Introduction to J1939 CAN Messaging and Data Logs in Excel

Description: The goal of this exercise is to gain experience in interpreting CAN based data on an ag machine. You will be provided two standard text file CAN log from a tractor during an active planting operation. Using Excel you will need to import the data into a spreadsheet format, extract the specific CAN signal information, and summarize your results.

Clearly show your work where needed. Your answers should be summarized in a Word document with appropriate detail for each question. The Word (or PDF) solution should be uploaded to Canvas.

- CAN data file "Full_CAN_Bus_Log.asc"
    - Contains 10 seconds of data from a full CAN bus log of both the tractor bus and implement bus
    - The implement bus (CAN 2) operates at the ISOBUS standard 250 kbps.
    - The tractor bus (CAN 1) operates at an elevated data rate of 500 kbps.

- CAN data file "Filtered_CAN_Bus_Log.asc"
    - Contains 600 seconds of data from a filtered CAN bus log of both the tractor bus and implement bus
    - Only non-proprietary PDU 2 Format messages are included in this data log

Requirements:
- Using the "Full_CAN_Bus_Log.asc"

    - Determine the number of messages per second being transmitted on the CAN Bus.

    - Determine the transmission frequency of each of the following signals on each unique CAN bus:
        - Engine Speed
        - PTO Speed
        - Latitude
        - Longitude

    - There are three different sources for Ground Speed defined by J1939 including Wheel-based Speed and Distance, Ground-based Speed and Distance, Navigational-based Vehicle Speed.

        - Determine the frequency of each message transmitted on each individual CAN bus.

        - If the message is transmitted on more than one CAN bus determine which bus is the original source of the message.

        - Provide a plot of all available sources of vehicle speed in miles per hour and comment on any differences between the sources.

    - Based on the log file size and the known 10 second log time, estimate how many gigabytes per hour of log data will be generated when logging CAN data from this vehicle system?

- Using the "Filtered_CAN_Bus_Log.asc"

    - Create an individual plot for each of the following signals:
        - Engine Speed
        - PTO Speed
        - Ground Speed
        - A combined plot with all signals as individual data series with the same X-axis time.

    - Quantify the average fuel consumption rate of the tractor when the vehicle ground speed is greater than 6.7 miles per hour and less than 6.7 miles per hour.