DECATUR INDUSTRIAL ELECTRIC
KANKAKEE INDUSTRIAL TECHNOLOGY
MT. VERNON ELECTRIC

DECATUR
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ELECTRIC

A/C Motor Testing

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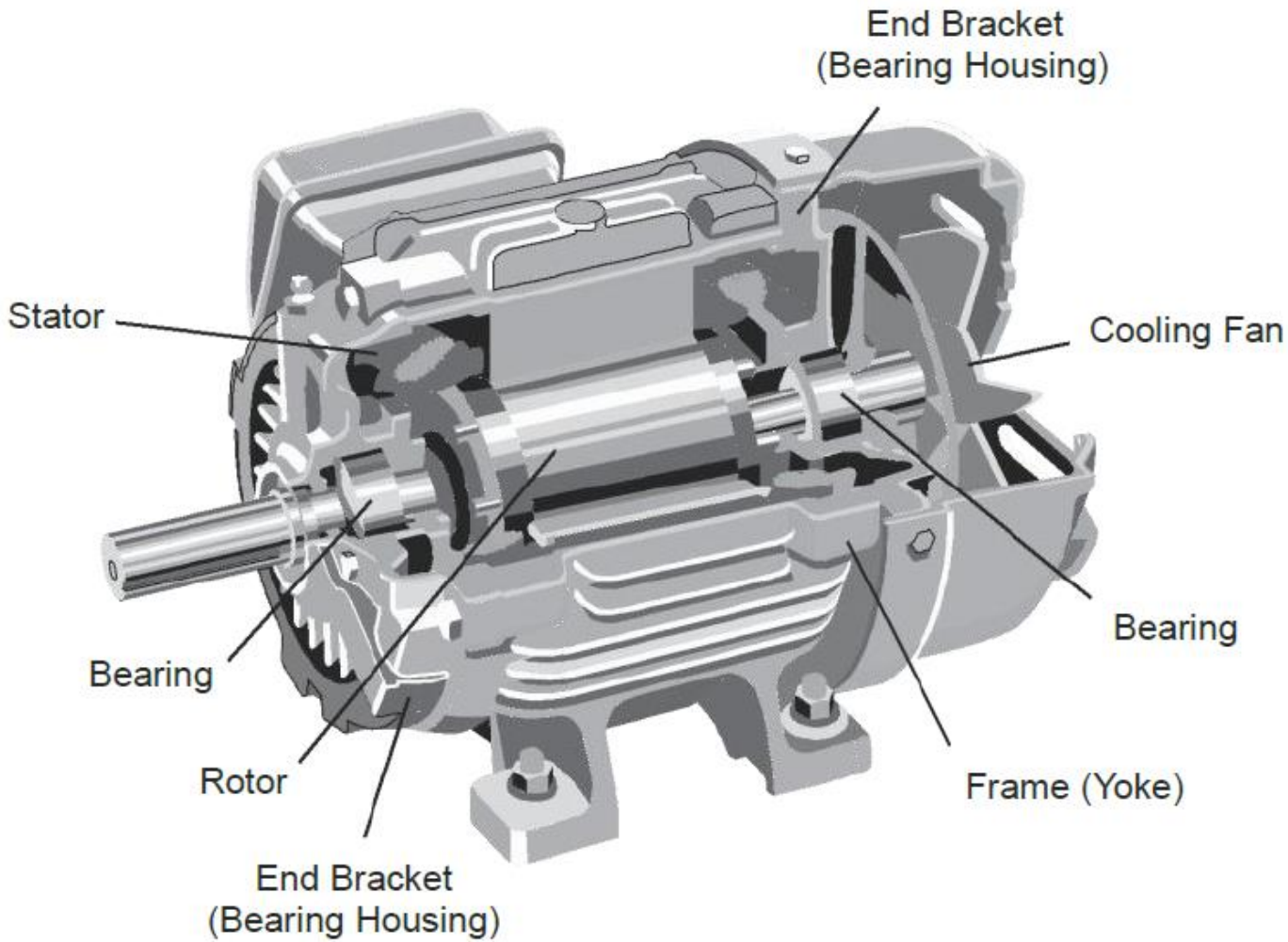
A/C MOTOR BASICS



Cutaway View of Motor

A/C motor mechanical issue

BEARINGS

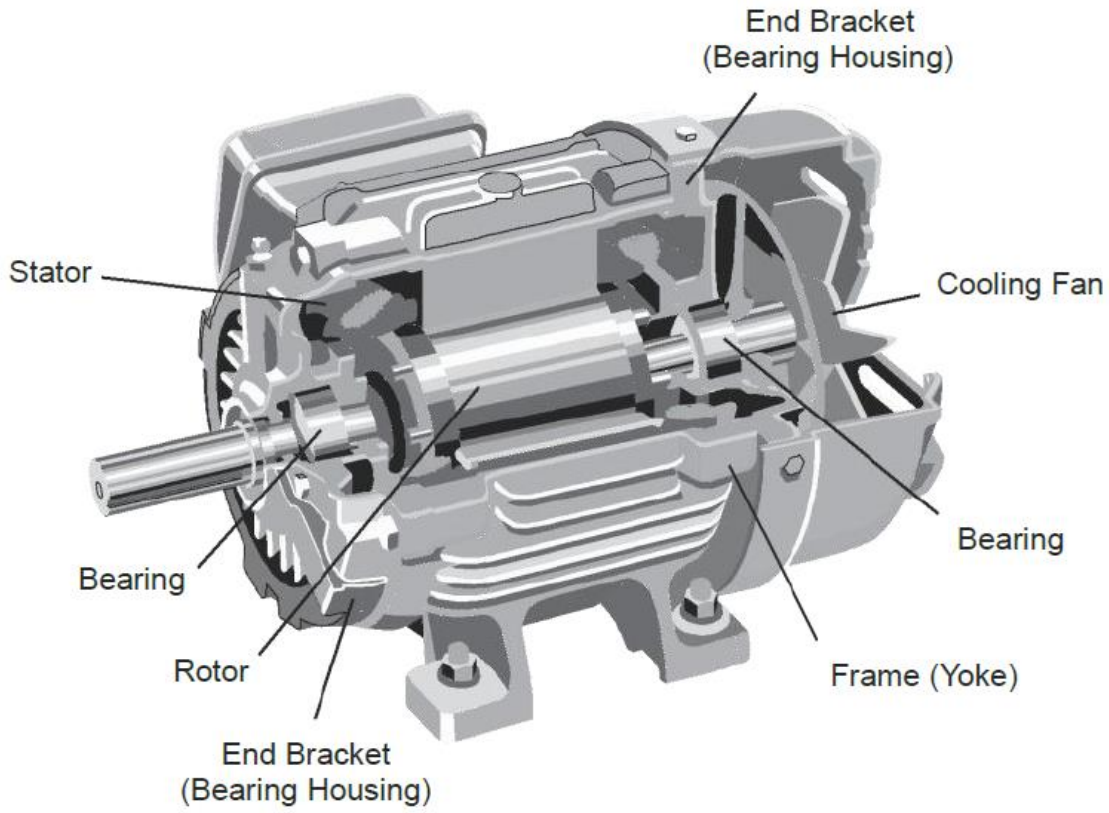
FAN

SOFT FOOT

ALIGNMENT

DIRT

DRIVEN UNIT



Cutaway View of Motor

A/C motor mechanical issue

A/C MOTOR ELECTRICAL ISSUES

WINDING

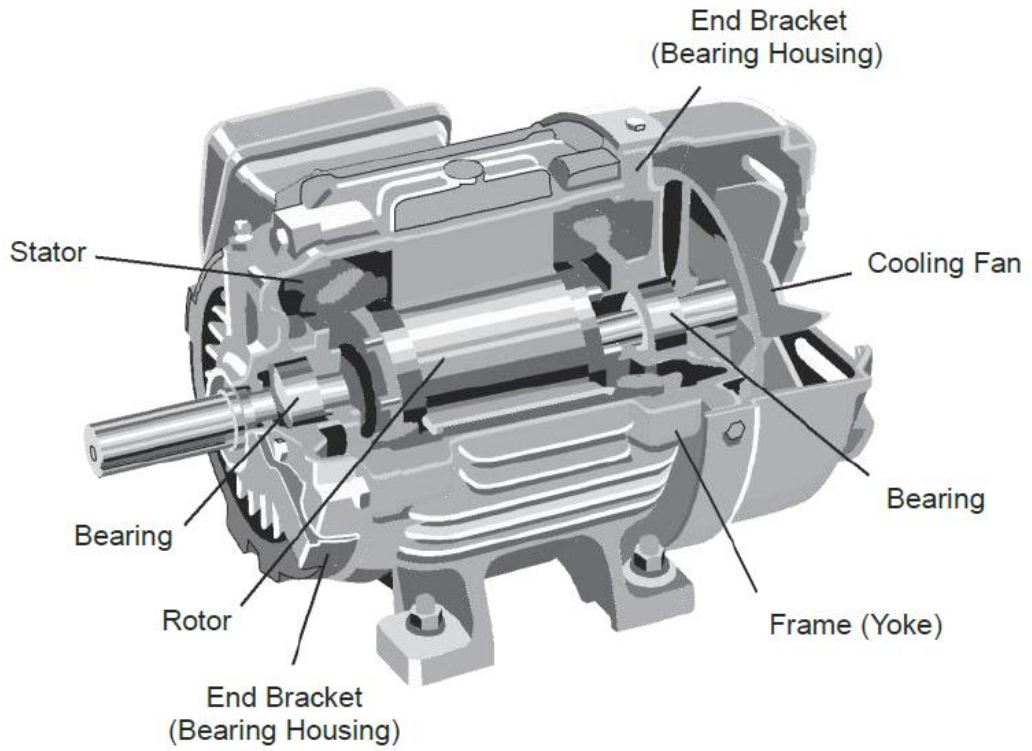
LOAD

CONNECTIONS

ROTOR

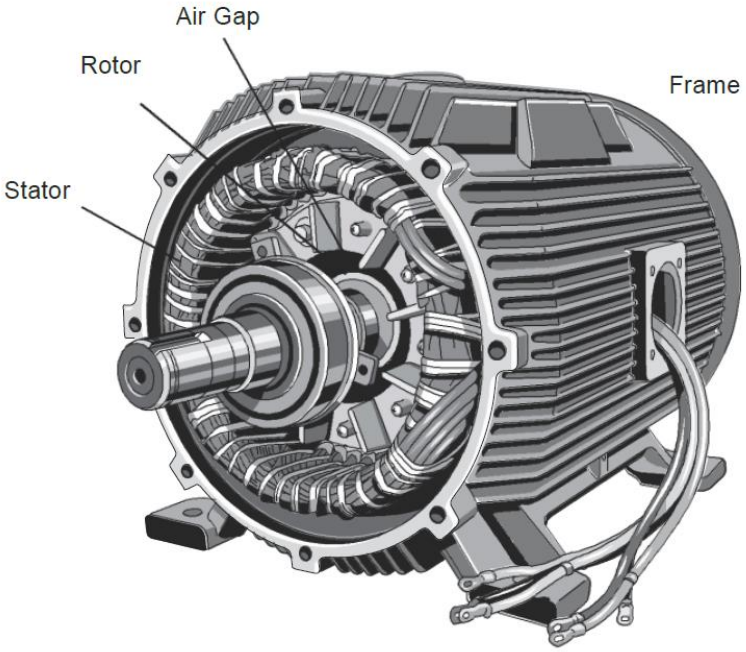
VOLTAGE

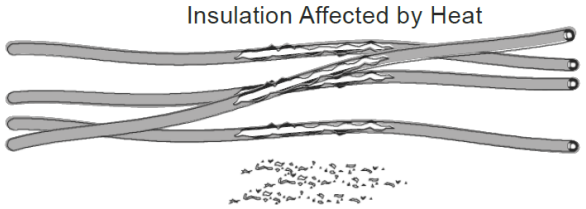
SINGLE PHASING



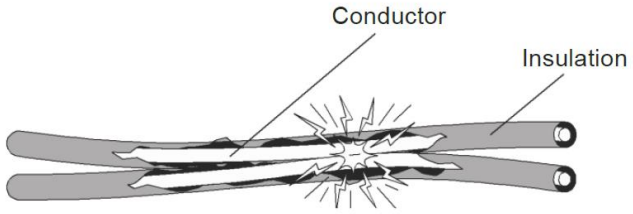
Cutaway View of Motor

A/C MOTOR WINDING ISSUES

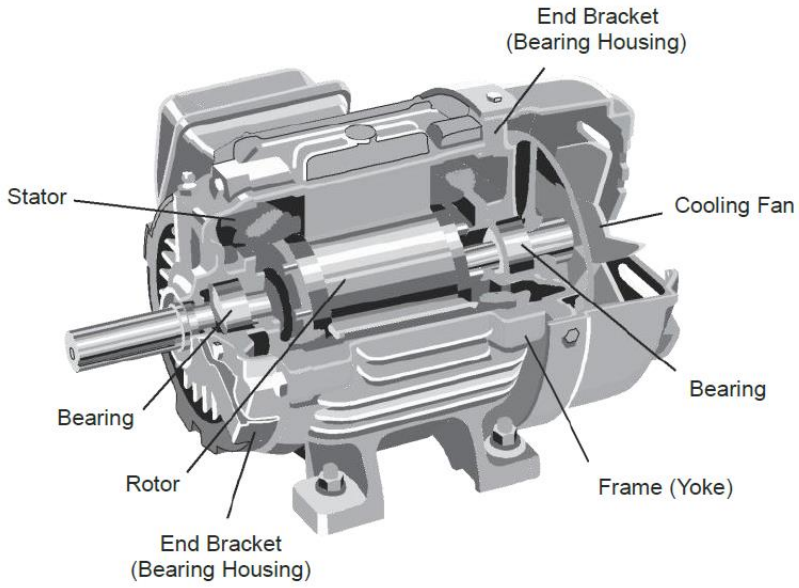




GROUNDED



TURN TO TURN/
SHORTED



Cutaway View of Motor

A/C Motor Electrical External Issues

Connection/Taping

Breaker/Starter/Upstream

Motor/Line leads

External Damage

Motor Line

Motor Terminals

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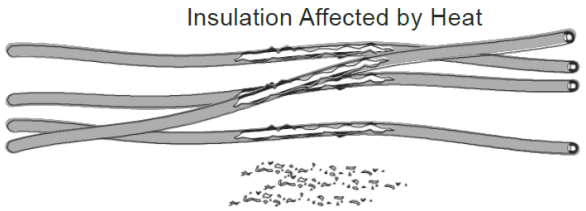
Testing A/C Motors?

Megohm over 100 at Starter
Resistance Balanced < 5%

Voltage Balanced <1%
Current Balanced <3%
Below nameplate current

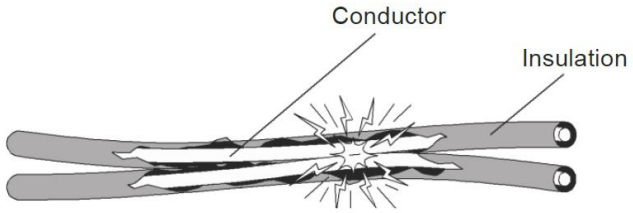
Megohm below 100 at Starter/Motor and/or grounded Megger



Motor drops out immediately at start.
Smells hot/burning
Don't keep starting motor

GROUNDED

Motor can Meg okay
Resistance Balanced > 5%
PdMA verification.



Motor may run okay unloaded
Loaded kicks it out.
Variable Frequency Drive calls out short.

TURN TO TURN/
SHORTED/OPEN

A/C Testing Procedure Part I

1. Make sure that Lock-Out Tag-Out is followed. (And no one is going to touch device being Meggered!)
2. Always start as far up the line. Starter/Breaker Etc.
   a) Never pull a motor if it tests bad at the Starter/Breaker
   b) Recheck at the motor leads.
      i. Be observant of condition of leads in the box.
      ii. Moisture present.
   c) If motor lead checks good, check up line.
   d) If motor lead checks bad, send to Decatur Industrial Electric ☺

A/C Testing Procedure Part II

4. Does the motor/driven unit turn?
5. Make sure that the leads are marked appropriately to go back the same as removed. (Rotation)
   a) At starter or testing point.
   b) Leads match.
   c) At the motor.
6. Check your megger
   a) Attach leads together, meter should read grounded.
   b) Hold lead out in the open, meter should read highest meg available on the meter.
7. Check for continuity all three phases. (Open circuit)

A/C Testing Procedure Part III

8. Megger at lowest voltage available on the device 1st and then apply voltage below.
   a. 460Volt Motors meg at 500 Volts
   b. 2300Volt Motor meg at 1000 Volts
   c. 4160Volt Motor Meg at 2500 Volts.
   d. We are not trying to stress the motor. (You don't want to be responsible for failure!)
   e. After testing each time, make sure and bleed the available current by grounding lead to ground.(If you don't you could get shocked and woke up!) (Recommended 3-times the testing duration done.)
   f. How long is a good base Megger Reading?_____
   g. If trending, take temperature reading of device testing and look at time of year test (Humid –vs- Dry)

A/C Testing Procedure Part IV

9. If you have continuity and Meg readings over 100 Meg (Mush Wound/480V), 100 Meg (Form Coil/1000V), life is good.
10. If readings are below 100 Meg at testing voltage check with Supervisor.
    b. Check history of motor if available.
    c. Call your Decatur Industrial Electric contact, wake him up!
11. If the readings at the Starter/Breaker/etc. is below 100Meg, what do you do before you send the motor to Decatur Industrial Electric? _____

A/C Testing Procedure Part V

12. If there is no ground and unit is kicking out, it could be a turn-to-turn short, and if motor is hard to get out or a bigger motor, call someone to do a resistance reading. (PdMA)
    a. <3% is acceptable per PdMA and most standards.
    b. 3% resistance is marginal.
    c. >5% resistance imbalance is a problem, needs to be addressed.
    d. Again, check at the starter, if resistance looks like an issue, go to the junction box of the motor.
    e. Pay attention to the connections at the motor and the starter.
    f. Resistance can be a good trending tool.
    g. All repaired motors from DIE should be 1% or lower at the motor.

A/C Testing Procedure Part VI

13. Variable Frequency Applications.
    a. If the drive shows kicking out because of a shorted and/or grounded fault.
    b. Test device as outlined earlier, for an obvious ground.
    c. If no ground is found, replace the motor.
        i. Drives will detect a ground running at a different frequency and switching voltages around 1,250 Volts.
        ii. This cannot be duplicated with testing.

In Conclusion

1. Always follow Lock-Out Tag-Out and make sure people are not going to be touching device.
2. Device testing is working properly
3. Double check electrical connections sequence.
4. Start up the line as far as possible.
5. Never assume it is the motor, without verifying at the motor.
6. Test below the voltage rating of the motor. 460Volt, can be tested at 500Volts if lower is not available.
7. Megger is a simple tool, and can check for obvious ground issue, if not grounded, PdMA and/or AWA testing could be performed for resistance issues or another situations that may be happening.
8. You can also, trend ground to predict when to check system and/or replace motor.