



Project 14-8: Motor Problem Resolution and Avoidance

Final Report: October 2016; available online @ www.dstar.org

Project Summary:

The Motor Problem Resolution and Avoidance manual was developed by the NRECA Cooperative Research Network (CRN) in 1996. The manual was designed as an easy-to-use training course to provide a basic background on motors and a detailed step-by-step process for resolution. It also furnished the necessary reference information for solving problems associated with motors. The manual is 286 pages.

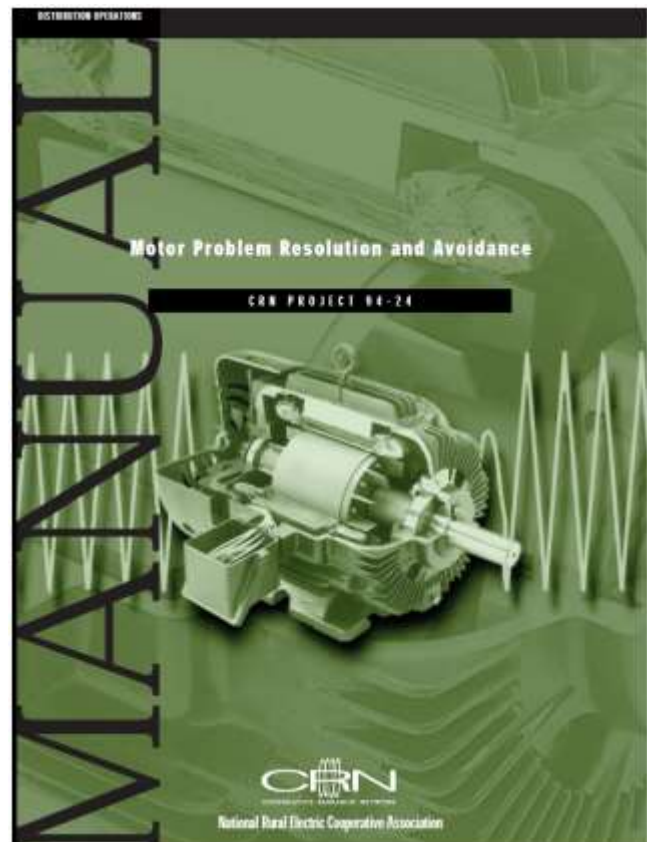
The audience for the existing report consists of customer service engineers who work for Distribution Cooperatives; as they endeavor to advise their customers concerned with “problems” with electrical service and mainly relating to motors connected to the electrical system. The existing report is consistent with the experiences of customers from the mid-1990s. Many things have changed in the intervening 15-years and the existing report does not address the changed conditions. One of the more important changes is a greater emphasis placed on reducing power consumption, reducing the cost of power and higher motor efficiency.

DSTAR members were interested in updating the content of the manual to reflect and incorporate change in motor type, and controls including changing industry standards and other relevant areas.

The scope of Project 14-8 follows the organization of the original report with a few new sections added to expand beyond motors to include electronic power converters (or “Drives”).

Changes to the manual include the following:

- Section 2 – What you need to know about Motors. The subparagraph on why a motor spins is updated to more clearly indicate how induction motors produce torque and how newer types of motors function; including switched-reluctance and permanent magnet motors.
- Section 2 – What you need to know about Motors. “Insulation” is expanded and changed to include additional factors beyond just temperature that are major life factors (damage mechanisms).



Expanding from a single life factor to three life factors and examining how they relate to each other to determine motor life.

- New Section 3 – What you need to know about power converters (Adjustable Speed Drives).
- Section 11 – Case studies. Expand to include:
 - Why Do I Have Electricity in the Ground?
 - Why Do I Continue Losing My Cows?
 - Why Do My Paper Machines Interact with my Extraction Turbines?

Table of Contents:

- 1 | Using This Manual
- 2 | What You Need to Know About Motors
- 3 | What You Need to Know About Motor Controllers
- 4 | The Problem-Solving Process
- 5 | Is There a Problem in the Primary System?
- 6 | Is It The Right Service Transformer for the Job?
- 7 | Is There a Problem in Secondary Service?
- 8 | Is the Customer's Wiring Right?
- 9 | Does the Motor Have the Proper Controllers and Protection?
- 10 | Is It the Right Motor for the Load?
- 11 | Case Studies: When a Customer Says ...
- 12 | Appendix
- References
- Acronyms
- Glossary

- 12 | Appendix
 - Appendix A | Useful Abbreviations and Formulae
 - Appendix B | Determining Power Factor with Metering
 - Appendix C | Motor Load Survey Forms
 - Appendix D | Preventive Maintenance Programs
 - Appendix E | Calculating Voltage Drops
 - Appendix F | Transformer Primary/Secondary Current
 - Appendix G | Voltage Ratings
 - Appendix H | Cross-Reference to NEC
 - Appendix I | Tables from the NEC
 - Appendix J | Motor Disconnects
 - Appendix K | Typical Electrical Data for Packaged Air-Conditioning Units
 - Appendix L | NEMA Enclosure Classifications
 - Appendix M | Number and Location of Overload Units
- References
- Acronyms
- Glossary

Who Should Use:

Distribution Engineering, Design, Standards, Power Quality and Reliability Groups

For the complete report on Project 14-8: Motor Problem Resolution and Avoidance, visit www.dstar.org.



LAVELLE FREEMAN
GE Energy Consulting
Technical Director
DSTAR Program Manager

GE Power
1 River Road
Schenectady, NY 12345
(518) 385-3335

CONTACT ME
Lavelle.Freeman@ge.com

