

The Definitive Technical Guide to Commander 112 Series Maintenance: IPC Analysis, Serial Tracking, and Operational Compliance

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The Aero Commander 112, later produced under the Rockwell International banner, remains a landmark in general aviation engineering. Introduced in the early 1970s, it was designed to challenge the dominance of the Beechcraft Bonanza and Piper Arrow by offering a more spacious cabin, trailing-link landing gear, and a robust airframe. However, for the contemporary aircraft technician or owner-operator, maintaining these legacy aircraft requires an exhaustive understanding of the **Illustrated Parts Catalog (IPC)** and the critical nature of **Serial Number (SN)** tracking. This technical guide provides an in-depth analysis of the Commander 112 series, focusing on the specific maintenance requirements for early serial numbers (1-125), variant transitions, and the regulatory frameworks governing their operation.

The Evolution of the Aero Commander 112: An Engineering Retrospective

The development of the Commander 112 was driven by a philosophy of "cabin-class" comfort in a single-engine retractable. Unlike its contemporaries, which often felt cramped, the 112 featured a wider cabin and dual entry doors. From an engineering standpoint, the aircraft utilized a semi-monocoque aluminum structure. The initial models, specifically those within the **Serial Number 1 to 125** range, represent the first generation of this design. These early units are pivotal for researchers and maintainers because they established the baseline for all subsequent refinements, including the 112B and the turbocharged 112TC/TCA models.

Understanding the legacy of these serial numbers is not merely an academic exercise. In the world of aviation maintenance, part interchangeability is often limited by production dates. The **Illustrated Parts Catalog** for the Model 112 serves as the definitive legal and technical reference for ensuring that the correct components—ranging from structural doublers to intricate seals—are installed according to the original type certificate.

Decoding the Illustrated Parts Catalog (IPC) Framework

The IPC is more than a list of parts; it is a complex schematic map of the aircraft's DNA. For the Commander 112, the **Model 112/B/TC/TCA Parts Catalog** is organized into chapters that follow the ATA (Air Transport Association) standards, though older manuals may use a proprietary Aero Commander format. The primary function of the IPC is to provide three critical pieces of information: the **Part Number**, the **Nomenclature**, and the **Quantity Required** per assembly.

The Role of Figure Graphics and Item Callouts

Modern revisions to the IPC, such as those released in 2014, have focused on updating IPL (Illustrated Parts List) figure graphics. These updates are essential for resolving ambiguities in part placement. A typical entry in the Commander 112 IPC includes a detailed exploded-view diagram. Technicians must cross-reference the **item number callout** on the graphic with the corresponding entry in the parts list to identify the exact serial-effective component.

Serial Number Effectivity

One of the most common errors in general aviation maintenance is the installation of a part that appears identical but is not certified for a specific serial range. In the **Commander 112 IPC for Serial Numbers 1-125**, several components are unique to these early airframes. This is particularly true for the fuel system and the landing gear retraction mechanisms. The term "Effectivity" in a parts catalog denotes the specific serial numbers to which a part applies. If a part is listed for "SN 1 thru 125," it cannot be legally used on a 112B (which typically starts at SN 495 or SN 500 depending on the production block) without a Supplemental Type Certificate (STC) or a Field Approval.

Technical Architecture of the 112, 112B, 112TC, and 112TCA Variants

The Commander 112 series evolved significantly over its production life. Each variant introduced changes to the aerodynamic profile, power plant, and gross weight capacities. The following table provides a comparative analysis of the primary technical specifications across the model range.

Feature/Metric	Commander 112 (Early)	Commander 112B	Commander 112TC/TCA
Engine Model	Lycoming IO-360-C1D6	Lycoming IO-360-C1D6	Lycoming TO-360-C1A6D
Horsepower	200 HP	200 HP	210 HP (Turbocharged)
Serial Range	1 to 494 (approx.)	495 to 540+	13000 to 13300+
Max Takeoff Weight	2,650 lbs	2,800 lbs	2,970 lbs
Key Identification	Standard Wing	Increased Span Wings	Turbocharged/T-Tail Performance

Propulsion Systems and Performance Matrices

While the naturally aspirated 112 used the reliable Lycoming IO-360, the transition to the **112TC (Turbocharged)** and **112TCA (Alpine)** represented a significant shift in high-altitude performance. The TCA model featured the "Alpine" package, which included a larger diameter propeller and improvements to the wastegate system. Maintaining these engines requires referencing specific Kohler engine identification numbers for ground support equipment and Lycoming-specific parts catalogs for the core power plants.

Structural Integrity: The Role of Doublers and Seals

In the 112 series, structural longevity is a primary concern, especially as the fleet ages. The IPC identifies critical structural components like the **615034-39 Doubler** and various specialized seals (e.g., **615034-37 Seal**). These parts are often found in high-stress areas such as the wing-to-fuselage attachment points or the stabilizer mounts.

- **Doublers:** These are reinforcement plates added to the airframe to distribute loads or repair fatigue cracks. The IPC specifies the exact alloy and thickness required for these repairs.
- **Seals:** Aerodynamic and environmental seals are crucial for preventing moisture ingress, which leads to corrosion. The 112's unique door design requires specific bulb seals to maintain cabin pressurization (where applicable) and noise reduction.

Regulatory Compliance: General Aviation Operations (CAR OPS 2A)

Operating a Commander 112 in a professional or commercial environment (such as fractional ownership or flight training) requires adherence to **CAR OPS 2A (General Aviation Operations - Aeroplane)**. This regulatory framework mandates that operators maintain a current list of fractional owners, registration markings, and serial numbers. Furthermore, it dictates the maintenance standards that must be met to keep the aircraft in a "General Aviation" category versus a more stringent commercial category.

The Maintenance Log and Amendment Log

Every technical manual for the Commander 112 includes an **Amendment Log**. This is a chronological record of changes made to the IPC or Maintenance Manual. For example, if a new service bulletin (SB) or airworthiness directive (AD) is issued regarding the landing gear pivot pins, the IPC will be amended to reflect new part numbers. Technicians must verify that their manual is up to date by checking the amendment date (e.g., the 1 Nov 2023 revision mentioned in recent documentation updates).

Step-by-Step Guide to Part Identification and Procurement

When a component failure occurs, the following professional workflow should be followed to ensure technical accuracy and airworthiness:

1. Identify the Airframe Serial Number: Locate the data plate on the aircraft (usually found on the rear fuselage or near the tail).
2. Locate the Relevant System in the IPC: Navigate to the chapter corresponding to the failed part (e.g., Chapter 32 for Landing Gear).
3. Cross-Reference the Figure: Find the exploded view diagram that contains the part. Note the item callout number.
4. Verify Part Number and Nomenclature: In the parts list, find the item number. Check for any "Serial Number Effectivity" notes. For instance, if the part is listed as "Effectivity: SN 1 thru 25," and your aircraft is SN 110, this part is compatible. If it says "SN 126 and up," you must find the alternative part number.
5. Check for Superseded Parts: Modern inventory systems often list newer part numbers that replace older ones. Always verify that the new number is an approved replacement by referencing the manufacturer's Product Catalog or Service Letters.

Failure Mode and Effects Analysis (FMEA) in Aging 112 Airframes

The Commander 112 series, particularly the early models (SN 1-125), faces specific failure modes that require proactive management. A critical area is the **Trailing Link Landing Gear**. While famous for making "greaser" landings easy, the pivot points and seals within the oleo struts are subject to wear. Failure to replace seals (like the 615034-37) can lead to hydraulic fluid leakage and subsequent gear extension failure.

Case Study: Structural Doubler Implementation

In several instances, early 112 models exhibited stress cracking in the aft fuselage skin. The solution involved the installation of a **615034-39 Doubler**. The engineering principle here is the redistribution of shear stress across a larger surface area, thereby reducing the localized pressure on the rivet holes. Maintenance teams must ensure that the fastener spacing for these doublers adheres strictly to the **Model 112/B/TC/TCA Parts Catalog** specifications to maintain the airframe's ultimate load factor.

Ground Support and Maintenance Equipment

Beyond the airframe itself, maintaining a Commander 112 involves ground support equipment. The data indicates that certain maintenance procedures involve components identified by **Kohler engine identification numbers** (specifically models like CH18-CH25, CH620-CH730). These are typically used in ground power units (GPUs) or tugs specific to the aircraft's handling. Proper identification of these numbers (Model, Specification, and Serial) is essential for ordering the correct repair components for support machinery, ensuring that the aircraft maintenance environment remains operational.

Summary of Best Practices for Fleet Management

The longevity of the Commander 112 fleet is a testament to its robust initial design and the dedicated community of owners and engineers. However, as these aircraft move further from their production dates, the reliance on precise technical documentation grows. The **Illustrated Parts Catalog** is not just a tool for ordering parts; it is a vital component of the aircraft's continuing airworthiness. By meticulously tracking serial numbers, adhering to the latest IPC amendments, and following the regulatory guidelines of CAR OPS 2A, operators can ensure that the Commander 112 remains a safe and efficient platform for decades to come.

Technicians are encouraged to join specialized groups such as the **Commander Owners Group** to stay informed about the latest developments in part sourcing and engineering fixes. In the modern era, where parts for legacy aircraft can be difficult to find, the ability to correctly identify a **nomenclature** or **part number** from a 1981-era catalog is a specialized skill that directly impacts the safety and value of the aircraft. Through rigorous adherence to these technical standards, the Aero Commander 112 continues to occupy its rightful place as a premier example of 20th-century general aviation engineering.

Baca Juga (Artikel Terkait)

- [Comprehensive Guide to A320 Dispatch Deviations: Navigating MEL, CDL, and DDG Protocols](http://alghafgolden.com/airbus-a320-dispatch-deviations-mel-cdl-ddg-guide.pdf)

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- [Comprehensive Guide to ATA 100 Specification: Mastering Aircraft Maintenance Manuals and Page Block Standards](http://alghafgolden.com/comprehensive-guide-ata-100-aircraft-maintenance-manuals-page-blocks.pdf)

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