CAT® Lift Trucks

Service Manual

GM 4.3L, G6 Engine
LPG Fuel System Supplement

GC35K	AT87A-10231-up
GC40K	AT87A-10231-up
GC40K-STR	AT87A-10231-up
GC45K-SWB	AT87A-10231-up
GC45K	AT88A-10231-up
GC55K	AT88A-10231-up
GC55K-STR	AT88A-10231-up
GC60K	AT89A-10231-up
GC70K	AT89A-10231-up
GC70K-STR	AT89A-10231-up

For use with the GM 4.3L, G6 Engine and
GC35K-GC70K Chassis Service Manuals

99789-84122

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LACK OF POWER, SLUGGISHNESS, OR SPONGINESS

Checks	Action
DEFINITION: *The engine delivers less than expected power. There is little or no increase in speed when partially applying the accelerator pedal.*	
Preliminary Checks	• Refer to the *LPG Fuel system OBD System Check.* • Compare the customer's vehicle with a similar unit to verify customer has an actual problem. *Do not compare the power output of the vehicle operating on LPG to a vehicle operating on gasoline as the fuels do have different drive feel characteristics.* • Remove the air filter and check for dirt or restriction. • Check the vehicle transmission. • Refer to the OEM transmission diagnostics.
Fuel System Checks	• Check for a restricted fuel filter, contaminated fuel, or improper fuel pressure. Refer to *LPG Fuel System Diagnosis.* • Check for the proper ignition output voltage with the spark tester *J 26792* or the equivalent. • Check for proper installation of the mixer assembly. Check all air inlet ducts for condition and proper installation. • Check for fuel leaks between the EPR and the mixer. • Verify that the LPG tank manual shut-off valve is fully open. • Verify that liquid fuel (not vapor) is being delivered to the EPR.
Sensor Checks	• Check the Heated Exhaust Gas Oxygen Sensors (HEGO) for contamination and performance. Check for proper operation of the TMAP sensor. • Check for proper operation of the TPS and FPP sensors.
Exhaust System Checks	Check the exhaust system for a possible restriction: • Inspect the exhaust system for damaged or collapsed pipes. • Inspect the muffler for signs of heat distress or for possible internal failure. • Check for possible plugged catalytic converter.
Engine Mechanical Check	Check the engine for the following: • Engine compression. • Valve timing. • Improper or worn camshaft. • Refer to *Engine Mechanical* in the Service Manual.
Additional Check	• Check the ECM grounds for being clean, tight, and in their proper locations. • Check the alternator output voltage. If all procedures have been completed and no malfunction has been found, review and inspect the following items: • Visually and physically, inspect all electrical connections within the suspected circuit and/or systems. • Check the DST data.

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SPARK KILL

The spark kill mode allows the technician to disable the ignition on individual cylinders. If the Spark Kill diagnostic mode is selected with the engine running below 1000 RPM, the minimum throttle command will lock into the position it was in when the test mode was entered. If the Spark System Test mode is selected with the engine running above 1000 RPM, the throttle will continue to operate normally. Disabling Ignition Outputs to disable the ignition system for an individual cylinder, use the mouse to highlight the "Spark Kill" button and select the desired coil. The spark output can be re-enabled by using the mouse to highlight the "Spark Kill" button and selecting "Normal." If the engine is running below 1000 RPM, the spark output will stay disabled for 15 seconds and then re-set. If the engine is running above 1000 RPM, the spark output will stay disabled for 5 seconds and then re-set. This test mode has a timeout of 10 minutes. Record the RPM drop related to each spark output disabled. The spark outputs are arranged in the order which the engine fires, not by cylinder number.

INJECTOR KILL

The Injector Kill mode is used to disable individual fuel injectors. If the Injector Kill mode is selected with the engine running below 1000 RPM, the minimum throttle command will lock into the position it was in when the test mode was entered. If the Injector Kill mode is selected with the engine running above 1000 RPM, the throttle will continue to operate normally. To disable an injector, use the mouse to select the desired injector. The word "Normal" will change to the Injector you have selected. The injector driver can be re-enabled by selecting again. If the engine is running below 1000 RPM, the injector driver will stay disabled for 15 seconds and then re-set. If the engine is running above 1000 RPM, the injector driver will stay disabled for 5 seconds and then re-set. Record the change in RPM while each driver is disabled.

DBW TEST MODE

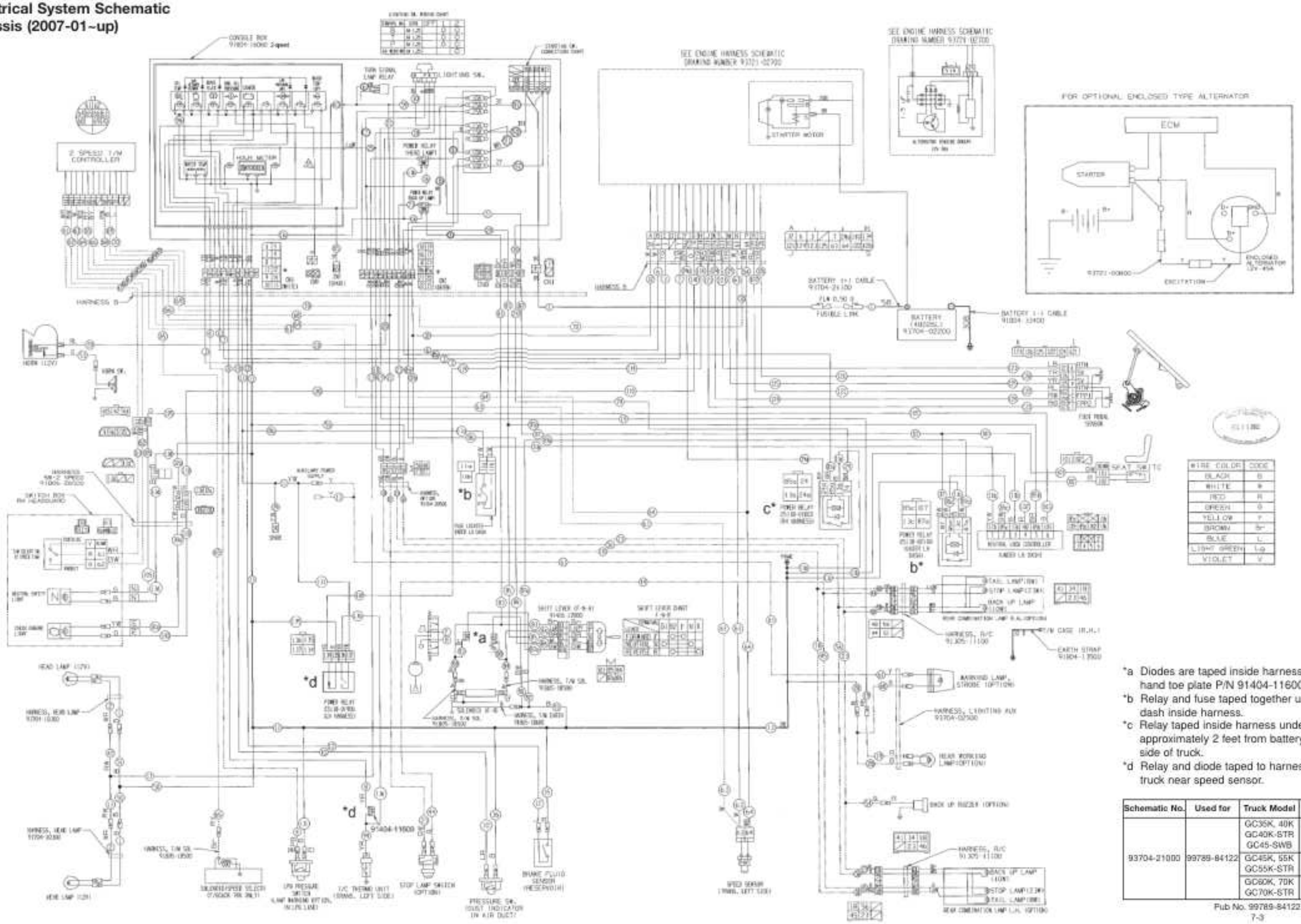
The DBW (Drive by Wire) test mode allows the technician to control the throttle directly with the foot pedal or throttle input and is used during the diagnostic routines specified for FPP and TPS for Spectrum systems that use DBW control. FPP position displays the current position of the foot pedal as a percentage. FPP volts display the voltage which the ECM is reading from the FPP sensor. TPS Command displays the commanded throttle position expressed as a percentage, which is being sent to the throttle. TPS Position is the actual percent of throttle opening being sent to the ECM from the throttle. TPS volts display the actual TPS signal voltage the ECM is receiving from the throttle. To select this test mode the engine must be off and the key must be in the ON position.

EXTERNAL POWER TEST

The external power test manually activates relays (relay power, fuel pump, and drive-by wire power) controlled by the ECM while the engine is in the "Stopped" or "Running" states. Reverts to normal operation if "Automatic" state is selected or ignition voltage is cycled from high to low.

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Electrical System Schematic
Chassis (2007-01~up)



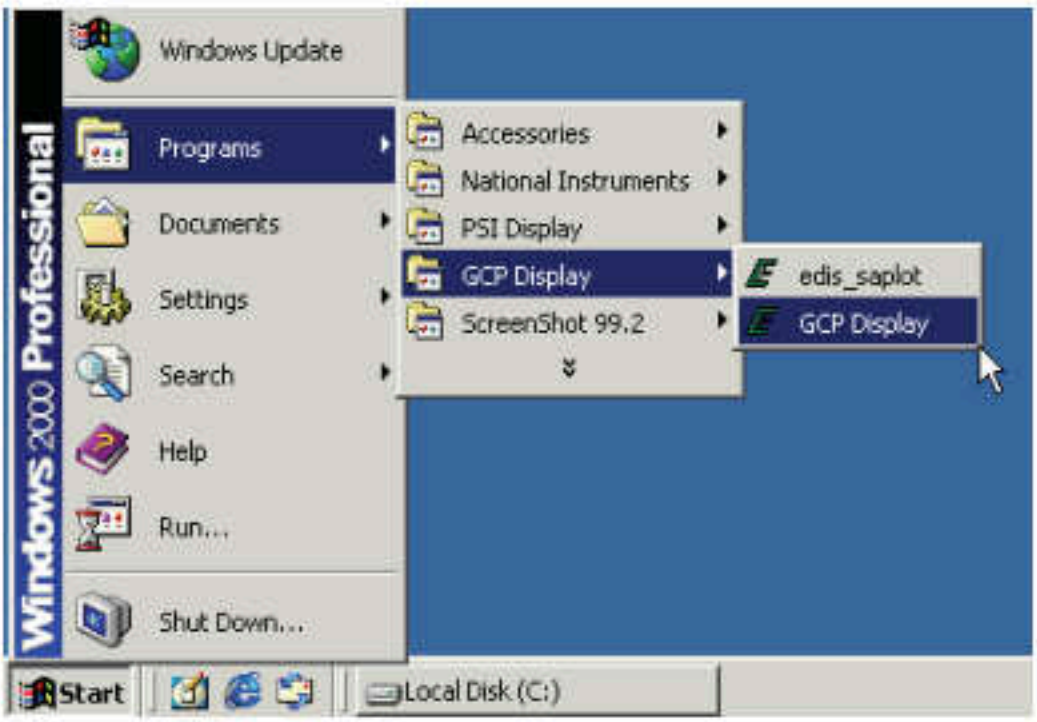
*a Diodes are taped inside harness under the right-hand toe plate P/N 91404-11600.
*b Relay and fuse taped together under left side of dash inside harness.
*c Relay taped inside harness under floor plate, approximately 2 feet from battery on right-hand side of truck.
*d Relay and diode taped to harness on left side of truck near speed sensor.

Schematic No.	Used for	Truck Model	Serial No.
93704-21000	99789-84122	GC35K, 40K GC40K-STR GC45-SWB	AT87A-10231-up
		GC45K, 55K GC55K-STR	AT88A-10231-up
		GC60K, 70K GC70K-STR	AT89A-10231-up

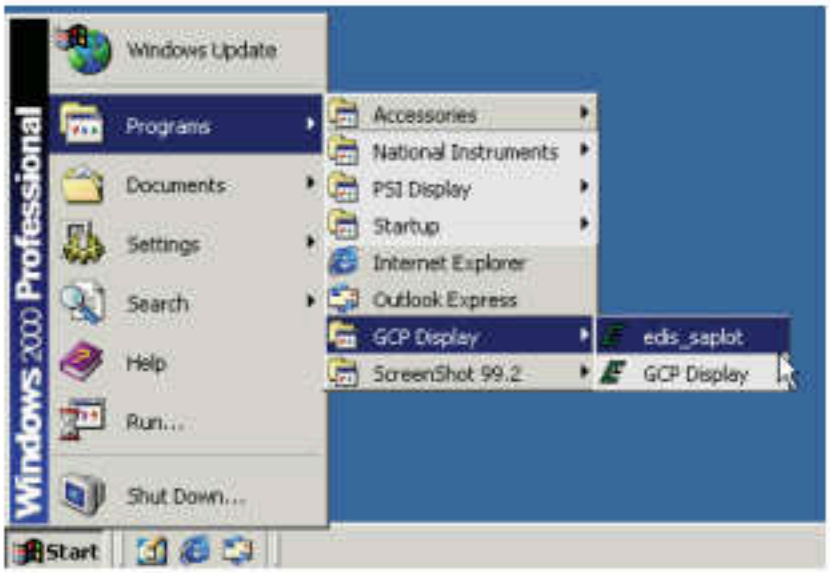
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- Click the "Finish" box to complete the installation.



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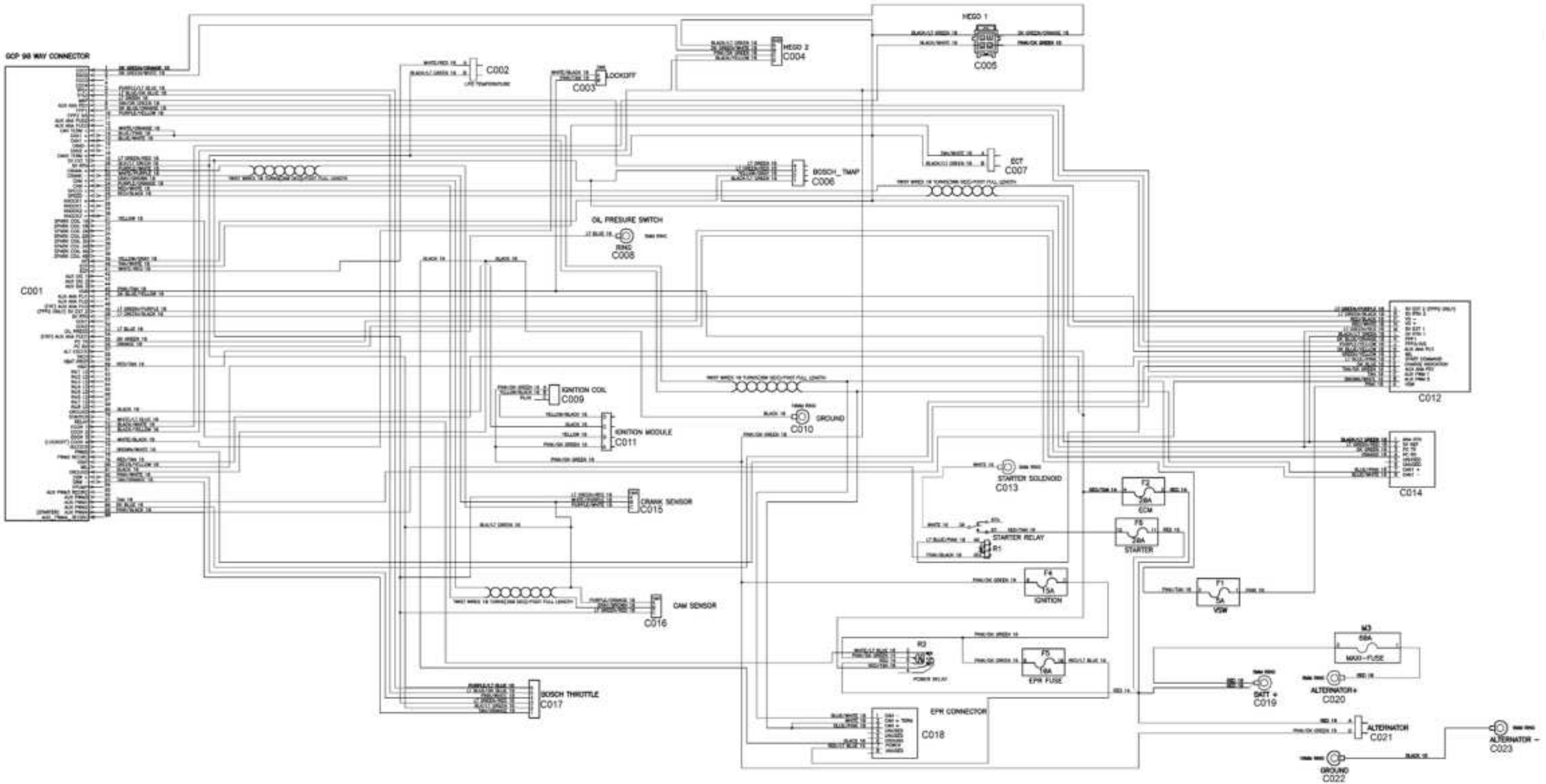
Start Menu Programs GCP Display edis_saplot

DST PLOT INTERFACE FUNCTIONS

A graphic tool incorporated in the plotter is the snapshot function. This function allows data collected in a plot to be transferred into a second window for quick graphical post-processing. The snapshot allows the user to zoom in/out, pan left/right, and move cursors along the signal traces to measure the variable values in virtual real-time. An example of a snapshot is shown in Figure 8. Any CSV file in plot format (.plt) may be loaded into the snapshot. Table 2 outlines the available hot key functions of the snapshot screen.

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Electrical System Schematic
Engine (2007-01~up)



Schematic No.	Used for	Truck Model	Serial No.
ES019-84122	99789-84122	GC35K, 40K GC40K-BTR GC45-SWB	AT87A-10231-up
		GC45K, 55K GC55K-STR	AT88A-10231-up
		GC60K, 70K GC70K-STR	AT89A-10231-up

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