

International[®] S13 Integrated (2023)

Overview: Powertrain Protection (PTP) Feature

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General Overview: Powertrain Protection (PTP) Description and Scope

Powertrain Protection (PTP) is designed to electrically protect vehicle driveline components and Power Takeoff (PTO) equipment. The feature is composed of Gear Group Torque Limit PTP. Benefits include improved engine performance without compromising the driveline.

Gear Group Torque Limit PTP is required on all vehicles configured with direct drive transmissions, (top gear ratio = 1.0), and it may be optionally ordered for any other transmission configurations.

Table 1 - Summary of Recommended PTP Configurations

| Feature | Direct Drive MT (Top gear ratio = 1.0) | Overdrive MT | Direct Drive AMT (Top gear ratio = 1.0) | Overdrive AMT | All AT |
|-----------------------------|--|---------------------------------|---|---------------------------------|---------------------------------|
| Gear Group Torque Limit PTP | Required (Turned On) | Customer Chosen (Turned On/Off) | Required (Turned On) | Customer Chosen (Turned On/Off) | Customer Chosen (Turned On/Off) |

The document will address unique PTP functionality for the S13 Engine

Overview: Gear Group Torque Limit PTP

Gear Group Torque Limit Powertrain Protection (PTP) is a feature designed to electrically protect vehicle driveline components and Power Takeoff (PTO) equipment by limiting engine torque. Benefits include improved engine performance without compromising the driveline.

The feature limits torque based on both vehicle speed, and gear groups (driving in gear group 1, gear group 4, etc.) that read transmission gear status.

Gear Group Torque Limit PTP Programmable Parameters

The following programmable parameters are populated for Gear Group Torque Limit PTP.

Parameters shown as customer programmable can be adjusted to meet the customer’s needs. Parameters indicated as non-customer programmable are preset from the factory and cannot be changed without authorization. Recommended settings are strongly encouraged for peak engine performance.

Table 2 - Programmable Parameters for Gear Group Torque Limit PTP

| Parameter Value | Description | Possible Values | Customer Programmable? | Recommended Settings |
|---|---|---|------------------------|---|
| PTP Gear Group Torque Limit Enable (PTPGTLE) (B10D 000) | This parameter must be enabled for Gear Group Torque Limiting PTP to operate. | 0: Disable 1: Enable | YES | See Table 1 above If direct drive MT or direct drive AMT: Enable Else: Customer Chosen |
| Transmission Type (TT) (B106 000) | This parameter sets the transmission type. It must be set correctly for Gear Group Torque Limiting PTP to operate as expected. | 0: Manual 1: AMT with Clutch Pedal 2: AMT without Clutch Pedal 3: Torque Converter Automatic | NO | Manual : 0 AMT with Clutch Pedal: 1 AMT without Clutch Pedal: 2 Torque Converter Automatic: 3 |
| PTP Highest Gear RATIO of Low Gear Range - MANUAL (PTPHGRATIOI LGR MANUAL) (B10D 004) | Highest gear ratio of the low gear range for MT's. Gears with ratios greater than or equal to this value will be placed in gear group 1. | 1 to 16 | YES | Default value: Parameter (A803 035) (Transmission Gear 1 Ratio) NOTE: Must be greater than parameter (B10D 005) setting. Refer to example for more info. |
| PTP Highest Gear RATIO of Intermediate Gear Range - MANUAL (PTPHGRATIOIGRMANUAL) (B10D 005) | Highest gear ratio of the intermediate gear range for MT's. Gears with ratios greater than or equal to this value and less than parameter (B10D 004) will be placed in gear group 2. | 1 to 16 | YES | Default value: Parameter (A803 035) (Transmission Gear 1 Ratio) NOTE: Must be less than parameter (B10D 004) setting. Refer to example for more info. |
| PTP Highest Gear RATIO of High Gear Range - MANUAL (PTPHGRATIOHGRMANUAL) (B10D 006) | Highest gear ratio of the high gear range for MT's. Gears with ratios greater than or equal to this value and less than parameter (B10D 005) will be placed in gear group 3. Gears with ratios less than this value will be placed in gear group 4. | 1 to 16 | YES | Default value: Parameter (A803 034) (Transmission Gear 3 Ratio) NOTE: Must be less than parameter (B10D 005) setting. Refer to example for more info. |
| PTP Zero Vehicle Speed Maximum Torque (PTPVSM T) (B10D 001) | This parameter sets the maximum torque when the clutch pedal is not depressed, and the vehicle is not moving. NOTE: Limits are in terms of engine output torque. | 800 to 1700 lb.-ft | YES | Default value: 1050 lb.-ft NOTE: Must match lowest torque setting of parameters (A803 043), (B10D 007) and (B10D 008)). Refer to example for more info. |
| PTP Low Gear Range Maximum Torque (PTPLGRMT) (A803 043) (B10D 002) | This parameter sets the maximum torque allowed in gear group 1. NOTE: Limits are in terms of engine output torque. | 800 to 1700 lb.-ft | YES | Default value: 1050 lb.-ft NOTE: Must be less than or equal to parameter (B10D 007) setting. Refer to example for more info. |
| PTP Intermediate Gear Range Maximum Torque (PTPIGRMT) (B10D 007) | This parameter sets the maximum torque allowed in gear group 2. NOTE: Limits are in terms of engine output torque. | 800 to 1700 lb.-ft | YES | Default value: 1050 lb.-ft NOTE: Must be less than or equal to parameter (B10D 008) setting. Refer to example for more info. |

| Parameter Value | Description | Possible Values | Customer Programmable? | Recommended Settings |
|--|---|--------------------|------------------------|--|
| PTP High Gear Range Maximum Torque (PTPHGRMT) (B10D 008) | This parameter sets the maximum torque allowed in gear group 3. NOTE: Limits are in terms of engine output torque. | 800 to 1700 lb.-ft | YES | Default value: 1700 lb.-ft NOTE: Must be greater than or equal to parameter (B10D 007) setting. Refer to example for more info. |

Gear Group Torque Limit PTP Customer Parameter Setup Examples

EXAMPLE - Overdrive AMT Gear Group Torque Limit PTP Configuration

In this example, assume Gear Group Torque Limit PTP is being enabled for a vehicle with an Eaton Fuller 13GYG Model FAOM-15810C-EA3 10-speed AMT by customer request. For this configuration, transmission ratios are summarized in Table 1B.

Table 1B - Eaton Fuller 13GYG Overdrive AMT Ratio Summary

| Gear Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-------------|-------|------|------|------|------|------|------|------|------|------|
| Gear Ratio | 12.80 | 9.25 | 6.76 | 4.90 | 3.58 | 2.61 | 1.89 | 1.38 | 1.00 | 0.73 |

For this overdrive AMT setup, default Gear Group Torque Limit PTP parameter settings are as follows in Table 2B.

Table 2B - Overdrive AMT Gear Group PTP Parameter Summary

| Parameter | Programmed Value |
|---|------------------|
| PTP Gear Group Torque Limit Enable (B10D 000) | Enable |
| Transmission Type (B106 000) | Automated Manual |
| PTP Highest Gear RATIO of Low Gear Range - MANUAL (B10D 004) | 12.80 |
| PTP Highest Gear RATIO of Intermediate Gear Range - MANUAL (B10D 005) | 9.25 |
| PTP Highest Gear RATIO of High Gear Range - MANUAL (B10D 006) | 6.76 |
| PTP Zero Vehicle Speed Maximum Torque (PTPVSMT) (B10D 001) | 1050 lb.-ft |
| PTP Low Gear Range Maximum Torque (PTPLGRMT) (B10D 002) | 1050 lb.-ft |
| PTP Intermediate Gear Range Maximum Torque (PTPIGRMT) (B10D 007) | 1050 lb.-ft |
| PTP High Gear Range Maximum Torque (PTPHGRMT) (B10D 008) | 1700 lb.-ft |

For this configuration, a summary of gear groups and torque limits is presented in Table 3B.

Table 3B - PTP Gear Groups and Torque Limits for Overdrive AMT Example B

| | | | | | | | | | | |
|------------------|--------------|--------------|--------------|--------|------|------|------|------|------|------|
| Gear Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Gear Ratio | 12.80 | 9.25 | 6.76 | 4.90 | 3.58 | 2.61 | 1.89 | 1.38 | 1.00 | 0.73 |
| PTP Gear Group | 1 | 2 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| PTP Torque Limit | *1050 lb.-ft | *1050 lb.-ft | *1700 lb.-ft | **Max. | Max. | Max. | Max. | Max. | Max. | Max. |

*For vehicle speed less than 16 km/hr. maximum engine torque for speeds greater than or equal to 16 km/hr.

**Maximum engine torque

Table 3 - Programmable Parameters for Engine Speed Limit PTP

| Parameter Value | Description | Possible Values | Customer Programmable? | Recommended Settings |
|------------------------------|---|---|------------------------|--|
| Transmission Type (B106 000) | This parameter sets the transmission type inside the ECM. | 0: Manual 1: AMT with Clutch Pedal 2: AMT without Clutch Pedal 3: Torque Converter Automatic | NO | Manual : 0 AMT with Clutch Pedal: 1 AMT without Clutch Pedal: 2 Torque Converter Automatic: 3 |

Frequently Asked Questions

Will PTP operate in reverse?

Yes, Gear Group Torque Limit will operate in reverse gear. Analogous to forward driving, the reverse gear ratio will determine gear group, and torque will be limited to the programmed value corresponding to that group.

Will Gear Group Torque Limit PTP recognize skip shifts?

Yes, the feature reads signals from the transmission that rapidly broadcast transmission gear number, so any shift performed by the driver will be tracked.

Will Gear Group Torque Limit PTP operate under stationary conditions in an AMT?

Yes, stationary condition for Gear Group Torque Limit PTP is satisfied when vehicle is not in motion. For zero vehicle speed the feature will limit torque to the minimum of parameters zero vehicle speed torque PTP Zero Vehicle Speed Maximum Torque (PTPVSM) (B10D 001) and gear group 1 torque PTP Low Gear Range Maximum Torque (PTPLGRMT) (B10D 002) in an AMT.

Definitions/Acronyms

The following terms are referenced in this document:

| Acronym | Definition |
|-------------|---|
| PTP | Powertrain Protection |
| PTO | Power Takeoff |
| MT | Manual Transmission |
| AMT | Automated Manual Transmission |
| AT | Torque Converter Automatic Transmission |
| AESC | Auxiliary Engine Speed Control |
| CEM1 | Engine Control Module |
| PIM | Powertrain Interface Module |