Starter Field Tester

Instructions

Model #3FT (6E)

Introduction —

This Tester takes some getting used to but, in the hands of a skilled operator, it can save many hours of needless assembly and disassembly of faulty starters. Read these Instructions carefully BEFORE attempting to use the Tester. It will save you time and frustration.

The STARTER FIELD TESTER works on the principle of a "gauss-meter". All field coils (main & shunt) are energized by a low voltage, line frequency alternating current. The resulting magnetic flux produced at each pole face is detected by four pick-up coils located in the cylindrical aluminum test mandrel. Each pick-up coil drives its own meter through an appropriate circuit. The meter readings are then compared to a "known good" standard.

Some of the characteristics of this tester are as follows...

* On a simple starter body (four identical heavy coils) all four meters will read the same (within 5 meter lines).

* A bad coil will show a lower than normal reading on its corresponding meter.

* A bad coil will also affect its neighbors as follows...

  - MAGNETICALLY - Since, in a four pole motor, coils lying directly opposite from one another have the same polarity, they are magnetically "bucking" each other. Therefore, a weak coil (low meter reading) will cause a good coil lying directly opposite to have a HIGHER than normal reading.

  - ELECTRICALLY - A shorted coil will offer less resistance and draw higher current than normal. Since several types of electrical hook-ups are used in starter motors (series-parallel, etc.), this also increases the current flowing through a "good" adjacent coil connected in SERIES with the shorted coil. A higher than normal reading will then result in the "good" coil.

* Four equal readings which are all lower than normal for the particular body being tested indicate a poor connection that is common to all four coils (such as the ground rivet in Chrysler bodies). Also, if all readings seem low, double check your Test Lead connections. We are dealing with very low resistance here so Test Lead contact resistance is a big factor.

* Two adjacent poles (e.g., top meter & left meter) showing low readings indicates a poor connection common to one branch in a series-parallel type connection. In this case, the two remaining "good" coils (bottom meter and right meter) will have higher than normal readings due to lack of magnetic "bucking".

* Readings on all four poles should not always be the same. When a shunt (fine wire) coil is present, the shunt pole will generally read higher. The best method is to compare the "pattern" of the test starter against a "known-good" pattern. The procedure for establishing the correct "pattern" will be discussed later.

* Shunt coils must be isolated from the heavy coils (at least at one end) so that they may be separately energized by the "shunt" power source.

* Characteristics of grounds and internal shorts in main (heavy) coils bear some attention. The main (series type) field coil consists of a few turns of very heavy copper strap. These coils, therefore, have a very low resistance. Consequently if a "small" (high resistance) coil-to-coil connection or a "small" (high resistance) ground fault (to the case) is present in the winding, it will only affect the meter readings to the extent that it draws current away from its intended path through the heavy strap in the coil. For this reason, a "small" ground which might light a 110 volt test light may not be distinguishable on the SFT Tester. You might want to continue testing for grounds with such a light test. Also, don't stop visual inspection of coils, insulation and connections for signs of discoloration or other damage.

Testing -

It is a good idea to start using your SFT by testing at least 10 bodies of the same type preferably a simple Chrysler body with no shunt coil. Testing "one of each kind" will only lead to confusion.

Connections -

The starter body to be tested is placed over the Test Mandrel and aligned so that each pole shoe faces a sensing head on the mandrel.

Connect "COMMON" (Large Black) to starter body (unpainted area).

Connect "MAIN" (Large Red) lead to series field input.

Connect "SHUNT" test lead to shunt field input (if there is a shunt coil).

Turn on power switch (at right). Pilot will come on. Left hand switch marked "MAIN" controls the SERIES power supply (Large RED Test Clip) used for testing heavy (series) coils. The next switch, marked "SHUNT", controls the shunt coil power supply (Small RED Test Clip). Large BLACK Test Clip is COMMON to both power supplies. In most cases, series and shunt type coils can be tested either separately or together.

Depress MAIN test switch and note (write down) readings for all four poles. Readings should agree with limits established by testing a group of KNOWN GOOD BODIES as described below. A variation of 2-1/2 lines either way is acceptable.

Establishing the Correct Pattern —

To find the "pattern" for this body, put a strip of masking tape along the top of each meter and mark a point by each meter reading for each of the 10 bodies. These tape markings should form "clusters" of dots. For good bodies, these clusters should be about 5 meter lines wide. Disregard any dots that are "way out" of a cluster and find the apparent center of the remaining dot cluster. Mark the center and also mark a line 2-1/2 lines to the left and the right. This sets up your "O.K." zone for this particular body. You might want to use BLUE markings for Chrysler bodies, RED for Ford, etc.

A common defect with Chrysler bodies is the grounding rivet. Experiment by connecting the heavy Black Test Clip first to a clean area on the test housing. Now energize the "main" power supply and record your readings. Next, move the Black Test Clip so that it directly touches the copper field strap near the rivet. All readings should improve. How much they improve indicates the quality of the rivet connection.

Now move on to 10 different type bodies - Ford for example- and establish the cluster patterns for this body.

FORD Body connections - Ford bodies with hollow pole shoes are tested as follows....

- Place a small piece of cardboard between points on starter to isolate heavy from shunt winding.

- Connect Large Black to starter input post as this point is COMMON to both heavy and shunt coils).

- Connect Large Red to either of the insulated brushes. Don't let either of these brushes touch the case.

- Connect Small Red (shunt power) to either grounded brush pigtail.

Heavy (series) coils and shunt coils can now be tested either separately or both at the same time.

A typical Ford body will read about 4.2 to 4.6 for the shunt coil alone. Heavy & Shunt Coils energized together should give readings of approximately... LEFT METER 6.9, TOP & BOTTOM METERS - 3.2, and RIGHT METER - 1.5

Experiment with other type starter bodies and KEEP RECORDS! In this way, you can establish your own "standards".

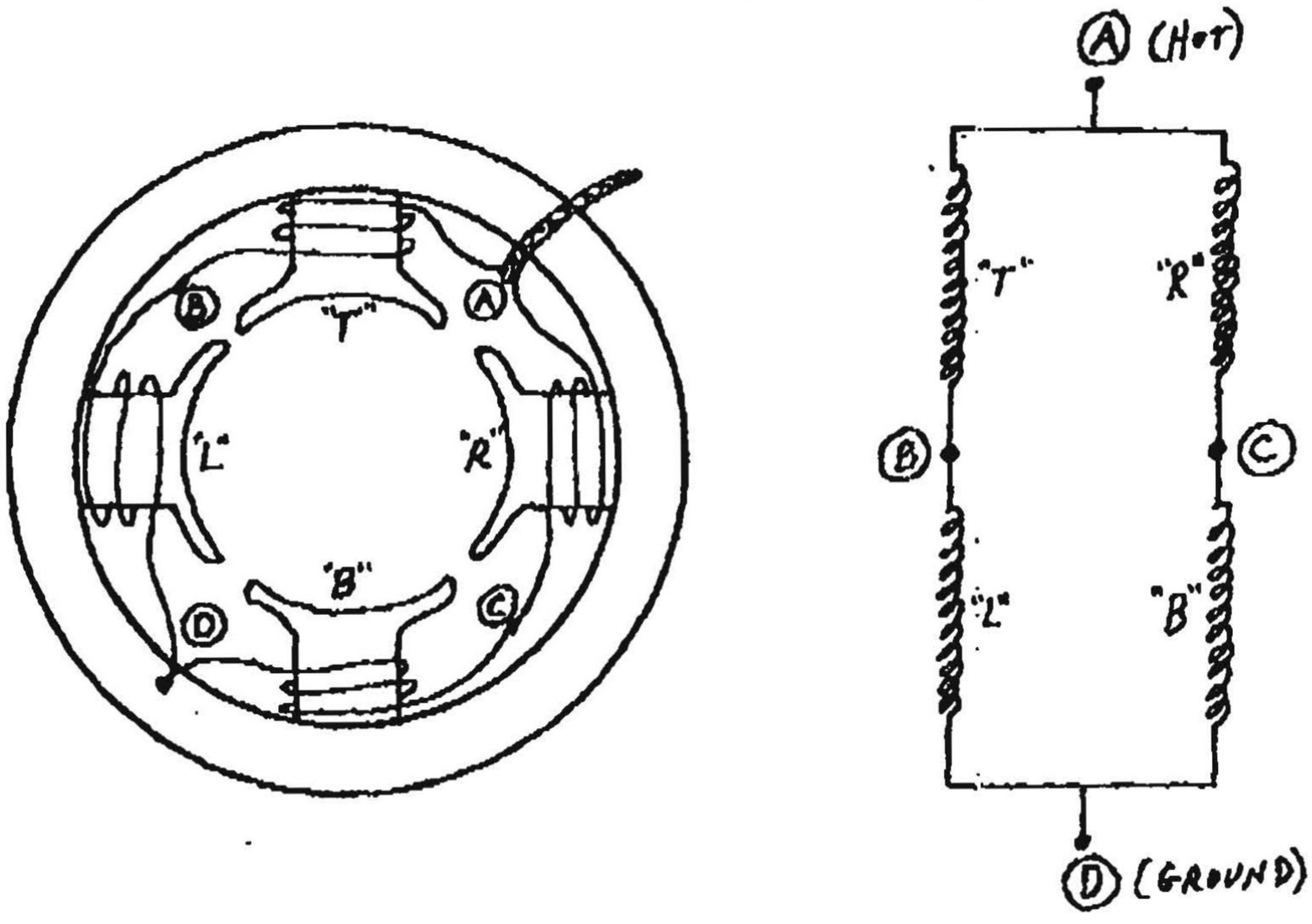
You're sure to have questions. If so, please, give us a call.

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TYPICAL PATTERNS - A simple body with four equal (heavy) coils and no shunt winding will produce four equal readings in the range of 4 to 8 on the meter scales. Where a shunt winding is present, this pole will usually read higher. The pole opposite from a strong shunt pole will normally read slightly lower than normal - this is o.k.

ANALYZING FAULTY PATTERNS - Figure 1 below shows a typical series parallel field connection (no shunts).



Poles are designated "T", "B", "L" and "R" for top, bottom, left and right meter locations. Connections between coils are designated "A", "B", "C" and "D". The chart following indicates some possible defects and the resulting meter patterns.

CONDITION	METER READINGS	EXPLANATION
Good body	$6\frac{1}{2}$ $6\frac{1}{2}$ $6\frac{1}{2}$ $6\frac{1}{2}$	
Coil "T" has internal short eliminating about 25% of the active coil.	5 7 $6\frac{1}{2}$ 7	Meter "T" reads weaker. Meter "L" reads slightly higher because the short in "T" causes higher current to flow in branc "T"-"L". Meter "B" reads slight ly higher because pole "B" lies opposite a weak pole ("T").
Coil "T" has a "ground" eliminating about 25% of active coil.	$5\frac{1}{2}$ $2\frac{1}{2}$ $6\frac{1}{2}$ $6\frac{1}{2}$	Meter "T" reads weaker. Meter "L" reads much weaker because "ground" in coil "T" prevents most current from ever reaching coil "L". Meters "R" and "B" read normal.
Point "D" (ground) has poor connection.	4 4 4 4	All four meters read lower than normal due to reduced current because of poor connection.
Poor connection at point "A" leading to coils "T" and "L".	5 5 7 7	Meters "T" and "L" read the same but lower than normal. Meters "R" and "B" read normal.

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Data Sheet

Starter	Left	Top	Bottom	Right