QUALITROL
INTERNATIONAL
A Division of CIMTEC

THE GE 90-70 SERIES FIELD GUIDE

Avoid costly downtime & extend the life of your GE 90-70 PLC

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Rule number one of maintaining any PLC system is "keep the floor running." High quality systems like the GE 90-70 Series help a lot. Durable and precise, these systems can work for years without much intervention.

We all know the value of regular maintenance and preventative care on the system. They not only keep the process flowing, but they also help with rule number two: "Keep the costs down."

A well maintained GE 90-70 system requires fewer repairs and runs more efficiently. It will also last longer.

Likewise, a well-prepared Maintenance Team is better positioned to pull off Rules One and Two simultaneously.

Why Read This?

Qualitrol is the leader in the repair and remanufacture of PLC parts – including being the only factory-authorized repair center for GE 90-70 components in the world. In fact, we recently purchased the 90-70 product line from GE, making Qualitrol the ONLY place to get new GE 90-70 parts.

As the repair and remanufacture division of Cimtec Automation, Qualitrol International is dedicated to helping you extend the life of your GE 90-70 system.

We understand GE 90-70 systems – inside and out.

We're publishing this guide to help plant managers and maintenance technicians better maintain GE 90-70 PLC systems and better prepare for situations when something goes wrong.

Keep this guide handy. Print one and leave it on your desk.
Save it to your desktop.

Our team of Senior PLC Engineers, with over 50 years' experience working with GE PLC systems, helped us prepare this guide so you can keep your system running and avoid costly maintenance issues.

In our work keeping 90-70 PLC systems running, we often come across situations that could have been averted, or at least minimized.

We've pulled together some of the most common steps you can take to help ensure the long-term stability of your 90-70 system. And in those instances where something does go wrong, you'll be better equipped to get it back in business!

OK, we know that you know the importance of preventative maintenance and keeping everything in top working order. We don't really have to sell you on that. It's your sanity that's on the line whenever things go sideways, after all.

We do want to remind you that in most of the critical issues where we're called in to help, the maintenance team had been doing a great job with their PM schedule. They were diligent. Even the most careful of organizations can fall prey to complacency after a while, though, especially when things have been going well for so long.

This eBook is a reference of the best practices we've uncovered.

By implementing these steps, you'll be setting your system up to be its most reliable. And you will be ready to tackle whatever issues may spring up down the road.

Part 1 – Know Your Hardware

We're going to start with the basics: the controls themselves. In addition to the manufacturer's recommended PM schedule, we've found that there are some simple steps that help alleviate a lot of headaches.

Stock up

PLCs are tough, and often seem like they can last forever. Inevitably, though, some component is going to fail, and the quickest solution is to simply replace the part. GE recommends that you keep one of each component, or 1% – whichever number is higher – on hand for quick replacement.

We've found there are a couple of components that we know are going to wear out pretty consistently. For these, it's worth your while to schedule swapping them before they go bad.

Processor Batteries

The batteries that power the processors in the PLCs are not rechargeable, and will need to be replaced every two to three years. The lifespan of the batteries can be affected negatively by both the age of the system and the temperature they're subjected to, so take into account your system when scheduling a time to swap them out.

And we do strongly recommend replacing them before they fail. Although a system can continue to operate with a bad battery, if a power outage occurs, the programming will be wiped out. That leaves you looking for backups and the system likely out of service beyond the outage.

If you're ready to change your existing batteries but need a little guidance, we've produced a video you can watch here:

Power Supplies

Along with your output modules, power supplies are the hardest working parts of your system. And like the processor batteries, you can count on them needing to be replaced on a regular schedule. We recommend changing out the power supplies every five years, especially in environments where it's hot.

Due to their hard-working status, it's best to keep extra power supply units on hand – even above the minimum "one of each" recommendation.

Additional Considerations

Any part of your system that drives current or builds up heat is going to be at high risk of failure. Be ready with these components already on hand. Since output modules are also heavy lifters, keep extras of them as well.

You can get by with the minimum recommendations for on-hand stock with input modules, as they don't draw a lot of power and are fairly hard to kill.

Scheduled Maintenance

Sure, everyone *knows* how important that PM schedule is. And yet, neglected maintenance tasks are easily the number one missed opportunity to find problems in the system before they become a major issue.

So we're going to harp on it for just a bit. Bear with us.

In our capacity as the only authorized GE repair facility and the go-to service for GE 90-70 PLC troubleshooting and on-site assistance, we see a lot.

And we can tell you that staying on top of your entire PM schedule is incredibly critical.

That said, here are four maintenance tasks that make the biggest impact.

Inspect Analog Input Devices

The quick answer is to make sure your analog components are always in good calibration. The manufacturer's schedule for preventative maintenance is the key here, and we highly recommend you follow it.

We've often seen issues where initially it appeared that the system had a bad analog input module. On further inspection, however, the culprit was the transmitter hooked up to it. Likewise, pay special attention when inspecting the contacts on large contactors for output modules, as they are under a heavy load and may need to be cleaned.

Protect from Airborne Contaminants

Your PLCs operate in some pretty harsh environments, and are often subjected to airborne contaminants. These can affect the operation of your PLCs in different ways.

Corrosive contaminants, such as chlorine and other caustics, will obviously degrade the performance of your components until they quit altogether.

Conductive contamination can be harder to notice, as components may operate normally much of the time with only an occasional error that's hard to track down.

As part of your regular PM schedule, we highly recommend doing visual inspections of the cabinets where your components are housed. Look for evidence of dust (especially black dust, which is a sign of trouble).

When needed, blow off the board gently with canned air. If you regularly find dust inside the cabinets, be sure to check the cabinet seal.

Check Cables and Connections

This makes sense to you already, right? Of course it does, but we see too many calls that are simple loose connections. Save yourself the time and energy needed to call tech support by including this simple inspection as part of your regular PM schedule, especially in cabinets that are subject to lots of vibration.

We've produced a video to help you check your GE 90-70 PLC connections here:

Electromagnetic Interference (EMI)

EMI is always a concern when dealing with the higher voltages and high currents that are common with large machinery.

Too often, the initial PLC installation didn't account for EMI interference. High current wires are a major producer of EMI and how those wires are physically located can cause problems with components that operate at a much lower level.

For example, a 480-volt, 20-amp cable will cause major problems for any nearby Ethernet or analog I/O cables.

Performing an audit of your existing wiring can help identify potential sources of EMI before they become a problem. You can do this check when creating or updating your wiring diagrams (which we'll discuss later).

Also, check for EMI sources when you're experiencing analog signals that are "all over the place." If you've already checked the wiring and have eliminated high-current wiring as a source, look at the contactors on output modules. These can be a significant source of EMI, especially as they get older and it takes more for them to pull in and drop out.

Another symptom of EMI is when communications get flaky. After making sure PLC components are fine, check for EMI. If it's not EMI, you may have a physical issue (like airborne contaminants corroding the grounding plug).

Part 2 – Know Your Software

If working on the hardware is like being a surgeon, then dealing with software issues can seem like being a psychiatrist.

Figuring out what's gone wrong on the software is often difficult and there's not a lot we can do to change that.

We can, however, mitigate the difficulties by dealing with PLC software more routinely so it's less likely to become its own issue.

Here are 5 ways you can make sure your software is "thinking" at its optimum levels so your 90-70 PLC stays healthy.

Diagnostic Fault Tables

The Controller Fault Table and I/O Fault Table are usually the first stop when there's a fatal issue with a GE 90-70 system. What you might be missing out on is that the fault tables are also a great resource to discover issues that aren't fatal yet.

Discovering these faults before they are a major issue will keep your 90-70 running well.

Since not all faults are fatal, you may not have an indicator that something is wrong and the outward appearance is that things are running smoothly.

For example, the loss of an individual input or output is not fatal. Likewise, the informational and diagnostic faults in the tables can tell you if an analog input is over range, under range, or has an open wire.

These kinds of faults are not going to be immediately obvious, and may not affect the process right away, but can be just as problematic if left to worsen.

Reviewing the fault tables on a regular basis will help you find those mild concerns before they become big issues.

To see how to best use your fault tables as a diagnostic tool, watch this video:

Back up Your Program

Like keeping up with the PM schedule, backing up the programs is something you know you should be doing. Far too many companies experience days-long stoppage when a simple software backup could have averted the situation.

You should be creating a backup every time you alter the program.

In addition to this simple rule, we'd like to add two follow-up rules that make a huge positive impact if you ever need to restore:

1. Keep a second set of backups off-site. As a maintenance tech, you know first-hand that even the best-kept equipment can fail unexpectedly and spectacularly. Don't trust your backups to a single laptop. Burn copies to disc or onto a thumb drive and keep somewhere safe.

2. Keep several iterations. Having a backup of the current program is important, yes, but we also recommend that you keep all the different versions that have been used in production. It's so much simpler to restore a "last known good" version of the program from backup than to revert manually!

You might be surprised to learn that the facilities most at risk with backups are those that rarely (if ever) update their programs.

Yes, they made backups when the programs were installed or last altered, but where are they stored?

Maintenance techs have come and gone in the intervening years, and now no one can find them.

Qualitrol is now offering Factory Risk Assessments where we will locate and verify backups for all of your GE 90-70 PLCs.

This includes ensuring you have the correct software on hand and installed for restoring programs to your specific processor.

If you would like to speak to someone about scheduling a free Factory Risk Assessment, please call 1 (800) 784-9385.

If you need help backing up or restoring your project, this video will help:

Update When Available

Most of the newer software packages include the ability to sign up for email notifications of new updates. It is imperative that you sign up.

The manufacturer will let you know of issues they've uncovered and send you service packs to fix many common problems. Stay on top of them.

Otherwise, you're apt to end up troubleshooting an error that could have been avoided.

Know Your Firmware

Know the firmware level of the CPUs. When I.T. departments roll out new equipment – and new operating systems – it's on you to ensure that the new laptop is compatible with your PLC's CPU.

Many facilities rarely update their PLCs, which means they're using older versions of the programming software, which in turn often means running an older operating system.

As time goes on, this becomes more and more untenable as fewer IT staff have the expertise to keep DOS applications running on modern computers.

If your firmware is out of date, you might have to upgrade it before using newer versions of the software. The software help file, usually included as a text document with the software, should tell you the minimum firmware requirements.

For example, with the GE 90-70 line of controllers there are three software programs that might be in use:

- LogicMaster, which is DOS-based, is supported through Windows 2000
- VersaPRO is supported from Windows 95 through Windows XP
- Windows 7 or 8 machines (which are the only versions still supported by Microsoft) require PROFICY version 7 or higher

To learn how to check your firmware, watch this video:

Upgrade Your Firmware

Depending on the controller you have, there are two possible ways to upgrade the firmware.

Newer processors (all current controls and some GE 90-70 processors) can be upgraded by flashing the PROM, much like you might upgrade the BIOS on a computer. Please make sure you have a current backup before proceeding with this activity.

Older CPUs require you to replace a chip. This is an advanced maintenance activity and one we recommend you outsource to us unless you are very comfortable with this kind of operation.

You can speak to one of our Support Engineers at 1 (800) 784-9385 if you need help or would like to schedule this maintenance.

Before replacing a chip you must ensure you have proper backups and always use proper static discharge protection.

Part 3 – Know Thyself

Faulty memory, erratic behavior, difficulty finding replacements.

No, we aren't talking about the worst control ever. We're describing your number one asset in keeping your operation running.... *your people.*

The great thing about PLCs is also the bad thing about PLCs: they are designed to run in harsh environments for a long time with little intervention.

The problem is that during those years, maintenance personnel can turn over 3 or 4 times.

Avoid a false sense of security.

In addition to keeping up with your maintenance and audit activities on the controls, give yourself the tools you need to be able to respond quickly and efficiently should a crisis arise.

Let's face it, when the floor is down and everyone is waiting on you to get everything running again – that's not the time to be searching around.

Maintain Your Brain with Training

Keep yourself up to date on GE 90-70 training.

Contact us to learn the latest on the hardware and software you run so you can stave off issues before they pop up.

And most of all, ensure that the new techs are trained not only in the technical side of maintaining your GE 90-70, but also in proper procedure and documentation.

We produce some training that we're pretty proud of. You can find it:

- On Our Blog
- YouTube Channel
- Tech Support Portal

We also offer on-site training for your team. Call us at 1 (800) 784-9385 to speak to us about getting your team current.

Keep a Library of Knowledge

One of the most time-consuming parts of troubleshooting a system that's having issues is tracking down where all the pieces are, and how they're connected.

This is especially true when bringing in someone to help.

Give yourself and your team a head start by keeping your library of assets up to date. They will be invaluable tools not only for troubleshooting, but also for getting new hires up to speed.

System and LED Diagrams

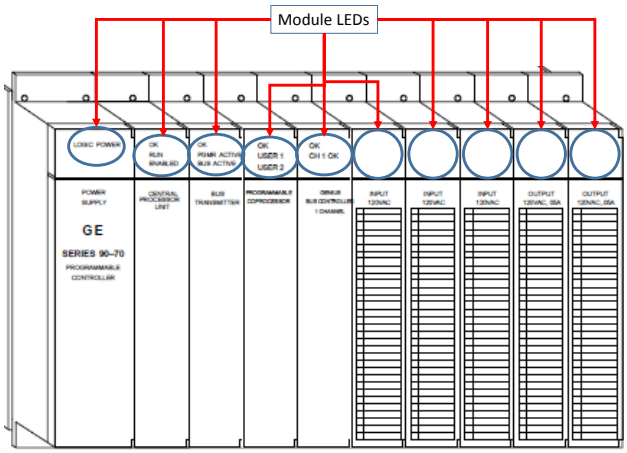
Keep your system wiring diagrams updated and handy.

If you don't have any, or they are old, you can update them as you go through and do your EMI audit (discussed earlier).

If you bring in a technician to help troubleshoot or update your system, this is likely the first thing they will ask for. It's also helpful to have if you need an extra pair of hands to help you track down a problem, and the only person available is Bob from Accounting.

Update system wiring diagrams that show what devices are connected to each input or output point on the PLC. This diagram should contain the electrical drawings of the system and everything that is connected to it, such as switches, lights, relays, etc. Once you know what is connected to each point on the PLC, you can use the LEDs on each module to determine which field device is failing or giving intermittent problems.

Here is an example:



Store a copy in the cabinet for handy reference. Those LEDs are your best guide to a component that's stopped working. They're also the second thing an outside technician will ask for. Might as well have them ready.

Control Manuals

Have a copy of the manufacturer's manual for each control on hand. We recommend having both a physical copy and a digital one. You can usually download a digital copy from the manufacturer's website. If you have a tablet, you can keep the digital copies with you on the floor.

Advanced Knowledge

We hope you've found a few tips to help you improve your PM process and eliminate some headaches with your GE 90-70 system – especially in those stressful times when something does go wrong.

Please remember that we're here to help.

Whether you need a repair, a remanufactured or new product for your GE 90-70 or on-site services, you can call on the folks who wrote the book (literally) on GE 90-70 PLC maintenance and repair.

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ABOUT QUALITROL

Qualitrol International is the repair and remanufacturer division of Cimtec Automation. We have installed, serviced or repaired hundreds of thousands of PLC systems over the past 20 years and hire the most knowledgeable automation engineers in the world.

Qualitrol is the only factory-authorized GE 90-70 Repair Center in the world and is also the only place you can still get new GE 90-70 PLC parts.

Workmanship, Functional Testing, and Product Presentation are the cornerstones of Qualitrol International's Remanufacturing and Repair processes

When you need quality parts fast....

When you need quality repairs.....

When you need the best support...

You need Qualitrol International

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