

## Diagnostic Tools

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Electrical Tools

**368-9910 Multi-Tool Group, Phase 3**

Model: All

Warranty: One Year

European Union compliant, CE marked

**Step 1. Order the basic multi-tool group**

- Replaces 9 separate diagnostic tools in 1 multi-function unit (8T-1000 Position Indicator Group, discontinued 8T-2700 Blowby/Air Flow Indicator Group, discontinued 8T-5200 Signal Generator/Counter Group, 8T-5300 Engine Timing Indicator Group, 9U-7400, 9U-7401, 9U-7402 Multitach II, pressure, and burn rate computer)
- Reduces dealer cost by combining 9 tools into one; also provides greater convenience for technician
- Used as a blowby/airflow indicator, signal generator and counter, electronic position indicator, engine timing indicator, multi-tachometer, thermometer, fuel monitor, pressure gage, and flow computer
- Provides technician with a hand-held unit with multiple diagnostic tools using a menu-driven display
- Ergonomic design has large, dual control buttons for ease of use even with gloved hands
- Large, color display is easily readable even in bright sunlight conditions
- Diagnostic Interface Module (DIM) plugs into multi-tool to adapt existing diagnostic sensors and cables
- Multi-tool uses many of the same cables and adapters used by existing tools (for this reason, purchase of new cables and adapters may not be required)
- Once a Diagnostic Interface Module (DIM) is used with a multi-tool, it should remain in use with only that multi-tool (interchanging DIM units and multi-tool units is not recommended without sending both units to the factory for calibration)
- For identification purposes, corresponding serial numbers are printed on the back of each DIM
- Modular design allows additional functions to be added as new software becomes available
- All applications are activated and ready to use
- An internal battery, universal AC power supply, and DC cable for vehicle battery power provides 3 options for supplying power
- 4 AC power cords are included for worldwide use

368-9910 Multi-Tool Group, Phase 3 Includes:
Carrying Case
NEHS1087 Tool Operating Manual

368-9910 Multi-Tool Group, Phase 3	
Part Number	Description
285-0896	5 Pin DIN Adapter (gender changer)
285-0903	Cable Assembly with Ground Clip (used with 285-0900 Small Blowby Tool Group)
285-0904	Battery DC Power Cable Assembly (9-32 VDC)
285-0905	Battery Pack (NiMH, 9.6 VDC)
285-0906	Universal AC/DC Power Supply with 4 International Power Cords (90 - 240 VAC)
285-0907	Diagnostic Interface Module (DIM)
285-0908	Multi-Tool
368-9910	Multi-tool Group

**Step 2. Order the sensors for the desired tool functionalities**

**Blowby/Airflow Indicator**

- Allows technician to measure volume of blowby gases released through crankcase breather or air velocity through a component, such as a radiator core
- Blowby measurements provide helpful information when planning engine repairs
- Airflow measurements identify plugged or partially restricted areas
- Large blowby group checks blowby on 3500 Series and 3600 Series Engines, including ACERT™ models as well as on larger 300 Series Engines

(Continued)

## Step 2. Order the sensors for the desired tool functionalities (Continued)

- Small blowby group works on engines smaller than 3500 Series Engines and smaller 300 Series Engines
- Displays blowby and airflow, strip charts, and maximum and minimum values with differences
- Sample rate is adjustable
- Select SAE or metric units
- Print screen capability
- Six language support: English, French, German, Italian, Portuguese, Spanish

### Signal Generator Group with Counter

- Used to simulate signal from a magnetic speed pickup for troubleshooting electronic controls for transmissions, as a frequency counter for pulsating AC or DC input, and for calibration of a number of electronic diagnostic tools
- Allows technician to make frequency and amplitude adjustments simply by pushing a button
- 285-0896 Five-Pin DIN Adapter, part of basic group, must be used to connect generator group cables to diagnostic interface module
- Print screen capability
- Six language support: English, French, German, Italian, Portuguese, Spanish

### Engine Timing Indicator

- Allows technician to measure an engines fuel injection timing
- During timing test, multi-tool will chart engine RPMs vs degrees on built-in display
- For diesel engines, multi-tool must be used with existing 8T-5301 Engine Timing Diesel Group and 285-0897 Engine Timing Pickup Group
- Checks engine timing on natural gas engines using 6V-9060 Engine Timing Gas Group and 285-0897 Engine Timing Pickup Group
- Also checks automatic timing advance unit on engines so equipped
- Print screen capability
- Six language support: English, French, German, Italian, Portuguese, Spanish

### Electronic Position Indicator (Upgraded)

- Replaces mechanical dial indicators in applications where they cannot be used, such as rack measurements on an operating engine or any other rapidly changing dynamic reading
- Simultaneously displays displacement, a strip chart, and maximum and minimum values with differences
- Select SAE or metric units
- Sample rate is adjustable
- Print screen capability
- Six language support: English, French, German, Italian, Portuguese, Spanish
- 4 Channels
- Record and Playback

### Multitach II

- Simultaneously displays 4 channels, strip charts, minimum and maximum values at once
- Analog gauge or digital display graphic
- Set point indicator measurement
- Print screen capability
- Create channel labels
- Six language support: English, French, German, Italian, Portuguese, Spanish

### Digital Thermometer

- Simultaneously displays 4 channels, strip charts, minimum and maximum values at once
- Analog gauge or digital display graphic
- Two differential measurements
- Bias out small differences between channels
- Print screen capability
- Create channel labels
- Select SAE or metric units
- Six language support: English, French, German, Italian, Portuguese, Spanish

### Fuel Flow Monitor

- Simultaneously displays 2 engines (4 flow meters), burn rate, supply flow, return flow, total, grand total, time, average, windowed average, burn rate, and strip chart
- Sample rate is adjustable: slow, medium, normal
- Print screen capability

(Continued)

**Step 2. Order the sensors for the desired tool functionalities (Continued)**

- Create channel labels
- Select SAE or metric units
- Run time, elapsed time mode
- Works with new 308-7271 Dual Turbine Flow Meter Group
- Works with 179-0710 Burn Rate Group (6V-2198 Cable required)
- Works with discontinued 154-8103, 154-8104, 168-7735, and 168-7745 Gear Meters (FT3098 Cable required)
- Six language support: English, French, German, Italian, Portuguese, Spanish

**Burn Rate Computer**

- Replaces 179-0701 Burn Computer
- Replaces 154-8106 Display
- Print Screen
- Create channel label
- SAE or metric
- Six languages

**Pressure**

- 3 pressure pickups with couplers 500; 6,000; 10,000 PSI
- Analog/Digital Display
- Two differential measurements
- Print screen
- Create channel labels
- Select SAE or metric
- Six languages

Sensor and Cable Groups Used with Multi-Tool	
Part Number	Description
<b>285-0897 Engine Timing Pickup Group</b>	
5P-7362	Cable Assembly - Signal TDC
6V-2197	Transducer - Magnetic TDC Pickup 114 mm (4.5 in) long
6V-2199	Adapter - Transducer, 1/8 in NPTF
6V-3093	Adapter - Transducer, 1/4 in NPTF
8T-5184	Transducer - Magnetic TDC Pickup 8.9 cm (3.5 in) long
8T-5185	Transducer - Magnetic 17.8 cm (7.0 in) long
<b>6V-9060 Gas Engine Timing Adapter Group<sup>1</sup></b>	
1U-5524	Cable As. - Spark Timing Adapter
8T-5258	Cable - Coil Adapter
<b>8T-5301 Diesel Engine Timing Adapter Group<sup>2</sup></b>	
5P-7435	Adapter Group - Tee
5P-7436	Adapter
5P-7437	Adapter
6V-2198	Extension Cable (X8)
6V-3016	Washer
<b>285-0898 Electronic Position Indicator Group (also part of 8T-1000 Electronic Position Indicator Group)</b>	
6V-6042	Point Group - Contact
8T-1002	Position Probe (X4)
6V-2198	Extension Cable (X8)

Sensor and Cable Groups Used with Multi-Tool	
Part Number	Description
<b>285-0899 Signal Generator Cable Group (also part of discontinued 8T-5200 Signal Generator/Counter Group)</b>	
8T-5112	Signal Input Cable
8T-5197	Calibrator Cable and Adapters
8T-5198	Transmission Adapter Cable
6V-2198	Extension Cable (X8)
<b>285-0900 Blowby Tool Group (Small Engine) (also part of discontinued 8T-2700 Blowby/Airflow Group)<sup>3</sup></b>	
285-0903	Cable Assembly with Ground Clip (used with 285-0900 Small Blowby Tool Group)
8T-2685	Pickup - Blowby (1,000 CFH)
<b>285-0901 Blowby Tool Group (Large Engine)<sup>4</sup></b>	
9M-0164	Clamps - Nose
<b>368-9911 Burn Rate Group</b>	
4C-9660	Carry Case
179-0706	Foam Insert
154-8099	Lid Foam Insert
179-0705	Hose Group
362-9907	Optional 12 to 24 VDC Invertor
362-9913	Meter Cable
<b>368-9914 Pressure Group</b>	
6V-2198	Extension Cable (X8)
376-4170	500 PSI (X1)
376-4171	6,000 PSI (X2)
376-4172	10,000 PSI (X1)

Diagnostic Tools

(Continued)

## Step 2. Order the sensors for the desired tool functionalities (Continued)

Sensor and Cable Groups Used with Multi-Tool	
Part Number	Description
<b>390-7879 Ball Stud Measurement Group</b>	
4C-9656	Pelican Case™
067-6809	Hex Bolt 3/8 x 5/8 (X4)
8T-1002	Position Probe (X4)
5P-4162	Contact Point (X4)
6V-2198	Extension Cable (X8)
390-7875	Magnetic Squaring Wedge
390-7876	Magnetic Base (X4)
390-7877	Probe Bracket (X4)
390-7878	Foam
5P-7590	Socket Screws 6-32 (X4)
<b>308-7265 Multitach 2 Photo Group</b>	
1U-6605	Retro-Reflective Tape, 12.5 mm (0.5 in) x 1.5 m (5.0 ft) long
6V-3137	Magnetic Mounting Base for 9U-5140
6V-3138	Extension Rod for 6V-3137
9U-5140	Pickup - LED Photo
6V-2198	Extension Cable (X8)
<b>308-7264 Multitach 2 Group</b>	
9U-5140	Pickup - LED Photo
1U-6605	Retro-Reflective Tape, 12.5 mm (0.5 in) x 1.5 m (5.0 ft) long
6V-3138	Extension Rod for 6V-3137
9U-7506	Magnetic Adapter Cable (required for TDC Sensors)
1P-7446	Rack Cable
5P-1759	Tachometer Drive Group (additional parts in accessory case)

Sensor and Cable Groups Used with Multi-Tool	
Part Number	Description
<b>308-7264 Multitach 2 Group (Continued)</b>	
5P-7360	Tach Generator (20-tooth internal gear )
8T-5111	Cable As. - Rack Adapter
6V-2198	Extension Cable (X8)
6V-3137	Magnetic Mounting Base for 9U-5140
<b>308-7267 Digital Thermometer Group</b>	
6V-2198	Extension Cable (X8)
4C-4545	Adapter Group , 3/4 in O-ring
4C-4547	Adapter Group , 1/2 in O-ring
4C-6264	Probe - RTD 25.4 mm (1 in) long, 3.2 mm (0.125 in) diameter
4C-6265	Probe - RTD 38.1 mm (1.5 in) long, 3.2 mm (0.125 in) diameter
4C-6266	Probe - RTD 63.5 mm (2.5 in) long, 3.2 mm (0.125 in) diameter
4C-6268	Exhaust Probe RTD
5P-2720	Adapter Group - Probe, 1/8 in NPT
5P-2725	Adapter Group - Probe, 1/4 in NPT
5P-3591	Adapter Group - Probe, 9/16 in O-ring
<b>308-7275 Hose Group (optional)</b>	
285-0902	Accessory Case (for cables and sensors [not included])
<b>308-7269 Accessory Case</b>	
308-7269	Accessory Case (not included)

Diagnostic Tools

<sup>1</sup> Includes: Fiber Optic Receiver (not serviced), Fiber Optic Transmitter (not serviced), Fiber Optic Cable (not serviced)

<sup>2</sup> Includes: Injection Timing Transducer Assembly(not serviced)

<sup>3</sup> Includes: Bushing and Hose Group

<sup>4</sup> Includes: Blowby Probe (4,000 Cf/h maximum) and Blowby Hose (large engine)

### 308-7271 Fuel Flow Group



308-7271 Fuel Flow Group

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**308-7271 Fuel Flow Group (Continued)**

Part Number	Description
308-7271	Fuel Flow Group
308-7273	Dual Turbine Mtr (2 meters)
308-7274	Cable din to Mtr (2 cables)
6V-3073	Case - Plastic

**Step 3. Order the accessory case**

- 285-0902 Accessory Case holds and protects all cables and sensors that are required for all blowby/airflow indicator, signal generator group, engine timing indicator, and electronic position indicator only
- 308-7269 Accessory Case offers convenience of storing all cables, probes, and adapters for all seven applications at a lower cost



285-0902 Accessory Case



308-7269 Accessory Case

**References**

NEHS1087, Tool Operating Manual, 348-5430 Multi-Tool Group  
 NEHS0605, Tool Operating Manual, 9U-7400, 9U-7401, and 9U-7402 Multitach II  
 SEHS8580, Special Instruction, Information and Use of 8T-5300 Engine Timing Group  
 SEHS8579, Special Instruction, Use of 8T-5200 Signal Generator/Counter Group  
 SEHS8623, Special Instruction, Using the 8T-1000 Position Indicator Group  
 NEHS0776, 179-0710 Burn Rate Group

**Repair Information**

SPX Service Repair  
 755 Eisenhower Drive  
 Owatonna, MN 55060  
 Attn: Repair Department  
 Phone: 800-344-4013

Visit the SPX Repair Track web link to complete and submit the form for proper authorization: <https://repairtrack.spx.com>

The 308-7271 Fuel Flow Meter should have the calibration checked annually. ATS (Advanced Technology Service) can provide this service. If recalibration is required, the fuel flow meters should be returned to Flow Dynamics, the supplier. Recalibration is required if the flow meter has been physically damaged. Improper storage and contamination in the fuel can lead to physical damage to the flow meter.

**Step 5. Memory Card**

- Multi-tool software upgrades are available by ordering compact flash memory cards preloaded with software
- The flash memory cards are available by ordering the appropriate part number
- The card is permanently inserted into the multi-tool CF slot
- Phase I, 285-0910 Multi-Tool requires factory calibration before upgrade



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## Step 5. Memory Card (Continued)

Multi-Tool Specifications with DIM (Diagnostic Interface Module)	
Global AC input voltage	90 to 240 VAC (50 to 60 Hz)
Vehicle DC input voltage	9 to 36 VDC (must use 285-0904) <sup>1</sup>
Internal battery voltage	9.6 V (2300 mA hr)
Battery operating time	Approximately 2 hours (dependent on sensor current draw)
Output voltages (sensor power)	5 VDC @ 140 mA (total current 4 channels)
	8 VDC @ 160 mA
	12 VDC @ 500 mA
Operating temperature	0° to 50° C (32° to 122° F)
Storage temperature	-20° to 70° C (-4° to 158° F)
Analog voltage	± 100 V maximum input
Signal frequency	10 Hz - 100 kHz maximum input, 0.1 to 50 V, Sine Wave
Input impedance	> 500k ohms
Display	320 x 240 LCD, color
Output frequency	1Hz to 100 kHz
Frequency outputs	0 - 8 V, ± 4 V, ± 1.5 V
Frequency output current	10 mA sink and source
<sup>1</sup> 285-0904 DC Cable has a switching power supply to isolate and protect the multi-tool from harmful voltage transients	
Part No.	Tool Function Description
386-5908	CF Memory Card upgrade for phase 3
	Multi-language (English, Spanish, French, German, Italian, and Portuguese) for blowby/airflow, signal enerator/counter, position indicator, upgrade engine timing indicator
	Multitach 2, Digital Thermometer, Fuel Monitor (Phase 2), Burn rate computer, Pressure

### Memory Card Usage

**Instructions for returning the multi-tool for re-calibration to the supplier:**

1. Wrap the Multi-Tool and DIM in a cushion-type packaging material, such as Bubble Wrap®.
2. Include the following information with the Multi-tool and DIM:

- Company Name
- Contact Name
- Return Address
- Service Description (Calibrate for Digital Thermometer Application)
- E-mail Address
- Telephone Number
- Dealer Name

3. Properly package the Multi-Tool, DIM, and information and send to:

SPX Service Repair  
 755 Eisenhower Drive  
 Owatonna, MN 55060 USA  
 Phone: 800-344-4013

Visit the SPX Repair Track web link to complete and submit the form for proper authorization: <https://repairtrack.spx.com>

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**Memory Card Usage (Continued)**

Upon receipt, Recalibration Service will contact you for credit card payment information. Caterpillar® will pay for the calibration. The dealer is responsible for shipping and handling fees. Allow about three weeks for calibration service and shipping. For status requests, contact Teleperformance at USA 1-800-344-4013. This program will end June 1, 2010.

**225-8266 Clamp On Ammeter**

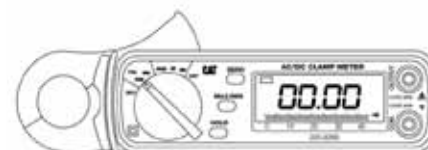
SMCS Code: 1400-038, 1400-081, 1450-038

Model: All

Warranty: Manufacturer's One Year

European Union compliant, CE marked

- Used to measure AC or DC current
- Compact size and low cost make this unit indispensable
- Clamp-on probe replaces standard test leads (allows current measurements without breaking circuit)
- Measures current in cables up to 23 mm (0.9 in) diameter
- User selectable 400 amp and 1200 amp scales for both AC and DC
- Powered by two 1U-9533 AA Alkaline Batteries
- Designed with a built-in display, push button zero control for DC operation, "display hold" to freeze display, "max/min recording" to display highest and lowest readings, auto power-off (unit turns off automatically after 30 minutes), and low battery indicator
- Shipped with batteries, carrying case, and users guide



**Repair Information**

Extech Instruments

9 Townsend West

Nashua, NH 03061

Phone: (781) 890-7440, ext: 220

Fax: (781) 890-7864

Email: repair@extech.com

Weight	190 g (6.7 oz)
Overall size	183 x 61 x 36 mm (7.2 x 2.5 x 1.4 in)
Resolution	1 A

Part Number	Description
225-8266	Clamp On Ammeter (400, 1200 A ranges)
<b>Service/Repair Parts</b>	
1U-9533	AA Alkaline Battery , non-rechargeable, package qty 96 (5 required to power Indicator III)
6V-6014	Cable

## 349-4205 Voltage Detector

SMCS Code: 1400-038, 1400-081

Model: All

Warranty: Manufacturers Two Year



European Union compliant, CE marked

- Used to quickly test for energized circuits (just touch tip to a terminal strip, outlet, or supply cord)
- Senses steady state electrostatic field produced by AC Voltage even through wire insulation (does not require contact with bare conductor)
- Tip will glow red if voltage is detected (high intensity red LED)
- An optional beeping noise also indicates presence of voltage (feature can be switched OFF)
- Safety rating of CAT IV, 1000 V for added protection
- Requires two AAA alkaline batteries (included)
- Press "Battery Check Button" to determine if batteries are good (if tip glows, batteries are good)
- Each unit is supplied with a manufacturers operating instruction sheet

Operating range	90 V AC to 1000 V AC
Operating temperature	-10 to 50° C (14 to 122° F)
Operating altitude	3000 M (9850 ft)
Voltage sensing range	90 to 1000 V AC; 45 to 405 Hz

Part Number	Description
349-4205	Voltage Detector

## 349-4199 AC/DC Probe (1000 Amp)

SMCS Code: 1400-038, 1400-081

Model: All

Warranty: Manufacturers One Year



European Union compliant, CE marked

- Used to measure AC or DC current
- Used with standard digital multimeter, recorders, digital or analog meters, data loggers/DAS, oscilloscopes, or other test and measurement instruments
- Converts high-current to a low level millivolt signal for input directly into a test instrument
- On/Off switch with red LED is illuminated when in On position
- Low battery voltage indicated by flashing LED
- Zero adjustment knob (adjust output voltage to zero by depressing thumbwheel and rotating)
- Current range selection switch for 200A or 1000A
- Includes carrying case, attached leads, and users manual

Maximum conductor size	31 mm (1.2 in)
Lead length	1.5 m (59 in)
Meter input impedance	10 k Ohms minimum and 100 pF maximum
Current ranges	200A and 1000A DC and AC peak
Overall accuracy	±1% of reading ± 0.5A
Operating temperature	0 to 50° C (32 to 122° F)
Power	9 V battery, NEDA 1604, JIS 006P, IEC 6F22
Battery life	50 hours (alkaline)
Weight	295 g (10 oz)
Size	55 x 220 x 30 mm (2.2 x 8.6 x 1.2 in)

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**349-4199 AC/DC Probe (1000 Amp) (Continued)**

SMCS Code: 1400-038, 1400-081

Model: All

Warranty: Manufacturers One Year

Part Number	Description
349-4199	AC/DC Probe (1000 Amp)

**271-8590 24-Volt Analyzer Group**

Model: All

Warranty: Manufacturer's

European Union compliant, CE marked

- Used to perform battery, electrical system, and diode tests
- Used with 225-8266 Amp Probe and 271-8585 Printer
- Used on 12 and 24 volt electrical systems (digital circuitry accurately controls testing — requires minimal interaction)
- Hand-held
- Large, backlit display requires less scrolling, provides more information
- Long 4.6 m (15.0 ft) cables allow operator to perform tests from cab of machine
- Step-by-step instructions quickly and easily guide technician through tests
- Tests flooded lead acid and absorbed glass mat (AGM) batteries with 50 to 4000 Cold Cranking Amp (CCA), Cranking Amp (CA), Amp Hours (A-HR), Japanese Industrial Standard (JIS), or German-Deutsche Industry Norm (DIN) capacity ratings
- Tests battery pack configurations, through algorithm design:
  - single battery, 6- or 12-volt
  - 2 batteries in series, 24-volt
  - 2, 3, or 4 batteries in parallel, 12-volt
  - 2 banks in parallel, each bank with batteries in series, 24-volt
- Internal resistance loads are applied for all configurations
- Amp clamp connections allow use of optional amp clamp cables for current drain and starting/charging tests
- Features infrared communications compatibility for optional wireless printer with user defined header and footer for custom printouts
- PC interface port allows unit updates as new software is released — download software for new battery types, system updates, and features
- Ergonomically designed over-molded surround with soft-touch keys for easy operation while wearing gloves during cold weather
- Security cable connection tethers tool in order to prevent drops or for security purposes
- Includes 24-volt analyzer, test cables, battery terminal adapters, manual, and case with foam insert



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## 271-8590 24-Volt Analyzer Group (Continued)

Model: All

Warranty: Manufacturer's

### Repair Information

The unit is warranted by the manufacturer for 3 years from the date of receipt. Cables are warranted for 90 days from the date of receipt. If the unit needs servicing, contact the manufacturer's repair facility.

SPX Service Repair

755 Eisenhower Drive

Owatonna, MN 55060

Attn: Repair Department

Phone: 800-344-4013

Visit the SPX Repair Track web link to complete and submit the form for proper authorization: <https://repairtrack.spx.com>

### Reference

NEHS0973, Tool Operating Manual, 271-8590 Analyzer Group (24 Volt)

Item	Description
Battery tests	Flooded lead acid (FLA) absorbed glass mat (AGM)
Cold cranking amp range	50 - 4000 CCA / 24 V
Battery voltage	Single, series, or parallel to 24 V
Electrical system tests	12 and 24 V, starting/charging/diode test
Scales	CCA, CA, AHR, MCA, JIS, DIN
PC interface	For field software updates
IR compatible	For optional infrared wireless printer
Amp clamp ports	For optional amp clamp connections
Display	Backlit 4 x 20 character display

Part Number	Description
271-8590	24-Volt Analyzer Group
<b>Replacement Parts</b>	
271-8587	Test cables, 4.6 m (15 ft)
281-1947	Rechargeable Battery
281-1950	Carrying Case with Foam Insert
271-8589	Analyzer Only

Part Number	Description
<b>Optional Accessories</b>	
225-8266	Clamp On Ammeter (400, 1200 A ranges)
271-8585	Optional Printer Group
281-1948	Printer Serial Cable
184-7679	Paper - Roll

### 177-2330 Digital Battery Analyzer

SMCS Code: 1401-081, 0785

Model: All

Warranty: One Year

- Replaces 127-8078 Battery Analyzer
- Used to quickly and accurately test condition of 6 and 12 volt batteries (even discharged to as low as 4 volt)
- Check for full state charge, condition of battery, and battery voltage in 20 seconds
- Test batteries in machine or vehicle without disconnecting battery cables
- Battery does not have to be fully charged at time of testing
- Saves time and money by allowing dealers to test condition of a battery while customer is present (works great for warranty claims)
- Eliminates need to charge and discharge a battery to test its condition
- Compensates for cold temperatures when testing batteries in extreme conditions
- Power-down feature prolongs battery life in analyzer
- Analyzer has reverse polarity and is protected to 17 volts maximum



#### References

NEHS0764, Tool Operating Manual, Using the 177-2330 Battery Analyzer

Battery rating range:	
Cold cranking amps (CCA)	50 - 4000
Cranking amps (CA)	65 - 5000
Ampere hours (A h)	6 - 500
DC voltmeter range	1.0 - 14 V
Voltmeter accuracy	±0.1 V
Power source	9 V battery or test battery
Test time	20 seconds
Analyzer cable length	815 mm (32 in)
Overall size	210 x 140 x 38 mm (8.25 x 5.5 x 1.5 in)
Weight	0.68 kg (1.5 lb)
Operating temperature range	0° to 50° C (32° to 120° F)
Storage temperature range	-20° to 70° C (0° to 160° F)
Over voltage protection	Up to 18 V

Part Number	Description
177-2330	Digital Battery Analyzer

### 4C-4911 Battery Load Tester

SMCS Code: 1401-081, 0785

Model: All Models

Warranty: One Year

- Used to test 6, 8 and 12 volt heavy equipment and automotive batteries
- Has built-in LCD digital voltmeter and ammeter
- Load adjustment knob for current drawn from battery to be adjusted up to maximum of 1000 amperes
- Cooled by internal fan automatically activated when load applied to prevent carbon pile overheating
- Large, 15 mm (0.59 in) high display digits are easier to read



#### Reference

SEHS9249, Special Instruction

Diagnostic Tools

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## 4C-4911 Battery Load Tester (Continued)

SMCS Code: 1401-081, 0785

Model: All Models

Warranty: One Year

Load test	6, 8 and 12 V batteries
Load current	0 - 1000 A (carbon pile)
Duty cycle	Continuous, limited only by cable and clamp heating
Operating temperature	0° - 50° C (32° ± 122° F)
Voltmeter accuracy	0.1% of full scale ± 1 digit
Ammeter accuracy	±3% of reading ± 1 digit
Size	33 x 33 x 30 cm (13 x 13 x 12 in)
Weight	12.428 kg (27.375 lb)

Part Number	Description
4C-4911	Battery Load Tester

## 372-5253 Battery Tester with Expansion Capabilities

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Used to test batteries in multi-battery vehicles
- Test up to 6 batteries in parallel without disconnecting
- Test 6 and 12V batteries, group 31 and commercial batteries, AGM and Gel, test 12 and 24V starting and charging systems
- Cable-drop test simultaneously calculates voltage drop across positive and negative sides of any circuit and total circuit drop without running engine
- Digital multi-meter capabilities with scope and infrared temperature readings
- Displays voltage, measured CCA, battery, starting and charging system condition, SD memory card capable for record keeping, data transfer, and software upgrades.
- Recall last test on screen or print to optional printer

Specifications	
Dimensions	9.5 x 4 x 2.5 in
Weight	0.43 kg

Part Number	Description
372-5253	Battery Tester with Expansion Capabilities



**8T-0500 Continuity Testing Light**

SMCS Code: 1000-017, 1000-025, 1250-025, 1250-036, 1355-081, 1400-038, 3071-017, 3100-017, 3156-010, 3156-012, 3200-038, 3224-025, 4208-010, 5050-038, 7400-036, 7451-038, 7401-045

Model: All Models

Warranty: One Year

- Used to test non-energized circuits; lamp comes on brightly when connected across low resistance circuit; no light appears if resistance of circuit exceeds 10 ohms
- Designed for rugged field use
- Comes with light bulb and 2 "N" size batteries (1.5 volts) and instruction decals



**Reference**

NEHS0543, Special Instruction, Checking Diodes

Part Number	Description
8T-0500	Light - Continuity Testing
<b>Service/Repair Parts</b>	
4C-8363	Battery, Size N, 1.5 V
6V-3061	Bulb

**5P-7277 Voltage Tester**

SMCS Code: 1400-038, 1400-081, 1450-081, 1700-081, 1800-081, 3168-035, 5050-081, 7300-081, 7400-081, 7451-038

Model: 215, 428, 621E, 627E, 768C, 769C, 793 All models

Warranty: One Year

- Used to make quick checks for presence of voltage
- Indispensable for checking out circuits, relays, bulbs, wires, and switches
- Designed for voltage range from 12 to 36 volts
- Bulb lights brightly when connected to 36 volts and gets progressively dimmer with lower voltages
- Encased in rugged, high-impact plastic housing which is grease and chemical resistant
- Standard 8D-1429 Bulb required for replacement



Part Number	Description
5P-7277	Voltage Tester

**197-7875 Lock Removal Tool**

**197-7876 Connector Removal Tool**

SMCS Code: 1800-0776

Model: All

Warranty: Six Months

- Used to service Cat® fuse blocks using mini-fuses (GM style)
- 197-7875 used to remove fuse block terminal locks
- 197-7876 used to remove wire and terminal from RTA, if replacement is necessary

**Instructions for use of 197-7875**

- From rear side of RTA, insert tool fingers into slots on outboard side of wires.
- With tool handle parallel to wires, press down on locking tabs of terminal locks.
- Pull out terminal locks by hand or with a small, flat blade screw driver.

**Instructions for use of 197-7876**

- Remove fuse from top of RTA.
- Locate wire terminal on outboard sides of RTA.
- Place long square fingers into square holes above and below slot for fuse blade.
- Press removal tool fingers completely into connector to compress terminal locking tabs.
- Remove wire and terminal.



(Continued)

## 197-7875 Lock Removal Tool (Continued)

## 197-7876 Connector Removal Tool

SMCS Code: 1800-0776

Model: All

Warranty: Six Months

Part Number	Description
197-7875	Lock Removal Tool
197-7876	Connector Removal Tool

## 140-9944 Terminal Kit

SMCS Code: 1400-023, 0700

Model: All Cat® Engines

Warranty: Six Months



- Replaces discontinued 1P-2305 Terminal Kit
- Used to repair wiring harness terminal ends which have become damaged or unserviceable
- Hand crimping tool has built-in dies for crimping insulated and non-insulated terminals, cutting edges for cutting wire, notches for stripping 10 to 22 gauge wire, shears for cutting up to 4.7 mm (0.18 in) diameter bolts, 2-thread chasers for screws with 24 and 32 threads-per-inch screws, and a scale for measuring screw length
- Splice connectors have hot-melt adhesive and shrink ends that when heated will provide an environmental seal around wire

Qty. Shipped	Part No.	Description	Replacement Qty.
1	140-9944	Terminal Kit	1
<b>Terminal and Wire Splice Service/Repair Parts</b>			
1	9S-9150	Terminal Crimp Tool	1
10	2L-8058	Terminal (8 Gauge 1/4 in Stud)	10
10	2L-8066	Terminal (12 - 10 Gauge No. 10 Stud)	10
10	2L-8067	Terminal (12 - 10 Gauge 1/4 in Stud)	10
10	2L-8069	Terminal (12 - 10 Gauge 3/8 in Stud)	10
10	2L-8071	Terminal (12 - 10 Gauge 1/2 in Stud)	10
20	2L-8075	Terminal (16 - 14 Gauge No. 8 Stud)	20
20	2L-8076	Terminal (16 - 14 Gauge No. 10 Stud)	20
15	2L-8077	Terminal (16 - 14 Gauge 1/4 in Stud)	15
15	2L-8079	Terminal (16 - 14 Gauge 3/8 in Stud)	15
30	5P-4571	Terminal (16 - 14 Gauge)	20
10	4S-1988	Terminal (Blade, Crimp Type)	50
15	136-4876	Wire Splice (12 - 10 Gauge)	1
15	136-4877	Wire Splice (16 - 14 Gauge)	1
15	136-4878	Wire Splice (22 - 18 Gauge)	1



### 8T-5319 CE/VE Connector Tool Group

SMCS Code: 1400-023

Model: All Models with CE/VE Connectors

Warranty: Six Months

- Used to service all CE/VE Connectors
- Contacts can be removed, installed or rearranged within connector

#### Reference

SEHS8038, Special Instruction



Item	Tool Part No.	Description	Color	Wire Gauge
—	8T-5319	Connector Tool Group	—	—
<b>Connectors</b>				
1	4C-4074	Removal Tool, 16 - 18 Gauge	Black	16, 18
2	4C-4073	Removal Tool, 12 - 14 Gauge	Yellow	12, 14
3	4C-4072	Removal Tool, 8 - 10 Gauge	Green	8, 10
4	4C-4071	Removal Tool, 4 - 6 Gauge	Grey	4, 6

### 6V-4148 Electrical Connector Repair Kit

Model: Some models with electronic controls

Warranty: Six Months

- Used to repair electrical connectors made by Amp Special Industries that are used in electrical controls and harnesses



Part Number	Description
9G-5859 Includes:	301741 Terminal (8)
	384841 Contact (18)
	384843 Plug (12)
	309491 Housing (16)
	309492 Housing (16)
	301782 Housing (10)
	301531 Housing (4)
	344953 Housing (4)
	301739 Socket (8)
	301740 Housing (10)
	301781 Housing (10)
9G-6790 Includes:	399860 Contact (22)
	368748 Connector
	368747 Connector
	389688 Connector (2)

Diagnostic Tools

(Continued)

## 6V-4148 Electrical Connector Repair Kit (Continued)

Model: Some models with electronic controls

Warranty: Six Months

Part Number	Description
6V-3001	Sure Seal Crimping Tool
6V-4145	Extraction Tool
6V-4146	Extraction Tool - 301530 Terminal (8)
6V-4147	Extraction Tool - 399862 Housing (4)
6V-4148	Electrical Connector Repair Kit
7N-6545	Terminal (32)

Part Number	Description
7N-6546	Terminal (32)
9G-5859	Pin (8)
9G-6789	Connector (2), 387062 Connector (2)
9G-6790	Socket (37)
9G-6791	Pin (32)
9G-6793	Terminal (9), 384842 Connector (6)

## 300-8648 Insulation Tester Group

SMCS Code: 4450-082, 0785

Model: General and Generator Sets

Warranty: Manufacturers One Year OEM



Diagnostic Tools

European Union compliant, CE marked

- Replaces discontinued 243-3134 1KV Insulation Tester
- Used to test insulation on generator sets, cables, motors, insulators, and wiring installations
- Test voltages of 50, 100, 250, 500, and 1000 volts
- Automatic calculation of Dielectric Absorption Ratio (DAR) and Polarization Index (PI)
- Repetitive or hard-to-reach testing is made easier with 300-9489 Remote Test Probe
- Make repetitive tests simple and easy with Compare (Pass/Fail) function
- Live circuit detection prevents insulation test if voltage of 30 volts or greater is detected
- Auto-discharge of capacitive voltage for added user protection
- Auto power off extends battery life
- CAT IV 600 volt overvoltage
- Read measurements easily with large, backlit display
- 4 AA alkaline batteries provide at least 1000 insulation tests

Part Number	Description
300-8648	Insulation Tester Group
<b>Service/Repair Parts</b>	
300-8649	Test Leads
300-8650	Test Probes
300-9487	Alligator Clips

Part Number	Description
<b>Service/Repair Parts (Continued)</b>	
300-9488	Case
300-9489	Remote Test Probe

## AC/DC Voltage Measurement

AC/DC Voltage Measurement	
Accuracy	50 Hz to 400 Hz $\pm$ (% of reading + digits): $\pm$ (2% of reading + 3 digits)
Range	0.1 V to 600.0 V
Resolution	0.1 V
Input impedance	3 M $\Omega$ (nominal), < 100 pF
Common mode rejection ratio (1 k $\Omega$ unbalanced)	> 60 dB at DC, 50 or 60 Hz
Overload protection	600 V RMS or DC
Earth Bond Resistance Measurement Specifications	
Range/Resolution	20.00 $\Omega$ / 0.01 $\Omega$
	200.00 $\Omega$ / 0.1 $\Omega$
	2000 $\Omega$ / 1.0 $\Omega$
	20.00 k $\Omega$ / 0.01 k $\Omega$
Accuracy	$\pm$ (1.5% of reading + 3 digits)
Overload protection	2 V RMS or DC
Open circuit test voltage	> 4.0 V, < 8 V
Short circuit current	> 200.0 mA
Insulation Specifications	
Measurement range	0.01 M $\Omega$ to 10 G $\Omega$
Test voltages	50 V, 100 V, 250 V, 500 V, and 1000 V
Test voltage accuracy	+ 20%, - 0 %
Short-circuit current	1 mA nominal
Auto discharge	Discharge time < 0.5 second for C = 1 $\mu$ F or less
Live circuit indicator	Inhibit test if terminal voltage > 30 V prior to initialization of test
Maximum capacitive load	Operable with up to 1 $\mu$ F load
Measure accuracy	50 V: $\pm$ (3% + 5)
	100 V: $\pm$ (3% + 5)
	250 V: $\pm$ (1.5% + 5)
	500 V: $\pm$ (1.5% + 5)
	1000 V: $\pm$ (1.5% + 5) to 2000 M $\Omega$ , $\pm$ (10% + 3) above 2000 M $\Omega$

## Environmental Specifications

Environmental Specifications	
Maximum voltage applied to any terminal	600 VAC RMS or DC
Storage temperature	-40° to 60° C (-40° to 140° F)
Operating temperature	-20° to 55° C (-4° to 131° F)
Temperature coefficient	0.05 x (specified accuracy) per °C for temperatures < 18 or > 28 °C (< 64 or > 82 °F)
Relative humidity	0% to 95% at 10° to 30° C (50° to 86° F)
	0% to 75% at 30° to 40° C (86° to 104° F)
	0% to 40% at 40° to 55° C (104° to 131° F)
Vibration	Random, 2 g, 5 - 500 Hz per MIL-PRF-28800F, Class 2 instrument
Shock	1 meter drop per IEC 61010-1 2nd Edition (1 meter drop test, 6 sides, oak floor)
Electromagnetic accuracy (EN 61326-1:1997) compatibility	In an RF field of 3 V/M, accuracy = specified
Compliance to Standards	
Complies with	ANSI/ISA 82.02.01 (61010-1) 2004, CAN/CSA-C22.2 NO. 61010-1-04, and IEC/EN 61010-1 2nd Edition for measurement category IV 600 V (CAT IV)
Certifications	CSA per standard CSA/CAN C22.2 No. 61010.1-04; TUV per standard IEC/EN 61010-1 2nd Edition
Power Specifications	
Batteries	4 AA batteries (NEDA 15A or IEC LR6)
Battery Life	
Insulation test use	Tester can perform at least 1000 insulation tests with fresh alkaline batteries at room temperature.
	These are standard tests of 1000 V into 1 MΩ with a duty cycle of 5 seconds on and 25 seconds off.
Resistance measurements	Tester can perform at least 2500 earth bond resistance measurements with fresh alkaline batteries at room temperature.
	These are standard tests of 1Ω with a duty cycle of 5 seconds on and 25 seconds off.
General Specifications	
Size (H x W x L)	5.0 x 10.0 x 20.3 cm (1.97 x 3.94 x 8.0 in)
Weight	550 g (1.2 lb)
IP Rating	IP40
Operating altitude	2000 m CAT IV 600 V, 3000 m CAT III 600 V
Non-operating (storage altitude)	12,000 m
Over-range capability	110% of range

### 349-4206 5KV Insulation Tester Group

SMCS Code: 4450-082, 0785

Model Usage: General and Generator Sets

Warranty: Manufacturer's Three Years

- Used to test insulation on generator sets, cables, motors, insulators, and wiring installations
- Test voltages of 50, 100, 250, 500, 1000, and 5000 volts
- Automatic calculation of Dielectric Absorption (DAR) and Polarization Index (PI)
- Selectable test Voltages in 50 V steps from 250 to 1000 V and 100 V steps above.
- Measurements can be stored in up to 99 memory locations with each location assigned a unique user-defined label for easy recall
- Resistance measurements up to 1TΩ (ohm)
- Long battery life gives the user over 750 tests between charges
- CE, CSA, and TUV Compliant



Specifications	
Dimensions	170 x 242 x 330 mm (6.7 x 9.5 x 13 in)
Weight	3.6 kg (7.94 lbs)
Safety	CAT III 1000 V, CAT IV 600V
Display	75 x 105 mm (3.0 x 4.1 in)
Power, Battery	12 V lead-acid rechargeable Yuasa NP 2.8 - 12
Charger Input (AC)	85 V to 250 V 50/60 HZ 20 VA
Temperature (operating)	-20° C to 50° C (-4° F to 122° F)
Temperature (storage)	-20° C to 65° C (-4° F to 149° F)
Electromagnetic Compatibility	EN 61326
Humidity	80% to 31° C decreasing linearly to 50% at 50° C

Part Number	Description
349-4206	5KV Insulation Tester Group

### 417-5122 Fluke Ti32 Thermal Camera

Model Usage: All

Warranty: Manufacturer's

European Union Compliant, CE marked

- Used to ensure proper connections are made in high voltage and current wiring installations
- Used to identify potentially insulation problems
- Use to view slowly changing temperatures on electrical switchgear, wiring and generator sets
- Compact and portable
- Includes IR-Fusion and SmartView analyzing and reporting software
- 320 x 240 resolution infrared thermal imager
- Optional wide-angle and telephoto lenses available



Diagnostic Tools

(Continued)

## 417-5122 Fluke Ti32 Thermal Camera (Continued)

Model Usage: All

Warranty: Manufacturer's

Temperature	
Temperature measurement range (not calibrated below -10° C)	-20 °C to + 600 °C (-4 °F to + 1112 °F)
Temperature measurement accuracy	± 2 °C or 2% (at 25 °C nominal, whichever is greater)
On-screen emissivity correction	Yes
On-screen reflected background temperature compensation	Yes
On-screen transmission correction	Yes
Imaging Performance	
Image capture frequency	9 Hz refresh rate
Detector type	Focal Plane Array, uncooled microbolometer, 320 x 240 pixels
Thermal sensitivity (NETD)	≤ 0.05 °C at 30 °C target temp. (50 mK)
Infrared spectral band	7.5 µm to 14 µm (long wave)
Visual (visible light) camera	Industrial performance 2.0 megapixel
Minimum focus distance	46 cm (approx. 18 in)
Standard infrared lens type	Field of view: 23° x 17°
	Spatial resolution (IFOV): 1.25 mRad
	Minimum focus distance: 15 cm (approx. 6 in)
Focus mechanism	Manual, one-handed Smart Focus capability

Diagnostic Tools

Part Number	Description
417-5122	Fluke Ti32 Thermal Camera

## Ti32 Thermal Camera Image Specifications

Image Presentation	
Palettes	Standard: Ironbow, Blue-Red, High Contrast, Amber, Amber Inverted, Hot Metal, Grayscale, Grayscale Inverted
	Ultra Contrast™: Ironbow Ultra, Blue-Red Ultra, High Contrast Ultra, Amber Ultra, Amber Inverted Ultra, Hot Metal Ultra, Grayscale Ultra, Grayscale Inverted Ultra
Level and span	Smooth auto-scaling and manual scaling of level and span
Fast auto toggle between manual and auto modes	Yes
Fast auto-rescale in manual mode	Yes
IR-Fusion® Information	
Picture-In-Picture (PIP)	Three levels of on-screen IR blending displayed in center of LCD
Full screen infrared	Three levels of on-screen IR blending displayed in center of LCD
Color alarms (temperature alarms)	High-temperature color alarm (user-selectable)
Voice annotation	60 seconds maximum recording time per image; reviewable playback on imager
Image capture and data storage	
Image capture, review, save mechanism	The Ti32 allows user to adjust palette, blending, level, span, IR-Fusion® mode, emissivity, and reflected background temperature compensation, and transmission correction on a captured image before it is stored. One-handed image capture, review, and save capability.
Storage medium	SD memory card (2 GB memory card will store at least 1200 fully radiometric (.is2) IR and linked visual images each with 60 seconds voice annotations, or 3000 basic bitmap (.bmp) images, or 3000 jpeg (.jpeg) images; transferrable to PC via included multi-format USB card reader
File formats	Non-radiometric (.bmp) or (.jpeg) or fully-radiometric (.is2)
	No analysis software required for non-radiometric (.bmp and .jpg) files
Export file formats w/SmartView® software	BMP, DIB, GIF, JPE, JFIF, JPEG, JPG, PNG, TIF, and TIFF
Memory review	Thumbnail view navigation and review selection

## Ti32 Thermal Camera General Specifications

General specifications	
Operating temperature	-10 °C to + 50 °C (14 °F to 122 °F)
Storage temperature	-20 °C to + 50 °C (-4 °F to 122 °F) without batteries
Relative humidity	10% to 95% non-condensing
Display	9.1 cm (3.7 in) diagonal landscape color VGA (640 x 480) LCD with backlight and clear protective cover
Controls and adjustments	User selectable temperature scale (°C/°F)
	Language selection
	Time/Date set
	Emissivity selection
	Reflected background temperature compensation
	Transmission correction
	User selectable hot spot and cold spot, and center point on the image (other custom markers and shapes in SmartView® software)
	High temperature color alarm
	User selectable backlight: "Full Bright or Auto"
	Information display preference
Software	SmartView® full analysis and reporting software included
Batteries	Two lithium ion rechargeable smart battery packs with five-segment LED display to show charge level
Battery life	Four+ hours continuous use per battery pack (assumes 50% brightness of LCD)
Battery charge time	2.5 hours to full charge
AC battery charging	Two-bay ac battery charger (110V ac to 220V ac, 50/60 Hz) (included), or in-imager charging. AC mains adapters included.
AC operation	AC operation with included power supply (110V ac to 220V ac, 50/60 Hz). AC mains adapters included.
Power saving	Sleep mode activated after five minutes of inactivity, automatic power off after 30 minutes of activity
Safety standards	CSA (US and CAN): C22.2 No. 61010-1-04, UL: UL STD 61010-1 (2nd Edition), ISA: 82.02.01
Electromagnetic compatibility	Meets all applicable requirements in EN61326 - 1:2006
C Tick	IEC/EN 61326-1
US FCC	CFR 47, Part 15 Class B
Vibration	0.03 G2/Hz (3.8 grms), IEC 68-2-6
Shock	25 g, IEC 68-2-29
Drop	2 m (6.5 ft) with standard lens
Dimensions (H x W x L)	27.7 cm x 12.2 cm x 17.0 cm (10.9 in x 4.8 in x 6.7 in)
Weight (battery included)	1.05 kg (2.3 lb)
Enclosure rating	IP54 (protected against dust, limited ingress; protection against water spray from all directions)
Warranty	Two year manufacturer
Recommended calibration cycle	Two year (assumes normal operation and normal aging)
Supported languages	Czech, English, Finnish, French, German, Italian, Japanese, Korean, Polish, Portuguese, Russian, Simplified Chinese, Spanish, Swedish, Traditional Chinese, and Turkish



### 417-5126 Fluke Ti27 Thermal Camera

Model Usage: All

Warranty: Manufacturer's

European Union Compliant, CE marked

- Used to ensure proper connections are made in high voltage and current wiring installations
- Used to identify potential problems to prevent costly repairs
- Use to view slowly changing temperatures on electrical switchgear, wiring and generator sets
- Compact and portable
- Equipped with integrated lens cover, protected display and 2 meter drop test
- 240 x 180 infrared resolution, spatial resolution and high definition display



<b>Temperature</b>	
Temperature measurement range (not calibrated below -10 °C)	-20 °C to + 600 °C (-4 °F to + 1112 °F)
Temperature measurement accuracy	± 2 °C or 2% (at 25 °C nominal, whichever is greater)
On-screen emissivity correction	Yes
On-screen reflected background temperature compensation	Yes
On-screen transmission correction	Yes
<b>Imaging Performance</b>	
Image capture frequency	9 Hz refresh rate
Detector type	Focal Plane Array, uncooled microbolometer, 240x180 pixels
Total pixels	43,200
Thermal sensitivity (NETD)	≤ 0.05 °C at 30 °C target temp. (50 mK)
Infrared spectral band	7.5 μm to 14 μm (long wave)
Visual (visible light) camera	Industrial performance 2.0 megapixel
Minimum focus distance	46 cm (approx. 18 in)
Standard infrared lens type	Field of view: 23° x 17°
	Spatial resolution (IFOV): 1.67 mRad
	Minimum focus distance: 15 cm (approx. 6 in)
Focus mechanism	Manual, one-handed Smart Focus capability

Part Number	Description
417-5126	Fluke Ti27 Thermal Camera

Diagnostic Tools

## Ti27 Thermal Camera Image Specifications

Image Presentation	
Palettes	Standard: Ironbow, Blue-Red, High Contrast, Amber, Amber Inverted, Hot Metal, Grayscale, Grayscale Inverted
	Ultra Contrast™: Ironbow Ultra, Blue-Red Ultra, High Contrast Ultra, Amber Ultra, Amber Inverted Ultra, Hot Metal Ultra, Grayscale Ultra, Grayscale Inverted Ultra
Level and span	Smooth auto-scaling and manual scaling of level and span
Fast auto toggle between manual and auto modes	Yes
Fast auto-rescale in manual mode	Yes
IR-Fusion® Information	
Picture-In-Picture (PIP)	Three levels of on-screen IR blending displayed in center of LCD
Full screen infrared	Three levels of on-screen IR blending displayed in center of LCD
Color alarms (temperature alarms)	High-temperature color alarm (user-selectable)
Image capture and data storage	
Image capture, review, save mechanism	The Ti27 allows user to adjust palette, blending, level, span, IR-Fusion® mode, emissivity, and reflected background temperature compensation, and transmission correction on a captured image before it is stored.
Voice annotation	60 seconds maximum recording time per image; reviewable playback on imager
File formats	SD memory card (2 GB memory card will store at least 1200 fully radiometric (.is2) IR and linked visual images each with 60 seconds voice annotations, or 3000 basic bitmap (.bmp) images, or 3000 jpeg (.jpeg) images; transferrable to PC via included multi-format USB card reader
Export file formats w/SmartView® software	Non-radiometric (.bmp) or (.jpeg) or fully-radiometric (.is2)
	No analysis software required for non-radiometric (.bmp and .jpg) files

## Ti27 Thermal Camera General Specifications

General specifications	
Operating temperature	-10 °C to + 50 °C (14 °F to 122 °F)
Storage temperature	-20 °C to + 50 °C (-4 °F to 122 °F) without batteries
Relative humidity	10% to 95% non-condensing
Display	9.1 cm (3.7 in) diagonal landscape color VGA (640 x 480) LCD with backlight and clear protective cover
Controls and adjustments	User selectable temperature scale (°C/°F)
	Language selection
	Time/Date set
	Emissivity selection
	Reflected background temperature compensation
	Transmission correction
	User selectable hot spot and cold spot, and center point on the image (other custom markers and shapes in SmartView® software)
	High temperature color alarm
	User selectable backlight: "Full Bright or Auto"
	Information display preference
Software	SmartView® full analysis and reporting software included
Batteries	Two lithium ion rechargeable smart battery packs with five-segment LED display to show charge level
Battery life	Four+ hours continuous use per battery pack (assumes 50% brightness of LCD)
Battery charge time	2.5 hours to full charge
AC battery charging	Two-bay ac battery charger (110V ac to 220V ac, 50/60 Hz) (included), or in-imager charging. AC mains adapters included.
AC operation	AC operation with included power supply (110V ac to 220V ac, 50/60 Hz). AC mains adapters included.
Power saving	Sleep mode activated after five minutes of inactivity, automatic power off after 30 minutes of activity
Safety standards	CSA (US and CAN): C22.2 No. 61010-1-04, UL: UL STD 61010-1 (2nd Edition), ISA: 82.02.01
Electromagnetic compatibility	Meets all applicable requirements in EN61326 - 1:2006
C Tick	IEC/EN 61326-1
US FCC	CFR 47, Part 15 Class B
Vibration	0.03 G2/Hz (3.8 grms), IEC 68-2-6
Shock	25 g, IEC 68-2-29
Drop	2 m (6.5 ft) with standard lens
Dimensions (H x W x L)	27.7 cm x 12.2 cm x 17.0 cm (10.9 in x 4.8 in x 6.7 in)
Weight (battery included)	1.05 kg (2.3 lb)
Enclosure rating	IP54 (protected against dust, limited ingress; protection against water spray from all directions)
Warranty	Two year manufacturer
Recommended calibration cycle	Two year (assumes normal operation and normal aging)
Supported languages	Czech, English, Finnish, French, German, Italian, Japanese, Korean, Polish, Portuguese, Russian, Simplified Chinese, Spanish, Swedish, Traditional Chinese, and Turkish

## 417-7905 Fluke IR Window

Model Usage: All

Warranty: Manufacturer's



European Union Compliant, CE marked

- Used to safely inspect indoor switchgear and reduce cost of predictive maintenance
- Enables thermographer to see potential problems in visual light and thermographic mode
- Allows visual inspection of switchgear with cover closed
- Complete with security access key, installation instructions and self-adhesive drilling template
- Used with the 417-5122 and 417-5126 Thermal Cameras

Specifications	
Crystal Insert Diameter	75 mm (2.96 in)
Viewing Aperture Diameter	68 mm (2.7 in)
Viewing Aperture Area	3632 sq mm (5.63 sq in)
Thickness	2 mm (.08 in)
Maximum Temperature	Gaskets 250 °C (482 °F)
	Body 659 °C (1219 °F)
	Optic 1400 °C (2552 °F)
Viewing Pane	150°C (302°F)
Pull-out Strength	Up to 630 kg (1388 lb)

Part Number	Description
417-7905	Fluke IR Window

## 345-1783 Automatic Lubrication System Diagnostic Kit

SMCS Code: 7540-081, 0785

Model Usage: 725, 730, 735 and 740 Articulated Trucks

Warranty: One Year



- Used to diagnose the automatic lubrication system
- Connection cables and adapter for connecting a laptop to the pump
- Twin/Gina diagnostic software
- Assembly instructions and parts information supplied in manual and digital form
- Kit Contents: Interface Box, USB Cable, Diagnostic Cable, Twin 2 Cable, Twin 3 Cable, Software CD, Installation Manual, Validation Code

Part Number	Description
345-1783	Automatic Lubrication System Diagnostic Kit

**146-4080 Digital Multimeter Group (RS-232)**

SMCS Code: 0115-036

Model: All Models

Warranty: Manufacturer's Three Year

European Union compliant, CE marked

- Used to measure duty cycle, frequency, resistance, AC/DC voltages, AC/DC currents, temperature, continuity, diode test and total harmonic distortion in percentage of line voltage or current at 50/60 Hz or as a percent of fundamental frequency
- Features RS-232 output which can be used to connect meter to 131-5050 Data-View using a 146-8488 Cable Assembly
- Measures true RMS on AC voltage and current ranges
- Has auto/manual ranging features
- Can be programmed to compare measurements to a desired reference value without an external reference source
- Has safety shutter to protect meter in the event of incorrect connections to current terminals
- 600 V fuse protected on both 10 amp and 400 milliamp range
- Ohm meter protected to 600 volts
- Automatic reading hold
- Digital display backlighting can be turned ON or OFF
- Small enough to be hand held and is protected by a rubber boot
- Battery powered
- Group includes items in Figure 2

**Repair Information**

Extech Instruments

9 Townsend West

Nashua, NH 03061

Ph: (781) 890-7440, ext: 220

Fax: (781) 890-7864

Email: repair@extech.com

**References**

NEHS0678, Tool Operating Manual

NEHS0682, Tool Operating Manual;

Specification, Testing, and Maintenance



Figure 1

Part Number	Description
146-4080	RS-232 Digital Multimeter

## Electrical Specifications

Function	Range	Resolution	Accuracy	Maximum Input
DC V	400 mV	0.1 mV	0.3% + 2 d	1000 V
	4 V	1 mV	0.3% + 2 d	
	40 V	10 mV	0.3% + 2 d	
	400 V	0.1 V	0.3% + 2 d	
	1000 V	1 V	0.75% + 3 d	
DC A	400 $\mu$ A	0.1 $\mu$ A	0.5% + 1d	$\mu$ A - 400 mA / 600 V
	4000 $\mu$ A	1 $\mu$ A	0.5% + 1d	$\mu$ A - 400 mA / 600 V
	40 mA	0.01mA	0.5% + 1d	mA - 400 mA / 600 V
	400 mA	0.1mA	0.5% + 1d	mA - 400 mA / 600 V
	4 A	0.001A	1.0% + 5d	A - 10 A / 600 V
	10 A	0.01A	1.0% + 5d	A - 10 A / 600 V
AC V	4 V	1mV	0.75% + 3d	750 V
	40 V	10mV	0.75% + 3d	
	400 V	0.1V	0.75% + 3d	
	750 V	1V	0.75% + 5d	

## Electrical Specifications

Function	Range	Resolution	Accuracy	Maximum Input
AC A	400 $\mu$ A	0.1 $\mu$ A	1.0% + 5d	$\mu$ A - 400 mA / 600 V
	4000 $\mu$ A	1 $\mu$ A	(45Hz to 1KHz)	$\mu$ A - 400 mA / 600 V
	40 mA	0.01mA		mA - 400 mA / 600 V
	400 mA	0.1mA		mA - 400 mA / 600 V
	4 A	0.001A		A - 10 A / 600 V
	10 A	0.01A		A - 10 A / 600 V
ohms	400 $\Omega$	0.1 $\Omega$	0.5% + 10d	600V
	4 K $\Omega$	1 $\Omega$	0.5% + 3d	
	40 K $\Omega$	10 $\Omega$	0.5% + 3d	
	400 K $\Omega$	0.1K $\Omega$	0.5% + 3d	
	4 M $\Omega$	1K $\Omega$	0.5% + 3d	
	40 M $\Omega$	10K $\Omega$	1.01% + 10d	
Hz	200 Hz	0.01 Hz	0.05%	
	(1.5Hz to 200kHz)	2 kHz	+2 digits	
		20 kHz	1 Hz	(20,000 Counts)
		200 kHz	10 Hz	
		7200 kHz	100 Hz	

## Temperature Specifications

Temperature Specifications			
Range	Resolution	Accuracy	Maximum Input
-40° to 0° C (-40° to 32° F)	0.1° C (0.° F)	$\pm$ 3.0° C + 1 digit ( $\pm$ 5.4° F + 1 digit)	60 VDC or 24 VAC RMS
0° to 400° C (32° to 752° F)	0.1° C (0.1° F)	$\pm$ 1% + 1° C ( $\pm$ 1% + 1.8° F)	60 VDC or 24 VAC RMS
401° to 1,370° C (753° to 2,498° F)	1° C (1° F)	$\pm$ 3.0% of reading	60 VDC or 24 VAC RMS

**General Specifications, Fuses and Units**

General Specifications	
Function	Description
Continuity	Open circuit test voltage: 1.2 V
Diode check	Open circuit test voltage: 3 V MAXIMUM TEST CURRENT: 25 mA
Duty cycle (1.5 Hz - 20 kHz)	0.0 - 99.9% Accuracy: within $\pm$ (0.2% per KHz + 0.1%)
THD Measurement (50/60 Hz) (Total harmonic distortion)	Voltage $\pm$ (2% + 2 digits)
	Current $\pm$ (2% + 2 digits)
DC V	Normal Mode Rejection Ratio: >20 dB at 50 Hz or 60 Hz
	Common Mode Rejection Ratio: >100 dB at DC, 50 Hz or 60 Hz
AC V	Common Mode Rejection Ratio: 85 dB at dc to 60 Hz
Crest factor	1:1 through 3:1. For non-sinusoidal waveforms (45 Hz to 1 KHz), add $\pm$ (2% of reading) to the accuracy
Fuse protection	$\mu$ A or mA: 1 A / 600 V FAST fuse A: 15 A / 600 V FAST fuse with >10,000 A interrupt rating
<b>3N-5612 Fuse</b>	
Voltage rating	600 V
Current rating	1 A
Size (diameter)	10.3 x 34.9 mm (13/32 x 1 3/8 in)
Load carrying capacity	110% load indefinitely, opens at 135% load within 1 hour
<b>9U-6398 Fuse</b>	
Voltage rating	600 V
Current rating	15 A
Size (diameter)	10.3 x 38.1 mm (13/32 x 1 1/2 in)
Load carrying capacity	110% load 4 hours, opens at 135% load within 1 hour
<b>Units</b>	
Exponents	Description
%	Percentage Annunciation in the Percentage (%) mode, the THD @ 50/60 Hz mode, and Duty Cycle mode
mV	Millivolts (1 x 10 <sup>-3</sup> V)
A	Amperes (amps)
mA	Milliamperes (1 x 10 <sup>-3</sup> A)
$\mu$ A	Microamperes (1 x 10 <sup>-6</sup> A)
$\Omega$	Ohms
K $\Omega$	Kilohm (1 x 10 <sup>3</sup> ohms)
M $\Omega$	Megohm (1 x 10 <sup>6</sup> ohms)
Hz	Hertz (1 cycle/sec)
KHz	Kilohertz (1 x 10 <sup>3</sup> cycles/sec)

## Digital Multimeter Equipment

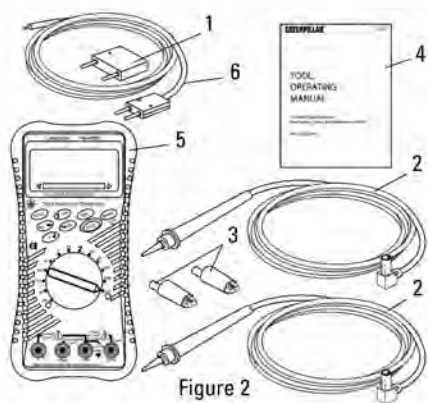


Figure 2

Item	Description
1	Thermocouple Adapter and Thermo-couple
2	Test Leads
3	Clip Adapter
4	NEHS0678-01 Operation Manual

Item	Part Number	Description
5	146-4080	RS-232 Digital Multimeter
6	8T-0458	Wire - Thermocouple
Not Shown	6V-7072	Lead Kit - Test
Not shown	212-2158	Replacement Lead Set

## Optional Equipment

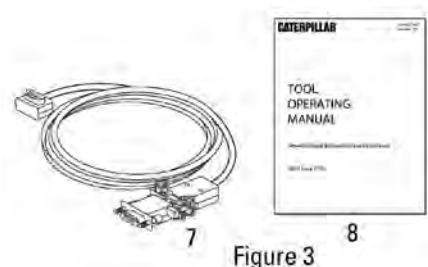


Figure 3

Item	Description
8	NEHS0682-01 Specification, Testing, and Maintenance Manual

Item	Part Number	Description
7	146-8488	Cable Group ( 9-pin, RS-232 Cable)

## 6V-7070 Digital Multimeter

### Discontinued - Service/Repair Parts Available



#### Reference

SEHS7734-01, Special Instruction

Part No. <sup>1</sup>	Description	Use
6V-7070	Digital Multimeter	To measure duty cycle, frequency, resistance, AC/DC voltages, AC/DC currents, temperature, continuity, diode test and total harmonic distortion
<b>Service/Repair Parts</b>		
6V-7803	Fuse, 2 A / 600 V	For all Cat <sup>®</sup> Multimeters (do not replace with 250 V fuse)
6V-7802	Fuse, 10 A / 600 V	For discontinued 6V-7804 Lead (6V-7070 Multimeter) (Buss Part No. KTK10)
9U-6398	Fuse, 15 A / 600 V	In newer meters

<sup>1</sup> All part numbers in the table have a six month warranty



**Deluxe Lead Kit**

Part Number	Description	Warranty
6V-7072	Lead Kit - Test	One Year



**8T-3224 Needle Tip Group for 6V-7070 Digital Multimeter**

- Warranty: One Year
- Tips slip over standard or deluxe test lead tips to provide long, smaller diameter tip for inserting into connectors and other tight areas
- Required when using multimeters with Cat® Electrical Training Aids 8T-9170, 8T-9171 and 8T-9172 (no longer available as form numbers SEKV1700, SEKV1500, and SEKV2100, respectively)
- Insulated with teflon sleeving which may be cut back to expose more metal or to shorten metal tip



Part Number	Description
8T-3224	Needle Tip Group

**237-5130 Multimeter with Infrared Thermometer**

SMCS Code: 1000 -038, 1050-038, 1400-038, 1400 -081, 1450-038, 3000-038, 3168-038, 4450-038, 5700-038  
 Model: All Models  
 Warranty: Manufacturer's One Year

- Replaces discontinued 6V-7070 Multimeter
- Used to measure AC/DC voltage and current, resistance, capacitance, frequency, duty cycle, and temperature
- Designed with a built-in infrared thermometer and laser pointer
- Large, backlit LCD display makes viewing easier
- 4000-count digital multimeter
- Provides a low-cost alternative to some other multimeters



**Repair Information**

Extech Instruments  
 9 Townsend West  
 Nashua, NH 03061  
 Phone: (781) 890-7440, ext: 220  
 Fax: (781) 890-7864  
 Email: repair@extech.com

Part Number	Description
237-5130	Multimeter with Infrared Thermometer
<b>Service/Repair Parts</b>	
237-5125	20 A Fuse
8Q-6668	0.5 A/250 V Fuse
1U-9534	Battery - 9V Size (not shown)

Part Number	Description
<b>Service/Repair Parts (Continued)</b>	
212-2158	Replacement Lead Set

## Specifications

Specifications	
Temperature sensor	Requires type K thermocouple (included)
IR spectral response	6 - 16 $\mu$ m
IR emissivity	0.95 fixed
IR distance ratio	8:1
Input impedance	>7.5M ohm (VDC and VAC)
AC response	True RMS
ACV bandwidth	50 Hz to 1 kHz
Display	4000-count backlit liquid crystal
Overrange indication	"OL" is displayed
Auto power off	15 minutes (approximately)
Operating temperature	0° to 50° C (32° to 122° F)
Storage temperature	-20° to 60° C (-4° to 140° F)
Weight	342 g (0.753 lb) (includes holster)
Size	187 x 81 x 50 mm (7.36 x 3.2 x 2.0 in) (includes holster)

## Specifications (Continued)

Specifications			
Function	Range	Resolution	Accuracy
DC Voltage	400 mV	0.1 mV	±(0.3% reading + 2 digits)
	4 V	0.001 V	±(0.5% reading + 2 digits)
	40 V	0.01 V	±(0.5% reading + 2 digits)
	400 V	0.1 V	±(0.5% reading + 2 digits)
	600 V	1 V	±(0.8% reading + 3 digits)
AC Voltage			50 - 400 Hz, 400 Hz - 1 kHz
	400 mV	0.1 mV	±(1.5% reading + 15 digits), ±(2.5% reading + 15 digits)
	4 V	0.001 V	±(1.5% reading + 6 digits), ±(2.5% reading + 8 digits)
	40 V	0.01 V	±(1.5% reading + 6 digits), ±(2.5% reading + 8 digits)
	400 V	0.1 V	±(1.5% reading + 6 digits), ±(2.5% reading + 8 digits)
	600 V	1 V	±(1.8% reading + 6 digits), ±(3% reading + 8 digits)
DC Current	400 µA	0.1 µA	±(1.5% reading + 3 digits)
	4000 µA	1 µA	±(1.5% reading + 3 digits)
	40 mA	0.01 mA	±(1.5% reading + 3 digits)
	400 mA	0.1 mA	±(1.5% reading + 3 digits)
	4 A	0.001 A	±(2.5% reading + 5 digits)
	20 A	0.01 A	±(2.5% reading + 5 digits)
AC Current			50 to 400 Hz, 400 Hz to 1 kHz
	400 µA	0.1 µA	±(1.8% reading + 8 digits), ±(3.0% reading + 7 digits)
	4000 µA	1 µA	±(1.8% reading + 8 digits), ±(3.0% reading + 7 digits)
	40 mA	0.01 mA	±(1.8% reading + 8 digits), ±(3.0% reading + 7 digits)
	400 mA	0.1 mA	±(1.8% reading + 8 digits), ±(3.0% reading + 7 digits)
	4 A	0.001 A	±(3.0% reading + 8 digits), ±(3.5% reading + 10 digits)
	20 A	0.01 A	±(3.0% reading + 8 digits), ±(3.5% reading + 10 digits)

## Specifications (Continued)

Warranty: Manufacturer's One Year

Specifications				
Function	Range	Resolution	Accuracy	
Resistance	400Ω	0.1Ω	±(0.8% reading + 4 digits)	
	4 kΩ	0.001 kΩ	±(0.8% reading + 2 digits)	
	40 kΩ	0.01 kΩ	±(1.0% reading + 2 digits)	
	400 kΩ	0.1 kΩ	±(1.0% reading + 2 digits)	
	4 MΩ	0.001 MΩ	±(1.0% reading + 2 digits)	
	40 MΩ	0.01 MΩ	±(3.0% reading + 5 digits)	
Capacitance	40 nF	0.01 nF	±(5.0% reading + 7 digits)	
	400 nF	0.1 nF	±(3.0% reading + 5 digits)	
	4 μF	0.001 μF	±(3.5% reading + 5 digits)	
	40 μF	0.01 μF	±(3.5% reading + 5 digits)	
	100 μF	0.1 μF	±(5.0% reading + 5 digits)	
Frequency	5.000 Hz	0.001 Hz	±(1.5% reading + 5 digits)	
	50.00 Hz	0.01 Hz	±(1.5% reading + 5 digits)	
	500.0 Hz	0.1 Hz	±(1.2% reading + 2 digits)	
	5.000 kHz	0.001 kHz	±(1.2% reading + 2 digits)	
	50.00 kHz	0.01 kHz	±(1.2% reading + 2 digits)	
	500.0 kHz	0.1 kHz	±(1.2% reading + 2 digits)	
	5.000 MHz	0.001 MHz	±(1.5% reading + 4 digits)	
	10.00 MHz	0.01 MHz	±(1.5% reading + 4 digits)	
		Sensitivity: 0.8 V RMS min. @ 20% to 80% duty cycle and <100 kHz; 5 V RMS min @ 20% to 80% duty cycle and > 100 kHz		
	Duty Cycle	0.1 to 99.9%	0.1%	±(1.2% reading + 2 digits)
Pulse width: 100 μs - 100 ms				
Frequency: 5 Hz to 150 kHz				
Temp (type-K)	-20° to 750° C	1° C	±(3.0% reading + 3 digits)	
	-4° to 1382° F	1° F	(probe accuracy not included)	
Temp (IR)	-20° to 270° C	1° C	±2.0% reading or ±2° C, ± 4° F	
	-4° to 518° F	1° F		

### NOTE:

Accuracy is stated at 18° to 28° C (65° to 83° F) and less than 75% RH.

Accuracy specifications consist of 2 elements:

(% reading) - This is the accuracy of the measurement circuit.

(+ digits) - This is the accuracy of the analog to digital converter.

**260-5800 Electrical Test Group**

SMCS Code: 1000-038, 1050-038, 1400-038, 1400-081, 1450-38, 3000-038, 3168-038, 4450-038, 5700-038

Model: All

Warranty: Manufacturer's One Year

European Union compliant, CE marked

**Three versatile electrical diagnostic tools complete with case, leads, and instructions**

**237-5130 Infrared Multimeter**

- Used to measure AC/DC voltage and current, resistance, capacitance, frequency, duty cycle, and temperature
- Designed with a built-in infrared thermometer and laser pointer
- Large, backlit LCD display makes viewing easier
- 4000-count digital multimeter
- Refer to 237-5130 Multimeter with Infrared Thermometer listed in this Dealer Service Tools Catalog for complete information
- CE Compliant

**225-8266 Clamp On Ammeter**

- Used to measure AC or DC current
- Clamp-on probe replaces standard test leads and allows current measurements without breaking circuit
- Measures current in cables up to 23 mm (0.9 in) diameter
- User-selectable 400 and 1200 ampere scales for both AC and DC
- Powered by two 1U-9533 AA Alkaline Batteries
- Refer to 225-8266 Clamp On Ammeter listed in this Dealer Service Tools Catalog for complete information
- CE Compliant

**Current Detector**

- Used to detect AC current in a circuit
- Also used to detect presence of PWM signal to electronically controlled fuel injector or solenoid
- Non-contact AC current range from 200 milliamperes to 1000 amperes
- Locates current flow even where voltage detectors cannot work
- Adjustable sensitivity
- Audible and visible indication of current presence
- CE Compliant

**Repair Information**

Extech Instrument  
 9 Townssend West  
 Nashua, NH 03061  
 Phone: (781) 890-7440, ext: 220  
 Fax: (781) 890-7864  
 Email: repair@extech.com



Diagnostic Tools

Part Number	Description
260-5800	Electrical Test Group

## 257-9140 Fluke 87V Multimeter

Warranty: Manufacturer's Limited Lifetime



European Union compliant, CE marked

- Replaces discontinued 9U-7330 Fluke 87-3 Multimeter
- Used to test and adjust electronic circuits
- Improved measurement functions, troubleshooting features, resolution, and accuracy to solve more problems on motor drives or electro-mechanical equipment
- Built-in thermometer allows temperature readings without using additional equipment (Type K Thermocouple)
- Selectable filter for accurate voltage and frequency measurements on motor drives
- Large-digit display with bright two-level backlight makes it significantly easier to read than older models
- Min/Max and average recording to capture variations automatically
- Removable holster with built-in test lead and probe storage
- Optional magnetic hanger for easy setup and viewing while freeing your hands for other tasks
- Improved sleep mode for long battery life
- Inputs are protected to Category III, 1000V, and Category IV 600V to withstand impulses in excess of 8000V and reduce risks related to surges and spikes
- Includes basic test leads, alligator clips, and bead-type thermocouple probe
- Complete with 9V battery, Getting Started Manual, and CD with detailed instruction manual

Size	201 x 98 x 52 mm (7.9 x 3.9 x 2.1 in) with holster
Weight	624 g (22 oz) with holster
Battery life	400 hours typical using 1U-9534 Alkaline 9V

Part Number	Description
257-9140	Fluke 87V Multimeter

## 349-4204 Multimeter

Model Usage: All

Warranty: Manufacturer's



European Union compliant, CE marked

- Used to measure electric current, voltage and resistance in one unit over several ranges of value
- Measures AC/DC voltage up to 600V, AC/DC current up to 10A, temperature, resistance, capacitance, frequency and duty cycle
- AC/DC micro amps for sensors diagnosis
- Large backlight LCD display
- Diode Test
- Audible continuity test
- Data hold
- Maximum, minimum and relative measurements
- Auto and manual ranging
- Auto power off
- Tilt Stand
- Includes thermocouple, test leads, and fuses
- CAT III

Part Number	Description
349-4204	Multimeter

**Repair Information**

Fluke

Phone: (888) 993-5853

Function	Range and Resolution	Basic Accuracy
DC volts	600.0 mV, 6.000 V, 60.00 V, 600.0 V, 1000 V	0.05%
AC volts	600.0 mV, 6.000 V, 60.00 V, 600.0 V, 1000 V	0.7% (True-RMS)
DC current	600.0 $\mu$ A, 6000 $\mu$ A, 60.00 mA, 600.0 mA, 6.000 A, 10.00 A	0.2%
AC current	600.0 $\mu$ A, 6000 $\mu$ A, 60.00 mA, 600.0 mA, 6.000 A, 10.00 A	1.0% (True-RMS)
Unit's temperature rating	-200° to 1090° C (-328° to 1994° F)	1.0%
Temperature probe rating	-40° to 260° C (-40° to 500° F)	2.2° C or 2%
Resistance	600.0 $\Omega$ , 6.000 k $\Omega$ , 60.00 k $\Omega$ , 600.0 k $\Omega$ , 6.000 M $\Omega$ , 50.00 M $\Omega$	0.2%
Capacitance	10.00 nF, 100.0 nF, 1.000 $\mu$ F, 10.00 $\mu$ F, 100.0 $\mu$ F, 9,999 $\mu$ F	1.0%
Frequency	199.99 Hz, 1.9999 kHz, 19.999 kHz, 199.99 kHz	0.005%

**Replacement**

European Union compliant, CE marked

Replacement Fuses <sup>1</sup>	
<b>3N-5612</b>	
Voltage rating	600 V
Current rating	1 A
Size (diameter)	10.3 x 34.9 mm (13/32 x 1 3/8 in)
Load carrying capacity	110% load indefinitely, opens at 135% load within 1 hour
<b>171-5207 Fuse (11A)</b>	
Voltage rating	1000 V
Current rating	11 A
Size	10.3 mm diameter x 38.1 mm (13/32 in diameter x 1 1/2 in)
Load carrying capacity	110% load 4 hours, opens at 135% load within 1 hour
<b>171-5209 Fuse (440 mA)</b>	
Voltage rating	1000 V
Current rating	15 A
Size	10.3 mm diameter x 34.9 mm (13/32 in diameter x 1 3/8 in)
Load carrying capacity	110% load 4 hours, opens at 135% load within 1 hour
Short circuit interruption	100,000 A at 600 VAC
<sup>1</sup> Also fits discontinued 9U-7330 Fluke 87 Multimeter and others	

## 329-9303 Fluke 355 True-RMS 2000

Model Usage: EPG Installations

Warranty: Manufacturer's Limited Lifetime



- Auto-ranging and auto-zeroing ohms, continuity and frequency measurements
- Category IV 600V and Category III 1000V
- Replaces 227-4324 Clamp-on Multimeter

Specifications	
Dimensions	300 x 98 x 52 mm (12 x 3.75 x 2 in)
Frequency Range	DC and 10 Hz to 1 kHz
Current Range	0 to 2000 A AC or DC
Voltage Range	0 to 1000 VDC or 0 to 600 VAC
Resistance Range	0 to 400 K ohms

Part Number	Description
329-9303	Fluke 355 True - RMS 2000

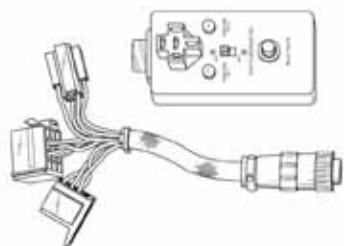
## 317-9760 Relay Tester

### Essential Tool

SMCS Code: 1400-038

Model: Any Cat® equipment with relays listed below

Warranty: Manufacturer's (One Year)



- Used to diagnose faulty 12V and 24V relays (checks one at a time)
- Portable design is great for field use
- Designed to test square "ice cube" style relays such as 3E-6477, 3E-9362, 265-8025, 146-9439, 248-2841, 140-9378, 158-5089, 3E-5239, and 115-1615
- Test relays with various terminal arrangements using one of four different connectors
- Checks normally OPEN and normally CLOSED relays, with and without resistor or diode
- Powered by two 1U-9534 Batteries, 9 Volt
- Controls include voltage slide switch, relay energize test button, and position No. 1 and No. 2 circuit test lamps

Part Number	Description
317-9760	Relay Tester

## 244-1536 Corrosion Cable Group

Model: Marine Engines

Warranty: One Year



- Used to determine if metal parts exposed to sea water, within an engine, are subject to corrosion
- Used with 257-9140 Multimeter
- Checks low level voltage by clipping black cable to metal part and placing silver probe into sea water inside the component
- Determines if zinc levels are low, good, or too high — proper levels of zinc extend service life of all parts exposed to sea water

Probe (Red)	6 m (20 ft) long
Alligator Probe (Black)	3 m (10 ft) long

Part Number	Description
244-1536	Corrosion Cable Group



### 276-7273 Cylinder Position Sensor Test Box

SMCS Code: 1400-081

Model: Models using hydraulic cylinder position sensors

Warranty: One Year

- Used to troubleshoot cylinder position sensors
- Used with digital multimeter to read duty cycle, frequency, and voltage
- Compact design for use in the field
- Internal 1U-9534 9V battery powers position sensor



#### References

REHS2553, Guideline for Reusable Parts and Salvage Operation

NEHS0993, Tool Operating Manual

Overall size	76.2 x 50.8 x 38.1 mm (3.0 x 2.0 x 1.0 in)
Cable length	1.83 m (6 ft)
Material	Plastic

Part Number	Description
276-7273	Cylinder Position Sensor Test Box

### 275-9936 Voltmeter Leads

Model: All models

Warranty: Six Months

- Push-button generates a load in an electrical circuit so a load test (voltage drop test) can be made with component removed
- Use up 28.5 volts (DC or AC) only
- Maximum 5 to 8 seconds per test
- Not for computer (ECM) INPUT circuits
- Not designed for high voltage circuits
- Do not use positive probe in negative side of circuit
- Use only with a digital voltmeter
- Will not function with ammeter or ohmmeter



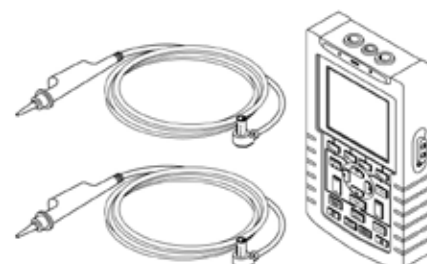
Part Number	Description
275-9936	Voltmeter Leads

### 152-7213 Fluke123 Scopemeter 120 VAC

Model: All Models

Warranty: Manufacturer's (3 years parts and labor)

- For 220 VAC operation, order optional 138-1154 Battery Charger
- Used to test and adjust electronic circuits
- Dual channel digital scope and dual channel true-RMS DMM
- Fully integrated — always displays scope waveforms and meter readings
- Battery life of up to 5 hours
- AUTO key for fast, rock stable waveform display of signals down to 1 Hz
- Save and recall feature for screen setups
- Integral holster stands up to rough treatment
- User assistance in English and Spanish
- Brilliant high contrast backlit LCD
- Hardened scratch-resistant lens protects LCD from damage
- Unique shielded test lead for all measurements
- All measurement terminals are isolated from earth ground
- Used to record trends and find intermittents using dual-channel TrendPlot



(Continued)

## 152-7213 Fluke123 Scopemeter 120 VAC (Continued)

Model: All Models

Warranty: Manufacturer's (3 years parts and labor)

### Comes fully equipped with:

- BP 120 Rechargeable battery pack (installed)
- PM 8907 line voltage adapter/charger — 120 volt AC, 50/60 Hz only
- 2 STL 120 shielded test leads (1 red, 1 gray; which includes 2 ground leads)
- 1 black TL75 test lead
- 2 HC 120 Hook Clips
- 3 AC 120 Alligator clips
- 1 BB 120 Shielded Banana to BNC adapter
- User's Manual

Part Number	Description	Size	Weight
152-7213	Fluke 123 Scopemeter 120 VAC	50 x 115 x 232 mm (2 x 4.5 x 9.1 in)	1 kg (3 lb)

### Repair Information

Fluke

Phone: (888) 993-5853

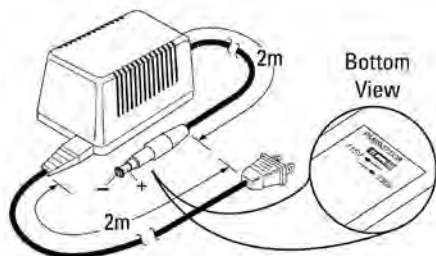
Diagnostic Tools

General Specifications	
Display	
Cold cathode fluorescent backlit LCD. Contrast and brightness user adjustable. Wide viewing angle.	
Size	72 x 72 mm (2.8 x 2.8 in)
Power	
Line voltage adapter/battery charger included (120 VAC, 50/60 Hz)	
For 220 VAC operation, order optional 138-1154 Battery Charger	
Installed battery	Rechargeable NiCd pack
Operating time	Up to 5 hours
Charging time	4 hours
Environmental	
Temperature	0° to 50° C
Environmental	MIL-T-28800E, Type III, Class 3, Style B
Electro-Magnetic Compatibility	
Emission	EN50081-1 (1992): EN55022 and EN60555-2
Immunity	EN50082-2 (1992): IEC1000-4, -2, -3, -5
Enclosure protection	IP51, IEC529 (dust, drip proof)
Mechanical Data	
Size	50 x 115 x 232 mm (2 x 4.5 x 9.1 in)
Weight	1.2 kg (2.5 lb)
Safety	
Designed for measurements on 600V Overvoltage Category III Installations, Pollution Degree 2, per:	
ANSI/ISA S82.01-1994, EN61010.1 (1993) (IEC1010-1), CAN/CSA-C22.2 No. 1010.1-92, UL3111-1	
Surge protection	6 kV on input A and B
Floating measurements	600 V RMS from any terminal to ground
Optically Isolated RS-232 Interface	
To printer	Supports HP LaserJet®, DeskJet®, Epson FX/LQ, and Postscript
To PC	Dump and load settings and data, compatible with FlukeView® Software SW90W/012E for Windows

## Dual Input 5000 Count Autoranging Meter

DC Voltage VDC	
Ranges	500 mV, 5 V, 50 V, 500 V, 1250 V
Accuracy	$\pm(0.5\% + 5 \text{ counts})$
True RMS Voltage VAC and VAC+DC	
Ranges	500 mV, 5 V, 50 V, 500 V, 1250 V
Accuracy	$\pm(1\% + 10 \text{ counts})$
Additional Measurements and Functions	
Ohms, Continuity, Diode Test, Amps, °C or °F, Capacitance, dBV, dBm, Crest Factor, Touch Hold, and Zero Set. (Amps, °C or °F with optional probes)	
TrendPlot™	
Graphs meter readings of the MIN and MAX values from 120 seconds to 16 days. Automatic vertical scaling and time compression. Displays the actual and MIN, MAX or AVG reading.	
Dual Input Oscilloscope	
Vertical	
Bandwidth	20 MHz at inputs with STL120 1:1 leads 12.5 MHz with PM 8918 10:1 optional probes 20 MHz
Coupling	AC, DC
Sensitivity	5 mV/div - 500 V/div
Vertical resolution	8 bit
Accuracy	$\pm(2\% \text{ of reading} + 0.05 \times \text{range/div})$
Horizontal	
Range	20 ns/div - 60 s/div
Acquisition modes	Normal, single, roll, envelope, smooth
Max. sample rate	1.25 GS/s for repetitive signals 25 MS/s for single shot
Record length	512 samples per channel
Accuracy	$\pm(0.1\% \text{ of reading} + 0.04 \times \text{time/div})$
Glitch capture	40 ns or longer
Trigger	
Source	A or B. External via optional ITP120
Modes	Auto, triggered, single
Video	NTSC, PAL, PAL+, SECAM random lines or user selectable line
Pre-trigger	Up to 10 division of pre-trigger view
Measurements	
VDC, VAC, VAC+DC, Vpeak, Vpeak-peak, Frequency, Duty Cycle, Pulse Width and Phase. Measurements can be scaled to A.	
Memory	
Type of memory	2 screens, 10 user setups

## 138-1154 Power Adapter, 220 volt



- Used to connect 152-7213 Fluke 123 Scopemeter to a 220 volt AC utility power supply
- Sold separately

Input volts	115 VAC $\pm$ 10% or 230 VAC $\pm$ 15%
Line frequency	50, 60, 400 Hz $\pm$ 10%
Output voltage	15 VDC
Output current	300 mA maximum
Power consumption	7 W maximum
Output plug	5 mm power jack per DIN 45232
Operating temperature	0° to 40° C (0° to 104° F)
Input plug	Standard 110 V

Part Number	Description
138-1154	Power Adapter, 220 Volt

## 228-3175 Calibrator Group

SMCS Code: 7002-038, 0778-035

Model: 3600 Generator Set

Warranty: Manufacturer's Three Year

European Union compliant, CE marked

- 220 VAC use only (international only)
- Used to source/measure temperature and electrical signals with precise accuracy, all in one rugged, hand-held device
- Used to calibrate 3600 Protection Systems, Marine Monitoring Systems, 3600 Engine Management Systems, 3600 Electronic Unit Injection Systems, and 3600 Custom PLC Systems
- Automatically captures calibration results
- Measures/simulates eleven different types of thermocouples and eight different RTD's
- Stores up to 8,000 readings
- Unit is protected against dirt, dust, vibration, and moisture
- Operates in English, French, German, Italian, or Spanish
- Equipped with a built-in calculator
- Comes with a three-year warranty
- Comes with ISO9001 Calibration Certificate
- Calibrator includes: 2 sets of test leads, 2 sets of alligator clips, 1 set of probe leads, 1 Nickel-Cadmium 7.2 volt battery, 1 battery charger, 1 carrying strap, 2 jumper leads

### Repair Information

Fluke

Phone: (888) 993-5853

Dimensions (W x D x H)	130 x 61 x 236 mm (5.1 x 2.4 x 9.3 in)
Weight	1.4 kg (3.06 lb)
Display	240 by 200 pixel graphic LCD
Memory backup	Lithium battery, 5 years typical lifetime
Operating temperature	-10° to 50° C (14° to 122° F)
Storage temperature	-20° to 60° C (-4° to 140° F)

Part Number	Description
228-3175	Calibrator Group
<b>Service/Repair Parts</b>	
163-0097	Battery
8T-0458	Wire - Thermocouple

**396-4789 Fluke 753 Calibrator**

Model Usage: 3600 Generator Sets, Marine

Warranty: Manufacturer's

European Union Compliant, CE marked

- Used to source/simulate volts, mA, thermocouples, RTDs, frequency, ohms, and pressure calibrate transmitters
- Automatically records and documents calibration results
- Measure and source simultaneously with one compact, rugged, reliable tool
- Stores up to 8000 readings
- Operates in English, French, German, Italian and Spanish
- Comes with three-year warranty
- Used to calibrate 3600 Protection Systems, Marine Monitoring Systems, 3600 Engine Management Systems, 3600 Electronic Unit Injector Systems and 3600 Custom PLC Systems
- Includes Battery Charger & Li-ion Battery Pack



Specifications	
Dimensions	245 x 134 x 63 mm (9.6 x 5.3 x 2.5 in)
Weight	1.2 kg (2.7 lb)
Batteries	7.2 V, 4400 mAh, 30 Wh, Internal battery pack Li-ion
Operating Temperature	-10 to 50°C (14 to 122°F)
Storage Temperature	-20 to 60°C (-4 to 140°F)
Service/Repair Parts	
396-4790	Battery Charger: 146 x 76 x 64 mm (2.8 x 3 x 2.5 in)
396-4791	Li-ion Battery Pack: 152 x 7 x 25 mm (6 x 2.8 x 1 in)

Diagnostic Tools

## Technical Data

Data Log Functions	Measure functions: Voltage, current, resistance, frequency, temperature, pressure
	Reading rate: 1, 2, 5, 10, 20, 30, or 60 readings/minute
	Maximum record length: 8000 readings (7980 for 30 or 60 readings/minute)
Ramp Functions	Source functions: Voltage, current, resistance, frequency, temperature
	Rate: 4 steps/second
	Trip detect: Continuity or voltage (continuity detection not available when sourcing current)
Loop Power Function	Voltage: Selectable, 26 V
	Accuracy: 10%, 18 V minimum at 22 mA
	Maximum current: 25 mA, short circuit protected
	Maximum input voltage: 50 V DC
Step Functions	Source functions: Voltage, current, resistance, frequency, temperature
	Manual Step: Selectable step, change with arrow buttons
	Autostep: Fully programmable for function, start delay, step value, time per step, repeat
Safety Specifications	
Agency Approvals	CAN/CSA C22.2 No 1010.1-92, ASNI/ISA S82.01-1994, UL3111, and EN610-1:1993

## Measurement Accuracy

Voltage DC		1 Year	2 Years	
	100.000 mV	0.02% + 0.005 mV	0.03% + 0.005 mV	
	3.00000 V	0.02% + 0.00005 V	0.03% + 0.00005 V	
	30.0000 V	0.02% + 0.0005 V	0.03% + 0.0005 V	
	300.00 V	0.05% + 0.05 V	0.07% + 0.05 V	
Voltage AC	Range	Resolution	1 Year	2 Years
	40 to 500 Hz			
	3.000 V	0.001 V	0.5% + 0.002 V	1.0% + 0.004 V
	30.00 V	0.01 V	0.5% + 0.02 V	1.0% + 0.04 V
	300.0 V	0.1 V	0.5% + 0.2 V	1.0% + 0.2 V
Current DC		1 Year	2 Years	
	30.000 mA	0.01% + 5 uA	0.015% + 7 uA	
	110.00 mA	0.01% + 20 uA	0.015% + 30 uA	
Resistance		1 Year	2 Years	
	10.000 Ω	0.05% + 50 mΩ	0.07% + 70 mΩ	
	100.00 Ω	0.05% + 50 mΩ	0.07% + 70 mΩ	
	1.0000 kΩ	0.05% + 500 mΩ	0.07% + 0.5 Ω	
	10.000 kΩ	0.1% + 10 Ω	0.15% + 15 Ω	
Frequency		Resolution Accuracy	(2 Years)	
	1.00 to 110.00 Hz	0.01 Hz	0.05 Hz	
	110.1 to 1100.0 Hz	0.1 Hz	0.05 Hz	
	1.101 to 11.000 kHz	0.001 kHz	0.005 kHz	
	11.01 to 50.00 kHz	0.01 kHz	0.05 kHz	

**Source Accuracy**

Voltage DC		1 Year	2 Years
	100.000 mV	0.01% + 0.005 mV	0.015% + 0.005 mV
	1.00000 V	0.01% + 0.00005 V	0.015% + 0.0005 V
	15.0000 V	0.01% + 0.0005 V	0.015% + 0.0005 V
Current DC		1 Year	2 Years
	22.000 mA (Source)	0.01% + 0.003 mA	0.02% + 0.003 mA
	Current Sink (Simulate)	0.02% + 0.007 mA	0.04% + 0.007 mA
Resistance		1 Year	2 Years
	10.000 Ω	0.01% + 10 mΩ	0.015% + 15 mΩ
	100.00 Ω	0.01% + 20 mΩ	0.015% + 30 mΩ
	1.0000 kΩ	0.02% + 0.2 Ω	0.023 + 0.3 Ω
	10.000 kΩ	0.02% + 3 Ω	0.03% + 5 Ω
Frequency		2 Years	
	0.1 to 10.99 Hz	0.01 Hz	
	0.01 to 10.99 Hz	0.01 Hz	
	11.00 to 109.99 Hz	0.1 Hz	
	110.00 to 1099.9 Hz	0.1 Hz	
	1.100 to 21.999 kHz	0.002 kHz	
	22.000 to 50.000 kHz	0.005 kHz	

**RTD's and Thermocouples**

RTD's and Thermocouples		
Device	Measure Accuracy	Source Accuracy
10 Cu (427)	3° C	1° C
100 Pt (3916)	0.3° C	0.1° C
100 Pt (3926)	0.3° C	0.1° C
100 Pt (385)	0.3° C	0.1° C
200 Pt (385)	0.3° C	0.1° C
500 Pt (385)	0.3° C	0.1° C
1000 Pt (385)	0.3° C	0.1° C
120 Ni (672)	0.3° C	0.1° C
E	0.3° C	0.2° C
N	0.5° C	0.3° C
J	0.3° C	0.2° C
L	0.3° C	0.2° C
K	0.3° C	0.3° C
T	0.3° C	0.3° C
U	0.3° C	0.3° C
B	0.9° C	0.8° C
R	1.0° C	0.9° C
S	0.9° C	0.9° C
C	0.6° C	0.6° C

Resolution: 0.1° C, except 1° C for 10 Cu. Best case, mid-range accuracies. Sensor inaccuracies not included. For 2-wire and 3-wire RTD measurements, add 0.4° C. Thermocouple accuracies with external cold junction. For internal add 0.2° C.

## Electrical Specifications

Electrical Specifications			
Measure Range (full scale)	Measure Accuracy (% of reading + % of full scale)	Source Range (full scale)	Source Accuracy (% of reading + % of full scale)
110.000 mV DC	0.025% + 0.015%	110.000 mV	0.01% + 0.005%
1.10000 VDC	0.025% + 0.005%	1.10000 V	0.01% + 0.005%
11.0000 VDC	0.025% + 0.005%	15.0000 V	0.01% + 0.005%
110.000 VDC	0.05% + 0.005%		
300.00 VDC	0.05% + 0.005%		
VAC, 20 - 40 Hz	2% + 10 Counts		
VAC, 40 - 500 Hz	0.5% + 5		
VAC, 500 - 1 KHz	2% + 10		
VAC, 1 kHz - 5 kHz	10% + 20		
30.000 mA DC	0.01% + 0.015%	Source 22.000 mA	0.01% + 0.015%
110.00 mA DC	0.01% + 0.15%	Simulate 22.000 mA	0.02% + 0.03%
11.000 Ω	0.05% + 50	11.000	0.01% + 20 m
110.00 Ω	0.05% + 50	110.00	0.01% + 40 m
1.1000 kΩ	0.05% + 0.5	1.1000 k	0.02% + 0.5
11.000 kΩ	0.1% + 10	11.000 k	0.03% + 5
1.00 - 109.99 Hz	0.05 Hz	0.00 - 10.99 Hz	0.01 Hz
110.0 - 1099.9 Hz	0.5 Hz	11.00 - 109.99 Hz	0.1 Hz
1.100 - 10.999 kHz	5 Hz	110.0 - 1099.9 Hz	0.1 Hz
11.00 - 50.00 kHz	50 Hz	1.100 - 21.999 kHz; 22.000 - 50.000 kHz	2 Hz; 5 Hz

### 163-0096 Fluke 741B Process Calibrator

Model: 3600 Series Generator Set

Warranty: Manufacturer's Three Year

- Used to source/measure temperature and electrical signals with precise accuracy, all in one rugged, hand-held device
- Automatically captures calibration results
- Measures/simulates eleven different types of thermocouples and 8 different RTD's
- Stores up to 8,000 readings
- Unit is protected against dirt, dust, vibration, and moisture
- Operates in English, French, German, Italian, or Spanish
- Equipped with a built-in calculator
- Comes with three-year warranty
- Comes with ISO9001 Calibration Certificate
- Used to calibrate 3600 Protection Systems, Marine Monitoring Systems, 3600 Engine Management Systems, 3600 Electronic Unit Injection Systems and 3600 Custom PLC Systems
- All items in both figures are included

#### Repair Information

Fluke

Phone: (888) 993-5853

(Continued)



**163-0096 Fluke 741B Process Calibrator (Continued)**

Model: 3600 Series Generator Set

Warranty: Manufacturer's Three Year

Dimensions (W x D x H): 130 x 61 x 236 mm (5.1 x 2.4 x 9.3 in)		
Weight: 1.4 kg (3.06 lb)		
Display: 240 x 200 pixel graphic LCD		
Memory backup: Lithium battery, 5 years typical lifetime		
Operating temperature: -10° to 50° C (14° to 122° F)		
Storage temperature: -20° to 60° C (-4° to 140° F)		
RTD's and Thermocouples		
Device	Measure Accuracy	Source Accuracy
10 Cu (427)	3° C	1° C
100 Pt (3916)	0.3° C	0.1° C
100 Pt (3926)	0.3° C	0.1° C
100 Pt (385)	0.3° C	0.1° C
200 Pt (385)	0.3° C	0.1° C
500 Pt (385)	0.3° C	0.1° C
1000 Pt (385)	0.3° C	0.1° C
120 Ni (672)	0.3° C	0.1° C
E	0.3° C	0.2° C
N	0.5° C	0.3° C
J	0.3° C	0.2° C
L	0.3° C	0.2° C
K	0.3° C	0.3° C
T	0.3° C	0.3° C
U	0.3° C	0.3° C
B	0.9° C	0.8° C
R	1.0° C	0.9° C
S	0.9° C	0.9° C
C	0.6° C	0.6° C
Resolution: 0.1° C, except 1° C for 10 Cu. Best case, mid-range accuracies. Sensor inaccuracies not included. For 2-wire and 3-wire RTD measurements, add 0.4° C. Thermocouple accuracies with external cold junction. For internal add 0.2° C.		

## Calibrator Electrical Specifications



Electrical Specifications			
Measure Range (full scale)	Measure Accuracy (% of reading + % of full scale)	Source Range (full scale)	Source Accuracy (% of reading + % of full scale)
110.000 mV DC	0.025% + 0.015%	110.000 mV	0.01% + 0.005%
1.10000 VDC	0.025% + 0.005%	1.10000 V	0.01% + 0.005%
11.0000 VDC	0.025% + 0.005%	15.0000 V	0.01% + 0.005%
110.000 VDC	0.05% + 0.005%		
300.00 VDC	0.05% + 0.005%		
VAC, 20 to 40 Hz	2% + 10 Counts		
VAC, 40 to 500 Hz	0.5% + 5		
VAC, 500 to 1 KHz	2% + 10		
VAC, 1 kHz to 5 kHz	10% + 20		
30.000 mA DC	0.01% + 0.015%	Source 22.000 mA	0.01% + 0.015%
110.00 mA DC	0.01% + 0.15%	Simulate 22.000 mA	0.02% + 0.03%
11.000 Ω	0.05% + 50	11.000	0.01% + 20 m
110.00 Ω	0.05% + 50	110.00	0.01% + 40 m
1.1000 kΩ	0.05% + 0.5	1.1000 k	0.02% + 0.5
11.000 kΩ	0.1% + 10	11.000 k	0.03% + 5
1.00 to 109.99 Hz	0.05 Hz	0.00 to 10.99 Hz	0.01 Hz
110.0 to 1099.9 Hz	0.5 Hz	11.00 to 109.99 Hz	0.1 Hz
1.100 to 10.999 kHz	5 Hz	110.0 to 1099.9 Hz	0.1 Hz
11.00 - 50.00 kHz	50 Hz	1.100 - 21.999 kHz; 22.000 - 50.000 kHz	2 Hz; 5 Hz

Diagnostic Tools

### Parts



Item	Description	Qty.
1	Test Leads	2 sets
2	Alligator Clips	2 sets
3	Probe Leads	1 set
4	Nickel-Cadmium 7.2 V Battery	1
5	Battery Charger	1
6	Carrying Strap	1
7	Jumper Leads	2

Part Number	Description
163-0096	Fluke 741B Process Calibrator
Service/Repair Parts	
163-0097	Battery
8T-0458	Wire - Thermocouple

### 1U-8115 Insulated Tip Test Lead Set

Model: All Models  
Warranty: One Year

- Optional accessory lead set for multimeters which have 9.5 mm (0.375 in) diameter input connectors; older meters have larger diameter connectors
- Spring loaded insulators over metal probe tips to prevent tips from making accidental electrical contact with wires and terminals during testing; accidental electrical contact can be a problem when reaching into electrical circuitry with normal test leads which have as much as 19 mm (0.75 in) of bare probe exposed; on 1U-8115 Test Lead probes, only very tip of probe normally exposed
- However, since insulating sleeves are spring loaded, they can be pushed back at any time to expose more of metal tip; allows metal probe tip to enter small diameter holes when testing connectors; insulators can be pushed back and locked in position to uncover approximately 6.3 mm (0.25 in) of bare probe



Lead length	1378 mm (54 in)
Connectors	9.5 mm (0.375 in) diameter shielded banana plug
Maximum voltage rating	700 VAC or VDC
Color	1 red and 1 black lead
Probe tip diameter	1.77 mm (0.070 in)
Probe tip length	15 mm (0.6 in) maximum

Part Number	Description
1U-8115	Insulated Tip Test Lead Set

### 152-7143 Cable Assembly (GSC Data Cable)

SMCS Code: 4450-038  
Model: Generator Sets  
Warranty: One Year

- Used to flash-program EMCP2+ Generator Status Control (GSC) module
- Used with universal communications adapter cable (139-4166)
- Requires Cat® ET and communication adapter (171-4400 or discontinued 7X-1700)
- Flash-programming only used for field updates



Part Number	Description
152-7143	Cable Assembly (GSC Data Cable)

### 4C-4029 Trimmer Adjustment Tool

Model: All Models  
Warranty: Six Months

- Allows easier adjustment of small screwdriver adjustments found on VR3 and VR4 Voltage Regulators and 2301 Woodward Regulator Controls
- Constructed of glass-filled, nylon body with stainless steel blades; one end has recessed blade to provide captive screwdriver for adjustments that are difficult to see; other end has exposed blade to reach adjustments that are behind panels and have small access holes



Diagnostic Tools

(Continued)

## 4C-4029 Trimmer Adjustment Tool (Continued)

Model: All Models

Warranty: Six Months

- Gain and level controls on VR3 Voltage Regulator are inside regulator case and difficult to adjust when generator set is in operation; inability to see the control and vibration of regulator make fine adjustments very difficult
- Prevents broken controls on Woodward 2301 Controls caused by improper tool usage and excessive force required for adjustment when wrong tool is used

Part Number	Description
4C-4029	Trimmer Adjustment Tool

## 189-1720 Analog Gauge Tester Group

Model: All Models

Warranty: One Year



- Used to test and troubleshoot analog temperature, pressure, fuel or articulation gauges
- Easy-to-use, hand-held unit
- Tool Operating Manual includes charts for specific gauges
- Decrease troubleshooting time and reduce cost by eliminating replacement of good parts
- Diagnose temperature, fuel or pressure gauge problems to determine if gauge, wiring or sender is faulty
- 0 to 50, 500, 1500 and 34,000 ohm dials used in combination to simulate senders output
- Fuse protected from electrical overload
- Not for use with the Cat® Quad Gauge Module
- Resistance tolerance:  $\pm 10\%$  at full scale
- Linearity tolerance:  $\pm 5\%$  independent
- Group includes all items in figure

### Reference

NEHS0786, Tool Operating Manual

Part Number	Description
189-1720	Analog Gauge Tester Group

## 4C-4693 Tester Group, VR3 and VR4 Regulator

Model: All Models

Warranty: One Year



- Supplies voltages necessary to check all styles of VR3 and VR4 regulators; serviceman selects correct sense voltage
- Operates from 110/220 volt AC source
- Uses 100 watt light bulb as load for field current
- Has test ports to measure sense voltage and field voltage with probes supplied with Cat® multimeter
- All items in figure are included

### Reference

NEHS0535, Tool Operating Manual

Item	Part Number	Description
All Items	4C-4693	Tester Group, VR3 and VR4 Regulator
1	4C-4529	Line Cord
2	4C-4694	Cable Assembly

**Voltage**

Input voltage	110/220 VAC, 50/60 Hz
Output voltage	Variable from 0 VAC to 20% over selected Sense voltage
Output voltage	0 VAC to 80 VAC (PM supply only)
Sense voltage	120 VAC, 240 VAC or 480 VAC

**FT1488 Exciter Tester Group**

SMCS Code: 1404-036

Model: SR-4 and SRCR Generators

Warranty: None

- Used to test regulator-exciter control assemblies on SR-4 and SRCR Generators
- Drawing provides complete details for assembling bench tester which will simulate generator for repairing exciter in the shop



**309-9888 USB Adapter Cable**

**309-9891 Serial (RS232) Adapter Cable**

Model: Forestry Products - Feller Bunchers

Warranty: 12 Month Manufacturer's

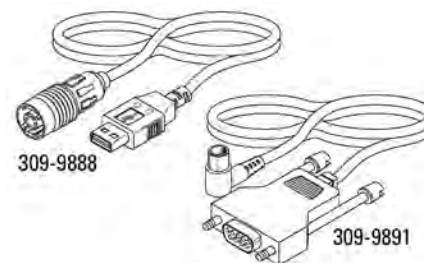
- Adapter cables used to service, troubleshoot, and reprogram IQAN Parker electronic control modules from a personal computer (PC)

**309-9888 USB Adapter Cable**

- Used to troubleshoot and reprogram electronic control modules
- Used with "IQANrun" software programs
- PC software available from Media Logistics — NETG5038

**309-9891 Serial Adapter Cable**

- Used to service electronic control modules
- Used with "IQANdevelop" software program
- PC software available from Media Logistics — NETG5037

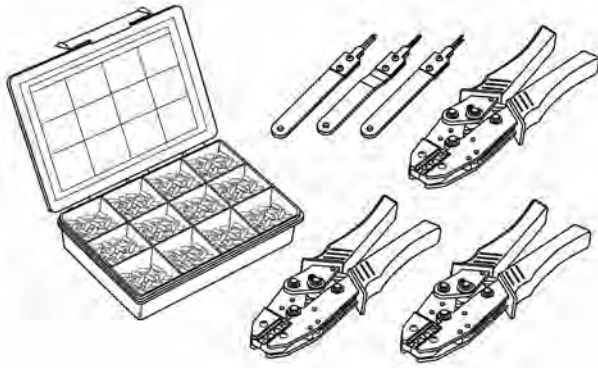


Part Number	Description
309-9888	USB Adapter Cable
309-9891	Serial (RS232) Adapter Cable

## 309-9893 Tool Kit

Model: Forestry Products

Warranty: 12 Month Manufacturer's



- Used to repair IQAN receptacles and plugs used on Parker electronic control modules
- Tool kit includes crimp tools, extraction tools, and all terminals necessary for repairing connector assemblies
- 309-9895 Terminal Kit (part of 309-9893 Tool Kit) is also available as a serviceable part

### Reference

NEHS1023, Crimp Tool Operating Manual

Item	Description
Red Crimp Tool	Crimping JPT (Junior Power Timer), with seal
Yellow Crimp Tool	Crimping JPT (Junior Power Timer), no seal
Blue Crimp Tool	Crimping Microtimer (with seal/no seal)
Red Extraction Tool	Extracts single-locking tab Junior Power Timer pins
Yellow Extraction Tool	Extracts double-locking tab Junior Power Timer pins
Blue Extraction Tool	Extracts double-locking tab Microtimer pins
Terminal Kit	(See other chart for included items)

Part Number	Description
309-9893	Tool Kit

### Terminal Kit



309-9895 Terminal Kit		
Item	Specification	Qty.
Microtimer (no seal)	18-20 AWG (0.75 mm <sup>2</sup> )	100
Microtimer (with seal)	18-20 AWG (0.75 mm <sup>2</sup> )	100
Microtimer Cavity Plug	—	100
Microtimer Seal	—	100
JPT (no seal)	18-20 AWG (0.75 mm <sup>2</sup> )	50
JPT (no seal)	14-16 AWG (1.5 mm <sup>2</sup> )	25
JPT (with seal)	14-16 AWG (1.5 mm <sup>2</sup> )	25
JPT (with seal)	18-20 AWG (0.75 mm <sup>2</sup> )	50
JPT (with seal)	18-20 AWG (0.75 mm <sup>2</sup> )	25
JPT Cavity Plug	—	25
JPT Seal	18-20 AWG (0.75 mm <sup>2</sup> )	50
JPT Seal	14-16 AWG (1.5 mm <sup>2</sup> )	25

**369-4181 Ampseal Connector Perimeter Seal Kit**

SMCS Code: 1408-023

Model Usage: Electronic Engines

Warranty: 1 Year

**Tool Description:**

- Replacement seals for all AMPSEAL connectors
- A damaged perimeter seal can allow moisture and dirt to affect mated connections
- Replacement perimeter seals are made of colored silicone rubber



Part Number	Description	Color/Size	Quantity
369-4181	Ampseal Connector Seal Kit	—	1
4C-4787	Utility Box (9 compartment, plastic)	7 x 3.75 x 1.24 in (178 x 95 x 31 mm)	1
264-7029	2-pin connector seal	Red	25
264-7030	3-pin connector seal	Yellow	25
264-7031	4-pin connector seal	Yellow	25
264-7032	6-pin connector seal	Red	25
264-7033	8-pin connector seal	Yellow	25
264-7034	12-pin connector seal	Yellow	25

**360-3122 Extension Lead Group**

SMCS Code: 1400-081

Warranty: Manufacturer's

- Used to extend leads to provide a longer reach from multimeter.
- Used with 257-9140 Fluke 87V Multimeter and 157-7213 Fluke 123 Scopemeter
- Includes one pair of color-coded (red/black) silicone insulated leads 1.5m (5.0 ft) long
- Two color-coded female couplers (included) allow two sets of 360-3122 Extension Leads to be connected together
- 600V CAT IV, 1000 V CAT III, 10A rating
- UL Listed

Part Number	Description
360-3122	Extension Lead Group

**Electrical Diagnostic Tools**

**Essential Tool**

SMCS Code: 1000-038, 1050-38, 1400-038, 1400-081, 1450-038

Model: 795F AC Off-Highway Truck

Warranty: Manufacturer's

**331-6561 High Voltage Meter (North America Only)**

- Used to measure Voltage
- Digital Voltmeter with removable handles has 10.2mm (.4 in) LCD backlit display
- Voltmeter features timed auto shut-off to extend battery life
- Unit will shut off or not operate if battery is low
- A 9 Volt battery powered voltmeter proff tester with 500V output is included
- Unit comes with two 20cm (8 in) fixed length fiberglass hotsticks
- Includes 9 Volt Alkaline batteries, carry case with foam insert, and calibration instruction manual



Diagnostic Tools

(Continued)

## Electrical Diagnostic Tools (Continued)

### Essential Tool

SMCS Code: 1000-038, 1050-38, 1400-038, 1400-081, 1450-038

Model: 795F AC Off-Highway Truck

Warranty: Manufacturer's

Item	Description	Qty
1	Carrying Case with Foam Insert	1
2	Handles	2
3	5000 Volt Voltmeter	1
4	Proof Tester	1

Part Number	Description
331-6561	High Voltage Meter (North America Only)
331-6563	Discharge Resistor Tool
359-9241	High Voltage Meter (Europe)



**WARNING**

Before using any of these instruments make sure to test and inspect the equipment to ensure that it is working properly and is in safe working condition. Failure to do so can cause serious injury or death and may result in erroneous test measurements.

### 331-6563 Discharge Resistor Tool



- Used to discharge Voltage (up to 3kV) from capacitor
- 1m (3 ft) cable between discharge sticks
- Includes carry case with foam insert

### 359-9241 High Voltage Meter (Europe)



- Used with 257-9140 Fluke 87V Multimeter (not included)
- Resistive attenuator (0-30kV) mounted on 38 cm (15 in) probe
- Ground lead mounted on 38 cm (15 in) handle with 1 m (3 ft) long cable to attenuator
- 1000 VDC verifier
- Holder for Fluke 87V Multimeter
- 20 cm (8 in) cable connects attenuator to multimeter
- Includes carry case and instruction manual
- NIST traceable certification

Item	Description
1	Carrying Case
2	Holder for 257-9140 Fluke Multimeter
3	0-30 KV Probe with 1m (3 ft) Insulated Cable
4	Ground Lead Handle
5	Probe Extensions



**349-4198 Phase Meter Assembly**

SMCS Code: 7002-038, 0778-035

Model: Generator Sets

Warranty: Manufacturer's Three Year

European Union compliant, CE marked

- Used to test three functions including open phase, phase sequence, and motor rotation
- One half of unit measures phase sequence of a 3-wire system using power from system under test (lamp indicators will indicate 3-phase sequence or an open phase situation)
- Other half of unit measures 3-phase motor rotation on a powered or unpowered motor (indicates whether motor shaft has clockwise or counter-clockwise rotation)
- Supplied with three CAT III rated color-coded, large alligator clips and test leads
- Rated for CAT III 600V on both testing phase sequence and motor rotation
- Conforms to EN61010-1:2001; CAT III 600V, Pollution Degree 2, Class 2; CSA 22.2-1010.1; and EN61557-7
- Zippered carrying case for portability
- Includes test leads (red, green, and blue) with alligator clips, soft vinyl case, Users Manual, and 9 V battery

Battery Life	Approximately 200 hours
Battery	Standard 9 V
Size	153 x 72 x 35 mm (6.02 x 2.83 x 1.37 in)
Weight	218 g (7 oz) including battery
Operating temperature	0 - 40° C (32 - 104° F)
Phase Sequence:	
Input Voltage	3 phase to phase inputs 100 V AC to 600 V AC maximum
Frequency range	45 to 70 Hz
Operating time	10 minutes ON maximum at 600 V AC
	10 minutes OFF minimum at 600 V AC
3-phase	Approximately 7 mA per phase of AC power source
Motor Rotation:	
Operating time	10 minutes ON maximum
	10 minutes OFF minimum
Tester field	14 mA of 9 battery

Part Number	Description
349-4198	Phase Meter Assembly

**368-8645 Blowby Group**

SMCS Code: 1000-038, 1350-038, 1350-081

Model: All

Warranty: One Year

European Union compliant, CE marked

- Used to trend volume of blowby gases released through engine crankcase breather (measures inches of water on orifice tube)
- Input uses convenient quick-disconnect fitting
- Large LCD display with backlighting
- Eleven units of measure (user selectable by front panel pushbutton)
- Max/Min/Avg recording
- Zero function for offset correction or measurement
- Advanced features include DATA HOLD, MIN-MAX-AVG RECORD mode, ZERO/OFFSET, AUTO POWER OFF
- Built-in USB serial interface
- Tool operating manual includes charts to convert readings from inches of water to cubic feet/minute
- Uses a 9V battery for power
- To conserve battery life, an automatic power off feature turns unit OFF after 20 minutes

(Continued)

# Electrical Tools

## 368-8645 Blowby Group (Continued)

SMCS Code: 1000-038, 1350-038, 1350-081

Model: All

Warranty: One Year

- Includes large and small orifices, two 1/8 - 27 NPT hose barb fittings, a two foot long 1/8 ID x 1/4 inch OD clear tubing, 6V-3073 Carrying Case, 6V-4094 Foam Inserts, 368-8645 Lid Decal

Unit of Measure Display	Icon
Pounds per square inch	psi
Inches of mercury	in Hg
Milli-bar	mbar
Millimeters of mercury	mm Hg
Kilo-Pascals	kPa
Kilograms per centimeter squared	Kg cm <sup>2</sup>
Inches of water	in H <sub>2</sub> O
Feet of water	ft H <sub>2</sub> O
Centimeters of water	cm H <sub>2</sub> O
Bars	bar
Ounces per square inch	oz in <sup>2</sup>

Part Number	Description
368-8645	Blowby Group



### WARNING

Pressure inputs of 0.689 Bar (10 psi) or higher will damage the instrument. Do not apply pressure higher than the maximum pressure listed in the specification chart.

### Repair Information

Extech Instruments Corporation

9 Townsend West

Nashua, NH 03061

Email: [repair@extech.com](mailto:repair@extech.com)

For repair or calibration, call 781-890-7440, ext: 220  
for a Return Authorization Number and shipping instructions

### Reference

NEHS1110, Tool Operating Manual

User Guide: Heavy-Duty Differential Pressure Manometer,

Model HD700 (OEM manufacturer supplied)

(Continued)

**Repair Information (Continued)**

Extech Instruments Corporation  
9 Townsend West  
Nashua, NH 03061

Specifications	Range	Resolution
kPa / mbar / psi	13.78 / 137.8 / 2	0.01 / 0.1 / 0.001
mm Hg / in Hg	103.4 / 4.072	0.1 / 0.001
oz in <sup>2</sup>	32	0.01
cm H <sub>2</sub> O / in H <sub>2</sub> O / ft H <sub>2</sub> O	140 / 55.40 / 4.616	0.1 / 0.01 / 0.001
kg cm <sup>2</sup>	0.140	0.001
bar	0.137	0.001
Display	Four-digit LCD with function indicators	
Units of Measure	bar, mbar, psi, kg/cm <sup>2</sup> , mm Hg, inches Hg, kPa, feet H <sub>2</sub> O, inches H <sub>2</sub> O, cm H <sub>2</sub> O, and oz in <sup>2</sup>	
Accuracy	± 0.3% FS [@ 25° C (77° F)]	
Repeatability	± 0.2% to 0.5% FS	
Linearity / hysteresis	± 0.3% FS	
Combined accuracy	± 1.1%FS	
Maximum pressure	0.689 bar (10 psi)	
Response time	0.5s typical	
Input circuit	Differential inputs (P1 and P2)	
Input ports	Two metal 4.8 mm (.189 in), barbed for 3.17 mm (.125 in) ID tubing	
Data hold	Freezes displayed reading	
Sensor	Built-in piezoelectric sensors	
Zero / offset function	Pushbutton activation	
Sample rate	0.5 sec. (approx.)	
Compatibility	Air or non-corrosive and non-ionized gas (not intended for use with liquids)	
Auto power OFF	Meter turns off after approx. 20 minutes to conserve energy (can be deactivated)	
PC interface	Built-in USB serial interface	
Storage conditions	0 to 60° C (14 to 140° F); < 80% RH	
Operating conditions	0 to 50° C (32 to 122° F); < 80% RH	
Battery power	9V alkaline battery (BAT low battery indicator)	
Battery life	125 hours typical	
Size	30 x 23 x 10 cm (12 x 9 x 4 in)	
Weight	4.5 kg (9 lb, .9 oz)	

**Specifications**

Specifications	Range	Resolution
kPa / mbar / psi	13.78 / 137.8 / 2	0.01 / 0.1 / 0.001
mm Hg / in Hg	103.4 / 4.072	0.1 / 0.001
oz in <sup>2</sup>	32	0.01
cm H <sub>2</sub> O / in H <sub>2</sub> O / ft H <sub>2</sub> O	140 / 55.40 / 4.616	0.1 / 0.01 / 0.001
kg cm <sup>2</sup>	0.140	0.001
bar	0.137	0.001

## 377-6198 Harness Braiding Cutter

Model Usage: All Models

Warranty: One Year



- Allows operator to easily cut braiding when repairing harnesses
- Braiding Cutter includes a safety ball and a safety cap

Part Number	Description	Dimensions
377-6198	Harness Braiding Cutter	5 1/8 in Long

## 362-3555 Ampseal Style Connector Field Repair Kit

Model Usage: All

Warranty: Six Months



- Used to maintain and repair Ampseal style connectors on electronic engine control harnesses
- Connectors individually sealed in plastic bag for cleanliness
- Connectors available in quantities most commonly used

**Note:**

1U-5804 crimp tool is not included.

Please order separately.

Part Number	Description
362-3555	Ampseal Style Connector Field Repair Kit

Tools for Electronic Engines

**190-8900 Deutsch HD Style Connector Field Repair Kit**

Model: Electronic Engines  
 Warranty: Six Months

- Redesigned from the discontinued 4C-3406 HD Style Field Repair Kit (1U-5804 Crimp Tool in discontinued 4C-3406 has been removed from 190-8900 to avoid duplicate tool expenses at reorder)
- Each connector in its own sealed plastic bag for cleanliness
- Quantities adjusted to better reflect most commonly used connectors
- Convenient new carrying case allows connectors to be found easily
- Easy-to-use chart for parts reordering



**NOTE:**

1U-5804 Crimp Tool is not included with group.  
 Order separately.

Part No.	Description	Qty.
190-8900	Deutsch HD Style Connector Field Repair Kit	1
151-6320	Removal Tool #14	6
7X-6195	Receptacle, 9-Pin	2
8T-8731	Plug, 3-Socket	10
8T-8732	Receptacle, 3-Pin	10
8T-8733	Plug, 5-Socket	5
8T-8734	Receptacle, 5-Pin	5
8T-8735	Plug - Connector	8

Part No.	Description	Qty.
8T-8736	Receptacle, 9-Pin	8
8T-8737	Seal Plug	30
9W-0847	Plug, 9-Socket	2
9X-3401	Pin #16/18	30
9X-3402	Socket #16/18	30
126-1767	Pin #14	30
126-1768	Socket #14	30
152-7997	Utility Box	1

**175-3700 DT Connector Service Kit**

**147-6456 Wedge Removal Tool**

SMCS Code: 1408-023  
 Model: All Models with Electronic Controls  
 Warranty: One Year

- Used to maintain and repair Deutsch "DT" style connectors on electronic engine control harnesses
- 175-3700 DT Connector Service Kit — connector/contact assortment for owners of discontinued 4C-3406 Connector Service Kits which have 1U-5804 Crimp Tool
- 147-6456 Wedge Removal Tool included in kits — also available separately

**Reference**

SEHS9615, Special Instruction — A black plug and connector body has been released to improve sealing. Please refer to SEHS9615 for a more detailed explanation of interchangeability.

**NOTE:**

1U-5804 Crimp Tool is not included but can be ordered separately.



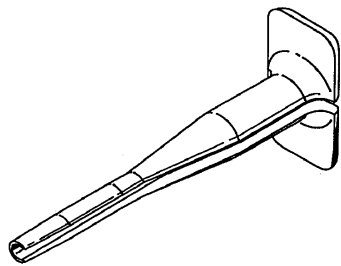
Item	Part Number	Description
1	175-3700	Connector Service Kit (less crimp tool)
2	147-6456	Wedge Removal Tool (included in kit)
3	152-7997	Utility Box

## Removal Tools

SMCS Code: 1408-023

Model: 121-9588 — 3116/3126 Engines with HEUI (Hydraulic Electronic Unit Injection), 151-6320 — All Models With Electronic Controls, 195-7970 — All Models with Electronic Engines

Warranty: Six Months



- Handle size: 12.7 x 25.4 mm (0.5 x 1.0 in)
- Material: plastic

### 121-9588 Removal Tool, 16 gauge TXL

- Used to remove wires from 40-pin connectors used on ADEM II (Advanced Diesel Engine Management) controls
- Tool slips over OD of wire and compresses wire retaining spring inside connector allowing wire to be removed
- If used improperly tool will break away before causing damage to connectors pin or socket

### 151-6320 Removal Tool, 14, 16, 18 gauge SXL/GXL

- Replaces discontinued 121-9587 Removal Tool (16 gauge GXL)
- Used to remove pins and sockets from Deutsch and AMP style connectors
- Versatile new design allows removal of 14, 16, and 18 gauge pins and sockets from connectors
- Made from a more durable material than former tool (reduces breakage)

### 195-7970 Deutsch DFN Style Connector Service Tool

- Used to remove the wire/socket assembly from Deutsch DFN style connector plugs
- Tool slips over OD of wire and compresses socket retaining mechanism inside connector allowing wire/socket assembly to be removed

Part Number	Overall Length
121-9588	56.6 mm (2.23 in)
151-6320	57.5 mm (2.26 in)
195-7970	57 mm (2.24 in)

Diagnostic Tools

## 195-1179 Extraction Tool

SMCS Code: 1408-023

Model: 554, 574 Forwarder; 550, 570, 580 Harvester

Warranty: One Year

- Used to remove stamped and formed terminals from AMP electrical connector bodies
- Due to various wire sizes, both tools are required



Typical AMP connector



Part Number	Description
195-1179	Extraction Tool

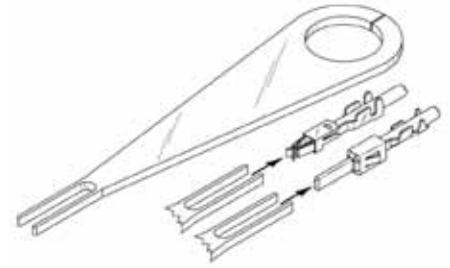
**290-9703 Extraction Tool**

SMCS Code: 1408-023

Model: All models with JPT terminals

Warranty: One Year

- Replaces 195-1178 Extraction Tool
- Used to extract Junior Power Timer (JPT) terminals on switch connectors inside vehicle cab and other locations
- Used with terminals such as 235-4123, 223-4779, 183-7754, 183-7755, 224-9261, 224-9262, 204-1297, and others (terminals not included with tool)
- Improved design allows for easier extraction of terminals (insert tool prongs to release terminal from connector)
- Durable spring steel construction
- Overall length: 82.5 mm (3.25 in)



Part Number	Description
290-9703	Extraction Tool

**266-1683 Removal Tool**

**Essential Tool**

Warranty: One Year

- Used to remove wire and socket assembly from 64-pin 100 watt delphi connector
- Wires are removed by inserting pin completely into hole beside socket (unlatches socket)



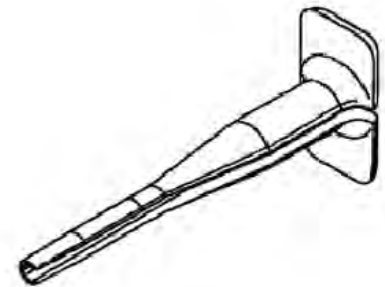
Part Number	Description
266-1683	Removal Tool

**355-2848 Removal Tool**

Model Usage: All

Warranty: Six Months

- Used to remove pins and sockets from Deutsch and AMP style connectors
- Tool slips over OD of wire and compresses wire, retaining spring inside connector to allow wire to be removed
- Material: Plastic
- Wire gauge: 20, 22
- Contact Size: 20

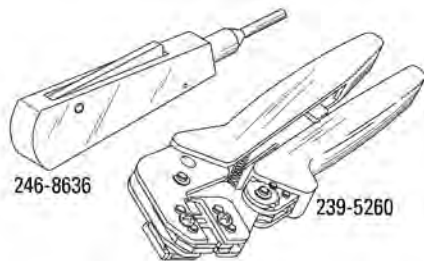


Part Number	Description
355-2848	Removal Tool

## 239-5260 Crimping Tool

## 246-8636 Extraction Tool

SMCS Code: 1408  
Warranty: One Year  
Essential Tool



- Crimp tool is used to crimp pins onto electronic wires for installation, repair, and maintenance applications
- Extraction tool removes AMP Mate-N-Lock and AMP Mate-N-Lock II pins and socket contacts from connectors
- Extraction tool enters contact cavity from front of connector, releasing the pin or socket contact
- Works with wire sizes ranging from 20 to 14 AWG

Part Number	Description	Use	Used On
239-5260	Crimping Tool	Used to crimp pins	Electronic wires
246-8636	Extraction Tool	Used to remove pins and socket contacts	Connectors
<b>Optional Die Set (Sold Separately)</b>			
329-5658	AMP Terminal Die Crimp Set (Use with 239-5260 Crimping Tool)	Used to crimp AMP terminals 770854-1 and 770854-3	Woodard F-series Actuator on 3500 Gensets

## 399-1594 and 399-1595 Crimping Tool

## 399-5778 Extraction Tool

Model Usage: All  
Warranty: Manufacturer's



- Used to properly remove and install APEX 2.8 mm terminals
- Crimping tools accurately and easily crimps terminals to wire with minimal force
- Extraction tool removes terminals from connector by inserting the tip into the service port of the connector and pulling the wire and terminal from the connector
- Use 399-1594 for 14 and 16 gage wires
- Use 399-1595 for 18 and 20 gage wires

Specifications		
Part No.	Description	Dimensions
399-1594	Crimping Tool	220 x 75 x 40 mm (8.66 x 2.95 x 1.57 in)
399-1595	Crimping Tool	220 x 75 x 40 mm (8.66 x 2.95 x 1.57 in)
399-5778	Extraction Tool	120 x 13 mm (4.72 x 0.51 in)

## NEXG4508 Service Program Module, 3406 B/C Truck Engine

SMCS Code: 1900-038, 0781  
Model: 3406 PEEC Truck Engine  
Warranty: One Year

- Software [in Erasable Programmable Read Only Memory (EPROM) chip]
- Installed in 7X-6400 DDT by customer to provide all service functions for 3406 B/C Truck Engine
- Version number printed on module and can be displayed on DDT screen under Mode 00 (present version number compatible with all versions of 3406 B/C Truck Engine control personality modules)

### References

SEHS8743, Special Instruction  
NEEG2501, Diagnostic Code Card

(Continued)



**NEXG4508 Service Program Module, 3406 B/C Truck Engine (Continued)**

SMCS Code: 1900-038, 0781  
 Model: 3406 PEEC Truck Engine  
 Warranty: One Year  
 NEEG2502, Driver's Card

**NEXG4509 Service Program Module, 3176/3406E Truck Engine**

SMCS Code: 1900-038, 0781  
 Model: 3176/3406 Truck Engine  
 Warranty: One Year

- Software [in Erasable Programmable Read Only Memory (EPROM) chip]
- Installed in 7X-6400 or 7X-1055 DDT by customer to provide all service functions for 3176 and 3406 Truck Engines
- Version number printed on module and can be displayed on DDT screen under Mode 00 (present version number compatible with all versions of 3176 and 3406E Truck Engines control personality modules)

**References**

SEHS8808, Special Instruction  
 NEEG2501, Pocket Card  
 NEEG2502, Pocket Card

**NEXG4519 Service Program Module, Challenger 65/75/85**

SMCS Code: 1900-038, 0781  
 Model: Challenger 65/75/85  
 Warranty: One Year

- Software [in Erasable Programmable Read Only Memory (EPROM) chip]
- Installed in 7X-6400 or 7X-1690 DDT by customer to provide all service functions for 3176 Engine in Challenger 65/75/85
- Version number printed on module and can be displayed on DDT screen under Mode 00

**Reference**

SEHS9203, Special Instruction

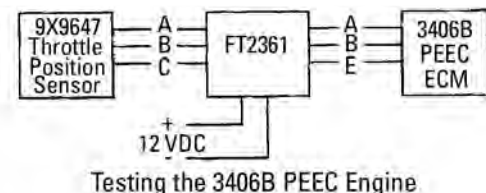
**FT2361 Cable for Connecting Throttle Position Sensor**

SMCS Code: 1000-081  
 Model: 3176, 3406B  
 Warranty: None

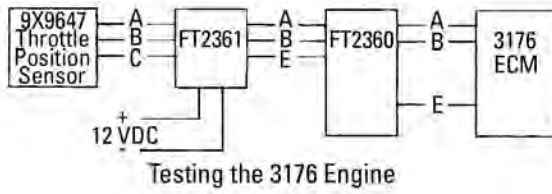
- Used for out-of-chassis testing of 3176 and 3406B PEEC Truck Engines on engine dynamometer
- Provide throttle position signal and power to ECM; allow engine to be tested on engine dynamometer like factory end-of-line test
- 9X-9647 is connected to engines ECM (Electronic Control Module) and 12-volt power source, as shown below; 12 volt DC can be supplied by 12-volt truck battery or by power supply of at least 10 amps
- FT2361 Cable is 3 meters long to easily connect ECM, Throttle Position Sensor and power source; 3176 test uses both cables; FT2360 Cable, with 3176 adapter, is just long enough to connect FT2361 Cable to 3176 ECM

**Note:**

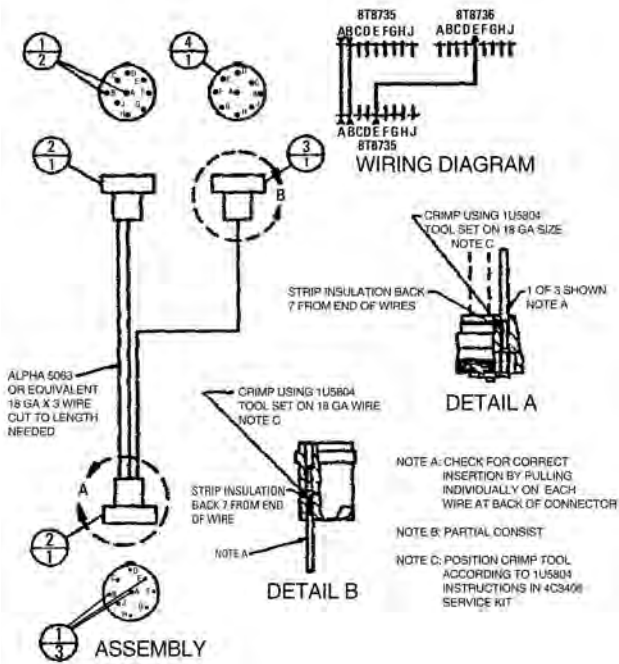
To test an engine this way the ECM must not be programmed. If it is programmed, the customer-specified parameters must be removed before testing. An easy way to do this is to use a discontinued 8T-8697 ECAP equipped with an NEXG4512 Configuration Aid. Knowledge of the customer passwords is required. Access the ECM with the ECAP and, with the help of the Configuration Aid, store the customer-specified parameters in the ECAP. Then remove the customer-specified parameters from the ECM so the ECM is no longer programmed. After testing, the ECM can be reprogrammed to its original configuration from the data stored in the ECAP by the Configuration Aid.



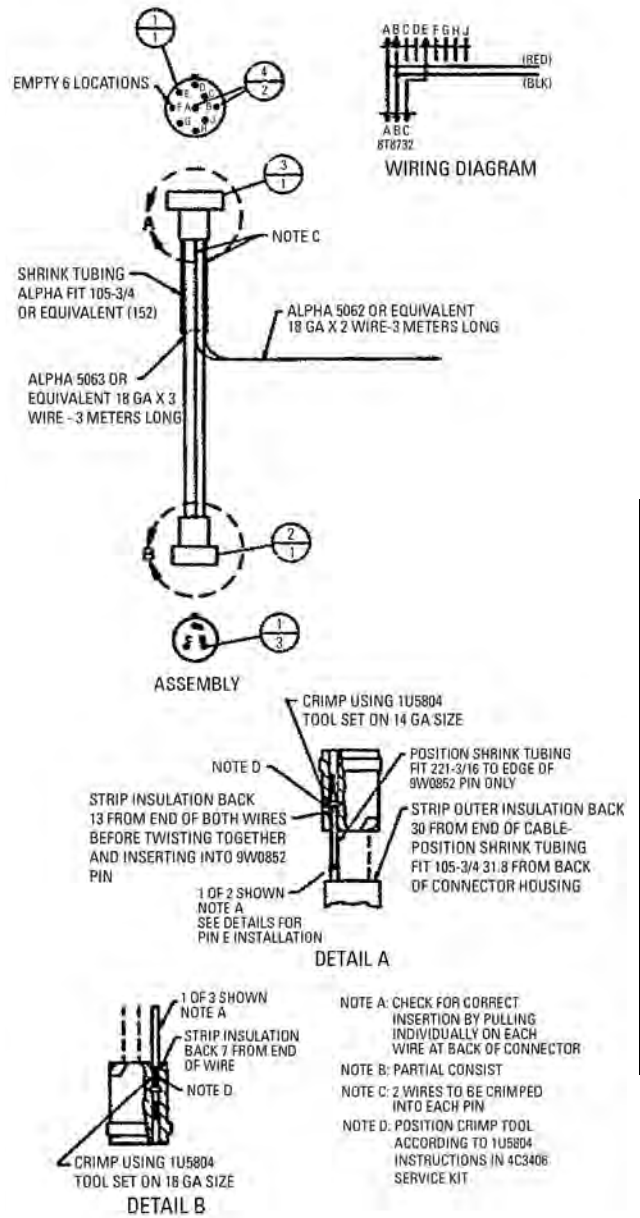
## FT2360 Cable



## Connection Diagram I



## Connection Diagram II



## NETG5030 Service Technician Workbench (STW)

### Essential Tool

Model: All Models

Service Technician Workbench (STW) is an umbrella application tying Caterpillar® software based service tools together with a common look and feel, installation, support, training, and delivery. STW is a platform that provides a framework to enable the technician to troubleshoot, repair, and report on the repair process. The applications under the STW umbrella are: Component Based Troubleshooting (CBT), Cat® Electronic Technician (ET), Challenger Technician, M300 Technician, Flash File Search (FFS), Technical Analysis (TA), Dataview and Data Technician, Upload Utility and Standalone Service Report. All tests and reports generated from these applications can be compiled into one STW Service Report.

STW is available on CD; order NETG5030 through Caterpillar Media Logistics.

### Direct Benefits to Dealer's Service Business

- Reduces time to access necessary information relevant to diagnostic and repair process
- Reduces time to correctly troubleshoot problems and identify best repair process
- Reduces purchase of printed service literature
- Reduces time to prepare complete and accurate service reports
- Reduces processing time for complete and accurate work order information necessary for prompt and accurate invoicing
- Reduces processing time for complete and accurate warranty claims

### Computer Recommendations

#### Desk. Computer

The following configuration is recommended to run STW on a desktop computer.

- 2.4 GHz Pentium-compatible processor
- 512 MB RAM minimum (1 GB recommended)
- 40 GB hard disk drive with at least 1.5 GB hard drive space available
- File transfer device (such as a 3.5 inch disk drive or USB port and compatible jump drive)
- Third generation DVD drive
- 17 inch VGA (1024 x 768, 256 colors) adapter and monitor
- 16-bit sound card (for use with Computer Based Training and Multimedia)
- Hewlett Packard Laserjet V or compatible printer
- Pointing device (built in or external) such as Microsoft Ballpoint Mouse
- Microsoft Windows 2000 or XP
- Microsoft Internet Explorer version 5.5 or 6.0; browser must support Java Script and HTML, version 2
- TCP/IP Dialup Adapter (needed only for communicating between SIS and Service Advisor or DBS through Parts Integrator). Also need TCP/IP Dial-up Adapter to send and receive feedback in STW
- RS232 port with 16550AF UART or PCMCIA card to RS232 adapter or USB to RS232 adapter (Cat® part number 370-8059)
- Ethernet or USB port (needed only for users with Dataview II)

#### Laptop Computer

The following configuration is recommended to run STW on a laptop computer.

- 1.4 Ghz Pentium-compatible processor
- 512 MB RAM minimum (1 GB recommended)
- 20 GB hard disk drive with at least 1.5 GB hard drive space available
- File transfer device (such as a 3.5 inch disk drive or USB port and compatible jump drive)
- Third generation DVD drive
- 11 inch or larger active matrix color screen
- Hewlett Packard Laserjet V or compatible printer
- Pointing device (built in or external)
- Emulation or LAN adapter and software suitable for the dealer host computer
- Microsoft Windows 98, NT 6.0, 2000 or XP
- Microsoft Internet Explorer version 5.5 or 6.0; browser must support Java Script and HTML, version 2
- TCP/IP Dialup Adapter (needed only for communicating between SIS and Service Advisor or DBS through Parts Integrator); also need TCP/IP Dial-up Adapter to send and receive feedback in STW
- RS232 port with 16550AF UART or PCMCIA card to RS232 adapter or USB to RS232 adapter (Cat® part number 370-8059)
- Ethernet or USB port (needed only for users with Dataview II)

**JERD2129 All Engines and Machines Combined**

Model: All models with electronic controls

Cat® Electronic Technician (ET) is a service tool designed to run on a personal computer under Microsoft Windows. With ET you can display the status of a group of parameters (temperatures, pressures, etc.) simultaneously, view and clear active and logged diagnostics, or display the current configuration of an Electronic Control Module (ECM). ET can perform these as well as many other tasks, such as:

- View events where irregularities occurred and were logged by the ECM
- View and change configuration of the ECM
- Perform diagnostic tests
- Perform calibrations
- View trip information through Trip Summary, Histograms, and Custom reports
- Print reports and diagnostic results

ET is designed to communicate with the ECMs through the communication data link.

ET allows the technician to obtain data, analyze it, and then diagnose existing and potential problems.

**Software Features and Requirements**

- Each license is a license for 1 computer
- Software subscription includes Caterpillar® Flash Memory Software
- 171-4400 Communications Adapter II is required to connect a personal computer to an ECM (comes complete with cables, manual, software CD, and carrying case — additional cable may be required)

**Diagnostic Capabilities**

- ET has separate pull-down menus for selecting different function screens and includes a HELP Function Screen which is very easy to use
- Diagnostic software helps technicians make accurate repairs, in a short time frame, on products that are increasingly complex
- Views events where irregularities occurred and were logged by the ECM
- Views and changes configuration of the ECM
- Retrieves engine totals for fuel used, miles traveled, and more
- An ECM summary screen allows viewing of the ECM version
- Other screens allow diagnostic tests and calibrations to be performed
- Output data can be viewed in either English or metric units

**Note:**

The minimum PC Configurations should not be used as a standard when buying new personal computers to run ET.

But if you have existing equipment that meets these minimum requirements, it will run ET.

**Recommended PC Configuration**

- IBM PC compatible with Pentium IV 2.4 GHz processor or higher
- 512 MB of RAM
- 1 GB available on hard disk drive
- File transfer device
- 14.1 inch XGA screen (800 x 600)
- Microsoft Windows 2000, ME, XP
- RS232 port with 16550AF UART or compatible
- Built-in pointing device or mouse
- Microsoft Internet Explorer 5.5 or higher

**Note:**

If your Microsoft Internet Explorer screen size is 640 x 480, press the maximize button to fill the screen.

**Other Requirements**

- 171-4400 Communications Adapter

**Ordering Information**

Cat® ET software is included on the STW installation CD and can be ordered through the Media Logistics System:

NEXG5030 STW software (includes ET software)

**Licensing Information**

An ET license is required to activate the ET program after installation. Licensing the program at <https://on-linelicensing.cat.com> automatically generates an order in the Media Logistics System for a Dealer ET subscription to JERD2129.

## 239-9967 Bypass Messenger Harness

### Essential Tool

Model: Marine, Industrial, and On-Highway Truck Engines

Warranty: One Year



- Used to flash Messenger when communication through service connector is not possible
- Used with ET/Winflash
- Power is provided by service connector

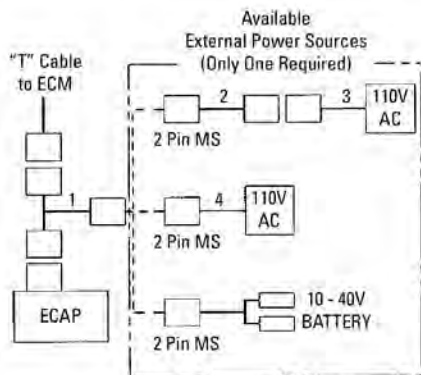
Part Number	Description
239-9967	Bypass Messenger Harness

## Cables

SMCS Code: 1900-038, 0781

Model: All Electronic Controlled Engines Tested by ECAP

Warranty: One Year



- Used to provide power to ECAP through external power source — ECAP retains power during engine cranking
- Used with discontinued 8T-8697 ECAP
- Cable assemblies can be connected to AC power adapter or battery — T-harness allows cable leading to electronic control module (ECM) to remain connected
- T-harness connects between ECAP and T-cable to ECM — discontinued 7X-1854 Cable for ECAP with metal connector
- 1 end of discontinued 7X-1854 Cable has 2-pin MS connector (allows connection to external power supply)
- 3 connections for external power sources are available — 5P-7366 Cable Assembly (for connection to battery), 8T-9276 AC Power Supply, and Converter

Item	Part Number	Description
1	7X-1854	Cable (metal connector)
2	7X-1856	Cable Assembly - Adapter
3	8C-9705	Converter As - 12V DC
4	8T-9276	Converter As - 12V DC 1A
5	5P-7366	Cable Assembly - Power

## NEXG4514 ECAP Executive/Utility Service Program Module

SMCS Code: 1900-038, 0781

Model: 3406 PEEC, 3176 Engines

Warranty: One Year

- Software [in Erasable Programmable Read Only Memory (EPROM) chip]
- Included in discontinued 8T-8697 ECAP; does not have to be ordered separately except for very early ECAP's with V1.0 installed
- NEXG4514 runs the ECAP; selects Metric or English display units; handles interface with SPM's in ECAP and interface with adapters connected to port 3; provides basic communication abilities with ports 1 and 2
- Current SPM may be marked NEXG4514 V1.1, 7X-1350 V1.1, or 8C-5363 V1.1; all 3 are same current software and will do same job; version number printed on SPM; also displayed on ECAP screen during power up self test and can be displayed on screen under SPM Version Number screen

### Reference

SEHS8741, Special Instruction

**NEXG4522 Truck Service Program Module, All Highway Truck Engines**

SMCS Code: 1900-038, 0781

Model: All Highway Truck Engines

Warranty: One Year

- Software [in Erasable Programmable Read Only Memory (EPROM) chips] and subscription for updates
- Installed in discontinued 8T-8697 ECAP by customer to provide all service functions for all Highway Truck Engines
- Version number printed on module and can be displayed on ECAP screen under SPM Version Number screen compatible with all versions of all Highway Truck Engine control personality modules

**References**

SEHS9349, Special Instruction

NEEG2501, Diagnostic Code Card

NEEG2502, Driver's Card

**NEXG4516 Service Program Module, Marine/Industrial Engines**

SMCS Code: 1900-036, 0782

Model: 3408, 3412 Marine/Industrial Engines

Warranty: One Year

- All Electronically Controlled Marine and Industrial Engines
- Software [in Erasable Programmable Read Only Memory (EPROM) chips] and subscription for updates
- Installed in discontinued 8T-8697 ECAP by customer to provide all service functions for all Highway Truck Engines
- Version number printed on module and can be displayed on ECAP screen under SPM Version Number screen compatible with all versions of all Highway Truck Engine control personality modules

**References**

SEHS9199, Special Instruction, Using the ECAP NEXG4516

Marine/Industrial SPM (included with SPM)

NEEG2490, Pocket Card

**NEXG4518 Service Program Module, Challenger 75**

SMCS Code: 1900-038, 0781

Model: Challenger 75

Warranty: One Year

- Software [in Erasable Programmable Read Only Memory (EPROM) chip]
- Installed in discontinued 8T-8697 ECAP by customer to provide all service functions for 3176 Engine in Challenger 65/75/85 Tractor
- Version number printed on module and can be displayed on ECAP screen under SPM Version Number screen

**References**

SEHS9202, Special Instruction

NEEG2456, Diagnostic Code Card

**NEXG4512 Configuration Aid Service Program Module**

SMCS Code: 1900-038, 0781

Model: 3406B PEEC, 3176 Engines

Warranty: One Year

- Software [in Erasable Programmable Read Only Memory (EPROM) chip], installed in discontinued 8T-8697 ECAP by customer and subscription for update
- User friendly, menu driven interface to help determine values for Customer Specified Parameters; user defines configuration of truck by selecting values from lists of such items as: engine rating, axle ratio, transmission, tire size and type; custom values not in the lists can be entered by user
- Once configuration defined, program steps user through each Customer Specified Parameter; does all necessary calculations and checks values entered for validity and conflict with other parameters; also displays and defaults to typical values for each parameter
- Customer Specified Parameters, including all truck configuration information, can be saved in discontinued 8T-8697 ECAP internal memory for later use, even if power removed from ECAP; can be reviewed and changed, if necessary; program steps user through any parameters affected by change and provides same checking as when values were first entered

(Continued)

## NEXG4512 Configuration Aid Service Program Module (Continued)

SMCS Code: 1900-038, 0781

Model: 3406B PEEC, 3176 Engines

Warranty: One Year

- List of configuration and parameter values can be printed using compatible serial interface printer; Split Chart can also be plotted; chart shows shift points for each transmission gear, along with engine RPM and vehicle speed limits
- When using NEXG4512 program, discontinued 8T-8697 ECAP can be powered by a 12-Volt Converter or from electronic engine control using 8T-5275 T-Harness; the converter allows use of program with discontinued 8T-8697 ECAP in office or shop area; parameter values defined can then be printed or saved to discontinued 8T-8697 ECAP memory; 8T-5275 Cable allows program to read and write Customer Specified Parameters directly to and from electronic engine control
- Version number printed on module and can be displayed on ECAP screen under SPM Version Number screen (present version number V1.1)

### Reference

SEHS88342, Special Instruction

## Adapter Cable Assemblies

SMCS Code: 1900-038, 0781

Model: 3406 PEEC, 3176 Engines

Warranty: One Year



- Help service 3406 PEEC and 3176 engines
- Provide test points for individual wires in wiring harness to facilitate troubleshooting of engine control system
- "T" cables with individual tip jacks on pigtail portion of cables; can be inserted into system wiring harness at connector locations; individual tip jacks on pigtails labeled same as wire to which they are connected in harness; standard probe tips, like those on multimeter leads, can be inserted into tip jacks

Diagnostic Tools

Part Number	Description
326-4904	Adapter Cable Assembly, 3-Pin DT Breakout
8T-8694	Adapter Cable Assembly, 5-Pin Breakout
8T-8695	Adapter Cable Assembly, 9-Pin Breakout

Part Number	Description
8T-8726	Adapter Cable Assembly, 3-Pin Breakout



**9X-1160 Adapter Cable Assembly, 40-Pin Breakout**

SMCS Code: 1900-038, 0781

Model: 3176 Engines

Warranty: One Year

- Used in servicing 3176 Engine
- Provide test points for individual wires in wiring harness to facilitate troubleshooting of electronic engine control system
- "T" cable with individual tip jacks on pigtail portion of cable; may be inserted into electronic engine control system wiring harness at connector locations; on 9X-1160 Adapter Cable Assembly 2 small probes with tip jacks can be inserted into appropriate connector socket to look at signal on any wire or between any 2 wires; standard probe tips, like those on multimeter leads, can be inserted into tip jacks



Part Number	Description
9X-1160	Adapter Cable Assembly, 40-Pin Breakout

**7X-1715 Cable Assembly, Small, 40 Pin Breakout**

SMCS Code: 1900-038, 0781

Model: 3406E and 3176B Electronic Engines

Warranty: One Year

- Used to provide test points for individual wires in wiring harness
- Makes troubleshooting of electronic engine control systems faster, easier, and more convenient
- "T" cable has 2 probes attached to pigtail portion of harness — 9X-1314 Wire Assembly, Red and 9X-1315 Wire Assembly, Black
- Probe tips on leads of standard multimeter can be inserted into tip jacks of pigtail — allows serviceman to check signal on any wire or between any 2 wires
- Connectors are A/B keyed



Item	Part Number	Description
1	9X-1314	Red - Wire Assembly
2	9X-1315	Black - Wire Assembly
All items	7X-1715	Adapter Cable Assembly

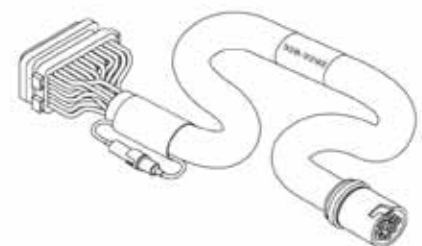
**328-2292 Harness Assembly**

SMCS Code: 0769-0779, 0781

Model: All models with ADEM III and A4:E4 ECMs

Warranty: One Year

- Contains additional ECM protection circuitry
- Used to provide communication link between Cat® ET and ADEM III or A4:E4 ECMs
- Used with 217-0113 Main Harness Assembly
- Attaches to engine harness ECM connection
- Requires auxiliary battery power (such as service truck battery)
- Improves service tools ability to maintain communications during engine cranking
- Replace blown (open) fuse with 8K-4644 Fuse (1 Amp)
- Do not use this harness on Cat® Implement and Transmission ECMs



Part Number	Description
328-2292	Engine ECM Bypass Harness

## Harness Assemblies

### Essential Tool

SMCS Code: 0781

Model: 217-0113 — ADEM II, ADEM III, and ADEM IV, 328-2292 — ADEM III and A4:E4 Electronic Control Modules

Warranty: One Year



- 328-2292 has additional protections to eliminate risk of damaging non-engine ECMs
- **IMPORTANT!** This protection only prevents damage to Cat® non-engine ECMs and will not allow 328-2292 to work on these ECMs (see note below)
- Harness change will be implemented and available around the end of the second quarter of 2008
- This harness replaced discontinued 167-9225 Service Bypass Harness

#### NOTE:

Discontinued 167-9225 change level 00 and 01 tool kit bypass harness may damage the internal circuitry of non-engine ECMs when the tools are connected to a 12 or 24VDC power supply. This harness should **ONLY** be used to service Cat® engine ECMs. Inappropriate use of these tools could result in a service claim rejection. For questions, please contact the Dealer Service Tools Hotline at 1-800-542-8665 (US) or 1-309-675-6277 (worldwide).

Item	Part Number	Description	ECM Application
1	217-0113	Main Harness	—
2	217-0114	Engine ECM Bypass Harness (cancelled)	—
3	328-2292	Engine ECM Bypass Harness	—
<b>Bypass harnesses available for these other ECM applications (all are used in conjunction with 217-0113 Harness)</b>			
—	224-4899	ECM Application	ADEM IV E1
—	277-4734	ECM Application	ADEM IV E2
—	317-2652	ECM Application	CAT Implement and Transmission ECMs (not available until May 2008)

### 224-4899 Harness Assembly (ADEM IV E1 ECM)

SMCS Code: 0781

Model: A4:E1 ECM

Warranty: One Year



- Used to provide communication link with ADEM IV:E1 ECM
- Used with 217-0113 Main Harness Assembly

Part Number	Description
224-4899	ECM Application

**277-4734 Harness Assembly (ADEM IV E2 ECM)**

SMCS Code: 0781  
 Model: ADEM IV:E2 ECM  
 Warranty: One Year

- Used to provide communication link with ADEM IV:E2 ECM
- Used with 217-0113 Main Harness Assembly

Part Number	Description
277-4734	ECM Application



**317-2652 Harness Assembly**

SMCS Code: 0769-0779  
 Model: A4:M1 and A4:M5 ECM  
 Warranty: One Year

- Used to test implement and transmission control modules
- Used with 217-0113 Main Harness Assembly
- Used to provide communication link between Cat® ET and transmission or implement ECMs
- 9-pin plug connects to 217-0113 Main Harness Assembly
- 70-pin plugs connect to transmission or implement ECM

Part Number	Description
317-2652	ECM Application



**134-5195 Adapter Cable Assembly, 40-pin T-harness Large Engine**

SMCS Code: 1900-038, 0781  
 Model: 3500 and 3600 Engines  
 Warranty: One Year

- Used to adapt 7X-1715 Cable Assembly to 3500 and 3600 Engines
- Adapts a square 40-pin AB-keyed connector on 7X-1715 Cable Assembly (40-pin Breakout Small Engine) to a square 40-pin CD-keyed connector on 3500 and 3600 Engines
- Length: 30 cm (12 in)

Part Number	Description
134-5195	Adapter Cable Assembly, 40-pin T-harness Large Engine



## 208-0059 Breakout "T"

### Essential Tool

SMCS Code: 1900-038, 0781

Model: 3176B, C-10, C-12, 3406E, 3600 Natural Gas Engines and other 70-pin ECM's

Warranty: One Year



- Used to provide test point for all individual wires in engine wiring harness of 70-pin connector ECM
- Connects between ECM and main wiring harness
- Allows testing access to all 70 wires

Part Number	Description
208-0059	Breakout "T"

## 257-8718 Breakout "T" Harness

### Essential Tool

SMCS Code: 1900-038, 0781

Model: All engines with ADEM IV ECM

Warranty: One Year



- Used to test engine wiring harness with 120-pin ECM connectors
- Connects between ECM and main wiring harness
- Provides testing access to all 120 individual wires
- Approximate length: 61 cm (24 in)

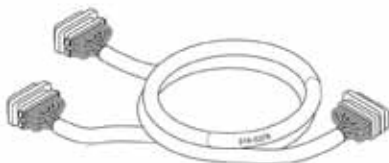
Part Number	Description
257-8718	Breakout "T" Harness

## 316-5376 Breakout "T" Harness Assembly

SMCS Code: 0769, 0779

Model: All Engines with B4:M1 ECM and other 54 pin ECMs

Warranty: One Year



- Used to test engine wiring harness with 54 pin ECM connectors
- Used with 9X-1314 Red Multimeter Test Probes and 9X-1315 Black Multimeter Test Probes
- Connects between ECM and main wiring harness
- Provides testing access to all 54 wires during operation
- Approximate length: 800 mm (31.5 in)
- Made with 18 AWG wire

Part Number	Description
316-5376	Breakout "T" Harness Assembly

**360-2176 ProAct Integrated Speed Control (PISC) Breakout Harness**

SMCS Code: 0769, 0779

Model Usage: G3500 C&E Natural Gas Engines with Woodward Governor

Warranty: One Year

- Used to flash the ProAct Integrated Speed Control on Woodward Governor
- Connects between control and main wiring harness
- Breakout harness is required to perform calibration after installing O-ring isolator kit on Throttle and Actuator control
- Works with Gas 3500 C&E model engines equipped with 313-6079, 304-9395, 304-9396, 304-9397, or 254-1115 Woodward ProAct throttle assemblies

**Reference**

REHS4743, Special Instruction



Part Number	Description
360-2176	ProAct Integrated Speed Control (PISC) Breakout Harness

**127-6359 Cable Assembly, Adapter HEUI Injector Test**

SMCS Code: 1900-038, 0781

Model: 3116 and 3126 HEUI Engines

Warranty: One Year

- Used to test injector and/or injector harness
- Allows wiring to an individual injector to be bypassed (helps to isolate problem between injector or harness)
- Overall length: 1.52 m (5 ft)



Part Number	Description
127-6359	Cable Assembly, Adapter HEUI Injector Test

**7X-1710 Probe Group**

SMCS Code: 1408-082, 0779

Model: All Models

Warranty: One Year

- Used with discontinued 6V-7070 Digital Multimeter to measure voltages in wiring harnesses without disconnecting them
- Multimeter leads plug into probe cable jacks; probes then slide along appropriate wires into rear of connector until they contact pin or socket of interest
- Eliminates need for new breakout "T" cable for each new connector
- Wire: 18-gauge
- Length: 18 inches



Part Number	Description
7X-1708	Probe, Red
7X-1709	Probe, Black
7X-1710	Probe Group

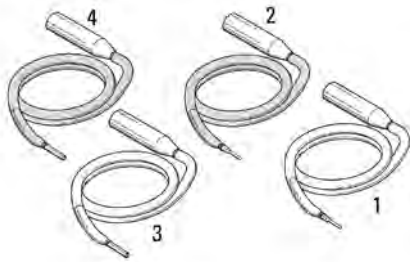
Diagnostic Tools

## Pin and Socket Probes

SMCS Code: 1408-082, 0779

Model: All models

Warranty: One Year



- Used to probe Deutsch pins and/or sockets during testing
- Used with multimeter test leads
- Can also be used to measure voltage signals when using a breakout "T" harness
- Multimeter leads plug into probe cable jacks and probes are inserted into Deutsch terminals
- Creates a "hands-free" method for connecting multimeter to Deutsch terminals
- Red and black color-coded for easy connection to multimeter test leads
- Wire: 18 gauge
- Length: 46 mm (18 in)

Item	Part Number	Description
1	9X-1314	Red - Wire Assembly
2	9X-1315	Black - Wire Assembly
3	309-6081	Socket Probe, Red
4	309-6082	Socket Probe, Black

## 7X-1695 Cable, TDC

### 7X-1395 Adapter, SI TDC

SMCS Code: 1905-082, 0712

Model: All Engines with Electronic Controls

Warranty: One Year



### 7X-1695 Top Dead Center (TDC) Cable

- Used on captive engine applications
- Allows magnetic sensor to be connected to engine to input timing information to ECM (Electronic Control Module)
- Used with ECAP/DDT
- 7X-1395 Adapter allows 7X-1695 Cable to be used on industrial and spark ignited (SI) engines

Part Number	Description
7X-1395	Adapter, SI TDC
7X-1695	Timing Probe Cable

## ECAP and DDT Connectors

SMCS Code: 1900-036, 0779

Model: All 3176 and 3406 Electronic Engines

Warranty: One Year



- Connect 8T-5275 T-Harness cable on ECAP or DDT to connector on dash of truck cabs
- Allow ECAP or DDT to be connected to electronic engine control from inside cab, instead of having to open engine compartment

### 7X-1873 Connector

- Used to replace present six-pin Deutsch connector on older 7X-1686 Adapter Cables (present 7X-1686 Adapter Cable manufactured with 7X-1873 Connector)
- Use 1U-5805 Removal Tool (green) and 1U-5804 Crimp Tool
- Locks onto highway truck in-cab diagnostic connector

(Continued)

**ECAP and DDT Connectors (Continued)**

SMCS Code: 1900-036, 0779

Model: All 3176 and 3406 Electronic Engines

Warranty: One Year

**7X-1686 Adapter Cable**

- Service Part: 3E-5226 Socket

Part Number	Description
7X-1403	Harness As - Adapter
7X-1686	Harness As - Adapter
7X-1873	Plug As - Connector
3E-5226	Socket - Connector

**7X-1714 Engine Adapter Cable, 3116**

Model: Electronically Controlled 3116 Engines

Warranty: One Year

- Used to setup and test electronic engine controls on 3116 Engines in General Motors on-highway trucks
- Connects between under dash Packard connector and 8T-5275, 139-4166, and 275-5122 T-Harness cable on ECAP or DDT



Part Number	Description
7X-1714	Engine Adapter Cable, 3116

**157-4829 Adapter Cable Assembly (SAE to CAT® CAN/ATA)**

**Essential Tool**

SMCS Code: 1900-036, 0779

Model: On-Highway Trucks

Warranty: One Year

- Used to connect 139-4166 Diagnostic Cable to J1939 Under-Dash Diagnostic Connector

Part Number	Description
157-4829	Adapter Cable Assembly (SAE to CAT® CAN/ATA)



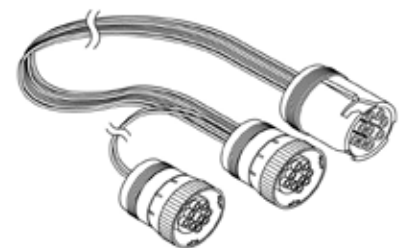
**211-4988 Adapter Cable Assembly**

SMCS Code: 1900-036, 0779

Model: Marine engines

Warranty: One Year

- Used to join 2 Cat® electronic marine engines together to record data
- Used with Cat® electronic technician sea trial state and transient data recorder
- Allows simultaneous data recording from both engines using 1 laptop
- Reduces ET recording time by 50%
- Provides easier data reduction by having both engines' data on same time scale



Part Number	Description
211-4988	Adapter Cable Assembly

## 136-7205 Extension Cable Assembly (Monitor)

SMCS Code: 0740, 0779

Model: All B-Series Excavators (Except 307)

Warranty: One Year



- Used to extend monitors viewing position to outside of operators compartment
- Can be used in training of technicians by allowing monitor to be viewed by more than 1 person at a time
- Overall length: 6.1 m (20 ft)

Service/Repair Parts	
Part Number	Description
136-7205	Extension Cable Assembly (Monitor)
102-7965	Female Terminal
111-4815	Plug Connector
121-1173	Male Terminal
125-4838	Plug Lock Wedge (7)
128-8951	Receptacle Connector <sup>1</sup>

<sup>1</sup>Not serviced

## 124-5643 Three-Pin Packard Break-Out Cable

SMCS Code: 1900-038, 0781

Model: 3116 HEUI Engines in General Motors On-Highway Trucks

Warranty: One Year



- Used to provide test points, for individual wires in wiring harness, to help troubleshoot electronic engine control system
- Sold separately and as part of 125-2580 HEUI Tool Group
- Standard multimeter probe tips can be inserted into the break out cable tip jacks allowing service technician to check voltage on any 1 wire or between 2 wires of a circuit

Part Number	Description
124-5643	Three-Pin Packard Break-Out Cable

## 224-9282 Breakout Harness Assembly

SMCS Code: 1900-038, 0781

Model: 3126E and C-9 Engines

Warranty: One Year



- Used to check actual current to engine-mounted hydraulic pump
- Used with a digital multimeter that has current measuring capability
- Connects digital multimeter into machine harness
- Cable has red and black banana plugs for multimeter connection
- Connects to any component with 2-pin, Deutsch connectors (designed with both plug and receptacle connectors)
- Overall length: 30.5 cm (12 in)

Part Number	Description
224-9282	Breakout Harness Assembly



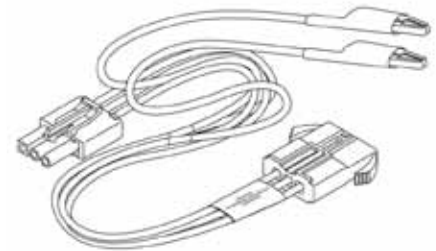
**248-4754 Breakout Cable**

**Essential Tool**

SMCS Code: 1901-038, 0781  
 Model: 320C Excavator  
 Warranty: One Year

- Used to check governor for proper voltage supply

Part Number	Description
248-4754	Breakout Cable



**125-3662 Sensor Bypass Cable**

SMCS Code: 1900-038, 0781  
 Model: 3116 and 3126 HEUI Engines  
 Warranty: One Year

- Used to isolate sensors when testing for faults
- Also used to test for bad sensor wiring in wiring harness

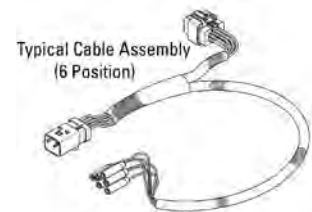
Part Number	Description
125-3662	Sensor Bypass Cable



**Ampseal Cable Assemblies**

Model: All Ampseal connector applications  
 Warranty: Six Months

- Used to troubleshoot sensors, solenoids, or controllers that use ampseal connectors
- Allows circuit to be monitored while in operation using a multimeter or scopemeter
- 2, 3, 4, 6, 8, and 12 pin configurations available
- Universal key allows use on Key 1 (Red), Key 2 (Grey), and Key 3 (Yellow) ampseal connectors
- Cables are color coded and labeled for easy identification
- Each cable has a 300 mm (11.8 in) cable length, a 900 mm (35.4 in) breakout length, and is made from 18 AWG wire



Part Number	Pin Configuration
305-0603	2-position
305-0604	3-position
305-0605	4-position

Part Number	Pin Configuration
305-0606	6-position
305-0607	8-position
305-0608	12-position

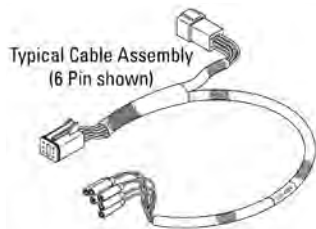
Diagnostic Tools

## DT Cable Assemblies

SMCS Code: 0769, 0779

Model: All Deutsch connector applications

Warranty: One Year



- Used to troubleshoot sensors, solenoids, or controllers that use Deutsch connectors
- Used with a multimeter or scopemeter
- Allows circuit to be monitored while in operation
- 2, 3, 4, 6, 8, 12, and 18 pin configurations available
- Cables are color coded and labeled for easy identification
- Works on Key 1 type Deutsch connectors used on many Caterpillar® applications

Part Number	Pin Configuration
326-4903	2-Pin Connector
326-4904	3-Pin Connector
326-4905	4-Pin Connector

Part Number	Pin Configuration
330-4424	6-Pin Connector
326-4906	8-Pin Connector
326-4907	12-Pin Connector
326-4908	18-Pin Connector

## 126-7877 M300 to PC RS-232 Cable

SMCS Code: 1901-038, 0781

Model: M300 Excavators

Warranty: One Year



- Used to setup and test electronic hydraulic controls using a personal computer
- Connects to hydraulic controls and RS-232 computer port

Part Number	Description
126-7877	M300 to PC RS-232 Cable

Diagnostic Tools

## 288-4325 Test Cable Group

SMCS Code: 1900-038, 0779, 0781, 0785

Model: Various engine models with three-wire, active analog sensor circuits

Warranty: One Year



- Used to test three-wire, active analog circuits
- Used with Cat® Electronic Technician (ET)
- One test cable assembly and two adapter cable assemblies allow testing of sensor circuits on various Caterpillar engines
- Process of elimination helps to diagnose bad wiring quickly

### Item 1

- Light emitting diode (LED) in test cable assembly indicates sensor is receiving power
- Test cable generates a Voltage signal that can be read by Cat® ET

### Items 2 and 3

- Adapter cable assemblies connect 3-pin Deutsch or 3-pin Amp connectors to test cable assembly

(Continued)

**288-4325 Test Cable Group (Continued)**

SMCS Code: 1900-038, 0779, 0781, 0785

Model: Various engine models with three-wire, active analog sensor circuits

Warranty: One Year

Item	Description
1	Test Cable Assembly with LED Indicator and Connector
2	Two-Connector Adapter Cable Assembly
3	Three-Connector Adapter Cable Assembly

Part Number	Description
288-4325	Test Cable Group

**Service Parts for All DDT's and Discontinued 8T-8697 ECAP**

SMCS Code: 1000-025, 1000-038, 1264-025, 1272-082

Model: 3176, 3406B

Warranty: One Year

The following are service parts for all Digital Diagnostic Tools (DDT), discontinued 8T-8697 Electronic Control Analyzer Programmer (ECAP) and their accessories:

- 190-8900 Deutsch HD Style Connector Field Repair Kit: Provides all service parts needed for Deutsch connectors used on the cables (all parts included in 190-8900 also available separately)
- 4C-4704 Removal Tool: Insertion/removal tool used to remove contacts from 9-pin circular connectors used on ECAP, DDTs, and T-Harness
- 6V-3110 Cover, Back: Back cover for DDTs
- 7T-4577 Pin, Connector: Pin in 9-pin circular connector used on ECAP and DDTs
- 8C-4145 Housing, Connector (plastic): 9-pin circular connector used on T-Harness
- 8C-4146 Housing, Connector (plastic): 9-pin circular connector used on ECAP and DDTs
- 8C-4147 Connector (plastic): Endbell on 9-pin circular connector used on T-Harness
- 3E-3423 Receptacle Assembly, Connector (metal): 10-pin circular connector used on ECAP
- 8C-4148 Connector, Relief: Strain relief on 9-pin circular connector used on T-Harness
- 8C-4797 Socket, Carriage: Socket in 9-pin amp connector used on T-Harness
- 8C-5543 Case, Plastic: Case for ECAP
- 3E-0152 Plug Assembly, Connector
- 8T-5277 Cable, Probe: PWM cable included with DDTs
- 9X-1314 Wire Assembly: Red wire assembly used with 40-pin breakout cable
- 9X-1315 Wire Assembly: Black wire assembly used with 40-pin breakout cable
- 9X-1339 Receptacle Assembly: Used on 40-pin breakout cable
- 7X-6170 Digital Diagnostic Tool: 9-pin to 4-pin adapter

Part Number	Description
8T-8697	ECAP

**Repair Tools for 9-Pin Amp Connector**

SMCS Code: 1000-025

Model: 3176, 3406B

Warranty: One Year

- Makes simple repairs possible on 9-pin Amp circular connector on 8T-5275 Adapter Cable Assembly and on port #1 of discontinued 8T-8697 Electronic Control Analyzer Programmer (ECAP)
- 4C-4704 used to insert and remove contacts from connectors when they are being replaced

Part Number	Description
4C-4704	Insertion/Removal Tool
8C-4145	T-Harness Connector
8C-4146	ECAP/DDT Connector

(Continued)

## Repair Tools for 9-Pin Amp Connector (Continued)

SMCS Code: 1000-025

Model: 3176, 3406B

Warranty: One Year

Part Number	Description
8C-4147	Endbell
8C-4148	Strain Relief
8C-4797	Socket
7T-4577	Pin

## 312-5642 Product Link Diagnostic Tool Group

SMCS Code: 1900-038

Model: All Cat® models with Product Link Attachment

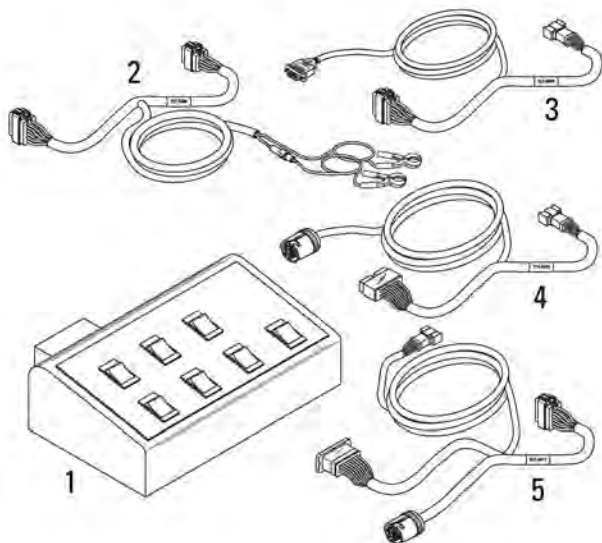
Warranty: One Year

- Used to setup, test, and troubleshoot Product Link system
- Used with external 12 VDC or 24 VDC battery power source
- 312-5641 Switch Box used with various harness assemblies to perform specific diagnostic tests on unit being serviced
- Comes complete with switch box, main (power supply) harness, three stub harnesses, and case with foam insert
- 312-5608 Main Harness connects to 312-5641 Switch Box and 312-5609, 312-5610, or 312-5611 Stub Harnesses connect main harness to Product Link component being tested

### Reference

NEHS1016, 312-5642 Product Link Diagnostic Tool Group

Diagnostic Tools



Item	Part Number	Description
1	312-5641	Switch Box Assembly
2	312-5608	Main Harness Assembly
3	312-5609	121 Stub Harness Assembly
4	312-5610	151/201 Stub Harness Assembly
5	312-5611	300/321 Stub Harness Assembly
—	312-5642	Product Link Diagnostic Tool Group
<b>Not Shown</b>		
1	6V-7145	Case
—	317-9430	Foam Insert for 6V-7145 Case

**317-7484 Communication Adapter 3 Group**

**Essential Tool**

SMCS Code: 1900-038, 0781

Model: All Cat® models with electronic controls

Warranty: One Year

European Union compliant, CE marked

- Replaces 275-5120 Communication Adapter II Group
- Used to monitor communication, between engine and PC, using service tool programs such as Cat® Electronic Technician on J1939/11 high-speed data link, Cat® DataLink, or J1708 (ATA) vehicle networks, or Dual DataLink
- Comes complete with cables, software CD, manual (included on CD), and carrying case
- Lightweight and portable
- Communication Adapter II, manual, and software can be purchased separately (317-7485)
- RP1210A compliant
- Group includes all items in Figure 2

**Software**

- Designed to run with Microsoft Windows XP and Vista
- Ready to use, just install software program onto PC using provided CD

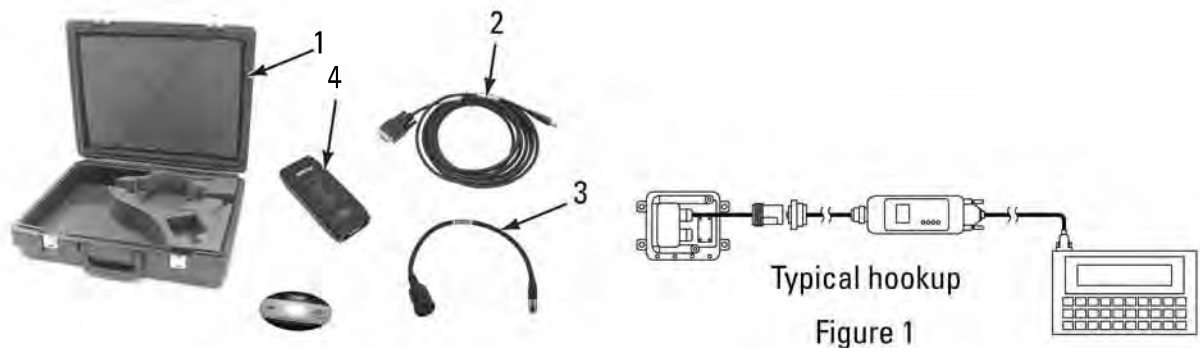
**Communication**

- Allows communication between service tools and engine controls using various data links such as J1939/11, Cat® DataLink, and J1708 (ATA) vehicle networks, or Dual DataLink
- Flash program allows adapter firmware upgrades as additional features become available
- Uses J1939/11, high-speed data link (part of ADEM III controls), substantially reducing flash times
- Automatically selects J1939/11 when flashing the engine (reduces the flash time approximately 80%, from 14 minutes to 3 minutes)

**Reference**

NEHS1032, Tool Operating Manual

Data Links	J1708 American Trucking Association (ATA), Cat® Data Link (CDL), and J1939-11 high-speed data link
PC Connection	USB 1.1 Full Speed
Operating Voltage	9-32 VDC
Operating Temperature	-18° to 65° C (0° to 149° F)
Size	470 x 396 x 127 mm (18.5 x 15.6 x 5 in)
Weight	2.53 kg (5.59 lb)
Item	Description
5	NETG5057, CD ROM <sup>1</sup>
<sup>1</sup> Not available separately	



(Continued)

## 317-7484 Communication Adapter 3 Group (Continued)

### Essential Tool

SMCS Code: 1900-038, 0781

Model: All Cat® models with electronic controls

Warranty: One Year

Item	Part Number	Description
1	6V-7145	Storage Case with 317-7513 Protective Foam Pad
2	370-4617	PC USB Cable
3	327-8981	Data Link Cable, 51 cm (20 in) — use with ATA, CDL, and J1939-11
4	317-7485	Electronic Control Group
--	317-7484	Communication Adapter 3 Group
<b>Optional Cables (Sold Separately)</b>		
--	7X-1686	In-Cab Adapter Cable (ATA only)
--	157-4829	In-Cab Adapter Cable; ATA, CDL, and J1939-11 (9-pin to 9-pin applications typically found in Freightliner)

## 317-7492 Wireless Communication

Model Usage: All

Warranty: One Year



European Union compliant, CE marked

- Used with 317-7485, Communication Adapter 3 to wirelessly monitor communication between engine and PC
- Uses service tool programs, Cat Electronics Technician on J1939/11 high-speed data link, CAT DataLink, or J1708 (ATA) vehicle networks, or Dual DataLink
- Includes cables, software CD and manual on CD
- Completely sealed connectors and enclosure
- USB device connectivity options

Part Number	Description
317-7492	Wireless Communication

## 349-1206 Wireless Communication

### Adapter 3 Radio Group (EAME Use Only)

Model Usage: All

Warranty: One Year



European Union Compliant, CE marked

- For EAME use only
- Used with 317-7485 Communication Adapter 3 to wirelessly monitor communication between engine and PC
- Uses service tool programs, Cat Electronics Technician on J1939/11 high-speed data link, CAT Datalink, or J1708 (ATA) vehicle networks, or Dual Datalink
- Includes cables, software CD and manual on CD
- Completely sealed connectors and enclosure
- USB device connectivity options

Part Number	Description	Region
349-1206	Wireless Communication Adapter 3 Radio Group	EAME only

**225-5985 Cable Assembly**

SMCS Code: 1900-038, 0781

Model: All Models with Electronic Controls

Warranty: One Year

- Used to connect laptop computers without serial ports to Communication Adapter II (see note)
- Uses computers parallel port
- Cable is 25 pin, male-to-male, 7.6 m (25 ft) long

**NOTE:**

Because of its length, this cable will work with Communication Adapter II only with newer PC's without a serial port. Older laptops will operate only with a shorter parallel cable, 2 m (6 ft) long maximum.



Part Number	Description
225-5985	Cable Assembly

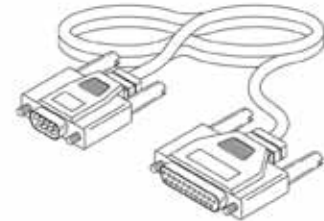
**321-4331 Serial Cable**

SMCS Code: 0769, 0779

Model: All models with electronic controls

Warranty: One Year

- Used to extend and adapt DB25 (25-pin) connector to DB9 (9-pin) connector
- Used with 275-5120 Communications Adapter II Group and cancelled 171-4400 Communication Adapter II Group
- Replaces 160-0141 Serial Cable
- Larger individual wires and more robust cable provides longer service life
- Overall length: 7.6 m (25 ft)



Part Number	Description
321-4331	Serial Cable

**187-8520 Wireless ET Link Group**  
**Discontinued — Service/Repair Parts Available**

**Reference**

NEHS0789, Using the 187-8520

Caterpillar Wireless ET Link Group  
 with Caterpillar Electronic Technician



Diagnostic Tools

(Continued)

## 187-8520 Wireless ET Link Group (Continued) Discontinued — Service/Repair Parts Available

Item	Part Number	Description
1	187-8510	Wireless ET Link Service Truck Unit
2	187-8511	Wireless ET Link Machine Unit
3	187-8507	Communication Adapter I Cable
4	187-8508	T Power Cable

Item	Part Number	Description
5	5P-7366	Cable Assembly - Power
6	4C-9031	Battery Cable
7	1U-9484	Communications Cable
All items	187-8520	Wireless ET Link Group
Not shown	187-8512	Fuse, 1 Amp

## 259-3183 Datalink Cable Assembly

### Essential Tool

SMCS Code: 1900-038, 0781

Warranty: One Year



- Used to connect engine control module (ECM) to 239-9955 Wireless Communication Adapter
- Allows communication between service tools and engine controls using various data links such as J1939/11, Cat® DataLink, and J1708 (ATA) vehicle networks
- Overall length: 1900 mm (75.0 in)

Part Number	Description
259-3183	Datalink Cable Assembly

## 139-4166 (CAT/ATA) Universal Cable

SMCS Code: 1900-038, 0781

Model: All Models With Electronic Controls

Warranty: One Year



- Replaces discontinued 7X-1412 Adapter Cable Assembly (ATA) and 7X-1570 Adapter Cable Assembly (CAT)
- Used to connect either the ATA data-link or the Cat® data-link to the discontinued 7X-1700 Communication Adapter
- Overall length: 3 m (18 ft)

Part Number	Description
139-4166	(CAT/ATA) Universal Cable



**370-8059 USB Serial Adapter**

Model Usage: All

Warranty: Six Months

- Used to provide a RS232 communication link for personal computers (PC's) equipped only with USB ports
- Can be used with the discontinued 171-4401 and 275-5120 Communication Adapters
- Can be used to flash DataView designed to work with 2000, Microsoft Windows XP, Vista Windows and Windows 7
- Includes software CD



Part Number	Description
370-8059	USB Serial Adapter

**399-7427 Power Cable Assembly**

Model: 3406E, 3176B, 3116HEUI, 3126HEUI, C-10, and C-12 Engines

Warranty: One Year

- Used to gain access to ADEM II ECM data, in event that service tool will not communicate at OEM connector
- Also provides means of powering service tool while cranking engine
- Allows service tool to be connected directly to ECM to verify ECM operation -- can also isolate a communication problem due to OEM wiring harness
- Cable assembly has fuse protected power clips to allow direct hook up to battery
- Replacement fuses available (8M-8948 Fuse, 15 amp)



Part Number	Description
399-7427	Power Cable Assembly

**7X-1425 RS-232 Cable**

SMCS Code: 1900-038, 0781

Model: All models with electronic controls

Warranty: One Year

- Replaces discontinued 7X-1688 Cable Group
- Used to connect a discontinued 7X-1701 Communication Adapter I to RS-232 computer port (discontinued 7X-1701 Communication Adapter I can now be purchased separately)
- 4C-6805 Adapter (9 to 25 pin), part of discontinued group, is sold separately for use with older computers



Part Number	Description
7X-1425	RS-232 Cable

## 3E-3423 Connector

SMCS Code: 0785

Model: 3406 and 3176 Engines

Warranty: One Year

- Used to replace ECAP's plastic Port 1 socket and mating connector with steel parts to eliminate breakage
- 3E-3423 Connector is installed into ECAP
- Rework can be done by dealer or sent to the Dealer Service Tools Division

### Instructions for Reworking ECAP at Dealership

- Enlarge diameter of connector mounting holes by 0.41 mm (0.016 in)
- Hole enlargement can be easily completed with a file
- Move wires from plastic 8C-4146 Connector to steel 3E-3423 Connector 1 wire at a time
- Move wires on connector

Pin No.(8C-4146)	To Pin On(3E-3423)
1	A
2	B
3	K
4	H
5	(no connection)
6	G
7	J
8	C
9	F
No connection	D and E
The other end of the wire is attached to the following locations — With Pre-Regulator Board or (Without)	
Pin No.(8C-4146)	
1	Input Pre-Reg (B+)
2	Gnd Pre-Reg (B-)
3	Gnd Pre-Reg (Gnd)
4	DL- (DL-)
5	(no connection)
6	RXL (RXL)
7	DL+ (DL+)
8	Tx (Tx)
9	Prog (Prog)

Part Number	Description
3E-3423	Connector

**7X-1713 EIS Loopback Cable**

SMCS Code: 1900-038, 0781

Model: All Engines with EIS (Electronic Ignition System)

Warranty: One Year

- Used to allow EIS (Electronic Ignition System) control to test itself

Part Number	Description
7X-1713	EIS Loopback Cable
<b>Service/Repair Parts</b>	
7X-6222	Plug
8T-8729	Connector Pin
8T-8730	Socket
8T-8735	Plug - Connector
8T-8737	Seal Plug
9W-0844	Socket



**245-4121 Communication Cable Assembly**

**Essential Tool**

SMCS Code: 1900-038, 0781

Model: Most Paving Products

Warranty: One Year

- Used for flash, upload, download, parameter adjustment, and status communication with Sauer Danfoss Controller (electric screed heat)
- Used with a laptop computer and WebGPI software

Part Number	Description
245-4121	Communication Cable Assembly



**Communication Cables, Adapter Cable, Test Cables, and Test Connector**

Model: CS-563E, CS-573E, CS-583E, CS-663E, CS-683E, CS56, CS64, CS74, CS76, CS76XT Soil Compactors

Warranty: One Year

- Used to service various electronic components and sensors on soil compactors

**Reference**

REHS3302, Service Manual

**300-7924 Communication Cable (Item 1)**

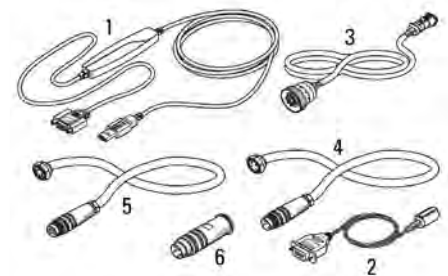
- CAN (DB9) to USB adapter
- Used on all models that contain a Sauer Danfoss Plus 1 ECM
- Used with Sauer Danfoss Plus+1 Guide Service Tool software
- Software available on SISWeb downloads page

**300-7925 Communication Cable (Item 2)**

- DB9 PC serial port to 3-pin receptacle Deutsch adapter
- Used with 300-7924 to connect PC service tool to machine (DB9 connects to 300-7924 Communication Cable)
- 3-pin Deutsch plug connects to CAN port or COM port on machine (CAN/COM ports sometimes located behind fuse panel)

**309-5667 Adapter Cable (Item 3)**

- 9-pin Deutsch (service port) to 3-pin plug Deutsch adapter
- Used with 300-7924 and 300-7925 for machines with 9-pin service port connector instead of a 3-pin Deutsch CAN plug



(Continued)

## Communication Cables, Adapter Cable, Test Cables, and Test Connector (Continued)

Model: CS-563E, CS-573E, CS-583E, CS-663E, CS-683E, CS56, CS64, CS74, CS76, CS76XT Soil Compactors

Warranty: One Year

### 309-5668 Test Cable (Item 4)

- Used to test A-sensor (accelerometer) on ALFA-030 controller

### 309-5669 Test Cable (Item 5)

- Used to test power on ALFA-030 controller
- Used to measure voltage on POWER/INSTR connector when no CMV, RMV, or frequency reading is present

### 309-5670 Test Connector (Item 6)

- Used to simulate A-sensor (accelerometer) on ALFA-030 controller

Item	Part Number	Description
1	300-7924	Communication Cable
2	300-7925	Communication Cable
3	309-5667	Adapter Cable
4	309-5668	Test Cable
5	309-5669	Test Cable
6	309-5670	Test Connector

## 371-3480 USB Cable

Model Usage: 735, 740, 740 Ejector

Warranty: One year



- A-Male to A-Male USB cable supports A-Male to A-Male USB cable supports Multi-Purpose Display (CMPD) ECMs used on Articulated Trucks
- The new method of flashing will transfer the flash file over a USB connection using Microsoft Active Sync
- CMPD's USB cable must be plugged into a USB port on the PC

Specifications	
USB A-Male to A-Male	
Length	3 meter (10 ft)
Type	USB 2.0

Part Number	Description
371-3480	USB Cable

## 366-7782 Attenuator

Model Usage: All with DPF

Warranty: One Year



- Used to perform the "DPF Soot Loading Sensor Functional Test"
- 20+/-0.5 dB fixed resistive attenuation from 1 MHz to 2 GHz
- 50 Ohms impedance
- 1 W power handling capability
- Temperature range -40 to 75° C (-40 to 167° F)
- TNC jack (female) on both ends
- Length: 0.75 m (29.5 in)

Part Number	Description
366-7782	Attenuator

Engine Tools

**219-2368 Diagnostic Plug**

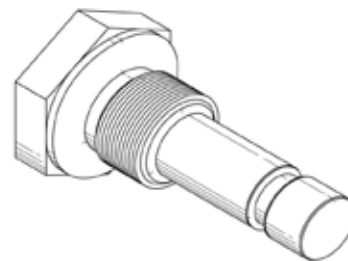
Model: 3126 HEUI Engines

Warranty: Six Months

- Used to troubleshoot HEUI pumps
- Used with 9X-1484 Seal Kit

**Reference**

REHS1281, Service Manual



Part Number	Description
219-2368	Diagnostic Plug

**125-2580 HEUI Engine Tool Group**

Model: 3116 HEUI and 3126 HEUI Engines

Warranty: One Year

- HEUI diagnostic tooling — includes all necessary cables, harnesses, and electrical pin removal tools to troubleshoot the electrical system, conveniently packaged in a separate plastic box within the group
- Hydraulic diagnostic tooling — includes all necessary fittings, pressure gauge and hose, and a special breakout tee to troubleshoot the hydraulic system — including the injection actuation pressure sensor and control valve/pump combination
- Injector and IAPC valve removal and installation tools
- Modified injector clamp to aid in proper assembly and tightening of the jumper tube
- Necessary bit drivers and socket to work on hard-to-reach components
- Double-ended offset feeler gauge for setting valves

Group Includes:
Plug
Clamp Assembly

Part Number	Description
125-2580	HEUI Engine Tool Group
<b>Parts List</b>	
1U-7587	Pry Bar, 6 in long <sup>1</sup>
3J-7352	Connector
3J-7354	Seal - O-ring - STOR for 8C-3446 (not pictured)
5P-0144	Fuel Line Socket
5P-0333	Crowfoot Wrench
5P-5008	Reducer 37° Flared
6V-8397	O-ring Seal
6V-9508	Plug - ORFS
7J-0204	O-ring Seal

Part Number	Description
<b>Parts List (Continued)</b>	
8C-7310	Adapter
9S-8007	O-ring Plug
123-4941	Valve Setting Gauge
125-2584	Hex Ball Driver
125-2588	Hex Wrench, 7/64 in
125-2589	Diagnostic Fitting
125-5902	Foam Insert GP
6V-7145	Case
1U-5757	Hose Assembly
3B-6768	Adapter - STR (NPTF)
8S-7169	Coupling - Pipe Hexagon
8T-0852	Gauge Group - Pressure

<sup>1</sup>Warranty: Lifetime

## 5P-6582 Vacuum/Pressure Gauge



- Complete with 0.6 m (2 ft) of high quality hose, plus (3) fittings
- 88.9 mm (3 1/2 in) compound gauge has a multicolor dual scale dial with ranges from 0 to 68.9 kPa (0 to 10 psi), 0 to 0.7 kg/cm<sup>2</sup> (0 to 9.94 psi) pressure and 0 to 70 cm (0 to 28 in) Hg vacuum
- Hook-on gauge enables technician to hang gauge and hose assembly to free his hands

Part Number	Description
5P-6582	Vacuum/Pressure Gauge

## 1U-5470 Engine Pressure Group

Model: All Models  
Warranty: One Year

- Used to check performance of turbocharged diesel and natural gas engines and, with optional 1U-5554 Panel and 8T-0840 Pressure Gauge, to make operating adjustments to naturally aspirated gas engines
- Replaces discontinued 6V-3150 Engine Pressure Groups and 4S-6553 Engine Evaluation Test Group; contents of 6V-3150 still serviced, but contents of 4S-6553 no longer serviced; 6V-3150 can be upgraded to essentially same functional specifications of 1U-5470 by installing optional 1U-5554 Panel with either 0-200 kPa [0-60 inch mercury (Hg)] 1U-5469 Pressure Gauge (0-60 inch Hg) or 100-0-100 kPa (30-0-30 inch Hg) 8T-0840 Pressure Gauge
- Equipped with 4 different pressure gauges that indicate pressure relative to ambient atmospheric pressure; require no measurement corrections due to atmospheric pressure changes
- 8T-0848 Pressure Gauges used to measure fuel pressure, intake manifold pressure on turbocharged diesel engines, cooling system pressure and to power balance diesel engines in multiple engine applications (0-58 psi)
- 8T-0846 Pressure Gauge used to measure oil pressure and air compressor cut-in and cut-out pressures (0-145 psi)
- Chart in case lid used to convert kPa or psi to inches of mercury as shown in Fuel Setting and Related Information microfiche
- 6V-6045 Accessories Case contains fittings that can be installed in all 1/8 inch NPT ports on Cat® Engines for setting up pressure taps for 1U-5470; 8T-0821 Tubing is easily connected to and disconnected from 1U-5470 panel and engine port fittings; internal O-ring seals tubing outer diameter and internal collet mechanism locks tubing into fitting
- Optional 8T-0840 Pressure Gauge used to measure intake manifold pressure on natural gas and gasoline engines and to power balance natural gas engines in multiple engine applications; mounts on optional 1U-5554 Panel Assembly which can be permanently installed in 1U-5470 Engine Pressure Group; 6V-4045 cannot be stored in 1U-5470 with optional gauge installed
- Optional slack tube 8T-0452 Water Manometer available for use with 1U-5470; measures static, vacuum, or differential pressure over range of 500 mm to 500 mm H<sub>2</sub>O for total range of 1000 mm H<sub>2</sub>O; stored in optional 8T-3153 Foam Block placed in lid of 8T-0841; optional 8T-3117 Foam Block can be used to store 8T-0452 in case lid of 6V-9450 Engine Pressure Group

(Continued)

**1U-5470 Engine Pressure Group (Continued)**

Model: All Models  
Warranty: One Year

8T-0848 Pressure Gauge range	400 kPa (58 psi)
8T-0846 Pressure Gauge range	1000 kPa (145 psi)
1U-5469 Pressure Gauge range of engine boost or positive intake manifold pressure	0 - 200 kPa (0 - 60 inches Hg)
8T-0839 Differential Pressure Gauge range	Up to 12 kPa [50 inches water (H2O)], as well as either 12 kPa (1.74 psi) pressure or vacuum
All other gauges in group read directly in	kPa and psi
8T-0840 Pressure Gauge range	0 - 100 kPa (0 - 30 inches Hg)
Vacuum range	0 - -100 kPa (0 - -30 inches Hg)
Operating temperature range	-1° to 60° C (30° to 140° F) for differential pressure gauges. -18° to 71° C (0° to 160° F) for all other gauges
Gauge accuracy	±2 percent of full scale for differential pressure gauge. SAE Grade A (±1.5 to 1 percent of full scale for all other gauges)
Operating position	Position has no effect on differential pressure gauge, if gauge has been mechanically adjusted to ZERO in the test position (on all other gauges, position has no effect on accuracy)
Pressure media	Differential pressure gauge — clean air and gases only (no liquids). All other gauges — air, gases and liquids (oil, water, antifreeze, fuel, etc.)
Size	390 x 310 x 190 mm (15.4 x 12.2 x 7.5 in)
Weight	6.8 kg (15 lb)
NOTE: DO NOT use any acids or other highly corrosive liquids in the gauges.	
Item	Description
Not shown	Form SEES5677 Conversion Chart
Not shown	Form NEEG2187 Title Decal

Part Number	Description	Use	Used with
102-6496	Adapter, 1/8 -27 NPTF to 1/8 -28 BSPTM	Allows 1U-5470 Engine Pressure Group to be connected to the oil pressure switch port on the listed engines. Adapter requires the removal of the oil pressure switch on these engines in order for oil pressure readings to be taken.	C0.5, C0.7, C1.1, C1.5, C1.7, C2.2, C3.4

**1U-5470 Engine Pressure Group (Continued)**

DO NOT use any acids or other highly corrosive liquids in the gauges.

Item	Part Number	Description
--	1U-5470	Engine Pressure Group
<b>Parts List</b>		
1	8T-0841	Case
2	8T-0839	Differential Pressure Gauge
3	8T-0846	Pressure Gauge
4	1U-5469	Pressure Gauge
5	8T-0848	Gauge GP - Pressure (3)
6	4C-3974	Fitting - Union Bulkhead (8)
7	8T-0821	Tubing, 16 m (52.5 ft)



(Continued)

# Engine Tools

## 1U-5470 Engine Pressure Group (Continued) (Continued)

DO NOT use any acids or other highly corrosive liquids in the gauges.

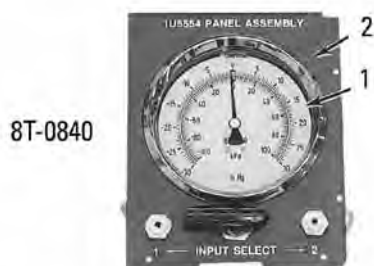
Item	Part Number	Description
<b>Parts List (Continued)</b>		
8	4C-3973	Fitting - Connector (male) (6)
9	4C-3972	Fitting - Male Elbow (Swivel) (6)
10	4C-3971	Union (2)
11	6V-6132	Cable Tie (4)
12	6V-6045	Case - Plastic Form SEES5575 Accessories Label
13	6V-6115	Packing Set Base

### 8T-0452



<b>Optional 8T-0452 Water Manometer (SEHS8907, pg. 7)</b>		
Item	Part Number	Description
1	8T-0452	Water Manometer
2	8T-3153	Foam Block

### 8T-0840



<b>Optional 8T-0840 Pressure Gauge</b>		
Item	Part Number	Description
1	8T-0848	Gauge GP - Pressure (3)
2	1U-5554	Panel Assembly

Diagnostic Tools

## 198-4240 Digital Pressure Indicator Group

Model: All

Warranty: Manufacturers One Year

- Used to measure vacuum, pressure, differential pressure, and temperature
- Self-contained, microprocessor based digital meter
- Uses sensors and cables to remotely measure systems under pressure
- Indicator has four input connectors:
  - Connector 1 measures pressure or vacuum
  - Connectors 1 and 2 measure differential pressure
  - Connectors 2, 3, and 4 measure pressure
- Includes Type-K thermocouple for measuring temperature

### Repair Information

SPX Service Repair  
 755 Eisenhower Drive  
 Owatonna, MN 55060  
 Attn: Repair Department  
 Phone: 800-344-4013

(Continued)



**198-4240 Digital Pressure Indicator Group (Continued)**

Model: All

Warranty: Manufacturers One Year

Visit the SPX Repair Track web link to complete and submit the form for proper authorization: <https://repairtrack.spx.com>

Operating temperature	0° to 38° C (32° to 100° F)
Storage temperature	-40° to 66° C (-40° to 150° F)
Battery	1U-9534 Alkaline Battery, 9 Volt
Battery life (approx.)	1 transducer 108 hours, 2 transducers 77 hours, 3 transducers 51 hours, 4 transducers 43 hours
Group weight	2.36 kg (5.2 lb)
Carrying case	394 x 311 x 102 mm (15.5 x 12.3 x 4.0 in)
Pressure pickup sensors	3,500, 35,000, 41,368 and 70,000 kPa (500, 5,000, 6,000 10,000 psi) (198-4240 Group does not include 5,000 psi pressure pickup)
NOTE: The Digital Pressure Indicator Group pressure sensors cannot be used with Data View at the present time.	

Part Number	Description	Range	Accuracy/Specification
198-4237	Pressure Pickup Sensor, 500 psi, blue connector	±0 - 30 inches Hg, ±0 - 100 psi, ±0- 500 psi, ±0 - 35 bar, ±0 - 3,500 kPa	0.5% ±0.33 inches Hg, 0.5% ±1 psi, 0.5% ±5 psi, 0.5% ±0.35 bar, 0.5% ±34 kPa
198-4238	Pressure Pickup Sensor, 5,000 psi, red connector	±0 - 5,000 psi, ±0 - 350 bar, ±0 - 35,000 kPa	0.5% ±50 psi, 0.5% ±3.5 bar, 0.5% ±340 kPa
198-4239	Pressure Pickup Sensor, 6,000 psi, orange connector	±0 - 6,000 psi, ±0 - 413 bar, ±0 - 41,368 kPa	0.5% ±60 psi, 0.5% ±4.1 bar, 0.5% ±413 kPa
251-9600	Pressure Pickup Sensor, 10,000 psi, orange connector	±0 - 10,000 psi, ±0 - 700 bar, ±0 - 70,000 kPa	0.5% ±100 psi, 0.5% ±7 bar, 0.5% ±700 kPa
8T-0458	K-Type Thermocouple Sensor	-40° to 2500° F, -40° to 1350° C	0.5% ±2 of reading, 0.5% ±2 of reading

**198-4240 Digital Pressure Indicator Group Parts**

- Used to measure vacuum, pressure, differential pressure, and temperature
- Self-contained, microprocessor based digital meter
- Uses sensors and cables to remotely measure systems under pressure
- Indicator has four input connectors:
  - - Connector 1 measures pressure or vacuum
  - - Connectors 1 and 2 measure differential pressure
  - - Connectors 2, 3, and 4 measure pressure
- Includes Type-K thermocouple for measuring temperature

Not Shown	NEHS0818 Tool Operating Manual
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Diagnostic Tools

(Continued)

## 198-4240 Digital Pressure Indicator Group Parts (Continued)

Item	Part Number	Description
1	198-4234	Indicator (face decal NEEG2932)
2	198-4236	Extension Cable, 20 ft (6 m) (2)
3	198-4229	Cable - Digital Pressure Indicator 40 ft (12 m)
4	198-4237	Pressure Pickup, 500 psi (3,500 kPa), blue connector
4	198-4238	Pressure Pickup, 5,000 psi (35,000 kPa), red connector (optional)
4	198-4239	Pressure Pickup, 6,000 psi (41,368 kPa), orange connector
4	251-9600	Pressure Pickup, 10,000 psi (70,000 kPa), orange connector
—	198-4240	Digital Pressure Indicator Group
<b>Not shown</b>		
—	198-4235	Foam Insert
—	6V-3072	Case - Plastic (case decal NEEG2931)
—	8T-0458	Wire - Thermocouple
<b>Optional Items (Sold Separately)</b>		
—	6V-0852	Cap - Dust
—	6V-3965	Valved External Nipple, 9/16 in SAE
—	6V-3966	Valved External Nipple, 1/4 in NPT
—	6V-4144	Valved Replacement Coupler, 1/4 in NPT, internal thread
—	8T-3613	Valved External Nipple, 1/8 in NPT

## 198-4229 Digital Pressure Indicator Cable

Model: All

Warranty: One Year



- Used to increase distance between pressure pickup and hand-held, digital pressure indicator
- Used with 198-4240 Digital Pressure Indicator (DPI)
- Allows technician greater freedom to move around during testing, especially when working on large equipment
- Overall length: 12 m (40 ft)

Part Number	Description
198-4229	Cable - DPI 40 ft (12 m)

### Reference

NEHS0818, Using the 198-4240 Digital Pressure Indicator Group

## 8T-5300 Timing Indicator Group

Discontinued — Service/Repair Parts Available



### Reference

SEHS8580, Special Instruction

Item	Part Number	Description
--	8T-5300	Timing Indicator Group
<b>Parts List</b>		
1	6V-7145	Case
2	8T-5250	Indicator (not serviced)
3	8T-3253	Packing Set
4	5P-7366	Cable Assembly - Power
5	8K-4644	Fuse (5)

(Continued)

**8T-5300 Timing Indicator Group (Continued)**  
**Discontinued — Service/Repair Parts Available**

Item	Part Number	Description
<b>Parts List (Continued)</b>		
6	6V-3093	Adapter - Transducer, 1/4 in NPTF
7	6V-2199	Adapter - Transducer, 1/8 in NPTF
8	6V-2197	Transducer - Magnetic TDC Pickup 114 mm (4.5 in) long
9	5P-7362	Cable Assembly - Signal TDC
<b>Not Shown</b>		
--	6V-6045	Case - Plastic, NEEG2061 Accessories Case Decal
<b>Additional accessories available separately</b>		
--	8T-5185	Transducer - Magnetic 17.8 cm (7.0 in) long
--	8T-5184	Transducer - Magnetic TDC Pickup 8.9 cm (3.5 in) long

**310-4780 Diesel Injection Detector**

Model: 3046, 3064, 3066 Engines

Warranty: Manufacturer's

European Union compliant, CE marked

- Used to detect fuel injection pulse on diesel engine fuel line
- Used with 9U-5358 Digital Timing Light or other analyzer/tester with an inductive pickup
- Pickup clamp fits around fuel line from injection pump
- 6 mm diameter pickup clamp is included with 6.5 mm and 1/4 inch diameter pickup clamps optional
- When a fuel injection pulse is detected it causes indicator lamp to flash and sends a current pulse through inductive loop (cable) on unit
- Inductive loop (cable) allows use of virtually any test equipment with an inductive pickup
- Faster and more accurate than drip timing an engine



**Reference**

NEHS1012, Tool Operating Manual, 310-4780 Diesel Injection Detector for 3046, 3064, and 3066 Engines

Operating temperature	-18 to 50° C (-4 to 122° F)
Storage temperature	-40 to 80° C (-40 to 176° F)
Lead length	1.7 m (67 in)
Power requirements	1U-9534 9 Volt Battery
Dimensions (H x L x W)	120 x 60 x 25 mm (4.7 x 2.4 x 1.0 in)

Item	Part Number	Description
1	310-4780	Diesel Injection Detector
2	310-4777	Pickup Clamp, 6 mm diameter
—	1U-9534	Battery - 9V Size (not shown)
<b>Optional</b>		
3	310-4776	Pickup Clamp, 1/4 in diameter
4	310-4778	Pickup Clamp, 6.5 mm diameter

## Magnetic Transducers

Model: 3208

Warranty: Six Months

### 8T-5184 Transducer

- Has 89 mm (3.5 in) long steel shank which is 12.7 mm (0.5 in) shorter than existing 6V-2197 Transducer
- Can be used in applications where 6V-2197 Transducer is too long, such as on some 3208 Engines where access to top center hole in front cover is limited by fan belts and fan guard

### 8T-5185 Transducer

- Has 178 mm (7.0 in) long steel shank which is 63.5 mm (2.5 in) longer than 6V-2197 Transducer
- Can be used in applications where 6V-2197 Transducer is too short, such as on D7G SA Tractor

Part Number	Size
8T-5184	88.9 mm (3.5 in) long
8T-5185	17.8 cm (7.0 in) long

## 4C-6710 Governor Test Unit Group

Model: 3600 Family Engines with Heinzmann Governors

Warranty: One Year



- Used to test and adjust Heinzmann Electronic Governors without running engine
- Simplifies installation and service of governor
- Measures governor frequency when engine is running and feedback voltage when engine is stopped
- Simulates engine for following tests:
  - Check governor frequency at different fuel levels
  - Adjust and check minimum and maximum governor frequency levels
  - Adjust speed droop during droop operation
  - Check effect of gain, stability and derivative value settings on operation of engine

### References

SEHS9222, Special Instruction

SENR4661, Heinzmann Governor Service Manual

Frequency range	100 - 10,000 Hz ( $\pm 5$ Hz)
Voltage range	1 - 6 Volts ( $\pm 50$ mV)
Simulator frequency	150 - 8,000 Hz
Output voltage	8V peak-peak maximum
Current consumption	8 mA maximum
Battery	1U-9534 Battery, 9 Volt
Temperature range	0° to 45° C (32° to 104° F)

Part Number	Description
4C-6710	Governor Test Unit Group

### 8T-5301 Diesel Timing Adapter Group

Model: 300, 1100, 3200, 3300 and 3400 Series Engines

Warranty: One Year

- Used to check timing on diesel engines using discontinued 8T-5250 Timing Indicator
- Allows discontinued 8T-5250 Timing Indicator to measure engine/fuel system timing and mechanical advance
- Discontinued 6V-7910 Transducer installed in No. 1 fuel line to provide RPM signal to discontinued 8T-5250 Timing Indicator
- Group includes all items in figure



Part Number	Item	Description
8T-5301	--	Diesel Engine Timing Adapter Group
Parts List		
6V-2198	1	Extension Cable (X8)
6V-7910	2	Transducer
5P-7436	3	Adapter
5P-7437	4	Adapter
5P-7435	5	Adapter Group - Tee
6V-3016	6	Washer

### 6V-9060 Spark Timing Adapter Group

Model: 3304, 3306, 3516

Warranty: One Year

- Used to check timing on spark ignited engines using discontinued 8T-5250 Timing Indicator
- Fiber optic link that allows discontinued 8T-5250 Indicator to check dynamic timing on engines that have individual coils for each cylinder
- Connected to port labeled injection or spark transducer input; can also be used with discontinued 6V-3100 Timing Indicator Group and connected to port labeled Diesel Injection Transducer; transmitter portion of adapter is then connected to primary (low voltage) coil terminals of No. 1 cylinder on engine (NOTE: 6V-9060 Spark Timing Adapter Group will be destroyed if it is connected to the secondary (high voltage) side of the coil.)



#### Reference

SEHS8580, Special Instruction

Item	Description
1	Transmitter, Discontinued

Item	Part Number	Description
2	8T-5260	Cable, Discontinued
3	8T-5257	Receiver, Discontinued
4	8T-5258	Cable - Coil Adapter
Not shown	1U-5524	Cable As. - Spark Timing Adapter
—	6V-9060	Gas Engine Timing Adapter Group

### 1U-5524 Adapter Cable

- Part of the 6V-9060 Spark Timing Adapter Group
- Allows dynamic timing of engines equipped with integral shielded ignition coils and Altronic magnetos to be checked; engines with Altronic magnetos have integral shielded ignition coils with 3-pin connectors for which 1U-5524 Adapter Cable is designed

(Continued)

## 1U-5524 Adapter Cable (Continued)

- Connected at primary (low voltage) coil terminals of No. 1 cylinder; cable from magneto disconnected at primary coil connector and two 1U-5524 Adapter Cable 3-pin connectors are coupled in between the coil and cable; remaining 2-pin connector of adapter is coupled to 6V-9060 Spark Timing Adapter Group; when 6V-9060 and TDC Magnetic Transducer are connected to discontinued 8T-5250 Indicator, engine RPM and timing displayed

## 373-4837 Temperature Sensor Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Used to measure voltage and resistance on circuits that go to the IAT sensor

Part Number	Description
373-4837	Temperature Sensor Breakout Harness

## 372-5251 Breakout Harness

Model Usage: CT660 Truck, CT11, CT13, CT15

Warranty: Manufacturer's



- Used to properly diagnose and service 11 & 13 L engines

Specifications	
Dimensions	304.8 x 304.8 x 304.8 (12 x 12 x 12 in)
Weight	2.95 kg (6.5 lb)

Part Number	Description
372-5251	Breakout Harness

## 372-5252 Breakout Box

Model Usage: CT660 Truck, CT11, CT13, CT15

Warranty: Manufacturer's



- A multi-cable device used to test electronic equipment
- Used where sufficient space or access to connections are not easily accessible
- Allows testing of the electronic control system components without disturbing connections

Specifications	
Dimensions	381 x 304 x 76.2 mm (15 x 12 x 3 in)
Weight	4 kg (8.8 lb)

Part Number	Description
372-5252	Breakout Box

### 372-5274 Engine Harness Repair Kit

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Kit allows system checks to be made on running engine for real time diagnostics as well as quality
- Includes 125 components
- Contains all connectors and terminal pigtails to make computer-safe repairs on engine electrical harness



Serviceable Parts	
Connectors	398-1270, 398-1272, 398-1273, 398-1274, 398-1275, 398-1276, 398-1277, 398-1278, 398-1279, 398-1280, 398-1281, 398-1283, 398-1284, 398-1285, 398-1286, 398-1287, 398-1288, 398-1289, 398-1291, 398-1293, 398-1294, 398-1295, 398-1296
Clip-TPA	398-1271
Tubes	398-1297, 398-1298, 398-1299, 398-1300, 398-1301, 398-1305, 398-1306, 398-1307, 398-1308, 398-1309, 398-1311, 398-1312, 398-1313, 398-1314, 398-1315
Terminals	398-1316, 398-1317, 398-1318, 398-1319, 398-1320, 398-1321, 398-1322, 398-1323, 398-1324
Backshells	398-1325, 398-1326, 398-1332, 398-1333
Splice-Butts	398-1327, 398-1328, 398-1329
Tube-Heat Shrink	398-1331

Part Number	Description	Dimensions	Weight
372-5274	Engine Harness Repair Kit	17 x 13 x 13 in	5 kg

### 373-4782 Coolant Mixer Valve Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for engine coolant valve #1, (mixing valve)

Specifications	
Dimensions	152.4 x 101.6 x 6.4 mm (6 x 4 x 0.25 in)
Weight	0.04 kg (0.08 lb)

Part No.	Description
373-4782	Coolant Mixer Valve Breakout Harness



## 373-4783 Coolant Flow Valve Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for engine coolant valve #2, (flow valve)

Specifications	
Dimensions	167.6 x 101.6 x 19.0 mm (6.06 x 4.0 x 0.75 in)
Weight	0.04 kg (0.08 lb)

Part No.	Description
373-4783	Coolant Flow Valve Breakout Harness

## 372-5260 Breakout Tee Kit

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Lead and probe test kit
- Kit contains connectors necessary when testing in tight locations
- Includes 2 tight spot test leads, over 40 spade and round terminal probes in 4 sizes, screw banana plugs and breakout adapters

Specifications	
Dimensions	279.4 x 190.5 x 44.45 mm (11 x 7.5 x 1.75 in)
Weight	.68 kg (1.5 lb)

Part Number	Part Name	Description
372-5260	--	Breakout Tee Kit
398-4980	Female Probe	Small Gray Round Female .06 D (3 pack)
398-4981	Male Probe	Extra Large Green Male Round .11 D (2 pack)
398-4983	Female Probe	Extra Large Green Female Round .11 D (2 pack)
398-4985	Male Probe	Medium Yellow Male Spade .12 (3 pack)
398-4987	Female Probe	Medium Yellow Female Spade .12 (3 pack)
398-4988	Male Probe	Extra Small Blue Male Spade .02 x .09 (3 pack)
398-4989	Female Probe	Small Blue Female Spade .02 x .09 (3 pack)
398-4990	Female Probe	Medium Orange Female Round .075 DIA (3 pack)
398-5021	Male Probe	Medium Orange Male Round .075 DIA (3 pack)
398-5052	Female Probe	Small Purple Female Spade 1.5 x 8 mm (3 pack)
398-5056	Male Probe	Extra Small Purple Male Spade 1.5 x 8 mm (3 pack)
398-5057	Male Probe	Large White Male Spade .25 x .032 (2 pack)

Part Number	Part Name	Description
398-5058	Female Probe	Large White Female Spade .25 x .03 (2 pack)
398-5059	Male Probe	Small Gray Male Round .06 DIA T.P. (3 pack)
398-5060	Male Probe	Male Terminal Square .025 Black (3 pack)
398-5061	Female Probe	Female Terminal Square .025 Black (3 pack)
398-5062	Female Probe	Female, Delphi, Terminal Spade .025 x .059 Red (3 pack)
398-5063	Male Probe	Male Terminal Spade .025 x .039 Red (3 pack)
398-5064	Male Probe	Male Terminal Round 0.03 Blue (3 pack)
398-5065	Female Probe	Female Terminal Round 0.03 Blue (3 pack)
398-5066	Male Probe	Male Terminal Round 0.039 Green (3 pack)
398-5067	Female Probe	Female Terminal Round 0.039 Green (3 pack)
398-5072	Tee Adapter	Dual Banana Plug Tee Adapter (each)
398-5080	Test Lead	Tight spot Black Test Lead (each)

(Continued)



### 372-5260 Breakout Tee Kit (Continued)

Model Usage: CT660 Truck

Warranty: Manufacturer's

Part Number	Part Name	Description
398-5081	Test Lead	Tight spot Red Test Lead (each)
398-5082	Clip	Screw on Alligator clip (1 each red and black)
398-5083	Plug	Screw on Banana plug (1 each red and black)

### 373-4784 EFP Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for engine fuel low pressure sensor

Specifications	
Dimensions	167.6 x 101.6 x 19.0 mm (6.06 x 4.0 x 0.75 in)
Weight	0.04 kg (0.08 lb)

Part No.	Description
373-4784	EFP Breakout Harness



### 373-4785 EOP Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for engine oil pressure sensor

Specifications	
Dimensions	167.6 x 101.6 x 19.0 mm (6.06 x 4.0 x 0.75 in)
Weight	0.04 kg (0.08 lb)

Part No.	Description
373-4785	EOP Breakout Harness



### 373-4786 MAT Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for engine charge air, (manifold air) temp sensor

Specifications	
Dimensions	167.6 x 101.6 x 19.0 mm (6.06 x 4.0 x 0.75 in)
Weight	0.04 kg (0.08 lb)

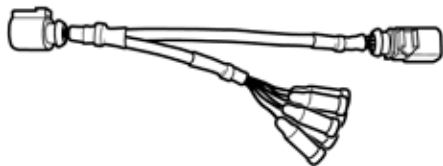
Part No.	Description
373-4786	MAT Breakout Harness



## 373-4787 Exhaust Lambda Sensor & V8 EGR Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for exhaust Lambda sensor diagnostics

Specifications	
Dimensions	279.4 x 40.6 x 25.4 mm (11.0 x 1.6 x 1.0 in)
Weight	0.06 kg (0.14 lb)

Part No.	Description
373-4787	Exhaust Lambda Sensor & V8 EGR Breakout Harness

## 373-4788 After-treatment 2 Pin Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for after-treatment temperature sensors and circuits
- Additional diagnostics include fuel shutoff, fuel dump and doser circuit (for urea injection)

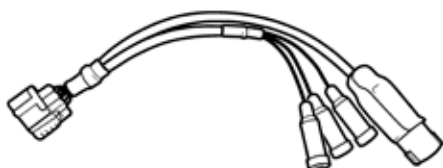
Specifications	
Dimensions	271.8 x 20.3 x 25.4 mm (10.7 x 0.8 x 1.0 in)
Weight	0.05 kg (0.11 lb)

Part No.	Description
373-4788	After-treatment 2 Pin Breakout Harness

## 373-4789 EGDP Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for the exhaust gas delta pressure sensor

Specifications	
Dimensions	279.4 x 25.4 x 20.3 mm (11.0 x 1.0 x 0.8 in)
Weight	0.04 kg (0.1 lb)

Part No.	Description
373-4789	EGDP Breakout Harness

## 373-4791 APS/IVS Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used on all throttle and sensor circuit diagnostics

Specifications	
Dimensions	355.6 x 31.7 x 25.4 mm (14.0 x 1.2 x 1.0 in)
Weight	0.07 kg (0.16 lb)

Part No.	Description
373-4791	APS/IVS Breakout Harness

### 373-4744 Cold Weather Start Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Used to measure voltage and resistance on circuits connected to Cold Start Relay (CSR)

Specifications	
Dimensions	203.2 x 177.8 x 50.8mm (8 x 7 x 2 in)
Weight	0.3 kg (0.6 lb)

Part Number	Description
373-4744	Cold Weather Start Breakout Harness



### 373-4745 Big Bore Terminal Test Probe Kit

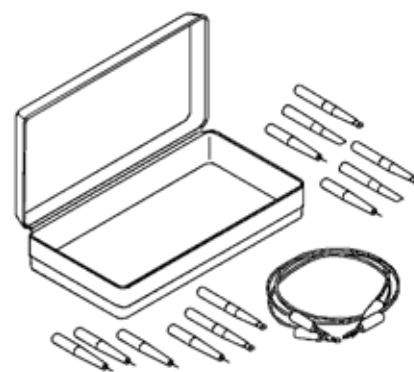
Model Usage: CT660 Truck

Warranty: Manufacturer's

- Used to access circuits in the connector harness and allows for use of Digital Multi-Meter without damaging the harness connectors

Specifications	
Dimensions	111.8 x 210.8 x 43.2 mm (4.4 x 8.3 x 1.7 in)
Weight	0.4 kg (0.9 lb)

Part Number	Description
373-4745	Big Bore Terminal Test Probe Kit



### 373-4747 EIM Power Relay Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Used to measure voltage and resistance on circuits to the EIM relay

Specifications	
Dimensions	254 x 203.2 x 25.4 mm (10 x 8 x 1 in)
Weight	0.07 kg (0.15 lb)

Part Number	Description
373-4747	EIM Power Relay Breakout Harness



### 373-4749 ECT, EOT and EGR Control Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for engine coolant temps 1 and 2, engine oil temperature sensor and EGR control diagnostics.

Part Number	Description
373-4749	ECT, EOT and EGR Control Breakout Harness



## 373-4750 CMP, CKP and FPCV Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for the engine camshaft and crankshaft sensor diagnostics and for high pressure fuel control module (MPROP).

Part Number	Description
373-4750	CMP, CKP and FPCV Breakout Harness

## 373-4751 FRP Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for the engine high pressure fuel rail sensor

Part Number	Description
373-4751	FRP Breakout Harness

## 373-4752 MAP/IAT2 Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for the engine boost pressure and temperature (MAP/IAT2) sensor

Part Number	Description
373-4752	MAP/IAT2 Breakout Harness

## 373-4754 BCS Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for the engine boost pressure control actuator

Part Number	Description
373-4754	BCS Breakout Harness

### 373-4778 EGR Position and Intake Throttle Control Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for EGR position and intake throttle control circuit diagnostics

Part Number	Description
373-4778	EGR Position and Intake Throttle Control Breakout Harness



### 373-4779 Retarder Control Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for engine retarder valve control

Part Number	Description
373-4779	Retarder Control Breakout Harness



### 373-4780 Engine Fan Control Actuator Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for engine electronic fan control

Part Number	Description
373-4780	Engine Fan Control Actuator Breakout Harness



### 373-4781 After-treatment Fuel Pressure Sensor

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used for engine after-treatment fuel pressure sensor

Specifications	
Dimensions	25.4 x 25.4 x 25.4 mm (1 x 1 x 1 in)
Weight	0.06 kg (0.14 lb)

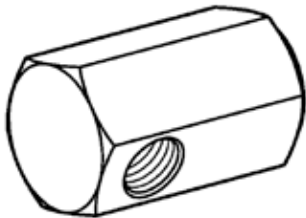
Part Number	Description
373-4781	After-treatment Fuel Pressure Sensor



## 373-4826 Cold Start Solenoid Test Adapter

Model Usage: CT660 Truck

Warranty: Manufacturer's



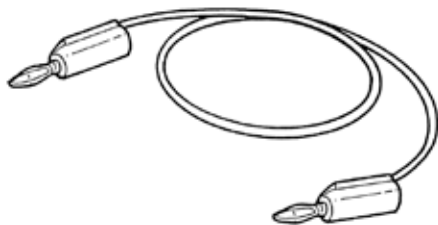
- Used to properly diagnose the cold start solenoid

Part Number	Description
373-4826	Cold Start Solenoid Test Adapter

## 373-4841 500 OHM Resistor Jumper Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Used for operational diagnostics of sensor circuits

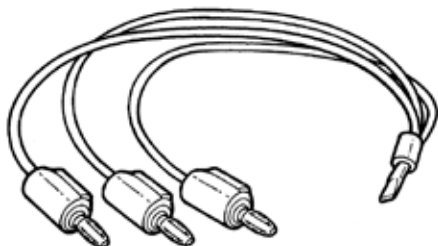
Specifications	
Dimensions	127.0 x 19.0 x 19.0 mm (5.0 x 0.75 x 0.75 in)
Weight	0.04 kg (0.1 lb)

Part Number	Description
373-4841	500 OHM Resistor Jumper Harness

## 373-4842 3 Banana Plug Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Used for operational diagnostics of sensor circuits

Specifications	
Dimensions	149.9 x 129.5 x 10.2 mm (5.9 x 5.1 x 0.4 in)
Weight	0.06 kg (0.12 lb)

Part Number	Description
373-4842	3 Banana Plug Harness

## 374-6405 CMP Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used for Cam position diagnostics on engine

Specifications	
Dimensions	157.5 x 94.0 x 17.8 mm (6.2 x 3.7 x 0.7 in)
Weight	0.04 kg (0.08 lb)

Part Number	Description
374-6405	CMP Breakout Harness

### 374-6406 MAT Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic harness used on the intake manifold temperature sensor of engine

Specifications	
Dimensions	157.5 x 109.2 x 22.9 mm (6.2 x 4.3 x 0.9 in)
Weight	0.04 kg (0.08 lb)

Part Number	Description
374-6406	MAT Breakout Harness



### 374-6407 WIF Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Two wire diagnostic breakout harness used on engine

Specifications	
Dimensions	320.0 x 20.3 x 20.3 mm (12.6 x 0.8 x 0.8 in)
Weight	0.03 kg (0.07 lb)

Part Number	Description
374-6407	WIF Breakout Harness



### 374-6408 Air System Controller Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Ten wire diagnostic breakout harness used on engine

Specifications	
Dimensions	203.2 x 165.1 x 38.1 mm (8.0 x 6.5 x 1.5 in)
Weight	0.1 kg (0.2 lb)

Part Number	Description
374-6408	Air System Controller Breakout Harness



## 374-6409 Compression Brake Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Four pin diagnostic breakout harness used on engine

Specifications	
Dimensions	152.4 x 114.3 x 25.4 mm (6.0 x 4.5 x 1.0 in)
Weight	0.06 kg (0.1 lb)

Part Number	Description
374-6409	Compression Brake Breakout Harness

## 374-6410 ITR AND EGR Valve Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic harness used on engine throttle valve (ETV) and exhaust gas recirculation (EGR)

Specifications	
Dimensions	180.3 x 114.3 x 20.3 mm (7.1 x 4.5 x 0.8 in)
Weight	0.08 kg (0.2 lb)

Part Number	Description
374-6410	ITR AND EGR Valve Breakout Harness

## 374-6411 AFS Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Diagnostic breakout harness used on engine fuel system

Specifications	
Dimensions	165.1 x 109.2 x 17.8 mm (6.5 x 4.3 x 0.7 in)
Weight	0.04 kg (0.08 lb)

Part Number	Description
374-6411	AFS Breakout Harness



### 374-6412 AFT Downstream Fuel Pressure Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic breakout harness used on engine

Specifications	
Dimensions	157.5 x 116.8 x 15.2 mm (6.2 x 4.6 x 0.6 in)
Weight	0.05 kg (0.10 lb)

Part Number	Description
374-6412	AFT Downstream Fuel Pressure Breakout Harness



### 374-6415 High Pressure Fuel System Breakout Harness

Model Usage: CT660 Truck

Warranty: Manufacturer's

- Diagnostic breakout harness used for performing diagnostics on high pressure fuel system

Specifications	
Dimensions	381.0 x 304.8 x 19.0mm (15.0 x 12.0 x 0.7 in)
Weight	0.10 kg (0.2 lb)

Part Number	Description
374-6415	High Pressure Fuel System Breakout Harness



### 163-5443 Detonation Sensor Harness

Model: 3400, 3500, and 3600 Gas Engines

Warranty: One Year

- Used to determine condition of detonation sensor on 3400, 3500 and 3600 gas engines

#### Reference

Page 13, May 1999, Engine News, Testing Detonation Sensor for Proper Use

Part Number	Description
163-5443	Detonation Sensor Harness



## Timing Cables

Model: G3408C and G3412C Gas Engines (EIS, Electronic Ignition System)

Warranty: One Year



- Used to check ignition timing using a timing light and flywheel markings
- Used to determine if a primary signal is going to each transformer
- Cable installs between ignition wiring harness and valve cover connector
- Makes timing less difficult because ignition wiring is encased in ridge/flexible conduit or in a braided wire bundle

Part Number	Use
143-4508	G3408C
143-4509	G3412C

## Block Heater Power Cables

Model: D9R, D10R, D11R Track-Type Tractor

Warranty: Six Months



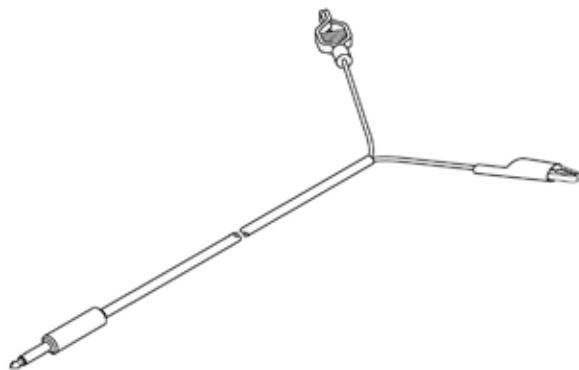
- Used to supply power to the block heater on large track-type tractor
- Length: 15.25 m (50 ft)
- Provides watertight seal
- Used with Marinco Engine Block Heater connectors
- Requires customer-supplied NEMA standard locking receptacle 125 or 250 volt outlet for 30 amp electrical circuit

Part Number	Description
218-7221	125 VAC, 30 A
218-7223	250 VAC, 30 A

## FT1814 Cable

Model: All Models with Set Points

Warranty: None



- Used with set point indicator, with 6V-7091, 6V-7092, 6V-7093 and Fuel Injection Equipment Test Stands
- Fabricated by shortening 1P-7446 Cable to 180.3 cm (71 in)

### 6V-3072 Carrying Case

Discontinued 6V-4060 Indicator Group, Engine Set Point

Warranty: One Year

- Depending on use, discontinued 6V-4060 Set Point Indicator can be stored with Engine Pressure Group or as individual unit in 6V-3072 Plastic Case

Items with No Part Number	
Item	Description
2	Form SEHS7920 Label for 6V-3072 Case, "6V-4060 Engine Set Point Indicator"
5	Form SEHS8009 Label for 6V-6045 Accessories Case



Item	Part Number	Description
1	6V-3072	Case - Plastic, NEEG2574 Group Decal on lid (9U-7402 Group)
3	6V-4863	Foam Insert
4	6V-6045	Case - Plastic, NEEG2061 Accessories Case Decal

### 373-4609 Spark Test Group for DPF Spark Plug on Tier 4 Engines

Model Usage: All Tier 4 Engines that require a higher spark capable tool

Warranty: Manufacturer's

- In-line tool used to test for spark at diesel particulate filter (DPF) igniter spark plugs
- Designed for use with higher current levels than 9U-6695 Electronic Spark Plug Firing Indicator
- Connect the tool in-line, between spark plug and plug wire when the engine is stopped, tool flashes a mirror image of ignition spark when engine is running
- For best access, tool is double-ended to offer a straight boot and 90° boot on one tool
- Spark plug wire adapter has straight spark plug boot on one end and insulator and test clip on other end [length: 27 cm (10.5 in)] for testing ignition coil



Part Number	Description
368-6232	Spark Tester
370-6633	Spark Plug Wire Adapter
373-4609	Spark Test Group

### 9U-6695 Electronic Spark Plug Firing Indicator

Model: Spark Ignited Engines

Warranty: One Year

- Greatly improved tool providing reliable way to diagnose ignition problems
- Adjustable sensitivity — user can set firing indicator to flash when placed near primary wire on exposed coils of 15.88 cm (6.25 in) bore engines
- Flashing LED on top of indicator easily seen in daylight
- Indicator can be carried easily in shirt pocket
- Once user sets sensitivity, instrument is activated when spring clip is depressed
- Rugged plastic housing and electronic circuit board combine durability features for a dependable, durable instrument



Diameter	15.0 mm (0.57 in)
Length	133.4 mm (5.25 in)
Indicator	bright red LED
Battery	3 required (147-6202 Battery)

(Continued)

## 9U-6695 Electronic Spark Plug Firing Indicator (Continued)

Model: Spark Ignited Engines

Warranty: One Year

Part Number	Description
9U-6695	Electronic Spark Plug Firing Indicator

## 9U-5358 Digital Timing Light

Model: All spark ignited engines

Warranty: Manufacturer's Three Year



- Replaces canceled 5P-6584 Timing Light
- Inductive clamp provides fast and easy hookups
- Super bright Xenon flash tube for easier reading of timing marks
- Built with dependable, solid-state circuitry for years of trouble-free service
- Detachable lead set
- Works on all 12 volt systems
- 2 or 4 cycle operation
- Light-weight and easy to handle (1.1 kg [2.4 lb])

### Repair Information

SPX Service Repair

755 Eisenhower Drive

Owatonna, MN 55060

Attn: Repair Department

Phone: 800-344-4013

Visit the SPX Repair Track web link to complete and submit the form for proper authorization: <https://repairtrack.spx.com>

Part Number	Description
9U-5358	Digital Timing Light

## 8T-5100 Smoke Meter Group

Discontinued — Service/Repair Parts Available



### Reference

SEHS8731, Special Instruction

Item	Part Number	Description
1	6V-9449	Case, SEES5696 Decal (8T-5100 Group) Block Group (foam insert with case)
2	8T-5309	Pump Group
3	8T-5307	Evaluator
4	8T-5310	Clamp Assembly
5	8T-5311	Mounting Group
6	8T-5304	Probe
7	8T-5305	Probe
8	8T-5323	Filter Paper
--	8T-5100	Smoke Meter Group

### 9U-6958 Magneto Peak Detect Module

Model: 3500 and 3600 Engines

Warranty: One Year with the Dealer Service Tools Division Tool Repair Service

- Used to check magneto performance during actual operating conditions (problem could be spark plug or magneto related)
- When used with 257-9140 Digital Multimeter or an equivalent, serviceman can measure magneto output DC Voltage
- Provides interface to magneto ignition system (9U-6959 T-Cable is included with the 9U-6958)
- Provides a separate voltage output for oscilloscope viewing of firing pulse train
- Does not require power to operate
- All items in figure are included



#### Reference

NEHS0588, Tool Operating Manual

Input	0 - 200 VDC
DC voltmeter connections	0 - 200 VDC
Scope connections	0 - 200 VDC
Operating temperature	-40° to 60° C (-40° to 140° F)
Dimensions	168 x 190 x 41 mm (6.6 x 7.5 x 1.6 in)
Weight	0.5 kg (1 lb)

Part Number	Description
9U-6958	Magneto Peak Detect Module

Flow Tools

**8T-2700 Blowby/Air Flow Indicator Group**  
**Discontinued—Service/Repair Parts Available**



Item	Part Number	Description
—	8T-2700	Blowby/Air Flow Indicator Group
1	6V-7145	Case
2	8T-2685	Pickup - Blowby (1,000 CFH)
<b>Service/Repair Parts</b>		
—	8T-0899	Membrane Switch
—	8T-0844	Front Cover
—	8T-0887	Connector Assembly
—	8T-1005	Liquid Crystal Display

**Optional items that can be ordered to use with the blowby/air flow instrument**



Item	Part Number	Description	Use
1	5P-7366	Cable Assembly - Power	Connects machine batteries (11 - 40 VDC) to hand-held indicator
2	8T-5268	Converter - 11V DC 300mA	Converts 110/220 VAC, 50/60 Hz, power supply to 11 to 20 VDC at 0.3 A maximum for powering indicator
3	6V-2198	Extension Cable (X8)	Operates indicator more than 914.4 mm (3 ft) from the pickup

**1U-8860 Large Engine Blowby Pickup Group**

Model: 3500, 3600 Family Engines, Larger 300 Family Engines

Warranty: One Year

- Replaces 8T-2685 Small Pickup for measurement of 3500 Engine blowby; use 8T-2685 small pickup on these engines for short duration test only because of reduction of engine breather tube during test
- Large 38 mm (1.5 in) ID pickup used on large engines without increasing crankcase pressure
- Checks blowby volume on Cat® 3500 and 3600 Engines and larger 300 Series Engines, as well as competitive large engines
- All-metal construction and large size makes tool suitable for permanent installation on engines; permanent installation allows continuous monitoring of blowby, making group useful for dynamometer rooms, marine or generator set applications
- Can also measure air velocity such as radiator cooling air flow
- Large blowby meter has no moving parts because an ultrasonic sound vortex shedding principle measures the air flow (makes the pickup reliable and virtually maintenance free)
- Pickup meter is sensitive to high frequency engine noise; to avoid incorrect readouts, keep pickup as far from engine as possible when making blowby measurements; do not put pickup near turbocharger or fan blades because this can cause reading error

**References**

SEHS8984, Special Instruction, Large Engine Blowby Pickup Group

(Continued)

### 1U-8860 Large Engine Blowby Pickup Group (Continued)

Model: 3500, 3600 Family Engines, Larger 300 Family Engines

Warranty: One Year

1U-8860 Group	
Case size (W x D x H)	432 x 330 x 114 mm (17 x 13 x 4.5 in)
Weight of 1U-8860 Group	6.1 kg (13.5 lb)
Weight of discontinued 1U-8861 Pickup only	3.0 kg (6.5 lb)
Item	Description
2	SEHS8984 Special Instruction
3	Large Engine Pickup (not serviced)

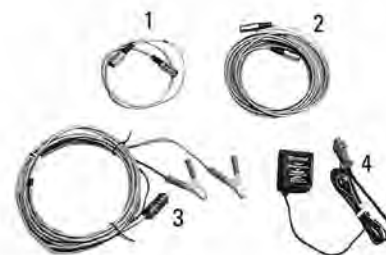


Item	Part Number	Description
1	6V-7145	Case
4	9M-0164	Clamps - Nose
5	1U-8863	Conversion Group
6	1U-8868	Pickup Hose
--	1U-8860	Large Engine Blowby/Air Flow Pickup Group (For 3500 and 3600 Engines)

### Optional Items

**Optional items for use with large engine pickup group (Items 3, 4, and 5 are also optional items for use with discontinued 8T-2700 Indicator Group for small engines, and may already be in your shop.)**

Item	Part Number	Description
1	8T-5297	Extension Cable 0.9 m (3.0 ft)
2	6V-2198	Extension Cable (X8)
3	5P-7366	Cable Assembly - Power
4	8T-5268	Converter - 11V DC 300mA



### 154-8100 Medium Engine Fuel Flowmeter Group Discontinued—Service/Repair Parts Available

#### Repair Information

Check Calibration and Repairs

ATS

8201 N. University Street

Peoria, IL 61615

Attn: Caterpillar® Diagnostic Tool Repair

(Continued)

## 154-8100 Medium Engine Fuel Flowmeter Group (Continued)

### Discontinued—Service/Repair Parts Available

Phone: 800-328-7287

309-693-4170 (Outside North America)

Email: CSR@AdvancedTech.com

#### Check Calibration and Repairs

Flow Technology

8930 South Beck Avenue, Suite 107

Tempe, AZ 85284

Phone: 480-240-3400

Fax: 480-240-3401

Email: ftimarket@ftimeters.com

Web site: ftimeters.com

#### References

NEHS0697, Tool Operating Manual

NEHS0698, Tool Operating Manual

Part Number	Description
154-8100	Medium Engine Fuel Flowmeter Group

## 168-7740 Fuel Flowmeter Group, 3600 Engine

### Discontinued—Service/Repair Parts Available



Item	Description
Not shown	NEHS0740 Tool Operating Manual
Not shown	NIST Traceable Flowmeter Calibration Certificates
5	NEEG2839 Decal

Item	Part No.	Description
1	168-7739	Sight Glass
2	154-8107	Junction Box
3	8T-9280	Power Supply
4	5P-7366	Cable Assembly - Power
5	4C-9660	Carry Case
5	168-7742	Component Foam Insert
5	154-8099	Lid Foam Insert
6	154-8106	Display - Hand Held
7	154-8097	Cable, 6.1 m (20 ft) (8T-9280 to 154-8107)
8	154-8095	Cable
—	168-7740	System Group - Fuel

Item	Part No.	Description
<b>Optional Items (Sold Separately)</b>		
—	154-8096	AC Power Supply Group
—	133-6975	Cable - Power
—	137-0171	Adapter - Plug AC
—	131-5047	Cable - Power, 110 VAC (USA Plug)
<b>Optional Items for discontinued 168-7730 and discontinued 168-7740</b>		
—	168-7755	Cable
—	168-7750	Hose/Adapter Group
—	168-7733	Hose Assembly, size 20, 1 m (3 ft)
—	5P-2712	Thermo-Hydrometer, Assembly API Gravity Scale
—	1P-7438	Beaker
—	1P-7408	Thermo-Hydrometer, Gravity Scale
—	154-8093	Extension Cable, 6.1 m (20 ft), (154-8107 to 154-8095)



**168-7740 Fuel Flowmeter Group, 3600 Engine (Continued)**  
**Additional Items Necessary for Testing 3612 and 3616 Engines**

**Repair Information**

The 168-7730 and 168-7740 Fuel Flow Meters should have the calibration checked annually.

ATS (Advanced Technology Service) can provide this service. If recalibration is required, the fuel flow meters should be returned to Flow Dynamics or TrigasFI, the suppliers.

Recalibration is required if the flow meter has been physically damaged. Improper storage and contamination in the fuel can lead to physical damage to the flow meter.



Items with No Part Number		
Item	Description	Qty
3	NEEG2180 Decal	2

Item 4	Part Number	Description	Qty.
1	1U-5295	Accumulator	2
2	168-7736	Swivel Tee	2
Not shown	3K-0360	Seal - O-ring - STOR (SAE 3/4 - 16)	6
Not shown	5P-2963	Charging Adapter	—

**Small to Medium Engine Burn Rate Meter Systems with Hand Held Display or No Display**

Model: 3116, 3126, 3176, 3208, 3304, 3406, and 3408 Engines

Warranty: One Year

- Used to evaluate engine performance
- Provides extremely accurate ( $\pm 1\%$  of reading) measurement of burn rate

**Burn Rate Meter**

- Uses a positive-displacement, rotary piston burn rate meter to measure burn rate and a built-in heat exchanger to cool return fuel
- Air bubbles in return flow do not affect burn rate readings



**Burn Rate Computer**

- 179-0701 Burn Rate Computer provides automatic temperature compensation and output scaling
- Burn rate computers microprocessor linearizes output signal and temperature to provide burn rate measurement accurate to  $\pm 1\%$  of actual value

**Output Signals**

- Includes frequency output signal to allow 131-5050 Dataview or 9U-7401 Multitach II to display burn rate
- Provides RS485 Communications for 154-8106 Fuel Flow Hand-Held Display
- 154-8106 Display flashes "UNDERFLOW" or "OVERFLOW" when fuel flow is out of the allowable range

**Power Supply**

- Uses 11-32 volt DC engine battery with an optional 100-240 VAC power supply available
- The power switch on 179-0701 Burn Rate Computer must be in "OFF" position when connecting an AC power supply or the system will not power up
- Not recommended for engines with supply fuel lines larger than a #10 JIC because of fuel flow restriction



Diagnostic Tools

(Continued)

## Burn Rate Computer (Continued)

NOTICE
Do not use the Burn Rate Meter System for 3500 Engines. Restriction created by burn rate meter will cause return fuel to overheat, resulting in engine damage.
NOTICE
The meter should be upright, with the carrying handle on top when being operated. The meter can be tipped 30 degrees from an upright position and still work properly.

### Details

Burn Rate Meter	
Burn rate	4 - 260 Lph (1.1 - 69.0 gph)
Accuracy	± 1% of reading, ± 0.4 Lph (0.10 gph)
Frequency output scaling	10 Hz = 1 gph
Fuel Temperature	
Fuel temperature range	-17.7° to 85° C (0° to 185° F)
Fuel temperature accuracy	0.5° C (1° F) providing fuel has been flowing through burn rate meter long enough to stabilize the reading
Power Supply	
DC	11 - 32 VDC at 10 A maximum
Horsepower Range	
Horsepower	11.3 Kw (15.2 Hp) — 735 Kw (1000 Hp)
Optional Alternating Current	
179-0713 AC Power Supply	100 - 240 VAC, 47 - 63 Hz at 1.6 A input provides 24 VDC, 3.0 A output
Low Filter Response Times	
Flow change from 11.4 Lph (3 gph) to 121.3 Lph (32 gph)	6 seconds
Flow change from 121.3 Lph (32 gph) to 11.4 Lph (3 gph)	21 seconds
High Filter Response Times	
Flow change from 11.4 Lph (3 gph) to 121.3 Lph (32 gph)	4 seconds
Flow change from 121.3 Lph (32 gph) to 11.4 Lph (3 gph)	6 seconds
Weight and Overall Size	
179-0700	17.7 kg (39 lb) — 320 x 298 x 130 mm (12.6 x 11.8 x 5.1 in) includes filter
179-0701	3.2 kg (7 lb) — 260 x 160 x 90 mm (10.3 x 6.3 x 3.5 in)
179-0705	9.5 kg (21 lb) — 660 x 394 x 109 mm (26.0 x 15.5 x 4.3 in)

### 179-0710 Small to Medium Engine Burn Rate Meter System with Handheld Display

Item	Part Number	Description
1	179-0700	Burn Rate Meter
2	179-0701	Burn Rate Computer
3	179-0702	Cable
4	179-0705	Hose Group
5	4C-9660	Carry Case
6	179-0706	Foam Insert
7	154-8106	Display - Hand Held
8	154-8095	Cable
9	5P-7366	Cable Assembly - Power
10	6V-2198	Extension Cable (X8)
--	179-0710	Engine Burn Rate Meter System



### Repair Information

#### Repair Information

The 179-0710 Burn Rate Group should have the calibration checked annually. ATS (Advanced Technology Service) can provide this service. ATS can also provide recalibration or repair if required. Recalibration is required if the flow meter has been physically damaged. Improper storage and contamination in the fuel can lead to physical damage to the flow meter.

#### Reference

NEHS0776, Using the Caterpillar 179-0710 Burn Rate Fuel Flow Measurement System



Service/Repair Parts (Sold Separately)		
Item	Part No.	Description
1	179-0703	Metric to JIC Adapter
2	179-0704	Electronic Connector (Fuel Meter)
3	179-0708	Temperature Sensor
4	081-4662	Fuel Filter
Optional Parts		
--	131-5047	Cable - Power, 110 VAC (USA Plug)
--	133-6975	Cable - Power
--	137-0171	Adapter - Plug AC

Service/Repair Parts (Sold Separately)		
Item	Part No.	Description
Optional Parts (Continued)		
--	154-8093	Extension Cable, 6.1 m (20 ft), (154-8107 to 154-8095)
--	5P-2712	Thermo-Hydrometer, Assembly API Gravity Scale
--	179-0715	Cable Assembly - (Twin Engine)
--	1P-7408	Thermo-Hydrometer, Gravity Scale
--	1P-7438	Beaker
--	179-0713	Power Supply

### FT2320 De-Aerator Group

### FT2309 De-Aerator Tank

Model: Engines with PT-Type Fuel System (mainly Cummins Engines)

Warranty: None

- Removes air in return fuel flow from diesel engine; removal of air required when using Caterpillar® Fuel Flow Monitor System
- Needed on engines with PT Type fuel system, used mainly by Cummins Engine Company; other engines may also have air in return fuel and require use of this group
- De-aerator system measures burn rates on competitive engines with Caterpillar® Fuel Flow Monitor System

(Continued)

## FT2320 De-Aerator Group (Continued)

### FT2309 De-Aerator Tank

Model: Engines with PT-Type Fuel System (mainly Cummins Engines)

Warranty: None

- Tank designed to slow velocity and reverse direction of fuel so any air tends to separate from fuel and rise to top of tank; inlet and outlet extended inside tank so flow changes direction to aid separation; baffles in tank reduce possibility of any air trapped at top of tank from being recombined with fuel when vehicle moves over rough ground; several float vents across top of tank allow air to pass but close to liquids

#### Reference

SEHS8874, Special Instruction, Operating Caterpillar Fuel Flow

Monitor System

#### Fuel/Air Separator Tank

The Fuel/Air Separator tank is used to remove any air in the return fuel flow from a diesel engine. This tank is needed on engines using the PT type fuel system, used mainly by Cummins Engine Co. Some other engines may also have air in the return fuel and require the use of this tank or some other method to remove the air. The removal of the air is required so that the fuel lines do not become full of air when using the one meter method of fuel measuring and is more critical when using the two meter method of measuring fuel.

The design of the tank is such that the velocity of the fuel is slowed and its direction is reversed so that any air will tend to separate from the fuel and rise to the top of the tank. The inlet and outlet are extended inside the tank so that the flow must change direction as an aid to the separation of the air from the fuel. The baffles in the tank are to reduce the possibility of any air that might be trapped near the top of the tank from being recombined with the fuel if the tank is tilted or agitated by a vehicle moving over rough ground. The holes in the baffles aid in the scrubbing of the air from the fuel.

Across the top of the tank are several Maid-O-Mist vents that allow air to pass but will close to liquids. These vents however will permit air to enter if a negative pressure exists in the tank. Therefore a small positive pressure must be maintained within the tank. (With a Cummins engine this positive pressure must be kept as low as possible to prevent it affecting the fuel system.)

The Maid-O-Mist vents contain a float that shuts off the outlet so that liquids will not be released to the atmosphere. However if the vehicle encounters a severe bump or rough ground these floats may allow a small amount of liquid to escape.

The de-aerator tank is located above the fuel tank to prevent fuel from siphoning out of the fuel tank and filling the de-aerator tank. The de-aerator tank is mounted perpendicular with the vehicle's frame, to reduce the possibility of fuel being mixed with air when the vehicle moves over rough ground.

#### Boost Pump

On Cummins engines using the PT type fuel system it is possible to get zero return fuel at low idle. The large Caterpillar® fuel flow monitor system must have a minimum of 40 gallons per hour of fuel flow to operate. If the fuel flow falls below 40 gallons per hour the fuel monitor will not read fuel burn, but will flash an error message.

The boost pump circulates enough fuel through the supply and return fuel flow meters to keep them in their operating range. Since the boost pump circulates the same amount of fuel through the supply and return meters, the burn rate created by the boost pump is zero. (Burn rate-supply rate-return rate).

Item	Part Number	Description
1	FT2309	De-Aerator Tank
2	—	Vent
6	—	Hose
8	—	Reducer
9	—	Hose

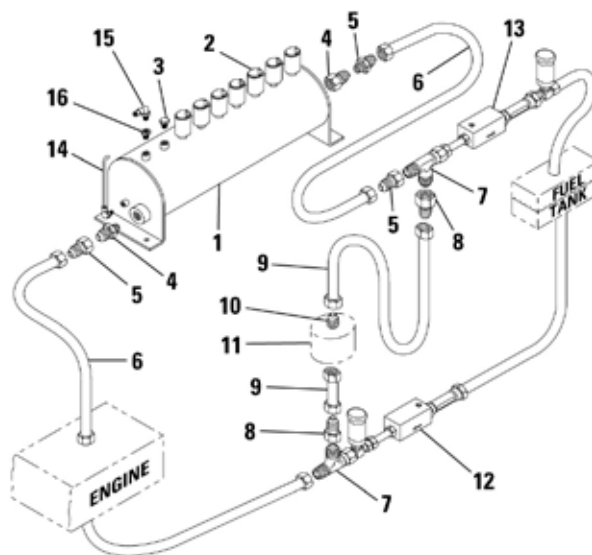
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**FT2320 De-Aerator Group (Continued)**

**FT2309 De-Aerator Tank**

Model: Engines with PT-Type Fuel System (mainly Cummins Engines)

Warranty: None



Item	Part Number	Description
3	5P-6213	Plug
4	009-4440	Connector
5	067-6684	Reducer
7	5P-2242	Swivel Tee
10	061-9463	Pump Fitting
11	5P-6520	Boost Pump
12	1U-5303	Flowmeter Group
13	1U-5304	Flowmeter Group
14	8T-0821	Tubing
15	4C-3972	Fitting
16	3B-6768	Adapter - STR (NPTF)

Diagnostic Tools

**Heat Exchanger Pressure Test Tooling**

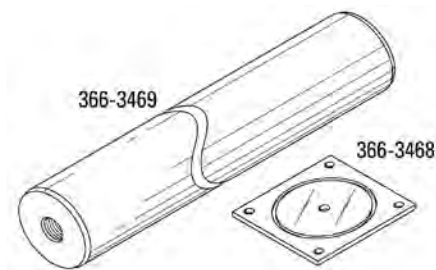
Model Usage: 3516C Marine Engine

Warranty: Six Months

- Used to pressure test 300-5622 Heat Exchanger
- Used with four bolts, O-ring, and 1/4 inch NPT fitting
- Made from stainless steel to eliminate corrosion

**Reference**

KENR6055 3500C Marine Engines Disassembly and Assembly



(Continued)

## Heat Exchanger Pressure Test Tooling (Continued)

Model Usage: 3516C Marine Engine

Warranty: Six Months

366-3468 Cover	
Overall size	69.3 mm (2.73 in) square
Thickness	6.35 mm (.25 in)
Weight	0.9 kg (2 lb)
366-3469 Mounting Bar	
Diameter	50 mm (1.97 in)
Length	371.8 mm (14.64 in)
Weight	5.6 kg (12.3 lb)

Part Number	Description
366-3468	Cover
366-3469	Mounting Bar

Measuring Tools

**8T-1000 Electronic Position Indicator Group**  
**Discontinued — Service Parts Available**

**Reference**

SEHS8623, Special Instruction

Item	Part Number	Description
1	6V-3072	Case - Plastic, NEEG2574 Group Decal on lid (9U-7402 Group)
2	6V-6045	Case - Plastic, NEEG2061 Accessories Case Decal
3	8T-5295	Foam Insert
4	6V-2198	Extension Cable (X8)
5	8T-1002	Position Probe (X4)
--	8T-1000	Indicator GP - POS



**391-8170 Emission Analyzer with Bluetooth**  
**393-0673 Emission Analyzer without Bluetooth**

Warranty: Manufacturer's

European Union Compliant, CE marked

- Used for compliance testing and troubleshooting the combustion process
- Measures combustion efficiency and monitors emissions
- Provides a multitude of field configurations for easier set up and performance
- Offers exclusive sensor design, patented gas paths, active sample conditioning and advance data logging and reporting
- Equipped to handle low thresholds and still deliver high accuracy
- Emission Analyzer can also be used for boiler and burner testing and industrial processes testing

**Emission Analyzer Overview**

The 391-8170 and 393-0673 Emission Analyzers provide the following:

- Sample Gas Conditioning
- Fresh Air Valve
- Dilution System
- Data BUS capability with re-catalyst and post catalyst testing screens
- Differential pressure sensor
- Type K or S temperature probe input
- Rechargeable battery
- Integrated combustion air sensor
- Trigger input
- Data memory
- DC Power Input (11-40VDC), DC Power Cable with battery clips optional 393-0675
- Carrying strap
- Bluetooth module upgrade which enables communication between the handheld controller to the analyzer box and also for the analyzer box to the computer. Some countries may have Bluetooth licensing issues. For those countries, the 393-0673 should be used.
- Power cord (shipped to match the country)
- 6 foot data connection cable
- IR printer
- Thermal printer paper – 6 rolls (10 year legibility)
- Particle filters – pack of 30 (20 tubular filters for analyzer and 10 flat analyzer gas prep filters)
- Pelican (or equal) Transport Case with wheels
- Calibration certificate (type of certificate country specific)
- Easy Emission software with USB cord (mini USB to standard USB)

(Continued)

# Measuring Tools

## 391-8170 Emission Analyzer with Bluetooth (Continued)

## 393-0673 Emission Analyzer without Bluetooth

Warranty: Manufacturer's

Measurement Range and Accuracy
O <sub>2</sub> Oxygen sensor (0-21%) 0.1 resolution: System accuracy +/- 0.8% of full scale value
CO module (0-10,000 ppm, 1 ppm resolution, H <sub>2</sub> compensated): System accuracy +/- 5% of reading (200 – 2000 ppm); +/- 10% (2001 to 10,000 ppm)
NO module (0-3,000 ppm, 1 ppm resolution): System accuracy +/- 5% of reading (200 – 2000 ppm); +/- 10% (2001 to 4,000 ppm)
NO <sub>2</sub> module (0 – 500 ppm, 0.1 ppm resolution): System accuracy +/- 5% of reading (100 – 500 ppm); +/- 5 ppm (0 – 99.9 ppm)
Gas engine probe 13", 2000° F, 7 foot Teflon-lined hose (8mm diameter)
Diesel engine probe 13", 2000° F, sintered filter, 7 foot Teflon-lined hose (14mm diameter)

Diagnostic Tools



### Control Unit Technical Data

Control Unit Technical Data	
Operating Temperature	20° F to 115° F
Storage Temperature	-4° F to 122° F
Battery Type	Li-ion
Battery Life	5 Hours (without wireless connection)
Memory	2MB (250,000 measurement value)
Weight	0.97 lbs
Dimensions	10 x 4.5 x 2.3 in
Protection Class	IP 40



## Specifications

Specifications	
Dimensions	330.2 x 127 x 436.9 mm (13 x 5 x 17.2 in)
Weight	4.79 kg (10.58 lbs)
Storage Temperature	-20° to 50°C (-4° to 122°F)
Operating Temperature	-5.5° to 45°C (22° to 113° F)
Housing Material	ABS
Memory	250,000 Measurement Values
AC Power Supply	90 to 260 V (47 to 65 Hz)
DC Voltage Supply	11 to 40 V
Maximum Dust Load	20 g/m <sup>3</sup> dust in flue gas
Dewpoint Calculation	0° to 100°C (32 to 212°F)
Maximum Positive Pressure Flue Gas	20 "H <sub>2</sub> O
Maximum Negative Pressure	-120 "H <sub>2</sub> O
Pump Flow Rate	1 l / min. with flow rate monitoring
Hose Length	Maximum 53 ft (corresp. to 5 probe hose extensions)
Maximum Humidity Load	+158°F at gas input of analyzer box
Trigger Input Voltage	5 to 12 Volt (rising or falling flank)
	Impulse Width >1 sec
	Load: 5 V/maximum. 5 mA, 12 V/maximum, 40 mA
Protection Class	IP40
Battery Life	Maximum Load Approx. 2.5 h

## Serviceable Parts

Serviceable Parts	
391-8171	Engine Probe Thermocouple Upgrade
391-8175	Easy Emission Software with USB Cord
391-8176	O <sub>2</sub> Replacement Sensor
391-8177	CO Replacement Sensor
391-8178	NO Replacement Sensor
391-8179	NO <sub>2</sub> Replacement Sensor
391-8180	Replacement Filter for NO Sensor
391-8181	Particle Filter
393-0675	DC Power Cable with Battery Clamps
393-0676	Battery for Base Unit
393-0677	Gas Engine Probe 8 mm
393-0678	Diesel Engine Probe 14 mm
393-0679	6 Foot Data Cable
393-0681	Thermal Paper 6 Roll
Note: Additional options are available from the manufacturer	

## Countries Licensed for Bluetooth:

Europe including all EU member states

Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and Turkey

### European countries (EFTA)

Iceland, Liechtenstein, Norway and Switzerland

### Non-European countries

Canada, USA, Japan, Ukraine, Australia, Colombia, El Salvador, Venezuela

(Continued)

## Countries Licensed for Bluetooth: (Continued)

Europe including all EU member states

### Contact Information USA and International:

<http://www.testo350.com/contact.html>

### 4C-8753 Extended Collet

Model: 3500 Family Engines

Warranty: Six Months (Not repairable)



- Improves accuracy of fuel setting measurement and adjustment on the 3500 Engine
- Used with 8T-1002 Electronic Position Indicator Probe or dial indicator
- Prevents side loading of probe shaft by fuel stop lever in governor; side loading can cause setting errors and breakage of contact point on indicator
- Attaches to indicator probe or dial indicator; is correct length for 5P-7263 Contact Point specified in 3500 fuel testing and adjusting instructions
- Has been added to 6V-7880 Timing and Fuel Setting Tool Group
- Fits all dial indicators with 9.5 mm (0.375 in) mounting boss
- 82.6 mm long; 3/8-16 thread for mounting on engine
- Allows 25.4 mm (1.0 in) probe travel when used with 76.2 mm (3 in) shaft extension

#### Reference

SEHS9278, Special Instruction

Part Number	Description
4C-8753	Extended Collet

### 8T-5096 Dial Indicator Test Group

Warranty: Six Months



- Provides tooling used in taking many different service measurements such as gear backlash, end clearance, side clearance, valve movement or rack position
- Contains all components of the 7H-1949 Dial Indicator Group, along with an 8S-2329 Base and 8S-2327 Post
- Magnetic base provides easier and quicker mounting of the dial indicator; the former 7H-1949 Dial Indicator Test Group can be updated by adding the 8S-2329 Base and the 8S-2327 Post

Item	Part Number	Description
1	2P-8311	Block
1	6V-3072	Case - Plastic, NEEG2574 Group Decal on lid (9U-7402 Group)
2	7H-1946	Arm
3	7H-1941	Base
4	7H-1942	Indicator
5	8S-2329	Base
6	7H-1940	Universal Attachment
7	7H-1947	Holder
8	8S-2327	Post
9	7H-1945	Holding Rod

(Continued)

## 8T-5096 Dial Indicator Test Group (Continued)

Warranty: Six Months

Item	Part Number	Description
10	7H-1645	Holding Rod
11	7H-1944	Post
12	7H-1943	Clamp
13	7H-1948	Snug
--	8T-5096	Dial Indicator Test

## 6V-7926 Dial Indicator Group

Warranty: Six Months

- Used primarily for measuring off-engine timing dimensions when setting fuel pump lifters
- Measurements made with a 25.4 mm (1.0 in) travel indicator and 5 contact points
- Can also be used in other applications for accurate depth measurements up to 127 mm (5 in)

Item	Part Number	Description
1	6V-3073	Case - Plastic
1	6V-7029	Block - Top
1	6V-7924	Holder Block
2	8S-3158	Indicator
3	3P-1565	Collet Clamp
4	5P-4156	Base
5	5P-4163	Point - Indicator Contact, 120.65 mm (4.75 in) long
6	5P-4162	Contact Point (X4)
7	5P-4161	Point - Indicator Contact, 69.85 mm (2.75 in) long
8	3S-3270	Point - Indicator Contact, 44.45 mm (1.75 in) long
9	5P-4160	Point - Indicator Contact, 19.05 mm (0.75 in) long
10	5P-4159	Gauge Stand
11	5P-4158	Gauge, Fuel Inj 50.8 mm (2 in)
12	5P-4157	Gauge, Fuel Inj 101.6 mm (4 in)
--	6V-7926	Indicator Group

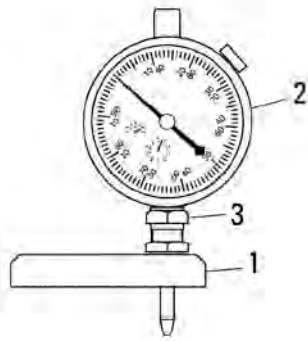


## 165-8958 Indicator Base

### Essential Tool

Model: All Models Containing Duo-Cone Seals

Warranty: Six Months



- Used to measure installation height of Duo-Cone seals
- Used with 6V-3075 Dial Indicator, 6V-6167 Contact Point, and 3P-1565 Indicator Collet
- Made of plastic to prevent damage to sealing surface of seal ring
- Extra long base provides stability when measuring installation height

Overall length	127 mm (5.0 in)
Length from centerline of indicator to outer edge	122 mm (4.8 in)
Width	15 mm (0.6 in)
Threaded hole	3/8 - 32 thd
Material	Plastic

Item	Part Number	Description
1	165-8958	Indicator Base
<b>Additional tooling required</b>		
2	6V-3075	Indicator - Dial
3	3P-1565	Collet Clamp
Not Shown	6V-6167	Contact Point

## 9U-6175 Soft Tool Case

Model: All Models

Warranty: One Year



- Low-cost protection for discontinued 1U-9800 Ultrasonic Wear Indicator
- Resistant to oil, fuel, and coolant
- Adjustable neck strap for hands-free operation
- Clear vinyl front allows use of encased keyboard and display
- Quick-close top uses Velcro to permit quick removal of instrument
- Dimensions: 195 x 195 x 40 mm (7.25 x 7.25 x 1.75 in)
- Weight: 227 g (0.5 lb)

Part Number	Description
9U-6175	Soft Protective Case

## 168-7720 Ultrasonic Wear Indicator III Group

### 168-7721 Ultrasonic Wear Indicator III

Model: All

Warranty: One Year

European Union compliant, CE marked (168-7721)

- Replaces 9U-6700 Ultrasonic Wear Indicator II — includes many improvements
- Used to measure track bushings (before and after turning), idler center flange wear on fabricated idlers, bulldozer blades, bucket base edges, scraper bowls, truck beds, components protected by guards, or any other thickness — works quickly and easily
- Easy battery access — loosen 2 battery cover screws on Indicator IIIs back side
- Uses 5 Alkaline or NiCad AA batteries (no battery pack)
- Liquid crystal display backlight can be turned on or off
- Power level monitor shows percent of estimated remaining battery power
- Mono-earphone connector accepts earphone to hear beeper while in a noisy environment

(Continued)

**168-7720 Ultrasonic Wear Indicator III Group (Continued)**

**168-7721 Ultrasonic Wear Indicator III**

Model: All

Warranty: One Year

- Built-in multiple language capability (English, Portuguese, French, Spanish, and German) — no program modules needed to switch language
- Group includes a new probe with longer, more durable cable; probe can also be used with the former 9U-6700 Indicator II
- Used with Custom Track Service (CTS) inspections, which can be downloaded directly to a computer for viewing or printing
- Automatically recalls and shows last machine location display screen when turned on
- Measurements stored in non-volatile memory
- Can select where machine data is stored in Indicator III when transferring from a PC that is using CTS
- Less time cleaning parts — eliminates measurement errors due to dirt packing or differences in measurement techniques between inspectors
- Accurate to within  $\pm 0.1$  mm (0.010 in) in Low Resolution Mode and  $\pm 0.076$  mm (0.003 in) in High Resolution Mode
- Capable of storing 64 CTS inspections and uses direct alphanumeric entry

**Reference**

NEHS0730, Tool Operating Manual

**NOTICE**

If alkaline batteries are installed, do not use a 4C-3024 Battery Charger or damage to the Indicator III may result. Place tape over the charge connector to prevent charging when alkaline batteries are installed.

Operating Temperature	
Ambient air	-18° to +60° C (0° to +140° F)
Storage Temperature	
Without batteries	-40° to +60° C (-40° to +140° F)
With NiCad batteries less than 6 months	-20° to +46° C (-4° to +113° F)
With alkaline batteries less than 6 months	-40° to +60° C (-40° to +140° F)
Weights	
168-7720	3.5 kg (7.60 lb)
168-7721	0.82 kg (1.81 lb)
168-7722	0.1 kg (0.22 lb)

Part Number	Description
168-7720	Ultrasonic Wear Indicator III Group

**168-7720 Ultrasonic Wear Indicator III**

Item	Description
7	NEEG2835 Group Label
Not Shown	4 RS232 Protective Caps, 39.7 mm (1 9/16 in)
Not Shown	NEHS0730 Tool Operating Manual

Item	Part Number	Description
1	168-7721	Ultrasonic Wear Indicator III
2	168-7722	Ultrasonic Probe (includes Certificate of Conformity)
3	6V-7145	Case
4	4C-3024	Battery Charger
5	9U-6000	Paper Towels
6	9U-7981	Couplant
<b>Not Shown</b>		
--	4C-4772	Foam Insert



Diagnostic Tools

## 168-7721 Ultrasonic Wear Indicator III



### NOTICE

Do not use battery charger if original rechargeable batteries in the Ultrasonic Wear Indicator III are replaced with non-rechargeable batteries. Damage to instrument may result. Place a piece of tape over the charge connector to prevent charging.

Items Not Shown
One RS232 Protective Cap (1 9/16 in) Installed
One Calibration Certificate

Part Number	Description
9U-7981	Couplant
<b>Service/Repair Parts</b>	
1U-7445	Nicad Battery, rechargeable, package qty 1 (5 required to power Indicator III)
1U-9533	AA Alkaline Battery , non-rechargeable, package qty 96 (5 required to power Indicator III)
4C-5490	Couplant Holder
<b>Optional Items (Sold Separately)</b>	
4C-5488	Cable Assembly RS232 - to transfer thickness values to the CTS program in a PC AT version
4C-5489	Cable Assembly RS232 - to transfer thickness values to the CTS program in a PC XT version
4C-5897	Modem Cable
9U-6175	Soft Protective Case

## 135-3156 Battery Pack

Model: 9U-6700 and 1U-9800 Ultrasonic Wear Indicators (both discontinued)

Warranty: One Year



- Used to provide nickel cadmium (NiCad) battery power to wear indicators (can be easily installed with a Phillips screw driver, in place of 4C-9417 Battery Holder)
- Used with discontinued 9U-6700 Ultrasonic Wear Indicator II Group or discontinued 1U-9800 Ultrasonic Wear Indicator Group and a 4C-3024 Battery Charger (135-3156 Battery Pack is now standard with all new wear indicators and can be retrofitted to all existing units)
- More resistant to corrosion, and provides better contact with battery holder terminals
- Rechargeable batteries should be replaced when not holding an adequate charge or once each year (replace all former battery holders at this time)
- Charge all new battery packs for at least 14 hours before using the wear indicator
- 4C-9417 Battery Holders are no longer available

Voltage requirement	6 VDC
Life of charge	12 hours
Battery pack	5 shrink-wrapped batteries

Part Number	Description
135-3156	Battery Pack

### Instructions for Replacement Battery Holder

Former battery holder should be replaced with new battery pack if experiencing any problems such as lost data, turns off by itself, displayed information locks-up, not measuring properly, and/or display shows “memory failed.”

#### Installation Procedure

1. Remove back cover.
2. Disconnect the 2-pin connector (on battery holder wires).
3. Remove 4 screws on battery holder.
4. Install new battery pack using original screws.
5. Connect the 2-pin connector.
6. Replace back cover.

#### Reference

NEHS0606, Tool Operating Manual, 9U-6700 Ultrasonic Wear Indicator II  
 SEHS9089, Special Instruction, 1U-9800 Ultrasonic Wear Indicator Operating Instructions



### 199-6268 Differential Pressure Gauge, 199-9817 Carrying Case Group

#### Essential Tool

Warranty: Six Months

- Used to measure low air pressure and/or non-corrosive gas pressure
- Frictionless magnahelic movement
- Positive, negative (vacuum), and differential readings
- No manometer fluid to evaporate or freeze
- Does not have to be level to provide accurate readings
- Used with 199-9817 Carrying Case Group which includes carrying case, mounting bracket, and 3 m (9 ft) of 4.76 mm ( 3/16 in) ID rubber tubing

#### Cab Pressurization Testing

- Used to measure cab pressurization standards
- Minimizes dust and noise in cab by making sure a positive pressure of 5.08 to 15.24 mm (0.2 to 0.6 in) of water is maintained
- Helps air conditioning system to operate at maximum efficiency

#### Tips for Obtaining Accurate Pressurization Readings

- Route gauge pickup tube under door seal into cab
- Do not crush pickup tube between door seal and cab frame
- Make sure pickup tube is completely sealed (if door seal collapses it can cause air leaks)
- If complete seal cannot be achieved, replace door seal
- Insert pickup tube in approximate area of operators head and chest



Diagnostic Tools

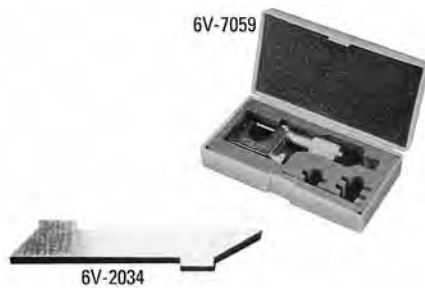
199-6268 Differential Pressure Gauge	
Vacuum range	0 - 25.4 mm (0 - 1 in) of water
High and low-pressure connections	1/8 NPT
Accuracy	±2% of full scale

Part Number	Description
199-6268	Differential Pressure Gauge
199-9817	Carrying Case

## 6V-7059 Multiple Anvil Micrometer

### 6V-2034 Adapter

Warranty: Six Months



- Micrometer used for measuring top flange thickness on cylinder liners, and also with the 6V-2034 Adapter to measure Cat® engine valve lip thickness
- Furnished with 2 anvils — 1 anvil is for measuring parts which can not be measured with a standard micrometer; the other anvil permits the micrometer to be used as a general purpose 0 to 25 mm (0 to 0.98 in) measuring instrument
- When measuring engine valve lips with the 6V-2034 Adapter, refer to the valve dimensions given in the Guideline for Reusable Parts, Form SEBF8034

Part Number	Description
6V-2034	Adapter
6V-7059	Multiple Anvil Micrometer

## 385-6365 Micrometer

Warranty: Manufacturer's



- Used to measure small thicknesses or diameters
- Large, easy to read (0.275 in/7 mm), high-contrast LCD digital readout
- LP67 protection against coolant, water, dust and dirt
- No glare satin chrome finish on thimble and sleeve
- Extremely hard and stable one piece spindle, accurate and smooth operating one-piece friction thimble
- Two 3-volt batteries included for more than one year of normal usage
- Micro-lapped carbide measuring faces
- Automatic OFF after 20 minutes of nonuse
- Metric only
- Measurement HOLD button
- Ability to zero tool at any position and retain and return to true zero reading of the micrometer
- Resolution .00005 in (0.001 mm)
- Accuracies (±.0001 in (±.002 mm))
- Measuring capacities 1 in (25 mm)
- Does not have 4S232 digital output

Part Number	Description
385-6365	Micrometer

## 6V-2012 Gauge Group, Micrometer Depth (in)

### 6V-7030 Gauge Group, Micrometer Depth (mm)

Warranty: Six Months



- Contains a complete set of measuring rods from 0 to 228.6 mm (0 to 9 in) which are all stored in the wooden case
- Base: 76.2 mm (3.00 in) wide; uses 3.96 mm (5/32 in) rods

Item	Description
1	Case (Not available)

Item	Part Number	Description
—	6V-2012	Gauge Group
—	6V-7030	Gauge Group
2	6V-0088	Rod, 177.8 - 203.2 mm (7 - 8 in)

(Continued)



## 6V-2012 Gauge Group, Micrometer Depth (in) (Continued)

## 6V-7030 Gauge Group, Micrometer Depth (mm)

Warranty: Six Months

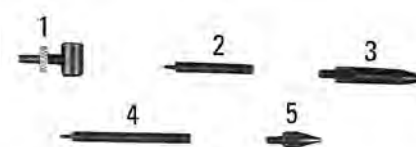
Item	Part Number	Description
3	6V-0091	Rod, 203.2 - 228.6 mm (8 - 9 in)
Not Shown	316-1188	Rod, 228.6 - 254 mm (9 - 10 in) <sup>1</sup>

<sup>1</sup> Sold separately

## 6V-6042 Point Group

Warranty: Six Months

- Has more contact points for the dial indicators
- Has straight contact points from 2.18 to 120.5 mm (0.09 to 4.74 in) long, 3 flat points, and a 12.7 mm (0.50 in) extension
- Has a plastic box with a divided tool holder and space to cut more slots for storage of special points (part numbers and sizes are shown on a chart inside the lid of the box)
- These contact points will fit all dial indicators with 4 to 48 threads but will not fit the 1P-2103 Dial Indicator
- Comes with 6V-2030 Indicator Extension



Contact Points (Included in 6V-6042)	
Part Number	Size
3S-3268	6.4 mm (0.250 in)
3S-3269	25.4 mm (1.00 in)
3S-3270	44.5 mm (1.75 in)
5P-2393	38.1 mm (1.50 in)
5P-4160	19.1 mm (0.75 in)
5P-4161	69.9 mm (2.75 in)
5P-4162	95.3 mm (3.75 in)
5P-4163	120.5 mm (4.75 in)
5P-4809	50.8 mm (2.00 in)
5P-6531	57.2 mm (2.25 in)
5P-7261	31.8 mm (1.25 in)
5P-7262	63.5 mm (2.50 in)
5P-7263	76.2 mm (3.00 in)
5S-8086	2.4 mm (0.094 in) <sup>1</sup>
6V-2057	3.2 mm (0.125 in) <sup>2</sup>
8S-3675	3.1 mm (0.122 in)
9S-0229	9.7 mm (0.38 in)
9S-8883	12.7 mm (0.50 in)
9S-8903	2.4 mm (0.094 in) <sup>3</sup>

<sup>1</sup> 6.4 mm (0.25 in) diameter flat face

<sup>2</sup> 9.52 mm (0.375 in) diameter flat face

<sup>3</sup> 12.7 mm (0.5 in) diameter flat face with a bevel to 9.7 mm (0.38 in) diameter

## Additional Contact Points & Service/Repair Parts

Item	Part Number	Description
--	6V-6042	Point Group - Contact
<b>Additional Contact Points Available (Sold Separately)</b>		
1	5P-2057	Contact Point
2	1P-5512	Contact Point
3	6V-6167	Contact Point
4	1P-5513	Contact Point
5	5P-2056	Contact Point
<b>Service/Repair Parts (Sold Separately)</b>		
Not Shown	6V-6045	Case - Plastic, NEEG2061 Accessories Case Decal
Not Shown	6V-6043	Block Holder

## 5P-2170 Dial Bore Gauge Group

Warranty: Six Months



- Gauge and related masters provide accuracy to 0.0025 mm (0.0001 in) for measuring all bores in the size range 19.05 - 38.10 mm (0.750 - 1.500 in)
- Particularly useful for measuring the relief valve spool bores in pressure control bodies on 631, 633, 637, 641, 650, 651, 657, 660, and 666 Tractors with eight speed transmissions

Item	Part Number	Description
1	5P-2170	Dial Bore Gauge Group
<b>Master Gauges (available separately)</b>		
2	5P-2043	Gauge, 19.050 mm (0.7500 in)
2	5P-2059	Gauge, 22.225 mm (0.8750 in)
2	5P-2169	Gauge, 25.400 mm (1.0000 in)
2	5P-2171	Gauge, 27.051 mm (1.0625 in)
2	5P-2173	Gauge, 31.750 mm (1.2500 in)
2	5P-2174	Gauge, 38.100 mm (1.5000 in)
2	5P-2172	Gauge, 28.575 mm (1.1250 in)

## 1P-3537 Dial Bore Gauge Group for Inch Measurements

Warranty: Six Months



- Useful for making any critical bore measurement from 50.8 to 203.2 mm (2.0 to 8.0 in)
- Specifically, they should be used when reconditioning the cylinder bores on 1100 and 3100 Series Engines and when refinishing connecting rods in 137.16 mm (5.4 in) bore V8 and V12 Engines

### Reference

GMGO0981, Special Instruction

(Continued)

**1P-3537 Dial Bore Gauge Group for Inch Measurements (Continued)**

Warranty: Six Months

Item	Part Number	Description
1	9U-6615	Size Setting Fixture Group
2	1P-3535	Dial Bore Gauge
3	5P-6580	Nest Kit (Early gauges require nest kit if used on later size setting fixtures)
--	1P-3537	Dial Bore Gauge, Inch Measurements

**6V-7898 Dial Bore Gauge, Metric; 6V-7899 Size Setting Fixture, Metric  
6V-7897 Dial Indicator for Converting 1P-3535 Dial Bore Gauge to Metric**

Warranty: Six Months

- Used for precision metric measurements
- Measure all internal diameters from 50 to 200 mm (1.97 to 7.87 in) and depths from 13 to 300 mm (0.51 to 11.81 in) in increments of 0.002 mm (0.00008 in)
- Increased accuracy is needed for applications such as connecting rods where the tolerances are very small
- Use of the gauge is simplified because all current specifications are given in metric dimensions
- 6V-7897 Dial Indicator is available to convert the current 1P-3535 Dial Bore Gauge to the 6V-7898 Dial Bore Gauge (all 1P-3535 Gauges can be converted except earlier gauges marked "MADE IN ENGLAND")

**Reference**

SMHS8253, Special Instruction, instructions for use of the 6V-7898 Dial Bore Gauge and also information for converting the 1P-3535 Gauge to the 6V-7898 Gauge

SMHS8254, Special Instruction, instructions for use of the 6V-7899 Size Setting Fixture

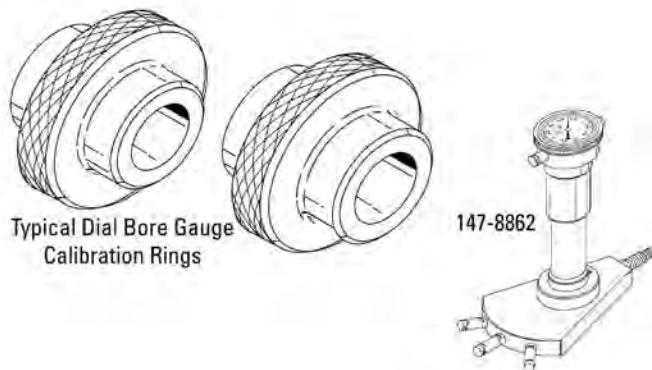


Part Number	Description
1P-3535	Dial Bore Gauge
6V-7897	Dial Indicator for Converting 1P-3535 Dial Bore Gauge to Metric
6V-7898	Dial Bore Gauge, Metric
6V-7899	Size Setting Fixture, Metric

## Dial Bore Gauge and Master Rings

Model: 3600 Engines, Gas and Diesel

Warranty: Six Months



### Reference

SEBF8109, Guideline for Reusable Parts

#### 147-8862 Dial Bore Gauge

- Used to measure 3600 Engine cylinder liners
- Dial graduated to 0.002 mm
- Tool can reach up to 457 mm (18.0 in)

#### 147-8860 Master Ring (diesel 280.025 mm [11.0246 in])

- Used to calibrate dial bore gauge to 280.025 mm (11.0246 in)

#### 147-8861 Master Ring (gas 300.00 mm [11.811 in])

- Calibrates gauge for use on diesel engines
- Used to calibrate dial bore gauge to 300.000 mm (11.811 in)
- Calibrates gauge for use on gas engines

Part Number	Description
147-8860	Master Ring (diesel 280.025 mm [11.0246 in])
147-8861	Master Ring (gas 300.00 mm [11.811 in])
147-8862	Dial Bore Gauge

## 6V-6000 Dial Bore Gauge for Metric Measurements

### 6V-6030 Size Setting Fixture

Warranty: Six Months



#### 6V-6030

- Precision measuring instrument with a diameter range of 30.0 to 50.8 mm (1.2 to 2 in) graduated in 0.002 mm (0.00008 in) increments
- Depth range: 8.5 to 150 mm (0.335 to 5.91 in)
- Gauge is especially useful for measuring piston pin bores for 3300 Series Engines
- Will set or check the dial bore gauge in 0.002 mm (0.00008 in) increments within its range of 0 to 50 mm (0 to 1.97 in)
- Fixture has a magnifying glass for easier reading

#### Reference

SMHS8037, Special Instruction for 6V-6000

SMHS8036, Special Instruction for 6V-6030

Part Number	Description
6V-6000	Dial Bore Gauge for Metric Measurements
6V-6030	Size Setting Fixture

### 245-5829 Battery and Coolant Refractometer

Model: All

Warranty: One Year

European Union compliant, CE marked

- Used to measure freezing point of coolants plus battery charge condition
- Refractometer uses a prism and lens with simple focus adjustment to provide accurate and repeatable measurements on easy to read scales
- Easy to operate
- Automatic temperature compensation (ATC)
- Requires only 2 or 3 drops of solution
- Carrying case and calibration screwdriver included
- Reads degrees Centigrade and Fahrenheit



Range	Resolution
-60° to 32° F propylene glycol freeze point	10° F
-50° to 0° C ethylene glycol freeze point	5° C
1.15 to 1.30 specific gravity of battery acid	0.01

Part Number	Description
245-5829	Coolant Test Kit

### 367-9109 6 Inch Fractional Digital Caliper

Model Usage: All machines/models

Warranty: One year

European Union Compliant, CE Marked

- Used to make inside, outside depth and step measurements
- Tri-mode digital display; Inches, Millimeters, and Fractions
- Auto off
- Replacement Battery; LR44
- Construction: Carbon Fiber



Specifications	
Range	0 - 6 in (0 - 150 mm)
Resolution	0.0005 in (0.01 mm or 1/64 in)
Accuracy	0.001 in (± 0.02 mm)
Length	38 mm (1.5 in)
Width	114 mm (4.5 in)
Depth	292 mm (11.5 in)
Weight	289.4 gram (0.638 lb)

Part Number	Description
367-9109	6" Fractional Digital Caliper

## 7B-0337 Surface Plate

Warranty: Six Months



- Use for checking small shafts and bars for straightness; checking flat surfaces for warp; and trimming rings, bearing caps, etc., using fine emery cloth
- Plate measurements: 304.8 x 330.2 x 38.1 mm (12.0 x 13.0 x 1.5 in)

### Note

As this plate is meant for general shop use, its surface is ground but not spot-scraped.

Part Number	Description
7B-0337	Surface Plate

Paving Products

**4C-5558 Auto Vibration Bypass Control**

Model: CB434, CB534 Vibratory Compactors

Warranty: One Year

- Allows vibration mode to operate while machine is standing still for testing and adjusting
- Without this tool machine has to be in motion for vibration mode to operate
- Consists of ON/OFF switch attached to 3.048 m (10-ft) long cable

**Reference**

KENR1305, Service Manual

Part Number	Description
4C-5558	Auto Vibration Bypass Control

**FT2373 Electrical Displacement Control Test Box**

Model: AP-800 (1BF), AP-1200 (2JD) Asphalt Pavers; RR-250 (6ED) Road Reclaimers; SS-250 (6DD) Soil Stabilizers

Warranty: None

- Tests electrical displacement control (EDC) in Sundstrand hydraulic systems (ground drive pump)
- Will move machine if electrical system failure other than EDC
- Minimum-maximum resistance: 0 - 250 ohms

Use the parts list and wiring diagram to construct a FT2373 Test Box.

For asphalt paving machines only, if an electrical failure causes the brakes to be engaged, use a jumper wire to supply electrical power directly to the brake solenoid. If the brake solenoid has failed, use a portable hydraulic power supply to release the brakes when the machine is to be moved

Mark the 0 to 250 ohm potentiometer to show the minimum and maximum resistance positions (0 ohms and 250 ohms respectively). The potentiometer should be at the maximum resistance (250 ohms) when the test box is connected to the machine.

**Operating Instructions**

Before making the following checks, ensure that the machine is on flat ground with adequate room for movement forward and reverse. With the brake off, manually move the pump control valve at the EDC (see the service manual). If the machine moves, the problem is electrical. Proceed with the following checks. If the machine does not move, the problem is in the hydraulic system and further electrical checks are not necessary

1. Ensure proper polarity when connecting large battery clips (7, 8) to the battery.
2. Turn the potentiometer (1) to the maximum resistance position (250 ohms).
3. Connect the mini-clips (9) to the EDC wiring harness.
4. Slowly turn the potentiometer (1) toward the minimum resistance position (0 ohms) until the machine starts to move. To reverse the direction of travel reverse the switch (2).
5. If the machine does not move and/or increase in speed as the potentiometer (1) is turned toward the minimum resistance position (0 ohms) replace the EDC.
6. If the machine moves and increases speed, as the potentiometer (1) is turned toward the minimum resistance position, the EDC is working correctly. Check for an electrical problem other than the EDC.

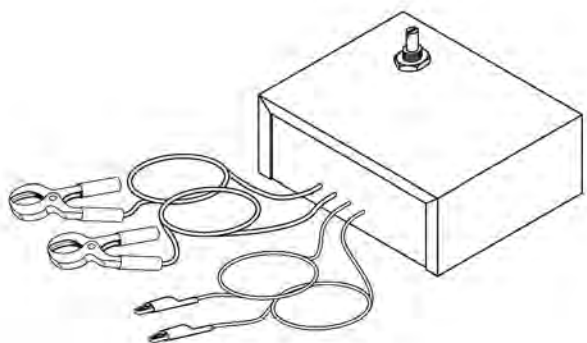
Item	Description	Radio Shack Part No.
4	14-gauge wire, 4.8 m (15.75 ft) long (4)	
5	16-gauge wire, length as required	
6	Terminal strip	274-658
7	Battery clip (+red)	270-344
8	Battery clip (-black)	270-344
9	Clip, mini (2)	270-378
10	Box, 133.4 x 76.2 x 54.1 mm (5.25 x 3 x 2.13 in)	270-238

(Continued)

## FT2373 Electrical Displacement Control Test Box (Continued)

Model: AP-800 (1BF), AP-1200 (2JD) Asphalt Pavers; RR-250 (6ED) Road Reclaimers; SS-250 (6DD) Soil Stabilizers

Warranty: None



Item	Part Number	Description
1	8C-7647	Potentiometer, 0 - 250 ohms
2	8C-8023	Micro Switch
3	081-7580	Resistor, 40 ohms (2)

## 4C-8758 Test Harnesses

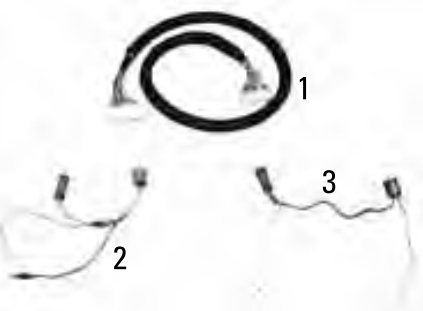
Model: E(L)200B, E(L)240B, and E(L)300B Excavators

Warranty: One Year

- Allows access to electrical control signals to be checked for correct operation and measurement of voltages, current, resistance and continuity

### References

SENR4527, Testing and Adjusting Module for E(L)200B  
 SENR4843, Electronic Power Unit Module for E(L)240B  
 SENR4871, Electronic Power Unit Module for E(L)300B  
 NEHS0546, Tool Operating Manual, Adjustment to Electronic Power Unit Control System



Item	Part Number	Description	Use
1	099-0048	Extension Harness	In electronic control circuit
2	099-0049	Test Harness	To check governor control potentiometer
3	099-0050	Test Harness	To check the Proportional Reducing Valve (PRV) on E(L)200B Excavator
Not shown	4C-8758	Test Harness	To check the PRV on E(L)240B and E(L)300B



Power Train Tools

**277-2362 Transmission Analyzer III Group**

Model: Machines with electrical transmission or pump controls

Warranty: One Year

European Union compliant, CE marked

- Replaces discontinued 9U-7500 Transmission Analyzer II Group
- Used to electronically test components on transmission or pump
- Used with dealer supplied computer
- Used on Powershift planetary, Powershift countershaft, Individual Clutch Modulation (ICM), Challenger, H-Series Motor Grader, and Electronic Clutch Pressure Control (ECPC) transmissions
- Used to test and adjust proportional valves which control transmission (connects directly to solenoids with dealer supplied adapters)
- Operates and checks solenoid operation, electronic shift lever operation, and transmission shifts
- Performs automatic or manual testing for shorted or open solenoid coils (can also alert technician to intermittent problems with solenoids)
- Analyzer can activate solenoids in a timeline sequence
- Modulates current to 1 or all activated solenoids at any point in time
- Analyzer outputs pulse width modulated (PWM) current (required for Challenger and ECPC transmissions)
- Determines if shift lever is functioning correctly on transmissions not controlled by autoshift electronic control feature
- Capable of testing electronically actuated pumps installed on a hydraulic test bench by energizing the solenoids inside the pump
- Uses PC based software to control transmissions allowing easy updates to support new transmissions, as they are released
- Software updated annually to accommodate New Production Introduction Software Subscription NETG5048
- PC software with easy to use graphic interface provides step-by-step instruction for analyzer operation
- Allows use of mouse, rollerball, touchpad, and keyboard controls
- USB communications cable (included) allows for quick easy connection between analyzer and dealer supplied PC
- Designed and built for harsh shop environment



Diagnostic Tools

**Reference**

NEHS0996 Tool Operating Manual

NETG5048 Annual Software Subscription, Bench Testing Hydraulic Components

Part Number	Description
—	Hinged Hard Shell Carry Case

(Continued)

## 277-2362 Transmission Analyzer III Group (Continued)

Model: Machines with electrical transmission or pump controls

Warranty: One Year

Part Number	Description
1U-9485	Power Cable
277-2362	Transmission Analyzer III Group
286-0755	USB Communications Cable
Optional Tools	
1U-9479	Gear Shift Test Adapter Cable
1U-9480	Gear Shift Test Adapter Cable
1U-9482	Test Cable (ICM)
1U-9483	Test Cable (Challenger)

Part Number	Description
Optional Tools (Continued)	
256-7623	Dozer Speed Sensor Cable
300-4993	Adapter Cable (17-pin to 14-pin) some R and T Series Track-Type Tractors
307-3542	Transmission Analyzer Adapter Cable
9U-7495	Test Cable (Wheel Loader)
9U-7496	Test Cable
9U-7497	Test Cable
9U-7498	Extension Cable

## Specifications

AC power	110 - 240 VAC
Minimum current required	10 amps
Power cord	231 cm (91 in) long
286-0755 USB Cable	203 cm (80 in) long
Operating temperature range	-18 to 60° C (0 to 140° F) ambient air
Storage temperature range	-40 to 60° C (-40 to 140° F) ambient air
Overcurrent protection	Current limiting electronic circuit
Short protection	30 amp quick-trip circuit breaker
PC software	Upgradable
Computer operating system	Windows 2000 or XP
Required RAM	1 MB
Minimum software required	Intel Pentium II 333 MHz processor or higher
	128 MB RAM or higher
	4.3 GB hard disk or higher
	CD drive or third generation DVD drive
	15 in or larger Super VGA adapter and monitor
Suggested pointing device	Mouse, trackball, or touchpad
Case size	52 x 45 x 22 cm (20.5 x 17.5 x 8.5 in)
Tester size	36 x 32 x 15 cm (14.25 x 12.5 x 6 in)
Group weight	6 kg (13.8 lb)
Tester weight	4 kg (8.9 lb)

**Applicable Models**

Articulated Trucks	D250E, D250E III, D300E, D300E III, D350E, D350E III, D400E, D400E III, 725, 730, 735, 740
Backhoe Loaders	416, 426, 428, 436, 438, 446, 446B-001, 446B-2500
Challenger Tractors	35, 45, 55 MT 700 Series, MT 800 Series
Compactors	815F, 816F, 825G, 826G, 836G
Dozers	D5M, D6M, D6R, D7R, D8R, D10R, D11N, D11R
H-Series Motor Graders	12H, 14H, 24H, 120H, 135H, 140H, 143H, 160H, 163H
Integrated Tool Carriers	IT12, IT12B, IT12F, IT14, IT14B, IT14F, IT18F, IT24F, IT24G, IT28F, IT28G, IT38F, IT38G, IT62G
Scrapers	621E, 621F, 623E, 623F, 627B, 627E, 627F, 631E, 631F, 633E, 633F, 637D, 637E, 637F, 639D, 639F, 651E, 657B, 657E
Off-Highway Trucks	725, 730, 768C, 769C, 772B, 773B, 773D, 776, 776B, 777, 777B, 777D, 785, 789, 793,
Wheel Loaders	910, 910E, 910F, 918F, 924F, 924G, 924GII, 928F, 928G, 928GII, 936, 936F, 938F, 938G, 938GII, 950F, 950G, 960F, 962G, 966F, 966G, 970F, 972G, 980F, 980G, 988F, 988G, 988GII, 990, 992D, 992G, 994D, 994G
Wheel Skidders	515, 520D, 522D, 525, 525B, 545
Wheel Tractors	814F, 824G, 834G, 836G, 844, 854

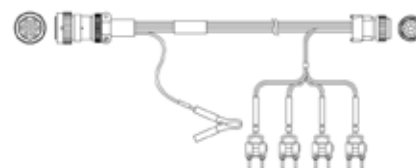
**256-7623 Dozer Speed Sensor Cable**

Model: D6M, D6R, and D6T Track-Type Tractors

Warranty: One Year

Part Number	Description
256-7623	Dozer Speed Sensor Cable

- Used to shift transmission and measure speed sensor signals during a bench test
- Used with discontinued 9U-7500 Transmission Analyzer II Group
- One end plugs directly into transmission control connector
- Speed sensor connectors plug directly into multimeter

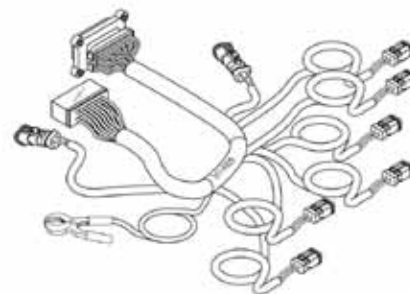


**311-4929 Adapter Cable**

Model: All OEM transmissions using A4:M1 ECM

Warranty: One Year

- Used to shift transmission and measure speed sensor output signals during bench test
- Used with 277-2362 Transmission Analyzer III Group
- 40-pin connector plugs into 306-0397 Extension Cable
- 70-pin connector plugs into machine harness J1 connector
- 8-speed sensor breakout plugs
- Speed sensor plugs can be back-probed with multimeter for checking speed sensor voltage and frequency signals
- Speed sensor plugs can also be connected into the Transmission Analyzer III using the 2-pin Deutsch receptacles
- Ground clamp connects to ground point on transmission
- Main harness approximately 300 mm (11.81 in) long
- Speed sensor breakouts approximately 600 mm (23.6 in) long



Diagnostic Tools

(Continued)

## 311-4929 Adapter Cable (Continued)

Model: All OEM transmissions using A4:M1 ECM

Warranty: One Year

Part Number	Description
311-4929	Adapter Cable

## 304-9169 Adapter Cable Assembly

Model: TH48FT-E70 Oil-Field Transmission

Warranty: One Year



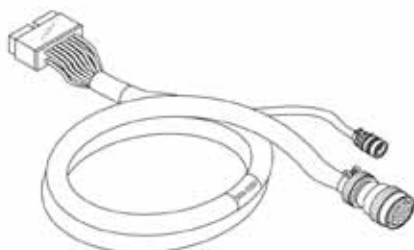
- Used to shift transmission during bench test
- Used with 277-2362 Transmission Analyzer III Group and 9U-7498 Extension Cable
- Connects to 31-pin 9U-7498 Extension Cable, 17-pin transmission bulkhead connector, and 2-pin lock-up clutch solenoid receptacle
- Ground clamp connects to ground point on transmission
- Overall length: 30 cm (11.8 in)
- Material: 18 gauge wire

Part Number	Description
304-9169	Adapter Cable Assembly

## 306-0397 Extension Adapter Cable

Model: All models with electronic controls

Warranty: One Year



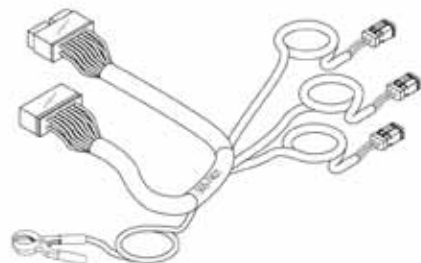
- Used with 277-2362 Transmission Analyzer III Group and individual machine test adapter cables that have speed sensor capability
- Provides longer connection between machine test adapter cable and Transmission Analyzer III
- Speed sensor breakout cable allows sensor readouts with Transmission Analyzer III software

Part Number	Description
306-0397	Extension Adapter Cable

## 305-7401 Adapter Cable

Model: 777F Off-Highway Truck

Warranty: One Year



- Used to shift transmission and measure speed sensor outputs during bench test
- Used with 277-2362 Transmission Analyzer III Group and 306-0397 Extension Cable
- Adapter connects 306-0397 Extension Cable to the transmission bulkhead connector
- Speed sensor breakouts allow multimeter readouts
- Enables technician to monitor output speed sensors via Transmission Analyzer III
- Ground clamp connects to ground point on transmission
- Main harness length: 30 cm (11.8 in)
- Speed sensor breakout harness length: 60 cm (23.6 in)

Part Number	Description
305-7401	Adapter Cable

**FT3194 Transmission Wire Harness**

Model Usage: 777G Off-Highway Truck

Warranty: Manufacturer's

- Used to connect to the internal transmission harness to avoid connection problems when intermediate harness is unavailable for test
- Connects intermediate speed sensor to Transmission Analyzer III to display intermediate speed during test
- Required to help troubleshoot transmission on the 777G

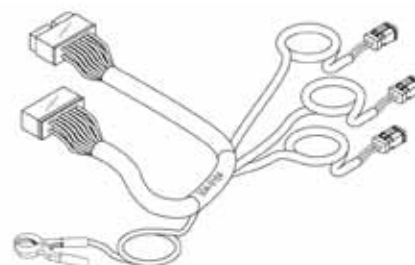
Specifications	
Dimensions	40 cm (15.8 in)

**304-9164 Adapter Cable**

Model: 773-775F Off-Highway Truck

Warranty: One Year

- Used to shift transmission and measure speed sensor outputs during bench test
- Used with 277-2362 Transmission Analyzer III Group and 306-0397 Extension Cable
- Adapter connects 306-0397 Extension Cable to the transmission bulkhead connector
- Speed sensor breakouts allow multimeter readouts
- Enables technician to monitor output speed sensors with Transmission Analyzer III
- Ground clamp connects to ground point on transmission
- Main harness length: 30 cm (11.8 in)
- Speed sensor breakout harness length: 60 cm (23.6 in)



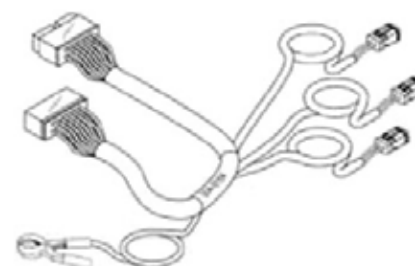
Part Number	Description
304-9164	Adapter Cable

**FT3211 Adapter Cable**

Model Usage: 773F, 775F Off-Highway Truck

Warranty: None

- Used to shift transmission and measure speed sensor outputs during bench test
- Used with 277-2362 Transmission Analyzer III Group and 306-0397 Extension Cable
- Adapter connects 306-0397 Extension Cable to the transmission bulkhead connector
- Used to connect to newer transmission harness assemblies referenced in SEPD1328
- Speed sensor breakouts allow multimeter usage
- Enables technician to monitor output speed sensors with Transmission Analyzer III
- Ground clamp connects to ground point on transmission
- Main harness length: 30 cm (11.8 in)
- Speed sensor breakout harness length: 60 cm (23.6 in)
- Modification of 304-9164



**Reference**

SEPD1328, Service Magazine

## 333-6413 Adapter Cable

Model Usage: 793F

Warranty: One Year



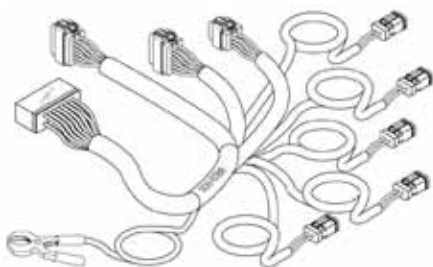
- Used to shift transmission and measure speed sensor outputs during bench test
- Used with 277-2362 Transmission Analyzer III Group and 306-0397 Extension Cable Adapter
- Connects 333-6413 extension cable to the transmission bulkhead
- Speed sensor breakouts allow multimeter readouts
- Capability to monitor output speed sensors with Transmission Analyzer III
- Ground clamp connects to ground point on transmission

Part Number	Description
333-6413	Adapter Cable

## 306-6388 Adapter Cable Assembly

Model: M-Series Motor Graders

Warranty: One Year



- Used to shift transmission and measure speed sensor outputs during bench test
- Used with 277-2362 Transmission Analyzer III Group and 306-0397 Extension Cable
- Adapter connects 306-0397 Extension Cable to the parking brake solenoid, shift solenoid, and speed sensor connectors on transmission
- Ground clamp connects to ground point on transmission
- Speed sensor breakouts allow for multimeter readouts
- Enables technician to monitor output speed sensors using Transmission Analyzer III
- Main harness length: 30 cm (11.8 in)
- Speed sensor breakout harness length: 60 cm (23.6 in)

Part Number	Description
306-6388	Adapter Cable Assembly

## 307-3542 Transmission Analyzer Adapter Cable

Model: D11R Track-Type Tractors Serial Number Prefix 7PZ, 9TR, 9XR, and AAF

Warranty: One Year



- Used to adapt 256-7623 Speed Sensor Cable to transmissions listed above
- Allows transmission to be tested with Transmission Analyzer II and III
- Adapts 17-Pin connector on speed sensor cable to 14-Pin connector on transmission
- Cable length: 30 cm (11.8 in)

Part Number	Description
307-3542	Transmission Analyzer Adapter Cable

**1U-9100 Adapter Cable (Challenger to PC)**

Model: Challenger 35, 45, and 55  
 Warranty: One Year

- Used to connect a personal computer into the Challengers on-board electronic system
- Used with personal computer
- Cable connects RS232 port on computer to Diagnostic and Maintenance (D.A.M.) connector on Challenger
- Cable allows Electronic Technician (ET) software to read fault codes, delete fault codes (where allowed), and change vehicle parameters
- Cable comes complete with communication adapter which allows computer to communicate with Challenger's electronic system
- Cable length: 2.1 m (7.0 ft)
- Computer connection: 9-pin serial



Part Number	Description
1U-9100	Adapter Cable (Challenger to PC)

**4C-4068 Extension Cable**

Model: 621E, 623E, 627E, 631E, 637E, 651E, 657E  
 Warranty: One Year

- 14-foot long extension cable that enables serviceman to position ICM control box in cab while troubleshooting transmissions
- Make troubleshooting safer and easier

Part Number	Description
4C-4068	Extension Cable

**139-5210 Extension Cable Assembly (ARC/EPTC II)**

Model: See List Below  
 Warranty: One Year

- Extension cable for Automatic Retarder Control (ARC) used on 769D, 771D, 773D, 775D, 776D, 777D, 785B, 789B, 793B, and 793C Off-Highway Trucks; and Electronically Programmable Transmission Control (EPTC II) used on 769D, 771D, 773D, 775D, 776D, 777D, 785B, 789B, 793B, and 793C Off-Highway Trucks; D250E, D300E, D350E, and D400E Articulated Trucks; and 621F, 623F, 627F, 631E, 633E, 637E, and 657E Wheel Tractor Scrapers
- Connects to 10-pin sure seal connector on ARC or EPTC II
- Two additional connectors allow 4C-8195 Control Service Tool and discontinued 7X-1700 Communication Adapter to be connected
- Allows serviceman to position ARC and EPTC II in cab while troubleshooting
- Overall length: 4.3 m (14 ft)



Part Number	Description
198-1758	Calibration Group
139-5210	Extension Cable Assembly (ARC/EPTC II)

## 198-1758 Calibration Group

### Essential Tool

SMCS Code: 5084-524

Model: 621G, 623G, 627G, 631G, and 637G Scraper

Warranty: Six Months

- Used to calibrate electro-hydraulic implement control system
- Used with Cat® Electronic Technician (ET) software
- Ensures efficient operation of implement system
- Overall length: 650 mm (25.6 in)

### Reference

REN1528, REN1534, and REN1593 Service Manual Modules

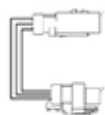
198-6593 Calibration Instructions

Service/Repair Parts	
Part Number	Description
142-2763	Coupler Assembly
202-8022	Switch Assembly
276-8158	Harness Assembly
3J-7354	Seal - O-ring - STOR for 8C-3446 (not pictured)
3K-0360	Seal - O-ring - STOR (SAE 3/4 - 16)
8C-7325	Adapter

## 369-4187 Calibration Group

Model Usage: 621H, 623H, 627H, 631H

Warranty: Six Months



369-4188



344-7391



142-2763



41-0899



214-7568



241-7566

- Used to calibrate electro-hydraulic implement control valve for 620H Series Wheel Tractor Scrapers
- Not for G models. G models use the 198-1758 Calibration Group.

Serviceable Parts	
Part Number	Description
369-4188	Calibration Cable Assembly 75 cm (30 in)
344-7391	Pressure Sensor Group
214-7568	O-ring STOR Seal 11.89 mm (9/16 in)
214-7566	O-ring STOR Seal 8.92 mm (7/16 in)
142-2763	Coupler Assembly
41-0899	STOR Boss/ STOR Port Fitting

## 4C-5974 Adapter Cable

Model: Machines with military-type connectors

Warranty: One Year



- Used to adapt military-type connector, previously used on majority of Cat® machines, to Sure Seal connector
- Standard harness with military-type connectors can now be used with the serviceable replacements that use Sure Seal connectors without any modification of wiring harness
- Testing and analysis equipment can be used on hardware with new Sure Seal connectors

Part Number	Description
4C-5974	Adapter Cable

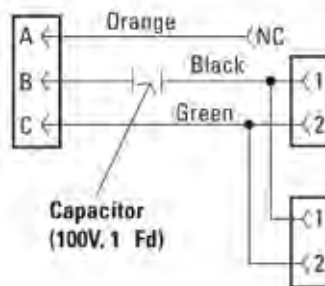


### FT2796 Breakout Harness

Model: 700 Series Articulated Truck

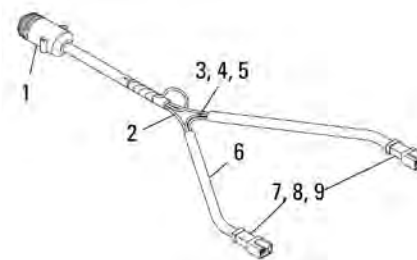
Warranty: None

- Used to connect a signal generator to transmission output speed sensor
- Made from 8T-8666 Connector Kit and other miscellaneous parts
- Simulates ground speed



### Assembly Instructions

1. Obtain 8T-8666 Connector Kit.
2. Cut 50 mm (1.97 in) off Green wire to make the same length as Black wire.
3. Splice 16GA Black wire to Black wire of 8T-8666 Harness.
4. Cut this black wire on the side of the splice closest to the 3-pin connector.
5. Splice or solder each end of the severed wire to one of the capacitor leads.
6. Splice 16GA Green wire to Green wire of 8T-8666 Harness.
7. Crimp 8T-8729 Pins to Green and Black wires.
8. Cover splices with heat shrink wrap.
9. Insert pins into receptacles, Black to 1 and Green to 2.
10. Insert wedges into receptacles. Tape unused Orange wire to harness.



Parts Required for Assembly			
Item	Part Number	Description	Qty.
2	—	16 GA Green Wire 25 cm (9.84 in) long	1
3	—	16 GA Black Wire 25 cm (9.84 in) long	1
4	—	Shrink Wrap	1
8	—	Capacitor (100 V, 1 μFd)	1
	—	Possible suppliers or other equivalent:	
	—	Digi-Key 399-4427 ND	
	—	Mouser Electronics 80-C340C105K1R	

Item	Part Number	Description	Qty.
1	8T-8666	Connector Kit	1
5	3E-3364	Receptacle As- sembly	2
6	3E-3365	Wedge	2
7	8T-8729	Connector Pin	4

## 232-1065 Cable Adapter

### Essential Tool

Model: 740 Articulated Truck

Warranty: One Year



- Used to connect transmission ICM solenoid to harness from discontinued 9U-7500 Transmission Analyzer II
- Adapts two-pin, military-type connector to two-pin Deutsch DT connector
- Allows discontinued 9U-7500 Transmission Analyzer II to be used on newer articulated truck transmissions
- Overall length: 300.0 mm (11.8 in)

Part Number	Description
232-1065	Cable Adapter

## 308-2506 Adapter Harness

Model: D6K Track Type Tractor

Warranty: Six Months



- Used to electrically connect cab to machine while cab is removed
- Used with Cat® ET to perform remote hystat stall test
- Includes jumpers for 31-pin and 40-pin cab connectors, battery, alternator, and ground connections
- Uses machine speed sensor inputs to maintain machines' safety features
- Prevents machine parking brake from being disengaged
- Ring terminals for battery, alternator, and ground connections provide safe, reliable, high-current connections (additional bolts required to connect ring terminals)
- Overall length: 6.1 m (20 ft)
- Approximate weight: 13.5 kg (30 lb)

Part Number	Description
308-2506	Adapter Harness

## Speed Measuring Tools

**9U-7400 Multitach II Group, 9U-7401 Multitach II****9U-7402 Multitach II Photo Group**

Model: All Cat® Products

Warranty: One Year

European Union compliant, CE marked

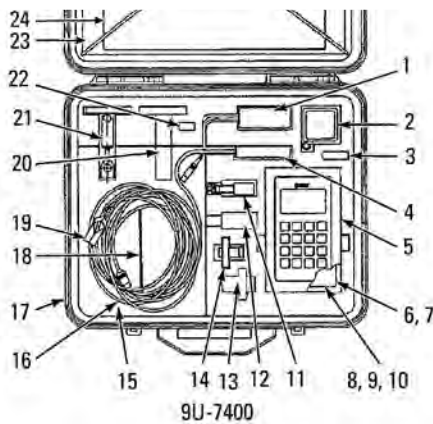
- Used to measure RPM, frequency, and engine set point — combines 3 instruments into one
- Engine set point indicator captures and displays set point RPM
- Hz frequency meter measures gen set or other signal frequency
- Easy to use photo pickup for fast RPM measurement
- 2 digital displays show Input 1 and Input 2 values simultaneously — eliminates switching screens
- Displays minimum, maximum, and difference values of inputs
- Displays difference between Input 1 and Input 2
- Backlit display for operation in low light conditions
- Optional RS232 output available for sending data directly to printer
- Adjustable pulses per revolution
- Operated by rechargeable battery — designed with low battery indicator and internal battery voltmeter
- Accepts many different types of pickups (including most pickups used with former Multitach II)
- Program each input separately with different PPR (Pulses Per Revolution) values for each — different pickups can be used simultaneously
- Stays pre-programmed to values last used — displays values when turned on

**Reference**

NEHS0605, Operating Manual

RPM measurement range	1 - 9999 RPM
Measurement accuracy	±1 RPM
Pulses per revolution	0.1 - 256 PPR (selectable)
Frequency measurement range	0-9999 Hz
Frequency measurement accuracy:	
0 - 999.9 Hz	±0.5 Hz
1000 - 9999 Hz	±1.0 Hz
Set point measurement	Set point — 20 RPM = full load RPM
Overrun indicator	0 - 10% rack contact
Set point RPM	11% rack contact (RPM held on display)
Overrun and lug off	11 - 74% rack contact
Lug indicator	75 - 100% rack contact

## 9U-7400 Multitach II Group

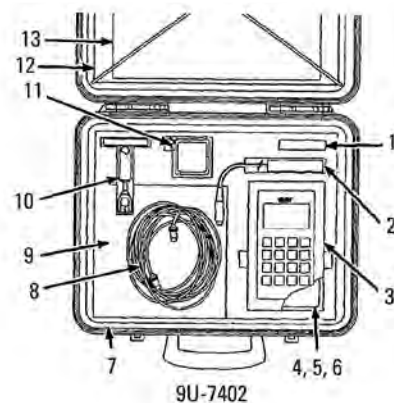


Item	Part No.	Description
3	—	Storage for 3 spare AA size batteries
12	—	Storage for additional Tachometer Generator
13	—	Storage for additional Tachometer Drive Group
20	—	Storage for additional photo pickup magnetic base
22	—	Storage for 2 spare AA size batteries
23	—	NEEG2593 Inside Lid Decal
24	—	NEHS0605 Operating Instructions

Item	Part No.	Description
1	9U-7505	High Voltage Adapter (600 V Max)
2	4C-3024	Battery Charger
4	9U-5140	LED Photo Pickup
5	9U-7401	Multitach II
6	6V-6045	Case - Plastic NEEG2061 Accessories Case Decal
7	1U-6605	Retro-Reflective Tape, 12 mm x 1.5 m (0.5 in x 5.0 ft) roll
8	6V-3138	Extension Rod for Magnetic Base
9	9U-7506	Magnetic Adapter Cable
10	8T-5111	Rack Adapter Cable
11	5P-7360	Tachometer Generator
14	5P-1759	Tachometer Drive Group (additional parts in accessory case)
15	9U-7508	Foam Insert
16	6V-2198	Cable Assembly, 5.5 m (18.0 ft)
17	6V-7145	Case, NEEG2573 Group Label on lid of 9U-7400 Group
18	6V-7072	Lead Kit - Test ( for use with high voltage adapter)
19	1P-7446	Rack Cable, 5.5 m (18.0 ft)
21	6V-3137	Magnetic Base for Photo Pickup
--	9U-7400	Multitach II Group

## 9U-7402 Multitach II Photo Group

Item	Part No.	Description
1	---	Storage for 5 spare AA size batteries
12	---	NEEG2594 Inside Lid Decal
13	---	NEHS0605 Operating Instructions



Item	Part No.	Description
2	9U-5140	Pickup - LED Photo
3	9U-7401	Multitach II
4	6V-6045	Case - Plastic, NEEG2061 Accessories Case Decal
5	1U-6605	Retro-Reflective Tape, 12.5 mm (0.5 in) x 1.5 m (5.0 ft) long
6	6V-3138	Extension Rod for 6V-3137
7	6V-3072	Case - Plastic, NEEG2574 Group Decal on lid (9U-7402 Group)
8	6V-2198	Extension Cable (X8)
9	9U-7507	Foam Insert
10	6V-3137	Magnetic Mounting Base for 9U-5140
11	4C-3024	Battery Charger
--	9U-7402	Multitach II Photo Group

### Optional Accessories (Sold Separately)



Item	Part No.	Description
1	4C-9499	RS232 Output Adapter
2	155-5175	AC Clamp-on Probe (use with 9U-7505 High Voltage Adapter or 9U-5265 Banana Plug Adapter to measure Hz)
3	155-5176	AC/DC Clamp-on Current Probe (use with 9U-7505 High Voltage Adapter or 9U-5265 Banana Plug Adapter to measure Hz)
4	9U-5215	Tool Case, Soft (not as shown)
5	8T-5297	Extension Cable 0.9 m (3.0 ft)
6	9U-5265	Adapter (connects 2 banana plugs to 9U-7506 magnetic adapter cable)
7	6V-0093	Retro Reflective Tape, 12.0 mm (0.5 in) wide x 15.0 m (50 ft) long roll
8	4C-6919	Retro Reflective Tape, 25 mm (1 in) wide x 2.5 m (100 in) long roll, with honeycomb pattern design
9 <sup>1</sup>	4C-6821	Injection Line Speed Pickup Group (for Multitach or Data Logger)
11 <sup>1</sup>	6V-4950	Injection Line Speed Pickup Group (for Multitach only)

(Continued)

# Speed Measuring Tools

## Optional Accessories (Sold Separately) (Continued)

Item	Part No.	Description
12	1U-7445	NiCad (Nickel Cadmium) Rechargeable Battery, AA (packaged singly) <sup>2</sup>
13	1U-9533	Alkaline Non-Rechargeable Battery, AA (package of 96) <sup>2</sup>
14	8L-4171	Magnetic Pickup (general purpose)
15	8T-5184	Magnetic Pickup, 88.9 mm (3.5 in) long x 6.35 mm (0.25 in)
16	6V-2197	Magnetic Pickup, 114.3 mm (4.5 in) long x 6.35 mm (0.25 in)
17	8T-5185	Magnetic Pickup, 177.8 mm (7.0 in) long x 6.35 mm (0.25 in)
18	6V-2199	Pickup Adapter, 6.35 mm (0.25 in) diameter x 1/8 in NPT
19	6V-3093	Pickup Adapter, 6.35 mm (0.25 in) diameter x 1/4 in NPT
<b>Not Shown</b>		
--	1U-6605	12.2 mm (0.5 in) Retro Reflective Tape (1), 1524 mm (5 ft) long roll

<sup>1</sup>Item 10 is part of this group

<sup>2</sup>Five batteries are required to power Multitach II

## 5P-1759 Tachometer Drive Group

Model: All Models

Warranty: Six Months



- Used on engines with ENM Service Meters including engines with Sleeve Metering Fuel Systems
- To use 5P-1759 Drive Group, service meter is removed and drive group installed
- On 5.4 inch bore engines not equipped with tachometer drive group, 5P-1758 Shaft Assembly must be used

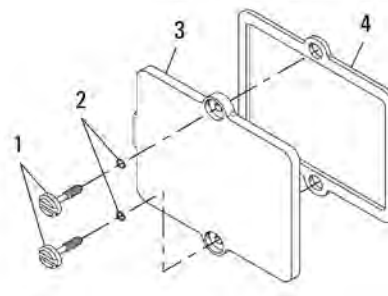
Item	Part Number	Description	Use
1	1W-2316	Adapter Assembly	For all engines with ENM Service Meters
1	4M-8308	Seal (outside)	—
2	5P-1758	Shaft Assembly	With 1W-2316 for 5.4 in bore V—engines
3	4N-0538	Coupling	With 1W-2316 and 5P-0537 for engines with Sleeve Metering Fuel Systems
4	5P-0537	Hard Washer	4N-0538 (5P-0537 Washer, discontinued, is not needed with later 1W-2316 Adapter Assembly)
5	9S-3032	Clamp (2)	—
6	9S-0211	Clamp (2)	—
--	5P-1759	Tachometer Drive Group (additional parts in accessory case)	—

## 168-7727 Battery Cover Group

Warranty: One Year

- Replacement battery cover kit for the following hand held diagnostic tools which have external battery access:  
9U-7401 Multitach II  
168-7721 Ultrasonic Wear Indicator III

Item	Description
1	Battery Screw Cover
2	O-ring Seal
3	Battery Cover
4	Gasket
Not shown	
	Battery Clip, Single (2)
	Battery Clip, Dual (4)



Part Number	Description
168-7727	Battery Cover Group

## 211-1773 Drive Motor Speed Pickup Breakout-T

## 211-1774 Engine Speed Sensor Breakout-T

Model: D3G, D4G, D5G Track-Type Tractor

Warranty: One Year

- Used to monitor drive motor speed pickup and engine speed sensor
- Used with DataView
- 211-1773 connects between machine harness and engine speed sensor (magnetic pickup)
- 211-1774 connects between machine harness and drive motor speed pickup (Hall-effect sensor)

Part Number	Description
211-1773	Drive Motor Speed Pickup Breakout-T
211-1774	Engine Speed Sensor Breakout-T



## FT1808 Magnetic Input Adapter Cable

Model: All Models

Warranty: None

- Permits easier use of discontinued 6V-2100 Multitach or 9U-7400 Multitach II to check engine or alternator RPM
- Used on engines equipped with magnetic pickup which is used as RPM signal for electronic overspeed switch or electronic governor

### Reference

SEN2945, Electronic Monitoring System (EMS) Service Manual (contains additional information to check alternator "R" terminal output)

### Operating Instructions

To measure engine RPM on the multitach, connect the lug end of the cable to the magnetic pickup output signal lead for the magnetic pickup. Connect the plug end of the cable to the 5P-7362 Magnetic Input Cable on the multitach. No ground connection is needed if the engine battery is used as the power source for the multitach. Use the number of flywheel teeth as the P/REV (pulses per revolution) number on the multitach.



(Continued)

# Speed Measuring Tools

## FT1808 Magnetic Input Adapter Cable (Continued)

Model: All Models

Warranty: None

To measure alternator RPM, connect the lug end of the cable to the "R" terminal on the alternator. Connect the plug end of the FT1808 Cable to the 5P-7362 Mag Input Cable that is connected to the multitach mag input. This method gives the alternator RPM which is a ratio of the engine RPM. See the chart for the P/REV numbers for the specific alternator to be checked.

Alternator Type	Multitach P/Rev
Cat®	6
DELCO 10-20 DI	7
DELCO 25-30 SI	8

## 5P-0935 Tachometer Drive Adapter Group

Model: 910, 931, D3, 3204

Warranty: One Year



- Used with Tachometer Drive Group for checking engine speed on 3204 Engine in D3 Tractors, 910 Wheel Loaders, and 931 Track Loaders (discontinued 7M-6006 Group must be modified by removing plate and machining housing to dimension shown)

Item	Part Number	Description
1	5P-0933	Adapter (Part of 5P-0935)
2	5P-0934	Shaft (Part of 5P-0935)
3	7M-6006	Drive Group
—	5P-0935	Tachometer Drive Adapter Group

## 8N-5945 Adapter Assembly

Model: 943, 953, 3204

Warranty: Six Months



- Used for measuring engine speed on 3204 Engines, 10X1-2935, in 943 and 953 Loaders
- 90° drive adapter assembly installed on engine timing gear cover
- Used with 5P-7360 Tachometer Generator; 4M-8303 Seal and two 9S-3032 Clamps also required for installation of adapter assembly

Part Number	Description
8N-5945	Adapter Assembly



**6N-1345 Tachometer Drive Adapter**

Model: 943, 953, 215, 3204

Warranty: Six Months

- Used for measuring engine speed on later 3204 Engines, 10X-2396-Up, in 943 and 953 Loaders and 215 Excavators (different adapter needed for later engines because of change to camshaft)
- Also required for adapter installation: 4M-8303 Seal, 5P-1758 Shaft Assembly, two 9S-3032 Clamps, two 0S-1617 Bolts and two 9M-1974 Washers



Part Number	Description
6N-1345	Tachometer Drive Adapter

**7N-8929 Cable Connector**

Model: All Models

Warranty: Six Months

- Used to connect tachometer drive cable to 9S-3047 Tachometer Generator (included in 1P-5500 Phototach Group) on engine applications where access to tachometer drive is difficult; disconnect tachometer drive cable at tachometer and use this fitting



Part Number	Description
7N-8929	Cable Connector

**1U-5550 Oil Pressure Adapter Group**

Model: XNIP Peugeot Engines

Warranty: Six Months

- Used to measure oil pressure on XNIP Peugeot Engines; these engines are found on several models of Cat® lift trucks; the 1U-5550 is installed in place of the oil pressure solenoid in the oil filter base; the 1U-5550 provides a 9/16 in 18-2B (SAE No. 6) port for pressure measurement purposes

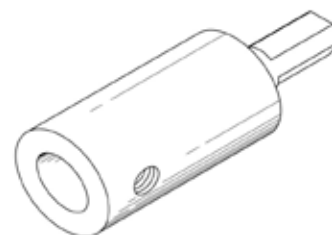
Part Number	Description
1U-5550	Oil Pressure Adapter Group

**FT0907 Adapter**

Model: D342, D343, D346, D348, D349, D353, D379B, D398B, D399

Warranty: None

- Used with reversible variable speed drill and tachometer to bench set mechanical overspeed controls
- Material: mild steel



# Speed Measuring Tools

## 1U-9139 Universal Fuel Line Pickup

Model: All non-unit-injected Cat® diesel engines

Warranty: One Year



- Used with discontinued 6V-2100 Multitach (as accessory part for 6V-4950 Pickup Group) to measure diesel engine speed
- Works on fuel lines with remote unit pump group, on all pre-combustion chamber fuel systems and on some smaller direct injection fuel systems
- Not applicable to unit injected 3500 and 3600 Engines
- Adaptable to different fuel line sizes from 5.5 mm (0.22 in) to 7.0 mm (0.28 in) size range

### References

SEHS8029, Special Instruction

SEHS7807-03, Special Instruction

Item	Part Number	Description
1	1U-9139	Universal Fuel Line Pickup
2	6V-6113	Amplifier

## 161-8384 Battery Charger

Model: All Models

Warranty: One Year

- Used to recharge nickel cadmium batteries on newer hand-held Photo-Tach
- Used with 1U-7771 Photo-Tach, part of discontinued 1U-6602 Photo-Tach Group

### Reference

SEHS8854, Special Instruction, Using the 1U-6602 Photo-Tach Group

Charger connector	Barrel type
Connector OD	5.6 mm (0.22 in)
Connector ID	2.5 mm (0.10 in)
Center pin (ID) polarity	Negative

Part Number	Description
161-8384	Battery Charger

## 351-8635 Tachometer Group

Model: All Models

Warranty: Manufacturer's

European Union compliant, CE marked

- Replaces canceled 1U-6602 Photo-Tach Group
- Used to measure RPM by directing class 2 laser light source onto reflective tape
- Reflective tape can be affixed to any rotating component
- Operates up to 8 meters (25 ft) from reflective target
- Lightweight, compact design allows direct line of sight of both target and display at the same time
- 32 function tachometer/ratemeter, totalizer/counter and timer (stopwatch)
- Programmable in both Metric and English units
- Auto ranging and fixed decimal readouts (user selectable)
- On-target and low battery indicators
- Ergonomic non-slip rubber surface for one hand operation
- Features tripod mounting bushing and "Power On" lock for hands free operation
- Kit includes pocket laser tach, carry case with foam insert, reflective tape, two AA alkaline batteries, operating manual (English, French, Spanish), and N.I.S.T. traceable certificate of calibration

(Continued)

## 351-8635 Tachometer Group (Continued)

Model: All Models

Warranty: Manufacturer's

Display	5 digits, 5 alpha-numeric LCD
Optical Range	5 to 200,000 RPM
Contact Range	0.5 to 20,000 RPM
Optical Accuracy	±0.01% of reading (subject to intensity of ambient light)
Contact Accuracy	±0.05% of reading in rpm (also reads in units per second and units per hour)
Totalizer	1- 999,990 (events or length)
Timer	99:59.9 (minutes, seconds, tenths)
Resolution	0.001 to 10 RPM (range dependent)
Operating Range	5 to 762 cm (2.0 inches to 25.0 feet) ±70° from perpendicular (subject to intensity of ambient light)
Memory	maximum, minimum, and last reading
Power	Two 1U-9533 AA 1.5 VDC batteries (30 continuous hours)
Temperature Range	5° to 40° C (0° to 100° F)
Humidity Range	80% relative humidity up to 31° C (88° F)
Dimensions (H x W x D)	17.6 x 6.1 x 4.0 cm (6.92 x 2.4 x 1.6 in)
Weight	210 g (7.4 oz)
Classification	class 2 laser product - 1 mW max @ 850 nm classified to IEC 60825-1: 2001



Part Number	Description
351-8635	Tachometer Group
<b>Service/Repair Parts</b>	
1U-6605	Retro-Reflective Tape, 12.5 mm (0.5 in) x 1.5 m (5.0 ft) long
1U-9533	AA Alkaline Battery , non-rechargeable, package qty 96 (5 required to power Indicator III)

## Temperature Measuring Tools

### 349-4202 Infrared and Contact Thermometer (12:1 Ratio)

Model: All

Warranty: Manufacturer's Two Year



European Union compliant, CE marked

- Used to determine surface temperature using non-contact temperature measurement with a distance-to-spot ratio of 12:1
- Thermometer also supports contact-temperature measurement (compatible with all standard mini-connector type K thermocouples)
- Measures temperatures from -40 to 550° C (-40 to 1022° F)
- Single-point laser sighting
- Easy emissivity adjustment (Lo, Med, Hi) for measuring pipes and other shiny materials more accurately
- Lightweight [just 340 g (12 oz)] and portable
- MIN, MAX, and DIF functions help quickly identify problems
- Battery life of 13 hours (laser and backlight used 50%)
- Includes K-Type thermocouple Velcro® pipe probe, durable hard case, two AA batteries, Getting Started guide in six languages, and Users Manual on CD in six languages (English, Spanish, French, German, Portuguese, and Simplified Chinese)

Temperature Range	-40° C to 550° C (-40° F to 1022° F)
Accuracy	± 1% or ± 1° C (2° F); <0° C (32° F), ± 1° C (2° F) ± 0.1°/1° (Assumes ambient operating temperature of 23 to 25° C (73 to 77° F))
Display Resolutuin	0.1° C / 0.1° F
Spectral Response	8 to 14 µm
Response Time (95%)	500 ms
Emissivity	Three settings: low (0.3), medium (0.7), high (0.95)
Power	Class 2 (II) operations; Output <1 mW, wavelength 630 to 670 nm

Part Number	Description
349-4202	Infrared and Contact Thermometer (12:1 Ratio)

### 349-4203 Infrared and Contact Thermometer (30:1 Ratio)

Model: All

Warranty: Manufacturer's Two Year



European Union compliant, CE marked

- Used to determine surface temperature using non-contact temperature measurement with a distance-to-spot ratio of 30:1
- Thermometer also supports contact-temperature measurement using a K-type thermocouple
- Measures temperatures from -40 to 650° C (-40 to 1202° F)
- Audible and visual alarms instantly alert user to measurements outside of set limits
- Confidently troubleshoot equipment with 1% measurement accuracy
- Versatile interface with six languages from which to choose
- Easily access advanced features with the soft-key buttons
- Temperatures are easily readable on a dot-matrix display
- Capture multiple points of data (up to 20) for downloading and recalling later
- Easily trend and analyze data with included FlukeView® Forms software

(Continued)

**349-4203 Infrared and Contact Thermometer (30:1 Ratio) (Continued)**

Model: All

Warranty: Manufacturer's Two Year

- Battery life if used continuously:  
with laser and backlight On, 12 hours;  
with laser and backlight Off, 100 hours
- Includes thermocouple K bead probe, durable hard case, two AA batteries, Getting Started guide in six languages, Users Manual on CD in six languages (English, Spanish, French, German, Portuguese, and Simplified Chinese)

Temperature Range	-4° C to 650° C (-40° F to 1200° F)
Accuracy	<0° C: ± (1.0° C + 0.1°/1° C)
	>0° C ± 1% or ± 1.0° C, whichever is greater
	(<32° F ± 2° F ± 0.1°/1° F)
	>32° F: ± 1% or ± 2° F, whichever is greater
Display Resolution	0.1° C / 0.1° F
Spectral Response	8 to 14 µm
Response Time (95%)	<500 ms
Emissivity	Digitally adjustable from 0.10 to 1.00 by 0.01 or via built-in table of common materials
Relative Humidity	10% to 90% RH non-condensing up to 30° C (86 °F)
Storage Temperature	-20° C to 60° C (-4° F to 140° F)
Weight	0.322 kg (0.7099 lb)
Dimensions	17.69 cm (6.95 in ) H x 16.36 cm (6.44 in) L x 5.18 cm (2.039 in) W
Power	2 AA / LR6 Batteries

Part Number	Description
349-4203	Infrared and Contact Thermometer (30:1 Ratio)

**349-4200 Infrared and Contact Thermometer (50:1 Ratio)**

Model: All

Warranty: Manufacturer's Two Year

European Union compliant, CE marked

- Used to determine surface temperature using non-contact temperature measurement with a distance-to-spot ratio of 50:1
- Thermometer also supports contact-temperature measurement using a K-type thermocouple
- Measures temperatures from -40 to 800° C (-40 to 1472° F)
- Versatile interface with six languages from which to choose
- Easily access advanced features with the soft-key buttons
- Temperatures are easily readable on a dot-matrix display
- Capture multiple points of data (up to 99) for downloading and recalling later
- Quickly download stored data with USB connection
- Easily trend and analyze data with included FlukeView® Forms software
- Battery life if used continuously:  
with laser and backlight On, 12 hours;  
with laser and backlight Off, 100 hours



Diagnostic Tools

(Continued)

# Temperature Measuring Tools

## 349-4200 Infrared and Contact Thermometer (50:1 Ratio) (Continued)

Model: All

Warranty: Manufacturer's Two Year

- Includes thermocouple K bead probe, durable hard case, two AA batteries, Getting Started guide in six languages, USB 2.0 cable, FlukeView® Forms software on CD, Users Manual on CD in six languages (English, Spanish, French, German, Portuguese, and Simplified Chinese)

Temperature Range	-40° C to 800° C (-40° F to 1470° F)
Accuracy	<0° C: $\pm (1.0^\circ \text{C} + 0.1^\circ/1^\circ \text{C})$
	>0° C $\pm 1\%$ or $\pm 1.0^\circ \text{C}$ , whichever is greater
	(<32° F $\pm 2^\circ \text{F} \pm 0.1^\circ/1^\circ \text{F}$ )
	>32° F: $\pm 1\%$ or $\pm 2^\circ \text{F}$ , whichever is greater
Display Resolution	0.1° C / 0.1° F
Spectral Response	8 to 14 $\mu\text{m}$
Response Time (95%)	<500 ms
Emissivity	Digitally adjustable from 0.10 to 1.00 by 0.01 or via built-in table of common materials
Relative Humidity	10% to 90% RH non-condensing up to 30° C (86° F)
Storage Temperature	-20° C to 60° C (-4° F to 140° F)
Weight	0.322 kg (0.7099 lb)
Dimensions	17.69 cm (6.995 in) H x 16.36 cm (6.441 in) L x 5.18 cm (2.039 in) W
Power	2 AA / LR6 Batteries or USB connection when used with a PC

Part Number	Description
349-4200	Infrared and Contact Thermometer (50:1 Ratio)

## 349-4201 Hand-held, Infrared, Non-contact Thermometer (60:1 Ratio)

Model: All

Warranty: Manufacturer's Two Year



European Union compliant, CE marked

- Used to determine surface temperature using non-contact temperature measurement with a distance-to-spot ratio of 60:1
- Measures temperatures from -30 to 900° C (-25 to 1600° F)
- Audible and visual high-temperature alarm instantly alerts user to measurement outside of set limit
- Coaxial, three-dot laser sighting system highlights true diameter of measurement spots at all distances
- Enhanced optics (distance-to-spot-ratio up to 60:1) allow measurements of smaller objects from farther away
- Confidently troubleshoot equipment with 1% measurement accuracy
- Battery life of 13 hours (laser and backlight used 50% )
- Includes durable hard case, two AA batteries, Getting Started guide in six languages, Users Manual on CD in six languages (English, Spanish, French, German, Portuguese, and Simplified Chinese)

(Continued)

**349-4201 Hand-held, Infrared, Non-contact Thermometer (60:1 Ratio) (Continued)**

Model: All

Warranty: Manufacturer's Two Year

Temperature Range	-30° C to 900° C (-25° to 1600° F)
Accuracy	± 0.75% of reading or ± 1K (± 1.5° F), whichever is greater at 25 °C (77° F) ambient temperature, ± 2° K (± 4° F) for targets below -5° C (23° F)
Display Resolution	0.1° C / 0.2° F
Spectral Response	8 to 14 µm
Response Time (95%)	<250 ms
Emissivity	Default 0.95, Range 0.10 to 1.50, in steps of 0.01
Storage Temperature	-20° C to 50° C (-4° F to 122° F)
Dimensions	200 x 170 x 50 mm (7.9 x 6.7 x 2 in)
Power	2 x 1.5 Alkaline Type AA Bateriaes

Part Number	Description
349-4201	Hand-held, Infrared, Non-contact Thermometer (60:1 Ratio)

**Infrared Thermometers**

Model: All

Warranty: Manufacturer's One Year

- Has 16-point laser circle spot (know exactly what area is covered) not available on discontinued 123-6700
- Used to measure temperature (without contact) in hard to reach places, around moving machinery, or without stopping production
- Measures component temperatures on engine, transmission, power train, hydraulic, electrical, and mechanical systems, axles, and bearings
- Measure equipment, electrical panel, circuit breaker, generator, and gearbox temperatures in production plants; piece part temperatures in manufacturing facilities; or component and system temperatures in field applications
- Monitor temperatures in commercial applications such as supply and return registers, air stratification, and duct leakage; monitor temperatures of gasoline and diesel engine cylinders; check food preparation and storage temperatures
- Small light-weight units — extremely portable

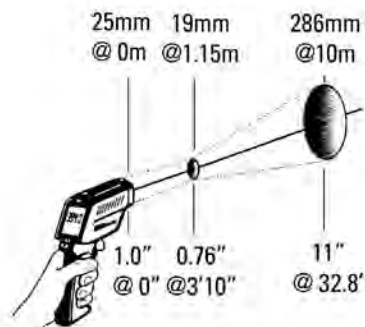
**Repair Information**

Raytek

See Tool Repair Section for repair locations

Part Number	Description
166-9030	Infrared Thermometer (Enhanced, 220 VAC) or Battery

166-9030



D:S = 60:1 at Focus Point

- Can be powered by battery or AC power access
- This unit is 220 VAC

### Graphic Display

- Allows more information to be displayed at a glance
- Automatically creates a graphic display of last 10 temperature points measured using maximum and minimum temperature values to establish range

### Laser Targeting Feature



- Laser targeting accuracy is greatly increased (60:1 ratio of distance versus spot size as compared to former 50:1 ratio)
- Increased accuracy when several heat sources are present (16% smaller target spot over former spot size at same distance)
- Factory aligned laser circle accurately pinpoints target, even when viewed at different angles
- Compact, solid-state laser is mounted inside thermometer and is manufactured for rugged use
- Laser targeting can be turned off when not required

Target Distance	Former 50:1 Spot Size	New 60:1 Spot Size
0.3 m (1 ft)	20 mm (0.8 in)	20 mm (0.8 in)
0.6 m (2 ft)	20 mm (0.8 in)	20 mm (0.8 in)
0.9 m (3 ft)	23 mm (0.9 in)	20 mm (0.8 in)
1.2 m (4 ft)	25 mm (1.0 in)	20 mm (0.8 in)
1.5 m (5 ft)	30 mm (1.2 in)	25 mm (1.0 in)
1.8 m (6 ft)	38 mm (1.5 in)	30 mm (1.2 in)
2.1 m (7 ft)	43 mm (1.7 in)	36 mm (1.4 in)
2.4 m (8 ft)	51 mm (2.0 in)	41 mm (1.6 in)
2.7 m (9 ft)	58 mm (2.3 in)	46 mm (1.8 in)
3.0 m (10 ft)	69 mm (2.7 in)	51 mm (2.0 in)

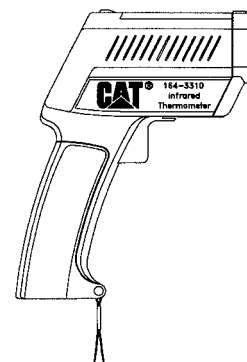
Diagnostic Tools



## Target Specifications

Temperature measurements can be taken at any distance as long as the target size is larger than the target spot. The chart measures target distance in meters (feet) and spot size in millimeters (inches). If the target distance is greater than 3 m (10 ft), divide the target distance by 24 to figure the spot size.

Temperature reading range	-30° to 900° C (-25° to 1600° F)
Accuracy	±1% of reading or ±1° C (±2° F), whichever is greater
Repeatability	±0.5% of reading or ±1° C (±2° F), whichever is greater
Response time	(95%) 250 mSec
Spectral response	8 - 14 um, thermopile detector
Display resolution	Tenth degree reading up to 900° C (0.2 to 999.8° F)
Ambient operating range	0° to 50° C (32° to 120° F)
Relative humidity	10 to 95% RH non-condensing @ up to 30° C (86° F)
Storage temperature	-20° to 50° C (-4° to 120° F) without battery
Power source	Two 1.5 V alkaline batteries
Power	Direct current
Operating time without laser	25 hours
Operating time with laser	10 hours
Tripod mount	1/4-20 UNC
Dimensions	200 x 170 x 50 mm (7.9 x 6.7 x 2 in)
Weight	480 g (1.06 lb)



## 213-4310 Infrared Thermometer

Model: All Models

Warranty: Manufacturers One Year

European Union compliant, CE marked

- Used to measure surface temperatures without surface contact
- Single point laser shows user where target area temperature is being measured
- Economically priced for general temperature measurement
- Applications include testing engine cooling systems, checking brakes and bearings, inspecting undercarriage components, verifying heating and air conditioning systems and inspecting defroster grids

### Repair Information

Raytek

See Tool Repair Section for repair locations

(Continued)

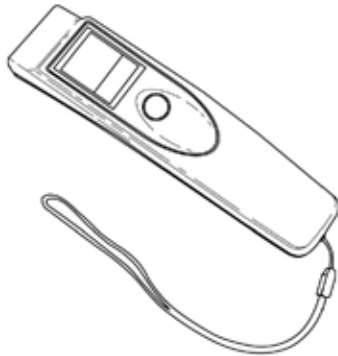
# Temperature Measuring Tools

## 213-4310 Infrared Thermometer (Continued)

Model: All Models

Warranty: Manufacturers One Year

Temperature	
measurement range	-20° to 260° C (0° to 500° F)
Accuracy	1 percent or 1° C (2° F) whichever is greater at 18° to 28° C (64° to 82° F) ambient temperature
Response time	500 milliseconds
Spectral response	7 - 18 microns nominal
Displace resolution	1° C to 1° F
Ambient operating range	0° to 50° C (32° to 120° F)
Relative humidity	10 - 95 percent non-condensing at up to 30° C (86° F)
Storage temperature	-25° to 70° C (-13° to 158° F)
Battery	1U-9534 Battery, 9 V alkaline
Dimensions	190 x 45 x 45 mm (7.5 x 1.75 x 1.75 in)
Weight	160 g (5.6 oz)



Diagnostic Tools

Part Number	Description
213-4310	Infrared Thermometer

## 251-0030 Infrared Thermometer

Model: All Models

Warranty: One Year



European Union compliant, CE marked

- Used to obtain non-contact (infrared) temperature measurements
- Built-in laser pointer increases target accuracy
- Backlit LCD and handy push-buttons combine for convenient, ergonomic operation
- Single point laser shows user where target area temperature is being measured
- Applications include testing engine cooling systems, checking brakes and bearings, inspecting undercarriage components, verifying heating and air conditioning systems, and inspecting defroster grids
- Wide temperature range meets most application needs
- Narrow 50:1 distance-to-target ratio measure smaller surface areas at greater distances
- Automatic "data hold" when trigger is released
- Automatically shuts OFF after 6 seconds
- Shipped with 9 volt battery

(Continued)

**251-0030 Infrared Thermometer (Continued)**

Model: All Models  
 Warranty: One Year

**Repair Information**

Extech Instruments Corporation  
 9 Townsend West  
 Nashua, NH 03061  
 Phone: (781) 890-7440, ext: 220  
 Fax: (781) 890-7864  
 Email: repair@extech.com  
 Web site: www.extech.com  
 Call for authorization number

Range/resolution	-50° to 1000° C (-58° to 1832° F) / 0.1° C/F to 200°, 1° over 200
Accuracy <sup>1</sup>	-50° to -20° C (-58° to -4° F) ±5° C (±9° F)
	-20° to 538° C (-4° to 1000° F) ±2% reading
	539° to 1000° C (1001° to 1832° F) ±3% reading
Emissivity	0.95 fixed value
Field of view	D/S = Approx. 50:1 ratio (D=distance, S=spot)
Laser power	Less than 1 mW
Spectral response	6 - 14 μ (wavelength)
Over range indication	LCD will display "1"
Display	3 1/2 digit backlit LCD display with function indicators
Display rate	1 second approximately
Operating temperature	0° to 50° C (32° to 122° F)
Operating humidity	Maximum 80% relative humidity
Power supply	1U-9534 Battery, 9V
Automatic power off	Meter shuts off automatically after 6 seconds
Weight	290g (10.2 oz)
Overall size	100 x 56 x 230 mm (3.9 x 2.2 x 9.0 in)
<sup>1</sup> Accuracy is specified for the following ambient temperature range: 18° to 28° C (64° to 82° F)	

Part Number	Description
251-0030	Infrared Thermometer

Diagnostic Tools

## 4C-6090 Multichannel Temperature Selector

Model: 3500 Captive Engines

Warranty: One Year



- Saves time and money by allowing serviceman to read individual cylinder exhaust temperatures to quickly locate faulty fuel injector
- Measures 16 exhaust temperatures individually
- Supplied with 8-channel cable pack stored in lid; optional 4C-6097 Cable Pack, 8-Channel, available to provide 16-channel capability
- Uses discontinued 6V-7070 and 6V-9129 Temperature Adapter to digitally display temperatures
- Connected to thermocouples installed in engine at assembly, starting with the following engine serial number and product designation:  
99W-2034 — D11N and 777  
96Z552 — 785  
54Z404 — 789
- Input: 16 channels, type K thermocouple, miniature connector
- Output: switch selectable, 1 of 16 inputs, miniature connector

### Reference

NEHS0537, Special Instruction

Item	Part Number	Description
1	4C-6096	Adapter Cable
2	4C-6089	Foam Insert
3	4C-6093	Cable Pack, Channels 1 - 8
--	4C-6090	Multichannel Temperature Selector

## 4C-9030 Mini TC-K Jack

Model: All Models

Warranty: Six Months



- Used with 7X-7481 Cable and discontinued 4C-6095 Mini Plug to make extension cables
- More uses for 4C-6090 Multichannel Temperature Selector, with extension cables and 8T-0933, 8T-0934, 8T-0935, 8T-0936, 8T-0458 and 6V-9055 Thermocouple Probes
- Industry standard, miniature yellow type K thermocouple jack

### References

NEHS0537-02, Operating Manual

NEHS0544, Installation Instructions

Temperature rating	204° C (400° F)
Connector dimensions	27 x 16 x 8 mm (1.06 x 0.624 x 0.312 in)
Thermocouple connections	"-" red wire, "+" yellow wire

Item	Part Number	Description
1	4C-9030	Mini TC-K Jack
2	7X-7481	Cable
3	4C-6095	Mini Plug

## 6V-9130 Temperature Adapter Group

Model: 0785

Warranty: One Year

European Union compliant, CE marked

- Used with any Cat® high impedance digital multimeter to measure oil, coolant or air temperatures from -50° to 900° C (-58° to 1652° F)
- 6V-9129 Temperature Adapter converts input from a K-type thermocouple to 1 mV/°C or 1 mV/°F output, for use with Cat® discontinued 6V-3030 or discontinued 6V-7070; if adapter (with the 6V-9131 K-type Thermocouple attached) is plugged into VOLT and COMMON inputs of a multimeter, temperature will be displayed on multimeter
- 8T-0458 Thermocouple Wire can be used to take temperature measurements in areas where probe is not necessary. Because thermocouple wire has less mass, response time is faster than with 6V-9131 Thermocouple Probe
- 6V-3073 Carrying Case, SEES5666 Decal, 8T-0485 Foam Block, and 6V-4094 Foam Top available to store 6V-9129 Temperature Adapter, 6V-9131 Thermocouple Probe, 8T-0458 Thermocouple Wire, and discontinued 6V-3030, discontinued 6V-7070 or 6V-7800 Digital Multimeter and Probes
- 6V-9129 Power source: 1U-9534 Battery, 9 volt



### Reference

SEHS8382, Special Instruction

### NOTE:

Use with 5P-2720, 5P-2725, 5P-3591, 4C-4545 and 4C-4547 Self-Sealing Probe Adapter Groups (Diagnostic Tools Section of Tool Guide, Speed Measuring Tools)

Item	Part Number	Description
1	6V-9129	Temperature Adapter
2	6V-9131	Thermocouple Probe, Type K
—	6V-9130	Temperature Adapter Group

### Probes (Sold Separately)

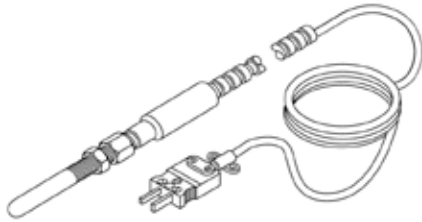
Part Number	Length	Diameter	Application
6V-9131	152.4 mm (6.0 in)	3.175 mm (0.125 in)	Hand held
8T-0935	63.5 mm (2.5 in)	3.175 mm (0.125 in)	Probe seals
8T-0934	38.1 mm (1.5 in)	3.175 mm (0.125 in)	Probe seals
8T-5334	Surface	—	Hand held
6V-9055	152.4 mm (6.0 in) <sup>1</sup>	6.35 mm (0.25 in)	Exhaust (bent)
8T-0936	88.9 mm (3.5 in)	3.175 mm (0.125 in)	Probe seals
8T-0933	25.4 mm (1.0 in)	3.175 mm (0.125 in)	Probe seals

<sup>1</sup> For 6V-9055 Probe replaceable fitting

## 238-5636 Exhaust Thermocouple

Model: All models

Warranty: Manufacturer's One Year



- Used to measure exhaust temperature
- Used with 237-5130, 146-4080, or 9U-7330 Digital Multimeters; can also be used with discontinued 6V-3030 or discontinued 6V-7070 Multimeters with a 6V-9130 Temperature Adapter Group. 9U-7330, discontinued 6V-3030, and 6V-7070 Multimeters require optional 6V-9129 Temperature Adapter
- Probe is attached to exhaust housing with an adjustable threaded ferrule

### Repair Information

Durex Industries  
190 Detroit Street  
Gary, IL 60013  
Phone: (847) 639-5600

Thermocouple Probe	Type K
Temperature range	0° to 850° C (1560° F)
Probe length	127 mm (5 in)
Probe diameter	6.4 mm (0.25 in)
Probe threads (male)	1/4 in NPT with adjustable ferrule
Probe cord length	182 cm (72.0 in)

Part Number	Description
238-5636	Exhaust Thermocouple

## 8T-2844 Temperature Recorder Group

Model: All Models

Warranty: Six Months



- Used for checking operating temperatures of the cooling system, engine oil system, hydraulic system and brake system
- Quick, easy, inexpensive method to determine components surface temperature
- 6 silver-colored temperature sensitive indicator windows on each recorder; each window turns permanently black when temperature for that window is reached or exceeded
- 5 different temperature recorders for 5 different ranges
- Adhesive back — attach to any clean dry surface; remove and keep as permanent record
- Withstands repeated temperature changes, solvents, and water
- Consist: 3 each of temperature recorders listed in chart
- Response time: approximately 1 sec.

Temperature Recorder (Range)						
Part No.	Temperatures					
8T-2820	60° C (140° F)	66° C (150° F)	71° C (160° F)	77° C (170° F)	82° C (180° F)	88° C (190° F)
8T-2821	82° C (180° F)	88° C (190° F)	93° C (200° F)	99° C (210° F)	104° C (220° F)	110° C (230° F)
8T-2822	104° C (220° F)	110° C (230° F)	116° C (240° F)	121° C (250° F)	127° C (260° F)	132° C (270° F)
8T-2823	127° C (260° F)	132° C (270° F)	138° C (280° F)	143° C (290° F)	149° C (300° F)	154° C (310° F)
8T-2824	149° C (300° F)	154° C (310° F)	160° C (320° F)	166° C (330° F)	171° C (340° F)	177° C (350° F)

(Continued)

## 8T-2844 Temperature Recorder Group (Continued)

Model: All Models

Warranty: Six Months

Part Number	Description
8T-2844	Temperature Recorder Group

### Thermometers

Warranty: One Year

- Used to check:
  - General temperature measuring applications
  - Coolant temperature
  - Heat indicator accuracy
- 138-1048 is stainless steel with a plastic case and can be calibrated



Item	Part Number	Temperature	Length	Type	Readout	Accuracy
1	2F-7112	-1.11° to 116° C (30° to 240° F)	226.1 mm (8.9 in)	Mercury with 6.4 mm (0.25 in) pipe connect	Linear	±1%
2	138-1048	10° to 288° C (50° to 550° F)	13 cm (5 in) stem	Analog	Dial	--
3	304-9375	-50° to 150° C (-58° to 302° F)	166 mm (6.54 in)	Digital	Digital	±1° C (±2° F)

### Self-Sealing Probe Adapter Groups

Model: All Models

Warranty: One Year

- Provide method for checking pressure or temperature in fluid-filled compartments without cooling down machine and draining fluid
- Can be installed in any prime product
- Seal permits probe insertion through center and seals automatically when the probe is removed
- All temperature probes included with thermistor thermometer and 164-2192 Pressure Probe can be used in these probe adapters
- 9F-2247 Plug ( 1/8 in) installed in adapter groups to serve as protective cover when tests are concluded
- Oil can be checked at temperatures less than 132° C (270° F) and pressures less than 3100 kPa (450 psi).
- Coolant and fuel can be checked at temperatures less than 121° C (250° F) and pressures less than 690 kPa (100 psi)

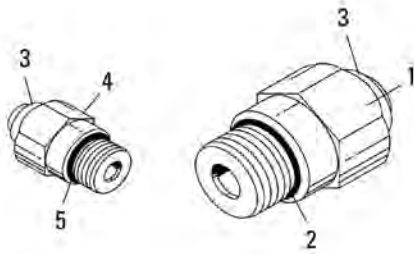


Item	Part Number	Description
1	5P-2720	Adapter Group - Probe, 1/8 in pipe thread
2	5P-2725	Adapter Group - Probe, 1/4 in pipe thread
3	5P-3591	Adapter Group - Probe, 9/16 in std thread
4	9F-2247	Plug - Pipe (Part of 5P-2720, 5P-2725 and 5P-3591 )

## Self-Sealing Probe Adapter Groups

Model: 1.1 Liter Engine

Warranty: One Year



- Used with 6V-9130 Temperature Adapter Group and 131-5050 Data View Temperature Sensors

Maximum oil temperature	132° C (270° F) at 3100 kPa (450 psi)
Maximum fuel/coolant temperature	120° C (250° F) at 690 kPa (100 psi)

Item	Part Number	Description
1	4C-4545	Adapter Group #8 (3/4 in X 16 thd)
2	3K-0360	Seal-O-Ring-STOR (SAE 3/4-16)
3	9F-2247	Plug - Pipe (Hex Counter Sunk)
4	4C-4547	Adapter Group #5 (1/2 in X 20 thd)
5	1J-9671	Seal-O-Ring-STOR (SAE 1/2 -20)

**⚠ WARNING**

Using the probe seal at pressures and temperatures higher than those indicated can result in injury to personnel or damage to the machine.



General Diagnostic Tools

**4C-8195 Control Service Tool, CMS II**

SMCS Code: 7490-038, 0785

Model: All Models with CMS Panels

Warranty: One Year

- Replaces discontinued 9U-6665 CMS Service Tool
- Used to access diagnostic modes on CMS panels (allows service technician to easily enter diagnostic modes)
- Used with available adapter cables to diagnose Wheel Loader transmission controls; also used on countershaft transmission controls
- Allows technician to scroll through active and logged faults
- Allows logged faults to be cleared
- 138-7795 replaces discontinued 134-2576 Countershaft Transmission Cable Assembly



**References**

NEHS0669, Tool Operating Manual

NEEG2741, Switch Positions for H-Series Motor Grader

Size	190 x 120 x 40 mm (7.5 x 4.7 x 1.5 in)
Weight	0.2 kg (0.44 lb)
Cable length	2.4 m (8 ft)

Item	Part Number	Description
1	4C-8196	Cable, CMS II
2	4C-8197	Wheel Loader Transmission Control Cable
3	138-7795	Countershaft Transmission Control Cable (for H-Series Motor Grader)

Item	Part Number	Description
--	4C-8195	Control Service Tool, CMS II

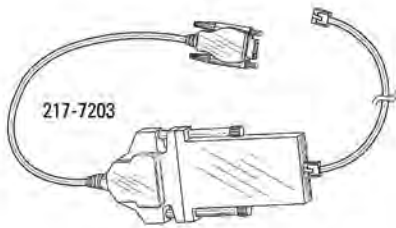
## 217-7202 Interface Kit (Standard 520)

## 217-7203 Interface Kit (Premium 550)

SMCS Code: 0734, 0779, 0785

Model: 3054 and 3056 Marine Generator Sets

Warranty: One Year



European Union compliant, CE marked

- Used to access configuration stored within control module on 3054 and 3056 Marine Generator Sets: CHN1-UP, TCN1-UP, SNX1-UP
- Allows user to view diagnostic display from control module
- Kit contains one 25 to 9 pin Adapter Cable, one FCC-68 Interconnecting Cable, and one Windows-based CD

PC Requirements	
Processor	486, 66 Mhz minimum
Operating system	Windows 95, 98, 2000 or NT
Ram	16 MB
Display resolution	640 x 480
Fixed disk	10 MB free, 80 MB minimum
Disk drive	CD-ROM
Communication port	RS-232
Operating Environment	
Temperature	-15° to 55° C (5° to 131° F)
Power Requirements	
Power	DC (powered from control module)

Part Number	Description
217-7202	Interface Kit (Standard 520)
217-7203	Interface Kit (Premium 550)

## 417-6067 Marine Genset Electronic Panel Service Tool Group

Model Usage: C4.4 / C6.6 / C9 MARINE GENSET

Warranty: Manufacturer's



European Union Compliant, CE marked

- Used to service the 366-0023 Electronic Panel Group and 366-0025 Electronic Panel Group used in marine applications
- Includes 416-9096, 416-9097 and 416-9098

### NOTE:

Note: Software and Instructions are located on the Dealer Service Tool web site under Technical Information: <https://dealer.cat.com/dealer-service-tools>

Serviceable Parts		
Part Number	Description	Dimensions
416-9096	Isolator USB	50.8 x 43.2 x 20.3 mm (2.0 x 1.7 x 0.8 in)
416-9097	USB Cable	914.4 mm (36 in)
416-9098	Null Modem Cable	1828.8 mm (72 in)

**Tool Harnesses**

SMCS Code: 1900-038, 0781

Model: See below

Warranty: Six Months

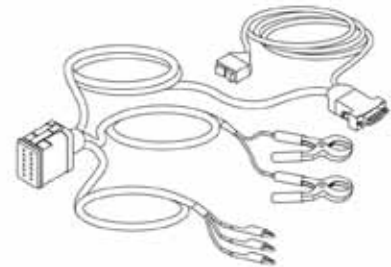
- Used to connect PC or laptop to electronic governor

Part Number	Description
262-8391	Tool Harness
262-8392	Tool Harness

**262-8391 Tool Harness**

- 3054/3056 Marine Generator Sets
- Used for LCS electronic governors
- Requires NETG5040, 262-8391 Service Tool Software LCS

NETG5040 Software System Requirements	
Computer	Pentium 133 Mhz PC
RAM memory	32Mb RAM
Operating system	Windows 95, 98, NT4.0, and 2000 or greater



**262-8392 Tool Harness**

- 3054/3056 Marine Generator Sets, C4.4 Marine Generator Sets
- Used for L-series electronic governors
- Requires NETG5041, 262-8392 Service Tool Software L-Series

NETG5041 Software System Requirements	
Computer	Pentium 133 Mhz PC
RAM memory	32Mb RAM
Operating system	Windows 95, 98, ME, NT4.0, 2000, and XP or greater



**243-3142 Interface Group**

SMCS Code: 0734, 0779, 0785

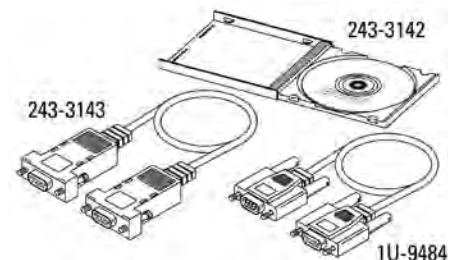
Model: 3054 and 3056 Marine Generator Sets

Warranty: One Year

- Used to access configuration stored in 238-4635 Control Module
- Also allows user to view diagnostic display contained within control module

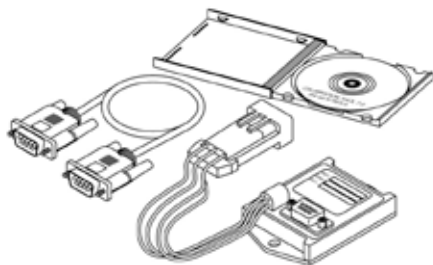
NEXG5078	Configuration Software CD-ROM for Windows
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Part Number	Description	Length	Cable End
243-3143	Null Modem Cable	3 m (10 ft)	DB9F to DB9F
1U-9484	Communications Cable	3 m (10 ft)	DB9F to DB9M
243-3142	Interface Group	—	—



## 237-9074 Calibration Group

SMCS Code: 0734, 0779, 0785  
 Model: C2.2 Marine Generator Set  
 Warranty: One Year



- Used to configure and adjust speed controller parameters
- Allows interactive, real-time display of engine speed using a personal computer
- Comes with 9-pin RS-232 cable, interface box, and NETG5038 CD-ROM software (Windows-based)

<b>Hardware Requirements</b>
IBM compatible, personal computer equipped with a CD-ROM drive and a serial port with DB-9 connector, capable of 9600 baud communication
Windows software: 95/98/ME/2000/XP
64 MB of available RAM memory and a hard disk with at least 2.0 MB of free disk space
SGVA capable video card and monitor, capable of 256 colors and 800 x 600 display

Part Number	Description
237-9074	Calibration Group
Service/Repair Parts	
146-8488	Cable Group ( 9-pin, RS-232 Cable)
237-9075	Interface Box

## 218-2944 Data Transfer Cable

Model: Power Module Models PM3512, PM3516, and PMG3516  
 Warranty: One Year

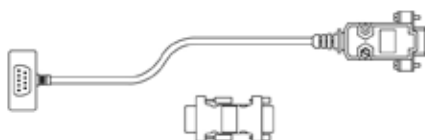


- Used to connect a computer to touchscreen display for downloading configuration files
- Requires a RS-232 (DB-9) port

Part Number	Description
218-2944	Data Transfer Cable

## 146-8488 RS-232 Cable

Model: Power Module Models PS003, PS004, PS005, and PS010  
 Warranty: One Year



- Used to connect a computer to power module protective relays for download of configuration files
- Used to connect 146-4080 Cat® Digital Multimeter to 131-5050 DataView
- Standard 9 pin DB9 RS232 cable and socket to pin adapter included

Part Number	Description
146-8488	Cable Assembly (RS-232)

## Payload Control System (PCS) Service Harness Assemblies

Model: All models with Payload Control System (PCS)

Warranty: One Year

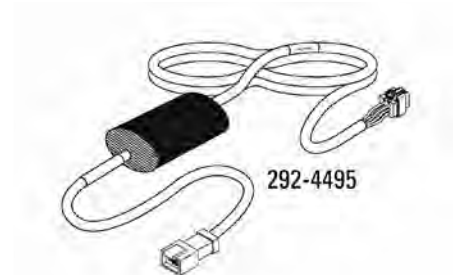
### Reference

SEBU8092, Service Manual, Payload Control System

REN6293, Service Manual

### 292-4495 Main Harness Assembly

- Used to connect payload control system data port to a computer or printer
- Used with 315-4999 Harness Assembly to adapt to VIMSPC and used with 315-5000 Printer Harness Assembly to adapt to a 24 Volt printer
- 6-pin Deutsch plug, 6-pin Deutsch receptacle
- Overall length: 1.8 m (70.8 in)

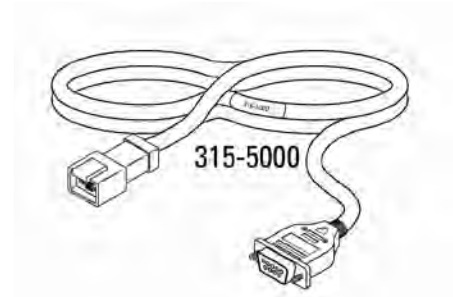


### 315-4999 PCS VIMSPC Breakout Harness Assembly

- Used to download PCS data to PC computer
- Used with 292-4495 Main Harness Assembly
- 6-pin Deutsch receptacle to DB 9-pin plug
- Overall length: 0.2 m (7.8 in)

### 315-5000 PCS Printer Breakout Harness Assembly

- Used to print PCS data to a 24 Volt printer
- Used with 292-4495 Main Harness Assembly
- 6-pin Deutsch receptacle to DB 9-pin receptacle
- Overall length: 0.2 m (7.8 in)



Part Number	Description
292-4495	Main Harness Assembly
315-4999	PCS VIMSPC Breakout Harness Assembly
315-5000	PCS Printer Breakout Harness Assembly

## 148-9610 PC Cart, 110-125 VAC, 60 Hz

SMCS Code: 7600-052

Model: All Models

Warranty: Manufacturer's

Used to hold PC, monitor, printer and data view hardware in one portable workstation

### General Features

- Durable corrosion resistant baked on powder coat finish on steel body
- Protective bumper wraps around top of PC cart
- Large 127 x 50.8 mm (5 x 2 in) casters which are customer installed
- 2 lower compartments for paper and supplies
- CD storage with self closing door holds up to 30 CDs
- Retractable cup holder
- 4 position communication and data port blank panel
- 5 cable hangers
- Care and use maintenance guide
- 1 year limited manufacturer's warranty

### Protection Features

- Fan and filter system provides added protection for computer components
- Locking cabinet door protects computer components

(Continued)

# General Diagnostic Tools

## 148-9610 PC Cart, 110-125 VAC, 60 Hz (Continued)

SMCS Code: 7600-052

Model: All Models

Warranty: Manufacturer's

- CPU securement system

### Power Management Features

- Master on/off switch (lighted) that will turn on all components at one time
- 381 mm (15 ft) power cord
- NEMA power block with 2 outlets
- "Quick release" power cord wrap system

### Printer and Monitor Features

- Accommodates most dot matrix or laser printers
- Universal printer securement strap (maximum printer weight 12.2 kg [27 lb])
- Universal monitor mounting system will hold diagonal screen size monitors up to 431 mm (17 in)

### Repair Information

Spectrum Composites

P. O. Box 4656

Troy, MI 48099

Phone: 800-359-9855

**148-9610 PC Cart, 110-125 VAC, 60 Hz (Continued)**

SMCS Code: 7600-052

Model: All Models

Warranty: Manufacturer's

Overall dimensions (H x W x D)	1263.7 x 958.9 x 749.3 mm (49.75 x 37.75 x 29.50 in)
Internal equipment area	546.1 x 781 x 565.2 mm (21.5 x 30.7 x 22.25 in)
Two internal storage compartments	235 x 381 x 546.1 mm (9.25 x 15 x 21.5 in)
Cart weight, empty	84 kg (185 lb)
Shipping weight	104.4 kg (230 lb)
Casters (4 swivel)	127 x 50.8 mm (5 x 2 in), 2 with brake
Color	Base is dark grey; top platform is medium grey
<b>Capacities and Other Dimensions</b>	
Largest monitor screen (diagonal measure)	431 mm (17 in)
Largest monitor base (W x D)	317.5 x 285.7 mm (12.5 x 11.25 in)
Maximum monitor column width	184.1 mm (7.25 in)
Maximum printer dimensions (W x D)	438.2 x 400.1 mm (17.25 x 15.75 in)
Maximum printer weight	12.2 kg (27 lb)
CD storage capacity (in door)	90 disks
Largest keyboard (W x D)	609.6 x 216.9 mm (24.0 x 8.50 in)
Mouse pad (largest recommended): (W x D)	279.4 x 215.9 mm (11.0 x 8.50 in)
<b>Power</b>	
Power	148-9610
Rated voltage	125 VAC
Rated amperage	15 amps
Rated frequency	60 Hz
Power cord	4572 mm (15 ft)
<b>Power Strip</b>	
Outlets	4
<b>Surge Suppressor</b>	
Electrical rating	125 VAC, 15 amps
Maximum surge voltage	6 KV
Maximum surge dissipation	75 Joules
Maximum spike current	4500 amps, at 25° C (77° F)
Maximum clamping ratio	1.2:1
Clamping volts	330 volts
Clamping response time	< 1 Nanosecond
Temperature range	-40° to +80° C (-40° to +176° F)
Outlets	6

(Continued)

# General Diagnostic Tools

## 148-9610 PC Cart, 110-125 VAC, 60 Hz (Continued)

SMCS Code: 7600-052

Model: All Models

Warranty: Manufacturer's



Part Number	Description
148-9610	PC Cart, 110-125 VAC, 60 Hz

## 372-5276 Remote Entry Pro

Model Usage: CT660 Truck

Warranty: Manufacturer's



- Used to test infrared (IR) & radio frequencies (RF) of keyless remote entry key fobs & remote control headsets
- Used to determine source of problem (eliminates guesswork)
- 3 led power level indicators
- Auto off saves batteries
- Handheld & lightweight
- Self-calibrating
- Works with RF frequencies 225, 332, 418, 433, 868 MHz (including AM & FM signals)
- Test PPM and carrier based infra red (IR)
- Uses 2 AAA batteries (included)
- Tests amplitude modulation (AM), amplitude shift key (ASK) & frequency modulation (FM) radio waves

Specifications	
Dimensions	6 x 3 x 3 in
Weight	2.5 lbs

Part Number	Description
372-5276	Remote Entry Pro



**Borescopes**

SMCS Code: 0777-000

Model: All Models

Warranty: One Year

- Caterpillars line of borescopes are used to make visual inspections of internal surfaces where normal viewing is not possible
- In most cases, inspection and analysis can be done without disassembling a product, significantly reducing inspection time
- Use a borescope as a first means of component inspection
- An adjustable focus under the eyepiece allows clear viewing of internal surfaces and objects
- Borescopes can be used to inspect internal engine surfaces through fuel nozzle holes on engines using “pencil style” injectors
- Other applications include checking turbochargers for cracked or missing blades, checking valve bodies for internal damage or blockage, and checking cylinder walls for scratching or scouring

**Repair Information**

All borescope systems are warranted to be free from defects in material and workmanship for a period of 12 months from original purchase date from Caterpillar Inc. If repair is necessary, contact Lenox Instrument Company Inc., for information on obtaining required service. Borescopes less than 1 year old will be repaired under warranty (EXCEPT FOR ABUSE). Cost of out-of-warranty repairs will be charged to the owner.

Lenox Instrument Company Inc.

265 Andrews Road

Scottsville Industrial Park

Trevose, PA 19053-3427

Phone: (215) 322-9990 or (800) 356-1104

Fax: (215) 322-6126

**Reference**

NEHS0838, Tool Operating Manual; Using the 8T-9290, 1U-5268, 9U-6940, 146-1738, 186-0170, and 186-0180 Inspection Borescopes

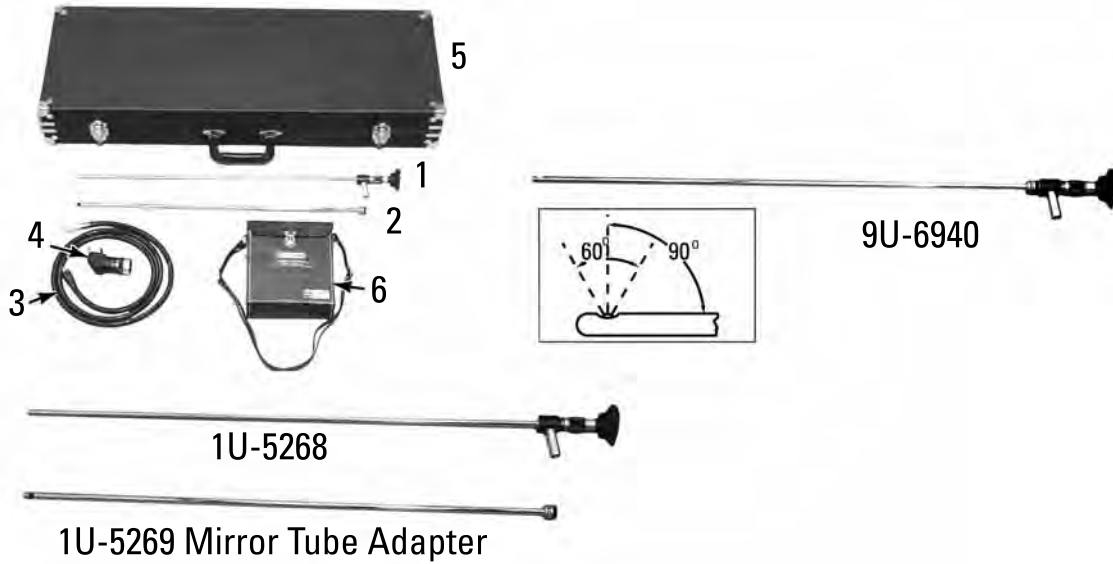
**1U-5268 Rigid Tube Borescope**

- 1U-5268 Borescope provides straight viewing of internal surfaces.
- 1U-5269 Mirror Tube Adapter slides over shaft of 1U-5268 Borescope for right angle viewing.
- Used with either a 1U-5266 and 190-8160 Light Source or a 1U-5265 Battery Light Source
- A 6V-9459 Fiber Optic Light Cable can be used with 1U-5268 Borescope.
- A 6V-9461 Right Angle (90 degree) Viewing Adapter allows operator to view into borescope from a 90 degree direction (use with 1U-5268 Borescope).

Part Number	Description	Probe Diameter	Working Length	Direction of View	Field of View	Focus Range	Total Adjustable View Coverage	Magnification	Resolution	Used with
1U-5268	Direct View Borescope	6.50 mm (0.256 in)	580 mm (23 in)	0 degrees	60 degrees	4.8 mm (0.19 in) to infinity	—	—	—	—
1U-5269	Mirror Tube, 90 degree direction of view)	7.24 mm (0.285 in)	580 mm (23 in)	90 degrees	60 degrees	4.8 mm (0.19 in) to infinity	—	—	—	1U-5268 Bore-scope

# General Diagnostic Tools

## Basic Borescope Inspection System



Diagnostic Tools

Basic Borescope Inspection System (items shown in photo must be ordered separately)		
Item	Part Number	Description
1	1U-5268	Direct View Borescope
2	1U-5269	Mirror Tube, 90 degree direction of view
3	6V-9459	Fiber Optic Light Cable 1830 mm (72.0 in)
4	6V-9461	Right Angle (90 degree) Viewing Adapter
5	4C-9662	Instrument Case, 355 x 832 x 115 mm (14.0 x 32.8 x 4.5 in)
6	1U-5265	Battery Light Source
Not shown		
--	9U-5118	Lamp, 6 volt, for use with 1U-5265
--	1U-6346	Foam Packing for use with 1U-6345
--	6V-9465	Replacement Rubber Eye Piece (1U-5268 and 9U-6940)
--	207-8837	Light Source Adapter

## 8T-9290 and 146-1738 Battery-Operated Borescopes

- Provides a compact, battery-powered borescope
- 8T-9290 battery handle can be attached directly or using an extension cable.
- 146-1738 battery handle attaches directly to viewing tube.
- 146-1738 provides 90 degree viewing.

See NEHS0504 for correct replacement bulb.

Description	Probe diameter	Length	Direction of view	Field of view	Focus range
Borescope Mirror Tube	8.0 mm (0.32 in)	305 mm (12.0 in)	1.0 (0.03 in) - infinity	90 degrees	40 degrees

(Continued)

8T-9290 and 146-1738 Battery-Operated Borescopes (Continued)

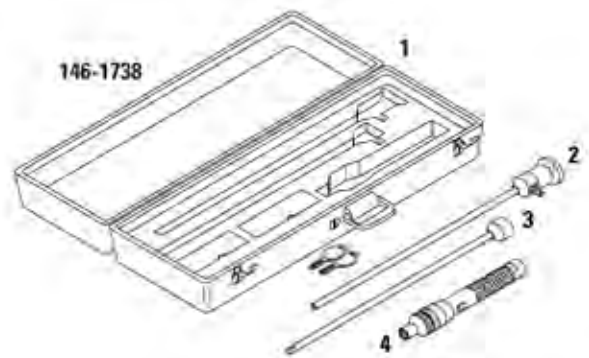


8T-9290 with Flexible Cord, Battery Pack Handle, and Case

Part Number	Description	Probe Diameter	Length	Direction of View	Field of View	Focus Range
146-1738	Borescopes Kit	6.4 mm (0.25 in)	305 mm (12.0 in)	0 degrees	40 degrees	10 - 317 mm (0.4 - 12.5 in)
8T-9290	Battery-Powered Borescopes	8 mm (0.31 in)	240 mm (9.5 in)	90 degrees	60 degrees	6.4 mm (0.25 in) - infinity
<b>Service/Repair Parts (Sold Separately)</b>						
1U-6862	Bulb	--	--	--	--	--
4C-6493	Bulb	--	--	--	--	--

146-1738 Borescope Kit

Item	Description
1	Borescope Case
2	Precision Borescope
3	90 Degree Viewing Adapter
4	Flashlight (light source)



186-0170 Flexible Shaft Borescope

- Allows viewing in areas where rigid-shaft borescopes cannot reach
- Articulated tip can be steered around or through obstructions.
- Provides 0 degree and 90 degree directional view



186-0170

(Continued)

## 186-0170 Flexible Shaft Borescope (Continued)

Diameter	6.00 mm (0.236 in)
Length	600 mm (24.0 in)
Direction of view	0 degrees
Field of view	50 degrees
Focus range	5.0 to 304.8 mm (0.20 to 12.0 in)
Light cable	Built-in
Mirror head (90 degree side view)	
Direction of view	90 degrees
Field of view	50 degrees

Item	Part Number	Description
1	186-0185	Mirror Head (90 Degree Side View)
5	4C-9662	Instrument Case, 355 x 832 x 115 mm (14.0 x 32.8 x 4.5 in)

### Optional Parts/Equipment

#### 110 VAC (1U-5266) and 220 VAC (190-8160) Light Sources

European Union compliant, CE marked (190-8160)

- Compact, lightweight units provide illumination with a 150 watt bulb
- Can be used with 1U-5268 and 186-0170 Borescopes
- Light intensity is adjustable and is controlled by varying voltage output of solid state dimmer
- Light cable plugs into a 12.7 mm (0.25 in) receptacle
- A cooling fan keeps units from overheating
- Bulb circuit is protected with a 2 amp fuse or circuit breaker which is replaceable (resettable)

Diagnostic Tools



1U-5266



190-8160

Part No.	Description	Voltage	Hz	Output	Replacement Lamp (21 V)	Unit Weight	Dimensions	Warranty
190-8160	Light Sources (220 VAC) <sup>1</sup>	220 to 230 V	50 to 60 Hz	150 W	1U-5792	4 kg (8 lb)	222.3 x 120.7 x 158.8 mm (8.75 x 4.75 x 6.25 in)	Manufacturer's
1U-5266	Light Sources (110 VAC)	120 V	50 to 60 Hz	150 W	1U-5792	—	—	—

<sup>1</sup>Contact the Dealer Service Tools Division for more information on this light source.

### 1U-5265 Battery Light Source

- Rechargeable from 110 VAC power source
- Used with 1U-5268 and 186-0170 Borescopes
- Requires 207-8837 Adapter

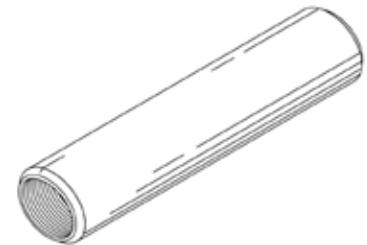


Part Number	Description
1U-5265	Battery Light Source

### 207-8837 Light Source Adapter

Part Number	Description
207-8837	Light Source Adapter

- Used to connect 1U-5268, 9U-6940, and 186-0170 Borescopes to 1U-5265 Battery Light Source
- Makes borescopes more portable
- Allows use in areas where a 110 VAC or 220 VAC power source is not available



### Camera Adapters

A variety of camera adapters are available for 1U-5268 and 9U-6940 Borescopes. Refer to NEHS0504 for a complete listing.

### 131-5050 DataView Group

#### 131-5051 DataView Portable TechStation Group

SMCS Code: 1000-038, 3000-038, 4000-038, 5000-038, 6000-038, 0788

Model: All Models

Warranty: One Year

European Union compliant, CE marked

- PC-based diagnostic tool that accepts up to nine standard Cat<sup>®</sup> sensors for measurements on any engine or machine — data is displayed on a personal computer (PC)
- Includes Data Logger using 2 MB PC Memory Card for storage. Data Logger has Auto Triggering and Pre-Trigger information settings.
- Measures pressure, temperature, blowby, position, rpm, Hz, duty cycle (PWM), hydraulic flow, and fuel flow
- DataView hardware unit connects to standard PC parallel (printer) port (DataView software program runs on PC using Microsoft Windows™)
- Allows many current hand-held diagnostic tools to be replaced with a single diagnostic unit
- Includes digital and analog measurements, bar graphs, charts, and histograms in real time or Data Logged data
- Can provide test/diagnostic data for test facilities such as dynamometer rooms, transmission test centers, or any other application where diagnostic measurements are required
- Future versions of DataView software will interface with other programs such as SIS and ET via Service Technician Workbench (STW)
- 6 "Analog" inputs for measuring any combination of pressure, temperature, blowby, and position
- 3 "Frequency" inputs for measuring rpm, Hz, duty cycle (PWM), hydraulic flow, and fuel flow
- 2 "Engine Set Point" inputs
- Calculated channels for displaying sum, difference, and hydraulic horsepower
- Automatic sensor identification of Analog sensors for automatic set-up using Auto ID cables (optional)

(Continued)

# General Diagnostic Tools

## 131-5050 DataView Group (Continued)

### 131-5051 DataView Portable TechStation Group

SMCS Code: 1000-038, 3000-038, 4000-038, 5000-038, 6000-038, 0788

Model: All Models

Warranty: One Year

- RS232 input connector for 146-4080 Digital Multimeter (DMM)
- Portable TechStation carrying case holds DataView and a portable PC
- Internal battery operates for up to 8 hours
- Operates and charges on 110/220 VAC, 11 to 40 VDC, or 12V Automotive Cigarette Lighter

**131-5050 DataView Group (Continued)**

**131-5051 DataView Portable TechStation Group**

SMCS Code: 1000-038, 3000-038, 4000-038, 5000-038, 6000-038, 0788

Model: All Models

Warranty: One Year

<b>Minimum PC Requirements</b>	
Connection to PC	Standard parallel (printer) port
Computer	IBM PC compatible with 486, 33 Mhz SL or SXL processor or greater
RAM	8 MB
Available hard disc space	10 MB
Diskette drive (internal or external add-on)	3.5 in, 1.44 MB
Monitor	VGA
DOS version	5.0 or greater
Operating system	Microsoft Windows™ version 3.1 or Windows 95, OS2 version 2.11, or Warp 3.0
Printer port	Parallel
<b>General Hardware Specifications</b>	
Internal power source	Rechargeable internal nickel metal hydride battery (Varta C526F, 7.2 volt 2400 mAh)
AC external power	131-5052 AC Power Adapter, 90 to 264 VAC, 47 to 63 Hz
External power connector	11 - 40 VDC machine power or cigarette lighter adapter
Power consumption	2 amp max at 15 VDC
Low battery indicator	Flashing ON light
Battery life	10 hours nominal (dependent upon sensors being used)
Battery charge time	6 hours
Battery charge indicator	Light off - not charging, light on solid - fast charge, light flashing - trickle charge
Operating temperature	-17° to +60° C (0° to 140° F)
Storage temperature	-40° to +100° C (-40° to +212° F)
Size	297 x 229 x 45.7 mm (1.7 x 9.0 x 1.8 in)
Weight	DataView hardware (enclosure only) 1.8 kg (4 lb)
<b>Data Logger Specifications</b>	
Channels	Data can be logged from all nine input channels
Memory	2 MB PC PCMCIA flash memory card is standard
Sample rate	Adjustable up to 1000 samples per second
Recording time	Varies depending on sample rate and number of channels in use
Maximum log size	At first release of software, logs will be limited to 8000 samples (a later software version will provide larger size logs)
Pre-trigger	Allows logging of events which happen before the log trigger point
Auto trigger	Logging can be triggered from an event or change in any channel
Manual trigger	Logging can be manually started from the PC or from the hardware

(Continued)

# General Diagnostic Tools

## 131-5050 DataView Group (Continued)

### 131-5051 DataView Portable TechStation Group

SMCS Code: 1000-038, 3000-038, 4000-038, 5000-038, 6000-038, 0788

Model: All Models

Warranty: One Year



Part Number	Description
131-5050	DataView Hardware
131-5051	DataView Portable TechStation Group



**DataView Group**

<b>Analog Channel Specifications</b>	
Connector type	5-pin DIN connectors (female)
Analog channel sensor types	Analog inputs are automatically reconfigured with relays to accept voltage, milliamp, RTD, or resistance-type output sensors
Analog channel input ranges	0 to 5 VDC; Milliamp: 4 to 20 mA; RTD: 100 ohm, PRTD; Resistance: 15K ohm nominal
Sensor power supply ranges	5, 8, 12, or 15 VDC available, firmware selectable
Input impedance	500K ohms minimum
A/D resolution	12 bit
A/D Access time	10 microseconds
Channel scan rate	50 microseconds per channel (10 channels scanned in 500 microseconds)
Frequency response	DC to 300 Hz (2000 samples per second)
A/D input voltage range	0 - 5 VDC
Max input voltage	Protected to 40V RMS or peak
<b>Frequency Channel Input Specifications</b>	
Frequency sensor types	Waveform or pulse inputs
Input voltage range	0.1 - 40 VAC or VDC peak
Allowable signal offset	+0.040 VDC
Input impedance	50K ohms minimum
Frequency response	3 Hz to 15K Hz
Frequency accuracy	±1 Hz
rpm measurement range	1 - 9999 rpm
rpm accuracy	±1 rpm in selected rpm/PPR ranges
Pulses per revolution	0.1 - 256 pulses per revolution;
Hz fixed at 60 pulses per revolution	
Pulse width measurement	1 - 100% duty cycle for 40 Hz to 15K Hz
Cat <sup>®</sup> PWM sensor measurement	Special adapter cable required because of DC offset on output signal
Pulse width accuracy	±1% for signals above 1V peak
Photo pickup	Power provided for 9U-5140 Photo Pickup
Photo pickup range	3 - 30 inches from retro-reflective tape target
<b>Engine Set Point Specifications</b>	
Set point inputs	2 inputs provided for use with 2 frequency channels
Rack contact voltage	12 VDC
Rack contact current	5.5 mA
Overrun indication	0 - 10% rack contact closure
Set point indication	11% rack contact stores engine rpm
Lug indication	75 - 100% rack contact closure

# General Diagnostic Tools

## 131-5050 Basic Cat® DataView Group



- Very basic group which includes only DataView hardware unit and accessories necessary to power it and connect it to the PC
- No sensor or adapter cables are included
- Memory card for data logging is not supplied but can be purchased separately

Item	Description
1	JERD2163 DataView Software
Not Shown	NEHS0662 Tool Operating Manual

Item	Part Number	Description
2	131-5050	DataView Hardware
3	137-0172	DataView Mounting Kit
4	137-0169	Cable As - DVFlash
5	131-5059	DataView Rear Flash Programming Cable

Item	Part Number	Description
6	131-5053	DataView to PC Parallel port cable (short)
7	131-5052	AC Power Adapter, 90 to 264 VAC, 47 - 63 Hz
8	131-5047	Cable - Power, 110 VAC (USA Plug)
9	137-0171	Adapter - Plug AC

## 131-5051 DataView Portable TechStation Group



- Contains all accessories, excluding sensors, needed to operate DataView on a PC
- Includes carrying case which holds DataView unit and PC (not included)

Item	Description
1	JERD2163 DataView Software
15	NEHS0662 Hardware Operating Instructions
16	JEBD3004 Software Program Operating Instructions
Not Shown	NEEG2723 Group Label on lid of 131-5051 DataView Group

Item	Part Number	Description
2	133-6976	Memory Card for DataView (2 MB Capacity)
3	131-5050	DataView Hardware
4	137-0173	DataView Carrying Case
5	131-5058	Foam Insert for Universal PC
6	137-0172	DataView Mounting Kit
7 <sup>1</sup>	6V-2198	Extension Cable (X8)
8	8T-5111	Cable As. - Rack Adapter
9	1P-7446	Rack Cable
10	131-5054	Adapter Cable for Cat® Pressure Sensors
11	131-5055	Adapter Cable for Blowby/Airflow Pickups
12	9U-7506	Magnetic Adapter Cable (required for TDC Sensors)

Item	Part Number	Description
13	131-5056	Adapter Cable for Cat® Hydraulic Flowmeters
14	131-5065	Auto ID Cable for 8T-1002 Position Sensor
17	9U-7505	High Voltage Adapter (600 V Max.)
18	6V-7072	Lead Kit - Test
19	131-5053	DataView to PC Parallel port cable (short)
20	137-0169	Cable As - DVFlash
21	131-5047	Cable - Power, 110 VAC (USA Plug)
22	131-5052	AC Power Adapter, 90 to 264 VAC, 47 - 63 Hz
23	137-0171	Adapter - Plug AC

(Continued)

131-5051 DataView Portable TechStation Group (Continued)

Item	Part Number	Description
24	131-5059	DataView Rear Flash Programming Cable

<sup>1</sup>4 provided

Optional Equipment



Item	Part Number	Description
1	131-5058	Generic Foam Insert - Fits in 137-0173 Case and has locations for DataView and a square hole for almost any laptop PC, plus a location for Cat® communications adapter
2	137-0173	DataView Carrying Case - Has access door in front to allow DataView to be used without removing it from case. Foam inserts must be ordered separately, depending on configuration
3	138-8779	Top Foam Inserts - Replaces generic PC foam in DataView case to allow Cat® Portable PC (Itronix) with CD-ROM drive and Cat® Communications adapter to be used with 131-5051 DataView Portable TechStation

Item	Part Number	Description
4	137-0168	External Power Cable, 11 - 40 VDC, 5 m (18 ft) long
5	133-6975	European DataView Power Cable (220 VAC) - European-style connector to fit 131-5052 AC Power Adapter
6	137-0170	Cigarette Lighter Power Cable (12 VDC)
<b>Not Shown</b>		
--	229-9392	DataView Replacement Battery

# General Diagnostic Tools

## Optional Cables and Sensors to Use with DataView

Diagnostic Tools

Analog Channel Sensors	
Part Number	Description
<b>Pressure Sensors for Analog Channels A 131-5054 Adapter Cable or Auto ID Cable is always required to use the following sensors:</b>	
213-3274	DataView Auto ID Pressure Sensor, 689 kPa (100 psi)
213-3275	DataView Auto ID Pressure Sensor, 6,890 kPa (1,000 psi)
213-3276	DataView Auto ID Pressure Sensor, 51,675 kPa (7,500 psi)
4C-6817	Pressure Sensor (0 - 100 psi)
4C-6818	Pressure Sensor (0 - 500 psi)
4C-6819	Pressure Sensor (0 - 1000 psi)
4C-6820	Pressure Sensor (0 - 7500 psi)
131-5060	Auto ID Cable (for 4C-6816 Sensor)
131-5062	Auto ID Cable (for 4C-6818 Sensor)
131-5061	Auto ID Cable (for 4C-6817 Sensor)
4C-6816	Pressure Sensor (0 - 60 psi)
131-5063	Auto ID Cable (for 4C-6819 Sensor)
131-5064	Auto ID Cable (for 4C-6820 Sensor)
Probe Type RTD Temperature Sensors	
4C-6264	Probe - RTD 25.4 mm (1 in) long, 3.2 mm (0.125 in) diameter
4C-6265	Probe - RTD 38.1 mm (1.5 in) long, 3.2 mm (0.125 in) diameter
4C-6266	Probe - RTD 63.5 mm (2.5 in) long, 3.2 mm (0.125 in) diameter

### Frequency Channel Sensors

Part Number	Description
Photo Pickup Speed Sensor	
6V-3138	Extension Rod for 6V-3137
1U-6605	Retro-Reflective Tape, 12.5 mm (0.5 in) x 1.5 m (5.0 ft) long
6V-0093	Retro-Reflective Tape, 12.0 mm (0.5 in) x 47.5 m (50 ft) long
4C-6919	Retro-Reflective Tape, 25 mm (1 in) x 2.5 m (100 in) long
6V-3137	Magnetic Mounting Base for 9U-5140
9U-5140	Pickup - LED Photo
Injection Line Speed Sensor	
6V-4950	Injection Line Pickup Group (from Multitach group)
Tach Generator Speed Sensor	
9U-7506	Magnetic Adapter Cable (required for TDC Sensors)
5P-7360	Tach Generator (20-tooth internal gear)
5P-1759	Tachometer Drive Group (additional parts in accessory case)

Analog Channel Sensors	
Part Number	Description
Probe Type RTD Temperature Sensors (Continued)	
4C-6267	Probe - RTD 88.9 mm (3.5 in) long, 3.2 mm (0.125 in) diameter
Exhaust RTD Temperature Sensor	
4C-6268	Exhaust Probe RTD
Hand Held RTD Temperature Probes	
4C-6496	Immersion Hand Held RTD Temperature Probe, 3.18 mm (0.125 in) diameter
4C-6497	Surface Hand Held RTD Temperature Probe, 6.35 mm (0.25 in) diameter
Blowby Sensors for Analog Channels	
8T-2685	Pickup - Blowby (1,000 CFH)
131-5066	Auto ID Cable for Small Blowby Pickup
1U-8860	Large Engine Blowby/Air Flow Pickup Group (For 3500 and 3600 Engines)
131-5067	Auto ID Cable for Small Blowby Pickup
Position Sensor for Analog Channels	
8T-1002	Position Probe (X4)
131-5065	Auto ID Cable for 8T-1002 Position Sensor
6V-6042	Point Group - Contact
5P-4814	Collet As - Clamp

Part Number	Description
Flywheel TDC Magnetic Speed Sensors	
8T-5184	Transducer - Magnetic TDC Pickup 8.9 cm (3.5 in) long
8T-5185	Transducer - Magnetic 17.8 cm (7.0 in) long
6V-2197	Transducer - Magnetic TDC Pickup 114 mm (4.5 in) long
6V-2199	Adapter - Transducer, 1/8 in NPTF
6V-3093	Adapter - Transducer, 1/4 in NPTF
7X-1171	Sensor Mounting Adapter TDC Pickup 114 mm (4.5 in) long
9U-7506	Magnetic Adapter Cable (required for TDC Sensors)
Magnetic Pickup Speed Sensors	
8L-4171	General Purpose Magnetic Speed Sensor, 91 mm (3.5 in) long, 5/8-18 thd
9G-6724	Magnetic Speed Sensor, 76 mm (3.0 in) long, 3/4 - 16 Thread
6V-4156	Adapter Cable (required for above sensors), Amphenol to Phono Jack

(Continued)

Frequency Channel Sensors (Continued)

Part Number	Description
<b>Magnetic Pickup Speed Sensors (Continued)</b>	
9U-7506	Magnetic Adapter Cable (required for TDC Sensors)
<b>Fuel Flowmeters and Fuel Flow Communicator</b>	
1U-5306	Hose Adapter Group, Large
1U-5305	Hose Adapter Group, Small
1U-5299	Case Assembly
<b>Hydraulic Flowmeters for Frequency Channels The 131-5056 Adapter Cable is required to use the following flowmeters:</b>	
4C-8686	Hydraulic Flowmeter, 60 - 700 lpm (15 - 180 gpm)
4C-8687	Hydraulic Flowmeter, 45 - 450 lpm (10 - 100 gpm)
4C-9911	Hydraulic Flowmeter, 8 - 50 lpm (2 - 12 gpm))
4C-9912	Hydraulic Flowmeter, 20 - 220 lpm (5 - 50 gpm)

Part Number	Description
<b>Hydraulic Flowmeters for Frequency Channels The 131-5056 Adapter Cable is required to use the following flowmeters: (Continued)</b>	
4C-9913	Hydraulic Flowmeter, 30 - 300 lpm (8 - 80 gpm)
4C-9914	Hydraulic Flowmeter, 50 - 550 lpm (12 - 150 gpm)
4C-9436	Hydraulic Flowmeter, 12 - 120 lpm (3 - 25 gpm)
<b>Hydraulic Flowmeters with Load Valves for Frequency Channels</b>	
160-2513	Tester Flowmeter, 20 - 220 lpm (5 - 50 gpm)
160-2514	Tester Flowmeter, 15 - 473 lpm (4 - 125 gpm)
160-2515	Tester Flowmeter, 60 - 700 lpm (15 - 180 gpm)

**153-9630 Sensor Test Group**

SMCS Code: 1000-038, 3000-038, 4000-038, 5000-038, 6000-038

Model: Electronically Controlled Cat® Equipment

Warranty: One Year

European Union compliant, CE marked

- Recommended for testing Cat® PWM and analog sensors on or off the machine
- Used with 131-5050 DataView and DataView 2.0 software
- DataView 2.0 software lists common sensors for easy setup
- Internal power supply powers active sensors while removed from equipment

**Reference**

NEHS0711, Tool Operating Manual

Input impedance	120 k
Input voltage	5 VDC (from DataView)
Output voltage	9.4 VDC (sensor power)
Maximum sensor current	40 mA maximum at 9.4 VDC
Operating temperature	-17° to 60° C (0° to 140° F)
Size	85 x 56 x 35 mm (3.3 x 2.2 x 1.4 in)
Weight (153-9625)	0.23 kg (0.5 lb)
NEEG2813 Decal	



Item	Part Number	Description
1	153-9629	Insert Foam
1	148-5675	Case
1	6V-6096	Foam
2	153-9625	PWM Sensor Adapter
3	153-9627	Cable Assembly, DT
4	153-9626	Cable Assembly, HD
--	153-9630	Sensor Test Group

## DataView Auto ID Pressure Sensors

SMCS Code: 1000-038, 4000-038, 5000-038, 6000-038, 0788

Warranty: One Year



European Union compliant, CE marked

- Low cost pressure sensors
- Used with 131-5050 DataView (sensors are not designed for use with discontinued 4C-6800 Data Logger and will not give correct readings if used)
- Built-in auto ID
- Plugs directly into DataView Analog Channels
- Accuracy of  $\pm 1\%$
- Replaces discontinued 143-4062, 143-4065, and 143-4066 Pressure Sensors

Pressure ranges	0 to 689 kPa (0 to 100 psi)
	0 to 6890 kPa (0 to 1000 psi)
	0 to 51675 kPa (0 to 7500 psi)
Accuracy	$\pm 1\%$ of full scale or $\pm 1\%$ of reading typical
Proof pressure	2 times rated range
Burst pressure	5 times rated range
Connection	Male, 1/4 in NPT thread
Connector	Male, 5-pin DIN
Operating temperature range	-40° to 100° C (-40° to 212° F)
Maximum diameter	26.0 mm (1.02 in)
Sensor length	84 mm (3.3 in)
Cable length	305 mm (12 in)
Weight	0.13 kg (0.28 lb)
DataView auto ID resistor	Built-in

Part Number	Description
213-3274	DataView Auto ID Pressure Sensor, 689 kPa (100 psi)
213-3275	DataView Auto ID Pressure Sensor, 6,890 kPa (1,000 psi)
213-3276	DataView Auto ID Pressure Sensor, 51,675 kPa (7,500 psi)

## 4C-9024 Battery Pack Group

### 4C-9031 Battery Cable

SMCS Code: 0785

Model: All Models

Warranty: One Year

- Portable, rechargeable power supply for use with all Caterpillar® diagnostic tools that require 12-volt DC power
- Provides quick power for short diagnostic tests — no need to open vehicle battery compartment
- 4C-9031 Cable required to connect to diagnostic tools

Part Number	Description
4C-9024	Battery Pack Group (12 V)
4C-9031	Battery Cable

### 4C-9024 Battery Pack

4C-9024 Battery Pack Group	
Volts	12 VDC
Capacity	6 amp hrs. at 20 hr. rating (25° C [77° F])
Internal resistance	25 milliohms
Self discharge	2 - 3% per month
Size (L x W x H)	210 x 73 x 165 mm (8.25 x 2.875 x 6.5 in)
Weight	3.18 kg (7 lb)
Charge/discharge cycles	Up to 500 typical
Operating temperature	-60° to +60° C (-76° to +140° F)
Charging temperature	-16° to +50° C (+4° to +122° F)
Recharge time	16-20 hrs.
Typical operating times	
Current drain (amps)	0.25, 0.5, 1.0, 2
Power drain (watts)	3, 6, 12, 24
Operating time (hours)	20, 11, 5, 2



4C9024

### 4C-9031 Battery Cable

4C-9031 Cable, Battery to Tool	
Length	182 cm (6 ft)
Weight	0.113 kg (0.25 lb)
Connectors:	
Plug:	Standard cigarette lighter plug with integral 1 amp fuse
Receptacle:	Standard MS, 2-pin connector used on diagnostic tools



4C9031

### 9U-7560 Field Soldering Iron Group

#### 9U-7561 Field Soldering Iron

SMCS Code: 0709

Model: All Models

Warranty: One Year

- Used to solder electrical connections in the field — light-weight and easy to use
- Used with 4C-9024 Battery Pack Group
- Tip is temperature regulated (provides better control for outdoor usage)
- In-line fuse prevents damage and/or overload
- Plugs into any 12V vehicle cigarette lighter plug
- Optional 4C-9024 Portable Battery Pack will power 9U-7561 for 3 hours continuously

#### Reference

NEHS0601, Tool Operating Manual

Voltage requirement	12 VDC
Wattage	42 Watts
Tip temperature	370° C (700° F)
Length	190 mm (7.5 in)
Cord length	3.5 m (11.50 ft)
NEEG2588 Soldering Iron Label	
NEEG2587 Case Label	



2

3

1

(Continued)

# General Diagnostic Tools

## 9U-7560 Field Soldering Iron Group (Continued)

### 9U-7561 Field Soldering Iron

SMCS Code: 0709

Model: All Models

Warranty: One Year

Item	Part Number	Description
1	9U-7561	Soldering Iron
2	9U-7562	Solder, 0.5 kg (1 lb) Spool
3	6V-3073	Case - Plastic
--	9U-7560	Field Soldering Iron Group
<b>Service/Repair Parts (Sold Separately)</b>		
--	9U-7563	Tip, Soldering Iron Replacement
--	2S-6024	Fuse or 333672 Fuse, 5 amp
--	6V-6024	Foam Block

## 4C-5607 Combustible Gas Detector

SMCS Code: 1250-034

Model: Spark Ignited Engines

Warranty: One Year



- Portable, battery operated, solid-state
- Approved for use in Class-1 Hazardous Atmospheres
- Provides "geiger-counter" ticking signal which increases in frequency as source of combustion gas or vapor is approached
- Excellent for instantly pin-pointing gas leaks in Class-1 Atmospheres, as minute as 50 PPM
- Includes flexible probe, sturdy carrying case, rechargeable batteries, and recharger adapter

### Materials the 4C-5607 will respond to:

#### Hydrocarbons

- Methane (Natural Gas)
- Ethane
- Propane
- Benzene
- Acetylene
- Butane
- N-Butane
- Isobutane
- Pentane
- Hexane
- Gasoline
- Diesel Fuel

#### Halogenated Hydrocarbons

- Methyl Chloride
- Methylene Chloride
- Trichloroethane
- Vinyl Chloride



### 4C-5607 Combustible Gas Detector (Continued)

SMCS Code: 1250-034  
 Model: Spark Ignited Engines  
 Warranty: One Year

Power supply	2 (2.4V) Ni-Cad batteries
Battery life	4 hours
Sensitivity	50 - 1000 PPM
Warm-up time	Automatic, approx. 15 sec.
Response time	Instantaneous
Weight	439 grams (15.5 oz)
Dimensions	20.32 cm x 7.62 cm x 4.57 cm (8 in x 3 in x 1.8 in)
Duty cycle	Continuous, no limitations
Operating temp. range	0° to 38° C (33° to 100° F)
Probe length	38.1 cm (15 in)

Part Number	Description
4C-5607	Combustible Gas Detector
<b>Service Part</b>	
4C-5611	Sensing Tip

### 8T-9295 Diagnostic Tool Holder

SMCS Code: 0785  
 Model: All Models  
 Warranty: One Year

- Frees serviceman's hands while performing critical diagnostic tests
- Magnetized, adjustable device holds multimeter, multitach, electronic position indicator or any diagnostic tool
- Especially helpful while checking or adjusting fuel systems

Part Number	Description
8T-9295	Diagnostic Tool Holder



### 9U-5215 Tool Case, Soft

SMCS Code: 0785  
 Model: All Models  
 Warranty: Six Months

- Universal soft case for most Cat® hand-held "green box" diagnostic tools
- Foam insert used to hold standard-size tool
- Resistant to coolant, diesel fuel, and oil
- Adjustable/removable strap
- Clear vinyl front for excellent instrument visibility; provides extra protection
- Opening in top for easy access to all connections of instrument

Part Number	Description
9U-5215	Tool Case, Soft (not as shown)



# General Diagnostic Tools

## 348-4570 Oxygen Analyzer

SMCS Code:0781,1088

Warranty: Manufacturers

European Union compliant, CE marked

- Replaces canceled 209-5545 Oxygen Analyzer
- Used to measure oxygen content and temperature of exhaust gases on natural gas, diesel fuel, gas, and propane powered engines
- Rugged, portable design with integrated protective boot
- Built-in magnetic back for hands free work
- Rechargeable Lithium-Ion battery rated for 5 hours of continuous use
- Universal power supply/battery charger with four interchangeable, universal adapter plugs
- Fast 30 second warm up time
- Features 4-line backlit display (user configurable)
- Sensor diagnostics and battery life indicator
- Oxygen probe hose assembly features a clear, inline filter canister and moisture trap
- Wireless IR link for optional printer
- Includes carrying case (not shown)

### Repair Information

Testo, Inc

See Tool Repair Section for tool repair and calibration locations

Diagnostic Tools

Operating temperature range	-5° to 45° C (23° to 113° F)
Storage temperature range	-20° to 49° C (-4° to 120° F)
Dimensions (L x W x H)	216 x 51 x 48 mm (8.5 x 2.7 x 1.9 in)
Weight	0.5 kg (1.1 lb)
Power supply	Li-Ion rechargeable battery
Oxygen sensor range	0 - 21% at 0.1% resolution
Probe temperature range	-40° C to +500° C at 0.17° resolution (-40° F to +932° F at 0.1° resolution)
Draft-resolution	± 16 in H2O at 0.001 in H2O -resolution
Battery Voltage	3.4 - 4.2 VDC
Battery Charger Input	100 - 240 VAC, 50 - 60 Hz
Battery Charger Output	5 VDC, 2.0 amps
Item	Description
1	Oxygen analyzer
2	Clear particle filter and moisture trap canister
3	Probe with hose
4	Replacement particle filters
5	Filter removal tool
6	Universal power supply/battery charger with adapter plugs
Not shown	Carrying case

(Continued)

**348-4570 Oxygen Analyzer (Continued)**

SMCS Code:0781,1088  
 Warranty: Manufacturers



Part Number	Description
348-4570	Oxygen Analyzer
<b>Service/Repair Parts</b>	
348-4567	Replacement Oxygen Sensor
209-5563	Replacement Filter Kit

**206-2933 ProLink Printer (220 VAC/12 VDC)**

SMCS Code: 1900-036, 0779  
 Model: On-Highway Trucks  
 Warranty: Manufacturers One Year

- Used to print active diagnostic codes, logged fault event codes, data lists, trip recorder, customer specified parameters, engine rating specifications, snap shot data, and maintenance data
- Provides printed copy for permanent history folder
- Helps troubleshoot intermittent engine problems (allows comparison between properly running engine and an engine with problems)



**Repair Information**

NEXIQ Technologies  
 6839 Caminito Sueno  
 Carlsbad, CA 92009  
 Phone: 800-639-6774  
 Fax: 810-731-3348

**Reference**

STG00-15, Manual

Power source input	220 VAC
Power output to printer	12 VDC

Part Number	Description
206-2933	ProLink Printer (220 VAC/12 VDC)

## 205-8335 Monitor Extension Cable

SMCS Code: 1901-038, 0781

Model: 320C Excavator

Warranty: One Year



- Used to connect in-cab system monitor to a remote monitor
- Provides ground-level system monitoring to instructors and training students

Part Number	Description
205-8335	Monitor Extension Cable

## 22 Wiring Harnesses for 320 SCM Excavators

SMCS Code: 1901-038, 0781

Model: 320 B and C SCM Hydraulic Excavators

Warranty: One Year

- Used to check a variety of electrical connections including: continuity between terminals, terminals and ground, or terminals and battery; measuring voltage between terminals; and checking reducing valve, governor actuator, engine/pump controller signal, engine/pump controller, and engine/pump attachment controller

### 192-8731 Harness Group (320 B and C)

- Used to check continuity between terminals, terminals and ground, or terminals and battery
- 190-0150 Harness Type 1 used on clip-type terminal
- 190-0152 Harness Type 2 used on terminals of Yazaki female type
- 190-0154 Harness Type 3 used to connect between Yazaki male and female type
- 190-0155 Harness Type 4 used on terminals of Yazaki female
- 190-0156 Harness Type 5 used to connect between Deutsch female and clip-type terminal
- 190-0157 Harness Type 6 used on Deutsch female terminals
- 190-0158 Harness Type 7 used on Deutsch 2-pin type plug

### 192-8732 Harness Group (320 B)

- Used to check continuity between terminals, or measure voltage between terminals, terminals and ground, or terminals and battery
- 190-0159 Harness Type 8 used on AMP female terminals
- 190-0160 Harness Type 9 used on AMP female terminals
- 190-0162 Harness Type 10 used to connect AMP female and clip-type terminal
- 190-0163 Harness Type 11 used on Deutsch 2-pin type receptacle

### 192-8733 Harness Group (320 C)

- Used to check continuity between terminals, or measure voltage between terminals, terminals and ground, or terminals and battery
- 190-0165 Harness Type 12 used on AMP female terminals
- 190-0166 Harness Type 13 used on AMP female and clip-type terminal
- 190-0167 Harness Type 14 used to connect Deutsch 2-pin type receptacle and clip-type terminal

### 188-8588 Valve Test Harness (320 B and C)

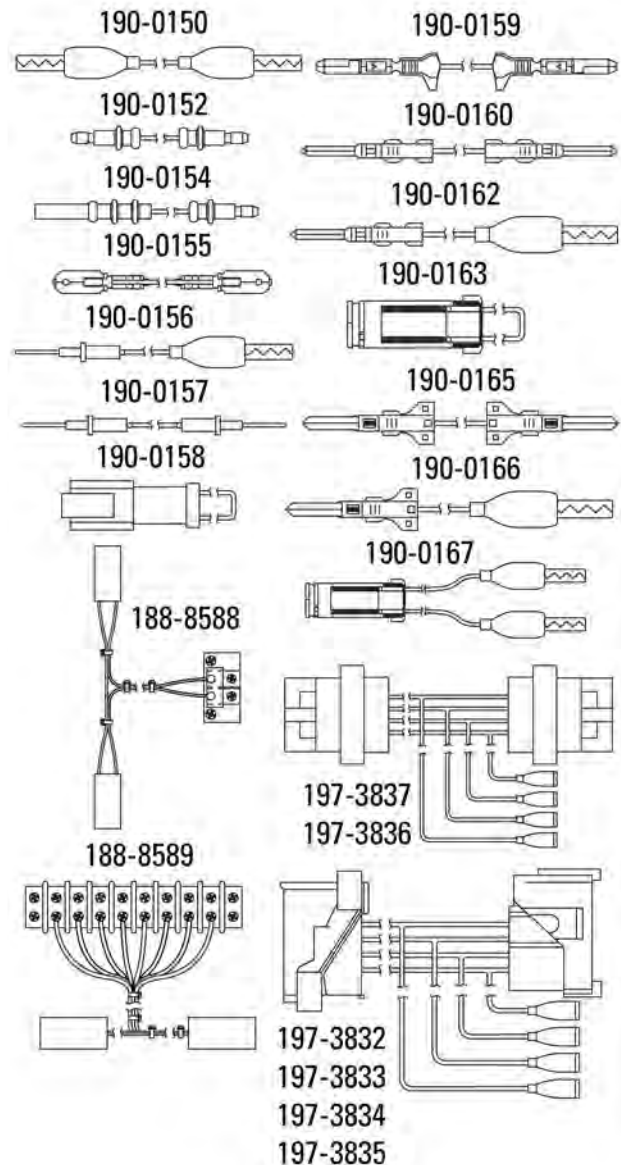
- Used to check operation of reducing valve by measuring a current signal (Sweep Test)

### 188-8589 Governor Test Harness (320 C)

- Used to check operation of governor actuator by measuring a voltage signal across different connections (Sweep Test)

### 190-0169 Harness Group (320 B)

- Used to check operation of engine/pump controller signal by measuring a voltage signal across different connections of controller
- 197-3836 Test Harness used for CONNECTOR 1



(Continued)

# General Diagnostic Tools

## 22 Wiring Harnesses for 320 SCM Excavators (Continued)

SMCS Code: 1901-038, 0781

Model: 320 B and C SCM Hydraulic Excavators

Warranty: One Year

- 197-3837 Test Harness used for CONNECTOR 2
- **192-8734 Harness Group (320 C)**
- Used to check operation of engine/pump controller by measuring a voltage signal across different connections of controller
- 197-3832 Test Harness used for CONNECTOR 1
- 197-3833 Test Harness used for CONNECTOR 2
- **192-8735 Harness Group (320 C)**
- Used to check operation of engine/pump attachment controller by measuring a voltage signal across different connections of controller
- 197-3834 Test Harness used for CONNECTOR 3
- 197-3835 Test Harness used for CONNECTOR 4

Diagnostic Tools

Part Number	Description
<b>192-8731 Harness Group (320 B and C)</b>	
192-8731	Harness Group (320 B and C)
190-0150	Harness Type 1
190-0152	Harness Type 2
190-0154	Harness Type 3
190-0155	Harness Type 4
190-0156	Harness Type 5
190-0157	Harness Type 6
190-0158	Harness Type 7
<b>192-8732 Harness Group (320 B)</b>	
190-0160	Harness Type 8
190-0162	Harness Type 9
190-0163	Harness Type 10
190-0159	Harness Type 11
192-8732	Harness Group (320 B)
<b>192-8733 Harness Group (320 C)</b>	
192-8733	Harness Group (320 C)
190-0165	Harness Type 12
190-0166	Harness Type 13
190-0167	Harness Type 14

Part Number	Description
<b>188-8588 Valve Test Harness (320 B and C)</b>	
188-8588	Valve Test Harness (320 B and C)
<b>188-8589 Governor Test Harness (320 C)</b>	
188-8589	Governor Test Harness (320 C)
<b>190-0169 Harness Group (320 B)</b>	
190-0169	Harness Group (320 B)
197-3836	Test Harness
197-3837	Test Harness
<b>192-8734 Harness Group (320 C)</b>	
192-8734	Harness Group (320 C)
197-3832	Test Harness
197-3833	Test Harness
<b>192-8735 Harness Group (320 C)</b>	
192-8735	Harness Group (320 C)
197-3834	Test Harness
197-3835	Test Harness

**8T-5200 Signal Generator/Counter Group**  
**Discontinued—Service/Repair Parts Available**

4C-6534 Harness in Tool Guide (setting electronic speed switches)

**Reference**

SEHS8579, Special Instruction



Item	Part Number	Description
1	6V-3072	Case - Plastic, NEEG2574 Group Decal on lid (9U-7402 Group)
2	8T-5201	Signal Generator/Counter
3	6V-2198	Extension Cable (X8)

Item	Part Number	Description
4	8T-5198	Transmission Adapter Cable
5	8T-5197	Calibrator Cable and Adapters
6	8T-5112	Signal Input Cable
7	6V-6045	Case - Plastic, NEEG2061 Accessories Case Decal
--	8T-5200	Signal Generator/Counter Group

**4C-6534 Harness**

SMCS Code: 7427-036

Model: All Models

Warranty: One Year

- Replaces discontinued 9W-6370 Harness
- Used with discontinued 8T-5201 Signal Generator/Counter to test and adjust all engine electronic speed switches, whether 2, 3 or 4 element (9W-6370 checks only 2 and 3 element speed switches; 4C-6534 Harness provides higher voltage signal which will operate 4 element speed switches)
- Length: 1524 mm (60 in)

**Reference**

SEHS8657, Special Instruction

Part Number	Description
4C-6534	Harness



## Hook and Loop Fastener

Warranty: Six Months



- Fast — lets you secure and release cables quickly and easily with the combinations of Velcro strap and nylon tie
- Easy — mounts to cables permanently; installs in seconds
- Reuseable
- Tidy — keeps cables neat and safe
- A great way to coil them for storage — a better way to keep harnessed cables organized

Part Number	Description	Size (W x L)
9U-5061	Closed Loop	25.4 x 177.8 mm (1 x 7 in)
9U-5062	Open loop	25.4 x 177.8 mm (1 x 7 in)
9U-5063	Open loop	38.1 x 457 mm (1 1/2 x 18 in)

## 262-8390 40X Pocket Microscope with Light

Warranty: One Year



- Replaces canceled 6V-2196 Microscope and 6V-7894 Microlite
- 40X microscope is a general usage instrument, but is specifically recommended for checking crankshaft bearing surfaces after magnetic inspection
- Small, lightweight folding design with built-in inspection light and adjustable focus lens
- Scale reading in 0.05 mm increments for accurate measurement
- Light source uses a standard 222 bulb with a screw-type base (can also use 6V-3061 as replacement bulb)
- Requires two 1U-9535 Alkaline 1.5V "AAA" size batteries (not included)

Part Number	Description
262-8390	40X Pocket Microscope with Light

## Dual Scale Pressure Gauges

Warranty: Six Months

- Dual scale, liquid-filled pressure gauge in a brass case
- Inside scale is kilopascals (kPa) identified by a yellow band
- Outside scale is pounds per square inch (psi)

Gauge diameter	63.5 mm (2.50 in)
Accuracy	1.6%
Connector	1/4-18 NPTF

Part Number	Connection Location	Range
8T-0846	Back	0 to 1,000 kPa (0 to 145) psi <sup>1</sup>
8T-0847	Back	-100 to 0 to 50 kPa (-15 to 0 to 72) psi
8T-0848	Back	0 to 400 kPa (0 to 58) psi <sup>1</sup>
8T-0849	Back	0 to 2,000 kPa (0 to 290) psi <sup>1</sup>
8T-0850	Back	0 to 4,000 kPa (0 to 580) psi <sup>1</sup>
8T-0851	Back	0 to 16,000 kPa (0 to 2,300) psi <sup>1</sup>
8T-0852	Back	0 to 40,000 kPa (0 to 5,800) psi <sup>1</sup>
8T-0853	Stem	0 to 400 kPa (0 to 58) psi
8T-0854	Stem	0 to 1,000 kPa (0 to 145) psi
8T-0855	Stem	0 to 4,000 kPa (0 to 580) psi
8T-0856	Stem	0 to 6,000 kPa (0 to 870) psi
8T-0857	Stem	0 to 10,000 kPa (0 to 1,450) psi

(Continued)



**Dual Scale Pressure Gauges (Continued)**

Warranty: Six Months

Part Number	Connection Location	Range
8T-0858	Stem	0 to 16,000 kPa (0 to 2,300) psi
8T-0859	Stem	0 to 25,000 kPa (0 to 3,600) psi
8T-0860	Stem	0 to 40,000 kPa (0 to 5,800) psi
8T-0861	Stem	0 to 60,000 kPa (0 to 8,700) psi
8T-0862	Stem	-100 to 0 to 500 kPa (-15 to 0 to 72) psi
8T-0863	Stem	0 to 250 (0 to 36) psi

<sup>1</sup> Can be used in 1U-5481 Transmission Test Group

**Standard and Certified Pressure Gauges**

Warranty: Six Months

- Dual scale, liquid-filled pressure gauge in a brass case
- Inside scale is kilopascals (kPa) identified by a yellow band
- Outside scale is pounds per square inch (psi)
- Certified gauge has a serial number and certificate of accuracy from the manufacturer



Accuracy	1.6%
Connector	1/4-18 NPTF
Gauge diameter	63.5 mm (2.50 in)
Gauge diameter of 186-2613	101.6 mm (4.0 in)

Certified Part No.	Part Number	Range
<b>Dual Scale Pressure Gauges (Back Connector) 2.50 in</b>		
186-2592	8T-0846	0 to 1,000 kPa (0 to 145) psi <sup>1</sup>
186-2593	8T-0847	-100 to 0 to 50 kPa (-15 to 0 to 72) psi
186-2594	8T-0848	0 to 400 kPa (0 to 58) psi <sup>1</sup>
186-2595	8T-0849	0 to 2,000 kPa (0 to 290) psi <sup>1</sup>
186-2596	8T-0850	0 to 4,000 kPa (0 to 580) psi <sup>1</sup>
186-2597	8T-0851	0 to 16,000 kPa (0 to 2,300) psi <sup>1</sup>
186-2598	8T-0852	0 to 40,000 kPa (0 to 5,800) psi <sup>1</sup>
<b>Dual Scale Pressure Gauges (Stem Connector) 2.50 in</b>		
186-2601	8T-0853	0 to 400 kPa (0 to 58) psi
186-2602	8T-0854	0 to 1,000 kPa (0 to 145) psi
186-2604	8T-0855	0 to 4,000 kPa (0 to 580) psi
--	212-7043	0 to 700 kPa (0 to 100) psi
186-2605	8T-0856	0 to 6,000 kPa (0 to 870) psi

Certified Part No.	Part Number	Range
<b>Dual Scale Pressure Gauges (Stem Connector) 2.50 in (Continued)</b>		
186-2606	8T-0857	0 to 10,000 kPa (0 to 1,450) psi
186-2607	8T-0858	0 to 16,000 kPa (0 to 2,300) psi
186-2608	8T-0859	0 to 25,000 kPa (0 to 3,600) psi
186-2609	8T-0860	0 to 40,000 kPa (0 to 5,800) psi
186-2610	8T-0861	0 to 60,000 kPa (0 to 8,700) psi
186-2611	8T-0862	-100 to 0 to 500 kPa (-15 to 0 to 72) psi
186-2612	8T-0863	0 to 250 (0 to 36) psi
<b>Dual Scale Pressure Gauges (Stem Connector) 4.00 in</b>		
186-2613	8T-0820	0 to 70,000 kPa (0 to 10,000) psi

<sup>1</sup> Can be used in 1U-5481 Transmission Test Group

## 8T-0820 Standard Pressure Gauge

### 186-2613 Certified Pressure Gauge

Warranty: Six Months



- Grade "A" liquid-filled dual scale (kPa range 0 to 70,000, psi range 0 to 10,000), 101.6 mm (4.0 in) diameter with 1/4 inch NPT thread and stem mounted
- General purpose gauge; can be used with all Cat® electric hydraulic pumps
- Certified gauge has serial number and certificate of accuracy from the manufacturer

Part Number	Description
186-2613	Certified Pressure Gauge
8T-0820	Standard Pressure Gauge

## 8T-5342 and 8T-5343 Pressure Gauge

Warranty: Six Months

- Liquid-filled pressure gauges designed for use with the most popular series of hydraulic pullers and rams
- 8T-5343 Gauge is a bottom mount pressure gauge having 1/4 inch NPT threads
- 8T-5342 Gauge is a lower back-mounted pressure gauge
- Both gauges have a 101.6 mm (4.00 in) liquid filled housing
- Provide Grade A accuracy with a pressure range of 0 to 70,000 kPa (0 to 10,000 psi)
- Tonnage scales are provided for 30, 50, 70, 100 and 150 ton cylinders (27T, 45T, 63.5T, 91T and 136T)

Part Number	Description
8T-5342	Pressure Gauge
8T-5343	Pressure Gauge

## 210-6990 Digital Pressure Gauge (0 to 500 psi)

Warranty: Six Months



- 2 3/4 inch gauge has 1% of full scale accuracy
- Gauge reads in psi only
- Operates in 0-50° C (32-122° F)
- NIST certified
- 1/4 inch NPT stem style connection
- Requires a 9-volt alkaline battery
- Weight: 0.198 kg (7 oz)

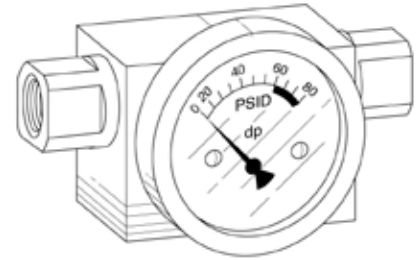
Part Number	Description
210-6990	Digital Pressure Gauge (0 to 500 psi)

### 218-8445 Differential Pressure Gauge

Model: 201-8131 Heavy Duty Filter Cart (discontinued)

Warranty: Six Months

- Used to monitor pressure drop across filter element
- Used with discontinued 201-8131 Heavy-Duty Filter Cart
- Easily mounts anywhere (can be panel mounted)
- 1/4 inch NPT hose connections



Maximum temperature	93° C (200° F)
Maximum pressure	400 bar (6000 psi)
Full range scale	0 to 100 psi
Accuracy FSD	± 2%
Dial size	63.5 mm (2.50 in)
Hose connections	1/4 FNTP
Line connections	Back mount
Lens	Plastic
Body material	Aluminum
Units of measure	Pounds per square inch (psi)
Seals	Viton
Red zone	From 60 psi and higher

Part Number	Description
218-8445	Differential Pressure Gauge

### 9U-6986 Service Indicator

Warranty: Six Months

- Used to monitor filter condition
- Has a 50.8 mm (2 in) diameter face with green background to 20 psi, yellow background to 24 psi, and red background to 60 psi
- Has 1/8 inch NPT port out on middle of back



Part Number	Description
9U-6986	Service Indicator

### 1U-5809 Grommet

Warranty: Six Months

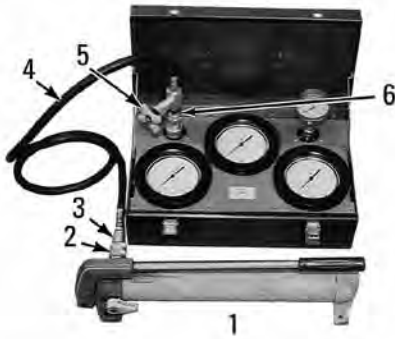
- Provides protection to gauges during field operations
- Fits stem or back-mounted gauges with 63 mm (2 1/2 in) face diameters and thicknesses of 28 mm (1 1/8 in)

Part Number	Description
1U-5809	Grommet



## 5P-8558 Calibrating Group Pressure Gauge

Warranty: Manufacturer's One Year



- 3 gauges of 1/2 % accuracy with pressure ranges of 1100 kPa (160 psi), 4150 kPa (600 psi), and 34 500 kPa (5000 psi)
- 2 lower pressure gauges protected from excessive pressure by 2 sensor valves which shut off the pressure signal to the gauges at a preset value
- Separate source of pressure such as the 1U-5230 Hand Pump is required to actuate the calibrating group

### Repair Information

Carrier-Oehler  
16955 Vincennes Avenue (Shipping)  
P.O. Box 40 (Mailing)  
South Holland, IL 60473  
Phone: (708) 339-8200  
Fax: (708) 339-9830

### Reference

NEHS0977, Tool Operating Manual

Item	Part Number	Description
--	5P-8558	Calibrating Group Pressure Gauge
<b>Components Used for Testing with the 5P-8558 Calibrating Group</b>		
1	1U-5230	Hand Pump
2	1P-2375	Coupler Assembly Quick Connective (Male)
3	1P-2376	Coupler Assembly Quick Connective (Female) (2)
4	8F-0024	Hose Assembly
5	1S-8937	Valve - Needle
6	5P-8998	Nipple - Pipe

## Calibrating Group Pressure Gauge



Item	Part Number	Description
1	5P-0946	Box
2	1P-2375	Coupler Assembly Quick Connective (Male)
3	8S-4600	Nipple (2) <sup>1</sup>
4	8S-4599	Coupling Assembly - Quick Disconnect

<sup>1</sup>Other nipples available for gauge attachment are: 2S-5244, 1/4 in NPT External Thread

### 204-7393 Gauge Comparator

Warranty: Six Months

- Used to compare accuracy of analog and/or digital gauges (compares gauge in question to a precise master gauge)
- Used with 204-7394 7000 kPa Precision Gauge, 204-7395 35000 kPa Precision Gauge, and 198-9257 70000 kPa Precision Gauge (not part of 204-7393)
- Can also be used to check accuracy of 198-4240 Digital Pressure Indicator Group
- Quick-sealing, threaded gauge adapters allow quick and easy gauge changes
- Works in stationary or portable applications (can be bench mounted or mounted to a rolling cart)
- Hand wheel allows minute pressure changes to be made
- Large diameter master gauges for easy pressure reading
- Master gauges have dual scale pressure readings (inside [kPa] and outside [psi])



Range	0 - 68900 kPa (0 - 10000 psi)
Pressure medium	Water, animal/vegetable oil, or alcohol
Mounting	4 holes
Dimensions (W x H x D)	275 x 200 x 270 mm (10.8 x 7.9 x 10.6 in)
Weight	5.9 kg (13 lb)
Connections	1/4-18 NPTF female
Accuracy	±0.25% of span

Part Number	Description
204-7393	Gauge Comparator

### 8T-5135 Gauge Mounting Group

Warranty: Six Months

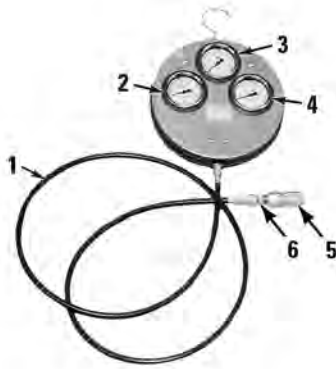
- Used to mount fluid-filled, 63.5 mm (2.50 in) diameter gauges, both kPa and psi back-mounted, in the discontinued 6V-4160 Transmission Test Case; some U-shaped mounting panels may need to be modified by brazing a piece of sheet metal to the U-shaped mounting panel to make it 4.8 mm (0.188 in) deeper
- Use for transmission test cases without a U-shaped mounting panel



Part Number	Description
8T-5135	Gauge Mounting Group

## 6V-7830 Tetragauge

Warranty: Six Months



- Functions as a general purpose pressure measuring device
- Capable of measuring hydraulic or air pressure from -100 to 40 000 kPa (-14.5 to +5800 psi)
- 2 lower pressure gauges are protected from over-pressurization by 2 sensor valves which shift and prevent pressure from increasing past a pre-set value which is less than the full-scale range of the gauges; the highest pressure gauge is not protected by a shutoff valve
- Background of the kPa scale is highlighted in yellow to indicate metric units
- Repair Kit: 8T-5324 Repair Kit

Item	Part Number	Description
1	1U-5757	Hose Assembly
2	8T-0862	Gauge, -100 to 500 kPa (-14.5 to 72.5 psi)
3	8T-0860	Gauge, 0 to 40,000 kPa (0 to 5,800 psi)

Item	Part Number	Description
4	8T-0855	Gauge - Pressure
5	6V-4144	Coupler Assembly (For 42000 kPa)
6	4S-6399	Connector
--	6V-7830	Tetragauge

## 4C-5623 Smoke Candle

SMCS Code: 7301-034, 7325-034

Model: All Models

Warranty: Six Months

- Easy, inexpensive way to find air leaks in vehicle cabs by pressurizing cab and watching for leaks identified by escaping white smoke
- Does not leave residue
- Contains no explosive materials
- Blends readily with air; stays in suspension for 10-15 minutes
- Smoke is generated as a mist that contains a large amount of atmospheric moisture as opposed to solids being generated as a by-product of burning. These smoke candles have a rating of 2100 total obscuring power (TOP), compared to 200 TOP for crude oil. TOP is the scientific method of determining the quantity of smoke generated by a given unit of smoke composition.

### Ordering Information

US and Canadian dealers — This product is a direct shipped item from our supplier to anywhere in the US and Canada. Order this part number on the DTS (Dealer Terminal System) as a class 3A order. (There is no emergency charge for this product.)

Do not order this product on a stock order. The system will not accept it. This direct shipped product is not stocked in Caterpillar® Parts Departments. The stock check procedure always shows “no stock” and therefore will reject the order.

All dealers outside the US and Canada — Order as a class 3A order with your subsidiary parts department. (There is no emergency charge for this product.) After placement of your order you should notify your subsidiary parts department that this is a direct shipped item from the US. (Do not order this product on a stock order. The system will not accept it.) Your order will be direct shipped from the supplier through a freight forwarder in the US to your subsidiary parts department.

(Continued)

**4C-5623 Smoke Candle (Continued)**

SMCS Code: 7301-034, 7325-034

Model: All Models

Warranty: Six Months

**Reference**

Material Safety Data Sheets (MSDS) for all chemical products are required by law. All of Caterpillar Material Safety Data Sheets are on file at the Rocky Mountain Poison Center in Denver, Colorado. In addition, Caterpillar now has a dedicated "Safety Hotline" to the Center. This toll free number (1-800-458-5924) is staffed by trauma specialists 24 hours per day all year round and is available to US and Canadian dealers.

Smoke duration	30 seconds
Smoke color	White to gray depending upon density and lighting
Volume generated	113.3 m <sup>3</sup> (4000 cu ft)
Quantity	12 candles per box



Part Number	Description
4C-5623	Smoke Candle

**9X-3075 Cable Assembly**

SMCS Code: 0781

Model: Off-Highway Trucks

Warranty: One Year

- Used to download information from TPMS (Truck Payload Measurement System) to a users laptop computer
- Setup functions, diagnostics, and productivity reports are available using TPMS, this cable, and TPM software package (available separately)
- Truck cab connector: 5 pin MS
- Computer connector: 9 pin serial port



Part Number	Description
9X-3075	Cable Assembly

Diagnostic Tools

## 127-9797 Cable, TPMS, VIMS, WLP to PC

SMCS Code: 7494-038, 0779  
 Model: All Off-Highway Trucks  
 Warranty: One Year

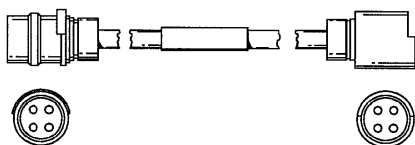


- Replaces discontinued 9X-3393 Cable Group
- Used to download data from off-highway trucks
- Used with Truck Payload Measurement System (TPMS) software package and IBM compatible personal computer
- Cable connects to 5-pin circular connector on TPMS and 9-pin "D" connector on computer
- New cable allows data to be downloaded from ground level (eliminates need to turn keyswitch inside cab)

Part Number	Description
127-9797	Cable, TPMS, VIMS, WLP to PC
Service/Repair Parts	
8C-6313	Connector
8C-4797	Socket

## 9U-6386 Extension Cable

SMCS Code: 5050-082, 5050-036  
 Model: 320, 330, and 325 Hydraulic Excavators  
 Warranty: One Year



- Used to extend reach of 7Y-5500 Control Group into cab — allows technician to adjust hydraulic system from inside cab
- Efficient and cost effective way to diagnose hydraulic system problems
- Length: 6 m (20 ft)

Part Number	Description
9U-6386	Extension Cable
Service/Repair Parts	
7N-8204	Socket Housing
7N-8205	Plug Housing
7N-7779	Socket Connector
7N-7780	Pin Connector

## 218-3363 Breakout T-Adapter

Model: Lexion Combine  
 Warranty: One Year



- Used to check voltage at solenoid while it is in use (verifies if solenoid is not working or there is no power to solenoid)
- Fits all standard DIN 43650 type connectors
- Connects between machine harness and solenoid

Part Number	Description
218-3363	Breakout T-Adapter



**209-1969 Training Harness**

SMCS Code: 0115

Model: C-15 Engines

Warranty: One Year

- Used to connect between C-15 Electronic Training Aid and 70 pin ECM connector
- Simulates 6-cylinder industrial engine

Part Number	Description
209-1969	Training Harness



**Harnesses**

SMCS Code: 0315

Model: 3500B EPG and Marine Engines

Warranty: One Year

- Used to connect engines' ECM to front panel connectors on Electronic Control System Simulator (wire colors and wire codes match production machines)
- Engine wire harness colors are identical to the training aid wire harness colors
- Used with 114-0905 Electronic Engine Training Aid
- 189-2231 Harness used for 3500B EPG Engine applications
- 203-0202 Harness used for 3500B Marine Engine applications



Part Number	Description
189-2231	Harness
203-0202	Harness

**Vibration Analyzer Replacement Batteries**

SMCS Code: 0781, 0783

Model: All Models

Warranty: Manufacturer's One Year

**Reference**

NEHS0568, Tool Operating Manual

Part No.	Description	Voltage	Dimensions	Use
169-0712	Battery Pack	7.2 volts, 3.0 AH	26 x 153 x 51 mm (1.0 x 6.0 x 2.0 in)	Used to replace battery in 2117 Vibration Analyzer
206-2689	Battery Pack	±12 volts, 1200 mAh	35 x 172 x 51 mm (1.4 x 6.8 x 2.0 in)	Used to replace battery in 2115 SX and 2115 SU Vibration Analyzer

## 4C-9021 Torsional Vibration Measuring Group Discontinued — Service/Repair Parts Available



- Discontinued but with some service/repair parts still available

### References

NEHS0558, Special Instruction,  
4C-9024 Battery Group

Item	Description
11	NEHS0562 Tool Operating Manual
	NEEG2471 Decal
	NEEG2503 Decal

Item	Part Number	Description
1	8D-8113	Fuse
1	4C-9024	Battery Pack Group (12 V)
2	4C-9023	Volts Adapter
3	4C-6918	Photo Head Pickup NEEG2455 Decal (not shown)
4	4C-6917	Photo Head Adapter Assembly
4	8D-6894	Washer
4	4C-6916	Magnetic Base Group
4	2S-6251	Machine Screw
5	4C-6919	Retro-Reflective Tape, 25 mm (1 in) x 2.5 m (100 in) long
6	6V-2198	Extension Cable (X8)
7	4C-6921	Adapter Cable Assembly (photo head to analyzer)
8	4C-9028	Adapter Cable Assembly (sure seal-BNC)
9	5N-9292	Magnetic Pickup
10	4C-3036	Cable Assembly (10 ft BNC-BNC)
--	4C-9021	Torsional Vibration Measuring Group
<b>Not shown</b>		
--	4C-9658 <sup>1</sup>	Case - Protective
--	7T-0037	Fuse

<sup>1</sup> Fold-down handle

## Accessories for 4C-3030 Vibration Analyzer Group

SMCS Code: 0781, 0783

Model: All Models

Warranty: One Year

### 4C-3032 Accelerometer

- Useful for higher frequency measurements where acceleration units are needed
- Response is flat between 6 and 6000 Hz ( $\pm 5\%$ , 3-10000 Hz).

Model	Wilcoxon Research Model 762S
Weight	80 g (0.18 lb)
Dimensions	43.2 x 21.6 mm (1.7 x 0.85 in) diameter)
Sensitivity	10 mV/G
Frequency response	$\pm 5\%$ 3.0-10000 Hz, $\pm 10\%$ 2.0-12000 Hz, $\pm 3$ dB 1.0-15000 Hz
Temperature range	-50° to 120° C
Attachment	1/4-28 thd

(Continued)

**Accessories for 4C-3030 Vibration Analyzer Group (Continued)**

SMCS Code: 0781, 0783

Model: All Models

Warranty: One Year

Part Number	Description
4C-3030	Vibration Analyzer Group
4C-3032	Accelerometer

**163-0097 Spare Battery**

SMCS Code: 0785

Warranty: Six Months

- For discontinued 163-0096 Process Calibrator

Part Number	Description
163-0097	Battery

**Fluid Sampling Valves and Quick Connect Couplers**

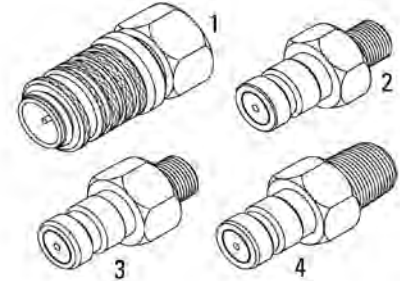
SMCS Code: 5050-036

Warranty: One Year

- Used to quickly take oil test samples (S-O-S) or make diagnostic connections
- Used with 169-8373 Bottle Group (oil sampling)
- Easy connection between coupler and sampling valve for continuous oil flow
- Designed specifically for use with portable particle analyzer
- Specific groups designed to work together without leaks or damage to sampling valves or coupler

**Single-Purpose Sampling Valves and Coupler**

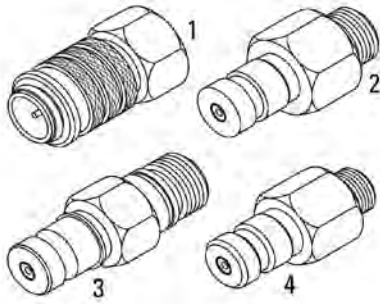
- Low-pressure, single-purpose sampling valves and coupler used to sample fluid only
- Do not use with 183-7264, 183-8652, and 229-5465 Sampling Valves or 210-5530 Quick Coupler
- Quick coupler has black oxide sleeve for easy identification



Diagnostic Tools

Item	Part Number	Thread Description	Operating Size	Burst Pressure	Max. Pressure	Seal Temperature	Seal Material
<b>Low-Pressure, Single-Purpose Quick Coupler and Sampling Valves</b>							
1	243-3133	Quick Coupler	3/4 - 18 NPTF	3500 kPa (500 psi)	14,000 kPa (2,000 psi)	107° C ( 225° F)	BunA-N
2	8C-3345	Sampling Valve	M10 x 1	3500 kPa (500 psi)	14,000 kPa (2,000 psi)	121° C ( 250° F)	Viton
3	8C-3446	Sampling Valve	7/16 - 20	3500 kPa (500 psi)	14,000 kPa (2,000 psi)	121° C ( 250° F)	Viton
4	7X-3387	Sampling Valve	1/4 - 18 NPTF	3500 kPa (500 psi)	14,000 kPa (2,000 psi)	121° C ( 250° F)	Viton

## Dual-Purpose Sampling Valves and Coupler



- High-pressure, dual-purpose valves and coupler used to sample fluid and for diagnostic purposes
- Do not use with 8C-3345, 8C-3446, and 7X-3387 Sampling Valves or 243-3133 Quick Coupler
- Dual-purpose sampling valves are flow rated at 3 L (0.79 gal) a minute in diagnostic applications

### NOTICE

Using discontinued 170-8505 Quick Coupler will cause damage to 183-7264, 183-8652, and 229-5465 Sampling Valves.

Item	Part Number	Description	Thread Size	Operating Pressure	Max. Pressure	Seal Temperature	Seal Material
<b>High-Pressure, Dual-Purpose Quick Coupler and Sampling Valves</b>							
1	210-5530	Quick Coupler	1/4 - 18 NPTF	41,350 kPa (6,000 psi)	--	104° C ( 220° F)	BunA-N
2	183-7264	Sampling Valve	9/16 - 18-2A	41,350 kPa (6,000 psi)	10,300 kPa (1,500 psi)	--	Viton
3	183-8652	Sampling Valve	9/16 - 18	41,350 kPa (6,000 psi)	10,300 kPa (1,500 psi)	--	Viton
4	229-5465	Sampling Valve	7/16 - 20	41,350 kPa (6,000 psi)	10,300 kPa (1,500 psi)	--	Viton

## 170-8500 S40 Particle Analyzer Group

SMCS Code: 0784, 5050-082

Warranty: Manufacturer's One Year



European Union compliant, CE marked

- Used to analyze particle contamination on pressurized and non-pressurized hydraulic systems
- Portable self-contained system uses red laser sensor technology to count and size particles in fluids (same sensor technology as particle analyzers used in S-O-S lab and other Caterpillar® factory applications)
- Performs fluid analysis in 90 seconds
- Internal battery pack capable of performing 60 tests per charge
- Self-contained digital display and printer shows test results
- Equipped with keypad and graphical, back-lit LCD (Liquid Crystal Display) with resistive touch screen

### Repair Information

The unit is warranted by the manufacturer for 1 year from date of receipt. If the unit needs servicing, contact one of the following manufacturer's repair facilities:

#### C & J International Inc.

6721 E. 106th Street  
Tulsa, OK 74133, USA  
Tel: 0 01 91 82 99 40 19  
Fax: 0 01 91 82 99 74 10

#### Sintech Scientific (SEA) Pet Ltd.

No. 196 Pandan Loop # 02-18  
Pantech Industrial Complex  
Singapore 128384  
Tel: 0 06 57 79 00 07  
Fax: 0 06 58 72 23 92

(Continued)

**170-8500 S40 Particle Analyzer Group (Continued)**

SMCS Code: 0784, 5050-082

Warranty: Manufacturer's One Year

**PAMAS GmbH**

Dieselstrabe 10

D-71277 Rutesheim

Postfach 162

Germany

Tel: + 49 7152 9 96 30

Fax: + 49 7152 5 48 62

**Reference**

NEHS0799, Tool Operating Manual

Operating voltages	
Internal battery	100 - 240 VAC 50/60 Hz
External battery	12 - 24 VDC
Weight	9 kg (20 lb)
Measurements	300 x 140 x 300 mm (11.8 x 5.5 x 11.8 in)
Ambient temperature	5° to 40° C (40° to 104° F)
Relative humidity	Maximum 70%
Size range	4 - 30 mm (certified ISO-11171)
Maximum viscosity	300 cSt

Part Number	Description
170-8500	S40 Particle Analyzer Group
<b>Service/Repair Parts</b>	
184-7679	Paper - Roll
131-5047	Cable - Power, 110 VAC (USA Plug)
6V-4144	Coupler Assembly (For 42000 kPa)

Part Number	Description
<b>Service/Repair Parts (Continued)</b>	
9U-6794	Adapter
170-8506	Hose Assembly
188-0639	Hose Assembly - Low-Pressure

**383-4255 Contamination Monitor**

Model Usage: All

Warranty: Manufacturer's

European Union compliant, CE marked

- Portable service unit for the temporary measurement of particulate contamination, water saturation and fluid temperature in hydraulic systems
- Integrated pump for measurement in pressureless reservoirs
- Operation with 24 VDC adaptor included
- Replaces 293-8413 Contamination Monitor



(Continued)

## 383-4255 Contamination Monitor (Continued)

Model Usage: All

Warranty: Manufacturer's

Specifications	
Display	LED, 6/4/4 digits in 17 segment format
Measuring Range	Saturation level 0 to 100% Temperature -25° to 100° C (-13° to +212° F)
Accuracy	+/- 1/2 ISO class in the calibrated range / ≤ ± 2% full scale maximum
Ambient Temperature Range	0 to 45° C (32 to 113° F)
Storage Temperature Range	-40 to 80° C (-40 to 176° F)
IP Class	IP50 in operation IP67 closed
Weight	13 kg (29 lb)
Pressure Maximum	345 bar/5000 psi
Fluid Temperature Range	0 to 70° C (32 to 158° F)
Power Supply Voltage	24 V DC ± 20%, residual ripple < 10%
Maximum Power Current Consumption	100 Watt / 4A
Interface	Plug connection, 5-pole, male (M12 x 1)

Part Number	Description
383-4255	Contamination Monitor

## 293-8413 HYDAC Contamination Monitor Group

### Essential Tool

SMCS Code: 0784, 5050-82

Warranty: One Year



European Union compliant, CE marked

- Used to monitor hydraulic and lubrication oil cleanliness
- Analyzes particle contamination on pressurized and non-pressurized systems
- Direct connection to low or medium pressure line of hydraulic system or machine for continuous monitoring
- Integrated pump used to take samples on non-pressurized reservoirs
- Particulate contamination detection by optical measurement cell
- Single INLET and OUTLET connections
- OUTLET requires use of non-pressurized reservoir (not supplied)
- Easy-to-see LED displays ISO, SAE, FLOW, DRIVE, and TEMP readings
- Durable sealed keypad operation
- Automatic measurement and display of cleanliness ratings as ISO Code (4406:1999) or SAE Code AS4059 (D)
- Includes power cable, low and high pressure inlet hoses, outlet hose, battery clips adapter for 24 VDC, and integrated case

### Repair Information

This unit is warranted by the manufacturer for one year from date of receipt. If the unit needs servicing, contact the manufacturer's repair facility.

### Germany

HYDC Servicecenter  
Rehgrabenstrasse, Werk 7  
661225 Saarbrücken  
Germany  
Tel: +49 (0) 6897 509 01

(Continued)

**293-8413 HYDAC Contamination Monitor Group (Continued)**

**Essential Tool**

SMCS Code: 0784, 5050-82

Warranty: One Year

**USA**

HYDAC Technology Corporation

Service Department

2280 City Line Road

Bethlehem, PA 18017

Phone: (610) 266-0100

**Reference**

NEHS0978, Tool Operating Manual, 293-8413 HYDAC Contamination Monitor

Operating voltage	24 VDC ± 20%, ripple £ 10%
Weight	Approximately 9 kg (20 lb)
Dimensions (with case)	340 x 220 x 300 mm (13.4 x 8.7 x 11.8 in)
Ambient temperature range	0° to 45° C (32° to 113° F)
Relative humidity	Maximum 90%
Oil temperature range	0° to 70° C (32° to 158° F)
Cleanliness class	> 4µm(c) > 6µm(c) > 14µm(c) > 21µm(c)
Viscosity range	10 - 350 mm <sup>2</sup> /s (46 - 1622 Sus)
Inlet pressure range	0 - 45 bar (0 - 650 psi)
Pump flow rate	30 - 300 ml/min (1.0 - 10.1 oz/min)

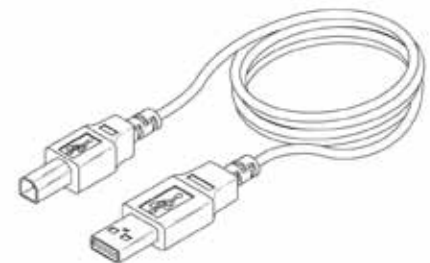
Part Number	Description
293-8413	HYDAC Contamination Monitor Group
<b>Service/Repair Parts</b>	
293-8414	Power Cable (291-1321 Fuse, 8 amp)
293-8415	Low Pressure Inlet Hose, 0.3 m (11.81 in)
293-8416	High Pressure Inlet Hose for Test Point 1620, 2 m (78.74 in)
293-8417	Outlet/Return Hose, 1 m (39.37 in)
293-8418	Battery Clips Adapter for connecting to 24 VDC
<b>Not Shown</b>	
289-2920	AC/DC Power Supply Adapter
289-2921	DC/DC Power Supply Adapter, 12 to 24 VDC

**285-3850 USB A/B Cable**

Warranty: One Year

- Used to connect USB devices to a personal computer
- Nominal length: 1.8 m (70 in)
- USB 2.0 compliant cable

Part Number	Description
285-3850	USB A/B Cable



## 243-3130 Contamination Monitor Group Discontinued — Service/Repair Parts Available



### Repair Information

The unit is warranted by the manufacturer for 1 year from date of receipt. If the unit needs servicing, contact the manufacturer's repair facility:

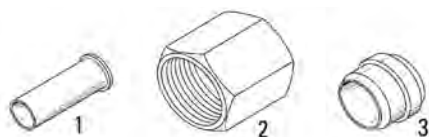
PAMAS-USA  
6721 E. 106th Street  
Tulsa, OK 74133, USA  
Phone: 918-299-4019  
Fax: 918-299-7410

Part Number	Description
243-3130	Contamination Monitor Group
Service/Repair Parts	
243-3131	Battery Supply Power Cable with Alligator Clips
243-3132	AC Adapter Power Supply
243-3144	RS232 Communications Cable
188-0639	Hose Assembly - Low-Pressure

### Fitting Groups

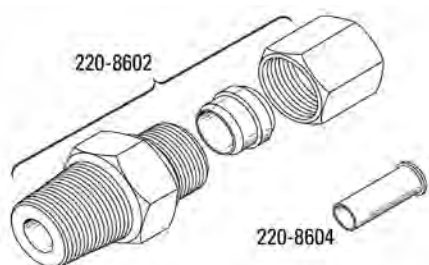
SMCS Code: 0783, 0784

Warranty: One Year



Item	Part Number	Description	Qty.
—	220-8608	Fitting Group	—
—	220-8607	Fitting Group	—
Service Kits (Sold Separately)			
1	220-8609	Tube Insert Kit	10
2	220-8610	Tube Nut Kit	10
3	220-8611	Tube Ring Kit	10

### 220-8607 Fitting Group



- Used to connect a particle analyzer to a low pressure source, quick disconnect fitting, or 210-5530 S-O-S quick disconnect fitting
- Used with 6 mm plastic tubing
- 1/4 inch NPT threaded end
- Comes with 220-8604 Brass Tube Insert for plastic tubing

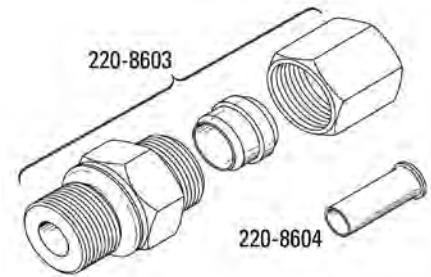
220-8607 Fitting Group	
Part Number <sup>1</sup>	Description
220-8602	Tube Fitting
220-8604	Brass Tube Fitting

<sup>1</sup> Not Serviced



**220-8608 Fitting Group**

- Replaces high pressure input/low pressure output fittings on 170-8500 Particle Analyzer with low pressure fittings
- Used with 6 mm plastic tubing
- Used for pressures between 0 and 689 kPa (0 and 100 psi)
- Eliminates flow restriction for SAE50 and SAE60 high viscosity fluids during low pressure sampling
- Connects low pressure tubing to 170-8500 Particle Analyzer for direct fluid flow into a catch can or bottle
- 1/4 inch BSPP threaded end
- Comes with 220-8604 Brass Tube Insert for plastic tubing



220-8608 Fitting Group	
Part Number <sup>1</sup>	Description
220-8603	Tube Fitting
220-8604	Brass Tube Fitting

<sup>1</sup> Not Serviced

**202-2301 Portable Contamination Instructional Kit**

Warranty: Six Months

- Used to estimate amount and type of solid contamination in hydraulic fluid or lubrication oil (cannot determine exact particle counts)
- Conduct on-the-spot visual field evaluations of system fluid contamination
- Can be used by trained technicians to compare actual patches (25 ml fluid volume) to examples shown in NEHS0729 to generally classify amount and type of contamination in a fluid sample

**Reference**

NEHS0729, Portable Contamination Instructional Kit (The examples shown in this brochure are typical of the type of contamination found using the portable contamination instructional kit. The examples are shown for reference only. Instructions on obtaining, preparing and viewing samples are also provided in this brochure.)



Item	Description
2	500 ml (16 oz) LDPE Wash Bottle with 28 mm (1.10 in) Cap
9	Grease Pencil
10	Spray Stem for Bottle
12	Microscope
13	Penlight (Included with microscope)

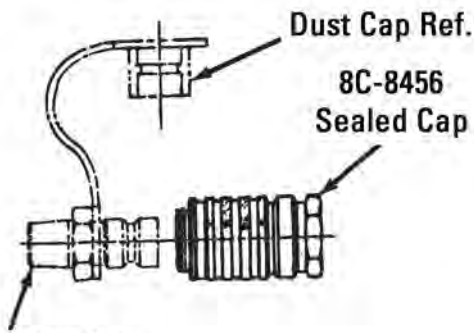
Item	Part Number	Description
1	202-2267	Dish Kit
3	6V-9449	Carrying Case <sup>1</sup>
4	202-2266	Funnel
5	1U-5718	Vacuum Pump
6	4C-6605	Tweezers
7	231-9405	Patch Group

Item	Part Number	Description
8	169-7372	Bottle As (4)
11	1U-9533	AA Batteries for Light (2)
--	202-2301	Portable Contamination Instructional Kit
<b>Not Shown</b>		
--	1U-5719	Seal Kit for 1U-5718 Vacuum Pump

<sup>1</sup> Replacement case without foam

## 8C-8456 Sealed Cap

Warranty: Six Months



- Used to seal the valved and non-valved nipples listed below (nipples are used on machines, tool groups, and dealer shop equipment.)
- Heavy-duty, pressure-tight cap that provides both positive sealing and added protection for the nipples

Operating pressure	42,000 kPa (6,100 psi)
Minimum burst pressure	168,000 kPa (24,000 psi)
Operating temperature	-34° to 107° C (-29° to 225° F)
Seal material	High Temp. (BunA-N®)

Mating Valve Ref.

Part No.	Description	Color
8C-8456	Sealed Cap	—
<b>Adaptable to these Pressure Diagnostic Quick Disconnect Nipples</b>		
6V-3965	Nipple - STR 9/16 in - 18 thd SAE external (for #6 Port) BunA-N® Seal	Zinc chromate
6V-3966	Nipple As 1/4 in-NPTF external thd BunA-N® Seal	Zinc chromate
6V-3989	Nipple - unvalved 1/4 in-NPTF internal thd non-valved	Zinc chromate
6V-4142	Nipple - unvalved 1/4 in-NPTF internal thd non-valved	Zinc chromate

Part No.	Description	Color
<b>Adaptable to these Pressure Diagnostic Quick Disconnect Nipples (Continued)</b>		
6V-4433	Nipple As - valved 9/16 in-18 thd external (for #6 Port) Viton Seal	Green chromate
6V-7691	Nipple As - valved 1/4 in-NPTF external thd Ethylene Propylene Seal	Red chromate
8T-3613	Nipple As - valved 1/8 in-NPTF external thd BunA-N® Seal	Zinc chromate
8T-3614	Nipple As - valved 1/8 in - NPTF external thd. Ethylene Propylene Seal	Red chromate

Diagnostic Tools

## Fluid Sampling Supplies

We offer a complete assortment of fluid extraction tools to service pressurized vehicle compartments such as engine, transmission, and hydraulic systems, as well as non-pressurized vehicle compartments such as final drives, differential, transfer case, and axle housings. Get extra protection and maximum performance by using Cat® fluids, filters, and regular oil analysis through scheduled oil sampling (S-O-S).

### Fluid Sampling Extraction Tools for Pressurized Compartments

Warranty: Six Months

- Valve locations provide oil sample confidence and continuity — comparative data of pressurized oil samples is more reliable because the sample is taken from a continuous flow of oil at a known location
- Probe is provided that allows the valve to be quickly flushed prior to taking the oil sample
- Sample bottle group is packaged, and sealed in a plastic bag to insure cleanliness
- Pressurized oil sampling is a fast, economical and clean method of obtaining oil samples from pressurized system.
- Better represents oil condition because the oil is continually mixed and circulated
- 10 to 20 times faster than sampling oil from non-pressurized systems
- Mailing container is available so the oil sample can be conveniently mailed to the testing laboratory

#### 169-8373 Bottle Group (Package Qty. — 300)

This bottle group is sealed in a plastic bag with sampling instructions included. The bottle group is ready to use when it is removed from the bag after the valve has been purged and the sample is ready to be taken. The bottle included in this group (169-7372) has the capacity to provide a 114 g (4 oz) sample. The 169-7372 can also be ordered by itself, 200 per case.

(Continued)

**Fluid Sampling Extraction Tools for Pressurized Compartments (Continued)**

Warranty: Six Months

After the sample is obtained, the probe and tube are removed from the bottle cap and holder, and discarded, and the cap-cover seals the bottle. Labels for identifying the sample (obtained locally) can then be attached to the bottle for identification purposes. The 4C-4600 mail tube is available to send the oil sample to the laboratory. The laboratory also provides the mailing label.

**177-9343 Probe and Cap Group (Package Qty. — 500)**

The probe and cap group provides the same probe and cap that are used in the 169-8373 Bottle Group, however, without the bottle. This group is also sealed in a plastic bag with sampling instructions included. This group allows the dealer the flexibility to use other bottles such as the smaller 71 g (2 1/2 oz) 169-7373 bottle assembly (which must be ordered separately). (The cap requires that the bottles have a 38 M thread.)

**169-7373 Bottle Assembly (Package Qty. — 200)**

This smaller bottle assembly (169-7373) can be used with the 177-9343 Probe and Cap Group and reduces mailing expense by approximately one-half for dealers whose oil sample labs can provide effective full service analysis with 71 g (2 1/2 oz) or less of oil. These bottles can be used for engine samples since particle count is not used for engine samples. This bottle can also be used with the 1U-5718 Vacuum Pump used for non-pressurized oil sampling.

**8T-9208 Probe Assembly (Package Qty. — 1)**

The 8T-9208 Probe Assembly can be attached to a 6.35 mm (1/4 in) ID rubber hose (6K-0713 Hose — 228.6 mm (9 in) long or any desired length cut from bulk 5P-6442 Hose or equivalent 100R6 type high temperature — low pressure hose). The 8T-9208 Probe and hose connected to a locally obtained waste container provide a method to purge or flush the 8C-3446, 8C-3345, or 7X-3387 sample valves prior to obtaining the desired oil sample using either the 169-8373 Bottle Group or 177-9343 Probe and Cap Group with the desired bottle. Approximately 14.8 cm<sup>3</sup> to 29.6 cm<sup>3</sup> (1/2 to 1 ounce) of expelled fluid purges the valves.

Pressurized systems on many Cat® products are factory equipped with sampling valves to quickly extract oil samples with the above tools. Special

Instruction SEHS9043 details retrofitting some earlier models with oil sampling valves, as well as pointing out the respective valve locations on models currently factory equipped with the oil sample valves



Item	Part Number	Description
1	169-8373	Bottle Group, 300 per box
2	162-8873	Probe, Holder
3	177-9343	Probe and Cap Group, 500 per box
4	4C-4600	Mailer Container — reusable Tube — 30.5 m (100 ft) rolls

(Continued)

# General Diagnostic Tools

## Fluid Sampling Extraction Tools for Pressurized Compartments (Continued)

Warranty: Six Months

Item	Part Number	Description
5	1U-8757	6.35 mm OD x 30.5 m rolls (1/4 in OD x 100 ft) 5 rolls per box
6	4C-4056	7.9 mm OD x 30.5 m rolls (5/16 in OD x 100 ft) 5 rolls per box, not pictured
7	169-7373	Clear Bottle, 71 g (2.5 oz), 200 per box
8	169-7372	Clear Bottle, 114 g (4 oz), 200 per box
9	1U-5718	Vacuum Pump
9	1U-5719	Seal Kit for 1U-5718 Pump (not pictured)
10	8T-9208	Purging Probe <sup>1</sup>
11	1U-7648	Tube Cutter
11	1U-8589	Replacement Blades (not pictured)
12	8C-8456	Sealed Cap
13	8C-3446	Oil Sampling Valve (7/16 in-20 — ext. thd)
13	3J-7354	Seal - O-ring - STOR for 8C-3446 (not pictured)
14	7X-3387	S-O-S Sampling Valve
15	8C-3345	Oil Sampling Valve (M10 x 1 — ext thd)
15	8T-7876	O-ring Seal for 8C-3345 (not pictured)
16	8C-3445	Dust Cap (Engine)
16	8C-3447	Dust Cap (Transmission) (not pictured)
16	8C-3451	Dust Cap (not pictured)
16	6V-0852	Dust Cap (Blank) (not pictured)
<b>Not Shown - Tube, 2.1 m (7 ft) pieces</b>		
--	4C-4057	7.9 mm OD x 2.1 m (5/16 in OD x 7 ft), 240 pieces per box
--	4C-4055	6.35 mm OD x 2.1 m (1/4 in OD x 7 ft), 250 pieces per box

<sup>1</sup>Warranty: Manufacturer's, 30-Day

## Fluid Sampling Valves, Fittings and Adapters

The following valves, fittings and adapters are required or are commonly used for retrofitting the sampling valves to pressurized systems:

Part Number <sup>1</sup>	Description
<b>Oil Sampling Valves and O-ring Seals (Sold Separately)</b>	
8C-3446	Oil Sampling Valve (7/16 in-20 — ext. thd)
3J-7354	O-ring Seal for 8C-3446
8C-3345	Oil Sampling Valve (Mid X1 ext. thd)
8T-7876	O-ring Seal Form 8C-3345
7X-3387	Oil Sampling Valve (1/4 in-18 NPTF ext. thd)
<b>Protective Dust Caps for Oil Sampling Valves (These are rubber caps with embossed symbols to indicate system being sampled.)</b>	
8C-3445	Dust Cap (Engine)
8C-3447	Dust Cap (Transmission)
8C-3451	Dust Cap (Hydraulic)
6V-0852	Dust Cap (Blank)
8C-8456	Sealed Cap
<b>Miscellaneous fittings and adapters commonly used for oil sampling valve retrofit installations (Sold Separately)<sup>1</sup></b>	
3B-7722	Bushing-Pipe-Reducing 3/8 in-18 NPTF to 1/4 in-18 NPTF
8C-6427	Adapter, 1/4 in-18 NPTF external to 7/16 in-20 SAE internal
6V-7529	Adapter, 1/8 in-27 NPTF external to 7/16 in-20 SAE internal

(Continued)

**Fluid Sampling Valves, Fittings and Adapters (Continued)**

Part Number <sup>1</sup>	Description
<b>Miscellaneous fittings and adapters commonly used for oil sampling valve retrofit installations (Sold Separately) (Continued)<sup>1</sup></b>	
7J-8611	Elbow-90°-Pipe 1/4 in-18 NPTF
5P-9617	Adapter Reducer, 9/16 in-18 SAE external to 7/16 in-20 SAE internal
3J-1907	O-ring Seal for 5P-9617 Adapter
3J-5390	Plug - NPTF (Ext Hex) 3/8 in-18 NPTF external to 1/8 in-27 NPTF internal
9T-6865	Adapter Plug, 5/8 in-12 SAE external to 7/16 in-20 SAE internal
2S-4078	O-ring Seal for 9T-6865 Adapter Plug
5P-3501	Adapter, 9/16 in-18 SAE external to 1/4 in-18 NPTF internal
3L-6521	Adapter Tee, 1/4 in-18 NPT (2 internal and 1 external)
6V-3966	Pressure Test Valve, 1/4 in-18 NPTF external
7M-8489	Adapter Assembly, 90° elbow 9/16 in-18 SAE external to 1/4 in-18 internal
5P-3413	Pipe Sealant, 47.25 g (1 2/3 oz) tube

<sup>1</sup>All part numbers in the table have a six month warranty

**8C-8456 Sealed Cap**

The 8C-8456 Sealed Cap can be applied to the valves with the valve dust cap retention ring left in place. This cap enables the user to quickly seal a leaking valve and prevents the need to immediately deadline (or stop) the machine or compartment. The leaking valve can then be repaired (flushed) or replaced during the scheduled maintenance period.

Some retrofit applications of the various valves may require the 8C-8456 Sealed Cap to provide maximum protection for both sealing and environmental contamination, such a brake and hydraulic system exposed to severe elements. This cap serves ONLY as a temporary solution to a leaking sampling valve.

**Fluid Sampling Extraction Tools for Non-Pressurized Compartments**

Warranty: Six Months

Fluid sampling extraction tools are used to obtain fluid samples from non-pressurized vehicle compartments such as final drives, differential compartments, transfer cases, axle housings, etc.

The 1U-5718 Vacuum Pump is capable of pulling 7.62 mm (25 in) Mercury (vacuum). The pump is compact and accepts the 169-7372, 114 g (4 oz), and 169-7373 Bottle Assembly, 71 g (2.5 oz), bottles, or any 38 M threaded plastic bottle, and 6.35 mm (1/4 in) OD and/or 7.9 mm (5/16 in) OD plastic tube.

The 1U-5719 Kit provides replacement seals for the vacuum pump.

The 169-7372 Bottle has 114 g (4 oz) capacity. The bottle is marked showing fluid fill range at 3/4 capacity. The fill range provides a reminder to not overfill the bottle. Partially filling the bottle satisfies both mailing and lab requirements. Full bottles expand because of temperature changes that can possibly rupture within the mailing container. The partially filled bottle also allows the lab to shake the fluid sample prior to extracting fluid for testing. Labels identifying the fluid are obtained locally. The label is processed locally and attached to the sample bottle.

The 169-7373 Bottle is the same as the 169-7372 bottle except the capacity is 71 g (2.5 oz) rather than 114 g (4 oz). Both are clear high performance plastic rated at 91° C (195° F).

The 1U-8757 Tubing consists of five 30.5 m (100 ft) rolls of 6.35 mm (1/4 inch) OD plastic tubing. Random lengths of tubing can be easily dispensed from the tubing package. The tubing connects the vacuum pump to the fluid in the compartment. The tubing is discarded after each sample is extracted.

(Continued)

## Fluid Sampling Extraction Tools for Non-Pressurized Compartments (Continued)

Warranty: Six Months

The 4C-4056 Tubing consists of five 30.5 m (100 ft) rolls of 7.9 mm (5/16 inch) OD plastic tubing. Again, random lengths of tubing can be easily dispensed from the tubing package. This tubing permits extraction of heavier oils when using the vacuum pump. Both tubing sizes are also available in pre-cut 2.1 m (7 ft) lengths that are packaged 250 pieces per box. This eliminates cutting the tube for each sample.

The 4C-4055 Tubing contains 250 pieces of 6.35 mm (1/4 in) OD tubing each 2.1 m (7 ft) long.

The 1U-7648 Tube cutter is a convenient tool that easily cuts the desirable length of either 6.35 mm (1/4 in) or 7.9 mm (5/16 in) plastic tubing. The cutter can cut the tubing at 90° or at a bias. The 1U-8589 blades are available as replacement blades for the cutter.

The following summarizes various sampling tools available through the Caterpillar® Parts Distribution System:

Part Number	Description
4C-4056	Tube, 7.9 mm (5/16 in) OD by 30.5 m (100 ft) length (5 rolls per box)
4C-4057	Tube, 7.9 mm (5/16 in) OD by 2.1 m (7 ft) length (250 per box)
4C-4055	Tube, 6.35 mm (1/4 in) OD by 2.1 m (7 ft) length (250 per box)
177-9343	Probe and Cap Group
8C-3345	Oil Sampling Valve
8C-3446	Oil Sampling Valve
8C-3445	Dust Cap (Engine)
8C-3447	Dust Cap (Transmission)
8C-3451	Dust Cap (Hydraulic)
8C-8456	Sealed Cap
3J-7354	O-ring Seal for 8C-3446 Valve

Part Number	Description
8T-7876	O-ring Seal for 8C-3345 Valve
169-8373	Bottle Group
8T-9208	Purging Probe, brass
1U-5718	Vacuum Pump
1U-5719	Seal Kit for 1U-5718 Vacuum Pump
169-7372	Bottle, 114 g (4 oz)
169-7373	Bottle, 71 g (2 1/2 oz)
4C-4600	Mail Tube
1U-7648	Tube Cutter
1U-8589	Replacement Blades
1U-8757	Tube, 6.35 mm (1/4 in) OD by 30.5 m (100 ft) length (5 rolls per box)
6V-0852	Dust Cap (Blank)
7X-3387	Oil Sampling Valve