Mack Trucks, Inc.

Chassis Data Management
Applications, Usage, and Output

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Chassis Data Management

- Mack Trucks, Inc. provides access to chassis data sources using a variety of PC-based software applications and services. They are:
  - Service Diagnostics Software
  - Customer Data Programming Software
  - InfoMax Fleet Management Software
  - Data Extraction and Incident Reconstruction Services

Service Diagnostics

- Mack Trucks, Inc. Service Diagnostic Software is used primarily to monitor engine and chassis performance operations, and to assist technicians and end users with fault code or problem resolution diagnostics.

Service Diagnostics

- Preservable program output includes:
  - The Vehicle Data Log
  - The Maintenance Log
  - Engine and Chassis Fault Tables

Vehicle Data Log

VIN: 1M1AA14Y23W150927

	Life	Vehicle Trip
Vehicle Time (hr)	896.8	896.8
Total Fuel (gal.)	5360.4	5360.4
Distance (miles)	30828.1	30828.1
Key Switch On Occurrences	751	751
Engine Revolutions (x100)	689348	689348
Cranking Time (hr)	0.0	0.0
Engine Running Time (hr)	892.2	892.2
Engine Running Fuel (gal.)	5360.4	5360.4
Vehicle Moving Fuel (gal.)	4823.5	4823.5
Vehicle Moving Time (hr)	586.8	586.8
True Idle Time (hr)	142.2	142.2
True Idle Fuel (gal.)	109.4	109.4
Idle Time (hr)	305.2	305.2
Idle Fuel (gal.)	535.6	535.6
Delayed Idle Time (hr)	246.9	246.9
Delayed Idle Fuel (gal.)	496.4	496.4
Hand Throttle Time (hr)	160.5	160.5
Hand Throttle Fuel (gal.)	422.4	422.4
Hand Throttle Distance (miles)	0.0	0.0
PTO #1 Time (hr)	0.0	0.0
PTO #1 Fuel (gal.)	0.0	0.0
Moving PTO #1 Time (hr)	0.0	0.0
Moving PTO #1 Fuel (gal.)	0.0	0.0
Moving PTO #1 Distance (miles)	0.0	0.0
PTO #2 Time (hr)	0.0	0.0
PTO #2 Fuel (gal.)	0.0	0.0
Moving PTO #2 Time (hr)	0.0	0.0
Moving PTO #2 Fuel (gal.)	0.0	0.0
Moving PTO #2 Distance (miles)	0.0	0.0
Time in Cruise Control (hr)	219.8	219.8
Fuel Used in Cruise Control (gal.)	2130.4	2130.4
Distance in Cruise Control (miles)	14047.7	14047.7
Fueled Vehicle Overspeed Time (hr)	112.4	112.4
Vehicle Overspeed Occurrences	149	149
Vehicle Overspeed Time (min)	31.8	31.8
Vehicle Overspeed Max (mph)	77.7	77.7
Engine Overspeed Co. Threshold Time (hr)	0.0	0.0
Engine Overspeed Co. Threshold Max (rpm)	2234	2234
Fan Clutch Cycles	5881	N/A

Active Fault Time (min)	738.5	738.5
Active Fault Occurrences	23	23
Hard Braking Occurrences	18	18
Traction Loss Occurrences	4	4
Severe Engine Overspeed Occurrences	0	N/A
Severe Engine Overspeed Max (rpm)	0	N/A
Fueled Engine Overspeed Time (hr)	3.9	3.9
Maximum Engine Speed (rpm)	2189	2189
Maximum Vehicle Speed (mph)	78	78
Time in Sweet Spot (hr)	446.2	446.2
Fuel Used in Sweet Spot (gal.)	3063.1	3063.1
Distance Traveled in Sweet Spot (miles)	24429.0	24429.0
Average Driving Speed (mph)	52.5	52.5
Driving Fuel Economy (mpg)	6.4	6.4
% Driving Time	65.4	65.4
Average Speed (mph)	34.4	34.4
Total Fuel Economy (mpg)	5.8	5.8
Cruise Fuel Economy (mpg)	6.6	6.6
Average Cruise Speed (mph)	63.9	63.9
% Cruise Time	24.5	24.5
% Cruise Fuel	39.7	39.7
% Cruise Distance	45.6	45.6
% Time in Sweet Spot	49.8	49.8
% Fuel Used in Sweet Spot	57.1	57.1
% Distance Traveled in Sweet Spot	79.2	79.2
% True Idle Time	15.9	15.9
% True Idle Fuel	2.0	2.0
% Idle Time	34.0	34.0
% Idle Fuel	10.0	10.0
% Delayed Idle Time	27.5	27.5
% Delayed Idle Fuel	9.3	9.3
% PTO Time - All	0.0	0.0
% PTO Fuel - All	0.0	0.0
% PTO Distance - All	0.0	0.0

Maintenance Data Log

VIN: 1M1AA14Y23W150927

	Before Next	Since Last
Oil Change		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 days	0 days
Oil Change & Filter		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 days	0 days
Fuel Filter		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 days	0 days
Air Filter		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Engine Belts		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Coolant Conditioner		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 days	0 days
Engine Coolant		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Clutch Lube		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Chassis Lube		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Power Steering		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Turbo/Injectors		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Gear Oil		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Fan Clutch		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Customer Defined		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks
Customer Defined		
Distance (miles)	0	0
Engine (hours)	0	0
Interval	0 weeks	0 weeks

Fault Tables

- Unfortunately, fault tables cannot be saved electronically. They must be printed in a hard copy format while attached to the vehicle, or captured using screen shots while attached to the vehicle.
- This issue will be addressed with the introduction of next generation software to be introduced in 2004.

Customer Data Programming

- Mack Trucks, Inc. Customer Data Programming Software is used primarily to configure electronic chassis parameters and chassis data management components.

Customer Data Programming

- Preservable program output includes:
  - Vehicle Data and Settings
  - General and Vocational Feature Settings
  - Cruise Control Parameter Settings
  - Electronic Hand Throttle Parameter Settings
  - PTO Parameter Settings
  - Shutdown Parameter Settings
  - Fan Override Options Settings
  - Fleet Data Settings, including Antitheft and Incident Trigger Threshold Settings
  - Engine ECU Customer Data Settings

Vehicle Data and Settings

Vehicle Data and Settings:

Serial Numbers:

Vehicle ID#:	1M1AA14Y23W150927
Vehicle Serial #:	150927
Engine Serial #:	2N0617
V-MAC III Serial #:	8600016020
V-MAC Software Version:	1MS349
Datafile Part #:	1MS350

Data Programming History:

OEM Information:	Vehicle Information:
Winnsboro 7/16/2002 6:41:09 AM	Winnsboro 7/16/2002 6:41:09 AM
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

Customer Information:	Fleet Information:
Winnsboro 7/16/2002 6:41:09 AM	Winnsboro 7/16/2002 6:41:09 AM
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

Vehicle Data Settings:

Unit ID Number:
Manual Transmission Installed

Transmission Model:	RTLO14610B 10 SP
Transmission Top Gear Ratio:	0.74
Carrier Ratio:	3.9
Tire Size:	512 revs/miles
Road Speed Pickup Teeth:	16 pulses/rev
Road Speed Limit:	65 mph
Low Gear RSL:	65 mph
Threshold for no mph signal:	40 %
Failed mph sensor engine power limit:	50 %
Battery low voltage threshold:	10.5 volts
Alternator low voltage fault threshold:	11.5 volts
Alternator high voltage fault threshold:	16 volts
Cruise Button Bonus enabled:	NO
Detect loss of signal from mph sensor:	YES
Limit power if no signal from mph sensor:	NO
Limit power if electrical fault from mph sensor:	YES
Electronic Torque Limiting Parameters:	
Customer Torque Limit:	2000 lb-ft
Customer Torque Limit Gear Ratio:	1
Torque Limit Ramp Up Time:	1 sec
Torque Limit with PTO:	NO
Enable Fault if Incorrect Gear Ratio:	NO

General and Vocational Features Settings

- General Features:

Lower gear road speed limit option:	NO
Delay engine brake application in cruise:	YES
Low idle adjust with switches:	YES
Hold electrical power on until vehicle stopped:	YES
Enable sleep mode alert:	YES
Display mpg type:	Total mpg
Engine overspeed fault threshold:	2350 rpm
Service brake fault threshold with engine:	5 mph

- Vocational Features:

Set/Resume switch state:	Set/Decel Resume/Accel
Inhibit cruise with PTO on:	NO
Single press of resume to accel:	NO
Initial set using resume switch:	NO
Driveshaft PTO2 option:	NO
Set/Resume fault diagnostic:	YES
PTO 3 switch setting:	Factory Setting (Default)
PTO 4 switch setting:	Factory Setting (Default)
Control 1 switch setting:	Factory Setting (Default)
Control 2 switch setting:	Factory Setting (Default)

Cruise Control Settings

- Cruise Control Settings:

• Custom cruise control:	NO
• Cruise min road speed:	35 mph
• Cruise max road speed:	65 mph
• Accel bump speed:	1 mph
• Decel bump speed:	1 mph

Electronic Hand Throttle Settings

- Electronic Hand Throttle Settings:

• Custom electronic hand throttle:	NO
• Hand throttle min set speed:	475 rpm
• Hand throttle max set speed:	1400 rpm
• Hand throttle engine speed limit:	1400 rpm
• Hand throttle max road speed:	10 mph
• Throttle ramp rate:	100 rpm/sec

PTO Parameters

- PTO 1 Settings:

Custom PTO 1:	NO	Autoset:	NO
Jump to min speed:	NO	Dropout above max:	NO
Accel bump speed:	0 rpm	Decel bump speed:	0 rpm
Hold to nearest:	0 rpm	Accel ramp rate:	100 rpm/sec
Decel ramp rate:	100 rpm/sec	Minimum set speed:	475 rpm
Maximum set speed:	1400 rpm	Maximum road speed:	10 mph
Engine speed limit:	1400 rpm	Preset speed:	1400 rpm
Road Speed Limit:	65 mph	Hold minimum speed:	NO
Single speed control:	NO		
Park brake check for PTO:	NO		

- Engagement Requirements:

Park Brake:	Ignore	Service Brake:	OFF Required
Clutch:	Ignore	PTO 2:	Ignore
PTO 3:	Ignore	PTO 4:	Ignore
Control 1:	Ignore	Control 2:	Ignore

- Dropout Requirements:

Park Brake:	Ignore	Service Brake:	ON Required
Clutch:	Pedal Pushed	PTO 2:	Ignore
PTO 3:	Ignore	PTO 4:	Ignore
Control 1:	Ignore	Control 2:	Ignore

- Temporary Dropout Requirements:

Park Brake:	Ignore	Service Brake:	Ignore
Clutch:	Ignore	PTO 2:	Ignore
PTO 3:	Ignore	PTO 4:	Ignore
Control 1:	Ignore	Control 2:	Ignore

- PTO 2 Settings:

Custom PTO 2:	NO	Autoset:	NO
Jump to min speed:	NO	Dropout above max:	NO
Accel bump speed:	0 rpm	Decel bump speed:	0 rpm
Hold to nearest:	0 rpm	Accel ramp rate:	100 rpm/sec
Decel ramp rate:	100 rpm/sec	Minimum set speed:	475 rpm
Maximum set speed:	1400 rpm	Maximum road speed:	10 mph
Engine speed limit:	1400 rpm	Preset speed:	1400 rpm
Road Speed Limit:	65 mph	Hold minimum speed:	NO
Single speed control:	NO		
Park brake check for PTO:	NO		

- Engagement Requirements:

Park Brake:	Ignore	Service Brake:	OFF Required
Clutch:	Ignore	PTO 1:	Ignore
PTO 3:	Ignore	PTO 4:	Ignore
Control 1:	Ignore	Control 2:	Ignore

- Dropout Requirements:

Park Brake:	Ignore	Service Brake:	ON Required
Clutch:	Pedal Pushed	PTO 1:	Ignore
PTO 3:	Ignore	PTO 4:	Ignore
Control 1:	Ignore	Control 2:	Ignore

- Temporary Dropout Requirements

Park Brake:	Ignore	Service Brake:	Ignore
Clutch:	Ignore	PTO 1:	Ignore
PTO 3:	Ignore	PTO 4:	Ignore
Control 1:	Ignore	Control 2:	Ignore

- PTO 3 Not Installed!
- PTO 4 Not Installed!

Shutdown Sensor Options

- Shutdown Sensor Options:

- Coolant temperature: YES
- Oil pressure: YES
- Coolant level: YES
- Transmission temperature NO
- Idle Cooldown Feature Enabled: NO

- Idle Shutdown Settings:

- Idle Shutdown: NO

Fan Override Options

- Fan Override Options (Cab Fan Controls):

- Allow fan override when moving: NO
- Allow fan override when parked: NO
- Engage fan with engine brake: NO
- Engage fan with PTO 1 on: NO
- Engage fan with PTO 2 on: NO
- Engage fan with PTO 3 on: NO
- Engage fan with PTO 4 on: NO

Fleet Data Settings

- Theft Deterrence Features:

- Demand driver ID to operate: NO
- Demand driver ID to continue running beyond 30 secs.: NO
- Driver ID length: 5
- Number of ID attempts allowed: 3
- Theft distance before shutdown: 1 miles
- Theft distance remaining after shutdown lamp on: 1 miles
- Theft time before shutdown: 5 mins
- Mechanic % of power limit: 50 %
- Mechanic road speed limit: 12 mph
- % power limit before shutdown: 50 %
- % power limit if no ID: 50 %

- Display and Trip Parameters:

- Vehicle display type: V.I.P.
- Advance to next trip via display: YES
- Reset DataMax via V.I.P.: NO
- Reset driver trip via V.I.P.: YES
- Reset maintenance via V.I.P.: NO
- Display trip information on the V.I.P.: YES
- Disable Sweet Spot Indicator on the V.I.P.: NO
- VIP Programming Options: Fleet Programming Group
- Request driver name at every startup: NO
- Blackout enabled: NO
- Fleet mpg target: 6.5 mpg
- Data save mode: Wrap around
- Maintenance reminder broadcast schedule: No times selected.

- Idle data type: Total idle
- Source of driver name for trip: Use Theft Deterrence ID
- Name length in list of drivers: 16
- Engine overspeed company limit: 2150 rpm
- Engine overspeed logging (severe): 2350 rpm
- Engine overspeed logging with fuel: 1850 rpm
- Vehicle overspeed logging with fuel: 65 mph
- Vehicle overspeed all conditions: 70 mph
- Idle logging delay: 2 mins
- Hard braking threshold: -8 mph/sec
- Traction loss threshold: 8 mph/sec

- Incident Log Filter and Trigger Settings:

- Engine speed increase trigger threshold: 50 rpm
- Engine speed decrease trigger threshold: -50 rpm
- Vehicle speed increase trigger threshold: 1 mph
- Vehicle speed decrease trigger threshold: -1 mph
- Vehicle acceleration trigger: 10 mph/sec
- Vehicle deceleration trigger: -10 mph/sec
- Trigger sample time: 100 msecs
- Recording rate: 200 msecs
- Engine speed filter: 6556 msecs
- Vehicle speed filter: 6556 msecs

- Incident Log Switches:

    - Service Brake
    - Park Brake
    - Clutch Pushed
    - Engine Brake Low Bank Engaged
    - Engine Brake High Bank Engaged
    - Cruise Control Status
    - Key Switch Status
    - No Switch Entry

Engine ECU Customer Data

- EECU Data Programming History:

OEM Information:	Customer Information:
Hagerstown 7/9/2002 7:21:44 AM	Winnsboro 7/16/2002 6:42:06 AM
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

Engine ECU Data:	1MS5112P7
EECU Serial Number:	74418064286.17
EECU Software Version:	1MS327
High idle engine speed:	2100 rpm
Engine coolant temperature engagement threshold:	200 °F
Air temperature engagement threshold:	175 °F
Air conditioning override time:	60 secs
Smart fan installed:	YES
Engine sleep mode:	NO
Driveshaft PTO dropout threshold enabled:	NO
Fuel temperature sensor applied:	YES
Oil level sensor available:	NO
Engine brake installed:	YES
Exhaust brake installed:	NO
Output boost pressure on J1587:	YES
Oil temperature sensor available:	NO
A/C Installed:	YES

InfoMax

- Mack Trucks, Inc. InfoMax Fleet Data Management Software is used primarily by fleet owners and operators interested in optimizing their logistic, maintenance, and driver-related operations.

InfoMax

- Preservable program output includes:
  - Fleet Driving Summary Reports
  - Vehicle Maintenance and Service Schedule Report
  - Driver Event Summary Data Report
  - Driver Event Totals Report
  - Driver Overspeed Events Report
  - Trip Summary Reports
  - Vehicle Fault Log and Summary Reports
  - Vehicle and Fuel Economy Histograms
  - Vehicle Incident Reports

InfoMax

- The Mack Trucks, Inc. InfoMax Fleet Data Management Program should be used by trained personnel familiar with vehicle to database associations and automated chassis download processes.
- For more information, please refer to the Mack Trucks, Inc. service publication 8-330, InfoMax for V-MAC Systems User's Guide.

InfoMax

- Note: The InfoMax Incident Reports function is not to be employed when examining serious or significant events of potential consequence.
- Module data stores are zeroed upon extraction thereby preventing the use of the ECU as evidence in the event of ancillary or ongoing investigations.

Data Extraction and Incident Reconstruction Services

- Mack Trucks, Inc. does provide data extraction and incident reporting services.
- These services should be employed whenever investigating an incident of any relative consequence.
- These are premium services starting at approximately $1,500.^{00} USD.

Data Extraction and Incident Reconstruction Services

- Benefits of Mack Trucks, Inc. Data Extraction and Incident Reconstruction Services:
  - Provides a controlled environment for extraction operations.
  - Modules remain forensically intact – operations are read-only.
  - Combined data provided from all previously mentioned applications as well as WHQ mainframe data stores.
  - Report certified to be true and correct in accordance with Mack Trucks, Inc. data extraction and incident reconstruction specifications.
  - Information is archived and preserved for future reference, administration, or fulfillment of statutory reporting requirements.

Data Extraction and Incident Reconstruction Services

- For more information on Mack Trucks, Inc. Data Extraction and Incident Reconstruction services, please contact the Mack Trucks, Inc. Reliability Engineering Department in Allentown, PA

- (610) 709-2448

The Future

- As with any series of electronic systems and subsystems, the Mack Trucks, Inc. V-MAC (Vehicle Management and Control System) will continue to evolve. Some items of interest coming in the near future are:
  - GPS Tracking and Vehicle Location History
  - Embedded Driver and DOT Logs
- More information will follow as it becomes available.