

Wreckage plot



Photograph 1
Main wreckage site
(Note absence of tail rotor)

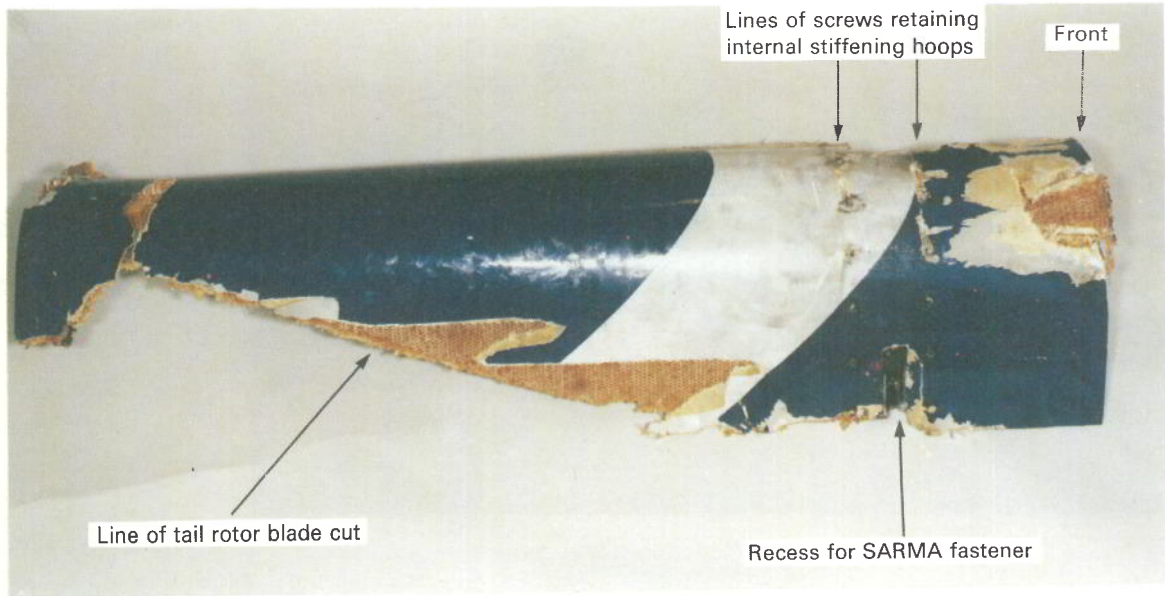


Photograph 2
Tail rotor and gearbox assembly
(Note sections missing from trailing edges of blades)

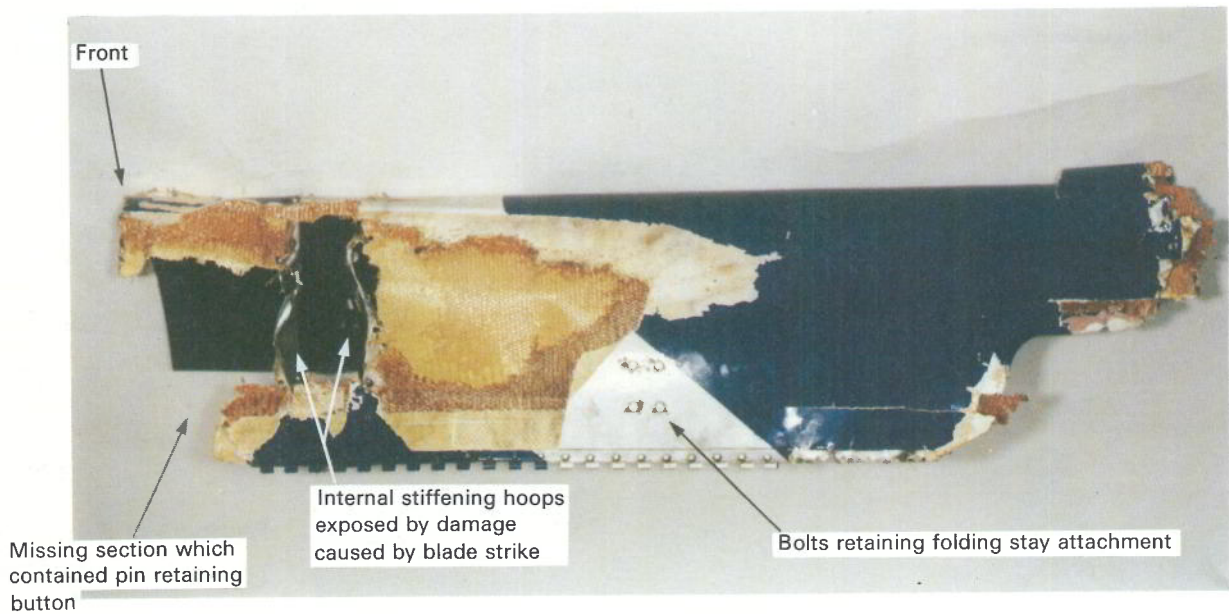


Photograph 3
Top of pylon assembly
(Showing detachment of upper pylon and tail rotor driveshaft)

a) Right side

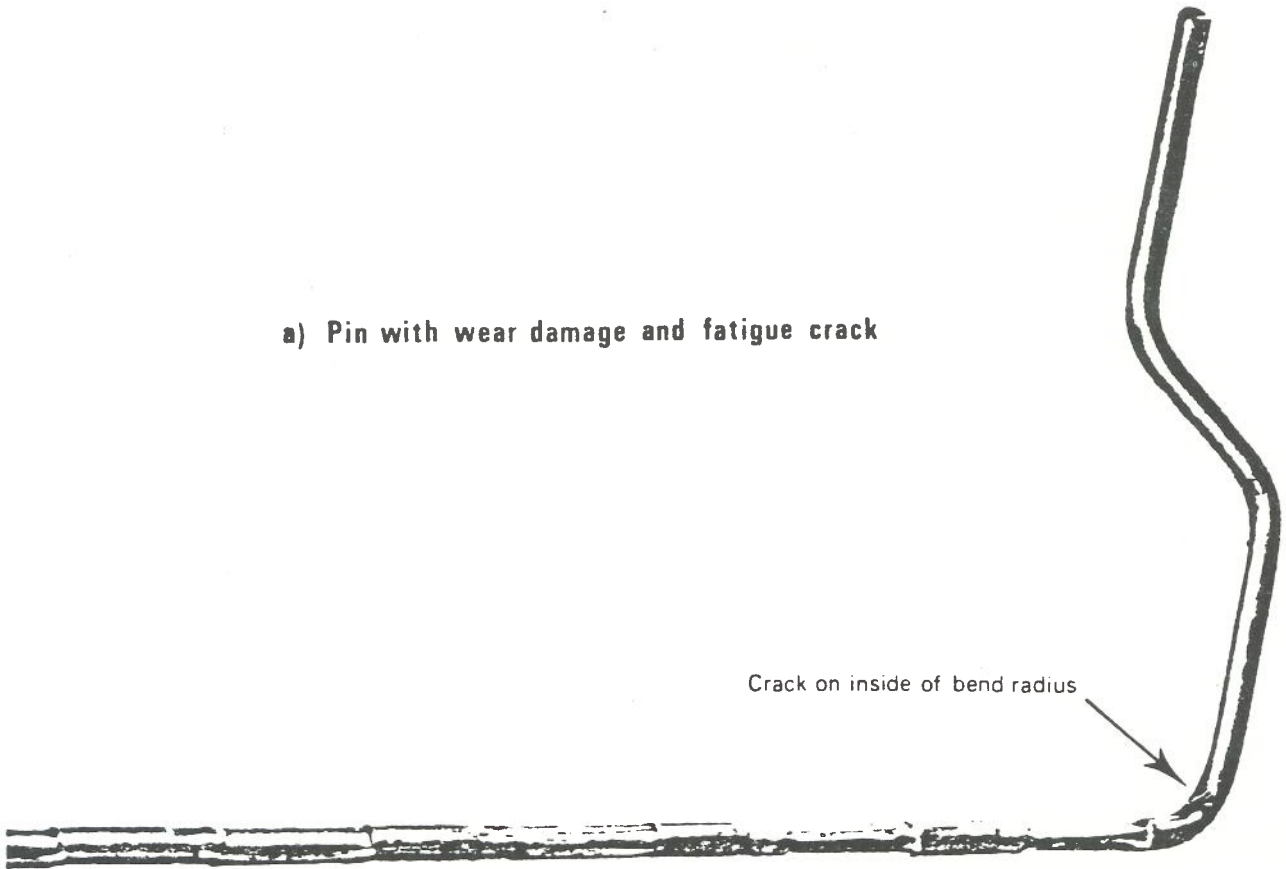


b) Left side

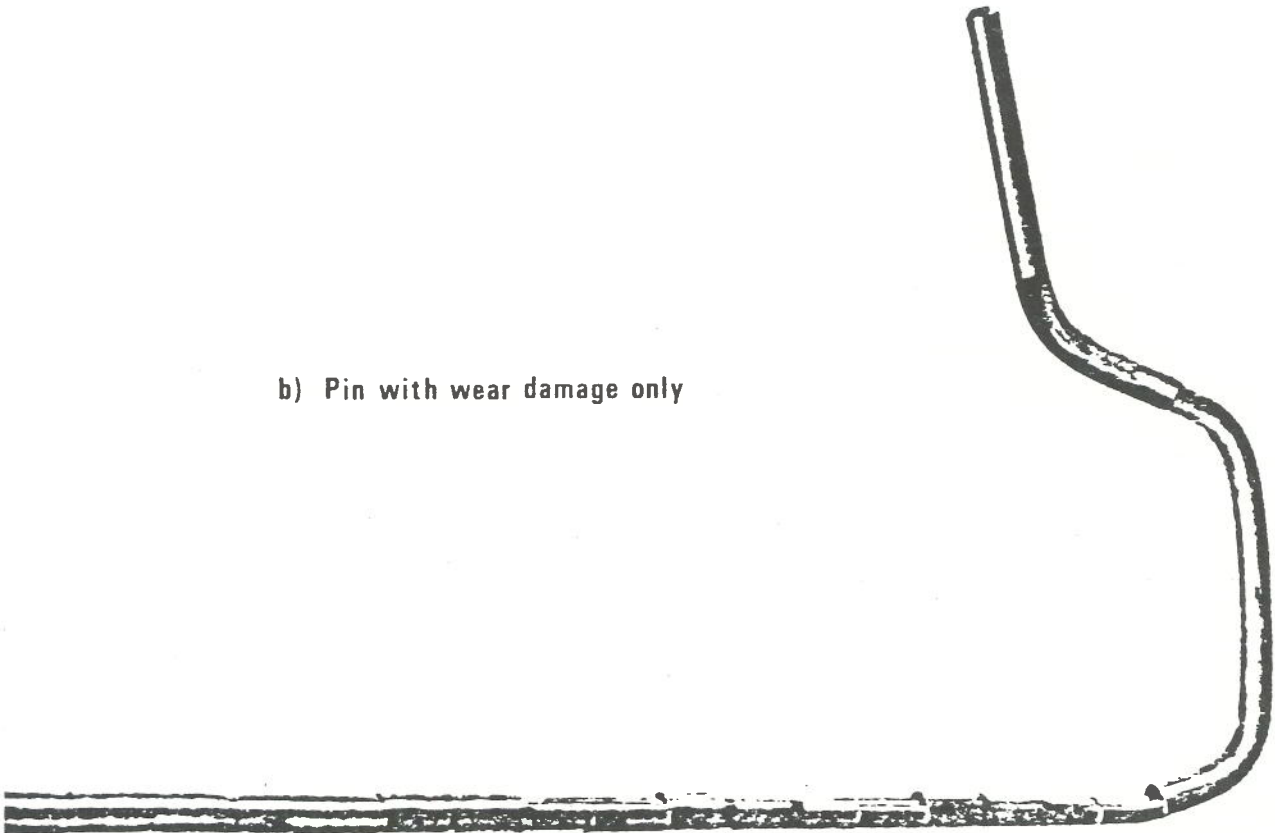


Views of damaged inclined driveshaft fairing

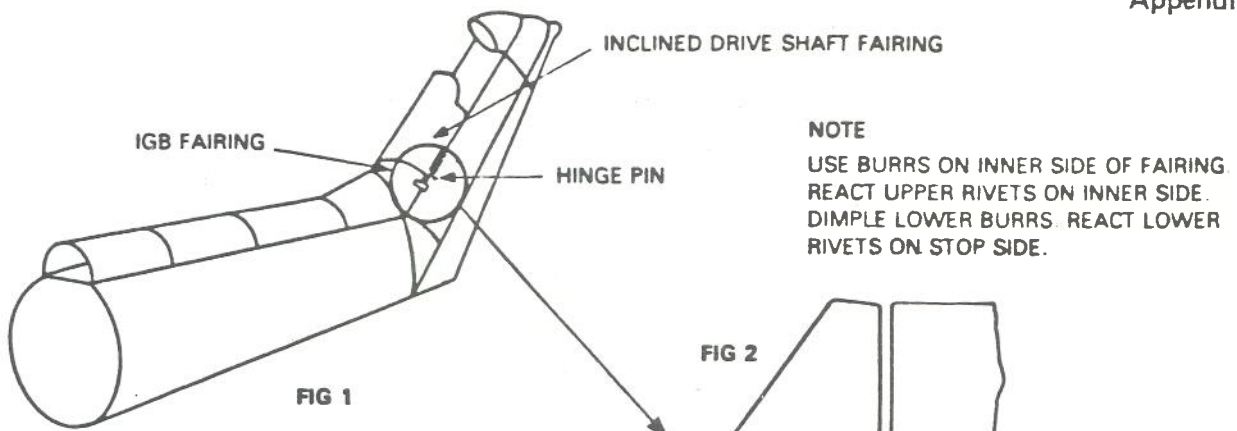
a) Pin with wear damage and fatigue crack



b) Pin with wear damage only



Stepped wear observed on hinge pins removed from two other aircraft of the Tiger fleet.



NOTE

USE BURRS ON INNER SIDE OF FAIRING.
 REACT UPPER RIVETS ON INNER SIDE.
 DIMPLE LOWER BURRS. REACT LOWER RIVETS ON STOP SIDE.

FIG 1

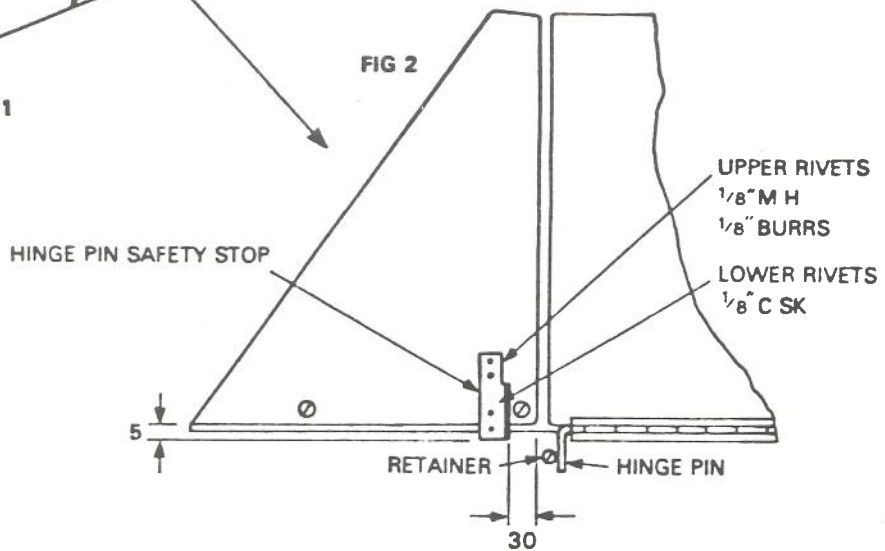


FIG 2

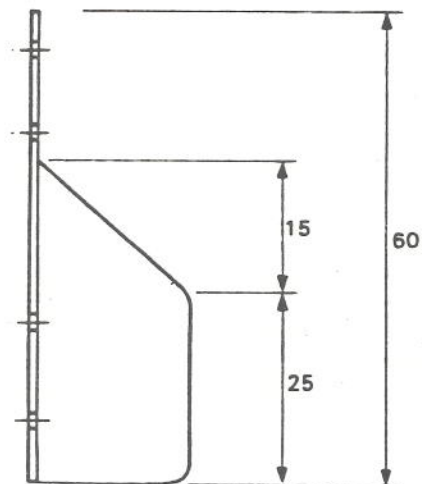
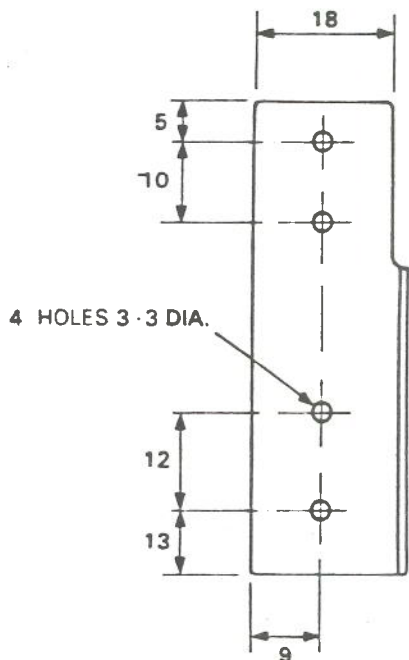
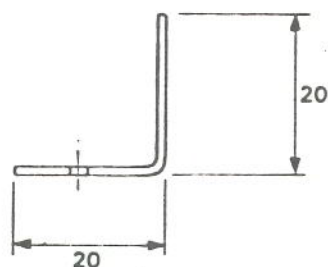


FIG 3

CORNERS 3mm RAD TYPICAL

ONE COAT EPOXY PRIMER
 APPLIED DIRECT TO METAL
 AFTER MANUFACTURE

ALL DIMENSIONS IN mm

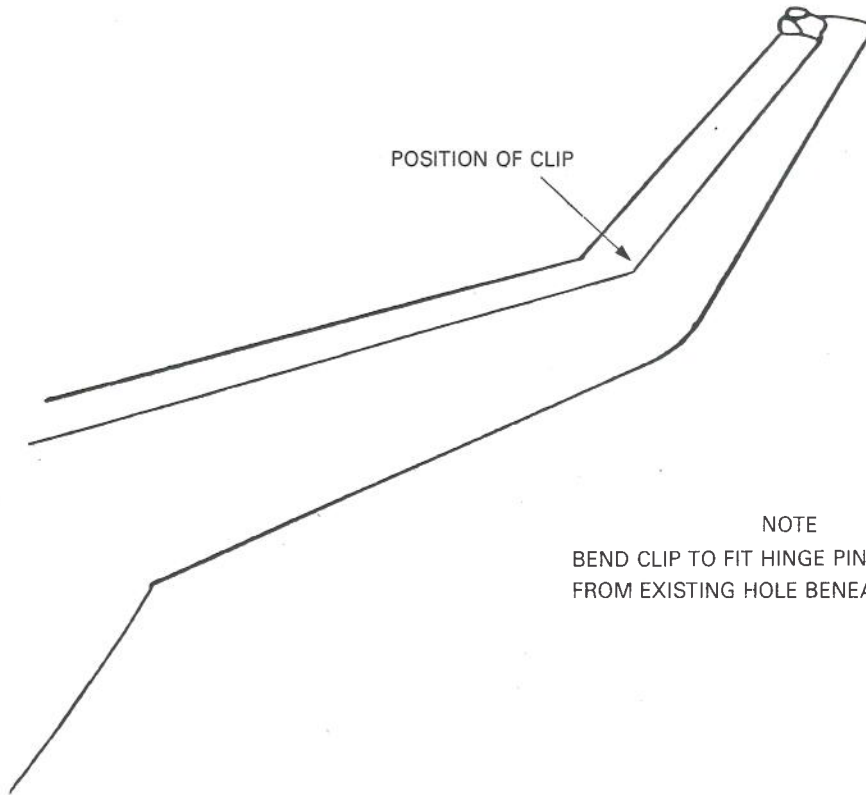


Stop made from 20 swg
 L72 Aluminium Alloy

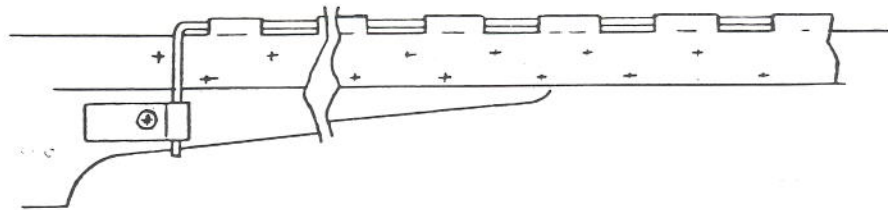
RAF hinge pin safety stop for PUMA inclined driveshaft fairing

This drawing associated with CM/PUMA/051

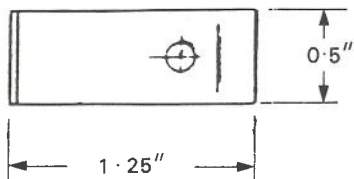
Drawing for SEM/PUMA/034 similar



NOTE
BEND CLIP TO FIT HINGE PIN & DRILL HOLE
FROM EXISTING HOLE BENEATH ACCESS COVER



DETAIL OF CLIP POSITION



CLIP

Drawing details copied from
Bristow Helicopters Ltd modification
drawing No BHL/PUMA 1080

To be made from 20 swg
L72 Aluminium Alloy

Bristow Helicopters' clip for hing pin on Puma inclined driveshaft fairing
Drawing details associated with modification BHL/PUMA/1038

INCIDENCE OF COWLINGS, FAIRINGS AND DOORS OPENING IN FLIGHT

(A) AS 330 PUMA

(i) Civil Registered Puma Helicopters

8. 4.78	G-BERH	Captain's door opened in flight.
17. 2.78	G-BFJY	Co-pilot's door opened in flight.
24. 4.78	G-BERG	Right cabin door became detached from runners when opened for rotors running crew change.
25. 5.78	G-BFJX	Co-pilot's door opened in flight.
18. 8.78	G-BERG	Rear cabin door dropped open whilst taxiing – no door warning.
24. 8.78	G-BFSV	Right cabin door opened in flight.
1.11.78	G-BFPN	Main transmission platform sliding cowling opened during turn-around, caught by wind and blown off.
23.12.78	G-BFNF	Cockpit door opened on three successive flights.
7. 6.79	G-BERG	Cover over inclined tail rotor driveshaft found open. Apparently pin had slid out of hinge.
8. 8.79	G-BERG	Captain's door opened 3 times in flight over 7 miles.
3.10.80	G-BERH	Captain's door opened in cruise shortly after take-off. Door was closed but re-opened later.
2. 7.81	G-BERG	Captain's door opened at 70 kts after take-off.
14. 2.81	9M SSD	Front of right engine cowling seen in cruise to be 1½" open. Both catches found disengaged with handle in locked position.
2. 6.83	G-PUMA	Captain's door partially opened in flight. Speed reduced and door successfully re-closed.
23. 6.83	G-PUMA	Intermittent door warning in flight. Aircraft returned. Right hand emergency exit latch incorrectly tensioned.
21.11.83	G-PUMB	Inclined tail rotor cover latches found undone. All fasteners to be monitored on flight to flight basis. Wire locking to be applied to fasteners.

(ii) Royal Air Force Puma Helicopters

7. 5.73	XW 227	Tail pylon top cover hinge pin missing.
14. 5.73	XW 203	Loss of hinge pin in tail rotor shaft cover.
28. 1.74	XW 212	Door hatch jettison. Assumed pin moved by turbulence.
20. 6.74	XW 203	Rear platform cowling missing.

7. 6.76	XW 205	Intermediate gearbox fairing detached, the fastener retaining housing had fractured along its bend line.
30. 1.78	XW 205	Yaw control was lost after the tail rotor was struck by the right cabin door.
17. 7.78	XW 222	Cabin door detached.
30.11.78	XW 218	Door detached.
8.12.78	XW 224	Crewman was unable to open left main cabin door. As door opened, runner dislodged two ball bearings from port cabin door upper rail assembly.
19. 5.79	XW 220	Right engine cowling opened on start up.
20. 2.79	XW 232	During after-flight, sliding cowling locking handle was missing. It fell off in flight. Handle assembled without araldite from Fleetlands.
14. 6.82	XW 211	Dull thud felt by crew. Right engine cowling in servicing position (down). Sliding cowling missing. Remains of the sliding cowling were still attached to the engine cowling by the locking bolt assembly and the upper hook.
18. 8.82	XW 218	Right main cabin door became detached. Two balls found missing on inboard site of ball carrier. Side holes in ball carrier found to be particularly worn. Ball could be pushed through inboard carrier holes with firm finger pressure.
25. 4.83	ZA 935	Co-pilot's jettisonable panel became partly detached. Door found to be held on by lower hinge bracket only. Left jettisonable door lock pin upper sheared immediately above lock nut. Port door sliding window and frame damaged. Aircraft fuselage slightly damaged by impact.

(B) AS 332 TIGER

23. 6.82	G-TIGE	10 min after take-off co-pilot's door opened in cruise followed by the Captain's.
24. 6.82	G-TIGE	Captain's door partially opened in flight and, despite reduction in speed, could not be re-secured.
11. 7.82	G-TIGE	Front top latch of co-pilot's door disengaged in cruise.
14. 7.82	G-TIGC	Co-pilot's door opened shortly after levelling off.
23. 7.82	G-TIGC	Front upper latch of Captain's door disengaged after take-off.

26. 7.82	G-TIGB	Tail pylon inclined driveshaft cover found to be open during rig turn-around. Fairing locking attachment brackets had failed.
27. 7.82	G-TIGD	During rotors running refuelling on barge, Captain was advised of loose cowling on Tail Rotor driveshaft. Cowling removed and aircraft returned to base. Rivets attaching bracket to tail pylon had sheared.
12. 8.82	G-TIGG	Top latch to emergency exit plug door found off after landing.
23. 8.82	G-TIGD	Although checked for security, following door warning, prior to take-off, co-pilot's door opened in cruise.
3. 9.82	G-TIGG	Co-pilot's door opened in cruise.
14. 9.82	G-TIGE	Subsequently top forward part of Captain's door seen to be open in flight but causing no warning. Aircraft returned to base for correct closure of door.
7.10.82	G-TIGK	Aircraft landed back on runway following main cabin door warning on take-off. Front lower attachment found to be unlocked.
15.10.82	G-TIGJ	Right cabin door warning in cruise. Passenger had accidently caught the door handle with his elbow.
16.11.82	G-TIGF	Right cabin door unlocked warning on rig approach. Passenger had moved handle with his elbow.
18.11.82	G-TIGE	After a series of door warnings on outbound leg which cleared when co-pilot's door handle was pulled to CLOSE, co-pilot's door opened shortly after rig departure.
22.11.82	G-TIGJ	Tail rotor driveshaft cowling latch seen to be open while rotors running on platform.
24.11.82	G-TIGJ	Aircraft returned to base when passenger inadvertently opened right cabin door shortly after take-off.
15.12.82	G-TIGG	Lower tail pylon cover securing clip found to be open during platform turn-around.
28.12.82	G-TIGE	No. 2 engine bay cowling opened in cruise.
10. 1.83	G-TIGG	Co-pilot saw loose intermediate gearbox panel during rig turn-around.
11. 1.83	G-TIGG	Co-pilot's door opened after departure as speed increased through 100 kts.

14.	1.83	G-TIGE	Aircraft landed back following right cabin door warning after take-off. Passenger had inadvertently moved door handle.
17.	1.83	G-TIGG	Aircraft shutdown after marshaller saw tail rotor servo cover loose.
23.	1.83	G-TIGG	Aircraft shutdown on rig to secure tail rotor servo cover.
24.	1.83	G-TIGH	Upper latch on tail pylon inclined cover found broken during rig walk-around.
7.	2.83	G-TIGE	Aircraft landed back following co-pilot's door warning on take-off. Front top corner of door seen to be open.
2.	2.83	G-TIGG	Tail rotor servo pack fairing detached unnoticed in flight.
9.	3.83	G-TIGL	Tail rotor servo inspection panel seen to be loose during rig turn-around.
25.	3.83	G-TIGC	Aircraft diverted en-route to reclose co-pilot's door which had not correctly locked at lower rear.
13.	5.83	G-TIGF	Aircraft diverted to nearest platform at reduced speed after right sponson strut fairing partially detached in flight with a jolt.
18.	5.83	G-TIGK	Aircraft shutdown on platform and tail pylon panel lower clip resecured and wire locked after being found unlocked during turn-around inspection.
24.	5.83	G-TIGI	Tail pylon panel lower securing clip found on platform turn-around to be undone and wirelocking broken.
14.	6.83	G-TIGP	Right engine cowling opened in circuit prior to landing at base.
15.	6.83	G-TIGC	After passenger disembarkation, tail rotor servo access panel seen to be open.
5.	7.83	G-TIGC	Tail rotor driveshaft cover hinge pin was found unclipped (see 83/1246) but held in place by BHL security mod.
8.	7.83	G-TIGC	Tail rotor servo cover was found to be open during running turn-around.
15.	7.83	G-TIGL	Tail rotor servo cover found open during rig turn-around.

15. 7.83 G-TIGJ Aircraft landed back to re-secure Captain's door after it opened partially after take-off. Forward top pin had not properly engaged.
20. 7.83 G-TIGL Lower portion of additional security fastening on right side of pylon tail rotor driveshaft cover had detached from the pylon due to failure of the rivets.
28. 7.83 G-TIGS During rotors running turn-around on rig, tail rotor driveshaft cover lower catch found open and wire locking broken.
29. 7.83 G-TIGE Co-pilot's door forward top latch opened suddenly in cruise.
10. 8.83 G-TIGK Tail rotor driveshaft cover found open with catch broken during rig turn-around.
- 15.10.83 G-TIGJ Shortly after 5th take-off of flight, right (emergency) passenger door warning illuminated. Aircraft landed back and door found unlocked.
- 26.10.83 G-TIGB During platform walk-around pilot saw inclined drive-shaft cover bottom catch open.
- 30.10.83 G-TIGH Aircraft returned to base (8 nm) following a 'COWL' warning and momentary heavy shake during cruise in moderate to severe turbulence. After landing ATC advised that entire gearbox cowling (doghouse) was missing and right engine bay cowling open.
- 8.11.83 G-TIGK Inclined driveshaft cover lower retaining clip found open while rotors running on platform.
- 25.11.83 G-TIGE As aircraft levelled after rig take-off passengers reported that cabin door was partly open although door warning was extinguished. Aircraft returned to rig where top forward microswitch lever was found distorted, preventing engagement of locking bolt.