

# The Dassault Mirage III in South African Air Force service



## PART 4

### Differentiating between the various SAAF Mirage III variants

This E-book was compiled by Malcolm Reid  
Pretoria May 2022

#### The Dassault Mirage III in South African Air Force service – Part 4

In the compilation of this document, data has been obtained from various Internet sources and contributors. This data has been cross-referenced where needed to ensure, as much as possible, the consistency and correctness of that data. There have been many contributors to various Internet forums relating to the SAAF Mirage III, and in particular, the Unofficial SAAF Website (saairforce.co.za). Without the efforts by fellow enthusiasts, pilots and crews in providing this written and photographic documentation of the history of the Mirage III in SAAF service, this narrative would not have been possible. Many of the images sourced via Internet searches have been used without the specific permission from the originators as, in many cases, these are unknown. Others have been included with the originators' details retained and unedited as sourced from the Internet. The images have been included in this document on a "fair use" basis for the purposes of historical research and the recording thereof. This document is offered publically as a free E-book and in no way does it provide a source of income for the author or any other party.

As noted in Part 1, the quality of images in many instances is low due to the electronic file size, some less than 50kB. These images have been retained as sourced from the Internet and have not been subject to any adjustments (hue, saturation etc.) and have not been sharpened.

This E-book was compiled by Malcolm Reid  
malcolmreid1136@gmail.com  
Pretoria May 2022

## **Part 4 - Differentiating between the various SAAF Mirage variants**

<b>1</b>	<b>DIFFERENTIATING BETWEEN THE SINGLE SEAT MIRAGE IIICZ AND MIRAGE IIIEZ</b>	<b>4</b>
<b>2</b>	<b>ATAR 09B VERSUS 09C EXHAUST CONFIGURATION :</b>	<b>5</b>
<b>3</b>	<b>LANDING GEAR AND WHEEL BRAKE DIFFERENCES</b>	<b>7</b>
<b>4</b>	<b>DIFFERENTIATING BETWEEN THE TWO-SEAT MIRAGE IIIBZ, DZ AND D2Z</b>	<b>10</b>
<b>5</b>	<b>DIFFERENTIATING BETWEEN THE RECONNAISSANCE MIRAGE IIIRZ AND R2Z</b>	<b>11</b>
<b>6</b>	<b>MIRAGE III WINGS AND DIMENSIONS</b>	<b>17</b>
<b>7</b>	<b>MIRAGE IIICZ WITH EZ WINGS AND “CAT BALLS”</b>	<b>22</b>
<b>8</b>	<b>REAR VENTRAL FAIRINGS</b>	<b>23</b>
<b>9</b>	<b>REFERENCES</b>	<b>26</b>

## 1 Differentiating between the single seat Mirage IIICZ and Mirage IIIEZ

Many people confuse the Mirage IIICZ with the IIIEZ. The significant and observable differences between the two are noted below :

- Fuselage :
  - The EZ had an extended fuselage which was achieved through adding a 30cm plug just behind the cockpit. This was to provide space for additional avionics for the ground attack mission and additional fuel. This extension is clearly visible as the leading edge of the engine intake on the EZ is in line with the rear of the canopy, whereas on the CZ, the intake leading edge is further forward.
  - The overall length of the engine air intake is slightly shorter on the EZ than the CZ (as measured from the intake blow-in doors).
  - The EZ was equipped with a ventral Doppler antenna fairing ahead of the nose undercarriage. The CZ was not.
  - Aft ventral fin – the CZ has a simple 2-dimensional blade type ventral strake whereas the EZ has a three dimensional ventral fairing housing additional fuel. This latter configuration was also common for the RZ, R2Z, DZ and D2Z.
  - The EZ had two small faired-in aft-facing exhausts on the rear fuselage either side of the ventral fin. The CZ did not.
- Wings :
  - The EZ had a slightly different wing internal structure to that of the CZ in that it was fitted with leading edge fuel tanks. This did not alter the plan form and overall dimensions of the wing.
  - On the EZ, the inboard wing external stores hard point is located further outboard (closer to the leading edge slot) than on the CZ by about 100mm and has a small hump located on the upper surface above the pylon fixing point. The reason for moving the hard point further outwards was to accommodate the EZ's main undercarriage legs which were designed with different retraction kinematics and configuration to the CZ. The DZ, D2Z, RZ and R2Z had similar wings and main undercarriage configuration as for the EZ.
  - The outer wing hard point remained unchanged in position relative to the leading edge slot.
  - The CZ could be fitted with E-wings but the undercarriage configuration would remain per CZ configuration. The E-wing was designed to accommodate both configurations.
- Engine :
  - The CZ was equipped with the Atar 9B turbojet engine which had a clamshell / eyelid variable nozzle configuration. The EZ had the higher thrust Atar 9C turbojet engine with a more conventional annular variable nozzle configuration.
- Landing gear :
  - The EZ had a different main landing gear leg configuration with changes to the retraction actuator. This undercarriage change was introduced to accommodate larger centerline stores and an increased all-up weight.
  - The EZ nose undercarriage was equipped with twin landing lights – the CZ did not have these but rather a single light mounted flush ahead of the nose landing gear which would flip down for landing and takeoff.
  - The main gear doors on the CZ had a slot cut into them. All other variants had a solid door without this slot.

- There was a distinct difference in the main wheel brake units – see images below.
- Vertical stabilizer :
  - The CZ had a leading edge strake at the front of the vertical stabilizer. The EZ did not.
  - The fairing at the base of the vertical stabilizer ending in the drag chute housing was more pronounced on the EZ than on the CZ, although this is not obvious.
- Pitot probes :
  - The CZ had a single pitot probe located on the port lower forward fuselage, the EZ had two small pitot probes located ahead of the windshield.

## 2 Atar 09B versus 09C exhaust configuration :



Atar 09B as fitted to the BZ and CZ. This illustrates the clamshell type variable exhaust nozzle.



Atar 09C on EZ #819 and as fitted to DZ, D2Z, EZ and RZ annular type variable exhaust nozzle.  
The R2Z uses the Atar 09K50 which has a similar exhaust nozzle arrangement as for 09C.





CZ #809 demonstrating its 09B in action with clamshell exhaust arrangement.

### 3 Landing gear and wheel brake differences

CZ and BZ on left below



CZ #813 left main undercarriage leg. Note that the front stabilization arm connects to a bracket inside the bay (top right in image).

Retraction arm can be seen at upper left.  
**(BZ undercarriage the same)**

EZ, DZ, D2Z, RZ and R2Z below



RZ #838 left main undercarriage leg (similar view to the image to the left). Note that the front stabilization arm now has a hydraulic ram for different retraction kinematics. The empty bracket for the C style arm can be seen in the right hand corner of the bay.

Retraction arm can be seen the top left.  
**(EZ, DZ, D2Z and R2Z undercarriage the same)**



BZ #818 right main undercarriage leg looking towards rear of aircraft. Note the slots in the doors.  
**(CZ the same)**



RZ #838 left main undercarriage leg looking towards rear of aircraft. Note absence of slots in the doors.  
**(EZ, DZ, D2Z and R2Z the same)**



The Dassault Mirage III in South African Air Force service – Part 4



CZ main wheel brake assembly.  
(BZ the same)



RZ #838 main wheel brake assembly.  
(EZ, DZ, D2Z and R2Z the same)



CZ #813 nose landing gear leg. There are no landing lights located on leg.  
(BZ the same)



RZ #838 nose landing gear leg. Note one of the dual landing lights located on leg.  
(EZ, DZ, D2Z and R2Z the same)



Despite these differences, all Mirage III variants were similar in terms of landing gear door operation. With landing gear locked in the extended position, the main gear and the main nose gear doors would close. A handle was provided on the lower fuselage to allow manual override of the hydraulic system to allow the main gear doors to be opened for maintenance and inspection purposes.



RZ #838 main undercarriage door opening handle located inside the wing. The cover is painted yellow and black on the outside. This is similar for both wings.

The dual antenna arrangement appeared to be unique to the RZ.



## 4 Differentiating between the two-seat Mirage IIIBZ, DZ and D2Z

There are a number of differences between the dual seat BZ, DZ and D2Z versions of the Mirage III. These are described below :

	<b>BZ</b>	<b>DZ</b>	<b>D2Z</b>
Fuselage length	No fuselage plug	30cm fuselage plug	30cm fuselage plug
Nose	Standard conical nose with radome. Small flush intake for cooling air on lower side of nose	Sharper nose with “chisel” shaped tip which contains an intake for cooling air	Sharper nose with “chisel” shaped tip which contains an intake for cooling air
Nose pitot probe	Centrally from tip of radome	Offset to upper lip of nose	Offset to upper lip of nose
Additional air data probes	Single probe on lower nose just aft of radome, offset to port	Two smaller probes, just forward of windshield	Two smaller probes, just forward of windshield
Doppler antenna	None	Located beneath the nose, ahead on the nose landing gear	None
Vertical stabilizer	Like the CZ, has a leading edge fillet	Like the EZ, has no leading edge fillet	Like the EZ, has no leading edge fillet
Rear ventral fin / fairing	Like the CZ, fin is simple blade configuration	Like the EZ, 3-dimensional ventral fairing to accommodate additional fuel	Like the EZ, 3-dimensional ventral fairing to accommodate additional fuel
Jet exhaust	Like the CZ, clamshell configuration (Atar 09B)	Like the EZ, annular configuration (Atar 09C)	Like the EZ, annular configuration (Atar 09C <sup>1</sup> )
Strakes (electrical loom ducting)	On lower forward fuselage, both sides, straight	On lower forward fuselage, both sides, curved	On lower forward fuselage, both sides, curved
Landing light	Like the CZ, located centrally on lower nose ahead of nose landing gear door, drops down when in use	Dual round lights fixed to nose landing gear leg	Dual round lights fixed to nose landing gear leg
External antennae	-	-	Horizontal blade antennae located either side of upper vertical stabilizer
Main undercarriage brake units	Early, as for CZ	Later, as for EZ	Later, as for EZ
Arrestor hook	None	None	Located in a slot in the rear of the ventral stabilizer. The D2Z was only SAAF Mirage III variant to be equipped with an arrestor hook.

<sup>1</sup> Contrary to what appears in some texts, the D2Z was equipped with the 09C and not the 09K50.

## 5 Differentiating between the reconnaissance Mirage IIRZ and R2Z

Both the RZ and R2Z were based on the EZ with the most obvious modification being the reshaped nose section to accommodate forward looking, oblique and vertical cameras. The window configuration for the cameras was the same for both the RZ and R2Z. There were a total of ten camera windows. The camera configuration used by SAAF RZ and R2Z aircraft was different to those used by other air forces.

The RZ was equipped with the Atar 9C and the R2Z with the higher thrust Atar 09K50. The exhaust nozzles looked similar. However, the intake boundary layer splitter plate on the R2Z was changed from the straight arrangement on the RZ (and other SAAF versions) to a scalloped (slightly curved) shape, possibly due to the cutting back of the intake lip (larger inlet area required for more airflow to the 09K50). This is only obvious on close inspection. One exception was RZ #836, which was converted to take the 09K50 engine, and therefore it also had the scalloped intake leading edge after conversion to 09K50.

The R2Z had two horizontal blade antennae located either side of the upper vertical stabilizer. The RZ did not have these.

Both the RZ and R2Z had the dual pitot probes located ahead of the windshield. These were larger and thus visually more prominent than those on the DZ, D2Z and EZ.

The RZ also had the distinct Doppler antenna beneath the nose ahead of the nose undercarriage leg. The R2Z did not. This is the easiest way to differentiate between an RZ and R2Z.



RZ #835 showing Doppler antenna, small black CRWS antenna and large pitot probes.



The Dassault Mirage III in South African Air Force service – Part 4



RZ #838 – note doppler antenna, small black CRWS antenna and large pitot probes – the one has a red cover on it.



RZ #857 – no doppler antenna. Black CRWS antenna is present.

The Dassault Mirage III in South African Air Force service – Part 4



Air intake of R2Z #857 which clearly shows the distinct scalloped leading edge splitter plate, indicating that the aircraft has been fitted with the higher thrust (increased air flow rate) Atar 09K50 engine.



Air intake of RZ #838 which shows the straight leading edge splitter plate, indicating that the aircraft has been fitted with the Atar 09C engine.



The Dassault Mirage III in South African Air Force service – Part 4



RZ #835



RZ #838



RZ #857. There is no doppler antenna.



Details of interior of camera windows complete with ducting – RZ #838



The Dassault Mirage III in South African Air Force service – Part 4



Camera nose of RZ #835.



Camera nose of RZ #838.



Above and below - camera nose of R2Z #857.



The Dassault Mirage III in South African Air Force service – Part 4



Vertical stabilizer of RZ #835 – standard SAAF CRWS antenna above rudder.



RZ #838 – configuration of CRWS slightly different to that on 835



RZZ #857 – note the horizontal blade antenna near the top of the vertical stabilizer.

## 6 Mirage III wings and dimensions

The Mirage III wing plan form is of delta configuration with fixed leading edges and three trailing edge control surfaces. The inner control surface is the pitch damper. The two outboard surfaces are the elevons which perform the combined function of an elevator and an aileron. These two surfaces operate in unison. The pitch damper operates independently of the elevons. There is a distinct aerodynamic slot on the leading edge of the wing at 53% of span measured from the fuselage.

The following wing measurements were taken by the author from several Mirage III aircraft at Swartkop :

- CZ #805 which is actually fitted with EZ wings
- BZ #818 which is actually fitted with CZ wings
- RZ #835 which is actually fitted with E wings
- RZ #838 fitted with RZ wings

The measured dimensions for the above wings are all similar. The dimensions of BZ #818 wings are the same as those measured on the EZ wing fitted to #805. The dimensions of #835 and #838 wings are the same as for #805 and #818. In conclusion :

- The CZ, EZ and RZ wings are dimensionally the same.
- As the BZ was a variant of the CZ, the wings should logically be the same dimensionally.
- As the DZ and DZZ was essentially a variant of the EZ, the wings should be dimensionally the same. It would therefore be reasonable to conclude that the same would apply to the DZZ.
- A similar argument can be made for the RZ and RZZ.

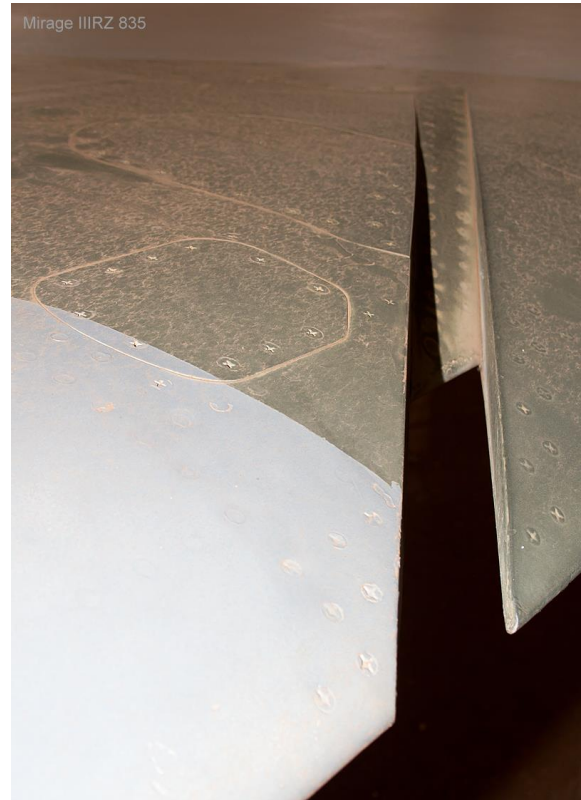
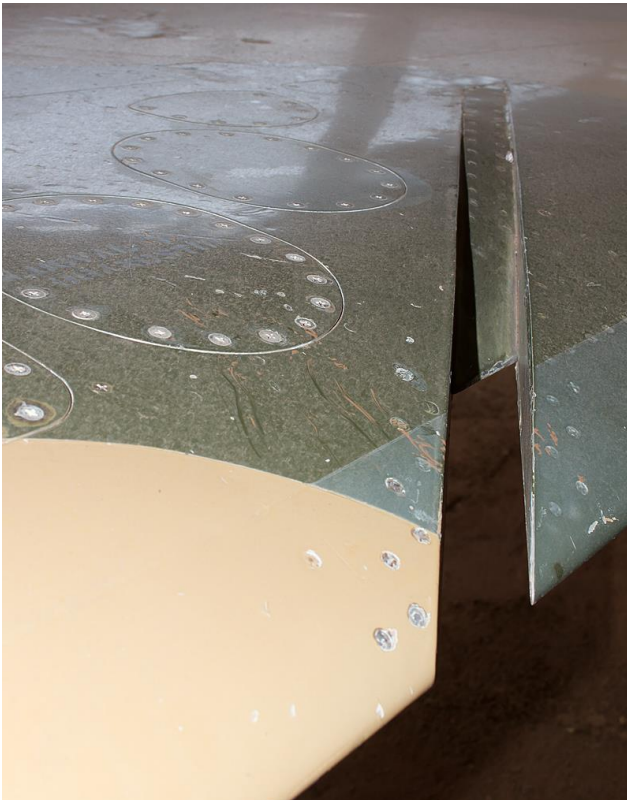
All SAAF Mirage III variants had two hard points per wing – making a total of five including the fuselage centerline hard point. However, as already noted elsewhere in this document, the CZ/BZ inboard hard point locations were located marginally closer to the fuselage centerline by 100mm. The inboard pylons were angled slightly outward to provide additional clearance when fitting the 1,300 liter wing tanks.

The reason provided for the movement outwards of the wing hard point on the E wings was for additional clearance of the main undercarriage which had different retraction kinematics from the earlier C. This change to undercarriage was necessitated by the desire to carry larger stores on the centerline station (e.g. AN52 15 kiloton tactical nuclear weapon). The differences in main undercarriage legs between the B/C and D/E/R have been addressed elsewhere above.

The D, E and R wings had an additional leading edge fuel tank located inboard of the leading edge slot. Capacity of each tank was 55 gallons (250 liters).



The Dassault Mirage III in South African Air Force service – Part 4



BZ #818 at left (in actual fact a CZ wing); RZ #835 at right (in actual fact an E wing).  
The slot is at the same span wise position on both wings. The inboard wing pylon attachment is clearly not.  
Note also the difference in panel configuration inboard of the slot on the upper and lower surfaces of the wings.  
D, E and R wings had a "wet" leading edge (fuel), BZ / CZ did not.

## The Dassault Mirage III in South African Air Force service – Part 4



CZ #805 which is equipped with an E-wing. Note that the location of hard point is closer to the slot. Of interest is the round cover plate on the upper wing – this is not apparent on the E-wing fitted to RZ #835. The reason for this variation is not clear. It is assumed that this cover plate provides access to the main pylon attachment point. On RZ #838, the cover plate is flush with the wing upper surface.

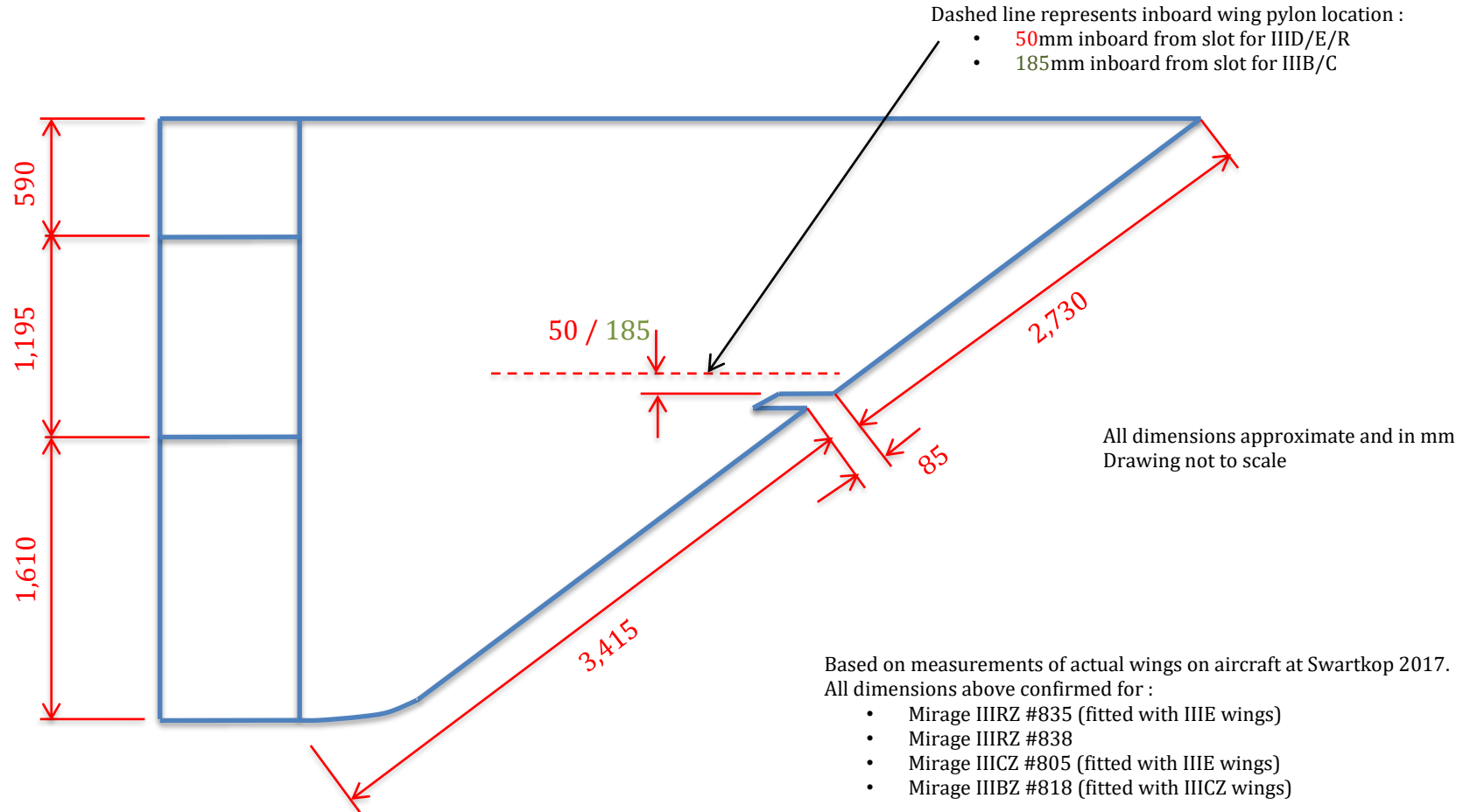


Upper wing on RZ #838. Note the access panels to the rear of and inboard of the wing slot.



Upper wing of CZ #813. As the main undercarriage doors were closed, the author could not gain access to the wing data plate. It is assumed that this is an original CZ wing.

## Plan view – Mirage III wing





The Dassault Mirage III in South African Air Force service – Part 4

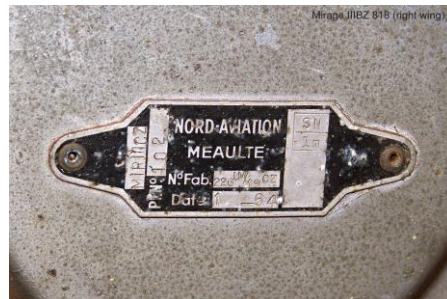
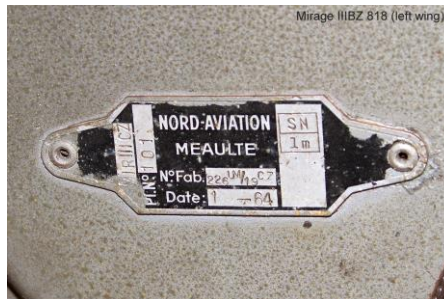
Wing data plate – left wing

Wing data plate – right wing

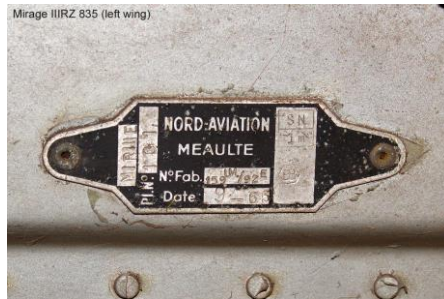
IIICZ  
#805  
(IIIE  
wings,  
1964)



IIIBZ  
#818  
(IIICZ  
wings,  
1964)



IIIRZ  
#835  
(IIIE  
wings,  
1965)



IIIRZ  
#838  
(IIIRZ  
wings,  
1966)



## 7 Mirage IIICZ with EZ wings and “cat balls”

As part of the SAAF's Cheetah E programme, the Mirage IIIEZ fuselages were upgraded with a new nose (avionics upgrade), canards and Nesher / Kfir wings (with characteristic dog tooth leading edges). The Atar 09C engine was retained. The Mirage IIIEZ wings therefore became surplus to requirement. Mirage III wings were interchangeable between the various airframes thus these E-wings could be fitted to the Mirage IIICZ airframe. An added bonus for the CZ would be the additional fuel tank in the leading edge of the E wing. In October 1988, Mirage IIICZ #805 was delivered to Atlas Aircraft Corporation as the prototype for the programme to fit the EZ-wings to the CZ fleet. The C and E wings would have been plumbed and wired similarly as both were designed to carry the same external stores (tanks, rockets, bombs and air-to-air missiles). The wings from EZ #824 were fitted to CZ #805. The modification further included wiring for the South African V3B air to air missiles on the outboard pylons. The V3B's seeker head would be slaved to the pilot's helmet mounted sight thus requiring the inclusion of the necessary wiring harnesses.

As part of this upgrade, CZ #805 also had the RIMS (Radar and Infrared Misleading System) and CRWS (Compact Radar Warning System) installed which consisted of :

- Distinctive “cat balls” radar warning receivers associated with the CRWS on either side of the forward fuselage and at either side at the tip of the vertical stabilizer. These did not have the later azimuth antenna beneath the nose as was installed on the Cheetahs and Mirage F1AZ.
- The slender ventral fin was modified at the rear with a box containing the chaff / flare dispenser unit associated with the RIMS.

Although the E wing was fitted, #805 had its original CZ main landing gear installed. The E wing was designed to accommodate the C's different landing gear retraction strut arrangement (see photos elsewhere in this document).

Following the conversion by Atlas Aircraft Corporation, #805 was sent to the Test Flight and Development Centre (TFDC) at Bredasdorp and was subject to flight testing from December 1990. #805 now resides in this configuration as part of the SAAF Museum static display at Swartkop AFB.

It would appear that only one other CZ was fitted with EZ wings, that being CZ #807. Although this modification proved successful, the imminent retirement of the Mirage IIICZ fleet from service (1990) precluded the need to further modify these aircraft with E-wings. The surplus EZ wings were likely sold to other Mirage IIIE operators such as Pakistan. Refer to images below showing a Pakistan Air Force Mirage IIIO (ex-RAAF) fitted with what are clearly SAAF standard buff/olive drab wings which are therefore likely to have been ex-SAAF EZ-wings – this is the subject of an XtraDecals 48<sup>th</sup> Mirage IIIE decal set.



Mirage IIIIO #560 of Pakistan Air Force with what can only be ex-SAAF Mirage IIIIE wings in the original SAAF camouflage.

## 8 Rear ventral fairings

The Mirage III variants used by the SAAF had differing configurations of the ventral fin / fairing located on the lower rear fuselage.

- The Mirage IIIBZ and CZ were equipped with a simple “2-dimensional” strake or blade fin to provide directional stability.
- The DZ, EZ, RZ and R2Z had a “3-dimesional” fairing which replaced the simple blade type strake on the BZ and CZ. This allowed for the installation of an additional rear fuselage fuel tank. It has an inspection window on the rear port side.
- The D2Z had a similar arrangement to the DZ but with an arrestor hook added.



Rear view of BZ #818 with simple blade ventral strake.



By comparison, rear view of RZ #838 with the ventral fairing which would house additional fuel.



## The Dassault Mirage III in South African Air Force service – Part 4



Close up image of ventral fairing on RZ #835 showing the fuel tank inspection window. Note also the configuration of the external RP825 fuel tank fins



BZ #818 with the simple blade ventral strake. CZ was the same.



By comparison, RZ #835 with the "3 dimensional" ventral fairing which housed additional fuel. Note the inspection window to the rear of the fairing. DZ, EZ and R2Z would have been similar.

The Dassault Mirage III in South African Air Force service – Part 4



D2Z #849 showing the aft ventral fairing with the arrestor hook protruding out the rear of the fairing. D2Zs were the only SAAF Mirages so equipped.



Another D2Z showing the ventral fairing with the arrestor hook protruding out the rear of the fairing. Note that the arrestor hook fitted neatly into a slot down the center of the fairing.

## 9 References

The Unofficial SAAF Website – [www.saairforce.co.za](http://www.saairforce.co.za) - both reference section and discussion forums including the following contributors – Dean Wingrin, Piet van Schalkwyk (SAAFColours), Greg Swart (GregAir), Alan Taylor (FlyingSpringbok), Vernon Vice (Spice), Joker, Brent Best (Kremlin), Sean Thackray (Madmax).

Other fine folks who shared their Mirage III information with me : Daan Conradie, Martin Strümpfer, Jon Durant (Battlebirds Models), John Weideman (ScaleWorx), Marc Conti, Herman Penderis.

Squadrons of the South African Air Force and Their Aircraft 1920 – 2005, Steven McLean, ISBN No. 0958492948

Aircraft of the South African Air Force, Herman Potgieter and Willem Steenkamp, ISBN No. 0869771337

Cheetah – Guardians of the Nation, Winston Brent, African Aviation Series No. 23

More Than Game, Herman Potgieter, ISBN No. 0620192135

The SAAF at War 1940 – 1984, JS Bouwer and MN Louw, ISBN No. 0868460567

On Wings of Eagles – South Africa's Military Aviation History, D. Becker, ISBN 0947478477

Mirage IIIEO flight manual – this is the Australian version which was essentially similar in terms of systems to the SAAF Mirage IIIEZ.