog voltage output	nV = v
Analog voltage pulse	nV = v(d)
Set reference voltage	P9 = v

n Channel number or sequence eg. 1V 1..4D
x Digital byte value, 0 to 255
b Digital bit value, 0 or 1
v Analog voltage, -7000 to +7000 mV
d Delay period, 0 to 65535 (mSec)
m Counter preset, -32768 to 32767

SWITCH COMMANDS

SWITCH ENABLE	SWITCH DISABLE	FUNCTION	DEFAULT SETTING
/A	/a	Pause/Resume data acquisition	/A
/C	/c	Pause/Resume control & alarms	/C
/D	/d	Return day of minima & maxima	/d
/E	/e	Echo commands	/E
/F	/f	Fix channel table	/f
/G	/g	ADC gain lock	/g
/K	/k	Auto calibration of ADC	/K
/L	/l	Log data to memory	/l
/M	/m	Return warnings & error messages	/M
/N	/n	Return channel number	/N
/O	/o	Overwrite oldest data in memory	/o
/P	/p	Return checksums during unstoring	/p
/R	/r	Return data in real time	/R
/S	/s	Synchronize scans to real time	/s
/T	/t	Return time of minima & maxima	/T
/X	/x	Log single scans	/x
/U	/u	Return units text	/U
/Z	/z	Low power (snooze) mode	/z
//		Set switches to default settings	

PEEK AND POKE COMMANDS

PEEK POKE	FUNCTION	PERMITTED VALUES	DEFAULT VALUE
P0	Calibration interval (0.01 Deg C)	0 to 30000	50 (0.5 Deg C)
P1	2V range trim factor (100 ppm)	-30000 to 30000	0
P2	200mV range trim factor (100 ppm)	-30000 to 30000	0
P3	20mV range trim factor (100 ppm)	-30000 to 30000	0
P4	Frequency range trim factor (100 ppm)	-30000 to 30000	0
P5	Resistance range trim factor (100 ppm)	-30000 to 30000	0
P6	Checksum interval (Data points)	1 to 30000	127
P7	Control/alarm scan interval	1 to 30000	5
P8	Voltage attenuation factor	1 to 30000	11 (11:1)
P9	Analog output Vref (mV)	-7000 to 7000	-2490
P10	ADC settling period (mSec)	0 to 30000	10
P11	Mains frequency (Hz)	40 to 1000	50/60
P12	Number of ave/min/max samples	Peek only	
P13	Debounce period of digital inputs	0 to 30000	47 (10 mS)
P14	High speed counter (Counter 0)	-32768 to 32767	13
P15	High speed counter stop	0 to 255	0
P16	High speed counter start	0 to 255	0
P17	High speed counter mode	0 to 255	5
P18	Set/read digital outputs (8 bit data)	0 to 255	0
P19	Clear digital outputs (8 bit mask)	0 to 255	0
P20	Set digital outputs (8 bit mask)	0 to 255	0
P21	Current Shunt (Milliohms)	1 to 65535	10000 (10.00 Ohm
P22	Data delimiter character	1 to 127	13 (CR/LF)
P23	Calibration cycles	1 to 20	3
P24	Scan delimiter character	1 to 127	13 (CR/LF)
P25	Unstore finished character	0 to 127	0
P26	Screen initial character 1	0 to 127	0
P27	Screen initial character 2	0 to 127	0
P28	Screen initial character 3	0 to 127	0
P29	Screen initial character 4	0 to 127	0
P30	Screen initial character 5	0 to 127	0
P31	Screen initial character 6	0 to 127	0
P32	End of screen initial string	Peek only	
P33	RTD reference channel	1 to 25	24
P34	Thermocouple temp reference channel	1 to 25	25
P35	Thermocouple zero reference channel	1 to 25	24
P36	Temperature units (0=C, 1=F, 2=K, 3=R)	0 to 3	0 (Deg C)
P37	Thermocouple temp reference sensor 0 = MA (LM 335, AD 590) 1 = MC (LM 135) 2 = BV (PT 100) 3 = BR (PT100)	0 to 3	0 (LM335)
P38	Strain gauge reference channel	1 to 25	22
P39	Time format (0 = HHMMSS, 1 = seconds) 2= decimal hours)	0 to 2	0 (HHMMSS)
P40	Time separator character (HH MM SS)	1 to 127	58 (:)

ASCII CHARACTER TABLE

ASCII Char	Decimal	ASCII Char	Decimal	ASCII Char	Decimal
NUL	0	+	43	V	86
SOH (^A)	1	,	44	W	87
STX (^B)	2	-	45	X	88
ETX (^C)	3	.	46	Y	89
EDT (^D)	4	/	47	Z	90
ENQ (^E)	5	0	48	[	91
ACK (^F)	6	1	49	\	92
BEL (^G)	7	2	50	]	93
BS (^H)	8	3	51	^	94
HT (^I) TAB	9	4	52	_	95
LF (^J)	10	5	53	`	96
VT (^K)	11	6	54	a	97
FF (^L)	12	7	55	b	98
CR (^M)	13	8	56	c	99
SO (^N)	14	9	57	d	100
SI (^O)	15	:	58	e	101
DLE (^P)	16	;	59	f	102
DC1 (^Q) XON	17	<	60	g	103
DC2 (^R)	18	=	61	h	104
DC3 (^S) XOFF	19	>	62	i	105
DC4 (^T)	20	?	63	j	106
NAK (^U)	21	@	64	k	107
SYN (^V)	22	A	65	l	108
ETB (^W)	23	B	66	m	109
CAN (^X)	24	C	67	n	110
EM (^Y)	25	D	68	o	111
SUB (^Z)	26	E	69	p	112
ESC (^[)	27	F	70	q	113
FS (^\)	28	G	71	r	114
GS (^])	29	H	72	s	115
RS (^^)	30	I	73	t	116
US (^_)	31	J	74	u	117
SPACE	32	K	75	v	118
!	33	L	76	w	119
"	34	M	77	x	120
#	35	N	78	y	121
$	36	O	79	z	122
%	37	P	80	{	123
&	38	Q	81	|	124
'	39	R	82	}	125
(	40	S	83	~	126
)	41	T	84	DEL	127
*	42	U	85		

SCANNING CONTROL COMMANDS

COMMAND	FUNCTION	EXAMPLE
*	Unary scan	*T
**	Repeated unary scan	**1V
	Single scan	D T 1..5R 10LB
X	Single rescan or polling scan	X
Rmt	Repeat scan on time	R10S D T 1..5TK 10F
Amt	Averaging scan on time	R30M A10S 5-..10+V
AZmt	Ave and Std Devn scan on time	R30S AZIS 1..10TK
MNmt	Minimum scan on time	R1H MN10S 1..4R 2D
MXmt	Maximum scan on time	R2H D T MX1M 1V 4..6LA
AMNmt	Ave & Min scan on time	R30M AMN2S 10BV 2C
AMXmt	Ave & Max scan on time	R1D AMX1H 1..4TN 5V
AMMmt	Ave, Min & Max scan on time	R90S T AMM2S 1TT 6V 10F
AZMMmt	Ave, SD, Min and Max scan on time	RID AZMM IV 2R 3F 4D
Rne	Repeat scan on event	R1E T 1V 2R 3F 1D
Ane	Averaging scan on event	R1H A3E 2..6+I
AZne	Ave and Std Devn scan on event	RIH AZ2-E 4..8V 10V& 2D
MNne	Minimum scan on event	R1Z MN2+E 1..4LA
MXne	Maximum scan on event	R12H D T MX3Z 3V 5..6TT
AMNne	Ave & Min scan on event	R2-E AMN3..5-E 2-..6+V
AMXne	Ave & Max scan on event	R1D AMX1Z 1..6TK 16R
AMMne	Ave, Min & Max scan on event	R1..4+E AMM8Z 1V 5..10TB
AZMMne	Ave, SD, Min and Max scan on event	RIE AZMM2E IV 3TT 6..8F
:nW	Conditional (While) scan	R1M:1W 1..5V 6R
H	Halt repeated scanning	H
/a	Halt repeated scanning	/a
G	Resume (Go) repeated scanning	G
/A	Resume repeated scanning	/A

m Scan time interval, 1 - 32767 time base units
t Time base unit, Seconds, Minutes, Hours, Days
n Digital input channel number or sequence
e Digital Event (E, +E, -E), Zero count event

DATA CONVERSION COMMANDS

COMMAND	FUNCTION	EXAMPLE
Yn=a,b,c,d,e"units"	Declare a polynomial	Y3=3.06,2.16e-3,8.77e3"KPa"
Sn=lp,up,le,ue"units"	Declare a span limit	S8=0,100,4,20"Nm"
Yn (Yn) [Yn]	Attach a polynomial	R2H 3..5VY2 6F[Y7]
Sn (Sn) [Sn]	Attach a span limit	R1M 1LA(S3) 6..8V[S5]

n	polynomial or span limit number, 1 to 10
a,b,c,d,e	polynomial constants
lp up	lower and upper physical limit
le ue	lower and upper electrical limit
"units"	7 character text string

CLOCK COMMANDS

COMMAND		EXAMPLE
T	Return real time	R1M T 1V
D	Return day number	R12H D T 1..5V
T=HH:MM:SS	Set real time clock	T=12:22:30 T=23:10 T=::45
D=ddd	Set day number	D=0 D=123
P39=d	Time format (0=HHMMSS, 1= secs 2= decimal hours)	P39=1
P40=d	Time separator character	P40=44 (comma)
/T	Enable time of Min/Max	R10S AMM1S 1.5R /T
/t	Disable time of Min/Max	R12H MM15M 1V 2R 3F /t
/D	Enable day of Min/Max	R1H MN15S 2..5LA /D
/d	Disable day of Min/Max	R15M AMX 10..15P /d
/S	Synch time intervals to midnight	/S
/s	Time from command entry	/s

CONTROL/ALARM COMMANDS

COMMAND	FUNCTION	EXAMPLE
m:D@n<>sp"text"	Control/alarm declaration	1D@1TN>450.0"High Temp"
mD@T<>time"text"	Time alarm declatation	3D@T<12:00:00"On"
nD@	Delete a control/alarm	5D@
/c	Suspend monitoring	/c
/C	Resume monitoring	/C

n	Digital output channel number and type
m	Any input channel number
sp	Setpoint (decimal)
"text"	20 Character text string. Text may contain Datataker commands in [ ] eg "[G/L]"

DATA STORE COMMANDS

COMMAND	FUNCTION	EXAMPLE
/L	Enable data storage	R10M D T 1V 2..6LA /L
/I	Disable data storage	/I
U	Unstore data from memory	U
P6=d	Number of data between checksums	P6=10 (requires /P)
/P	Enable checksum protocol	P6=32 /P U
/p	Disable checksum protocol	/p
(ACK)	Acknowledge checksum	CTRL-F from terminal
(NAK)	Not acknowledge checksum	CTRL-U from terminal
/Q	Abort data unstore	/Q
/(ESC)	Abort data unstore	/ESC or CTRL-[
CLEAR	Clear all data memory, sets /I	
CLAST	Clear unstored data memory	

( ) Denotes an ASCII character, not a literal command

SYSTEM COMMANDS

COMMAND	FUNCTION	EXAMPLE
(XOFF)	Suspend communications	CTRL-S from terminal
(XON)	Resume communications	CTRL-Q from terminal
#n	Address one logger in network	#3 CLEAR
##	Address all loggers in network	## IDENT
$="text"	Define text string, 1 - 80 chrs	$="Project 14, Run 11^M^J"
$	Return defined text string	R5M $ D T 1..10V
!	Handshake with sensor support	R30S T 3..5F!
Pn	Read (Peek) system variables	P22 P40 P12
Pn=dd	Set (Poke) system variables	P22=44 P40=58 P35=22
RESET	Reset logger	RESET
STATUS	Return total system status	STATUS
STATUS1	Return logger address	STATUS1
STATUS2	Return scan schedule	STATUS2
STATUS3	Return control/alarm schedule	STATUS3
STATUS4	Return declared polynomials & spans	STATUS4
STATUS5	Return data points free/stored	STATUS5
STATUS6	Return switch settings	STATUS6
IDENT	Return logger address	IDENT
TEST	Return ADC parameters	TEST TEST1
TEST2	Repeated TEST report	TEST2 (Stop by H)
TEST3	Repeated CMRR reading	TEST3 (Stop by H)
TEST4	Repeated battery current reading	TEST4 (Stop by H)
TEST5	Test watchdog, reset logger	TEST5

( ) Denotes an ASCII character, not a literal command

WARNINGS AND ERROR MESSAGES

E1 – time set error
E2 – input buffer full
E3 – frequency error
E4 – clear data memory
E5 – data memory full
E6 – data memory empty
E7 – day set error
E8 – peek/poke error
E9 – switch error
E10 – clear command error
E11 – input(s) out of range
E12 – channel list error
E13 – stimulate handshake error
E14 – communications error
E15 – assignment error
E16 – current loop error
E17 – control/alarm error
E18 – status command error
E19 – reset command error
E20 – illegal character(s)
E21 – illegal separator(s)
E22 – ave/sd/min/max error
E23 – repeat1 error
E24 – repeat2 error
E25 – ident command error
E27 – test command error
E29 – declaration error
E30 to E38 – calibration failure
E39 – thermocouple error
E40 – rtd error
E41 – RAM1 error
E42 – RAM2 error
E43 – RAM3 error
E44 – bottom NSC810A error
E45 – top NSC810A error
E46 – ROM checksum error
E47 – message error

COMMAND SYNTAX

To program the Datataker to scan a group of channels requires a single command line of not more than 255 characters. A scan command can contain up to four optional parts: a logger address, a single scan, and two repeat scans. The three parts must always be on one line terminated by a carriage return. It is not possible to edit or append to a command line already entered.

The syntax for a scan command is as follows:

[add]	[list {AMM list}]	[R list {AMM list}	[R list {AMM list}]]
address	single scan	repeat scan 1	repeat scan 2

where

"add" is logger address if more than one logger is connected eg #1 or ## or #F

"list" is any valid list of channels, time, day or pulse types eg 19F 1..5V T D 7D = 1(100)

"AMM" is the rapid scan specifier for averaging , standard deviation, maximum and/or minimum eg A1S or AMX10S or MM25M

"R" is the repeat (or report) scan specifier eg R1S or R3E or R2M

"{ }" curly brackets enclose option(s) which may be repeated eg R1M AMX 1V MX1S 2V

"[ ]" square brackets enclose optional parts of the command line
eg 1V R5S 2V R1M 3V or R2S 2V

Notes:

Spaces: The proper use of spaces in a command line is important. At least one space is required between address, scan specifiers, channel or type members, system commands, etc.

Case: Most commands must be in upper case. Switch commands are the only exception where the case determines the action to be taken. Any lower case character not preceeded by a "/" is ignored and may be used to improve command readability eg Report10Minute Time 1Volt (note where spaces are present and absent).

Switch Commands: May be placed anywhere in a command line provided they are space separated.

Assignments: These lie Poke =, Time =, Day =, Outputs etc) are processed only on entry of the command line. They are not repeated if embedded in a repeat schedule eg R1H T 1..5TT P34 = 6 P35 = 7 T = 12:00:00 will set the pokes and time only once and not every hour. The pulse command is the only exception.

Sample Programs:

Record every hour on the hour the average for the previous hour of the temperature on each of five thermocouples. Day stamp once per day:

```
/S/L
R24H D R1H A 1..5TT
```

Log the line frequency and time every ten seconds only while the line frequency is below 49.5Hz and greater than 30Hz. Issue a warning when this occurs. If memory fills overwrite the oldest data:

```
///L/O
1D@7F > 49.5"^JFreq Low^J"
2D@7F < 30.0"Gen Out^J^J"
R10S:1W T 7F
```

Comment: connect digital outputs 1 and 2 to digital input 1 for conditional scanning.

Print the average temperature of each of ten thermocouples in columns with a header and column title at the top of each page.

```
///u/n P22 = 9 ie a tab character
$ = "^L^M^M^I^I^ITemp (deg C)^M T1^I T1^I T2^I T3^I T4^I T5^I T6^I T7^I T8^I T9^I T10"
B61M $ B1M A 10 19TN
```

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