

GBT ARCHIVE L0480
FILE: LASER RANGING
KEYS: INTERFACE, LASER RANGING, SOFTWARE



Library

The Green Bank Telescope
Laser Metrology System
ZY Version 2.5 Software Interface
Reference Manual

Ramón E. Creager

September 1, 1998

Contents

1	Introduction	9
2	System Overview	11
2.1	ZP ranger hardware	11
2.2	ZY ranger software	12
2.3	Servo System	15
2.3.1	Resetting the LM628	18
2.3.2	Loading the PID filter values	18
2.3.3	Axis amplifiers	18
2.3.4	Finding home	18
2.3.5	Pointing the Laser Beam	18
2.4	Coordinate System	20
2.5	Data Acquisition System	23
2.6	Range Calculation	26
2.7	Time System	26
2.7.1	Year 2000 compliance and Leap Seconds	26
2.8	Power Supplies and Environment	27
2.9	Communications	27
2.10	Program Interface	28
2.10.1	Command String Format	30
2.10.2	Local (Console), batch (file) or TCP operation	31
2.10.3	Transaction ID ticket	31
2.10.4	Time Stamp	31
2.10.5	Command Execution	32
2.10.6	Simple Scheduler	32
3	Operation	35
3.1	Booting the ZY	35
3.2	Connecting to ZY	35
3.3	Using Commands	36
3.4	Initializing the ZY	36
3.4.1	CUBES.INI example	38
3.4.2	ZY.INI example	39
3.4.3	ZP011.INI example	41
3.5	Servo Operation	43
3.5.1	Preparing the Servo System for Operation	43
3.5.2	Finding Home Position	43
3.5.3	Using the Servos	44
3.6	Data Acquisition	44
3.6.1	Data Acquisition Sub-System	44

3.6.2	Direct Memory Access (DMA)	44
3.6.3	Using A/D commands	45
3.6.4	Data Acquisition Timings	47
3.7	Watch Dog Timer	47
3.8	Reset log	48
3.9	Safety	48
3.9.1	Auto/Manual Switch	49
3.9.2	Software Control of Laser and Servo Systems	49
3.10	Troubleshooting	49
3.10.1	Communications Problems	49
3.10.2	Servo Problems	50
3.10.3	Data Acquisition Problems	50
3.11	Other Operational Issues	51
3.11.1	Power Outages	51
3.11.2	Data Reduction	51
4	List of Commands by Function	53
4.1	Instrument Control	53
4.2	Data Acquisition	54
4.3	Servo	54
4.4	Pointing	55
4.5	High level, or Cube Commands	55
5	Detailed Description of Commands	57
5.1	ABA	57
5.2	ABP	58
5.3	ABV	59
5.4	ACP	60
5.5	ACU	61
5.6	ALPHA	62
5.7	AMP	63
5.8	AXIS	64
5.9	AXS	65
5.10	AZM	67
5.11	BETA	69
5.12	BP	70
5.13	BYE	71
5.14	CIL	72
5.15	CMEAS	74
5.16	COO	76
5.17	CWT	78
5.18	CYC	79
5.19	D0	80
5.20	DAT	81
5.21	DSP	82
5.22	DST	83
5.23	ELV	84
5.24	ENTEMP	86
5.25	ERL	87
5.26	EZ	88
5.27	FHM	89

5.28 FIL	91
5.29 FKD	92
5.30 FKI	93
5.31 FKP	94
5.32 FLT	95
5.33 FSI	97
5.34 GRI	98
5.35 GTI	100
5.36 IDX	101
5.37 IFF	102
5.38INI	103
5.39 INITZY	104
5.40 LIMIT	106
5.41 MAG	107
5.42 MO	108
5.43 MPC	109
5.44 NUM	110
5.45 ORD	111
5.46 PHI	114
5.47 PS	115
5.48 QQQ	116
5.49 RAD	117
5.50 RDF	118
5.51 RDS	119
5.52 REFR	120
5.53 REPEAT	121
5.53.1 REPEAT, subfunction 0: List all scheduled commands	121
5.53.2 REPEAT, subfunction 1: Add a command string	123
5.53.3 REPEAT, subfunction 2: Remove a command by name	124
5.53.4 REPEAT, subfunction 3: Remove a command by TID	125
5.53.5 REPEAT, subfunction 4: Remove all commands	126
5.54 RST	128
5.55 SCN	129
5.56 SEQ	131
5.57 SFQ	133
5.58 STI	134
5.59 STS	135
5.60 STT	137
5.61 STW	138
5.62 TN (Experimental)	140
5.63 TR	142
5.64 TRG	144
5.65 TS	145
5.66 TSP	146
5.67 VER	148
5.68 VHM	149
5.69 WAI	150
5.70 WCNT	151
5.71 WMD	152
5.72 WTMO	153
5.73 WTOL	154

5.74 XOFF	155
5.75 XON	156
5.76 ZPNAME	157
A Installing the ZY systems	159
A.1 Requirements	160
A.2 ZY Boot Diskette Archive	160
A.2.1 Layout of the Archive	161
A.2.2 Directory NDIS	162
A.2.3 Directory PCTCP	164
A.2.4 File AUTOEXEC.BAT	165
A.2.5 File CONFIG.SYS	167
A.2.6 File RLOAD.EXE	168
A.3 Creating a Boot Diskette	169
A.4 ZIY FTP Server	169
B ZY Tools and Accessories	171
B.1 Introduction	171
B.2 CAMERA.EXE	171
B.3 VY.EXE	172
B.4 T.EXE	172
B.5 RLOAD.EXE	173
B.6 The Status Panel, SPAN.EXE	174
B.7 Frame Grabber Viewer	179
B.8 140' Telescope HA & DEC Data Acquisition	179
B.9 630TEST.EXE	181
C ZY System Resource Maps	183
C.1 ZY IRQ line usage map	183
C.2 ZY I/O port usage map	184
C.3 ZY DMA channel usage map	185
D Software Development Tools	187
D.1 Language and Compiler	187
D.2 Revision Control System	187
E ZY and EMS 3.0 Memory	189
E.1 EMS 3.0 Interface	190
E.1.1 Introduction to EMS 3.0	190
E.1.2 The EMM Interface	190
E.2 Using C++ Objects with EMM 3.0	191

List of Figures

2.1	Block diagram of Ranger hardware	12
2.2	Foreground/background system.	13
2.3	ZY Software System Block Diagram.	16
2.4	ZY Main Loop Flowchart.	17
2.5	ZY Servo Find Home Flowchart.	19
2.6	Flowchart for the ZY Servo System settling routine.	21
2.7	ZY mounted on monument, side view.	22
2.8	A/D System Timing Diagram.	25
2.9	ZY Interface: Command Parser & Hash Table	29
2.10	Flowchart for the ZY Scheduler routine.	33
3.1	ZY Initialization Flowchart.	37
A.1	ZY Boot Diskette Archive, as seen from the Windows NT 4.0 Explorer.	161
A.2	Interface between PC/TCP Kernel and network adapter hardware.	162
A.3	ZIY FTP server directory structure, as seen from the Windows NT 4.0 Explorer.	170
B.1	The Status Panel.	175
B.2	The 140' Encoder Display Program.	180

If you require a complete copy of this manual, please reference GBT ARCHIVE No. LO480, to request the full document.

OR, you may contact Shirley Curry at 304-456-2240,
E-mail scurry@nrao.edu