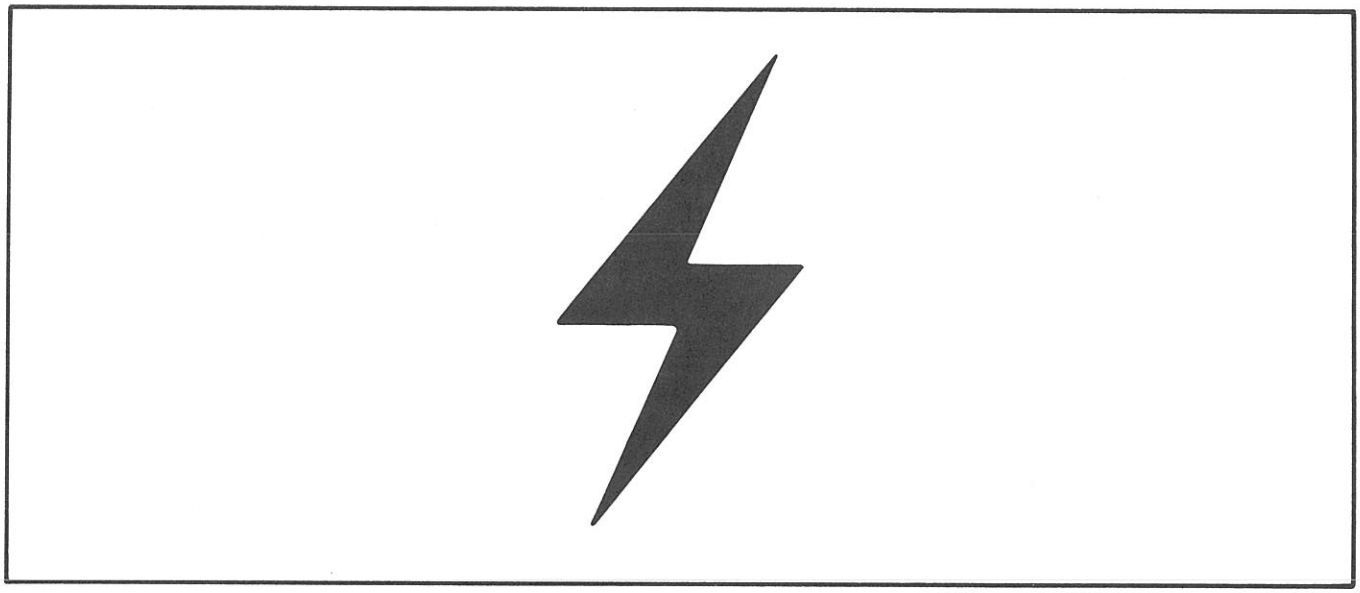
T.M.

STEIGER®

PANTHER 1000 SERIES

SECC ELECTRONICS



IMMEDIATE ACTION LETTER REFERENCE:

No/Date

1_____ 4_____ 7_____

2_____ 5_____ 8_____

3_____ 6_____ 9_____

SERVICE BULLETIN REFERENCE:

No/Date

1_____ 4_____ 7_____

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SERVICE NEWS REFERENCE:

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37-133 (1-84)

Panther 1000 Series Electronic System

Contents

Glossary of Terms

ALTERNATING "AC" CURRENT - Current flow that changes polarity twice in one complete cycle.

AMPERE - A unit of measure to describe the amount of **current flow** through a given circuit.

CIRCUIT - A path in which electrical energy is allowed to flow.

CLUTCH DETECTION SYSTEM (CDS) - The clutch detection system consists of an electronic "top of travel" switch and a mechanical bottom of travel switch. The purpose of the "top of travel" switch is to signal the computer that the clutch pedal is at top of stroke. The top of stroke position is sensed by a magnet attached to the pedal moving into position close to a hall effect switch. The bottom of travel switch breaks all electrical power to the transmission and signals the computer that bottom of travel is obtained.

COMMON - Having the same terminal connection.

DIRECT CURRENT "DC" - Current flow that travels though a circuit in one direction without a cycling of polarity.

DISPLAY DRIVERS CIRCUIT (DDC) - A 6 x 6 inch printed circuit card contained inside the SECC enclosure identified by the numeral No. "6" hot-stamped on the extractor handle.

ENGINE RPM PICKUP - The engine rpm pickup is mounted in the bell housing of either the Cat or Cummins engine. The rpm pickup feeds a signal (generated by passing gear teeth) from the engine to the computer. The frequency of this signal is directly proportional to engine rpm.

GROUND SPEED PICKUP - The ground speed pickup is mounted in the transmission and feeds a signal (generated by passing gear teeth) from the rear output yoke to the computer. The frequency of this signal is directly proportional to tractor's ground speed.

HALL EFFECT SWITCH - Magnetic switch that will send out a signal whenever the controlling magnet comes into position close to the electronic switch.

HARDWARE - The integrated circuits and discreet devices which physically make up the electronic system.

HVAC - Heating, Ventilation and Air Conditioning System.

ILM - Dashboard Indicator Light Module

LCD - Liquid Crystal Display

LED - Light Emitting Diode

MODE CONTROL LEVER (MCL) - Used to select forward, neutral or reverse transmission range. The lever is manually detented in each range.

MOTHERBOARD ASSEMBLY - Consists of a backplane, and a flexible printed circuit card which joins the backplane to the rear computer box connectors and a rear computer box support plate. The purpose of the Motherboard Assembly is to act as an interconnection medium between the various circuit cards inside the computer box and the tractor inputs.

OHM - A unit of measure to describe the amount of **resistance** to current flow in a given circuit.

OPEN - A place in a circuit that is separated and permits no path for electrical energy to flow.

POWER SUPPLY CIRCUIT (PSC) - This is a 6 x 6 inch printed circuit card contained in SECC enclosure. The card is identified by the numeral No. "1" stamped into the metal heat sink bracket affixed to the card.

PROM - Programable Read Only Memory as used in computer terminology.

PULSER CONTROL LEVER (PCL) - Used to upshift or downshift the transmission. This is a five position (upshift, downshift, forward override, reverse override and center) lever, spring loaded to the center position.

RAM - Random Access Memory as used in computer terminology.

RECTIFIER - A device which uses diodes to convert alternating current to direct current.

RELAY - A device which permits current flow to loads after receiving energy from a control circuit, generally used when voltage drop in a given circuit may be severe.

SECC - Steiger Electronic Control Center

SHORT - A place in a circuit which terminates the current path before it reaches the proper destination.

SOFTWARE - Basic system program which produces the functionality of the hardware.

THREE POINT HITCH CONTROL MODULE (TPH) - This is a 6 x 6 inch printed circuit card contained inside the SECC enclosure and is identified by the numeral No. "4" hot-stamped on the extractor handle.

TRANSMISSION DRIVER MODULE (TDC) - This is a 6 x 6 inch printed circuit card contained inside the SECC enclosure and is identified by the numeral No. "5" hot-stamped on the extractor handle.

UNIVERSAL MICROPROCESSOR CONTROL MODULE (UMCM) - This is a 6 x 6 inch printed circuit card contained inside the SECC enclosure and identified by the numeral No. "8" hot-stamped on the extractor handle.

VEHICLE WARNING SYSTEM (VWS) - This is a 6 x 6 inch printed circuit card contained inside the SECC enclosure and is identified by the numeral No. "7" hot-stamped into the extractor handle.

VOLT - A unit of measure to describe the amount of electrical force available.

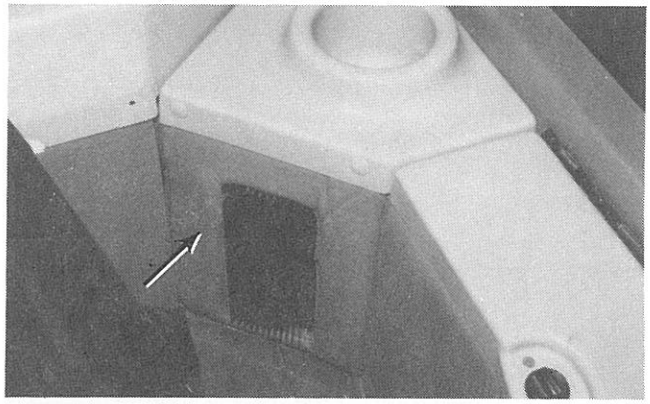

Figure 1: SECC Location

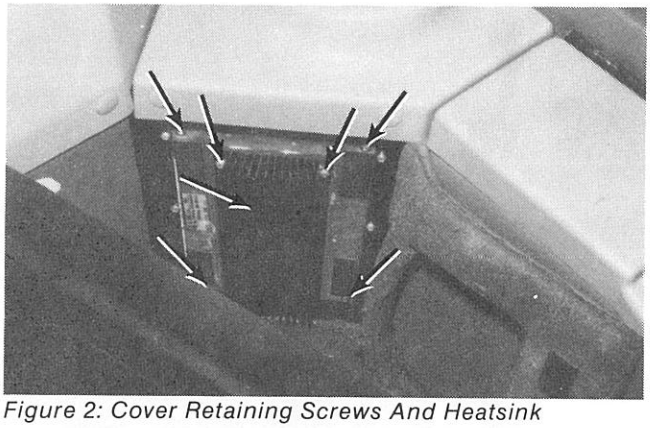

Figure 2: Cover Retaining Screws And Heatsink

Figure 3: Front Cover Removed & All Printed Circuit Cards Installed

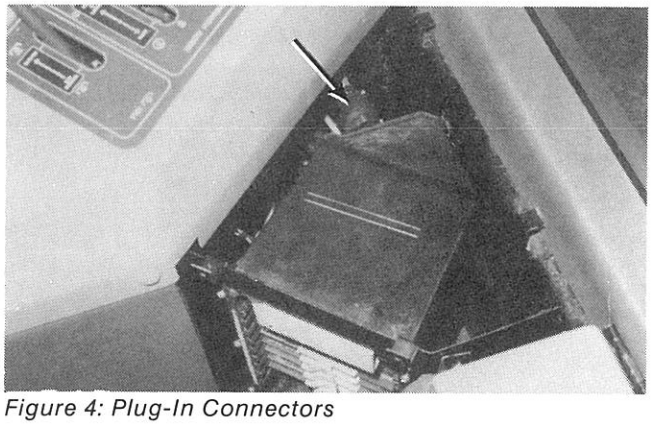

Figure 4: Plug-In Connectors

Steiger Electronic Control Center (SECC)

General Description

The Steiger Electronic Control Center is housed in a structural foam plastic enclosure with an extruded aluminum heatsink/cover assembly. The SECC is attached to the lower right rear corner of the cab structure by means of six screws which pass through a metal partition wall (Fig. 1).

All electrical connections to the box are made via plug-in connectors at the rear of the SECC. The SECC may be removed or installed as an entire assembly (Fig. 2). Access of internal parts, without assembly removal, is accomplished by removal of the front cover. The cover may be removed by removing four retaining screws in the cover and two retaining screws in the heatsink. The two retaining screws in the heatsink connect the heatsink directly to the Power Supply Circuit (PSC) (Card No. 1). Removal of the cover in this manner allows the computer electronics and onboard diagnostics to remain functional although the cover has been removed. Failure to remove the two screws which affix the PSC to the cover will result in the Cover/PSC assembly being removed as a unit when only the four corner screws which attach the cover to the box are removed. There is a soft white heat transfer compound between the cover and PSC card. **DO NOT** remove this material or allow it to become dirty.

The on-board diagnostics can detect certain critical faults which may occur within the PSC hardware. If the PSC is allowed to remain in the computer when the cover is removed, power will be supplied via the PSC card to all other cards in the enclosure.

IMPORTANT: *Do not allow the computer to operate more than 10 minutes without the heatsink connected to the PSC card.*

LED's (Light Emitting Diode)

All printed circuit cards within the SECC enclosure are fitted with an LED (Light Emitting Diode) on the right front corner of each card. When the system is powered-up and this lamp is illuminated it **may** indicate a fault in the respective card. However, cards should **not** be replaced before referring to the troubleshooting guide.

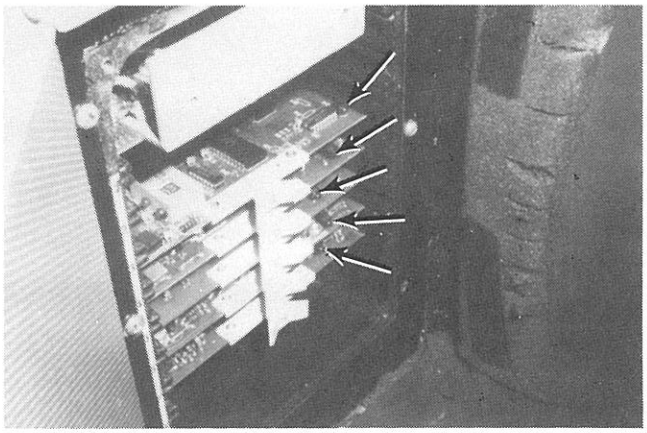

Figure 5: Light Emitting Diodes

Computer Card Functions

PSC (Card No. 1)

The SECC is programmed by an eight position slide switch located on the PSC card (refer to error code E10.0 in troubleshooting guide for program information).

In operation, the PSC card provides filtered power for all SECC components and component assemblies, provides an orderly restart for the system, controls the HVAC water valve and controls both the activation and direction of the HVAC blend doors.

In addition the PSC is equipped with a "watchdog timer". The purpose of the watchdog timer is to maintain a watch on the microprocessor. In normal operation the microprocessor is instructed to periodically reset the watchdog timer. Failure to do so within a specified time frame results in the generation of a "soft" restart by the PSC. Four such "soft" restarts within a specified time frame will generate a "hard" restart. A hard restart fails the computer and allows the override relay on the PSC to energize. With the override relay energized on the PSC, power is removed from the computer and ground is provided for the transmission system. The system maybe "reset" by turning the switch key to the "off" position and then turning it to the "on" or "run" position.

The PSC also provides the SECC with over voltage, under voltage, reverse voltage and load dump protection.

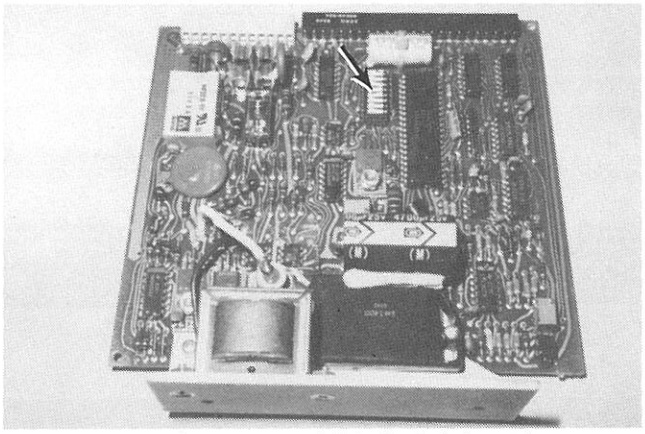

Figure 6: PSC (Card No. 1) Slide Switch Location

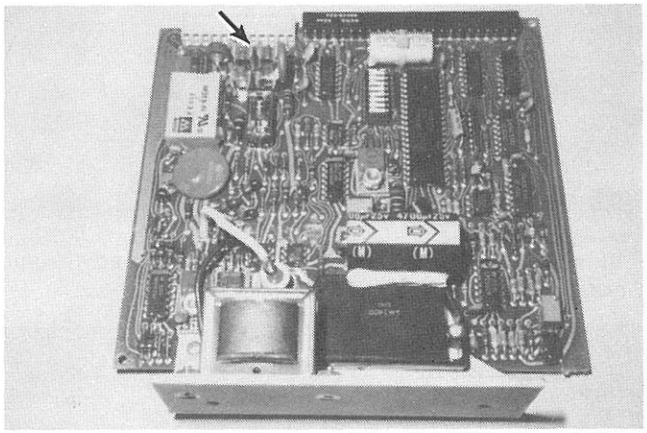

Figure 7: Power Supply Card (No. 1) HVAC Blend Door Actuator Motor Fuse Location

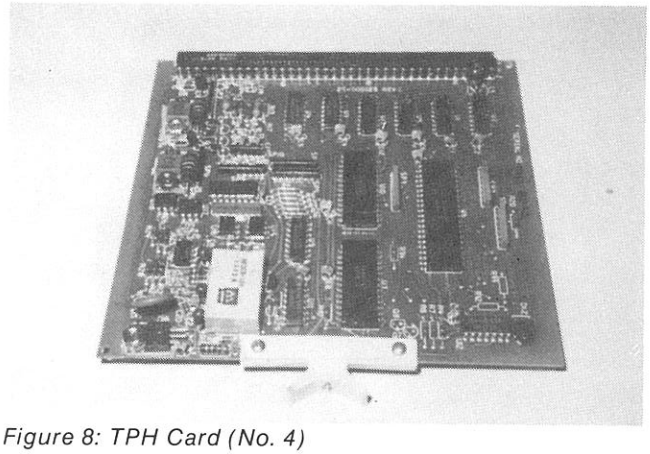

Figure 8: TPH Card (No. 4)

TPH (Card No. 4)

The purpose of the TPH control is as follows:

1. To provide both power and ground to the TPH hydraulic valves for raising or lowering of the TPH.
2. To provide for the data aquisition and analysis of the current position of the TPH rockshaft and command lever.
3. To provide for the analysis of true ground speed input.
4. To provide for the detection of store and override commands from the TPH command lever.

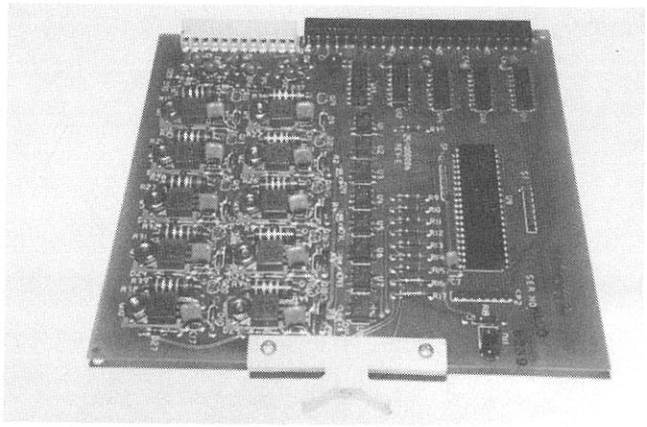

Figure 9: TDC Card (No. 5)

TDC (Card No. 5)

The TDC provides an interface between the SECC, the transmission and the forward and reverse lockout solenoids on the mode control lever.

The purpose of the TDC is threefold:

1. To provide separate ground paths for each transmission solenoid

2. To provide a method of verification that there exists a complete circuit path from the SECC to the transmission.

3. To provide separate ground paths for each lockout solenoid on the mode contol.

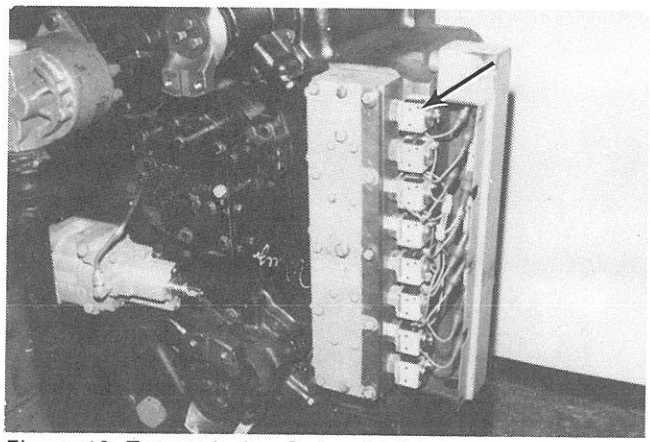

Figure 10: Transmission Solenoid Bank

Transmission Solenoid Bank

The transmission solenoid bank is located on the rear side of the transmission and is composed of eight electrically activated solenoids which control the pilot pressure to activate clutch packs in the powershift transmission. One side of each solenoid is connected to power. The opposite side of each solenoid is connected directly to the computer. Three solenoids are required to be grounded to obtain any gear. The computer grounds the appropriate three solenoids to obtain the selected gear.

DDC (Card No. 6)

The DDC provides an interface between the SECC and the following assemblies:

1) Pulsar Lever
   A) Upshift
   B) Downshift
2) Mode Lever
   A) Forward
   B) Neutral
   C) Reverse
3) Clutch Pedal
   A) Up position
4) Dash Displays
5) TPH Display (optional)

The purpose of the Display Drivers Circuit is to process signals from the transmission control levers (indicated above), to provide a buffered output to drive dash displays, and to provide a hardware time delay for sequential shifts for the transmission.

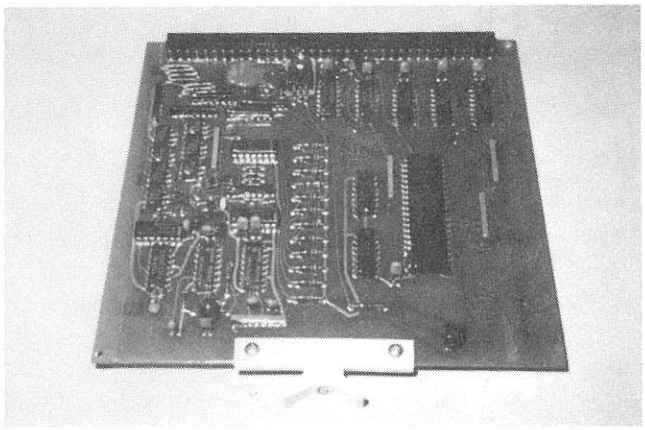

Figure 11: DDC Card (No. 6)

VWS (Card No. 7)

The purpose of the VWS is to sense certain vehicle malfunctions for handoff to the computer for further decision making action and to act as an output for alarm information presentation.

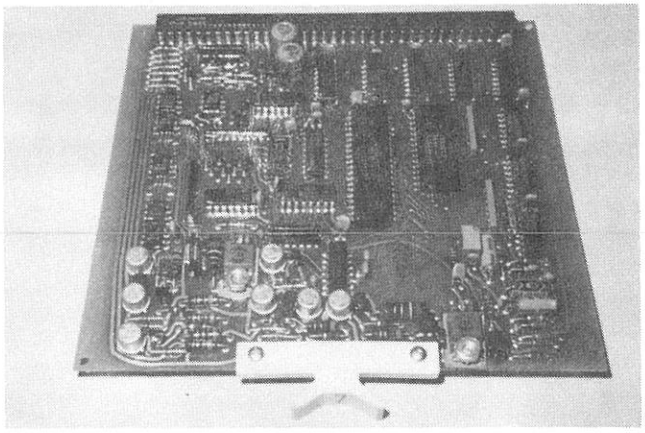

Figure 12: VWS Card (No. 7)

UMCM (Card No. 8)

The UMCM provides the decision making capabilities of the Steiger Electronic Control Center.

NOTE: *There are two programed micro chips located on this card that the technician may be required to change at some point. These chips must be handled carefully when removed and installed to prevent damage. They must also be installed in the correct location with the small notch in the center of the chip facing to the rear of the card.*

The following information deals with the individual systems the SECC controls and/or monitors to help the service technician better understand the function and purpose of the total SECC system.

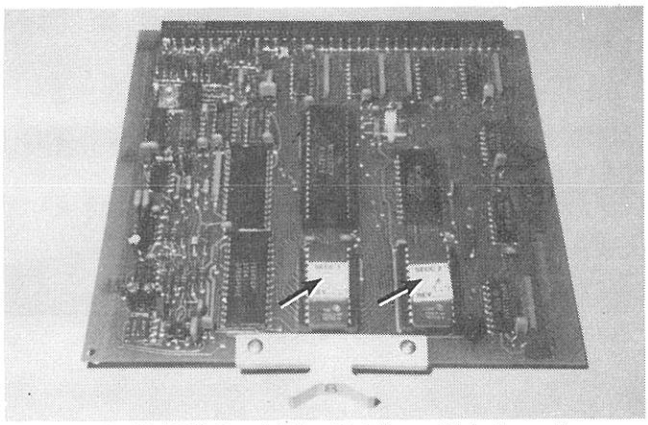

Figure 13: UMCM Card (No. 8) Micro Chip Location

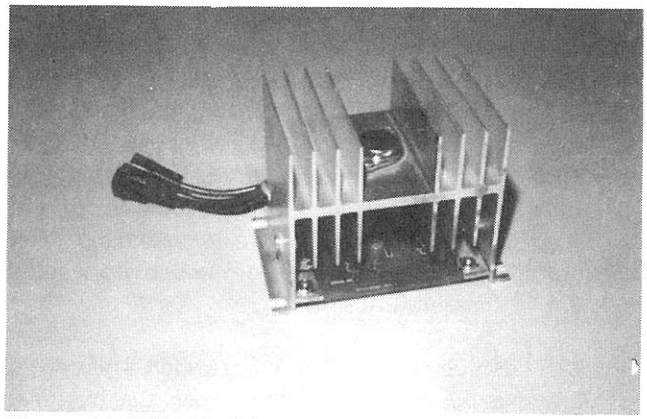

Figure 14: BCM Module

Blower Control Module

General Information

The Blower Control Module acts as a current amplifier for signals which have low source current ability and high output current requirements. The current gain is approximately 1000 (e.g. .010 amps input yields 10 amps output). The Blower Control Module is used in the HVAC system to provide a source of high current for the blowers and in the overhead console to provide a source of high current to dim interior lights.

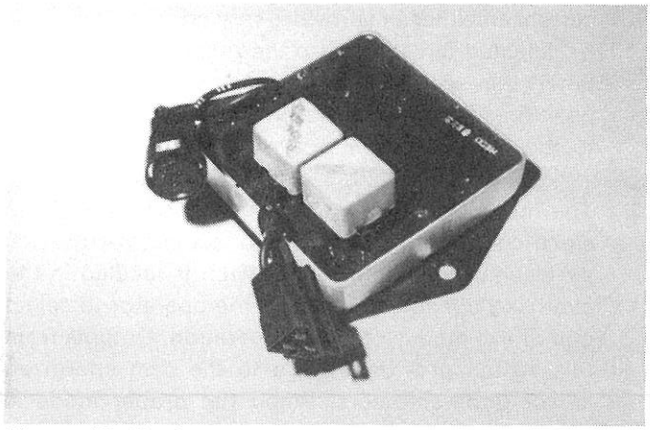

Figure 15: Flasher Module

Flasher System

General Information

The Flasher System operates independently of the SECC. The heart of the system is a Flasher Module. The Flasher Module interfaces with the steering column, the battery and the tractor warning lamps. The Flasher Module is designed to provide the following flash sequence.

Mode	Right Lamps	Left Lamps
Right Turn	Rapid Flash	Steady On
Left Turn	Steady On	Rapid Flash
Road Lights	Slow Flash	Slow Flash
Hazard	Rapid Flash	Rapid Flash
Hazard & Right Turn	Rapid Flash	Steady On
Hazard & Left Turn	Steady On	Rapid Flash
Road & Right Turn	Rapid Flash	Steady On
Road & Left Turn	Steady On	Rapid Flash

The slow flash rate will be a minimum of 60 flashes/minute. The rapid flash rate will exceed the slow flash rate by a minimum of 20 flashes/minute. The flasher module will operate independently of the master switch key position when the hazard button is depressed.

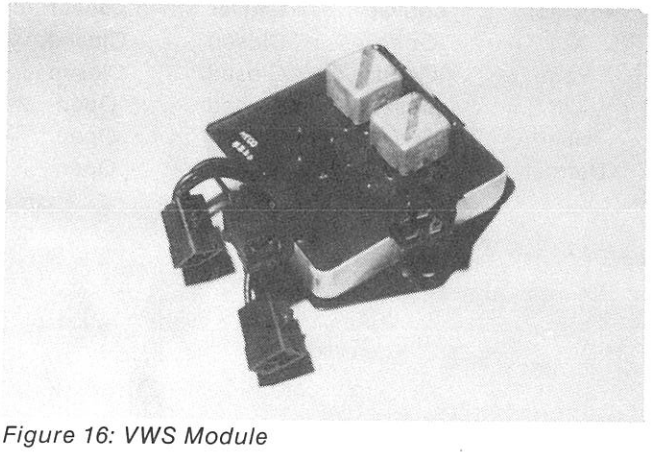

Figure 16: VWS Module

Wiper System

General Information

The wiper system operates independently of the SECC. The heart of the system is the wiper control module. The purpose of the wiper module is to provide for the high current requirements of the three wiper motors and provide for uniform "parking" of all three motors. The module receives input commands from the wiper actuation lever located on the steering column and provides current to the three wiper motors as required for high speed, low speed and park.

Heating, Ventilating & Air Conditioning Control System (HVAC)

General Information

The SECC Heating, Ventilating and Air Conditioning Control System provides for the control of the pressurization blower and blend doors. All other portions of the Air Conditioning system are controlled electro-mechanically by switches located in the overhead console.

Those areas of the HVAC system controlled electro-mechanically are as follows:

a) Air Plenum Louver Doors
   1. Defrost
   2. Dash
   3. Heat
b) Recirculation Fan
c) A/C Compressor
d) Water Valve

The basic operational controls are:

1. A temperature potentiometer for selecting air conditioner plenum discharge temperature.

2. A five position "mode" switch for selecting one of the following air conditioner operational modes.
   a) Heat
   b) Defrost
   c) Off
   d) Vent
   e) A/C

3. A five position recirculation fan speed switch for selecting varying speeds of the recirculation blower.

The basic features of the HVAC computer control system are:

1. A computer controlled pressurizer blower.

2. An electronic temperature control system which eliminates the necessity for cable routing and subsequent adjustment problems.

The HVAC system in the tractor is operational immediately when the master switch key is turned on. The computer is the heart of the HVAC system. There are four **inputs** to the HVAC system which are **monitored** by the computer and two **outputs** that are **controlled** by the computer.

Monitored Inputs to the HVAC system are as follows:

1. Temperature command input potentiometer. This potentiometer is installed in the overhead console. The purpose of the temperature command input is to inform the computer system of the operators selection of temperature.

2. Recirculation blower speed input switch. This control is a five position switch located in the overhead console and is labeled high and low with three intermediate positions. The purpose of this switch to directly control the speed of the recirculation blower by varying the voltage to the recirculation blower module.

   A recirculation blower control module acts as a current amplifier and provides varying currents, based on selected fan speeds, to the recirculation blower. When this switch is in the maximum speed (high) position, the computer is signaled by a sense line tied to the fan speed switch.

3. The mode selection input switch is tied directly to electrically operated louver door actuators in the cab air discharge plenum. This switch is located in the overhead console and allows the operator to select one of five modes of HVAC operation. Outputs from this switch provide voltage to the cam energized louver door actuators. When the proper mode is selected, motors are allowed to run inside these actuators until an internal contact runs off a contact cam. The motors then stop, leaving the driven lower door at the correct position for the selected mode.

The five modes available on the selector switch, and the corresponding door positions are as follows:

Switch Position	Dash Louver	Defrost Louver	Heat Louver
A/C	Open	Closed	Closed
Vent	Open	Closed	Closed
Off	Closed	Closed	Open
Heat	Closed	Bleed	Open
Defrost	Closed	Open	Open

The mode selector switch also directly controls the air conditioner compressor, and provides power to the recirculation fan switch and the electrical activated water valve. The following table lists the status of each of the components in relation to each position of the mode switch.

Mode Switch Position	Compressor	Water Valve	Fan Power
A/C Normal	On	On	On
A/C (temp pot max cool)	On	Off	On
Vent	Off	Off	On
Off	Off	Off	Off
Heat	Off	On	On
Defrost	On	On	On

The A/C switch contact is monitored by the SECC.

4. Blend door position potentiometor monitors the position of the blend doors in the HVAC plennum.

The computer controlled outputs to the HVAC system are as follows:

1. The output current from the computer to the pressurizer blower is amplified by a blower control module and fed to the pressurizer blower.

2. Blend door direction and drive control

The SECC is capable of diagnosing certain malfunctions of the HVAC system. These malfunctions result in the generations of warnings when they are displayed in the mph slot of the LCD dashboard for five seconds after the error is detected (and everytime the system is turned on thereafter until the error is corrected for a five second duration).

In normal operation, the operator need only select the desired HVAC mode, the desired recirculation fan speed, and the corresponding temperature he desires. The blend doors are then properly positioned and the pressurization blower speed properly maintained by the computer so as to give the required ventilation and discharge air temperature. Louver door position, compressor activation, water valve status and recirculation fan speed are controlled electro-mechanically by switches in the overhead console.

When the operator selects the "Off" mode, the computer shuts down the pressurizer blower and the recirculation blower is turned off by the overhead switch.

The critical components of the HVAC computer system are feedback loops formed by the temperature command pot/blend door position subsystem. The UMCM (Card No. 8) and the PSC (Card No. 1) within the computer are directly involved in this subsystem.

Three Point Hitch Control System

General Information

The SECC TPH control system allows the operator to control the position of the TPH, store that position for future use, override the position without destroying the stored value and display the current status of both hitch position and command lever position.

The control responds to operator initiated commands and energizes the correct solenoid to raise or lower the hitch. Both power and ground are supplied to the control valve by the TPH computer control.

The basic system operational control is:

a) A lever controlling a potentiometer, which informs the computer of the operator requested hitch position

b) A push button on top of the lever handle to actuate a Hall Effect switch, the output side of the switch signals the computer.

c) A lever "override" detection Hall Effect switch, the output signal of the switch is sent to the computer.

d) A lever mechanism to lock the control in the full raised (or transport position).

e) A spring mechanism by which the control is forced off the end-of-travel switch position (override).

The basic computer interface components are:

1. A hitch (rockshaft) position feedback sender
2. A remote raise/lower solenoid valve bank
3. A remote LCD display capable of displaying current hitch position, stored command position and current hitch status (raising, lowering or transport).

The primary function of the TPH control system is to allow the operator to control the position of the three point hitch, to set a pre-established depth of operation, and to monitor the hitch activity.

The TPH control lever has three discreet positions referred to as "Transport Lock", "Operating Range" and "Override". The control lever has a manual pushbutton on the control handle. Operation of this button cause a Hall Effect switch to signal the computer that the button has been depressed. In the full rearward (raised) position the lever is capable of being locked by depressing the button, moving the lever back all the way to the "Transport" position and releasing the button. In the full forward (lowered) position the lever may be pushed against spring pressure by depressing the button which simultaneously activated a Hall Effect switch which will signal the com-

puter the the "Override" position has been obtained. Releasing the applied force will cause the lever to be spring returned to the operating range. Sweeping the TPH lever through the operating range will vary the resistance of the poteniometer attached to the lever. The resistance variance cause a voltage variance at the computer which is used to determine lever position.

Operator Sequence Of Control

When the master key switch is first turned on, (engine not running) the TPH display will show the current rockshaft position and the current lever position.

With the engine running the operator must "capture" the hitch by moving the command lever to a position which corresponds to the current rockshaft displayed position. If the command lever is in the full raised (or transport) position and the rockshaft has settled below the current lever position, bringing the lever forward to the current rockshaft posi-tion will activate the system.

Whenever the tractor is first started the on-board computer must adjust itself to the hydraulic valve in the system. Because of this the TPH will always "raise" or "lower", depending on current rockshaft position, from one to three points. This condition must always be considered, particularly when an implement is attached.

If the engine is running but the command lever has not "recaptured" the hitch position, the TPH control will not allow further settling of the hitch but will keep the rockshaft at its current position until recaptured. Once the rockshaft position has been recaptured, the rockshaft will follow lever position in all ranges above (higher than) the set point. The rockshaft will not follow command lever position below (lower than) the set point. Once the set point has been established, it is only necessary to move the command lever to the full up and full down position within the operating range of the lever. The hitch will not drop lower than the established set point.

To store a new set point, the operator must depress the "set" button on top of the lever handle. This button must be depressed twice within one (2) seconds. Upon release of the second button depression, the current rockshaft position will be stored in the computer memory. This then becomes the new set point and any previous set point is destroyed.

To lower the hitch beyond an established set point without destroying the set point, the operator must move the command lever to the full forward position, depress the button, and push the command lever against spring pressure into the "override" position. Holding the lever in this position will lower the hitch under computer control, (at a slower rate) to the desired point. To stop the lowering action, the lever is released. To store this new position, the "set" button must be depressed twice within two seconds. If the new position is not stored, the hitch may be raised by moving the lever rearward and the set point may be recovered by raising the command lever above the set point and lowering it below the set point. Whenever the pushbutton is depressed twice within two seconds the TPH control system will store the current **Hitch Position,** not lever position.

Transmission Control System

General Information

The SECC transmission control system allows the operator to make full powershifts through twelve forward ranges and two reverse ranges. The computer responds to operator initiated commands and energizes the correct combination of solenoids to achieve the transmission range selected.

The basic operator transmission controls are:

a) A three position "Mode" lever for selecting "Forward", "Neutral" or "Reverse" electronically.

b) A five position "Pulser" lever, for sequentially shifting up or down one range per actuation, or progressive sequential ranges by lever actuation and hold; and for providing emergency roading ability in case of severe electronic failure.

c) A clutch foot pedal to allow hydraulic modulation of the master clutch in **first forward or first reverse only**; and to give neutral, electronically when depressed from top of travel in all other ranges, and to give neutral electro-mechanically when depressed to bottom of travel.

The basic features of the transmission computer control system are:

1. A numerical LCD gear display on the dash.
2. Provide for a mechanical backup of electronic systems.
3. Provide for computer generated diagnostics.
4. Provide for engine RPM input.
5. Provide a ground speed input.
6. Provide for mechanical mode lever lockout solenoids.
7. Provide an audible alert for diagnositc problems.
8. Provide for electronic back-up provision.

Transmission Computer Control System Layout & Logic

The primary function of the transmission control system is to allow the operator to initiate a transmission gear change and visually detect each change by an LCD dash display.

The mode lever has three discreet positions labeled "FWD", "NEUT" and "REV". Forward and Reverse positions of the mode lever activate Hall Effect switches which signal lever position to the computer control. Neutral position activates a mechanical switch which signals the neutral position to the computer. In addition, the Neutral position has a normally closed switch (held open in neutral) for removing power from all transmission solenoids when the mode lever is in neutral. A neutral start relay is also closed in neutral but has no connection to the computer control.

The "mode" control is equipped with mechanical lockout cams to inhibit the ability to achieve the forward or reverse position, without first depressing the clutch pedal after tractor startup. It is not required to depress this button to return the lever to neutral.

The "Pulser" lever has a spring return to center mechanism with actuated positions labeled "Upshift" and "Downshift". Each detented position of this lever activates a Hall Effect switch which signals the lever position to the computer control. The lever has override provisions for emergency roading of the tractor in case of severe electronic failure.

The clutch foot pedal is connected mechanically by a cable arrangement to the transmission hydraulic controls and has a switch arranged to indicate pedal position. The Top of Travel clutch pedal switch normally sources current and takes current away upon initial movement of the pedal.

Bottom of Travel of the clutch pedal will activate a mechanical switch (micro-switch) to remove all power to the transmission solenoid bank much the same way as the mode lever does in neutral.

When the mode lever is in neutral, or moved through the neutral position, transmission neutral will always be achieved. When the mode lever is moved to "Rev" from "Neutral" or any forward range, first reverse gear in the transmission will be signaled electrically (at tractor speeds below 2 mph, reverse is inhibited above 2 mph mechanically). Prior to obtaining first reverse, the transmission inertia is slowed by the momentary engagement of two solenoids in the transmission for .5 of a second followed by neutral for .3 of a second prior to obtaining first reverse.

When the mode lever is moved to "FWD" from Neutral at any tractor speed below 2 mph, forward range will be signaled to the transmission. Below 2 mph, a .5 second "lockup" followed by a .3 second "neutral" followed by first forward will be obtained. Above 2 mph the computed gear will be obtained instantly.

The clutch foot pedal may effect the transmission operation by hydraulically allowing clutch modulation (in first gear forward or reverse only) or electrically causing neutral.

When in the "FWD" or "REV" range on the mode lever, Pulser Lever actuation will upshift or downshift the transmission one range at a time, but will not allow downshifting to "Neutral". Nor will it cause a shift from "Neutral" to "FWD" or "REV".

The Pulser Lever is recognized by the SECC anytime the mode lever is in "FWD" or "REV". The Pulser Lever cannot alter the gear to be engaged (displayed) when the transmission mode lever is in neutral because the direction to be selected is not known; nor can the return gear be displayed. All Pulser Lever commands will be ignored if the clutch pedal is depressed. If the clutch foot pedal is pushed while actuating the Pulser Lever, the Pulser Lever will have no effect.

If in a "FWD" or "REV" gear, releasing the clutch pedal will cause a return to a gear closely matching tractor velocity and engine speed. Without any specific operator action, a return gear appropriate to tractor speed is possible. The return gear is shown in the LCD display while the clutch pedal is pushed, and indicates the gear that will be engaged if the pedal is released. If the returned gear is 1st FWD or 1st REV, the clutch pedal will allow controlled master clutch engagement and modulation.

The SECC Vehicle Warning System (VWS)

General Information

The Vehicle Warning system is a means of alerting the operator to conditions which may warrant his attention. The operation of this system may be divided into two areas; the **monitor** system and the **control** system.

There are two sources of signals which are monitored by the VWS; those originating from the dash ILM (Indicator Light Module) and those originating from sources external to the ILM. Signals originating from the ILM are broken down into two categores, critical and non-critical alarms.

All critical alarm signal tones will be a pulsating tone from a low pulse rate to a high pulse rate to a steady tone and can only be stopped by correcting the problem.

All non-critical signal tone alarms will be for a five second duration followed by a 12 minute delay and continue until the problem is corrected.

Any error code displayed in the mph LCD during this 5 second duration will then disappear and reappear at 12 minute intervals for 5 seconds until the problem is corrected. This allows the operator to have mph displayed during non-critical alarm status. The electronic failure light will remain on until the problem is corrected.

The following chart will be a summery of all critical and non-critical alarms.

Critical Alarm Summary

Alarm	Source
Low Voltage	SECC
Low Engine Oil Press.	ILM
Low Trans Oil Press.	ILM
Low Charge Pump Hyd Oil Press.	ILM
Low Engine Coolant Level	SECC
Park Brake On	ILM

Non-Critical Alarm Summary

Alarm	Source
Electronic Failure	SECC
High Trans. Oil Temp	ILM
High Hyd Oil Temp	ILM
Engine Air Filter Restricted	ILM
High Engine Coolant Temp	ILM
Restricted Hyd Oil Filter	ILM
PTO, Overspeed	SECC

In addition to the previously mentioned monitor points which are utilized by the computer as source points for generating alarms, there are also monitor points integrated by the computer for "housekeeping purposes". These monitor points keep tabs on certain key areas of tractor performance, but are not in themselves sources of alarms.

The monitor points and the purpose for their existance are as follows:

1. **Clutch Pedal Fully Depressed Input -** Validates proper operation of the top of clutch pedal switch.

2. **PTO Engagement Input -** Monitors the PTO lever for proper engagement.

Outputs controlled by the VWS are as follows:

Condition	Control Device
Tractor Running	Hourmeter & ILM Power
PTO Overspeed	ILM Lamp
Low System Voltage	ILM Lamp
Low Engine Coolant	ILM Lamp
Electronic Failure	ILM Lamp
Radiator Probe Current Output	Radiator Probe
Defective Circuit Boards	Cards 1-8

The VWS system is operational at any time the master switch key is in the "on" position. If engine rpm is below 100 rpm, the hourmeter will not work, only the engine oil pressure light will be illuminated on the ILM and no audible alarms will be generated. Once engine RPM is above 100 rpm, the system will wait 5 seconds before generating any audible or visual alarms. Any error codes which are discovered will be displayed at 5 second intervals in the mph slot. The mph LCD will then display the most critical alarm code and allow operation of the tractor.

IMPORTANT NOTE: *The generation of any alarm by the VWS circuit will* **NOT** *automatically shutdown the engine.*

VWS Alarm Parameters and Description

1. **Low Voltage:**
   Because there are electrically actuated solenoids for the transmission and TPH, as well as the requirement for minimum voltage levels in the SECC, a certain minimum voltage must be maintained in the tractor. A tractor system voltage below 9 VDC is considered inadequate to maintain transmission, TPH, A/C and computer control. If system voltage is at or below 9V, the low voltage on the ILM will be illuminated, a critical audible alarm will be generated and the tractor will be placed in neutral until the source of the problem is found and corrected.

2. **Low Engine Oil Pressure:**
   Engine oil pressure is monitored by a sender connected to a Murphy gauge. The trip point is set at 10 psi. After start-up, the engine rpm must be greater than 100 rpm for 5 seconds before an audible alarm is generated.

3. **Low Transmission Oil Pressure:**
   Transmission pressure is monitored by a sender connected to a Murphy gauge. The trip point is set at 5 psi.

4. **Low Charge Pump Hydraulic Pressure:**
   Charge pump hydraulic oil pressure is monitored by a sender connected to a Murphy gauge. The trip point is set at 5 psi.

5. **Low Engine Coolant Level:**
   Engine coolant level is monitored by a probe immersed in the radiator top tank. An alternating current signal is fed to this probe by the computer. The trip point is set at a point 2.4 gal. (9.09L) below normal coolant level.

6. **Park Brake:**
   The park brake is monitored by a mechanical switch which is closed by the park brake lever when the brake is set. An alarm is generated if the tractor is shifted into gear with the park brake applied.

NOTE: *Early tractors will be on when brake is applied and engine rpm are greatr than 100.*

7. **Electronic Failure:**
   Electronic failure is a programed function of the computer.

8. **High Transmission Oil Temperature:**
   Transmission oil temperature is monitored by a probe connected to a Murphy gauge. The trip point is set at 250°F.

9. **High Hydraulic Oil Temperature:**
   Transmission oil pressure is monitored by a probe connected to a Murphy gauge. The trip point is set at 205°F.

10. **Restricted Engine Air Filter:**
    The engine air filter restriction is monitored by a probe connected to a Murphy gauge. The trip point is set at 25" H^20 restriction.

11. **High Engine Coolant Temperature:**
    Engine coolant temperature is sensed by a probe connected to a Murphy gauge. The trip point is set at 215°F.

12. **Restricted Hydraulic Oil Filter:**
    Restricted hydraulic oil filter is monitored by a input/output differential pressure transducer which is connected to a Murphy gauge. The trip point is set at 20 psi restriction.

13. **PTO Overspeed:**
    PTO overspeed is sensed by the computer software. Engine speeds which produce a PTO speed of greater than 1170 rpm generate an alarm.

CB or Business Band Radio Installation

When or if it becomes necessary to install a "CB" or Business Band radio in a P1000 Series tractor certain precautions must be followed in order to prevent frequency or noise interference in the Electronic Control Center. Once the location for the radio is determined (we recommend mounting the radio vertically on the front face of the left rear tool compartment, **routing of the antenna lead becomes critical. It is of the utmost importance that the antenna be a self grounding type and that the coaxial cable not be routed along or tied to any wiring harness. The coaxial cable must be kept as far away from the wiring harness as possible. Any excess coaxial cable must not be coiled up, it must be cut to length.** If radio installation becomes necessary contact your dealer to obtain specific instructions.

Panther 1000 Series Circuit Number Listing

WIRE CIRCUIT NO.	DESCRIPTION
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	DIRECT BATTERY THRU MAIN FUSE
11	DIRECT BATTERY THRU MAIN FUSE
12	
13	DIRECT BATTERY THRU MAIN FUSE
14	TACHOMETER (+) TO SENDER
15	SWITCH TO ETHER START SOLENOID
16	TACHOMETER (-) TO SENDER
17	IGNITION SW (SOLENOID) TO NEUTRAL SAFE SW
18	NEUTRAL SAFETY SW TO START MAGNETIC SW
19	SWITCH TO LAMPS (STOP)
20	#8 RELAY (BATTERY)
21	ENGINE OIL PRESSURE SWITCH
22	WATER TEMPERATURE SWITCH
23	TRANSMISSION TEMPERATURE SWITCH
24	TRANSMISSION PRESSURE SWITCH
25	IGNITION #1 TO FUEL SOLENOID
26	GAUGE TO ENGINE OIL PRESSURE SENDER
27	GAUGE TO WATER TEMPERATURE SENDER
28	CENTER WIPER PARK
29	CENTER WIPER LOW
30	CENTER WIPER HIGH
31	HVAC RELAY TO AMBIENT AIR SWITCH
32	RELAY TO COLUMN (HORN)
33	SWITCH TO WINDSHIELD WASHER SOLENOID
34	OPTIONAL EQUIPMENT (FRONT OUTLET)
35	LEFT FRONT FIELD LAMPS TO CIRCUIT BREAKER
36	DIMMER SWITCH TO HEADLAMP (LOW)
37	DIMMER SWITCH TO HEADLAMP (HIGH)
38	ETHER START SOLENOID TO TEMPERATURE SW
39	IGNITION SWITCH ACC
40	DOME & DOOR SWITCHES TO DOMELAMPS
41	SWITCH TO TAIL & MARKER LAMPS
42	SWITCH TO LAMPS (STOP)
43	CIRCUIT BREAKER TO RIGHT REAR FIELD LAMPS
44	CIRCUIT BREAKER TO LEFT REAR FIELD LAMPS
45	RIGHT TURN LAMPS & INDICATOR
46	LEFT TURN LAMPS & INDICATOR
47	SWITCH TO IMPLEMENT SOCKET
48	LEFT WIPER PARK
49	LEFT WIPER LOW
50	LEFT WIPER HIGH
51	FLASHER TO TURN SWITCH (HAZARD)
52	IGNITION SWITCH I^2 TO RELAYS
53	
54	
55	CIRCUIT BREAKER TO IGN SW (B 3)
56	CIRCUIT BREAKER TO IGN SW (B 2)
57	
58	C.B. FEED TO DOOR SW, LIGHTER & DOME SW
59	
60	
61	CIRCUIT BREAKER TO SWITCH (IMPL SOCKET)
62	CIRCUIT BREAKER TO WINDSHIELD WIPER/WASHER
63	MODE SWITCH TO WATER VALVE RELAY
64	
65	IGN SW (B^1) CIRCUIT BREAKER FEED
66	IGNITION SWITCH (I^1) FEED

WIRE CIRCUIT NO.	DESCRIPTION
67	POTENTIOMETER TO MODULE PANEL LAMP DIMMER
68	(IGNITION SW ACCESSORIES) TO RADIO & RELAY
69	
70	CIRCUIT BREAKER TO HEADLAMP DIMMER SWITCH
71	SWITCH TO WARNING LAMP (DIFF L/O)
72	
73	
74	GROUND
75	WARNING TO PARK BRAKE SWITCH
76	IGNITION RELAY POWER ELECTRONIC BOX
77	LOSS OF COOLANT SWITCH
78	C.B. (POWER) TO WINDSHIELD WIPER MODULE
79	
80	DEFROST ACTUATOR POSITION 1 DEFROST
81	DEFROST ACTUATOR POSITION 2 VENT & AIR COND
82	DEFROST ACTUATOR POSITION 3 HEAT
83	ALTERNATOR TO STARTER (BATTERY)
84	
85	
86	HVAC TEMPERATURE POTENTIOMETER HI
87	HVAC TEMPERATURE POTENTIOMETER LO
88	POWER TAKE OFF HALL EFFECTS CONTROL
89	IGN SW GROUND, TO LAMP CHECK RELAY COIL
90	
91	
92	STARTER MAGNETIC SW TO STARTER SOLENOID "S"
93	
94	THROTTLE POTENTIOMETER (CONTROL)
95	THROTTLE POTENTIOMETER (+)
96	THROTTLE POTENTIOMETER (-)
97	
98	
99	
100	
101	
102	HORN RELAY (BATTERY)
103	
104	
105	RELAY TO HORN
106	
107	
108	
109	
110	BACKUP HORN
111	BATTERY (MAIN CAB SUPPLY)
112	BATTERY MAIN FUSED
113	
114	PANEL LAMP DIMMER TO LAMPS
115	
116	
117	CIRCUIT BREAKER (BATTERY) TO CLOCK OR RADIO
118	
119	CIRCUIT BREAKER TO ACCESSORIES SW (FEED)
120	COLUMN SWITCH TO WINDSHIELD WIPER MODULE
121	COLUMN SWITCH TO WINDSHIELD WIPER MODULE
122	MODE SWITCH TO HVAC CLUTCH RELAY
123	HVAC COMPRESSOR CLUTCH TO DRYER SWITCH
124	
125	#9 RELAY (BATTERY)
126	#2 RELAY (BATTERY)
127	#3 RELAY (BATTERY)
128	#4 RELAY (BATTERY)
129	#5 RELAY (BATTERY)
130	#6 RELAY (BATTERY)
131	#7 RELAY (BATTERY)
132	IGN SW (B^2) CIRCUIT BREAKER FEED

Panther 1000 Series Circuit Number Listing

WIRE CIRCUIT NO.	DESCRIPTION
133	IGN SW (B^3) CIRCUIT BREAKER FEED
134	
135	
136	
137	
138	
139	
140	FUEL TANK SENDER
141	
142	
143	RIGHT FRONT FIELD LAMPS TO CIRCUIT BREAKER
144	
145	
146	HVAC ACTUATOR FEEDBACK LO TO ELEC BOX
147	HVAC ACTUATOR FEEDBACK SENSE TO ELEC BOX
148	HVAC ACTUATOR FEEDBACK HI TO ELEC BOX
149	HVAC MOTOR (+)
150	HVAC MOTOR (-)
151	AMBIENT AIR SWITCH TO DRYER SWITCH
152	WATER SOLENOID VALVE #1
153	WATER SOLENOID VALVE #2
154	WATER VALVE RELAY CONTROL
155	FAN SPEED SWITCH TO HVAC BLOWER MODULE
156	
157	PRESSURE BLOWER MODULE TO ELECTRONIC BOX
158	PRESSURE BLOWER MODULE TO BLOWER
159	HVAC BLOWER MODULE TO BLOWER
160	CIRCUIT BREAKER TO PRESSURE BLOWER MODULE
161	CIRCUIT BREAKER TO HVAC BLOWER MODULE
162	
163	HYDRAULIC OIL TEMPERATURE SWITCH
164	
165	HYDRAULIC OIL FILTER SWITCH
166	HYDRAULIC OIL PRESSURE SWITCH
167	
168	ENGINE AIR FILTER SWITCH
169	SPEEDOMETER TO SENDER (-)
170	SPEEDMOTER TO SENDER (+)
171	
172	LEFT SPEAKER (+)
173	LEFT SPEAKER (-)
174	RIGHT SPEAKER (+)
175	RIGHT SPEAKER (-)
176	RIGHT WIPER PARK
177	RIGHT WIPER LOW
178	RIGHT WIPER HIGH
179	
180	A/C ACTUATOR POSITION 1 TO MODE SW OR DIODE
181	A/C ACTUATOR POSITION 2 TO MODE SW OR DIODE
182	#1 RELAY TO FRONT FIELD LAMP CIRCUIT BREAKER
183	#2 RELAY TO LEFT REAR FLD LAMP CIR BREAKER
184	#3 RELAY TO RIGHT REAR FLD LAMP CIR BREAKER
185	#4 RELAY TO HEADLAMP CIRCUIT BREAKER
186	#5 RELAY TO TAIL & MARKER CIRCUIT BREAKER
187	TURN SWITCH (IGN) TO (IGN) CIRCUIT BREAKER
188	#6 RELAY TO WINDSHIELD WIPER & IMPL C.B.
189	#7 RELAY TO TURN & ACCESSORIES CIR BREAKER
190	
191	LIGHT SWITCH (HEAD) TO RELAY COIL
192	MODE SWITCH OFF TO ELECTRONIC BOX
193	MODE SWITCH OFF TO ELECTRONIC BOX
194	ELECTRONIC BOX RELAY TO CIRCUIT BREAKER
195	
196	
197	
198	POWER SHIFT TRANSMISSION - SOLENOID "Y"

WIRE CIRCUIT NO.	DESCRIPTION
199	POWER SHIFT TRANSMISSION — SOLENOID "Z"
200	POWER SHIFT TRANSMISSION — COMMON
201	POWER SHIFT TRANSMISSION — SOLENOID "V"
202	POWER SHIFT TRANSMISSION — SOLENOID "Q"
203	POWER SHIFT TRANSMISSION — SOLENOID "T"
204	POWER SHIFT TRANSMISSION - SOLENOID "S"
205	POWER SHIFT TRANSMISSION — SOLENOID "W"
206	POWER SHIFT TRANSMISSION — SOLENOID "X"
207	T.P.H. HALL EFFECTS SW OVERRIDE CONTROL
208	T.P.H. HALL EFFECTS SW STORE CONTROL
209	
210	
211	
212	
213	
214	CIR BREAKER TO PANEL LAMP DIMMER MODULE
215	LIGHT SWITCH (ROAD) TO RELAY & FLASHER
216	LIGHT SWITCH (FIELD) TO FIELD RELAYS
217	HVAC TEMPERATURE POTENTIOMETER CONTROL
218	CIR BREAKER (BATT) TO FLASHER & COLUMN SW
219	
220	
221	
222	
223	
224	
225	FAN SWITCH (+) FROM MODE SWITCH
226	MAX FAN SWITCH LOW TO ELECTRONIC BOX
227	
228	
229	
230	
231	HOURMETER TO RELAY & ILM V BB
232	SPEAKER RELAY 1
233	SPEAKER RELAY 2
234	SPEAKER B+
235	TURN SWITCH TO FLASHER (RIGHT)
236	TURN SWITCH TO FLASHER (LEFT)
237	
238	
239	
240	
241	
242	
243	
244	
245	
246	TPH SOLENOID POWER
247	TPH SOLENOID A (LOWER)
248	TPH SOLENOID B (RAISE)
249	TPH POSITION TRANSDUCER (+)
250	TPH POSITION TRANSDUCER (SIGNAL)
251	TPH POSITION TRANSDUCER (-)
252	
253	
254	
255	
256	
257	
258	TPH HALL EFFECTS SWITCH (+)
259	TPH HALL EFFECTS SWITCH (-)
260	TPH POSITION POTENTIOMETER CONT
261	CLUTCH SW (N-C) TO CURRENT MONITOR
262	CLUTCH HALL EFFECTS CONTROL
263	ELECTRONIC BOX TO REVERSE OVERRIDE SWITCH
264	DOWN SHIFT HALL EFFECTS CONTROL

Panther 1000 Series Circuit Number Listing

WIRE CIRCUIT NO.	DESCRIPTION
265	UPSHIFT HALL EFFECTS CONTROL
266	ELECTRONIC BOX TO FORWARD OVERRIDE SWITCH
267	ELECTRONIC BOX TO OVERRRIDE SWITCHES
268	HALL EFFECTS SWITCH (+)
269	HALL EFFECTS SWITCH (-)
270	NEUTRAL SAFE SW (N-O) TO BOX & RELAY
271	FORWARD HALL EFFECTS CONTROL
272	FORWARD HALL EFFECTS AUTO MODE CONTROL
273	MODE REVERSE SOLENOID CONTROL
274	MODE FORWARD SOLENOID CONTROL
275	REVERSE HALL EFFECTS CONTROL
276	NEUTRAL SAFETY RELAY (COIL)
277	
278	
279	
280	TPH POSITION POTENTIOMETER (+)
281	TPH POSITION POTENTIOMETER (-)
282	POWER SHIFT C.B. TO NEUTRAL SAFE SW COMMON
283	MICRO SWITCH (COMMON)
284	MICRO SWITCH (N-O) TO ELECTRONIC BOX
285	MICRO SWITCH (N-C)
286	NEUTRAL SW (N-C) CLUTCH SW (CLOSED)
287	
288	
289	
290	ACTUATOR DIODE TO ACTUATOR POSITION 1
291	ACTUATOR DIODE TO ACTUATOR POSITION 2
292	KEY START RLY TO ILM PRINTED CIRCUIT BOARD
293	HOUR METER RELAY TO ELECTRONIC BOX
294	CURRENT MONITOR SENSOR TO ELECTRONIC BOX
295	
296	
297	
298	
299	
300	
301	
302	
303	
304	
305	
306	
307	
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Normal Tractor Startup Computer Characteristics

Upon normal tractor startup (transmission "mode" lever in neutral and engine started) the dashboard will immediately display the current software revision level of the on-board computer in the "MPH" display. This revision level will be in the form of a "C" followed by a decimal number (i.e. C1.9). This data will be displayed for five (5) seconds. The dash will then display 8's in all locations (except two bars in the extreme left digit of the MPH display and one bar on the 2nd digit of the gear display). After the computer has gone through this check routine, and no error codes are discovered, the dashboard will then read current rpm, mph and 0 gear.

If a fault should be discovered during the computer check routine an error code will be displayed in the mph display. This display will be in the form of an "E" followed by a decimal number (i.e. E41.9) and the electronic failure light will illuminate generating an audio alarm.

IMPORTANT: *If an error code should be displayed, the technician should always "reset" the system for a follow up check and verification routine. The system may be reset by turning the key switch to the "off" position and turning the switch back on to the "run" position.*

Using The Troubleshooting Flow Charts And Wiring Schematics

General Information

Because of the nature of the design and programing of the Steiger Electronic Control Center, conventional electrical troubleshooting practices may not always apply.

The service technician should not attempt to wire around (by-pass) or use jumper wires on any part of the electronic system unless specifically instructed to do so.

No attempt should be made to repair any of the computer cards or the computer box. If there is a fault they should be replaced with new or remanufactured components.

The primary test instrument required for troubleshooting the SECC system is a multimeter. We strongly recommend a digitized type such as a Beckman Model 3010, Steiger P/N 58-171.

The troubleshooting guide format is such that if used properly will lead the technician through a specific listed "error code" or "problem" in a logical step by step sequence. The flow charts format may, at first glance, seem to be troublesome or a long way to arrive at a problem solution. However, in the long run it will prove to be the easiest, fastest and most accurate method available to the technician for arriving at a problem solution if used properly.

The troubleshooting guide flow charts **must** be used in conjunction with the electrical system wiring schematics included in this manual in order to be effective.

Each block of the flow chart will have a number located in the upper left hand corner of the block. These are **not** sequential numbers, they are insignificant, except in those cases when it becomes necessary to reference another block. The lead block of each flow chart will list either a specific displayed "error code" or will list a specific problem or symptom. All error code flow charts will be listed sequentially by the numerical group number (i.e. E10.0, E10.1, E40.0, E40.1, E40.2 etc). Following the error code flow charts will be "Problem" type flow charts. These types of flow charts will be listed randomly. If a problem should arise in the SECC system whereas an error code **is not** displayed, the technician should always refer to the problem flow charts for a description of the problem that matches the particular symptom. The triangle configuration in each chart will indicate that the problem is likely corrected.

As an aid to the technician in determining specific circuits and functions, we have included a complete circuit number listing. This listing must also be used in conjunction with the wiring schematics. The wiring circuitry design is such that all battery "+" wires are colored "red". All ground (-) wires are colored "white" and carry a No. 74 circuit number. All battery "+" switched circuits are black and carry a circuit number etched on the wire.

The various wire harness connectors shown in the wiring schematics are alphabetically and numerically coded and identified as "male" or "female". These connector codes coincide with the connector codes listed in the flow charts for easy cross reference.

Example: MC-1, MC-2 etc - Main Cab Connector
TPH-1, TPH-2 etc - 3-Pt Hitch Connector
RC-1, RC-2 etc - Rear Cab Connector
H-1, H-2 etc - HVAC Connector

The wiring schematics are in sequence beginning at the front of the tractor on sheet No. 1 and continuing progressively on subsequent sheets to the rear of the tractor. This allows the technician to lay one sheet next to the other to pickup a continuous circuit from front to rear. When reference must be made to the right side console, transmission control or 3-Pt hitch control, these schematics will be found on separate sheets. The technician should study the wiring schematics carefully to familiarize himself with the layout and function of these schematics.

All programed error codes and their meaning will be listed separately in numerical order for quick reference. Upon examination of the error code group numbers the technician will find that the group number may be related to a specific printed circuit card in the computer.

Example E10.0 Card No. 1
E40.0 Card No. 4 etc

It must be remembered that because an error code is displayed it does not necessarily mean that the related card is faulty.

Experience has shown that most electronic problems can be related to loose or poor connections or ground circuits. The technician must be sure that all ground points and connections are clean and tight to ensure a good system.

General Information For Error Code Display

Some system malfunctions may disable the tractor, other malfunctions may disable some functional systems such as, 3-Pt Hitch Control, HVAC (Heating, Ventilation & Air Conditioning or the Vehicle Warning System (VWS) but will not disable the tractor. If/or when an error code should be displayed refer to the following guide to determine the specific error code meaning and possible check or field repair. In addition to error codes there may also be certain indicator lights displayed simultaneously that will indicate a specific system malfunction.

Error Code Display

NOTE: *If electronic failure and PTO overspeed indicator light or electronic failure and cab air filter indicator light should be displayed at the same time, refer to Trouble-shooting "Problem" Flow Chart.*

IMPORTANT: *If an error code or certain dash indicator lights are displayed generating an audio alarm, which may disable the computer and tranmission circuitry, the operator may still be able to move the tractor in emergency situations by shifting the "mode" control lever to the "forward" or "reverse" range and depressing the button in the center of the Pulsar Control Lever and moving the lever to the "override" position.*

E10.0 Card No. 1 in computer will not function properly as per the software instruction. This will result in Limp Home being activated.

E10.1 The selector switches located on Card No. 1 are not set according to the possible combinations, this will result in Limp Home being activated.

E40.0 Thru E40.2 Card No. 4 in the computer doesn't function properly as per the software instructions set. This will render the 3-Pt Hitch inoperable.

E40.7 The TPH Hitch Sensor Feedback is defective due to a break or short in the harness. Also a bad sensor can cause this problem. This will render the 3-Pt Hitch inoperable.

E40.8 The TPH Hitch Command Sensor in the cab is defective due to a break or short in the harness. Also a bad command potentiometer can cause this problem. This will render the 3-Pt Hitch inoperable.

E41.2 The computer provides + 12V DC to the TPH Hydraulic Solenoids and if the control lines are open or shorted within the harness this error will be displayed. This renders the hitch inoperative.

E50.1 Thru E50.7 These Error Codes are displayed when the computer finds a configuration pattern on the output of Card No. 5 which doesn't correspond to the instruction from the software. This will result in the transmission going to electrical neutral and must be repaired before the tractor can be moved.

E51.0 Thru E51.7 These Error Codes are displayed when the computer finds an open circuit between itself and the transmission. These will also result in the transmission going to electrical neutral and the harness must be repaired before the tractor can be moved.

E53.0 The computer will display this Error Code when all of the solenoids in the transmission have a power loss. This will put the transmission in electrical neutral and must be repaired before the tractor can be moved.

E53.2 When the Ignition Key is turned to the run position and the Mode Lever is placed into the forward position prior to depressing the clutch pedal, this Error Code will be displayed. To correct the Error Code, find the open or short in the harness between the computer and the forward lockout solenoid. To clear the error code, follow normal startup procedure of depressing clutch pedal first.

E53.3 When the Ignition Key is turned to the run position and the Mode Lever is placed into the reverse position prior to depressing the clutch pedal, this Error Code will be displayed. To correct the Error Code, find the open or short in the harness between the computer and the reverse lockout solenoid. To clear the error code, follow normal startup procedure of depressing clutch pedal first.

E60.2 This Error Code indicates the computer is being commanded by the Mode Lever for a forward and neutral at the same time which is physically impossible. If this error is displayed in neutral, then the forward command line is faulty or if this error is displayed in forward, then the neutral command line is bad. This error results in the transmission being put into electrical neutral and must be repaired before the tractor can be moved.

E60.3 This Error Code indicates the computer is being commanded by the Mode Lever for a reverse and neutral at the same time which is physically impossible. If this error is displayed in neutral, then the reverse command line is faulty or if this error is displayed in reverse, then the neutral command line is bad. This error results in the transmission being put into electrical neutral and must be repaired before the tractor can be moved.

E60.4 This Error Code indicates that the Mode Lever has instructed the computer for both forward and reverse at the same time which is physically impossible. This will result in the transmission being placed in electrical neutral and must be repaired before the tractor can be moved.

E60.5 This Error Code indicates that the Pulsar Lever has instructed the computer for both an upshift and downshift at the same time which is physically impossible. This will result in the transmission being placed in electrical neutral and must be repaired before the tractor can be moved.

E60.7 This Error Code indicates that the Mode Lever was not placed in the locked neutral position when the control was moved from either forward or reverse. This will result in the tractor being put into electrical neutral. To clear this condition, put mode in neutral locked position or correct mechanical problem.

E60.8 This Error Code indicates that during the start-up cycle of the computer, the Mode Lever was in either the forward or reverse position. This will put the tractor in electrical neutral and can be cleared by placing the Mode Lever in neutral and then selecting the proper direction.

E70.0 & E70.1 Card No. 7 in the computer will not function properly as per the software instruction. This will result in Limp Home being activated.

E81.7 The HVAC Temperature Potentiometer located in the overhead console has an open or shorted circuit in the harness that leads to the computer. This will result in the blend door actuator being disabled.

E81.8 Not used presently.

E81.9 The HVAC Blend Door Potentiometer located in the A/C module has an open or shorted circuit in the harness that leads to the computer. This will result in the blend door actuator being disabled.

E82.1 This Error Code is displayed when the RPM sender developes an open circuit between the sender and the computer. This can be corrected by repairing the open in the harness or replacing the sender. The error disables ground speed matching from selecting the proper gear range.

E82.2 This Error Code is displayed when the MPH sender developes an open circuit between the sender and the computer. This can be corrected by repairing the open in the harness or replacing the sender. The error disables ground speed matching from selecting the proper gear range.

E82.4 & E82.5 Card No. 8 in the computer will not function properly as per the software instructions. This will result in Limp Home being activated.

E82.9 This Error Code indicates that the ratios which establish the transmission gear ranges are not proper according to the RPM sender input and the MPH sender input. This will disable the ground speed matching and can be corrected by repairing the intermittent in the sender harness.

Hall Effect Switch Testing Procedure

Because of the nature of the hall effect switch design they cannot be checked using conventional methods. When checking or testing hall effect switch performance, the technician must first be sure the actuating magnet is in place and that the air gap clearance between the switch and magnet is adjusted to .030 in.

To test the switch performance will require that the switch have both power and ground.

For this reason a special hall effect switch test harness is available under P/N 58-214. This test harness will allow the technician to disconnect the hall switch connectors and connect the test harness in-line between the existing male and female switch connector. When the system is energized, the technician can then check for voltage at the red (+) wire and ground (-) at the black wire. When the actuating magnet is positioned above the switch there should be at least 8V DC present on the blue signal wire.

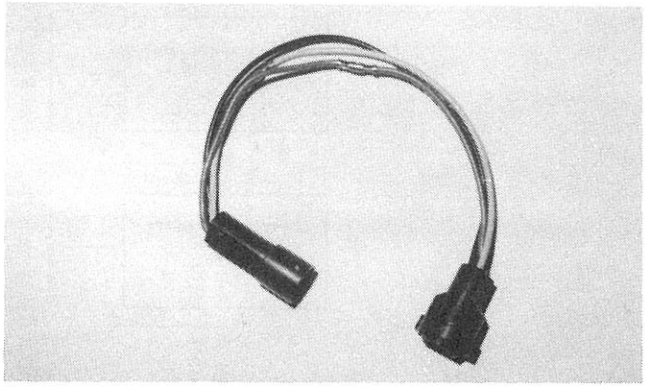

Figure 17: Hall Effect Switch Test Harness

3-Pt Hitch Transducer Adjustment Procedure

CAUTION: All adjustments to the 3-Pt Hitch must be made with the engine shutdown. When making the following adjustments there should not be any equipment attached to the 3-Pt linkage.

1. Disconnect the TPH-7 connector at the rockshaft transducer.

2. Turn the key switch to the run position, move 3-Pt Hitch lever through the full range of raise to lower, without going into transport position, the 3-Pt display should read the full range from 0 to 99. If not, adjust the position potentiometer at the lever control to read the proper display.

3. Start engine, lift 3-Pt Hitch to full raise position. **Shut down the engine.** Loosen the set screw on the rockshaft to transducer shaft. Turn transducer shaft slowly until the 3-Pt Hitch display **just** reads 99.

NOTE: *This adjustment is very sensitive and must be done carefully to avoid overshooting. Turn the shaft slowly until the 99 is just barely displayed, at this point lock the shaft set screw.*

4. Start the engine, lower the hitch completely and shut down the engine. The display should read between 7 and 10. If not loosen set screw and adjust the transducer so that the display reads between 7 and 10. Repeat the above procedure as necessary to achieve the correct adjustment.

NOTE: *If the 3-Pt will not lower be sure the flow control valve for the 3-Pt return oil is open. Readjust the flow control to achieve proper implement drop rate is necessary.*