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ARROW 1 SERVICE DATA

SECTION 42

ELECTRONICS

"X" BAND BEACON

(This data supersedes the previous issue dated 15 Jan 57)

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DESCRIPTION

GENERAL

1 The X-Band Beacon system is installed to evaluate the centimetre waveband antenna which will be required for the air-to-air X-Band IFF system fitted to later aircraft. The beacon transmits a pulsed reply when interrogated by signals from an X-Band pulsed radar set. The system increases the operating range of the interrogating radar by reinforcing the normal echo with a re-transmitted signal. The frequency range of the system is 9200 mc/s to 10,500 mc/s.

2 The system comprises the following main component units:

- (a) Receiver-Transmitter RBX-1
- (b) Power Supply RPX-1
- (c) Antenna
- (d) Waveguide Assembly
- (e) Waveguide Dehydrator

RECEIVER-TRANSMITTER

3 The X-Band Beacon receiver-transmitter consists of a crystal video type receiver, a hard tube modulator and a transmitter.

4 Interrogation signals from a pulsed radar set are received by the X-Band antenna and controlled by a flap attenuator to reject signals other than those occurring within a narrow band about the frequency of the interrogating radar. The accepted signals are applied to a crystal detector type 1N23C fitted in a crystal mount housed in the flap attenuator. The crystal passes positive video pulses to the receiver where they are amplified. The receiver output triggers a blocking oscillator which in turn triggers the hard tube modulator circuit, so enabling the unit to transmit closely spaced pulses such as are required for coding. The modulator output is fed to a co-axial (dual cavity) klystron which generates the transmitted signal. The transmitted signal is controlled by a flap attenuator and transferred

via the waveguide for radiation at the antenna. A tee section and dummy load mounted between the two attenuators and the waveguide permits the antenna to be used for both transmission and reception.

5 The receiver-transmitter unit is enclosed in a pressurized cylindrical case approximately 12-1/4 inches long and 3-1/2 inches in diameter. A control, accessible through the end of the case, permits adjustment of the receiver sensitivity to prevent the beacon from triggering on noise voltage.

WAVEGUIDE PRESSURIZATION

6 The waveguide system is pressurized to prevent arcing. Pressurizing air is fed to the system via a non-return valve and a waveguide dehydrator which filters out any moisture. The antenna incorporates a pressure relief valve which opens at a nominal value of 16 psig to prevent over-pressurization. A pressurized mica window fitted between the waveguide and the tee section and dummy load isolates the receiver-transmitter from the waveguide pressurizing system. A charging valve is fitted in the air pressure line to facilitate ground testing.

POWER SUPPLY

7 The receiver-transmitter derives 6.3 volts AC for filament supply, and 300 volts DC for the plate supply which is regulated for stability, from a power unit provided with the system. The power unit operates on an input of 115 volts 400 cps AC at a nominal current of 0.9 amps. A control, accessible through the end case of the power unit, permits the pre-adjustment of the output voltage. The unit is enclosed in a pressurized cylindrical case similar to that provided for the receiver-transmitter.

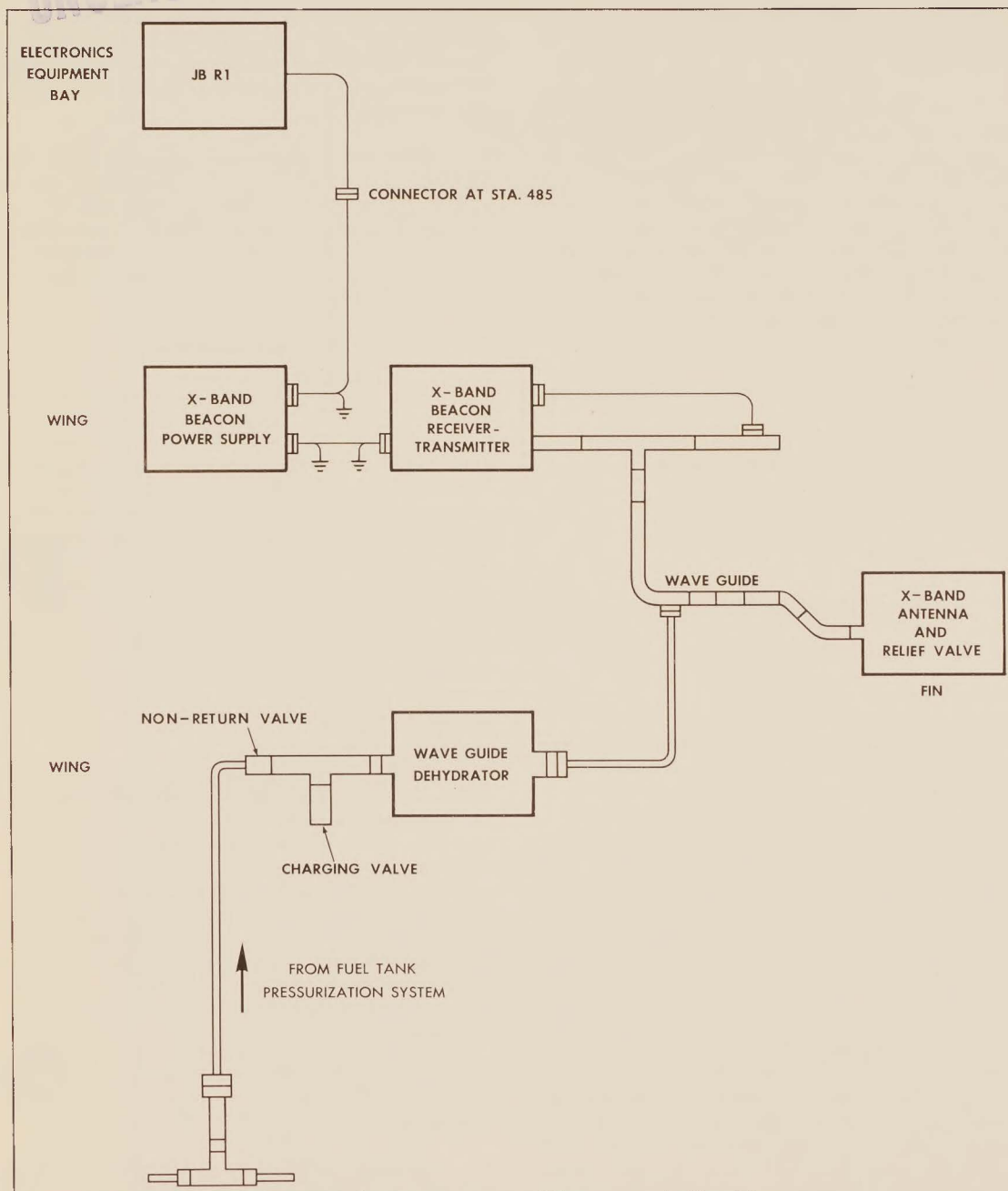
FUNCTION TESTING

GENERAL

8 Prior to installation in the aircraft, the system is tested and adjusted to operate in conjunction with a particular radar interrogator.

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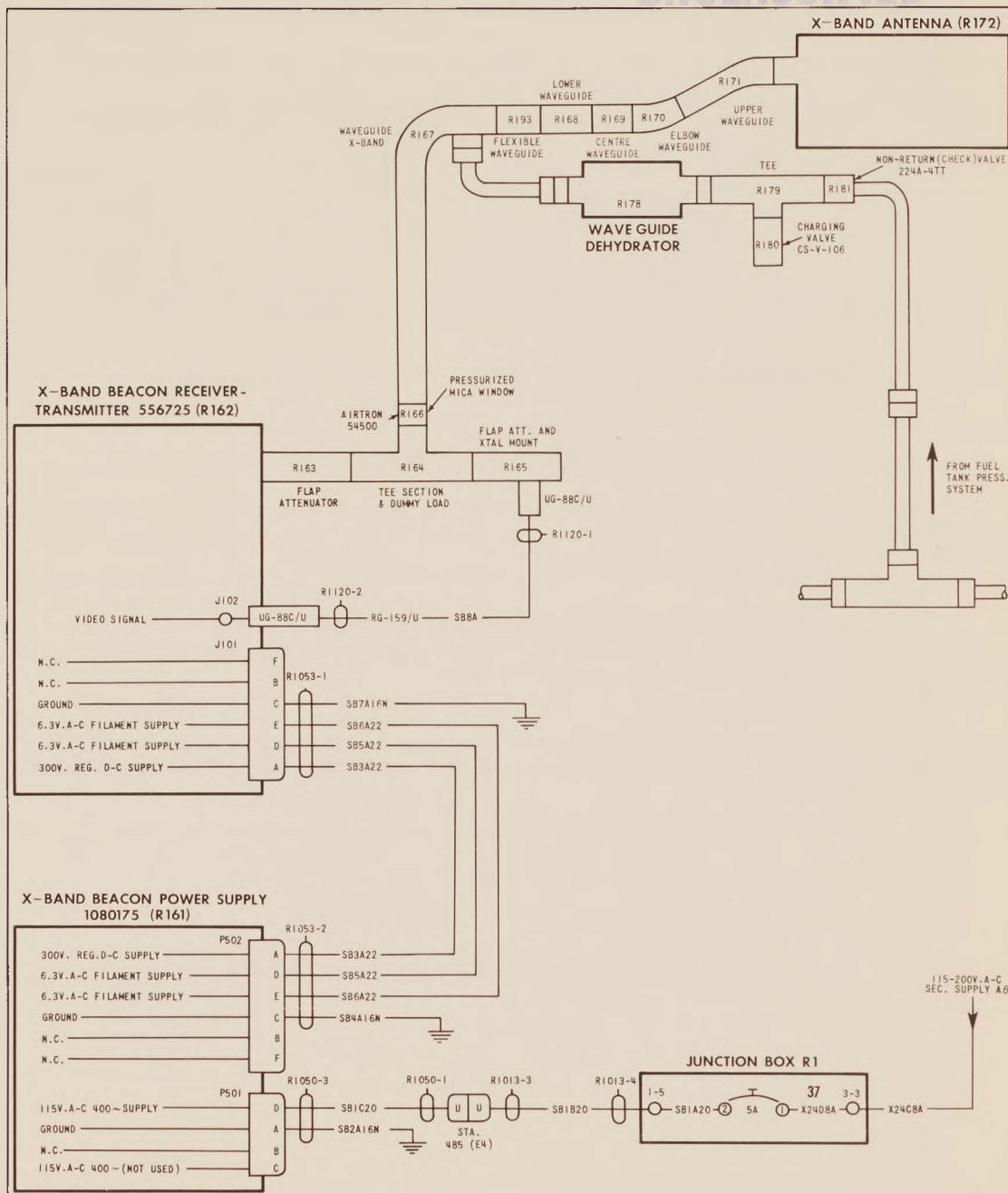


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FIG. 1 X-BAND BEACON - GENERAL ARRANGEMENT

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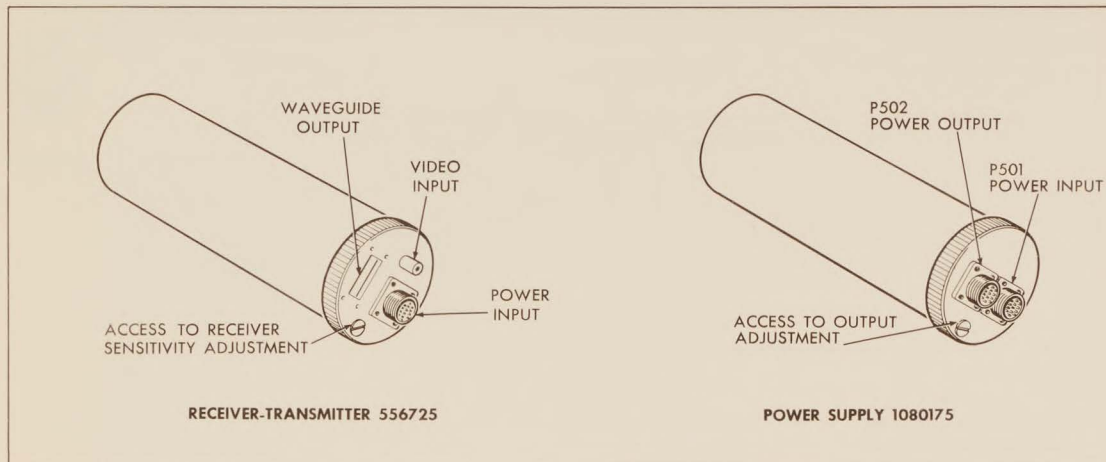


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FIG. 2 X-BAND BEACON - CABLE ROUTING

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FIG. 3 X-BAND BEACON RECEIVER-TRANSMITTER AND POWER SUPPLY

9 The only control accessible from outside the beacon case is the receiver sensitivity control. This is set during testing and should not require further attention.

10 If, after installation, the response of the beacon to noise signals requires a decrease in receiver sensitivity the following procedure should be adopted:

(a) With no input signal, advance the sensitivity control clockwise until the beacon first triggers on noise voltage.

(b) Turn the control counterclockwise until the beacon just stops triggering.

11 The only control accessible outside the power supply unit case is the output voltage adjustment. This is adjusted during testing and should not require further adjustment.

12 The system operates automatically upon receipt of interrogation signals when the X-BAND BEACON circuit breaker in junction box R1 is switched ON.

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SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Receiver-Transmitter RBX-1		REF. NO. 13-4	
AVRO PART NO.		MANUFACTURER Bendix (Supplier, Aviation Electric)		MAN'FR'S PART NO. 556725		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED- 200 hours			
FUNCTION Receives signals in the 9200 Mc/s to 10,500 Mc/s frequency range from a tracking radar and transmits an amplified signal.							
LOCATION Dorsal electronic equipment area between stations 540 and 550.							
ACCESS Remove the radio compass sense antenna access panel - six screws. Disconnect the sense antenna at the susceptiformer. Remove the aft dorsal fairing - six latches.						MEN X MINUTES	
REPLACEMENT PROCEDURE Fit the unit into its mounting. Secure the mounting clamp with six screws. Connect and secure the waveguide. Fit and secure one connector (R1053-1), and one coaxial connector (R1120-2). Refit the aft dorsal fairing - six latches. Reconnect the sense antenna to the susceptiformer. Refit the sense antenna access panel - six screws.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check that the unit is securely mounted. Check that the cables and connectors are securely and properly fitted.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>		MEN X MINUTES
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>External Power Source. Source of Air Pressure. Pressure Gauge.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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COMPONENT DATA SHEET

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SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Power Supply RPX-1		REF. NO. 13-4	
AVRO PART NO.		MANUFACTURER Bendix (Supplier, Aviation Electric)		MAN'FR'S PART NO. 1080175		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED- 200 hours			
FUNCTION Supplies 300 volts DC and 6.3 volts AC to the X-Band Receiver-Transmitter 556725.							
LOCATION Dorsal electronic equipment area between stations 540 and 550.							
ACCESS Remove the radio compass sense antenna access panel - six screws. Disconnect the sense antenna at the susceptiformer. Remove the aft dorsal fairing - six latches.						MEN X MINUTES	
REPLACEMENT PROCEDURE Fit the unit into its mounting. Secure the mounting clamp with six screws. Fit and secure two connectors. Refit the aft dorsal fairing - six latches. Reconnect the sense antenna to the susceptiformer. Refit the sense antenna access panel - six screws.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check that the unit is securely mounted. Check that the connectors are securely and properly fitted.</p>	<p>MEN X MINUTES</p>
<p>FUNCTIONAL CHECKS</p>	<p>MEN X MINUTES</p>
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>External Power Source. Source of Air Pressure. Pressure Gauge.</p>	
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>	
<p>REMARKS</p>	

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COMPONENT DATA SHEET

SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Antenna and Relief Valve		REF. NO. 13-4	
AVRO PART NO. 7-1383-57		MANUFACTURER		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		1000 hours	
FUNCTION To transmit and receive signals in the X-Band. The assembly includes a CS-V-105 pressure relief valve which opens at 16 psig to prevent over-pressurization of the waveguide.							
LOCATION Upper end of rear spar of fin.							
ACCESS Remove eight screws attaching the antenna to one access door. Remove one access door - 22 screws.						MEN X MINUTES	
REPLACEMENT PROCEDURE Attach the antenna to one access door - eight screws. Place the access door in position and secure with 22 screws. Attach the antenna to the waveguide - four screws. Attach the antenna to the other access door - eight screws. Secure the second access door - 22 screws.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check that the antenna is securely mounted. Inspect the antenna for cracks and corrosion. Check the connection to the waveguide for security and leakage.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure. Pressure Gauge. External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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COMPONENT DATA SHEET

SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Waveguide Dehydrator		REF. NO. 13-4	
AVRO PART NO.		MANUFACTURER Eastern Industries Ltd		MAN'FR'S PART NO. DP1050 - Type 201A		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED- 1500 hours			
FUNCTION To remove any moisture present in the pressurization air supplied to the waveguide.							
LOCATION Dorsal electronic equipment area.							
ACCESS Remove the radio compass sense antenna access panel - six screws. Disconnect the sense antenna at the susceptiformer. Remove the aft dorsal fairing - six latches.						MEN X MINUTES	
REPLACEMENT PROCEDURE Fit and secure the dehydrator with four mounting screws. Attach the input and the output pipe lines. Refit the aft dorsal fairing - six latches. Reconnect the sense antenna at the susceptiformer. Refit the sense antenna access panel - six screws.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check the colour of crystals and replace if they are pink. Check the dehydrator for security and damage. Check the piping for damage.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure. Pressure Gauge.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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COMPONENT DATA SHEET

SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Tee		REF. NO. 13-4	
AVRO PART NO. 7-1362-35		MANUFACTURER Avro Aircraft Ltd.		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		1500 hours	
FUNCTION To provide an entry into the waveguide air pressure line for charging valve CS-V-106, to facilitate ground testing.							
LOCATION Aft dorsal area at station 505 between dehydrator and non-return valve.							
ACCESS Remove the forward section of the electronic equipment dorsal fairing - six latches.						MEN X MINUTES	
REPLACEMENT PROCEDURE Screw the tee section to the dehydrator union. Screw the non-return valve to the tee section. Clamp the non-return valve to the valve mounting. Fit and secure the charging valve CS-V-106. Refit the forward section of the electronic equipment dorsal fairing - six latches.						MEN X MINUTES	

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<p>UNCLASSIFIED</p> <p>INSPECTION</p> <p>Check that the unit is securely fitted. Check for the proper value of air pressure. Check for pressure leaks.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>		
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure. Pressure Gauge. External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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COMPONENT DATA SHEET

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SYSTEM ELECTRONICS	SUB-SYSTEM X-BAND BEACON	COMPONENT Charging Valve	REF. NO. 13-4		
AVRO PART NO.	MANUFACTURER Schrader	MAN'FR'S PART NO. CS-V-106	AIRCRAFT EFFECTIVITY 25201		
OVERHAUL LIFE: KNOWN-		ESTIMATED- 1500 hours			
FUNCTION To facilitate ground checking of the waveguide pressurizing system.					
LOCATION Mounted in the air piping tee section - Dorsal electronic equipment area at station 505.					
ACCESS Remove the forward section of the electronic equipment dorsal fairing - six latches.			MEN X MINUTES <table border="1"> <tr><td></td><td></td></tr> </table>		
REPLACEMENT PROCEDURE Screw the charging valve to the tee section. Refit the forward section of the aft dorsal fairing.			MEN X MINUTES <table border="1"> <tr><td></td><td></td></tr> </table>		

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<p>INSPECTION</p> <p>Check that the proper pressure is being supplied. Check for pressure leaks.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure. Pressure Gauge. External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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COMPONENT DATA SHEET

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SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Non-return Valve		REF. NO. 13-4	
AVRO PART NO.		MANUFACTURER James-Pond-Clark		MAN'FR'S PART NO. 224A-4TT		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-			
FUNCTION To prevent the loss of waveguide pressure in the event of the pressure source failing.							
LOCATION Fitted to the waveguide in the radar area of the dorsal.							
ACCESS						MEN X MINUTES	
Remove the radio compass sense antenna access panel - six screws. Disconnect the sense antenna at the susceptiformer. Remove the aft dorsal fairing - six latches.							
REPLACEMENT PROCEDURE						MEN X MINUTES	
Connect the air lines. Secure the clamp retaining screw. Refit the aft dorsal fairing - six latches. Reconnect the sense antenna at the susceptiformer. Refit the sense antenna access panel - six screws.							

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<p>INSPECTION</p> <p>Check the leakage rate during waveguide pressure tests.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>		MEN X MINUTES
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of air pressure. Pressure Gauge. External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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COMPONENT DATA SHEET

SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Flap Attenuator	REF. NO. 13-4
AVRO PART NO. 7-1362-21	MANUFACTURER Sinclair Radio Lab.	MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED- 1500 hours	
FUNCTION To control the transmission signals radiated by the X-Band Beacon.					
LOCATION Centre line of the aft dorsal section at station 580.					
ACCESS Remove the radio compass sense antenna access panel - six screws. Disconnect the sense antenna at the susceptiformer. Remove the aft dorsal fairing - six latches.					MEN X MINUTES
REPLACEMENT PROCEDURE Remove the cap from waveguide openings on the transmitter and tee section (if fitted). Connect the component at the transmitter and at the hybrid tee connection. Refit the aft dorsal fairing - six latches. Reconnect the sense antenna at the susceptiformer. Refit the sense antenna access panel - six screws.					MEN X MINUTES

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<p>INSPECTION</p> <p>Check for security, damage and proper setting.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure. Pressure Gauge. External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Tee Section and Dummy Load		REF. NO. 13-4	
AVRO PART NO. 7-1362-25		MANUFACTURER Sinclair Radio Lab.		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		1500 hours	
FUNCTION To permit the use of one antenna for both the transmission and reception of RF energy.							
LOCATION Dorsal electronic equipment area.							
ACCESS Remove the radio compass sense antenna access panel - six screws. Disconnect the sense antenna at the susceptiformer. Remove the aft dorsal fairing - six latches.						MEN X MINUTES	
REPLACEMENT PROCEDURE Remove the caps from the ends of the flap attenuator (if fitted). Secure the tee to its mounting with mounting bolts. Connect the tee to the antenna waveguide. Fit four bolts securing the mica window to the waveguide. Connect the tee section to the two flap attenuators. Refit the aft dorsal fairing - six latches. Reconnect the sense antenna at the susceptiformer. Refit the sense antenna access panel - six screws.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check for security, damage and corrosion.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>		MEN X MINUTES
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure. Pressure Gauge. External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Flap Attenuator and Crystal Mount		REF. NO. 13-4	
AVRO PART NO. 7-1362-23		MANUFACTURER Sinclair Radio Lab.		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED- 1500 hours			
FUNCTION To restrict the signals applied to the crystal detector to a narrow band around the interrogating radar frequency.							
LOCATION Aft dorsal section - station 590 at centre line.							
ACCESS Remove the radio compass sense antenna access panel - six screws. Disconnect the sense antenna at the susceptiformer. Remove the aft dorsal fairing - six latches.						MEN X MINUTES	
REPLACEMENT PROCEDURE Remove the caps from waveguide (if fitted). Fit the clamp to the crystal mount. Fit and secure the RF connection to the crystal mount. Connect the flap attenuator at the hybrid tee. Refit the aft dorsal fairing - six latches. Reconnect the sense antenna at the susceptiformer. Refit the sense antenna access panel - six screws.						MEN X MINUTES	

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INSPECTION Check for security, damage and proper setting of attenuator.	MEN X MINUTES	
FUNCTIONAL CHECKS	MEN X MINUTES	
GROUND HANDLING AND GROUND TEST EQUIPMENT Source of Air Pressure. Pressure Gauge. External Power Source.		
SPECIAL TOOLS TO REMOVE OR SERVICE		
REMARKS		

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SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Waveguide - X-Band		REF. NO. 13-4	
AVRO PART NO. 7-1362-191		MANUFACTURER Sinclair Radio Lab.		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		1500 hours	
FUNCTION To transfer X-Band RF energy between the receiver-transmitter unit and the antenna. Includes a pressurization fitting.							
LOCATION Dorsal electronic equipment area.							
ACCESS Remove the radio compass sense antenna access panel - six screws. Disconnect the sense antenna at the susceptiformer. Remove the aft dorsal fairing - six latches.						MEN X MINUTES	
REPLACEMENT PROCEDURE Remove the cap from the waveguide at the tee end at the base of the fin. Securely clamp the waveguide to its mounting. Connect the waveguide to the tee at the base of the fin. Connect the air pressure input conduit. Refit the aft dorsal fairing - six latches. Reconnect the sense antenna at the susceptiformer. Refit the sense antenna access panel - six screws.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check that the unit is securely mounted. Check for pressure leaks.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>		
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure. Pressure Gauge. External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Waveguide - Lower Portion		REF. NO. 13-4	
AVRO PART NO. 7-1383-65		MANUFACTURER Sinclair Radio Lab.		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE :		KNOWN-		ESTIMATED- 1500 hours			
FUNCTION To transfer RF energy between the receiver-transmitter and the antenna.							
LOCATION In the leading edge of the fin.							
ACCESS Installed for the life of the fin. Joints are accessible for leak checks.						MEN X MINUTES	
REPLACEMENT PROCEDURE Installed for the life of the fin. Inspection panel for joints provided on leading edge of fin between ribs 6 and 7 - 16 screws.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check joints for leaks.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure.</p> <p>Pressure Gauge.</p> <p>External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		

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SYSTEM ELECTRONICS		SUB-SYSTEM X-BAND BEACON		COMPONENT Waveguide - Centre Portion		REF. NO. 13-4	
AVRO PART NO. 7-1383-63		MANUFACTURER Sinclair Radio Lab.		MAN'FR'S PART NO.		AIRCRAFT EFFECTIVITY 25201	
OVERHAUL LIFE:		KNOWN-		ESTIMATED-		1500 hours	
FUNCTION To transfer X-Band RF energy between the receiver-transmitter and the antenna.							
LOCATION Between ribs six and seven of fin.							
ACCESS Access panels on the left hand side of the leading edge of the fin at station 195 and on the left hand side of the upper fin at spar three, station 105.						MEN X MINUTES	
REPLACEMENT PROCEDURE Remove the caps from the waveguide lower portion and the waveguide elbow. Remove the waveguide elbow. Connect the centre portion to the lower portion. Connect the waveguide elbow to the centre portion and the upper portion. Refit the access panel on the left hand side of the leading edge of the fin at station 195. Refit the access panel on the left hand side of the upper fin at spar three station 105.						MEN X MINUTES	

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<p>INSPECTION</p> <p>Check the unit for security and damage. Check for pressure leaks.</p>	MEN X MINUTES	
<p>FUNCTIONAL CHECKS</p>	MEN X MINUTES	
<p>GROUND HANDLING AND GROUND TEST EQUIPMENT</p> <p>Source of Air Pressure. Pressure Gauge. External Power Source.</p>		
<p>SPECIAL TOOLS TO REMOVE OR SERVICE</p>		
<p>REMARKS</p>		