

## 8 APPLICATIONS

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## 8.1 APPLICATION CODE SYSTEM

DDC Application Engineering, Product Engineering, and DDEC Engineering work together to establish and define the Electronic Control Module (ECM) functions and the electronic parameters that are maintained by the DDEC Application Code System (ACS). DDC Application Engineering creates application codes (6N4C groups) that define defaults and validation ranges for the ECM features. ACS provides the flexibility to customize engine speed governing and control, engine protection, and communications. DDC Product Distribution and Distributors use the application codes to process and further customize customers' orders.

This section contains a blank copy of the "DDEC ACS Worksheet." This worksheet may be used by the OEM, or distributor, to specify desired DDEC parameters and help determine the proper 6N4C group. These parameters include:

- Type of transmission or powertrain
- Engine speed governing
  - Idle speed
  - High idle speed
  - Droop
  - Cruise Control options
- Engine protection strategy
- DDEC digital inputs
- DDEC digital outputs

### DDEC Nonroad Application Specification

<b>6N4C Group</b>	
(To be assigned by DDC Application Engineering)	

<b>Transmission</b>				
(The transmission codes are listed in Table 8-1 on page 8-7.)				
Transmission Code:				

<b>Governing</b>				
Type (Circle One)		VSG Only	LSG Only	VSG & LSG
Number of VSG Throttle Locations (0, 1, or 2)				
Number of LSG Throttle Locations (0, 1, or 2)				
VSG MAX RPM	400 to 2500 RPM			
VSG MIN RPM	400 to 2500 RPM			
VSG ALT MIN RPM	400 to 2500 RPM			
VSG DROOP	0 to 300 RPM			
HOT IDLE	400 to 2500 RPM			
COLD IDLE	750 to 1050 RPM			
LSG DROOP	0 to 300 RPM			
Idle Operation at Zero VSG	Yes	No		
Note: VSG ALT MIN RPM must be greater than VSG MIN RPM. LSG DROOP must be greater than or equal to VSG DROOP.				

<b>Cruise Switch VSG</b>				
Cruise Switch VSG (Circle One)		Yes		No
Initial Speed	400 to 2500			
RPM Increment	0 to 250			

<b>Idle Timer Shutdown</b>				
Idle Timer Shutdown (Circle One)		Yes		No
Time	1 to 99 Minutes			
Operates On		Idle Only		Idle & VSG
Override		Yes		No

**DDEC Nonroad Application Specification**

<b>Engine Protection</b> (Circle required option)				
Coolant Temperature		Shutdown	Rampdown	Warning
Coolant Level		Shutdown	Rampdown	Warning
Coolant Pressure		Shutdown	Rampdown	Warning
Oil Pressure		Shutdown	Rampdown	Warning
Oil Temperature		Shutdown	Rampdown	Warning
Aux. Stop 1		Shutdown	Rampdown	Warning
Aux. Stop 2		Shutdown	Rampdown	Warning
Crankcase Pressure		Shutdown	Rampdown	Warning
Intercooler Temperature		Shutdown	Rampdown	Warning
Engine Overtemperature Protection		Yes		No
Air Temperature Reduction		Yes		No
Continuous Override		Yes		No

<b>Fan Controls</b> (Circle required options)					
Digital Fan Type:	None	Single	Dual	2-Speed	PWM

<b>Engine Brakes</b> (circle required option)				
Engine Brake Type:	None	Jake Brake	KD Brake	DVB

<b>Engine Brake Cruise</b>				
Engine Brake Cruise (Circle One)		Yes		No
Engine Brake Low	1 to 10 MPH			
Increment	1 to 5 MPH			

<b>Vehicle Speed Sensor</b>				
Vehicle Speed Sensor (VSS) (Circle One)		Yes		No
VSS Sensor Type (Circle One)		Transmission		Wheel
VSS Signal Type (Circle One)		Open Collect		Magnetic
Number of Teeth		2 to 200		
Tire Revolutions Per Mile		100 to 1000		
Axle Ratio:				
Final Gear Ratio:				

**DDEC Nonroad Application Specification**

<b>Vehicle Speed Limit</b>				
Vehicle Speed Limit (Circle One)		Yes		No
Max. Speed	20 to 127 MPH			
Overspeed with Fuel	0 to 127 MPH			
Overspeed w/o Fuel	0 to 127 MPH			

<b>Cruise Control</b>				
Cruise Control (Circle One)		Yes		No
Auto Resume (Circle One)		Yes		No
Min. Speed	20 to 127 MPH			
Max. Speed	20 to 127 MPH			

<b>Air Compressor Controls</b>				
Air Compressor Controls (Circle One)		Yes		No
Load Pressure				
Unload Pressure				
Range 1 Min. Pressure				
Range 1 Max. Pressure				
Range 2 Min. Pressure				
Range 2 Max. Pressure				
Range 3 Min. Pressure				
Range 3 Max. Pressure				

<b>Other Options (Circle required options)</b>			
Fuel Economy Incentive	Yes		No
Pressure Governor System	Yes		No
Progressive Shift	Yes		No

### DDEC Nonroad Application Specification

<b>Configuration Of Digital Inputs</b> (A list of Digital Input options and codes is listed in Table 8-2 on page 8-8.)		
VIH Pin Number	VIH Wire Number	Customer Selection
E1	451	
F1	542	
G1	528	
H1	523	
J1	541	
F2	544	
G2	543	
H2	524	
J2	531	
K2	583	
G3	545	
K3	979	

<b>Configuration Of Digital Outputs</b> (A list of Digital Output options and codes is listed in Table 8-3 on page 8-8.)		
VIH Pin Number	VIH Wire Number	Customer Selection
A1	988	
A2	555	
F3	499	
Sensor Harness Pin Number	Sensor Harness Wire Number	Customer Selection
W3	563	
X3	564	
Y3	565	

Refer to section 5.25, "Transmission Interface," for further details of the transmission definition.

Transmission Type	Code	Transmission Type	Code
Manual	00	RTLO-XX610B-T2 – TOP2	27
Allison Hydraulic	01	RTL-XX710B-T2 – TOP2	28
Voith	03	RTLO-XX713A-T2 – TOP2	29
Z-F Ecomat	04	RTLO-XX718B-T2 – TOP2	30
Allison Electronic	09	Eaton Fuller Automatic	33
Allison WT	12	% TPS Hydraulic	26
Other Automatic	14	Optimum Load Curve	32
GE Statex III	15	GE Propulsion System	31
Autoshift / J1939	16		
Note:If application has no transmission enter code "00"			

**Table 8-1 Transmission Options and Codes**

Refer to section 4.2, "Digital Inputs," for a detailed description of each digital input option.

Description	Code	Description	Code
None	00	Resume / Accel On	22
Engine Brake Low	01	Cruise Enable	23
Engine Brake High	02	PGS System Enable	24
Aux. Shutdown # 1	03	SEO / Diagnostic Request	25
Aux. Shutdown # 2	04	Engine Brake Disable	26
Park Brake Interlock	05	Transmission Retarder Status	27
Idle Validation	06	Dual Throttle	28
Throttle Kickdown	07	A/C Fan Status	29
Pressure RPM Mode	08	N/A	30
Throttle Inhibit	09	Aux CLS	31
External Engine Synchronization	10	Fan Control Override	32
RPM Freeze	11	VSG Station Change	33
Rating Switch # 1	12	VSG Station Complement	34
Rating Switch # 2	13	Air Load Switch	35
Limiting Torque Curve	14	N/A	36
Diagnostic Request	15	N/A	37
Alt Min VSG / Fast Idle	16	In Neutral Switch (ESS)	38
Service Break Release	17	In Gear Switch (ESS)	39
Clutch Released	18	KD Brake	40
Set / Coast On	20	VSG Inhibit	42

**Table 8-2 Digital Input Options and Codes**

Refer to section 4.3, "Digital Outputs," for a detailed description of each digital output option.



Description	Code	Description	Code
No Function	00	Coolant Temp. High Light	20
N/A	01	Air Compressor Solenoid	21
N/A	02	Crankcase Pressure High	22
Low DDEC Voltage	03	Coolant Pressure Low Light	23
External Engine Synchronization Active	04	Ether Start	24
PSG Pressure Mode Light	05	N/A	25
Vehicle Power Shutdown	06	Optimized Idle Light	26
Starter Lockout	07	N/A	27
External Engine Brake Enable	08	ESS Low Range	28
Transmission Retarder Enable	09	ESS High Range	29
Coolant Level Low Light	10	Shift Solenoid (TOP2)	30
Cruise Active Light	11	Shift Lockout (TOP2)	31
N/A	12	Gas Throttle Actuator	32
Fan Control # 1	13	Fuel Supply Solenoid	33
Fan Control # 2	14	KD Brake Solenoid	34
Deceleration Light	15	Sequential Turbo	35
Engine Brake Active	16	Natural Gas Knock Shutdown	36
VSG Active Indication	17	Cold Engine Signal (S4000)	37
Oil Pressure Low Light	18	Engine Overspeed Signal	39
Oil Temperature High Light	19		

**Table 8-3 Digital Output Options and Codes**

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## 8.2 TYPICAL ON-HIGHWAY APPLICATION

This section contains typical parameter settings for on-highway truck applications and the pin assignments for the Vehicle Interface Harness and the Engine Sensor Harness as listed in the Verification Report on the following pages.

The Digital Input and Digital Output ports can be configured for a variety of software options. The location of the connector pin for each software option can be specified at the time of engine order, by VEPS or the Distributor Reprogramming Station. For more information on software options, refer to section 4.2, "Digital Inputs" and section 4.3, "Digital Outputs."

DATE:  
SALES ORDER NUMBER:

VERIFICATION REPORT

DDEC III/IV ENGINE SUMMARY

Series I60	DDEC Appl Group	06N04C0126	DDEC IV HIGHWAY TRK EPL W/O JAKE BRAKE		
	Base group	06N04D6437	370-430 HP STD RAT 1999 DDEC IV LINE HAUL 12L S60		
	Hp Group	06N04M7109	400HP@1800RPM 1056 1999 LINE HAUL TRK 12L S60 (155OFTLB)		
PWM Trans 0	MANUAL	VSG Max RPM	1600	Hot Idle	600
VSG Cruise Switch	YES	VSG Min RPM	600	Cold Idle	2500
Init Speed	1000	VSG Alt Min RPM	600	Max Droop	150
RPM Increment	25	VSG is Primary	NO	LSG Droop	125
				VSG Droop	0
IDLE SHUTDOWN	YES	Time	5 MIN		
		Operates On	IDLE & VSG GOVERNOR		
Maximum Security	NO	Override	NO		
Minimum Security	NO	Min Temp	75 DEGC	Max Temp	75 DEGC
ENGINE PROTECTION		Digital Fan	SINGLE	FUEL ECONOMY INCENTIVE	
Coolant Temp	SHUTDOWN	PWM Fan	NONE	Min MPG	N/A
Coolant Level	SHUTDOWN	Dynamic Brk	NO	Max MPH	0
Coolant Pressure	DISABLED			Conv. Factor	N/A
R1 Coolant Prs		Engine Brakes	NONE	Calc. Type	N/A
Crankcase Prs	DISABLED	Eng Brake Cruise	NO		
Override	YES	Eng Brake Low	3		
Intercool Temp	DISABLED	Increment	2		
Oil Press	SHUTDOWN				
Override		Data Pages	NO		
Oil Temp	SHUTDOWN	Optimized Idle	NO		
R1 Oil Temp		Fan Timer	180 SEC		
Aux Stop 1	SHUTDOWN				
Aux Stop 2	SHUTDOWN	Full Power Override	NO		
Vehicle Speed Sensor	YES	Cruise Control	YES	Press Gov System	NO
VSS Sensor Type	TRANS	AutoResume	NO	Cavitation Timeout	
VSS Signal Type	MAGNETIC	Min Speed	30	Pump Press Incr	
Num Teeth	16	Max Speed	65	Eng Spd Incr	
Tire Rev/Mile	500			Integral Gain	
Axle Ratio	3.55	ATI Port	NONE	Prop Gain	
Final Gear Ratio	1				
Vehicle Speed Limit	YES	Digital Torque Curve		1	
Max Speed	68	Starter Lockout Enable Speed		500	
Overspeed with Fuel	0	Starter Lockout Disable Speed		60	
Overspeed w/o Fuel	0				
PROGRESSIVE SHIFT	NO				
Low Gear #1 Max MPH		Max RPM		Turn-off RPM	
Low Gear #2 Max MPH		Max RPM		Turn-off RPM	
High Gear Max MPH		Max RPM			
Air Comp. System	NO	R1 Min Pressure		R1 Max Pressure	
Load Pressure		R2 Min Pressure		R2 Max Pressure	
Unload Pressure		R3 Min Pressure		R3 Max Pressure	
Pressure Increment		% Integral Gain		Prop Gain	
PIN WIRE# Fn		VIH		Reverse	
E1 #451 32	FAN CONTROL OVERRIDE	PIN Wire# Fn	Polarity		
F1 #542 29	A/C FAN STATUS	A1 #988 10	NO	COOLANT LEVEL LOW LIGHT	
G1 #528 25	SEO/DIAGNOSTIC REQUEST	A2 #555 13	YES	FAN CONTROL #1	
H1 #523 03	AUX SHUTDOWN #1	F3 #499 06	NO	VEHICLE POWER SHUTDOWN	
J1 #541 20	SET/COAST ON				
F2 #544 23	CRUISE ENABLE	ESH	Reverse		
G2 #543 17	SERVICE BRAKE RELEASED	PIN Wire# Fn	Polarity		
H2 #524 05	PARK BRAKE INTERLOCK	W3 #563 00	NO	NO FUNCTION	
J2 #531 18	CLUTCH RELEASED	X3 #564 00	NO	NO FUNCTION	
K2 #583 00	NONE	Y3 #565 00	NO	NO FUNCTION	
G3 #545 22	RESUME/ACCEL ON				
K3 #979 00	NONE				

## **8.3 TYPICAL INDUSTRIAL APPLICATION - ON-HIGHWAY CRANE**

This section contains typical parameter settings for on-highway crane applications and the pin assignments for the Vehicle Interface Harness and the Engine Sensor Harness as listed in the Verification Report on the following pages.

The Digital Input and Digital Output ports can be configured for a variety of software options. The location of the connector pin for each software option can be specified at the time of engine order, by VEPS or the Distributor Reprogramming Station. For more information on software options, refer to section 4.2, "Digital Inputs" and section 4.3, "Digital Outputs."

DATE: VERIFICATION REPORT  
 SALES ORDER NUMBER:

DDEC III/IV ENGINE SUMMARY

Series I60	DDEC Appl Group	06N04C0760	DDEC IV CRANE W/JAKE EPL				
	Base group	06N04D6431	370-430 HP STD RAT 1999 LINE HAUL 11L S60				
	Hp Group	06N04M7103	400HP@2100RPM 1053 1999 LINE HAUL TRK 12L S60 (1450FTLB)				
PWM Trans 0		VSG Max RPM	2100	Hot Idle	700		
VSG Cruise Switch	NO	VSG Min RPM	700	Cold Idle	2500		
Init Speed	1000	VSG Alt Min RPM	1500	Max Droop	125		
RPM Increment	25	VSG is Primary	NO	LSG Droop	100		
				VSG Droop	0		
IDLE SHUTDOWN	NO	Time	5 MIN				
		Operates On	IDLE & VSG GOVERNOR ONLY				
Maximum Security	NO	Override	NO				
Minimum Security	NO	Min Temp	75 DEGC	Max Temp	75 DEGC		
ENGINE PROTECTION		Digital Fan	SINGLE	FUEL ECONOMY INCENTIVE			
Coolant Temp	WARNING	PWM Fan	NONE	Min MPG	N/A		
Coolant Level	WARNING	Dynamic Brk	NO	Max MPH	0		
Coolant Pressure	DISABLED			Conv. Factor	N/A		
R1 Coolant Prs		Engine Brakes	JAKE	Calc. Type	N/A		
Crankcase Prs	DISABLED	Eng Brake Cruise	YES				
Override	YES	Eng Brake Low	5				
Intercool Temp	DISABLED	Increment	2				
Oil Press	WARNING						
Override	YES	Data Pages	YES				
Oil Temp	WARNING	Optimized Idle	NO				
R1 Oil Temp		Fan Timer	180 SEC				
Aux Stop 1	WARNING						
Aux Stop 2	WARNING	Full Power Override	NO				
Vehicle Speed Sensor	YES	Cruise Control	YES	Press Gov System	NO		
VSS Sensor Type	TRANS	AutoResume	YES	Cavitation Timeout			
VSS Signal Type	MAGNETIC	Min Speed	30	Pump Press Incr			
Num Teeth	16	Max Speed	60	Eng Spd Incr			
Tire Rev/Mile	501			Integral Gain			
Axle Ratio	5.87	ATI Port	NONE	Prop Gain			
Final Gear Ratio	1.0						
Vehicle Speed Limit	NO	Digital Torque Curve		1			
Max Speed		Starter Lockout Enable Speed		500			
Overspeed with Fuel		Starter Lockout Disable Speed		60			
Overspeed w/o Fuel							
PROGRESSIVE SHIFT	NO						
Low Gear #1 Max MPH		Max RPM		Turn-off RPM			
Low Gear #2 Max MPH		Max RPM		Turn-off RPM			
High Gear Max MPH		Max RPM					
Air Comp. System	NO	R1 Min Pressure		R1 Max Pressure			
Load Pressure		R2 Min Pressure		R2 Max Pressure			
Unload Pressure		R3 Min Pressure		R3 Max Pressure			
Pressure Increment		% Integral Gain		Prop Gain			
PIN	WIRE#	Fn	VIH	Reverse			
E1	#451	01	ENGINE BRAKE LOW	PIN	Wire#	Fn	Polarity
F1	#542	02	ENGINE BRAKE MED	A1	#988	00	NO NO FUNCTION
G1	#528	18	CLUTCH RELEASED	F3	#555	24	NO ETHER START
H1	#523	23	CRUISE ENABLE	A2	#499	13	YES FAN CONTROL #1
J1	#541	20	SET/COAST ON				
F2	#544	22	RESUME/ACCEL ON	ESH			Reverse
G2	#543	17	SERVICE BRAKE RELEASED	PIN	Wire#	Fn	Polarity
H2	#524	12	RATING SWITCH #1	W3	#563	00	NO NO FUNCTION
J2	#531	13	RATING SWITCH #2	X3	#564	00	NO NO FUNCTION
K2	#583	25	SEO/DIAGNOSTIC REQUEST	Y3	#565	00	NO NO FUNCTION
G3	#545	16	ALT MIN VSG/FAST IDLE				
K3	#979	09	THROTTLE INHIBIT				

## 8.4 TYPICAL FIRE TRUCK APPLICATION

This section contains typical parameter settings for Fire Truck applications and the pin assignments for the Vehicle Interface Harness and the Engine Sensor Harness as listed in the Verification Report on the following pages.

The Digital Input and Digital Output ports can be configured for a variety of software options. The location of the connector pin for each software option can be specified at the time of engine order, by VEPS or the Distributor Reprogramming Station. For more information on software options, refer to section 4.2, "Digital Inputs" and section 4.3, "Digital Outputs."

DATE: VERIFICATION REPORT  
 SALES ORDER NUMBER:

DDEC III ENGINE SUMMARY

Series	DDEC Appl Group	06N04C0507	DDEC III/IV APPL FIRETRUCK W/PGS/EOP OFF JB
I60	Base group	06N04D6429	470/500 HP PREM RAT 1999 DDEC IV LINE HAUL 12L S60
	Hp Group	06N04M7095	470HP@2100RPM 1045 1999 LINE HAUL PREM 12L S60 (155OFTLB)
PWM Trans	12 ALLISON WT	VSG Max RPM	2100 Hot Idle 600
VSG Cruise Switch	NO	VSG Min RPM	600 Cold Idle 750
Init Speed	1000	VSG Alt Min RPM	600 Max Droop 150
RPM Increment	25	VSG is Primary	NO LSG Droop 125
			VSG Droop 0
IDLE SHUTDOWN	NO	Time	5 MIN
		Operates On	IDLE GOVERNOR ONLY
Maximum Security	NO	Override	NO
Minimum Security	NO	Min Temp	75 DEGC Max Temp 75 DEGC
ENGINE PROTECTION		Digital Fan	SINGLE FUEL ECONOMY INCENTIVE
Coolant Temp	WARNING	PWM Fan	NONE Min MPG N/A
Coolant Level	WARNING	Dynamic Brk	NO Max MPH 0
Coolant Pressure	DISABLED		Conv. Factor N/A
R1 Coolant Prs		Engine Brakes	JAKE Calc. Type N/A
Crankcase Prs	DISABLED	Eng Brake Cruise	NO
Override	YES	Eng Brake Low	2
Intercool Temp	DISABLED	Increment	1
Oil Press	WARNING		
Override	YES	Data Pages	NO
Oil Temp	WARNING	Optimized Idle	NO
R1 Oil Temp		Fan Timer	180 SEC
Aux Stop 1	WARNING		
Aux Stop 2	WARNING	Full Power Override	NO
Vehicle Speed Sensor	NO	Cruise Control	NO Press Gov system YES
VSS Sensor Type		AutoResume	Cavitation Timeout 5
VSS Signal Type		Min Speed	Pump Press Incr 4
Num Teeth		Max Speed	Eng Spd Incr 25
Tire Rev/Mile			Integral Gain 10
Axle Ratio		ATI Port	NONE Prop Gain .75
Final Gear Ratio			
Vehicle Speed Limit	NO	Digital Torque Curve	1
Max Speed		Starter Lockout Enable Speed	500
Overspeed with Fuel		Starter Lockout Disable Speed	60
Overspeed w/o Fuel			
PROGRESSIVE SHIFT	NO		
Low Gear #1 Max MPH		Max RPM	Turn-off RPM
Low Gear #2 Max MPH		Max RPM	Turn-off RPM
High Gear Max MPH		Max RPM	
Air Comp. System	NO	R1 Min Pressure	R1 Max Pressure
Load Pressure		R2 Min Pressure	R2 Max Pressure
Unload Pressure		R3 Min Pressure	R3 Max Pressure
Pressure Increment		% Integral Gain	Prop Gain
PIN WIRE# Fn		VIH	Reverse
E1 #451 15	DIAGNOSTIC REQUEST	PIN Wire# Fn	Polarity
F1 #542 16	ALT MIN VSG/FAST IDLE	A1 #988 16	NO ENGINE BRAKE ACTIVE
G1 #528 00	NONE	A2 #555 11	NO CRUISE ACTIVE LIGHT
H1 #523 08	PRESSURE/RPM MODE	F3 #499 05	NO PGS ACTIVE LIGHT
J1 #541 20	SET/COAST ON		
F2 #544 26	ENGINE BRAKE DISABLE	ESH	Reverse
G2 #543 24	PGS SYSTEM ENABLE	PIN Wire# Fn	Polarity
H2 #524 09	THROTTLE INHIBIT	W3 #563 10	NO COOLANT LEVEL LOW LIGHT
J2 #531 05	PARK BRAKE INTERLOCK	X3 #564 08	NO EXT BRAKE ENABLE
K2 #583 02	ENGINE BRAKE MED	Y3 #565 07	NO STARTER LOCKOUT
G3 #545 22	RESUME/ACCEL ON		
K3 #979 01	ENGINE BRAKE LOW		