

**The Accident Airplane's Radar Unit
Timeline of Repairs and Maintenance Actions
ERA19FA039 | N5044J | Cessna 310R**

Details of the Investigation

This report is a summary of the service difficulties and maintenance actions pertaining to the onboard weather radar system for N5044J. The majority of the maintenance records were not located or were destroyed in the accident. Record of conversations with a mechanic familiar with the accident airplane and work orders from a repair facility were used to trace the work performed on the radar unit.

Onboard Weather Radar Unit:

The airplane was equipped with a King KWX 56 onboard weather radar unit that had two components¹:

Radar Indicator: King Model KI-244 / Serial Number 1651

Radar ART Antenna: Narco Model KA-126 / Serial Number 1441 (Original)

Figure 1 shows an exemplar radar system, which included the display screen mounted in the cockpit panel and the antenna mounted in the nose of the airplane.



Figure 1: Exemplar Radar Display and Antenna

¹ Source: FAA Airworthiness Record, Form 337 December 12, 1994.



Photo 1: Photograph of the accident airplane's cockpit at an undetermined time prior to the accident



Photo 2: N5044J Cockpit Photo, Estimated Date August 2017

Service Difficulties with Radar Unit

According to Mr. Paul D. Faltyn, who was an airframe and powerplant mechanic and pilot who had experience flying and maintaining the accident airplane, there were repeated failures of the on-board weather radar system.² Mr. Faltyn was also a friend of the accident pilot. Several work orders provided by Texas AvRad detailed an extensive troubleshooting process to get the radar unit operational.

Burning and melting was discovered during examinations of the unit, and in August 2018, the radar system was removed for repair. The original display was repaired and reinstalled on the airplane in September 2018. After numerous failed attempts to get the repaired original antenna to function, a replacement antenna was shipped to the pilot just prior to the accident, and a person familiar with the accident airplane who had worked on the airplane previously, reported that the antenna was not where he left it in the hangar, when he entered the hangar after the accident. But he did not know if the accident pilot/ mechanic installed the antenna, or just placed it in the airplane to be installed later. Neither display or antenna were located in the wreckage, and no maintenance records have been located showing that the unit was reinstalled.

August 2018

According to a copy of the 2018 annual performed by Chautauqua Aircraft Sales, the radar indicator display (KI-244) and antenna (KA-126) were removed and were sent to Texas AvRad in Richmond Hills, Texas. Refer to Figure 3, which shows the 2018 annual endorsement.

According to Mr. Paul D. Faltyn, a mechanic based in Buffalo, New York who was friends with the pilot, and a person who worked on and flew the accident airplane, the radar display was intermittent and did not function properly. The repairs made by Texas AvRad are detailed below. Note, the accident airplane did not fly to Texas AvRad, rather, just the radar unit was shipped back and forth.

² Refer to the NTSB Record of Conversation with Mr. Faltyn in the public docket for additional information.

 CHAUTAUQUA AIRCRAFT SALES, INC. 3163 Airport Dr. Box 11 Phone: 716-664-7700 Jamestown, NY 14701 Fax: 716-664-7714 CRS# IC1R213K	 MOONEY
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Work Order# 9683	Date: 08-21-18	Aircraft: N5044J
Airframe Serial#: 310R0164	A/C Hobbs: 499.8	ACTT: 5416.6 by adding [4916.8] to hobbs
* Stewart/ Warner Heater Hobbs: 90.7 / Total Time: 363.3 by adding [272.6] to heater hobbs		

- Complied with Annual Inspection IAW 14 CFR 43 appendix D.
- Complied with ELT Annual in accordance with 14 CFR 91.207D part 1-4 function test good. ~~Installed new battery. [BP-1010] battery expires Sept. 2019.~~
- Replaced R/H engine #4 EGT probe. And L/H engine #6 EGT probe.
- CW AD 16-07-24 Elevator trim tab control rod hardware, by installing new hardware per MEB 27-02 R1, next visual inspection due hobbs: 599.8 or August 2019 whichever occurs first.
- Top charged AC battery. Replaced pilots shoulder harness bushing.
- Serviced landing gear gearbox.
- **Removed Radar indicator KI-244 SN1651, and Radar antenna KA-126 SN-1441 for repair. Placarded inop. Revised weight and balance.**

Figure 2: 2018 Annual Endorsement Record

August 6th, 2018

The following work order was provided by Texas AvRad for the KA-126 antenna:

Texas AvRad

FAA CRS 9TKR944B

7163-A/B Latham Dr.
Richland Hills, Tx 76118

Tel. 817-938-2880
Fax. 817-423-7518

Work Order Number: 993942

Customer PO: Verbal

Date In: Aug 06, 2018

Date Complete: Aug 10, 2018

Owner: Paul Foltz

Tel.1: [REDACTED]

Fax.:

Address:

Model: KA-126

Manufacturer: Narco

Part No.: 071-1220-02

Nomenclature: Radar ART

Serial No. 1441

Customer Request: Test and advise.

Initial Inspection: No external damage noted.

Inspection Findings: Found unit transmits within specs, with the original microwave associates magnetron tube. Unit draws .5A more current than it should, and shuts down the power supply after it gets hot. Upon cover off tests, noted original power supply/modulator board, the board is burned between the drivers, causing poor power supply operation. Will need to replace the power supply/ modulator with the new style board that is modeled after the KA-128. Perform complete calibration and alignment to the mfg. specs. Verify all final functional tests, good.

Repair Details: Replaced power supply modulator board assembly, established good power on, transmit and receiver operation. Cleaned, inspected, aligned and calibrated to the mfg. specs. Verified all final functional tests, good.

Final Disposition: Repaired

Repaired in accordance with Publication No. 006-5191-00 (R1)

Part Name	Part Number	Quantity	List Price	Total
Power Supply/Modul	200-6740-00	1	\$1,475.00	\$1,475.00
Labor Hours:		Labor Rate:	Total Parts:	\$1,475.00
4 X		\$98.00	Total Labor:	\$392.00
Shipping Instructions:			Shipping:	\$0.00
			Work Order Total:	\$1,867.00

ORIGINAL REPAIR

Figure 3: Texas AvRad work order for the KA-126 antenna

KA-126 Antenna Summary:

Found:

- Unit draws .5A more current than it should and shuts down the power supply after it gets hot.
- Power supply/ modulator board is burned between the drivers, causing poor power supply operation.

Actions:

- Replaced power supply modulator board assembly, modeled after the KA-128. Functional test good.

The following work order was provided by Texas AvRad for the KI-244 display:

Texas AvRad		7163-A/B Latham Dr.	Tel. 817-938-2880
FAA CRS 9TKR944B		Richland Hills, Tx 76118	Fax. 817-423-7518

Work Order Number: 993943
Customer PO: Verbal
Date In: Aug 06, 2018
Date Complete: Aug 10, 2018
Owner: Paul Folly

Tel.1: [REDACTED]
Fax.:
Address:

Model: KI-244
Part No.: 066-3065-00
Serial No. 1651

Manufacturer: King
Nomenclature: Radar Indicator

Customer Request: Test and advise.
Initial Inspection: No external damage noted.
Inspection Findings: Found display slowly drifts up and down with a vertical retrace noticeable. Upon cover off check found burned transistor Q334 has melted the insulator, suspect Q334 overheating due to caps in the circuit. Need to replace the sweep vidoe board, and perform complete calibration and alignment to the mfg. specs. Verify all final funcitonal tests, good.
Repair Details: Replaced sweep board assembly, and established consistant display. Cleaned, inspected, aligned and calibrated to the mfg. specs. Verified all final functional tests, good.
Final Disposition: Repaired
Repaired in accordance with Publication No. 006-5191-00

Part Name	Part Number	Quantity	List Price	Total
Sweep Board Assem	200-6275-00	1	\$325.00	\$325.00

Labor Hours:	Labor Rate:	Total Parts:	\$325.00
2 X	\$98.00	Total Labor:	\$196.00
Shipping Instructions:		Shipping:	\$0.00
		Work Order Total:	\$521.00

ORIGINAL REPAIR

Figure 4: Texas AvRad work order for the KI-244 display

According to Texas AvRad, this was the original and only repair made to the display KI-244 unit. It was shipped to Mr. Faltyn. Summary of original findings and repairs:

KI-244 Display Summary:

Found:

- Display slowly drifts up and down.
- Burnt transistor Q334 melted insulator, technician believes Q334 overheating due to caps in the circuit

Actions:

- Replaced sweep board assembly and established consistent display. Cleaned inspected, functional test good.

Attempt to Return Unit to Service, Early September 2018

According to Mr. Faltyn, the radar system was received from Texas AvRad and the display and antenna were reinstalled, and ground power was plugged into the accident airplane. With the ground power unit plugged in, the radar system was turned on to the standby position. After 5 minutes it was switched to the test position. The radar failed to display. The indicator was removed and reinstalled and the connector at the antenna was removed and re-installed to verify the connectors were making proper contact. The system was tried again several times and failed to turn on.

Mr. Faltyn reported that he contacted Texas Avrad and discussed the problem with a technician. The technician provided the schematic necessary to verify the power and connections were correct and no anomalies were discovered that would explain the failure. Texas AvRad advised Mr. Faltyn to return only the antenna to be re-tested and he did so.

September 14th, 2018, KA-126, Antenna, Second Repairs

Texas AvRad provided the following work order, which was the second repair they made with the KA-126 original antenna.

Texas AvRad

FAA CRS 9TKR944B

7163-A/B Latham Dr.
Richland Hills, Tx 76118

Tel. 817-938-2880
Fax. 817-423-7518

Work Order Number: 993980

Customer PO: Verbal

Date In: Sep 14, 2018

Date Complete: Sep 16, 2018

Owner: Paul Foly

Tel.1: [REDACTED]

Fax.:

Address:

Model: KA-126

Manufacturer: Narco

Part No.: 071-1220-02

Nomenclature: Radar ART

Serial No. 1441

Customer Request: Warmaty repair.

Initial Inspection: No external damage noted.

Inspection Findings: Confirmed customers complaint, found unit with open main fuse, and will not turn on. Upc troubleshooting found power supply drivers shorted, unable to determine cause of this fault replace power supply modulator board.

Repair Details: Replaced power supply/modulator board, ran unit for 4 hrs, turning on and off, verifying no failure. Cleaned, inspected, aligned and calibrated to the mfg. specs. Verified all final functional tests, g

Final Disposition: Repaired

Repaired in accordance with Publication No. 006-5191-00 (R1)

Part Name	Part Number	Quantity	List Price	Total
Psp/Modulator	200-06740-0000	1	\$0.00	\$0.00

Labor Hours: **Labor Rate:** **Total Parts:** \$0.00

8 X \$98.00 **Total Labor:** \$784.00

Shipping Instructions:

Shipping: \$0.00

Work Order Total: \$784.00

☒ **Warranty**

1st Warranty.

Figure 5: Second work order for the KA-126 Antenna

KA-126 Antenna Summary of Second Repairs:

Found:

- Confirmed customer complaints. Found unit with open main fuse and will not turn on.

- Power supply drivers shorted, unable to determine cause of this fault.

Actions:

- Replaced power supply modulator board, ran unit for 4 hours, turning on and off, verifying no failures. Functional test good.

Post Second Repairs of the Antenna:

According to Mr. Faltyn, after the second repair of the antenna, where only the antenna was repaired, he and the accident pilot, installed the antenna in the aircraft. The ground power was plugged in and the system was turned on. It functioned normal and Mr. Faltyn observed from outside the aircraft that the antenna was sweeping correctly, and the tilt functioned properly in the manual setting and then confirmed the indicator was functioning properly. Mr. Faltyn reported, everything appeared to be working normal and roughly 20 to 30 minutes later it again failed. The screen went blank and the antenna stopped working.

Mr. Faltyn reported that he again verified the correct power and ground output from the indicator in the harness. He contacted Texas AvRad again and the customer service representative agreed to ship a loaner unit to use while they tested and repaired the original antenna again, which would have been the third repair. The loaner unit arrived from Texas AvRad, and the unit sent was the same model number, but the reflector plate, to best of Mr. Faltyn's knowledge, was 12.5 inches, whereas the C-310 required a reflector plate of 10.0 inches. T

Mr. Faltyn reported that he decided to temporarily mount the loaner 12.5-inch unit in the aircraft and verify the system worked. He plugged in the ground power and ran the unit for over an hour with no failures. Mr. Faltyn reported that he contacted Texas AvRad again and advised of the reflector plate size issue and that he would be returning the antenna.

Mr. Faltyn reported that a few days later, he received a call from Texas AvRad stating that they verified that the original antenna failed again, and they were not comfortable returning that unit and offered a no charge exchange to which Mr. Faltyn reported, he and the accident pilot agreed to. Mr. Faltyn reported that the exchange unit was shipped to his home.

Third Repairs on Antenna October 15th, 2018

Texas AvRad provided the following work order, which was the third time they had seen the original KA-126 original antenna.

Texas AvRad

FAA CRS 9TKR944B

7163-A/B Latham Dr.
Richland Hills, Tx 76118

Tel. 817-938-2880
Fax. 817-423-7518

Work Order Number: 994026

Customer PO: Verbal

Date In: Oct 15, 2018

Date Complete:

Owner: Paul Foly

Tel.1: [REDACTED]

Fax.:

Address:

Model: KA-126

Manufacturer: Narco

Part No.: 071-1220-02

Nomenclature: Radar ART

Serial No. 1441

Customer Request: Test and advise for warranty repair.

Initial Inspection: No external damage noted.

Inspection Findings:

Repair Details: Exchanged with S/N 51025

Final Disposition:

Repaired in accordance with Publication No. 006-5191-00 (R1)

Part Name	Part Number	Quantity	List Price	Total
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Labor Hours: Labor Rate:

0 X \$98.00

Total Parts:

\$0.00

Total Labor:

\$0.00

Shipping Instructions:

Shipping:

\$0.00

Work Order Total:

\$0.00

2ND FAILURE, THIS TIME WE EXCHANGED THIS
UNIT WITH S/N #51025

Figure 6: Third work order where the original unit was replaced.

KA-126 Antenna Summary of Third Repairs:

Found:

- It is not known, nor stated on the work order, if the original antenna was examined for a third time.

Actions:

- The original antenna, KA-126, P/N 071-1220-02, S/N 1441, was replaced with another unit, with a S/N of 51025.

Exchanged/ Replaced Radar Antenna October 16th, 2018

The below work order is for the exchanged antenna. The model was a KA-126, P/N 071-1220-03, S/N 51025.

Texas AvRad		7163-A/B Latham Dr.	Tel. 817-938-2880
FAA CRS 9TKR944B		Richland Hills, Tx 76118	Fax. 817-423-7518

Work Order Number: 994022	Tel.1: [REDACTED]
Customer PO: Verbal	Fax.: [REDACTED]
Date In: Oct 11, 2018	Address: [REDACTED]
Date Complete: Oct 16, 2018	
Owner: Texas Avrad	

Model: KA-126	Manufacturer: Narco
Part No.: 071-1220-03	Nomenclature: Radar ART
Serial No. 51025	

Customer Request: Evaluate for purchase.

Initial Inspection: No external damage noted.

Inspection Findings: No damagee found. Unit requires alignment. Ran unit for 4 hours without a failure. Need to align and calibrate to the mfg. specs.

Repair Details: Cleaned, inspected aligned and calibrated to the mfg. specs. Verified all final functional tests, good.

Final Disposition: Repaired

Repaired in accordance with Publication No. 006-5191-00 (R1)

Part Name	Part Number	Quantity	List Price	Total
Labor Hours:	Labor Rate:	Total Parts:	\$0.00	
0 X	\$98.00	Total Labor:	\$0.00	
Shipping Instructions:			Shipping:	\$0.00
			Work Order Total:	\$0.00

This is the EXCHANGE, AND THE LAST UNIT SENT OUT.

Figure 7: Exchange work order noting the replacement unit

Texas AvRad approved the part and provided a serviceable part maintenance release tag.

SERVICABLE PART		
Owner: Texas Avrad	Date: 16-Oct-18	
Manufacturer: Narco	Nomenclature: Radar ART	
Model: KA-126	Part No. 071-1220-03	Serial No. 51025
Work Performed: Repaired		
MAINTENANCE RELEASE		
The aircraft and/or component identified was repaired and inspected in accordance with current regulations of the FEDERAL AVIATION ADMINISTRATION and is approved for return to service. Pertinent details of the repair are on file at this repair station under:		
Work Order No.: 994022	Signed: [Redacted Signature]	
Texas AvRad		FAA Approved Repair Station
7163-A/B Latham Dr.		9TKR944B
Richland Hills, Tx 76118		

Photo 3: Serviceable part tag for the replacement antenna

Replacement Antenna Received October 22, 2018

According to Mr. Faltyn, the replacement antenna (S/N 51025) was delivered to his home address near Buffalo, New York. Mr. Faltyn reported that the accident pilot had left for an extended trip to Europe during this time. Once the antenna arrived at Mr. Faltyn's home, he reported that he took it to the accident airplane's hangar at (IAG) Niagara Falls Airport in Buffalo, New York, removed the antenna from the box, and placed the unit on the desk in the hangar, with the mounting hardware and the airworthiness paperwork. Mr. Faltyn confirmed that the unit was a KA-126, S/N 51025.

Mr. Faltyn reported that he was not aware that the accident pilot had returned from his trip from Europe, nor was he aware of the pilot's accident flight. Mr. Faltyn reported that when he returned to the hangar after the accident on 11/12/18, the antenna, hardware, and paperwork were not on the desk or in the hangar.

Mr. Faltyn reported that he has over 35 years of experience in the instrument and avionics field, and he is an A&P Mechanic, holds an instrument and radio repairman certificate, and is commercial pilot rated in fixed wing and helicopters.