



CSP Electronics, LLC
111 Suwanee Rd.
Lafayette, LA 70503
(337) 255-0540

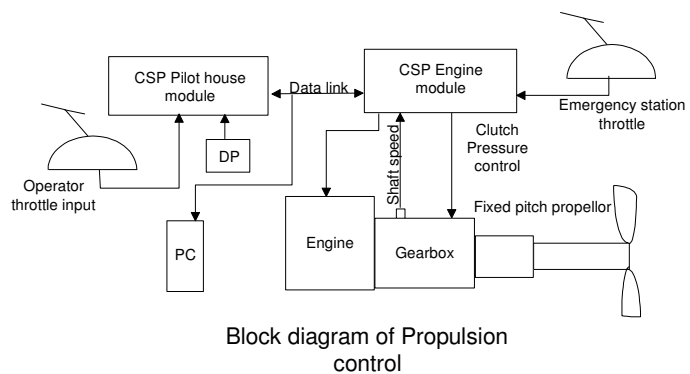
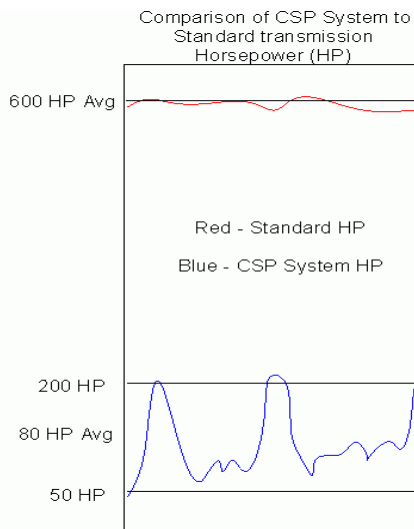
Controllable Speed Propulsion System – A High performance, economical propulsion control system

Propulsion System Decision Matrix

System	Cost	Complexity	Performance
Controllable Speed Propulsion System	\$	Uses standard gearbox, modified for Clutch pressure control	Full control from low to high speed with unparalleled performance, especially with DP
Controllable Pitch Propeller	\$\$\$	Highly complex submerged hydraulic machinery	Full control from low to high speed, large hub limits top end performance
Two Speed Gearbox	\$\$	Modified gearbox with dual ratio gears	Limited performance improvement with stop to shift between gears
Jet Drive	\$\$	Uses standard gearbox and hydraulic water jet system	High fuel consumption under all load conditions

System Benefits

- Infinitely variable gear ratio performance with standard gearbox
- Maintenance requirements the same as standard gears
- Smooth shift performance and quiet operation during DP
- Lowest cost solution with higher performance for today’s high performance, high power engines
- Automatic self protection to reduce catastrophic failures
- Closed loop engine and transmission cooling system is environmentally safe
- Reduces engine lugging during low speed maneuvering
- Greatly improved fuel economy during Dynamic Positioning
- Quieter operation for more crew and passenger comfort
- PC displays all monitored parameters and provides continuous logging of data



Components of the system are:

- Throttle levers, single or dual design for up to 7 stations and 6 engines
- Control modules
- Wiring harnesses for each engine and control lever
- PC and software for display and data logging
- Dynamic Positioning interface
- Engine throttle interface
- Engine speed sensor
- Shaft speed sensor
- Transmission oil pressure sensor
- Transmission oil temperature sensor

How the system works

Propeller speed is controlled for the first 30% of throttle lever travel with engine speed held constant. Above 30% the clutch is fully engaged and engine speed is increased to increase shaft speed. When interfaced to a Dynamic Positioning system, control of the shaft speed can be commanded by the DP controls.

The system monitors transmission operation to help prevent damage due to failures or normal wear. Verbal warnings from the PC generated audio system communicate to the operator conditions that need attention. If conditions exist that could cause catastrophic failures to the transmission, the system will derate engine operation to idle speed and place the transmission in neutral. The protection feature operates over the entire speed range of the engine/transmission not just at initial engagement. This feature has been shown to prevent clutch damage even when the failure occurs at maximum engine speed. The system will also interface to vessels ship to shore email system to report system operating conditions and alerts.

The system also provides 2 other operating modes. Engine only mode allows operation of the engine with the transmission in neutral. Fire pump mode operates with the transmission in neutral with a limited top engine speed to prevent fire pump damage.

The system is designed to ABS and Coast Guard requirements.

Technical Specifications

Supply voltage	9-32 Vdc
Supply current.....	1.25 Adc
Communications link	250Kbaud CAN Network
Shift response time	100 mSec
Gear pressure sensing range	0-500 PSI
Gear oil temperature range	-30 to 300 F
Minimum controlled shaft speed	25 RPM
Engine throttle interface	0-5 Vdc or 500 Hz PWM
Dynamic positioning interface voltages	0-10 Vdc

Available now on Cummins Engines and Twin Disc Transmissions. Others available on request.

Other CSP Products

- Integrated Engine and Gear Protection with Full Vessel Monitoring System
- Standard Propulsion System Controls
- All Electric Steering System
- Automatic Engine Overload Protection
- Fuel Consumption Monitoring