



Hazard Definitions

These terms are used to bring attention to presence of hazards of various risk levels or to important information concerning product life.

CAUTION

Indicates presence of hazards that will or can cause minor personal injury or property damage if ignored.

NOTICE

Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury hazards.

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Battery Conditions

NOTICE

Until temperatures of electrical system components stabilize, these conditions may be observed during cold start voltage tests.

- **Maintenance/Low Maintenance Battery:**
 - Immediately after engine starts, system volts measure lower than regulator setpoint and system amps measure at a medium level.
 - 3-5 minutes into charge cycle, volts increase and amps decrease.
 - 5-10 minutes into charge cycle, volts reach regulator setpoint or very close, and amps decrease to a minimum.
 - Low maintenance battery has same characteristics with slightly longer recharge times.
- **Maintenance-free Battery:**
 - Immediately after engine starts, system volts measure lower than regulator setpoint with low charging amps.
 - Once the charge cycle begins, low volts and low amps are still present.
 - After the alternator energizes, voltage will increase several tenths. Amps will increase gradually, then quickly, to medium to high amps.
 - Finally, volts will increase to setpoint and amps will decrease.

The time it takes to reach optimum voltage and amperage will vary with engine speed, load, and ambient temperature.
- **High-cycle Maintenance-free Battery:**
 - These batteries respond better than standard maintenance-free. Charge acceptance of these batteries may display characteristics similar to maintenance batteries.

Charge Volt and Amp Values

Volt and amp levels fluctuate depending on the battery state of charge. If batteries are in a state of discharge—as after extended cranking time to start the engine—system volts will measure lower than the regulator setpoint after the engine is restarted and system amps will measure higher. This is a normal condition for the charging system; the greater the battery discharge level, the lower the system volts and the higher the system amps. The volt and amp readings will change as batteries recover and become fully charged: system volts will increase to regulator setpoint and system amps will decrease to low level (depending on other loads).

- **Low Amps:** Minimum or lowest charging system amp value required to maintain battery state of charge, obtained when testing the charging system with a fully charged battery and no other loads applied. This value will vary with battery type.
- **Medium Amps:** System amps value which can cause the battery temperature to rise above adequate charging temperature within 4-8 hours of charge time. To prevent battery damage, the charge amps should be reduced when battery temperature rises. Check battery manufacturer's recommendations for proper charge amp rates.
- **High Amps:** System amps value which can cause the battery temperature to rise above adequate charging temperature within 2-3 hours of charge time. To prevent battery damage, the charge amps should be reduced when battery temperature rises. Check battery manufacturer's recommendations for proper charge amp rates.
- **Battery Voltage:** Steady-state voltage value as measured with battery in open circuit with no battery load. This value relates to battery state of charge.
- **Charge Voltage:** Voltage value obtained when the charging system is operating. This value will be higher than battery voltage and must never exceed the regulator voltage setpoint.
- **B+ Voltage:** Voltage value obtained when measuring voltage at battery positive terminal or alternator B+ terminal.
- **Surface Charge:** Higher than normal battery voltage occurring when the battery is disconnected from battery charger. The surface charge must be removed to determine true battery voltage and state of charge.
- **Significant Magnetism:** Change in strength or intensity of a magnetic field present in alternator rotor shaft when the field coil is energized. The magnetic field strength when the field coil is energized should feel stronger than when the field is not energized.
- **Voltage Droop or Sag:** Normal condition occurring when the load demand on alternator is greater than rated alternator output at given rotor shaft RPM.



CEN C803D Alternator Description and Operation

C803D 28 V, 500 A alternator is internally rectified. All windings and current-transmitting components are non-moving, so there are no brushes or slip rings to wear out. Energize switch activates regulator. Field coil is then energized. Regulator maintains alternator output voltage at regulated setting as vehicle electrical loads are switched on and off. Alternator output current is self-limiting and will not exceed rated capacity of alternator.

Features of **A2-330** regulator furnished with some units include:

- P terminal that can provide optional AC voltage tap.
- D+ terminal that can provide DC voltage signal to vehicle electrical system, confirming alternator operation.
- Overvoltage cutout (OVCO) function.

C803D alternator is furnished with an open duct in the anti-drive end cover plate, which accommodates a 4" duct.

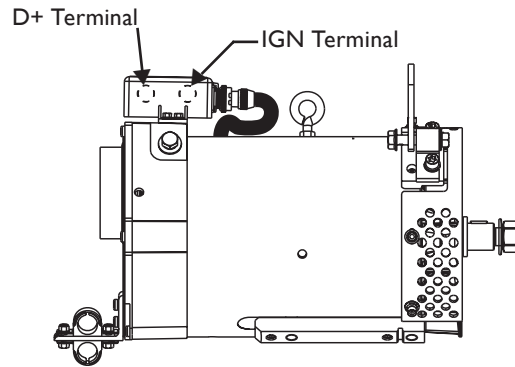
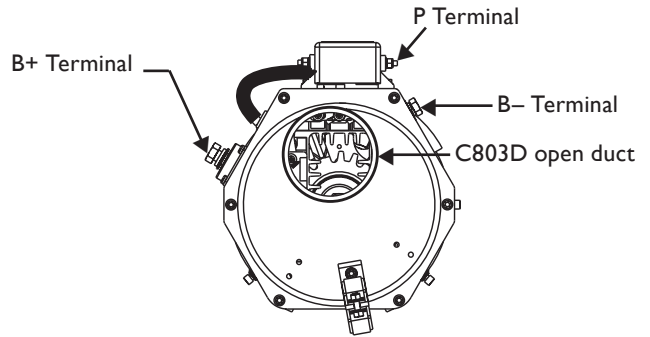


Figure 1 — C803D Alternator and A2-330 Regulator Terminals

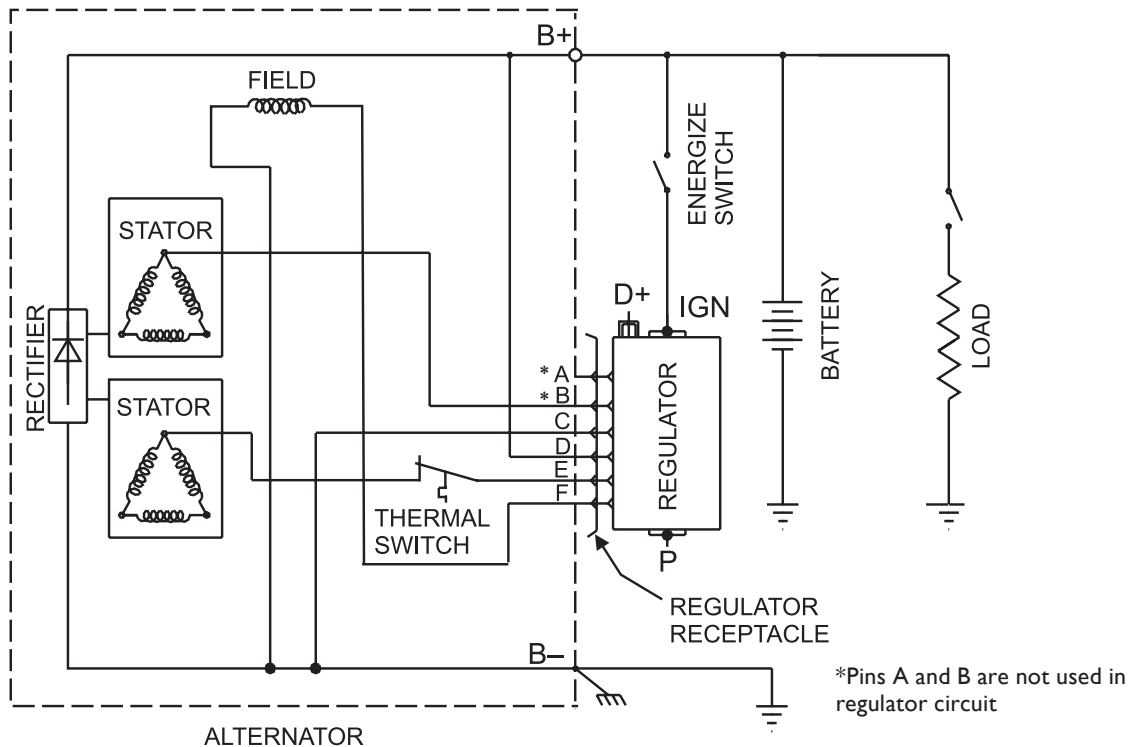


Figure 2 — C803D Alternator with A2-330 Regulator



Tools and Equipment for Job

- Digital Multimeter (DMM)
- Ammeter (digital, inductive)
- Jumper wire

Identification Record

List the following for proper troubleshooting:

- Alternator model number _____
- Regulator model number _____
- Setpoints listed on regulator _____

Preliminary Check-out

Check condition of items in Table 1 and correct if necessary.

| TABLE 1 – System Conditions | |
|--|---|
| SYMPTOM | ACTION |
| Low Voltage Output | Check: loose drive belt; low battery state of charge. Check: current load on system is greater than alternator can produce. Check: defective wiring or poor ground path; low regulator setpoint. Check: defective alternator and/or regulator. |
| High Voltage Output | Check: wrong regulator. Check: high regulator setpoint. Check: defective regulator. Check: alternator. |
| No Voltage Output | Check: broken drive belt. Check: battery voltage at alternator output terminal. Check: defective alternator and/or regulator. |
| No Air-Conditioning/ Alternator Warning Light On | Check: defective alternator or regulator. Go to Chart 1, page 5. |

Basic Troubleshooting

1. **Inspect charging system components for damage**
Check connections at B- cable, B+ cable, and regulator harness. Repair or replace any damaged component before electrical troubleshooting.
2. **Inspect vehicle battery connections**
Connections must be clean and tight.
3. **Determine battery voltage and state of charge**
If batteries are discharged, recharge or replace batteries as necessary. Electrical system cannot be properly tested unless batteries are charged 95% or higher.
4. **Connect meters to alternator**
Connect red lead of DMM to alternator B+ terminal and black lead to alternator B- terminal. Clamp inductive ammeter on B+ cable.
5. **Operate vehicle**
Observe charge voltage.

CAUTION

If charge voltage is above 33 volts, immediately shut down system. Electrical system damage may occur if charging system is allowed to operate at high voltage. Go to Table 1 at left.

- If voltage is at or below regulator setpoint, let charging system operate for several minutes to normalize operating temperature.
6. **Observe charge volts and amps**
Charge voltage should increase and charge amps should decrease. If charge voltage does not increase within ten minutes, continue to next step.
 7. **Battery** is considered fully charged if charge voltage is at regulator setpoint and charge amps remain at lowest value for 10 minutes.
 8. **If charging system** is not performing properly, go to Chart 3, page 6.



A2-330 Regulator

Description and Operation

A2-330 regulator is attached directly to the outside of alternator or mounted remotely on the vehicle.

Main diagnostic feature is a tricolored LED next to the harness receptacle on regulator. LED works like a voltmeter, measuring charging voltage. See Table 2 for diagnostic features and LED explanations.

Regulators with OVCO (overvoltage cutout) will trip at vehicle electrical system voltage above 33 volts that exists longer than 3 seconds. OVCO feature detects high voltage and reacts by signaling relay in F- alternator circuit to open. This turns off alternator (LED is flashing RED). OVCO circuit is reset when engine is restarted or when system voltage drops to 22 V. Regulator then regains control of alternator output voltage.

Troubleshooting

Shut down vehicle and restart engine. If alternator functions normally after restart, a “no output condition” was normal response of voltage regulator to “high voltage” condition. Inspect condition of electrical system, including loose battery cables, both positive and negative. If battery disconnects from system, it could cause “high voltage” condition in electrical system, causing OVCO circuit to trip.

If you have reset alternator once, and electrical system returns to normal charge voltage condition, there may have been a one time, high voltage spike, causing OVCO circuit to trip.

If OVCO circuit repeats cutout a second time in short succession and shuts off alternator F+ circuit, try third restart. If OVCO circuit repeats cutout, go to Chart 2, page 5.

TABLE 2 – A2-330 Regulator Diagnostics

| LED COLOR | | STATUS | ACTION |
|-----------|----------|--|--|
| GREEN | Solid | Alternator and regulator operating normally. | No action required. |
| AMBER | Solid | Low system voltage — Electrical load exceeds alternator rating at present rotor speed. | When loads decrease or speed increases, LED should be solid GREEN. If not, check drive belt and charging system connections. |
| | Flashing | Alternator fault — No output. | Replace alternator. |
| RED | Solid | High system voltage – May occur during normal load switching. | If flashing more than 3 seconds, OVCO will trip, disabling charging system. LED will flash RED. |
| | Flashing | OVCO tripped. | Overvoltage condition. Attempt reset. System diagnosis required. Go to Chart 2, page 5. |



Chart 1 – No Air-Conditioning/NO ALT OUTPUT Light On

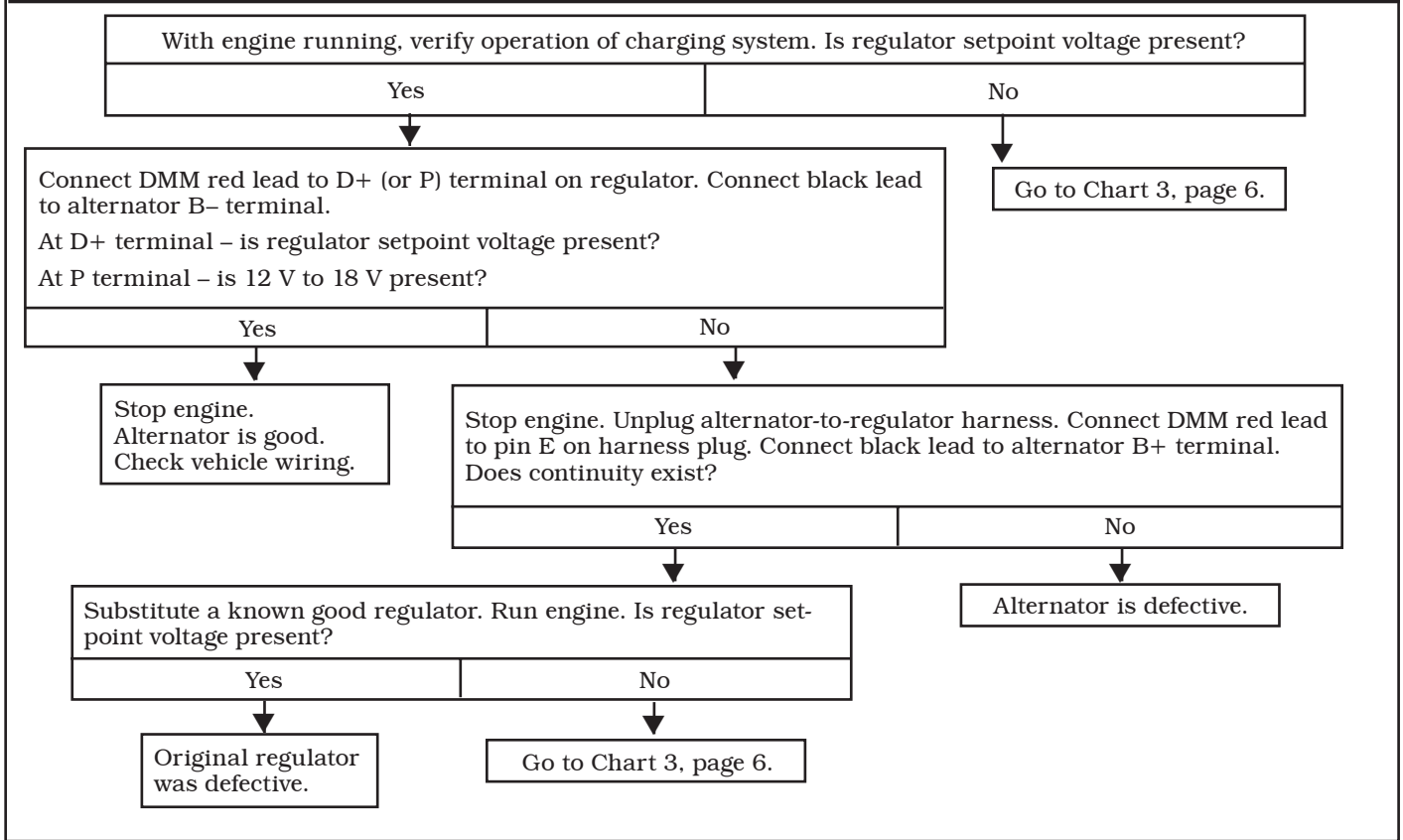
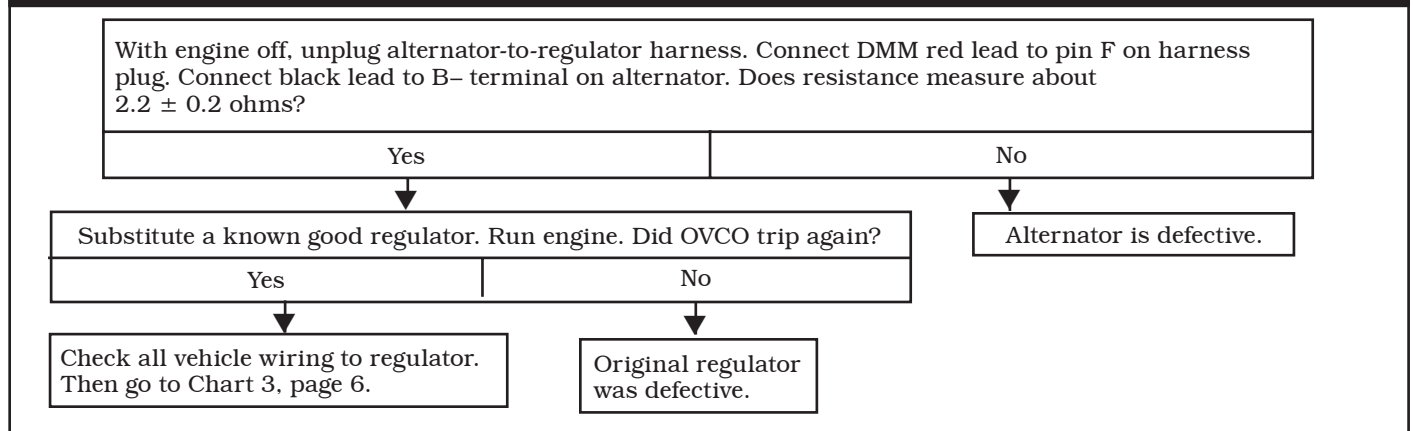


Chart 2 – RED LED Flashing – No Alternator Output – Test OVCO Circuit



SOCKET CONNECTIONS

- Pin A Not Used
- Pin B Not Used
- Pin C B-
- Pin D B+
- Pin E Phase
- Pin F F+

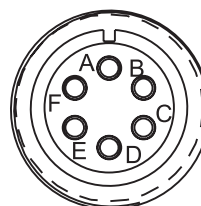
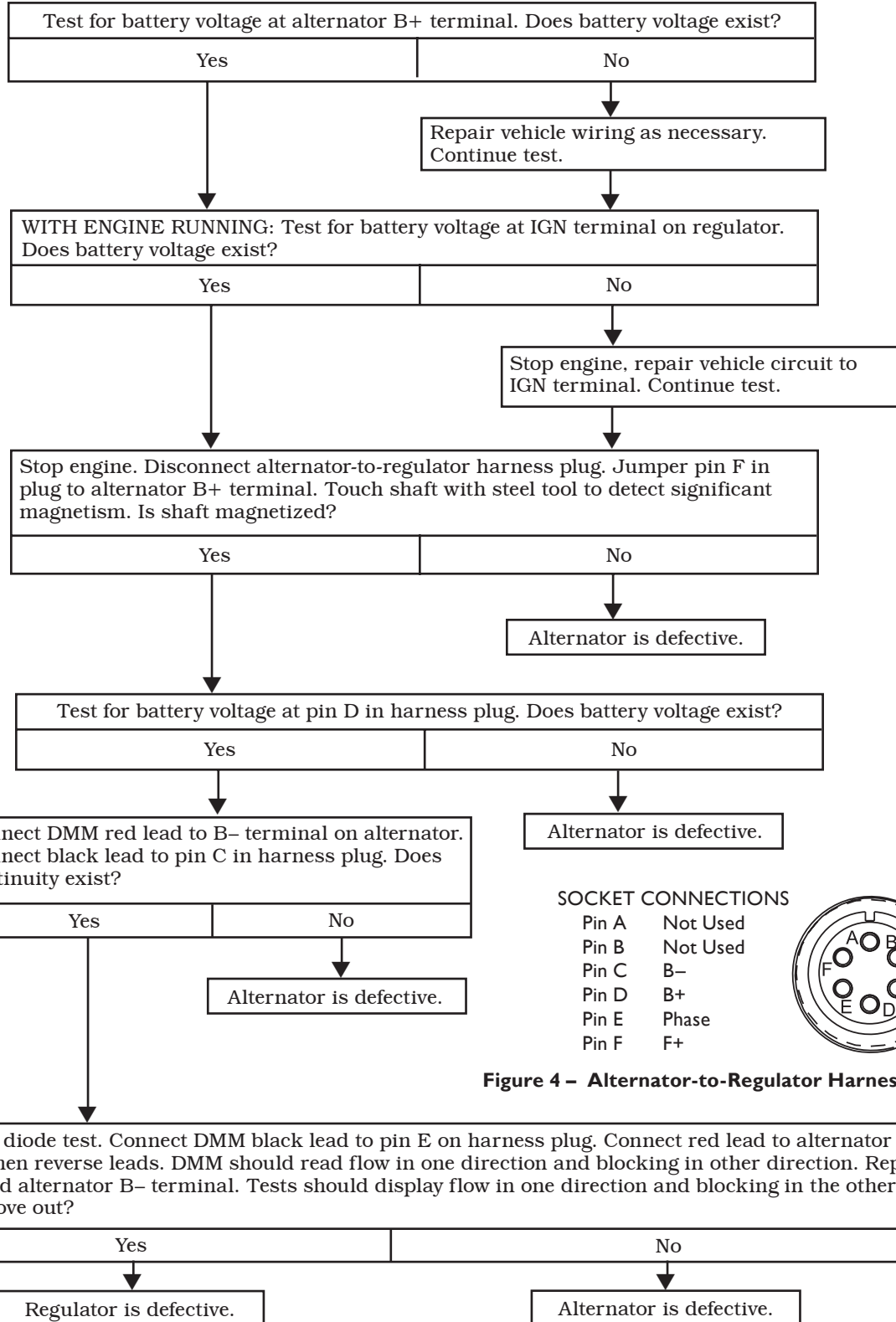


Figure 3 – Alternator-to-Regulator Harness Plug



Chart 3 – No Alternator Output – Test Charging Circuit

STATIC TEST – ENGINE OFF, BATTERY SWITCH ON, KEY ON







If you have questions about your alternator or any of these test procedures, or if you need to locate a Factory Authorized Service Dealer, please contact us at:

C. E. Niehoff & Co. • 2021 Lee Street • Evanston, IL 60202 USA
TEL: 800.643.4633 USA and Canada • TEL: 847.866.6030 outside USA and Canada • FAX: 847.492.1242
service@CENiehoff.com www.CENiehoff.com