

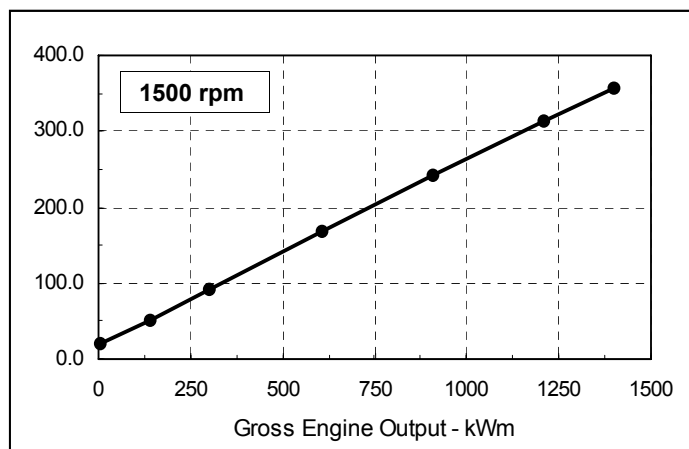
|                                                                                  |                                                         |                                                                                  |                                 |                                          |
|----------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------|------------------------------------------|
|  | <b>Cummins Inc.</b><br><br>Columbus, Indiana 47202-3005 | Basic Engine Model:<br><b>QSK50-G3 NR2</b>                                       | Curve Number:<br><b>FR-6621</b> | <i>G-DRIVE</i><br><b>QSK</b><br><b>1</b> |
|                                                                                  | <b>Engine Data Sheet</b>                                | Engine Critical Parts List:<br><b>CPL: 42771</b>                                 | Date:<br><b>7Mar08</b>          |                                          |
| Displacement : <b>50.3 litre (3067 in<sup>3</sup>)</b>                           |                                                         | Bore : <b>159 mm (6.25 in.)</b> Stroke : <b>159 mm (6.25 in.)</b>                |                                 |                                          |
| No. of Cylinders : <b>16</b>                                                     |                                                         | Aspiration : <b>Turbocharged and Low Temperature Aftercooled (2 Pump/2 Loop)</b> |                                 |                                          |

| Engine Speed | Standby Power |             | Prime Power |             | Continuous Power |             |
|--------------|---------------|-------------|-------------|-------------|------------------|-------------|
|              | kWm           | hp          | kWm         | hp          | kWm              | hp          |
| <b>1500</b>  | <b>1401</b>   | <b>1878</b> | <b>1210</b> | <b>1622</b> | <b>1100</b>      | <b>1475</b> |
| <b>1800</b>  | <b>1559</b>   | <b>2090</b> | <b>1395</b> | <b>1870</b> | <b>1223</b>      | <b>1640</b> |

## Engine Performance Data @ 1500 rpm

| OUTPUT POWER            |      |      | FUEL CONSUMPTION |             |                |                 |
|-------------------------|------|------|------------------|-------------|----------------|-----------------|
| %                       | kWm  | hp   | kg/<br>kWm·h     | lb/<br>hp·h | litre/<br>hour | US gal/<br>hour |
| <b>STANDBY POWER</b>    |      |      |                  |             |                |                 |
| 100                     | 1401 | 1878 | 0.217            | 0.356       | 357            | 94.2            |
| <b>PRIME POWER</b>      |      |      |                  |             |                |                 |
| 100                     | 1210 | 1622 | 0.220            | 0.361       | 313            | 85.5            |
| 75                      | 908  | 1217 | 0.226            | 0.371       | 241            | 63.6            |
| 50                      | 605  | 811  | 0.237            | 0.389       | 168            | 44.4            |
| 25                      | 303  | 406  | 0.254            | 0.418       | 91             | 23.9            |
| <b>CONTINUOUS POWER</b> |      |      |                  |             |                |                 |
| 100                     | 1100 | 1475 | 0.218            | 0.358       | 282            | 74.3            |

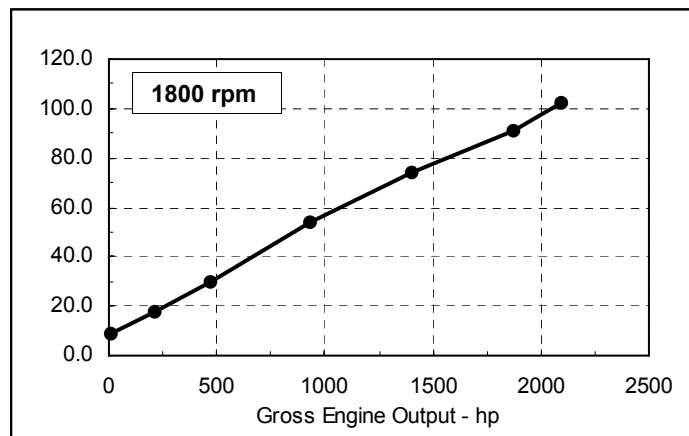
litre/hour



## Engine Performance Data @ 1800 rpm

| OUTPUT POWER            |      |      | FUEL CONSUMPTION |             |                |                 |
|-------------------------|------|------|------------------|-------------|----------------|-----------------|
| %                       | kWm  | hp   | kg/<br>kWm·h     | lb/<br>hp·h | litre/<br>hour | US gal/<br>hour |
| <b>STANDBY POWER</b>    |      |      |                  |             |                |                 |
| 100                     | 1559 | 2090 | 0.211            | 0.348       | 388            | 102.3           |
| <b>PRIME POWER</b>      |      |      |                  |             |                |                 |
| 100                     | 1395 | 1870 | 0.210            | 0.346       | 345            | 91.1            |
| 75                      | 1046 | 1403 | 0.227            | 0.374       | 280            | 73.8            |
| 50                      | 698  | 935  | 0.249            | 0.410       | 204            | 54.0            |
| 25                      | 349  | 468  | 0.276            | 0.454       | 113            | 29.9            |
| <b>CONTINUOUS POWER</b> |      |      |                  |             |                |                 |
| 100                     | 1223 | 1640 | 0.218            | 0.358       | 313            | 82.7            |

US gallons/hour



**CONVERSIONS:**(litres = US Gal x 3.785) (US Gal = litres x 0.2642)

Data Subject to Change Without Notice

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. **STANDBY POWER RATING:** Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating. This rating should be applied where reliable utility power is available. A Standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency. **PRIME POWER RATING:** Applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories: **UNLIMITED TIME RUNNING PRIME POWER:** Prime Power is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12-hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year. **LIMITED TIME RUNNING PRIME POWER:** Limited Time Prime Power is available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation exceeding 750 hours per year at the Prime Power rating should use the Continuous Power rating. **CONTINUOUS POWER RATING:** Applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

Reference AEB 10.47 for determining Electrical Output.

Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2. Derates shown are based on 15 in H<sub>2</sub>O air intake restriction and 2 in Hg exhaust back pressure.

The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/litre (7.1 lbs/US gal). Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.

Data Status: --Limited Production--

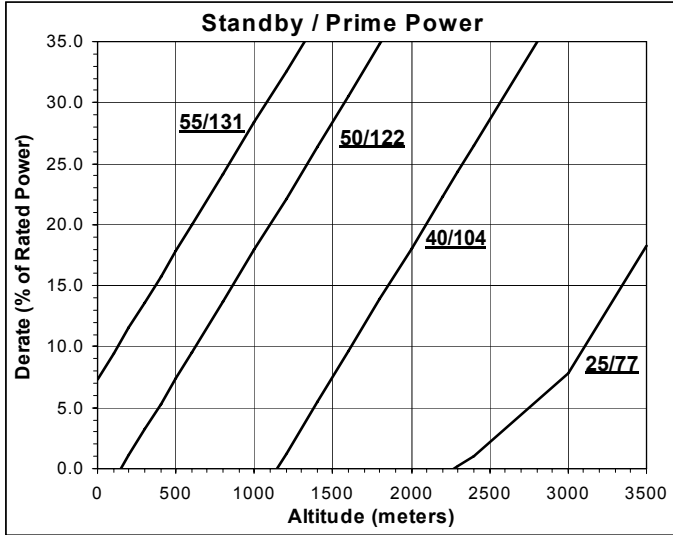
Data Tolerance: ± 5%

Chief Engineer:

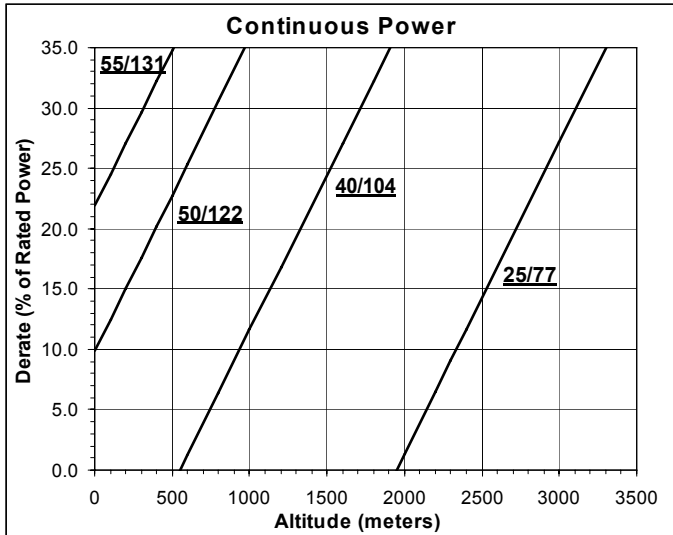
*C. J. Martin*

### 1500 rpm Derate Curves

Ambient Temp. °C/°F

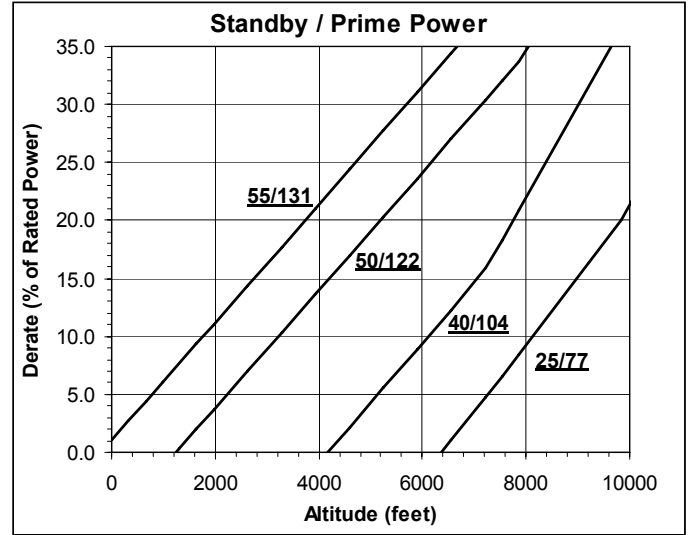


Ambient Temp. °C/°F

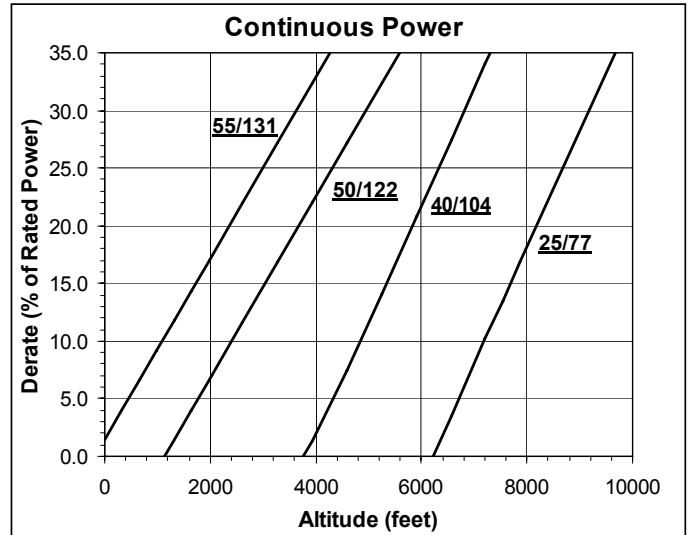


### 1800 rpm Derate Curves

Ambient Temp. °C/°F



Ambient Temp. °C/°F



#### Operation At Elevated Temperature And Altitude:

For **Standby/Prime Operation** above these conditions, derate by an additional 6% per 300 m (1000 ft), and 21% per 10° C (18° F).

For **Continuous Operation** above these conditions, derate by an additional 8% per 300 m (1000 ft), and 24% per 10° C (18° F).

#### Operation At Elevated Temperature And Altitude:

For **Standby/Prime Operation** above these conditions, derate by an additional 8% per 300 m (1000 ft), and 15% per 10° C (18° F).

For **Continuous Operation** above these conditions, derate by an additional 10% per 300 m (1000 ft), and 21% per 10° C (18° F).

**Cummins Inc.****Engine Data Sheet****ENGINE MODEL: QSK50 G3 NR2****CONFIGURATION NUMBER:****DATA SHEET :** DS-6621**DATE :** 7Mar08**PERFORMANCE CURVE :** FR-6621**INSTALLATION DIAGRAM**

• Fan to Flywheel: 3170631

**CPL NUMBER**

• Engine Critical Parts List: 42771

**GENERAL ENGINE DATA**

|                                                                                                      |                                                            |                         |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------|
| Type .....                                                                                           | 4-Cycle; 60 Vee; 16-Cylinder Diesel                        |                         |
| Aspiration .....                                                                                     | Turbocharged and Low Temperature                           |                         |
|                                                                                                      | Aftercooled (2 Pump/2 Loop)                                |                         |
| Bore x Stroke .....                                                                                  | — in x in (mm x mm)                                        | 159 x 159 (6.25 x 6.25) |
| Displacement .....                                                                                   | — in <sup>3</sup> (litre)                                  | 50.3 (3067)             |
| Compression Ratio .....                                                                              |                                                            | 15.0 : 1                |
| Dry Weight (Approximate),<br>Fan to Flywheel Engine (with SAE 0 Flywheel and Flywheel Housing) ..... | — lb (kg)                                                  | 11927 (5410)            |
| Wet Weight (Approximate),<br>Fan to Flywheel Engine .....                                            | — lb (kg)                                                  | 12593 (5712)            |
| Moment of Inertia of Rotating Components                                                             |                                                            |                         |
| • with FW 6066 Flywheel .....                                                                        | — lb <sub>m</sub> • ft <sup>2</sup> (kg • m <sup>2</sup> ) | 301 (12.7)              |
| • with FW 6057 Flywheel .....                                                                        | — lb <sub>m</sub> • ft <sup>2</sup> (kg • m <sup>2</sup> ) | 515 (21.7)              |
| Center of Gravity from Rear Face of Block .....                                                      | — in (mm)                                                  | 47.5 (1206)             |
| Center of Gravity Above Crankshaft Centerline .....                                                  | — in (mm)                                                  | 11 (279)                |
| Maximum Static Loading at Rear Main Bearing .....                                                    | — lb (kg)                                                  | 2000 (908)              |

**ENGINE MOUNTING**

|                                                    |                   |             |
|----------------------------------------------------|-------------------|-------------|
| Maximum Bending Moment at Rear Face of Block ..... | — lb • ft (N • m) | 4500 (6100) |
|----------------------------------------------------|-------------------|-------------|

**EXHAUST SYSTEM**

|                             |               |         |
|-----------------------------|---------------|---------|
| Maximum Back Pressure ..... | — in Hg (kPa) | 2 (6.8) |
|-----------------------------|---------------|---------|

**AIR INDUCTION SYSTEM**

|                                   |                             |          |
|-----------------------------------|-----------------------------|----------|
| Maximum Intake Air Restriction    |                             |          |
| • with Dirty Filter Element ..... | — in H <sub>2</sub> O (kPa) | 25 (6.2) |
| • with Clean Filter Element ..... | — in H <sub>2</sub> O (kPa) | 15 (3.7) |

**COOLING SYSTEM**

|                                                                                        |                  |           |
|----------------------------------------------------------------------------------------|------------------|-----------|
| Coolant Capacity — Engine .....                                                        | — US gal (litre) | 37 (140)  |
| Minimum Pressure Cap (for Cooling Systems with less than 2m [6 ft.] Static Head) ..... | — psi (kPa)      | 14 (96)   |
| Maximum Static Head of Coolant Above Engine Crank Centerline .....                     | — ft (m)         | 60 (18.3) |

**Jacket Water Circuit Requirements:**

|                                                                        |             |                   |
|------------------------------------------------------------------------|-------------|-------------------|
| Maximum Coolant Friction Head External to Engine — 1500/1800 rpm ..... | — psi (kPa) | 7/10 (48/69)      |
| Maximum Top Tank Temperature for Standby / Prime Power .....           | — °F (°C)   | 220/212 (104/100) |
| Thermostat (Modulating) Range .....                                    | — °F (°C)   | 180-200 (82-93)   |

**Aftercooler Circuit Requirements:**

|                                                                                 |                  |                 |
|---------------------------------------------------------------------------------|------------------|-----------------|
| Coolant Capacity — Aftercoolers .....                                           | — US gal (litre) | 9 (34)          |
| Maximum Coolant Friction Head External to Engine — 1500/1800 rpm .....          | — psi (kPa)      | 5/7 (35/48)     |
| Maximum Inlet Water Temperature to Aftercoolers @ 25 °C (77 °F) .....           | — °F (°C)        | 120 (49)        |
| Maximum Inlet Water Temperature to Aftercoolers for Standby / Prime Power ..... | — °F (°C)        | 160/150 (71/66) |
| Thermostat (Modulating) Range .....                                             | — °F (°C)        | 115-135 (46-57) |

**LUBRICATION SYSTEM**

|                                                      |                  |                 |
|------------------------------------------------------|------------------|-----------------|
| Oil Pressure @ Idle Speed .....                      | — psi (kPa)      | 20 (138)        |
| @ Governed Speed .....                               | — psi (kPa)      | 50-70 (345-483) |
| Maximum Oil Temperature .....                        | — °F (°C)        | 250 (121)       |
| Oil Capacity with OP 6100 Oil Pan : Low - High ..... | — US gal (litre) | 46-54 (174-204) |
| Total System Capacity (Including Filter) .....       | — US gal (litre) | 62 (235)        |

## FUEL SYSTEM

|                                                                                                            |                 |
|------------------------------------------------------------------------------------------------------------|-----------------|
| Type Injection System .....                                                                                | Cummins MCRS    |
| Maximum Restriction at Lift Pump(clean/dirty filter)..... — in Hg (kPa)                                    | 5.0/9.0 (17/34) |
| Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) — in Hg (kPa) | 10.0 (34)       |
| Maximum Fuel Flow to Injector Pump .....                                                                   | 200 (757)       |
| Maximum Return Fuel Flow .....                                                                             | 90 (341)        |
| Maximum Fuel Inlet Temperature .....                                                                       | 160 (70)        |

## ELECTRICAL SYSTEM

|                                                        |           |      |
|--------------------------------------------------------|-----------|------|
| Cranking Motor (Heavy Duty, Positive Engagement) ..... | — volt    | 24   |
| Battery Charging System, Negative Ground .....         | — ampere  | 55   |
| Maximum Allowable Resistance of Cranking Circuit ..... | — ohm     | .002 |
| Minimum Recommended Battery Capacity                   |           |      |
| • Cold Soak @ 0 °F to 32 °F (-18 °C to 0 °C) .....     | — 0°F CCA | 1800 |

## COLD START CAPABILITY

|                                                                                              |           |         |
|----------------------------------------------------------------------------------------------|-----------|---------|
| Minimum Ambient Temperature for NFPA 110 Cold Start (90 degree °F Coolant Temperature) ..... | — °F (°C) | 50 (10) |
| Minimum Ambient Temperature for Unaided Cold Start .....                                     | — °F (°C) | 45 (7)  |

## PERFORMANCE DATA

- All data is based on:
- Engine operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; not included are battery charging alternator, fan, and optional driven components.
  - Engine operating with fuel corresponding to grade No. 2-D per ASTM D975.
  - ISO 3046, Part 1, Standard Reference Conditions of:
 

|                     |                         |                   |                 |
|---------------------|-------------------------|-------------------|-----------------|
| Barometric Pressure | : 100 kPa (29.53 in Hg) | Air Temperature   | : 25 °C (77 °F) |
| Altitude            | : 110 m (361 ft)        | Relative Humidity | : 30%           |

|                                                                                              |       |                |      |
|----------------------------------------------------------------------------------------------|-------|----------------|------|
| Steady State Stability Band at Any Constant Load .....                                       | — %   | +/-            | 0.25 |
| Estimated Free Field Sound Pressure Level of a Typical Generator Set;                        |       |                |      |
| Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft); @ 1500/1800 rpm .....             | — dBA | 95/97.1 (est.) |      |
| Exhaust Noise at 1 m Horizontal from Centerline of Exhaust Pipe Outlet Upwards at 45 ° ..... | — dBA | 125/128 (est.) |      |

|                                                               |                  |
|---------------------------------------------------------------|------------------|
| Governed Engine Speed .....                                   | rpm              |
| Engine Idle Speed .....                                       | rpm              |
| Gross Engine Power Output .....                               | hp (kW)          |
| Brake Mean Effective Pressure .....                           | psi (kPa)        |
| Piston Speed .....                                            | ft/min (m/s)     |
| Friction Horsepower .....                                     | hp (kW)          |
| Engine Water Flow at Stated Friction Head External to Engine: |                  |
| • 4 psi Friction Head .....                                   | US gpm (litre/s) |
| • Maximum Friction Head .....                                 | US gpm (litre/s) |

### Engine Data

|                                                |               |
|------------------------------------------------|---------------|
| Intake Air Flow .....                          | cfm (litre/s) |
| Exhaust Gas Temperature .....                  | °F (°C)       |
| Exhaust Gas Flow .....                         | cfm (litre/s) |
| Air to Fuel Ratio .....                        | air : fuel    |
| Radiated Heat to Ambient .....                 | BTU/min (kW)  |
| Heat Rejection to Engine Jacket Radiator ..... | BTU/min (kW)  |
| Heat Rejection to Exhaust .....                | BTU/min (kW)  |
| Heat Rejected to Fuel* .....                   | BTU/min (kW)  |

### Engine Aftercooler Data

|                                                                   |                  |
|-------------------------------------------------------------------|------------------|
| Heat Rejection to Coolant .....                                   | BTU/min (kW)     |
| Aftercooler Water Flow at Stated Friction Head External to Engine |                  |
| • 2 psi Friction Head .....                                       | US gpm (litre/s) |
| • Maximum Friction Head .....                                     | US gpm (litre/s) |

\* This is the maximum heat rejection to fuel.

| STANDBY POWER |              | PRIME POWER  |             |
|---------------|--------------|--------------|-------------|
| 60 hz         | 50 hz        | 60 hz        | 50 hz       |
| 1800          | 1500         | 1800         | 1500        |
| 700 - 900     | 700 - 900    | 700 - 900    | 700 - 900   |
| 2090 (1559)   | 1878 (1401)  | 1870 (1395)  | 1622 (1210) |
| 299 (2062)    | 323 (2227)   | 268 (1848)   | 279 (1924)  |
| 1875 (9.5)    | 1562 (7.9)   | 1875 (9.5)   | 1562 (7.9)  |
| 225 (168)     | 155 (116)    | 225 (168)    | 155 (116)   |
| 536 (34)      | 448 (28)     | 536 (34)     | 448 (28)    |
| 500 (32)      | 416 (26)     | 500 (32)     | 416 (26)    |
| 4820 (2275)   | 4230 (1995)  | 4640 (2190)  | 3950 (1865) |
| 865 (465)     | 945 (510)    | 815 (435)    | 905 (485)   |
| 11690 (5520)  | 10580 (4995) | 10755 (5075) | 9665 (4560) |
| 28.4 : 1      | 26.9 : 1     | 30.5 : 1     | 28.8 : 1    |
| 8835 (160)    | 8165 (145)   | 7895 (140)   | 7145 (130)  |
| 35595 (630)   | 32285 (570)  | 32625 (575)  | 28910 (510) |
| 63355 (1115)  | 63885 (1125) | 56410 (995)  | 56630 (995) |
| 201 (4)       | 201 (4)      | 201 (4)      | 201 (4)     |
| 24475 (430)   | 20000 (355)  | 21065 (375)  | 17000 (300) |
| 159 (10)      | 123 (8)      | 159 (10)     | 123 (8)     |
| 142 (9)       | 121 (7.6)    | 142 (9)      | 121 (7.6)   |

N.A. - Not Available

N/A - Not Applicable to this Engine

TBD - To Be Determined

ENGINE MODEL : QSK50-G3 NR2

DATA SHEET : DS-6621

DATE : 7Mar08

CURVE NO. : FR-6621