CGIcodes.txt

Gemini-II web interface

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1. Introduction

Gemini's internal web server searches the files requested by the HTTP URLs first on the SD card. Only very few pages, like an initial index.htm, sd.cgi and error pages are stored hard-coded in the firmware as a fallback if the SD card is empty, freshly formatted or faulty. This gives the user the possibility to customize the web interface at will. He can put static files on the SD card (HTML, JPEG, PNG, ...) if the browser can interpret them correctly.

Important to find the files is their location. Currently Gemini's web server supports four languages: English, German, French and Spanish. For these languages, directories EN, DE, FR and ES exist on the SD card, which contain the web pages in the respective languages.

Whenever a web page is requested, the web server examines the language code in the HTTP header the browser sent according to

its setup, changes to the directory (or defaults to EN if the language is not (yet) supported and tries to open the file. If this is successful and the file name extension does not mark it as a dynamic HTML file, the file content is transmitted to the browser.

All commands and parameters described below are case sensitive!

2. Dynamic .cgi files
2.1. Format description

These files are analyzed and interpreted line by line. A line must not exceed 120 characters.
Each line starts with a character describing how to to interpret it:

'#' A hash mark tells the interpreter to ignore this line
't' Text. The line will be sent to the browser without any changes
'i' This line will be replaced by the file with the given name included,
'c' This line will be interpreted, the output will be dynamically build.
'.' End of file.

Lines starting with the character 'c' will have some more characters following determining how to interpret them. The second character will be ignored, the third character will be used for the first and most important selection. Depending on this, the fifth character may be used as a secondary choice.

Dynamic files are examined and the returned content is generated at runtime. If you don't want to build your own .cgi-file, there's a dummy file "command.cgi" included in the Gemini firmware image, that allows to work with the parameters given below.

2.2 cgi file parameter list

'a' Network parameters
- i current IP address
- m current netmask
- g current default gateway
- p current primary DNS server
- q current secondary DNS server
- a current MAC

address
I static IP address
M static netmask
G static default gateway
P static primary DNS server
Q static secondary DNS server
A static MAC address
T DHCP timeout span
d displays "checked" if DHCP is selected
U UDP Port number
u accepted IP address for UDP communication or 0 for all
t TCP Port number for transparent BSD socket
c accepted IP address for TCP BSD socket or 0 for all

'A' A/D (battery, 12V, Feature port)
1
..
6

'b' Default Boot mode
0
..
3

'B' Preferred Browser language

'C' Coordinates

p	current PRA position
q	current DEC position
r	current apparent RA position
d	current apparent DEC position
i	current telescopic RA position
j	current telescopic DEC position
R	target RA position
D	target DEC position
a	current Az position
e	current El position
A	target Az position
E	target El position
n	target name
s	apparent target TRA position
t	apparent target TDEC position

```
                 h       telescopic target
TRA position
                 m       telescopic target
TDEC position
                 u       difference target
RA - telescope RA
                 v       difference target
DEC - telescope DEC
                 U       difference
unmodelled target RA - telescope RA
                 V       difference
unmodelled target DEC - telescope DEC
                 Y       current RA worm
PEC pointer position
                 S       Serial Emulator
output string
'c'     TCP status

'D'     Databases
                 D       name of current
directory
                 d       complete directory
                 f       catalog files
directory
                 F       catalogue files
                 t       catalogue content
                 S       object selection
                 s       flash chip
selection
                 i       object info
```

(state.cgi)

'd' System password - file 'system.cgi'

'E' Axis encoder
- R resolution X / RA
- D resolution Y / DEC
- r current value X / RA
- d current value Y / DEC
- x X / RA readout errors
- y Y / RA readout errors

'e' Encoder Port Usage

'F' Firmware
- f SD card label
- i current firmware info
- B firmware .bin file names
- b firmware .bin file directory entries
- s board serial #

'g' Graphic HC brightness

```
'G'     Graphic HC color scheme

'H'     Hardware
                S       Get Serial Number

'h'     Classic HC mode
                0       Visual Mode
                1       Photo Mode
                2       All Speeds Mode

'I'     Information
          'I' Information Buffer Content
          'H' Hand Controller Display
          'S' Serial emulation return
string
'i'     returns currently selected site
(1..4)

'K'     returns current Parking mode
preselection (0..2)

'k'     returns current PEC state

'L'     Safety Limits in steps
                r       right
                l       left
                g       Western GoTo Limit
                t       Time to western
limit
'l'     Browser Language - file
```

'language.cgi'

'M' Gearing:
- W RA worm ratio
- w DEC ...
- S RA spur ratio (unsigned int)
- s DEC ...
- X RA spur ratio (double)
- Y DEC ...
- R RA motor nominal encoder resolution
- r DEC
- A RA step size (double)
- a DEC ...
- T DEC TVC step count

'm' Mount Type
- 0
- ..
- 6

'N' Mount Design
- 0 (German) Equtorial
- 1 Alt/Az

'n' tracking rate selection
- 0 Sidereal

```
                1       King
                2       Lunar
                3       Solar
                4       Terrestrial
                5       Closed Loop
                6       Comet/User Defined
'O'     Object
                'n'     name of selected
object or "---"

'Q'     Filename to store the currently
selected telescope pointing model

'P'     Model parameters
                E       Alignment count in
the East
                W       ... West
                a       Azimuth
                e       Elevation
                c       Non-Polarity at
the Meridian
                n       Non-Polarity at
the Pole
                h       Index error in HA
                d       Index error in DEC
                t       Tube Flexure
                C       Counterweight
flexure
                F       Flip in RA
                f       Flip in DEC
```

```
                0..1    currently selected
model
                s       swap :CM# and :Cm#

'p'     serial port setings - file
'serial.cgi

'Q'     Parking mode preselection
                0       Unpark on any Move
command
                1       Unpark on GoTo or
Unpark commands
                2       Unpark only after
Unpark command

'q'     GPS port

'R'     Axis Movement
                r       RA/AZ
                d       DEC/EL

'S'     Safety Limits in degrees/minutes
                r       right
                l       left
                g       WestGoToLimit
's'     Site Settings
                n       name of site
                t       timezone
                o       longitude
                a       latitude
```

```
                 e       elevation
                 #       site number

'T'     time:
                 U       UTC date
                 u       UTC time
                 C       Civil Date
                 c       Civil time
                 s       Sidereal time
                 m       Julian Date
(floating poit)
't'     moving mode
                 x       RA axis state,
f.i. currently active tracking rate
                         (sidereal, solar,
lunar, terrestrial, comet, ...),
                         Slewing, No
Motion, Centering, Guiding, STALL
(language-dependend string)
                 y       DEC axis state...
                 L       RA axis lag
[steps], range -400..400
                 l       DEC axis lag
[steps], range -400..400
                 P       RA motor PWM duty
cycle, -100..100
                 p       DEC motor PWM duty
cycle, -100..100
                 T       warning treshold
for offset in RA/Az while holding
```

position/guiding/tracking
t warning treshold for offset in DEC/El while holding position/guiding/tracking
H warning treshold for heavy load (high PWM duty cycle) in RA/Az while holding position/guiding/tracking
h warning treshold for heavy load (high PWM duty cycle) in DEC/El while holding position/guiding/tracking
S warning treshold for heavy load (high PWM duty cycle) in RA/Az while slewing
s warning treshold for heavy load (high PWM duty cycle) in DEC/El while slewing

'V' Velocities:
S Manual Slewing RA
s Manual Slewing DEC
M Move Speed RA
m Move Speed DEC
T GoTo Slewing RA
t GoTo Slewing DEC
A Slewing Acceleration RA
a Slewing Acceleration DEC

C	Centering RA
c	Centering DEC
G	Guiding RA
g	Guiding DEC

'X' Servo motor curve parameters (Attention: Wrong values could burn the motors!)

P	Proportional value for the X axis (RA, AZ)
p	Proportional value for the Y axis (DEC, EL)
D	Differential value for the X axis (RA, AZ)
d	Differential value for the Y axis (DEC, EL)

'z' State (may be expanded later, please test single bits)

0	currently waiting for startup mode selection
1	Gemini started up

2.3 Serial Port Emulator

This emulator bridges the gap between the HTTP-based web interface and the serial commands. Commands sent as string value of the SE= parameter are executed by the

serial command interpreter. It is possible to send several serial commands at once, but it must be assured that the responses not exceed 64 bytes, the length of a special output buffer used for the interpreter. This output can be obtained with the cgi command line "c C S %s".

2.4 Forms input

2.4.1 POST parameter

So far, the HTTP POST method is only used for file uploading and SD card formating.

2.4.2 GET parameter

Syntax:

Several command strings don't need any parameter values given (nothing noted after the equal sign) or simply ignore them, but most commands need them formed exactly as described below in C-printf syntax:

```
%d      integer
%u      unsigned integer
%f      floating point number
```

%s string

All other characters have to appear exactly as they are shown.

Parameter list:

MR=e	Move Eastward
MR=w	Move Westward
MR=q	Stop moving RA
MD=n	Move Northward
MD=s	Move Southward
MD=q	Stop moving DEC
PH=	Park at Home Position
Ph=	Set Home Position
PC=	Park at CWD Position
PZ=	Park at Zenith
PS=	Sleep Telescope
PW=	Wakeup Telescope
hc=0..2	Set Hand Controler into Visual (0), Photo(1) or All Speed Mode
hB=0..7	Hand Controler brightness
hC=0..2	Hand Controler color scheme (day, dawn, night)
ts=0..6	Set Tracking Mode (Sidereal, King, ...)
du="%u.%u.%u"	UTC Date

```
dc="%u.%u.%u"   Civil Date
tu="%u:%u:%u"   UTC Time
tc="%u:%u:%u"   Civil Time

tr="%u:%u:%u"   Target Right Ascension
td="%d:%u:%u"   Target Declination
tR="%u"         Target Physical Right
Ascension
tD="%u"         Target Physical
Declination
ta="%d:%u:%u"   Target Azimuth
te="%u:%u:%u"   Target Elevation
tn="%s"         Target Name

mn="%u"         Current model number 0..1
sm="%u"         Store current model under
number 0..1
cm="%u"         clear model number #
aa=             Additional Alignment
Sm=             Synchronize
ia=             Initial Alignment

ML=%s           Load model under the given
name from the Models subdirectory
MS=%s           Store model with the given
name in the Models subdirectory

mD="%u"         mount design
mt="%u"         mount type
wr="%d"         Worm ratio in right
```

```
ascension
wd="%d"          Worm ratio in declination
sr="%u"          Spur ratio in right
ascension
sd="%u"          Spur ratio in declination
mr="%u"          Motor encoder resolution
in right ascension
md="%u"          Motor encoder resolution
in declination
dt="%u"          DEC TVC step count

SP="%u"          Proportional parameter for
X servo (RA/AZ) for High Speed
Sp="%u"          Proportional parameter for
X servo (RA/AZ) for Low Speed
SQ="%u"          Proportional parameter for
Y servo (DEC/EL) for High Speed
Sq="%u"          Proportional parameter for
Y servo (DEC/EL) for Low Speed
SD="%u"          Differential parameter for
X servo (RA/AZ) for High Speed
Sd="%u"          Differential parameter for
X servo (RA/AZ) for Low Speed
SF="%u"          Differential parameter for
Y servo (DEC/EL) for High Speed
Sf="%u"          Differential parameter for
Y servo (DEC/EL) for Low Speed
ST="%u"          warning treshold for
offset in RA/Az while holding
position/guiding/tracking
```

St="%u" warning treshold for offset in DEC/El while holding position/guiding/tracking
SH="%u" warning treshold for heavy load (high PWM duty cycle) in RA/Az while holding position/guiding/tracking
Sh="%u" warning treshold for heavy load (high PWM duty cycle) in DEC/El while holding position/guiding/tracking
SS="%u" warning treshold for heavy load (high PWM duty cycle) in RA/Az while slewing
Ss="%u" warning treshold for heavy load (high PWM duty cycle) in DEC/El while slewing

R1="%c" Move Speed: G=Guide, C=Center, M=Move, S=Slew

VM="%d" Manual Slewing Speed RA
Vm="%d" Manual Slewing Speed DEC
VT="%d" GoTo Slewing Speed RA
Vt="%d" GoTo Slewing Speed DEC
VV="%d" Move Speed RA
Vv="%d" Move Speed DEC
Vi="%d" Increment Move Speeds by the given value. If omitted, default is 50.
Vd="%d" Decrement Move Speeds by the given value. If omitted, default is

50.

```
VA="%f"          RA Slewing Acceleration
Va="%f"          DEC Slewing Acceleration
VC="%u"          RA Centering Speed
Vc="%u"          DEC Centering Speed

VG="%u.%u"       RA Guiding Speed
Vg="%u.%u"       DEC Guiding Speed

Sr="%u°%u"       Right Safety Limit
Sl="%u°%u"       Left Safety Limit
Sg="%u°%u"       Western GoTo Limit

ER="%d"          Axis Encoder RA resolution
ED="%d"          Axis Encoder DEC
resolution
ep="%u"          encoder port usage, 0..15

si="%u"          select location
sn="%s"          site name
st="%d:%u:%u"    Timezone (minutes and
seconds can be omitted)
so="%d°%u'%u"    Longitude
sa="%d°%u'%u"    Latitude
se="%d"          Elevation
s#="%u"          site number
gp="%u"          Query GPS receiver at
serial ports 0..3
```

```
bm="%u"          default boot mode, 0..3
for Cold Start, Warm Start, Warm Restart,
Ask, if possible
bo="%u"          select boot mode, 0..2 for
Cold Start, Warm Start, Warm Restart

bO=              Reboot (if possible, ask
for startup mode)
bC=              Reboot, enforcing a Cold
Start

s0="%u"          Baud rate selection,
serial port 0
s1="%u"          Baud rate selection,
serial port 1
s2="%u"          Baud rate selection,
serial port 2
s3="%u"          Baud rate selection,
serial port 3
sg="%u"          Baud rate selection for
GPS receiver

ct="%u"          Catalog selection (active
catalog file id)
ff="%u"          Firmware flashing
(selected firmware file id)
CN="%s"          Catalog Name selection
DN="%s"          Directory to change to
Df="%s"          Delete File in current
path
```

```
DF="%s"          Delete File with absolute
path given
DM=              Delete modeling log file
/LOGS/POINTING.DAT

co="%s"          Catalog object string
SO="%u"          Solar System object number
(Sun=0, ...)
gtf=             enforce meridian flip
pac=             reset MA and ME for Polar
Axis Correction
GT=              start GoTo
GP=              start Physical GoTo
GA=              start Alt/Az GoTo

AbH="%c"         '1': List only catalog
object currently above horizon, '0': list
all objects
prec="%u"        always precess ('1') given
coordinates or not ('0')
swCM="%u"        swap serial commands :CM#
and :Cm# functionality:
Synchronize<->Additional Align
sdo=             precess given object
coordinates

ip="%u.%u.%u.%u"         current IP Address
msk="%u.%u.%u.%u"        current IP Netmask
gw="%u.%u.%u.%u"         current IP default
gateway
```

```
pdns"%u.%u.%u.%u"       current Primary
DNS server
sdns"%u.%u.%u.%u"       current Secondary
DNS server
Ip="%u.%u.%u.%u"        static IP Address
Msk="%u.%u.%u.%u"       static IP Netmask
Gw="%u.%u.%u.%u"        static IP default
gateway
Pdns"%u.%u.%u.%u"       static Primary DNS
server
Sdns"%u.%u.%u.%u"       static Secondary
DNS server
mac="%x:%x:%x:%x:%x:%x" MAC address
UP="%u"                 UDP socket port
number
TP="%u"                 TCP socket port
number
Tp="%u.%u.%u.%u"        Accepted TCP Peer
for transparent TCP sockets
Up="%u.%u.%u.%u"        Accepted UDP Peer
for UDP socket communication

CL=             SRAM reset to default
Losmandy HGM settings
CM=             SRAM reset to default
MI-250 settings
CS=             Store SRAM configuration
parameters to \config\Gemini.cfg
CR=             Load SRAM configuration
parameters from \config\Gemini.cfg
```

PM="%u" Parking Mode preseclection (0..2)

pt= Start PEC training
pa= Abort PEC training
ps= Start PEC replay
pe= Stop PEC replay
pb="%u" Activate PEC playback at boot time, if PEC data are available.

3. Character encoding

Gemini-II supports internationalized messages. Special characters have to be displayed by the HC, browsers as well as they have to be exchanged between browser.

XML-like character encoding is the only form of encoding that is fully supported by most browsers not only for displaying HTML pages, but also for Ajax technologies, which requires valid XML. For this reason, special characters should be coded in UCS Universal Character Set as defined by ISO/IEC 10646. Characters are encoded as numeric entities using the format

&#nnnn;

where nnnn is the numeric representation of the character (leading zeros my be omitted).

The graphical HC supports XML encoded Greek lowercase characters with nnnn reaching from 945 to 969:

945: alpha (coded: α)
946: beta β
947: gamma γ
948: delta δ
949: epsilon ε
... until ...
969: omega ω

The HC also supports the most common German, French and Spanish special characters. So far that are:

196: Ä
205: Í
214: Ö
218: Ú
220: Ü
224: à
225: á
228: ä
231: c cedilla

232: è
233: é
234: ê
237: í
241: ~n (n with tilde above)
243: ó
246: ö
250: ú
252: ü

Other characters used may show up correctly in browsers but the HC will display a question mark '?'at its place.