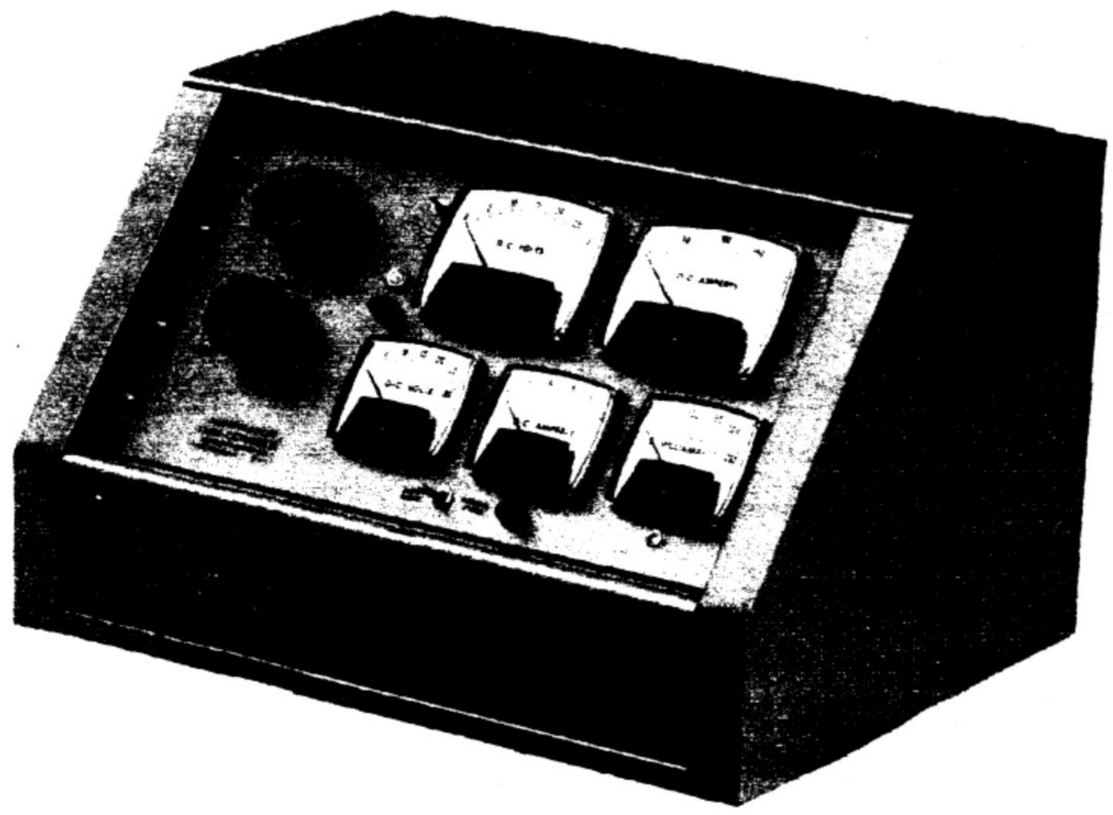
Alternator Test Console
Model No. C-200-24
Operating Instructions

The **Alternator Test Console** is used in conjunction with a separate drive motor and vise to test automotive alternators up to 200 Amp capacity. The motor must be at least 5 HP with a pulley large enough to produce 4000 RPM at the alternator. This means that, if the motor is RPM is 3450 (or thereabouts), the drive pulley should be 3-3/4 inch pitch diameter. A motor speed in the neighborhood of 1725 RPM would require a 7-1/2inch P.D. pulley. A second pulley of the serpentine type is advisable to permit full load testing of alternators equipped with this type pulley.



The Console performs two important functions. First, it **supplies electric power** to the rotor (field) of the alternator. This field power is variable between 0 and 17 volts DC. If the field supply is shorted, the main circuit breaker will trip.

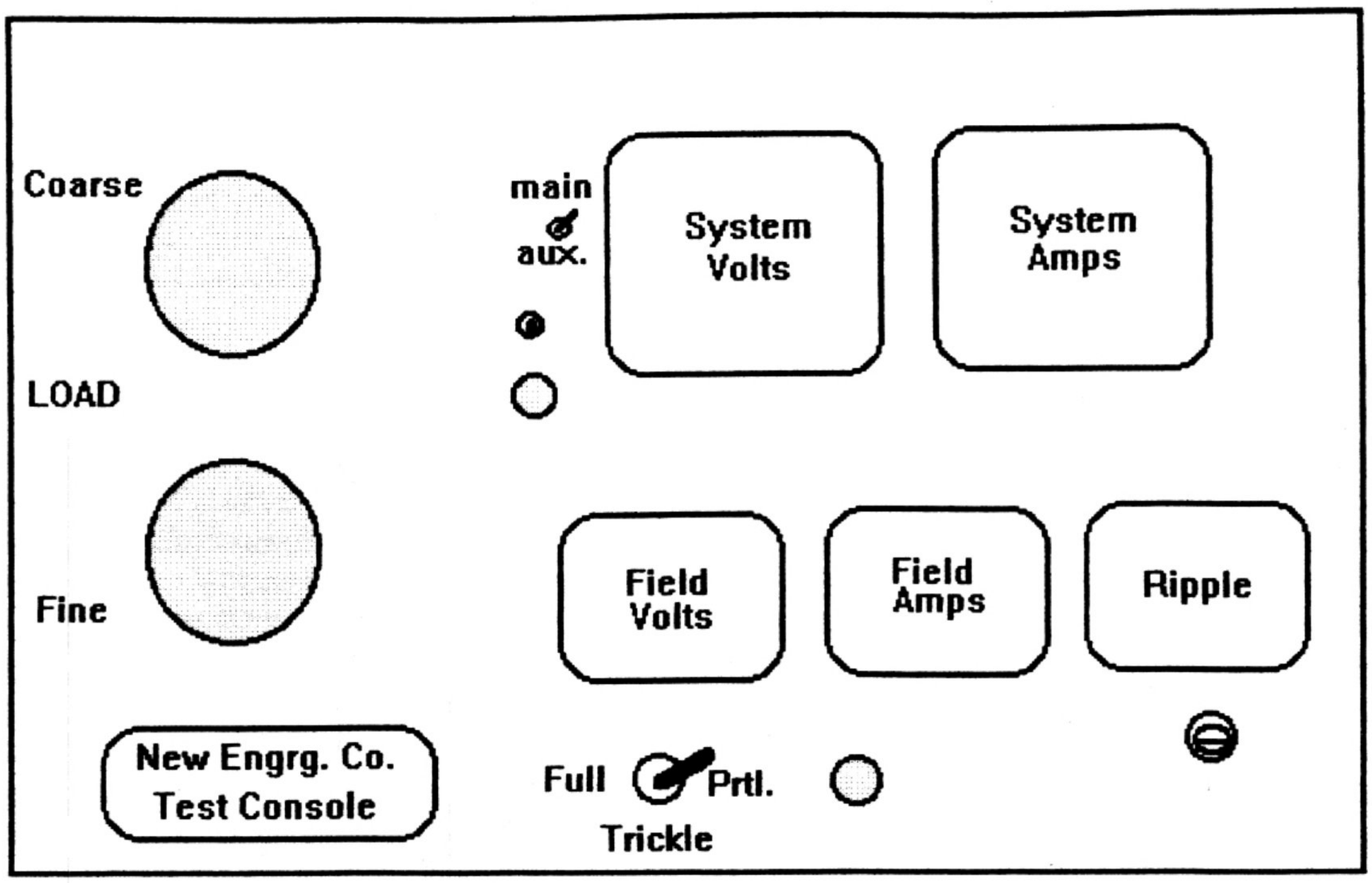
The second function of the Console is to **absorb the power output** from the alternator being tested. This is accomplished by using high power, relay controlled, load resistors for COARSE load control and a carbon pile for FINE load control.

FEATURE IDENTIFICATION - Output voltage and current are shown on the two large (upper) meters. Located directly to the left of the main voltmeter is a small switch marked "main" and "aux". This allows switching the voltmeter from the Main (large red) test lead to the "Aux." (green) test lead. This will be explained under "Auxiliary Output Testing".

The three lower (smaller) meters are (from left to right) Field Volts, Field Amps and Ripple Voltage. These will be explained under "Operating Procedure".

Load controls are located to the left on the upper panel. The upper black knob is the COARSE Load Control which varies the load from 0 to 175 Amps in 25 Amp steps. Below this knob is a similar black knob which is the FINE Load Control. This is a Carbon Pile which allows for infinite adjustment up to 40 Amps. Located beneath the field voltmeter and ammeter

is a switch and a red light. This light corresponds to the dash mounted warning light in systems such as the Delco 10SI and is often referred to as the "trio light". When the toggle switch near this light is switched right (toward the light) the field power must go through a 10 ohm resistor (like on the vehicle). This "PARTIAL FIELD" reduces the rotor current to about 1 amp and causes the red light to glow. As the alternator produces power and field current is supplied by the trio, this light will go out. The Field Ammeter will also drop to zero. Placing this switch in its center position further reduces the field current to a "TRICKLE" (about 0.1 amps) as required when testing some foreign internally regulated alternators. Setting this switch to the left restores "FULL FIELD". When testing internally regilated alternators, if you're not sure which setting to use, start with "Trickle". If that doesn't work, switch to "Partial" and finally, if necessary, to "Full Field".



On the lower panel (from left to right) are found the main on-off, pilot, Battery Connect Switch and light, l2v/24v Switch, Field Control Knob, Pos/Neg Ground Switch and the various test lead cables. These switches and controls will be explained later. The small black terminal block located on right side of the Console is for connection to an oscilloscope.

Operating Procedure

Since this equipment may not operate exactly like older testers you may be familiar with, it will pay you to follow these instructions through once carefully. Test the same type of alternator indicated in the instructions and follow the same sequence for best results. Random jumping from one type of alternator to another or starting with the most complicated alternator in the shop usually leads to confusion, frustration and more time spent getting to know your new Test Bench.

(1) - (Testing a 12 volt, negative ground, non-regulated, single field alternator)

<u>TEST LEAD CONNECTIONS</u>

After securely mounting the alternator to be tested, connect test leads as follows -

Large Black Clip (GND.) goes to frame or mounting vise.

Large Red Clip (12v main) goes to alternator main (BATT) output terminal.

Small Red Clip (field) goes to alternator field terminal.

Small Green Clip (aux) may be connected to the "auxiliary" output (such as the diode trio output on some Motorola alternators) or the "stator" output terminal (such as found on Ford alternators) if there is one.

FIELD POWER SET-UP

Locate black Field Control Knob at center of lower panel and set to low (about 9 o'clock) position (5-6 volts on Field Voltmeter). - Locate 12v/24v Switch (to left of Field Control Knob) and set it to its down (12v) position.

Locate "Full Field" switch on upper panel and set to left (full field) position.

Locate ground switch directly to the right of the Field Control Knob and put it in the upper (NEG.GND) position.

LOAD CONTROL

Set Coarse Load Control to 50 Amp setting. This is a good starting point for most automotive alternators.

Set Fine Load Control to minimum (about one full turn CCW from full CW (snug) position).

METER SETTINGS - Set voltmeter switch to "main".

TESTING

Turn Console on using the switch located to the far left of the lower panel. This switch is also a sensitive circuit breaker which protects the Console from damage due to shorts. It may sometimes trip when the machine is turned on. This is O.K. - try again. It is best to start out with reduced field power (5-6 volts) for several reasons. First, it is easier to start the motor with the alternator in low/no load status. Second, watching the Field Ammeter as the field voltage is increased gives early warning of a rotor short. Finally, starting with full field voltage against a light load (in a non-regulated alternator) will result in high system voltage which might damage some components.

START MOTOR. If you have a variable speed bench, bring alternator speed up to 3600-4000 RPM. Gradually increase field voltage (and current). Besure that field current stays within the expected limits (3-6 amps). Watch main output volts and amps. If main output volts exceed 15v as field is increased, add some load (using Coarse Load Control) to keep voltage under 15. Increase field voltage until it reaches 12.5 (heavy line on meter between 10 and 15). Use Coarse and Fine Load Controls to bring main voltage to 12.5. Main ammeter will now read RATED OUTPUT AMPS for this alternator. Check reading on Ripple (lower right) meter. This should be somewhere in the area of the output amps (within 20%). Ripple voltage readings vary between alternator makes so this meter will take some "getting used to". Keeping records will help. Open or shorted power diodes or stator will cause the Ripple (Stator/Diode) Meter to read at least 50% higher than normal.

If the green "aux." Test Lead is connected to an auxiliary trio (such as Motorola) the green "aux." light will glow brightly during the test. Switching the main voltmeter from "main" to "aux." should give a voltmeter reading within one volt of the main output voltage (under load).

If the green (aux.) Test Lead is connected to a "stator-" output (such as Ford, etc.) the green panel light will also glow during the test. Switching the voltmeter to "aux." should result in a voltage of approximately HALF the main output voltage.

(2) Double Field Alternators - (such as Chrysler) must have the second field tab grounded to complete the field circuit. Use a small jumper for this - not a screwdriver.

(3) INTERNALLY REGULATED Alternators such as Delco 10SI

TEST LEAD CONNECTIONS - After securely mounting the alternator to be tested, connect test leads as follows -

Large Black Clip (GND.) goes to frame of mounting vise.

Large Red Clip (12v main) goes to alternator main (BA'i'T) output terminal.

Small Red Clip (field) goes to alternator field terminal with a jumper to the "sense" terminal if the regulator has one. Use the proper field plug for the test alternator if available.

FIELD POWER SET-UP

Locate black Field Control Knob at center of lower panel and set field voltage to 12 volts.

Locate "Full Field" Switch on upper panel and set to right (partial field) position.

Locate Ground Switch directly to the right of the Field Control Knob and make

sure it's in the upper (NEG.GND) position.

LOAD CONTROL

Set Coarse Load Control to 25 Amp setting

Set Fine Load Control to minimum (about one full turn CCW from full CW snug position).

METER SETTINGS - Set voltmeter switch to "main"

TESTING

When Field Test Lead is connected to BOTH (field input and sense) field pins on the alternator (use the correct plug if available), the red "trio" light should come on. Field current will be about 1 amp. This indicates that the regulator has turned on and is supplying partial ("start-up") power to the rotor.

START MOTOR and bring it up to speed. Red "trio" light should go out. Main Voltmeter should go up to about 15 volts. Main ammeter should read 30-40 amps. Alternator is now operating under light load conditions and is being controlled by the internal regulator. Increase load (using "Coarse" and "Fine" Load Controls) until the main (output) voltage falls to exactly 12.5 volts. Now read the output amps. This is the **TRUE OUTPUT** for the alternator being tested.

(4)Auxiliary Output Testing - As mentioned above, some alternators (such as Motorola) have an auxiliary positive output (from the diode trio) which goes to a remote regulator and is returned to the alternator to power the field. This output can be tested as follows, With alternator running under load and adjusted to its maximum (12.5v) output, connect Green Test Clip to "aux" output terminal of alternator. This puts a 3 amp load on the "aux" output and lights the green panel light. The "aux" output voltage can be checked by switching the main voltmeter to "aux". This voltage should not vary from the main output voltage by more than 1 volt (two lines on the meter scale). If it's low, check the trio.

(5) Positive Ground Alternators - 12 volt positive ground alternators are tested like negative ground units with two exceptions.

Set Ground Switch to lower (POS.GND) position.

Reverse main test leads. That is - Heavy Red to mounting vise frame. Heavy Black to alternator output. Field lead is now negative. Test as outlined above. "Aux" test lead should not be used with Console switched to "positive ground".

(6) Single Wire Alternators - Some single wire alternators rely on the residual magnetism in the rotor to start the generating process and, therefore, receive no external field current. Another type of Single Wire alternator takes its field power directly from the "Batt." terminal of the alternator. The secret of testing these alternators is to begin with the MINIMUM POSSIBLE LOAD. Turn the Coarse Load Control to 0. Turn the Fine Load Control to mimimum. Field Control Switch should be in its left (full field) position. Connect "Main" Test Lead to alternator output post.

START MOTOR. Alternator might "kick in" by itself because of residual magnetism in the rotor. If not, set field voltage to 15 volts and touch field test lead briefly to alternator output terminal. This should "kick" the alternator into action. Once the alternator begins to generate, reduce the field voltage to 10 or lower to avoid affecting the regulator. Use the carbon pile (FINE load control) FIRST and then the COARSE load control to increase load until system voltage drops to 12.5 volts. Read output amps. Check Ripple. Done.

(7) DELCO CS type alternators are tested like single wire alternators. Use the special plug (provided) connected to the "Field Harness" and follow the procedure outlined above. The red trio light will not glow as this alternator has no trio and requires no initial start-up rotor current. The green "aux" light will glow during testing and the "aux" voltage will be one-half system voltage. This is because a "stator" output tap is connected in the harness, The red light in the plug itself is used for "battery type" testers only.

(8)FORD internally regulated alternators are tested using the same procedure. Use the Ford harness provided and connect Main Red Test Lead from Console to large bare ring terminal on harness. Red (trio) light (showing partial field current into rotor) will go out when generating starts. Green (aux) light will glow when generating and “aux" voltage will be half of system voltage.

BATTERY CONNECTION - Some rebuilders have better results testing self-excited type alternators when there is a battery present in the system. This is easily accomplished by connecting any light duty car battery to the rear of the console. Use #14 wire or heavier to connect the battery positive terminal to the 1/4 inch stud marked "POS" at the back of the Console. Connect the battery negative terminal to the stud marked "NEG". The switch on the lower front panel marked "BATTERY" serves to connect and disconnect the battery from the system. Internal resistors limit current into or out of the battery to 25 amps max. When the battery is switched on, testing procedure is the same (start with minimum load) but the alternator should not require .jump starting" from the field lead. Be sure that field voltage is set at 10 or lower so as to avoid any effect on the regulator.

24 Volt Operation

FIELD - Before setting up machine for 24 Volt operation, shut the Console off. Locate the 12-24 volt selector switch just to the left of the large black field control knob on the lower panel. Set

the 12-24 Volt selector switch to its 24 Volt (upper) position. Field (medium red) Test Lead now becomes 0-30 Volts DC (up to 5 amps on the Field Draw meter). Main circuit breaker will trip if the Field Lead is overloaded.

LOAD - Power resistors are now re-arranged into 24 volt (series) configuration. The alternator load is controlled by the Coarse and Fine Load Control knobs.

Do not exceed 100 amps or 30 volts when testing in 24 volt mode!

Partial Field and Auxiliary Test should NOT be used on 24 volt alternators as this may damage resistors and blow out the panel lights. Partial (start-up) rotor current can be provided for when testing 24 volt internally regulated units by switching to "Full Field" and using the Field Voltage Control to keep field voltage at 10-15 (instead of 24) volts.

NEG./POS. Ground switch works the same as on 12 volts. See 12 volt instructions for testing positive ground, A and B type circuits and Single Wire (self-exciting) type alternators.

TESTING - Turn Console on, connect test leads and start motor.
Gradually increase field voltage until output (system) voltage exceeds 25 volts. Increase load to bring system voltage below 25 and continue to increase field volts. When both output and field volts are stabilized at 25, alternator is operating at its rated output. Read amps.

To test internal regulators, use the Load Controls to reduce the output current below 20 amps. Voltage should not rise above 30 volts.

Stop testing and shut the Console off before switching back to 12 volt operation.

If you ever have any questions or run into difficulty, drop us a line or give us a call.

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