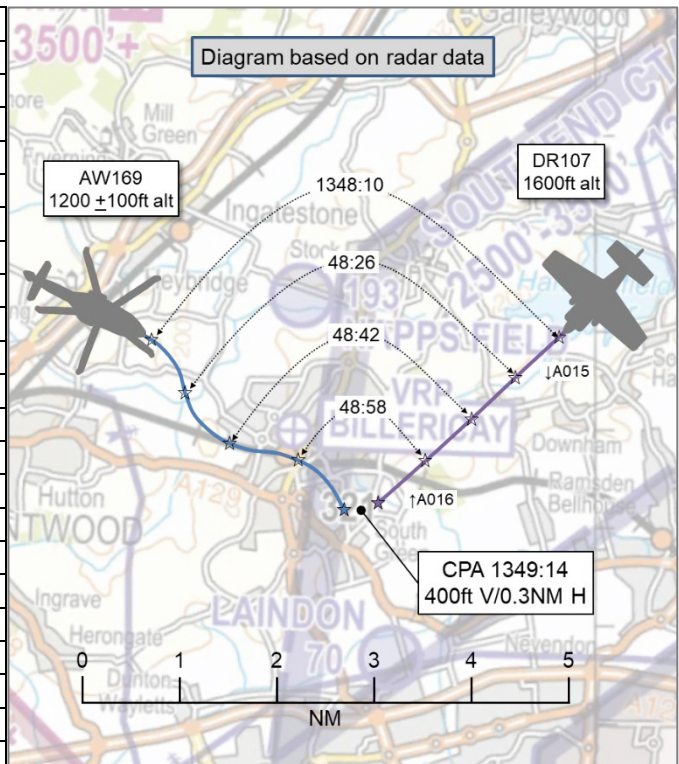


AIRPROX REPORT No 2020086

Date: 18 Jul 2020 Time: 1349Z Position: 5137N 00026E Location: Billericay

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

Recorded	Aircraft 1	Aircraft 2
Aircraft	AW169	DR107
Operator	HEMS	Civ FW
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	VFR
Service	Basic	Listening Out
Provider	Southend Radar	Southend Radar
Altitude/FL	1200ft	1600ft
Transponder	A, C, S	A, C, S
Reported		
Colours	Red/yellow	Red/white
Lighting	Strobes, nav lights	NR
Conditions	VMC	VMC
Visibility	>10Km	10Km
Altitude/FL	1200ft	1700ft
Altimeter	QNH	QNH
Heading	100°	230°
Speed	140kt	140kt
ACAS/TAS	TCAS II	Not fitted
Alert	RA	N/A
Separation		
Reported	100ft V/500m H	200ft V/300m H
Recorded	400ft V/0.3NM H	



THE AW169 PILOT reports that they were tasked to a HEMS scene in Southend. Once in the cruise, and following the after take-off checks, the crew noted that there was an unusually high number of TCAS contacts displayed on the MFD with a range setting of 10NM. The aircraft commander flew a course and altitude with full consideration towards maintaining maximum distance from all contacts. Approximately 5min into the flight it was noticed that one of the closer contacts looked to be on a conflicting course. The contact was quickly visually identified at a range of approximately 2NM and the aircraft commander deviated from their current course. The co-pilot maintained visual with the contact and noticed it began banking towards them as it passed abeam. The RA sounded between their course being altered and the aircraft passing safely abeam.

The pilot assessed the risk of collision as ‘None’.

THE DR107 PILOT reports maintaining height and heading in good VMC. They had selected the Southend frequency with the intention of requesting a Basic Service as the weather was good and they did not think that a Traffic Service was necessary. However, the frequency was busy and they had then become distracted, so did not call the Southend controller. They heard a helicopter call Southend for zone transit and they continued their lookout. However, they acquired the helicopter late, slightly below, in their 1-2 o'clock. They turned right to pass behind and climbed to avoid the wake vortex. They would have passed above the helicopter if they had not turned.

The pilot assessed the risk of collision as ‘Low’.

THE NORTH WEALD LEAD OPERATIONS OFFICER reports that they do not have any details of this Airprox as it was not reported on their frequency at the time. However, they can confirm [the AW169 pilot] was still on their frequency at the time maintaining a listening watch. They do not know the other aircraft involved, or who they were working.

THE SOUTHEND CONTROLLER reports that, whilst providing a LARS at Southend, [the AW169 pilot] called for a Basic Service, 1200ft, and entry into the Southend CTR. Following co-ordination with Director, a clearance was issued to enter Southend Class D airspace, VFR, not above altitude 1500ft. The pilot responded with "...the TCAS is talking, say again". The clearance was passed again and the aircraft was transferred to Southend Director. The only aircraft observed in the vicinity of [the AW169] was [a PA28], approximately 2NM north (behind [the AW169]) indicating 1600ft.

Factual Background

The weather at Southend was recorded as follows:

METAR EGMC 181350Z 24011KT CAVOK 24/11 Q1017=

Analysis and Investigation

London Southend Airport investigation

Southend was operating SSR only, as per the NOTAM, due to primary radar failure. The investigation has used the surveillance and RT recordings, the Director and LARS controllers' reports and interviews with the relevant radar controllers. The pilot's report was not available.

[The AW169 pilot] was in receipt of a Basic Service from Southend Radar at time of the incident with [the DR107]. The aircraft's Mode S ID, Mode A and Mode C (verified) were displayed correctly. [A PA28 pilot] was in receipt of a Basic Service from Southend Director, operating on a local flight from Southend, in vicinity of Billericay and Hanningfield Reservoir. [The DR107 pilot] was not in receipt of a service from Southend.

Timeline (filtered for relevant calls), Southend Radar frequency:

1345:45 – [The AW169] first appeared on Southend radar displays, 3NM ESE North Weald indicating 1300ft. [The PA28] was manoeuvring near Billericay indicating 2000ft, tracking northeast.

1348:03 – [The AW169] was tracking towards the BIL VRP (Billericay) indicating 1300ft. [The PA28] was approximately 1.5NM NE of [the AW169], tracking south, indicating 1000ft.

1348:16 – [The AW169] was observed to turn to the right, away from [the PA28] which was then tracking south. The lateral distance between the aircraft was approximately 0.6NM with a vertical separation indicated at 200ft.

1348:38 – [The AW169 pilot] called Southend Radar. They were 0.5NM W BIL at 1300ft indicated; [the PA28] was then 1NM N BIL at 1400ft indicated. [The AW169 pilot] transmitted "*[C/S] is an AW169 out of North Weald, we're just approaching the edge of your zone routing to a scene in Southend looking for a transit direct through your overhead*".

1348:53 – [The AW169] was S of BIL tracking ESE at 1200ft indicated. [The PA28] was 1NM N BIL at 1500ft indicated, tracking east. The lateral distance between the 2 aircraft was 1.4NM.

1349:02 – The Southend Radar controller transmitted "*[AW169 C/S] Southend QNH 1017, Basic Service*". This was read back correctly.

1349:03 – [The PA28 pilot] (approaching Hanningfield) requested re-join instructions from Director. They were instructed to stand by.

1349:15 – The radar indicated [the AW169] TCAS warning with a descent instruction (Figure 1). There were no apparent contacts in the vicinity to account for the warning. [The AW169] was 1NM SE BIL at 1200ft indicated. [The PA28] was 2NM N of [the AW169] at 1600ft indicated.



Figure 1 – Southend Radar display at CPA.

Southend ATC cannot confirm the level, position or track of [the DR107] at the time of the Airprox/TCAS event. For reasons which only became apparent during this investigation, their transponder had at no stage been recognised or processed by Southend radar systems. This is not an unknown phenomenon, although the precise nature of the problem was generally unknown to controllers. At the time of this incident, Southend was also operating SSR only, due long-term primary radar failure. Hence, in the unusual event that a transponder was not recognised, there is the potential for an aircraft to be rendered invisible to the controller(s). Both [the PA28] and [the AW169] were identified throughout using Mode S/A/C indications.

Two Southend Radar positions were operating at the time of the Airprox. The two ATCOs sit side-by-side and coordinate flights closely. [The PA28 pilot] was on a local flight and, as is common practice, had remained with Director. The Southend Director controller did not at any stage pass Traffic Information to [the PA28 pilot] on [the AW169] because they either did not see the potential confliction with [the AW169] or did not perceive there to be a genuine risk of collision. They were on the telephone to Tower at the time of the TCAS event, coordinating the transit. They transferred the helicopter as it entered their controlled airspace, after the Airprox/TCAS event. [The PA28 pilot] had called them for re-join instructions after the Airprox and, after an initial delay, was given join to right base RW23.

The Southend Radar controller did not warn the Director controller of a possible confliction between [the AW169] (not yet on Southend Radar frequency but approaching Hanningfield) and [the PA28] (which they knew was working Director) because they either did not see the potential confliction or did not perceive there to be a genuine risk of collision. It would not be their responsibility to do so but it is encouraged in the spirit of team-work when conditions allow. The Southend Radar controller was also providing a Service to several other callsigns.

Regarding the [reported] Airprox between [the DR107] and [the AW169]: [The AW169 pilot] had just been placed under a Basic Service from Southend Radar. The Southend Radar controller was coordinating a clearance with Director who, in turn, then coordinated with Tower. At some point during this coordination it appears that, from the pilot's report and the subsequent TCAS warning, they came into conflict with traffic which was completely unknown to Southend. The traffic did not call and was not at any time observed on radar. As far as the radar controller was aware, there was no traffic in the vicinity [of the AW169] and the TCAS event appeared to be a spurious one. The [AW169] pilot mentioned that their TCAS was 'talking', but at no point intimated an Airprox had occurred with either [of the other] aircraft. They were transferred to Director with no further incident

and neither controller made initial reporting action, as they were unaware of any potential incident having occurred.

Evidence suggests that [the DR107] pilot was routing outside controlled airspace and had a serviceable transponder which Southend Radar did not see due to a combination of a lack of primary radar and a radar processor which did not recognise their transponder (see conclusion).

[The AW169] and other helimed callsigns frequently operate close to Southend controlled airspace without speaking to Southend ATC. Radar controllers at Southend are accustomed to seeing helimed callsigns close to, or underneath, the Southend CTA whilst not providing the pilots with a Service.

[The AW169 pilot] was not receiving a Service when they turned away from [the PA28]. They appeared to make a manoeuvre to deconflict themselves in good time to avoid a more serious conflict. Their relatively late first call to Southend, given their flight status, meant hurried coordination between controllers to prevent a delay.

The controller providing the Basic Service to [the PA28 pilot] was, at the time of the event, both receiving late-notice coordination from their radar colleague and coordinating an ATZ transit with Tower. However, by the time they were made aware of [the AW169] and the pilot's intentions, [the PA28] was well clear.

[The PA28 pilot] was manoeuvring VFR in Class G airspace under a Basic Service. It is possible that their turn away from [the AW169] was intentional due to good lookout, or may have been providence.

Controllers are not obliged to pass/update Traffic Information to aircraft receiving a Basic Service, except where an obvious danger of collision exists. Pilots remain responsible for maintaining a lookout and avoiding traffic.

Unit Conclusions – The Airprox/TCAS event between [the AW169] and [the DR107] cannot be commented upon. Evidence suggests that at the time of the event, [the AW169 pilot] had just confirmed a Basic Service. [The DR107] was unknown and unseen by Southend ATC (see below).

As a result of enquiries and initial recommendations during this investigation, Southend ATC has:

- Completed works in recommissioning the primary radar. As of 9th September 2020 the primary radar is serviceable and in-use.
- Established that the [DR107] was fitted with Garrecht VT-01-type transponder.
- Established that certain Garrecht-type transponders have a known incompatibility problem with Selex processors, which was documented during the post-installation trial period. Colloquial evidence suggests that this phenomenon is not unique to Southend but is, in fact, a common problem documented by other units and known to both manufacturers and the CAA. The installation sign-off stated the following in relation to the raised problem:
 - “Closed – It has been identified that these transponders are displaying inconsistent responses to all Radar types. This has been attributed to the transponders and is under investigation by the CAA. We consider this closed as it is not an ATCR33 system fault.”
- Reviewed the ATC safety case for operation of the Selex system, to include the above.
- Reviewed MATS part 2 and include a Supplementary Instruction containing information and advice to controllers on the above.

- Consulted CAA SARG¹ in relation to the above actions.

Unit Recommendations – SATCO to consider a reminder to staff of the requirement to log and report any unusual occurrences concerning the behaviour of the Selex radar, in particular the phenomenon whereby certain transponders are rendered invisible to Selex SSR processors.

UKAB Secretariat

Analysis of the NATS radar replay was undertaken. The phenomenon of a transponder-equipped aircraft not being displayed on the radar screen, such as that which occurred on the Southend radar, was not apparent on the NATS radar. A radar screenshot is provided below (Figure 2) clearly showing the presence of the AW169, the DR107 and the PA28 that is referred to in the Southend ATC investigation. Figure 3 is the radar CPA at 1349:14.

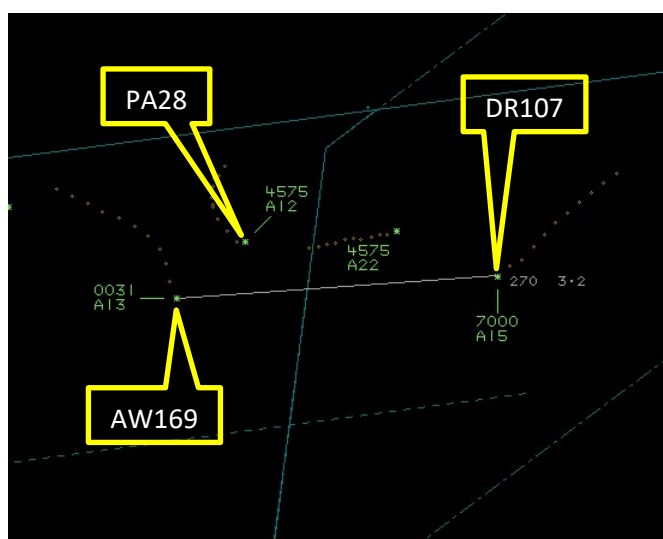


Figure 2



Figure 3 - CPA

The AW169 and DR107 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard.² If the incident geometry is considered as converging then the DR107 pilot was required to give way to the AW169.³

Summary

An Airprox was reported when an AW169 and a DR107 flew into proximity over Billericay at 1349Z on Saturday 18th July 2020. Both pilots were operating under VFR in VMC; the AW169 pilot was in receipt of a Basic Service from Southend Radar and the DR107 pilot, whilst not in receipt of a formal Air Traffic Service, was listening out on the Southend Radar frequency.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available consisted of reports from both pilots, radar photographs/video recordings, GPS log files, reports from the air traffic controllers involved and a report from the appropriate operating authority. Relevant contributory factors mentioned during the Board's discussions are highlighted within the text in bold, with the numbers referring to the Contributory Factors table displayed in Part C.

¹ Safety and Airspace Regulation Group.

² SERA.3205 Proximity.

³ SERA.3210 Right-of-way (c)(2) Converging.

Due to the exceptional circumstances presented by the coronavirus pandemic, this incident was assessed as part of a 'virtual' UK Airprox Board meeting where members provided a combination of written contributions and dial-in/VTC comments.

The Board first discussed the actions of the AW169 pilot. Members heard from a helicopter pilot member that the area in which the Airprox took place is widely known as popular with GA and is often quite busy, particularly in the vicinity of the Hanningfield reservoir. Therefore, although not a contributory factor in this particular encounter, the Board felt that, as a general note, the pilot may have been better served requesting a surveillance-based Air Traffic Service. That said, members agreed that the AW169 pilot had had situational awareness on the presence of the DR107 from their TCAS equipment and had also sighted the DR107, albeit it appeared to the Board they may have delayed their manoeuvring to increase separation to the extent that a TCAS RA had been generated (CF4), which had led the AW169 pilot to be concerned by the proximity of the DR107(CF6).

The Board then discussed the actions of the DR107 pilot, and quickly agreed that they had become distracted after selecting the radio frequency for Southend Radar which had led to them not informing the Southend controller of their presence. That said, he had been aware of the presence of the helicopter by virtue of hearing the AW169 pilot's transmissions. This had permitted him to mentally plot where to look for the helicopter and he had eventually become visual with it, albeit slightly later than the ideal (CF5). The DR107 pilot had then manoeuvred to increase separation, though the Board was unable to assess whether or not the AW169's TCAS RA had occurred before or after this manoeuvre had taken place.

Turning to the actions of the Southend Radar controller, the Board noted that they had been working SSR only (CF1) and that this had rendered the DR107 invisible to the controller, thus they had had no situational awareness of the potential conflict between the AW169 and DR107 (CF2, CF3). A GA member noted that this had been a salutary lesson that all barriers to mid-air collision have their weaknesses, and these can be exposed in the most unexpected of circumstances; thus lookout remains a vital element in avoiding conflicts with other aircraft, albeit lookout also has inherent weaknesses. Some ATC members wondered whether the Southend Radar controller should have informed the AW169 pilot on initial contact that they were working SSR only, notwithstanding there had been a NOTAM issued describing the unserviceability of the primary radar. CAP774, paragraph 1.10 (Reduced traffic information/deconfliction advice) states:

- *There may be circumstances that prevent controllers/FISOs from passing timely traffic information and/or deconfliction advice, e.g. high workload, areas of high traffic density, unknown aircraft conducting high energy manoeuvres, or when traffic is not displayed to the controller or is obscured by surveillance clutter. Controllers/FISOs shall inform the pilot of reductions in traffic information along with the reason and the probable duration; however, it may not always be possible to provide these warnings in a timely fashion.*

Although not contributory to this event, members wished to remind controllers that it is good practice to inform pilots of any limitations that may be placed on the Service they have agreed to provide. That said, members did feel that had the AW169 pilot requested a surveillance-based Service then that may have prompted the controller to remind the pilot that Southend was working SSR only. As for the inability of the Southend SSR to detect the presence of certain certified transponders, the Board was concerned to discover that the particular pairing of the make of transponder fitted to the DR107 and the SSR processor in use at Southend was a known problem that appears to have existed for a considerable time. Enquiries with the CAA revealed that, although there is some corporate memory of this issue and that the reference to a 'CAA investigation' may be based on historic communications between the manufacturer of the SSR processor and Southend ATC when the radar was first installed, there is no formal investigation into the problem by the Regulator. In light of this information, the Board wished to make a formal Safety Recommendation that **'The CAA reviews the Southend ATC Safety Case activity to ensure that it includes robust mitigations for the known incompatibility between the SSR processor and Garrecht-type transponders'**.

Finally, the Board discussed the risk involved in this encounter. Members quickly agreed that, given a CPA of 400ft vertical and 0.3NM horizontal separation, coupled with the pilots assessments of collision

risk as 'none' and 'low' respectively, there had been no risk of collision. However, some members felt that normal safety standards and parameters had pertained (Risk Category E) while others considered that the complete absence of the ATC Situational Awareness barrier due to apparent equipment compatibility shortfalls could not be considered to be 'normal'. After further discussion, the Board agreed that there had been no risk of collision but that safety had been degraded; Risk Category C.

PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK

Contributory Factors:

	2020086		
CF	Factor	Description	Amplification
Ground Elements			
• Manning and Equipment			
1	Technical	• Aerodrome and ATM Equipment	Non-functional or unavailable equipment
• Situational Awareness and Action			
2	Contextual	• Situational Awareness and Sensory Events	The controller had only generic, late or no Situational Awareness
3	Human Factors	• Conflict Detection - Not Detected	
Flight Elements			
• Electronic Warning System Operation and Compliance			
4	Contextual	• ACAS/TCAS RA	
• See and Avoid			
5	Human Factors	• Monitoring of Other Aircraft	Late-sighting by one or both pilots
6	Human Factors	• Perception of Visual Information	Pilot was concerned by the proximity of the other aircraft

Degree of Risk: C

Recommendation: The CAA reviews the Southend ATC Safety Case activity to ensure that it includes robust mitigations for the known incompatibility between the SSR processor and Garrecht-type transponders.

Safety Barrier Assessment⁴

In assessing the effectiveness of the safety barriers associated with this incident, the Board concluded that the key factors had been that:

Ground Elements:

Manning and Equipment were assessed as **ineffective** because the Southend Radar controller was operating SSR only and the equipment was unable to detect the presence of the DR107.

Situational Awareness of the Confliction and Action were assessed as **ineffective** because the Southend Radar controller did not know of the presence of the DR107 due to the DR107's transponder being invisible to the Southend Secondary Surveillance Radar.

⁴ The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).

Airprox Barrier Assessment: 2020086 Outside Controlled Airspace

Barrier		Provision	Application	Effectiveness		
				Barrier Weighting		
		0%	5%	10%	15%	20%
Ground Element	Regulations, Processes, Procedures and Compliance	✓	✓			
	Manning & Equipment	✗	✓			
	Situational Awareness of the Confliction & Action	✗	✗			
	Electronic Warning System Operation and Compliance	○	○			
Flight Element	Regulations, Processes, Procedures and Compliance	✓	✓			
	Tactical Planning and Execution	✓	✓			
	Situational Awareness of the Conflicting Aircraft & Action	✓	✓			
	Electronic Warning System Operation and Compliance	⚠	✓			
	See & Avoid	✓	✓			
Key:		Full	Partial	None	Not Present/Not Assessable	Not Used
Provision	✓	⚠	✗	○		
Application	✓	⚠	✗	○		○
Effectiveness	■	■	■	■		□