NMEA Logger build instructions

1. Install fan.
2. Acquire and activate a 4/5G mobile data SIM.
3. Download an SD Card Formatter on a PC.
4. On the same computer, download the RPi OS Installer from <http://www.raspberrypi.org/downloads/>. Install the imager and create an OS SD on the SD card formatted in the previous step with the option “Raspberry Pi OS (32 bit)” for operating system.
5. Connect an ethernet cable to the RPi. Ensure that the ethernet cable is attached to a hub that allows direct access to the internet.
6. Connect a USB mouse and USB keyboard.
7. Insert the SD card created in the previous steps and connect power to the RPi.
8. Connect the RPi to power to start it up.
9. Ensure fan operates and airflow is evident.
10. Setup wizard will start
    1. Set your country and language
    2. Connect to your network
11. If asked to update software, accept this. Reboot if required.
12. If needing to pair with a Bluetooth device, such as a mouse or keyboard, either

open a terminal window and type

sudo bluetoothctl

agent on

scan on

Note the mac address of the device to pair (in format xx:xx:xx…).

pair [mac address of the device]

or in the desktop

* 1. click the Bluetooth symbol at the top right
  2. choose the device to pair with

1. Update the operating system again to ensure that the latest updates are installed.
   1. Open a terminal window and type

sudo apt-get update

sudo apt-get upgrade

* 1. Reboot the RPI either by typing *sudo reboot* in a terminal window or in the desktop main choosing “Logout” and “Reboot”. In the following steps when rebooting the RPi either procedure can be used.

1. Add required Python packages
   1. Open a terminal window and type

sudo pip install configparser

sudo pip install psutil

1. Configure the RTC
   1. In the desktop menu click “Preferences” and “Raspberry Pi Configuration”
   2. In the Interfaces tab under I2C click “Enable”. Confirm with OK.
   3. Open a terminal window and type

sudo i2cdetect -y 1

This should show “68” in column 8 and row 60

* 1. Edit the file /boot/config.txt using the desktop editor or vi or vim. If permissions are insufficient, perform the edit in the operating system with sudo.
  2. After line “dtparam=audio-on” add a new line

dtoverlay=i2c-rtc,ds3231

* 1. Save the file and close it
  2. Reboot the RPi
  3. Open a terminal window and type

sudo i2cdetect -y 1

This should now show “UU” in column 8 and row 60

* 1. To acquire time from an internet NTP either connect the RPi to a Wifi router or ensure that an ethernet cable is plugged into the RPi and connected to a router that allows direct access to the internet.
  2. In the desktop menu click “Preferences” and “Raspberry Pi Configuration”
  3. In the “Localisation” tab click “Set Timezone” and choose Area “Etc” and Location “UTC”.
  4. In the “Localisation” tab click “Set Keyboard” and under “Layout” set it to your keyboard’s layout. Click OK.
  5. Open a terminal window and type

sudo apt-get -y remove fake-hwclock

sudo update-rc.d -f fake-hwclock remove

sudo systemctl disable fake-hwclock

* 1. Edit file /lib/udev/hwclock-set using the desktop editor or vi or vim
  2. Add a hash symbol (#) to comment out the beginning of the following lines so they read

**#**if [-e /run/systemd/system]; then

**#**exit 0

**#**fi

* 1. and further down

**#**/sbin/hwclock --rtc=$dev --systz –badyear

* 1. and further down

**#**/sbin/hwclock --rtc=$dev – systz

* 1. Save and close the file
  2. Open a terminal window and type

sudo hwclock -w

sudo hwclock -r

The correct UTC time should now be displayed. UTC will be your local time adjusted by your local timezone offset.

sudo reboot

1. Change boot options

Edit file /boot/config.txt. After line ‘#hdmi\_safe=1’ add the line  
  
hdmi\_force\_hotplug=1

1. Load the current version of the NMEA Logger program
   1. Open a terminal window and type

cd /home/pi

Copy nmea\_logger.py and nmea\_logger.config to the directory.

* 1. Create the job to start logging when the RPi starts:
  2. Edit /etc/rc.local. Just before the line “exit 0” add

sudo bash -c ‘/usr/bin/python3 /home/pi/nmea\_logger/nmea\_logging.py’ &

Note: ensure that the ‘&’ symbol at the end of the previous line has been entered

* 1. Save and close the file

1. Set up Actisence NDC-5
   1. Connect an ethernet cable from the logger to the PC.
   2. Enter http://ndc-[serial]/ in a browser to start the configuration. The admin page could take some time to appear. Log in with admin/admin if no other user and password have been set.
   3. Use the wizard and set:

Config name: default

bidirectional serial port to Baud Rate 115200

input ports IN1-5 to AutoBaud

In routing section set “Pass All” (green) for all nodes

Go to end of config wizard and ensure settings are saved

* 1. If necessary, provide a 12V AC, 0.5A power supply with the NDC-5. Clip lead ends and attach the current lead to the “PWR / +VE” terminal and the ground to the “PWR / GND” terminal

1. Measure voltage of the RTC battery using the two terminals on the printed circuit next to the battery. If the voltage is less than 2.8V, replace it.
2. Set a new pi password. On the logger type  
     
   passwd  
   enter the old password  
   enter the new password
3. Update the logger software
4. Run the following commands to check the correct operation of the RGB LED and the Off button. During the test the lights must flash red, blue, green. After this test, press the Off button and ensure that a message appears that indicates correct operation of the button.

cd /home/pi/nmea\_logger

1. Connect one or more NMEA producing devices
2. Insert a flash drive in one of the USB ports
3. Open file /home/pi/nmea\_logger/nmea\_logging.config and set the following options:

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| vessel | the name of the vessel |
| output\_file\_size | 2000 (small file size only for testing) |
| baud\_rate | [baud rate of the port] |
| ftp\_transfer\_enabled | 1 |
| delete\_after\_transfer | 0 |
| ftp\_server | [url of ftp server] |
| ftp\_user | A valid ftp user account |
| ftp\_password | Password for this account |
| ftp\_wait\_sec | 60 |
| ftp\_use\_ports\_file | Set to 0 if transmission is allowed everywhere. This value is used when sending data via the ship network. Set to 1 if using 4G communication to transfer files and limiting transmission area. |
| save\_all\_nmea | 0 |
| nmea\_sentence\_types | list, comma separated, no spaces, uppercase, default is ‘GGA,VDM’ |

1. Connect the logger to the internet, eg via Wifi. Open a browser and type “utc time”
2. In Linux type:  
     
   sudo hwclock -w  
     
   sudo hwclock -r
3. Ensure that the time on the desktop is showing the current UTC time (look it up on the internet), and not 00:00.
4. Press the Off button to end logging. Confirm that the program terminates without any error messages.
5. Create file /home/pi/nmea\_logger/ports\_v1.txt and ensure the areas for 4G file transmission are set as required. If the logger uses on-board internet connection add the entries:  
     
   All, All (70,0) (-70,180)  
   All, All (70,0) (-70,-180)
6. On the flash drive create the following directories if they have not been auto-created by the logger program: “complete”, “transferred”.
7. Ensure that the flash drive contains no other directories and no files. Those can remain on the drive. IMPORTANT: If the logger receives data and the lights flash but no files are written to the flash disk then:  
     
   identify any directories in /media/pi that are not from the *128 GB VOLUME,* which is the flash disk. Delete all these:  
     
   cd /media/pi  
   sudo rm -r [name of the directories that are not the flash drive, eg 6DEF or D6…, they will be owned by root]

Ensure the logger can write to the flash drive. Ensure that the top-level directory is owned by pi

1. Ensure that the incoming data has the correct talkers, “RA” for the radar unit and “GP” for the GPS unit.
2. Test data capture. Type  
     
   python3 test\_serial.py (should show data coming in)  
     
   python3 nmea\_logging.py  
     
   The logger should begin to capture and log data within a few seconds and blink blue or green. If it does not, ensure that baud rate is set to 115200 for all COM ports.  
     
   Ensure that a file is created and increasing in size in the root dir of the flash drive.
3. Test data capture and transfer without screen:
   1. Reboot the logger and disconnect the monitor
   2. The logger should blink to indicate date capture
   3. Wait a few minutes and check that files have been transferred to the FTP server.
4. Set config parameters to final values. Open file /home/pi/nmea\_logger/nmea\_logging.config and set the following options:
   1. Set parameter ‘output\_file\_size’ to 200000
   2. Set parameter ‘ftp\_wait\_sec’ to 600
   3. Set parameter ‘baud\_rate’ for all COM ports to 115200 when using the NDC-5 (or 4800 when devices are connected directly to the USB ports).
5. Clean up stray files.
   1. Delete all files from:  
        
      the flash drive: base dir, completed dir and transferred dir.  
        
      the FTP server directory associated with the logger.
   2. There may be stray directories under /media/pi that are not associated with the flash drive, delete them (non-empty ones with sudo rm -rf [dirname])
   3. Clear file nmea\_logging.log from /home/pi/nmea\_logger and ensure it is owned by pi. This is important. Do not delete it since it may be recreated with user root
6. Activate the Wifi device
   1. Click the network icon at the top right (two arrows pointing in opposing directions) and enter the Wifi password
   2. Ensure that the data transfer is working.
   3. Turn off auto updates: Advanced/System/System settings/Auto-update
7. Install AnyDesk for RPi.
   1. Delete the file /etc/anydesk/service.conf  
        
      cd /etc/anydesk  
        
      sudo rm service.conf
   2. Quit AnyDesk if it is running and restart it so that it gets a new AnyDesk ID.
   3. In About AnyDesk enter the license key in the About window.
   4. Open AnyDesk. In options, set “Allow unattended access”. Enter the same password as for the pi user in the password required field.
   5. Set “Never show incoming connection request” in AnyDesk
   6. Test access to the logger via AnyDesk from a PC
   7. Ask the ship technician to enable RDP on their network
   8. Ensure modem is set up.

