

circuit breaker compatibility chart

circuit breaker compatibility chart is an essential tool for electricians, contractors, and homeowners who need to ensure that the circuit breakers they select are compatible with their electrical panels and systems. Understanding compatibility is crucial to maintaining electrical safety, optimizing system performance, and complying with electrical codes. This article provides an in-depth exploration of circuit breaker compatibility charts, explaining their significance, how to read and use them, and the factors influencing compatibility. Additionally, it covers the different types of circuit breakers, panel manufacturers, and common compatibility challenges. By the end of this guide, readers will have a clear understanding of how to effectively use a circuit breaker compatibility chart to make informed decisions on electrical installations and upgrades.

- Understanding Circuit Breaker Compatibility
- How to Read a Circuit Breaker Compatibility Chart
- Types of Circuit Breakers and Their Compatibility
- Common Electrical Panel Brands and Compatibility Considerations
- Factors Affecting Circuit Breaker Compatibility
- Best Practices for Selecting Compatible Circuit Breakers

Understanding Circuit Breaker Compatibility

Circuit breaker compatibility refers to the ability of a circuit breaker to fit and function properly within a specific electrical panel. Compatibility involves mechanical fit, electrical ratings, and adherence to safety standards. Using a circuit breaker that is not compatible with the panel can cause malfunctions, safety hazards, or code violations. Therefore, a circuit breaker compatibility chart serves as a reference to match breakers to the correct panel models and manufacturers. These charts typically include breaker types, frame sizes, voltage ratings, and manufacturer recommendations.

Importance of Circuit Breaker Compatibility

Ensuring compatibility prevents issues such as improper breaker seating, unreliable operation, and potential electrical fires. It also guarantees that the breaker will trip as intended under fault conditions, protecting both equipment and personnel. Moreover, compatibility supports warranty compliance and electrical code adherence, which are critical during inspections and insurance evaluations.

Overview of Electrical Panels and Breakers

Electrical panels, also known as load centers, house circuit breakers and distribute power throughout a building. Breakers come in various designs, including standard thermal-magnetic, ground-fault, and arc-fault types. Each panel manufacturer designs their panels to accommodate specific breaker models, making a universal breaker incompatible in many cases. Recognizing the differences between panels and breaker offerings is fundamental to understanding compatibility charts.

How to Read a Circuit Breaker Compatibility Chart

A circuit breaker compatibility chart is organized to help users quickly identify which breakers fit which panels. Proper interpretation of the chart ensures accurate selection and avoids costly errors. The chart usually lists panel brands and models alongside compatible breaker types and part numbers.

Key Components of the Chart

Charts often include the following elements:

- **Panel Brand and Model:** Identifies the specific electrical panel or load center.
- **Breaker Type:** Specifies the breaker style, such as plug-in, bolt-on, or tandem breakers.
- **Breaker Frame Size:** Indicates the physical dimensions and electrical capacity of the breaker.
- **Voltage and Amperage Ratings:** Lists the electrical ratings that the breaker supports.
- **Manufacturer Part Numbers:** Provides exact breaker models approved for use.

Using the Chart Effectively

To use a circuit breaker compatibility chart, first identify the panel manufacturer and model number, usually found on the panel door or inside label. Next, locate the corresponding section in the chart to review the compatible breakers. Confirm that the breaker type and ratings meet the electrical requirements of the circuit. If the chart indicates multiple compatible breakers, select the breaker that best fits the application and availability.

Types of Circuit Breakers and Their Compatibility

Circuit breakers come in several types, each with unique characteristics and compatibility considerations. Understanding these types is vital when consulting a circuit breaker compatibility chart.

Standard Thermal-Magnetic Breakers

These are the most common breakers used in residential and commercial panels. They combine thermal elements for overload protection and magnetic elements for short-circuit protection. Compatibility charts typically list these breakers extensively, given their widespread use.

Tandem or Double-Stack Breakers

Tandem breakers allow two circuits to fit into a single breaker slot, effectively doubling the number of circuits in a panel. Not all panels support tandem breakers, so compatibility charts highlight which panels can accommodate them and under what conditions.

GFCI and AFCI Breakers

Ground-Fault Circuit Interrupter (GFCI) and Arc-Fault Circuit Interrupter (AFCI) breakers provide enhanced safety features by detecting ground faults and arc faults respectively. These breakers have specific compatibility requirements due to their added circuitry and are clearly marked in compatibility charts.

Common Electrical Panel Brands and Compatibility Considerations

Several major electrical panel manufacturers dominate the market, each with proprietary designs affecting breaker compatibility. Familiarity with these brands helps in understanding the chart and making correct selections.

Square D

Square D panels, especially the QO and Homeline series, have distinct breaker designs. The QO line uses plug-in breakers with a unique clip system, while Homeline breakers have different form factors. Compatibility charts separate these series and list approved breakers accordingly.

Siemens

Siemens panels use bolt-on breakers for many models, which differ mechanically from plug-in types. Compatibility charts specify which bolt-on breakers fit which Siemens panel models.

GE (General Electric)

GE panels have historically used both bolt-on and plug-in breakers, depending on the series. Compatibility charts clarify these differences and guide breaker selection based on panel model numbers.

Other Brands

Brands such as Eaton, Murray, and Cutler-Hammer have unique breaker designs and compatibility requirements. Circuit breaker compatibility charts include these brands to assist users in identifying suitable breakers.

Factors Affecting Circuit Breaker Compatibility

Several factors impact whether a circuit breaker is compatible with a given panel. These must be considered alongside the compatibility chart to ensure proper selection.

Physical Dimensions and Mounting Style

The physical size and mounting mechanism of a breaker must match the panel's bus bar and mounting system. Breakers that are too large, too small, or have incompatible mounting clips will not fit securely.

Electrical Ratings and Codes

Amperage and voltage ratings must align with the panel's specifications and the circuit's requirements. Additionally, compatibility must comply with National Electrical Code (NEC) regulations and local codes.

Panel Age and Model Updates

Older panels may only accept specific breaker models, while newer panels might support updated breakers with advanced features. Compatibility charts often note discontinued breakers or panels to prevent mismatches.

Manufacturer Recommendations

Manufacturers provide guidelines and approved breaker lists to ensure safety and warranty compliance. Deviating from manufacturer recommendations can lead to compatibility issues and void warranties.

Best Practices for Selecting Compatible Circuit Breakers

Following best practices in selecting circuit breakers ensures safety, reliability, and code compliance. Utilizing a circuit breaker compatibility chart is a key step in this process.

Verify Panel Identification

Always confirm the exact panel brand and model before referencing a compatibility chart. Misidentification can lead to selecting incompatible breakers.

Consult Updated Compatibility Charts

Use the most current circuit breaker compatibility charts available from manufacturers or trusted sources, as breaker designs and panel models evolve over time.

Match Electrical Specifications

Ensure that the chosen breaker's voltage, amperage, and interrupting capacity meet or exceed the circuit requirements and panel capabilities.

Use Manufacturer-Approved Breakers

Select breakers that the panel manufacturer explicitly approves to maintain safety and warranty coverage.

Consider Professional Assistance

When in doubt, consult a licensed electrician or electrical professional to interpret compatibility charts and recommend appropriate breakers.

- Identify panel brand and model accurately.
- Consult up-to-date compatibility charts.

- Verify breaker type and electrical ratings.
- Use manufacturer-approved breakers only.
- Follow local electrical codes and standards.

Frequently Asked Questions

What is a circuit breaker compatibility chart?

A circuit breaker compatibility chart is a reference guide that helps electricians and engineers determine which circuit breakers are compatible with specific electrical panels or load centers, ensuring proper fit and functionality.

Why is it important to use a circuit breaker compatibility chart?

Using a compatibility chart is crucial to ensure that the circuit breakers installed are approved and fit properly within the electrical panel, which helps prevent electrical hazards, ensures safety, and maintains compliance with electrical codes.

Where can I find a reliable circuit breaker compatibility chart?

Reliable circuit breaker compatibility charts can typically be found on the manufacturers' official websites, in product manuals, or through electrical supply companies that provide detailed specifications for their panels and breakers.

Can I use a circuit breaker from a different brand in my electrical panel?

Generally, it is recommended to use circuit breakers that are listed as compatible with your specific panel brand and model because using breakers from a different brand may result in improper fit or unsafe connections, unless explicitly approved by the panel manufacturer.

How do I read a circuit breaker compatibility chart?

To read a compatibility chart, locate your electrical panel model on the chart, then check the list of circuit breaker models that are marked as compatible. The chart may include breaker types, amperage ratings, and other specifications to help you select the correct breaker.

Are all circuit breakers interchangeable within the same brand?

Not necessarily. Even within the same brand, compatibility can depend on the panel model and breaker type. It's important to consult the compatibility chart to ensure that the breaker you choose is suitable for your specific panel to maintain safety and performance.

Additional Resources

1. *Circuit Breaker Compatibility Guide: Ensuring Safe Electrical Systems*

This comprehensive guide delves into the intricacies of circuit breaker compatibility, offering detailed charts and tables to help electricians and engineers select the right breakers for various applications. It covers different breaker types, manufacturers, and their interoperability with panelboards. Practical examples and troubleshooting tips make it an essential resource for maintaining safe and efficient electrical installations.

2. *Electrical Panelboards and Circuit Breakers: Compatibility and Installation*

Focused on the relationship between panelboards and circuit breakers, this book explains compatibility standards and installation best practices. It includes manufacturer-specific compatibility charts and emphasizes compliance with electrical codes. The book is designed to assist professionals in avoiding common pitfalls and ensuring reliable circuit protection.

3. *Mastering Circuit Breaker Selection: Compatibility Charts and Techniques*

This text offers a detailed overview of how to master circuit breaker selection using compatibility charts. It discusses the technical aspects of breaker ratings, interrupting capacities, and how to interpret manufacturer data sheets. Readers will find step-by-step methodologies for matching breakers to electrical panels for various residential, commercial, and industrial settings.

4. *Understanding Circuit Breaker Compatibility: A Practical Handbook*

Aimed at electrical contractors and technicians, this handbook simplifies the complex topic of circuit breaker compatibility. It provides clear explanations, compatibility matrices, and real-world case studies to enhance understanding. The practical approach makes it easy to apply knowledge directly to job sites and maintenance tasks.

5. *The Circuit Breaker Compatibility Chart Compendium*

This compendium collects compatibility charts from leading circuit breaker manufacturers, presenting them in an organized, easy-to-reference format. It serves as a quick reference guide for professionals needing to verify breaker and panelboard compatibility on the fly. Supplementary information on breaker types and panelboard features adds depth to the charts.

6. *Electrical Safety and Compatibility: Circuit Breaker Selection Essentials*

Focusing on electrical safety, this book highlights the critical role of proper circuit breaker compatibility in preventing hazards. It explains how to use compatibility charts to ensure compliance with safety standards and reduce the risk of electrical faults. The text also covers recent updates in electrical codes and standards related to breaker compatibility.

7. *Circuit Breaker Technology and Compatibility in Modern Electrical Systems*

This title explores advances in circuit breaker technologies and their impact on compatibility considerations. It examines new breaker designs, smart breakers, and integration with digital panelboards. The book provides charts and guidelines for incorporating these innovations while maintaining system compatibility and reliability.

8. Residential and Commercial Circuit Breaker Compatibility Handbook

Tailored to both residential and commercial electrical systems, this handbook offers detailed compatibility charts and selection criteria for a variety of breakers and panels. It addresses common compatibility challenges and solutions in different building types. The book also features maintenance tips and upgrade considerations for existing electrical infrastructure.

9. Panelboard and Circuit Breaker Compatibility: Engineering Perspectives

Written from an engineering viewpoint, this book covers the theoretical and practical aspects of circuit breaker compatibility with panelboards. It includes in-depth analysis of electrical parameters, compatibility testing methods, and design considerations. Engineers and technical specialists will find valuable insights into optimizing system performance and safety through proper breaker selection.

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Circuit Breaker Compatibility Chart: Unlocking Seamless Electrical System Integration

Are you tired of the frustration and potential dangers of mismatched circuit breakers? Imagine the nightmare: a faulty breaker, a system shutdown, or worse - a fire. Choosing the wrong breaker can lead to costly repairs, system downtime, and compromise the safety of your home or business. Finding the right breaker for your specific electrical panel and needs can feel overwhelming, especially with the vast array of brands, amperages, and trip types available. This isn't just about flipping a switch; it's about ensuring the safety and reliability of your entire electrical system.

This comprehensive guide, "The Ultimate Guide to Circuit Breaker Compatibility," will equip you with the knowledge and tools to confidently navigate the complex world of circuit breaker selection.

Contents:

Introduction: Understanding the importance of circuit breaker compatibility.

Chapter 1: Deciphering Circuit Breaker Specifications: Breaking down voltage ratings, amperage, trip curves, and interrupting capacity.

Chapter 2: Identifying Your Existing Electrical Panel: Recognizing panel manufacturers and their specific requirements.

Chapter 3: The Compatibility Chart: A Step-by-Step Guide: Using a compatibility chart effectively and interpreting its data.

Chapter 4: Understanding Trip Curves and Their Applications: Selecting the right trip curve for various loads.

Chapter 5: Advanced Considerations: Addressing arc fault circuit interrupters (AFCIs), ground fault circuit interrupters (GFCIs), and other specialized breakers.

Chapter 6: Troubleshooting Compatibility Issues: Diagnosing problems and finding solutions.

Conclusion: Ensuring electrical safety through proper breaker selection.

The Ultimate Guide to Circuit Breaker Compatibility

Introduction: The Critical Importance of Correct Circuit Breaker Selection

Choosing the right circuit breaker is not merely a technical detail; it's a cornerstone of electrical safety and system reliability. A mismatched breaker can lead to a cascade of problems, ranging from nuisance tripping to catastrophic equipment failure and even fire hazards. This guide provides a comprehensive understanding of circuit breaker compatibility, empowering you to make informed decisions and avoid costly mistakes. Understanding breaker specifications and panel compatibility is crucial for maintaining a safe and efficient electrical system.

Chapter 1: Deciphering Circuit Breaker Specifications

Circuit breakers are complex devices with several key specifications that must be carefully considered for compatibility. These include:

Voltage Rating: This indicates the maximum voltage the breaker can safely handle. Incorrect voltage can lead to overheating and failure. Common voltage ratings are 120V and 240V in residential settings. Always match the breaker's voltage rating to your system's voltage.

Amperage (Amps): This represents the maximum current the breaker can carry before tripping. Choosing a breaker with an amperage rating lower than the load's current draw will cause frequent tripping. Conversely, a breaker with too high an amperage rating will not protect against overloads, posing a significant fire risk. Wire gauge and load calculations determine the appropriate amperage.

Trip Curves (B, C, D, K): Trip curves define the relationship between the current flowing through the

breaker and the time it takes to trip. Different curves are suitable for different load types.

B-Curve: Designed for low-inrush loads like lighting and electronics. Trips quickly at high overcurrents.

C-Curve: The most common curve, suitable for general-purpose loads with moderate inrush current.

D-Curve: Used for high inrush current loads such as motors. Withstands significantly higher inrush currents before tripping.

K-Curve: Designed for extremely high inrush loads, often found in industrial settings.

Interrupting Capacity (kA): This specifies the maximum fault current the breaker can safely interrupt. This is crucial for protecting against short circuits. The interrupting capacity must be equal to or greater than the system's short-circuit current. A lower interrupting capacity can lead to arc flashes and potential injuries.

Understanding these specifications is paramount for ensuring correct breaker selection and preventing electrical hazards.

Chapter 2: Identifying Your Existing Electrical Panel

Before selecting a new circuit breaker, meticulously identify your existing electrical panel. This involves determining:

Manufacturer: The manufacturer's name and model number are usually found on a label on the panel's door or inside. This information is vital for determining compatibility with specific breaker brands.

Panel Type: Panels come in various types, including load centers, distribution boards, and subpanels. The type of panel dictates the size and type of breakers it can accommodate.

Busbar Configuration: The busbar is the main conductor within the panel. The configuration and size of the busbar will impact the types of breakers that can be installed safely.

Available Space: Ensure sufficient space within the panel to accommodate the new breaker. Overcrowding can lead to overheating and fire hazards.

By accurately identifying these features, you can ensure that the new circuit breaker is compatible with the existing electrical panel. Refer to the manufacturer's specifications for precise compatibility information.

Chapter 3: The Compatibility Chart: A Step-by-Step

Guide

A circuit breaker compatibility chart is an invaluable tool for verifying compatibility between breakers and panels. These charts often provide a matrix listing breaker manufacturers and panel manufacturers, indicating whether specific breakers are approved for use in particular panels. Using a compatibility chart is a straightforward process:

1. Identify Your Panel: Determine the manufacturer and model number of your electrical panel.
2. Locate the Chart: Access the compatibility chart from the panel manufacturer's website or documentation. Some charts are provided by the circuit breaker manufacturer, detailing which panels their breakers are compatible with.
3. Find Your Panel: Locate the row representing your specific panel model in the chart.
4. Select Your Breaker: Identify the column for the desired circuit breaker manufacturer and model.
5. Check for Compatibility: The intersection of the row and column will indicate whether the breaker is compatible. A "Yes," "Compatible," or similar indication means it's suitable; otherwise, it's not.

Chapter 4: Understanding Trip Curves and Their Applications

Selecting the correct trip curve is crucial for effective overcurrent protection. Mismatched trip curves can lead to nuisance tripping or insufficient protection. Choosing the right curve depends on the load characteristics.

Resistive Loads: These loads (e.g., lighting, heating elements) draw a relatively constant current and benefit from B-curve breakers, ensuring prompt tripping during overloads.

Inductive Loads: These loads (e.g., motors, transformers) draw a high inrush current initially. C-curve or D-curve breakers are appropriate, tolerating the initial surge without tripping unnecessarily.

Motor Loads: Motors require breakers with high interrupting capacity and often need D-curve breakers to handle the high inrush current during startup.

Improper trip curve selection can lead to frequent nuisance tripping (too sensitive) or inadequate protection (not sensitive enough), posing significant safety risks.

Chapter 5: Advanced Considerations: AFCIs, GFCIs, and Specialized Breakers

Beyond standard circuit breakers, various specialized breakers offer enhanced safety features:

Arc Fault Circuit Interrupters (AFCIs): These breakers detect and interrupt arcing faults, reducing the risk of electrical fires caused by arcing in wiring. They are frequently mandated for bedroom circuits.

Ground Fault Circuit Interrupters (GFCIs): GFCIs detect ground faults, protecting against electric shock in areas with potential water exposure, such as kitchens and bathrooms. They are usually required by code in these locations.

Other Specialized Breakers: Other types exist, such as surge protectors and those designed for specific applications like solar panels or EV charging stations. Compatibility with these specialized breakers needs careful consideration, adhering to the manufacturer's instructions.

Chapter 6: Troubleshooting Compatibility Issues

Despite careful planning, compatibility issues might arise. Troubleshooting steps include:

Recheck Specifications: Verify all breaker and panel specifications to ensure accuracy.

Consult Documentation: Refer to the manufacturer's manuals for both the panel and the breakers.

Contact Manufacturers: If the problem persists, contacting the manufacturer's technical support can resolve uncertainties.

Professional Electrician: For complex issues, always consult a qualified electrician to avoid safety hazards. Electrical work should only be performed by trained professionals.

Conclusion: Ensuring Electrical Safety Through Proper Breaker Selection

Selecting the correct circuit breaker is essential for a safe and reliable electrical system. By understanding breaker specifications, panel compatibility, and trip curves, you can confidently choose the right breaker, mitigating risks and ensuring the longevity of your electrical system. Remember, when in doubt, always consult a qualified electrician.

FAQs:

1. What happens if I use an incompatible circuit breaker? This can lead to overheating, fire hazards, frequent tripping, or failure to protect against faults.

2. How do I find a compatibility chart for my electrical panel? Check the manufacturer's website or the panel's documentation.
3. What is the difference between a B-curve and a C-curve breaker? B-curve is for low inrush loads, while C-curve is for general-purpose loads.
4. Are AFCIs and GFCIs always necessary? AFCIs are often required for bedroom circuits, while GFCIs are mandatory in wet areas.
5. Can I install a circuit breaker myself? Unless you are a qualified electrician, it's unsafe to do so.
6. What is interrupting capacity, and why is it important? It's the maximum fault current a breaker can safely interrupt, preventing arc flashes and damage.
7. What should I do if my circuit breaker keeps tripping? Check for overloads or short circuits, and if the problem persists, call an electrician.
8. How do I determine the amperage rating for a circuit? This is based on load calculations and the wire gauge used.
9. Where can I find more information on circuit breaker selection? Consult the National Electrical Code (NEC) and manufacturer's documentation.

Related Articles:

1. Understanding Electrical Panel Types and Their Applications: Explains different electrical panel types and their suitability for various applications.
2. Calculating Amperage Requirements for Electrical Circuits: A guide to accurately calculating the necessary amperage for different circuits and loads.
3. A Comprehensive Guide to Arc Fault Circuit Interrupters (AFCIs): Detailed information about AFCIs, their functions, and installation.
4. Ground Fault Circuit Interrupters (GFCIs): Protecting Against Electrical Shock: Explores GFCIs, their importance in safety, and installation requirements.
5. Interpreting Circuit Breaker Trip Curves: A Practical Guide: A detailed explanation of different trip curves and their applications.
6. Troubleshooting Common Circuit Breaker Problems: Practical tips for identifying and resolving common circuit breaker issues.
7. Choosing the Right Wire Gauge for Your Electrical Circuits: A guide to selecting appropriate wire gauge based on amperage requirements.
8. Residential Electrical Safety: A Homeowner's Guide: A comprehensive overview of residential electrical safety practices.
9. The Importance of Regular Electrical System Inspections: Emphasizes the importance of regular

inspections to identify potential problems before they become serious.

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by the Electrical Contractors' Association and Select (formerly the Electrical Contractors' Association of Scotland), provides a detailed, authoritative guide to the Wiring Regulations, BS 7671: Requirements for Electrical Installations. As the regulations are not drafted by topic, the handbook will be particularly useful in guiding designers, installers, inspectors and testers round the various requirements. It gives practical guidance on how to approach new installations, extensions to existing installations, and the more extensive testing and inspection which are required. The handbook has been revised to take account of amendments introduced by BS 7671:2001 effective from 1 January 2002. The most significant changes are: chapter 13 rewritten to include three sections on protection for safety, design and selection of electrical equipment a new chapter 44 on overvoltage protection a new chapter 48 on high fire risk situations revisions to the requirements on rooms containing a bath or shower new earthing requirements for the installation of equipment with high protective conductor outlets

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and unlike other solutions, it can communicate over multiple protocols including MQTT, AMQP, and Kafka's binary protocol. About the book Apache Pulsar in Action teaches you to build scalable streaming messaging systems using Pulsar. You'll start with a rapid introduction to enterprise messaging and discover the unique benefits of Pulsar. Following crystal-clear explanations and engaging examples, you'll use the Pulsar Functions framework to develop a microservices-based application. Real-world case studies illustrate how to implement the most important messaging design patterns. What's inside Publish from Pulsar into third-party data repositories and platforms Design and develop Apache Pulsar functions Create an event-driven food delivery application About the reader Written for experienced Java developers. No prior knowledge of Pulsar required. About the author David Kjerrumgaard is a committer on the Apache Pulsar project. He currently serves as a Developer Advocate for StreamNative, where he develops Pulsar best practices and solutions. Table of Contents PART 1 GETTING STARTED WITH APACHE PULSAR 1 Introduction to Apache Pulsar 2 Pulsar concepts and architecture 3 Interacting with Pulsar PART 2 APACHE PULSAR DEVELOPMENT ESSENTIALS 4 Pulsar functions 5 Pulsar IO connectors 6 Pulsar security 7 Schema registry PART 3 HANDS-ON APPLICATION DEVELOPMENT WITH APACHE PULSAR 8 Pulsar Functions patterns 9 Resiliency patterns 10 Data access 11 Machine learning in Pulsar 12 Edge analytics

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circuit breaker compatibility chart: Dictionary of Acronyms and Technical Abbreviations Jakob Vlietstra, 2012-12-06 My first encoWlter with acronyms took place when I was ten years old and growing up in an occupied COWltry during the Second World War. My father proudly annoWlced one day that, despite the ban imposed by the occupying administration, he had managed to get a radio installed and could receive the BBC. (All acronyms used in this introduction are listed in this dictionary.) To me the meaning ofBBC was that we would receive different information about the war than we got from the usual censored broadcasts. There was, of course, the well-known acronym associated with the nT, but at that time I did not realize that it meant more than the postal service, in those years a deteriorated service. Gradually the daily use of acronyms grew. Most of the newly acquired three-and four-letter abbreviations referred to organiza tions, such as the broadcasting corporations in The Netherlands and Belgium, and references to coWltries such as the USA, USSR, and UK. When attending high school (the HBS) after the war, my knowledge of acronyms grew slowly. Even during the ten years I spent in the Dutch Merchant Marine (the GHV), the number of acronyms was limited to ad vanced equipment that eventually became known as RADAR, LORAN, and DECCA.

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