Radar Echoes from Birds*

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As radars have increased in power and efficiency, echoes from an ever-greater variety of targets have been detected. For some time it has been recognized that some radar echoes were quite probably caused by birds, but confirmation has been difficult and the phenomenon received comparatively little attention.

Recent radar observations made in the United States have turned up echoes from birds which are of a bit more than passing interest. The deduction that these were actually echoes from birds makes a rather interesting story. It also provides an instructive example of procedures occasionally employed in the analysis and interpretation of radar observations.

In April 1957, at the Sixth Weather Radar Conference at Massachusetts Institute of Technology in the United States, Elder, a scientist from the University of Michigan described some peculiar echoes which had been detected with an experimental radar he was using. The echoes he detected are shown in fig. 1 and still have not been satisfactorily explained. The ring-shaped echo expanded at a speed of about 30 miles per hour like a ripple when a pebble is tossed in a quiet pond. It will be noted that the distance of this echo from the radar is of the order of 10 miles or so. Moving target indication, a special circuit which cancels echoes from stationary objects such as buildings, was used. That is why no "ground clutter" appears in the picture.

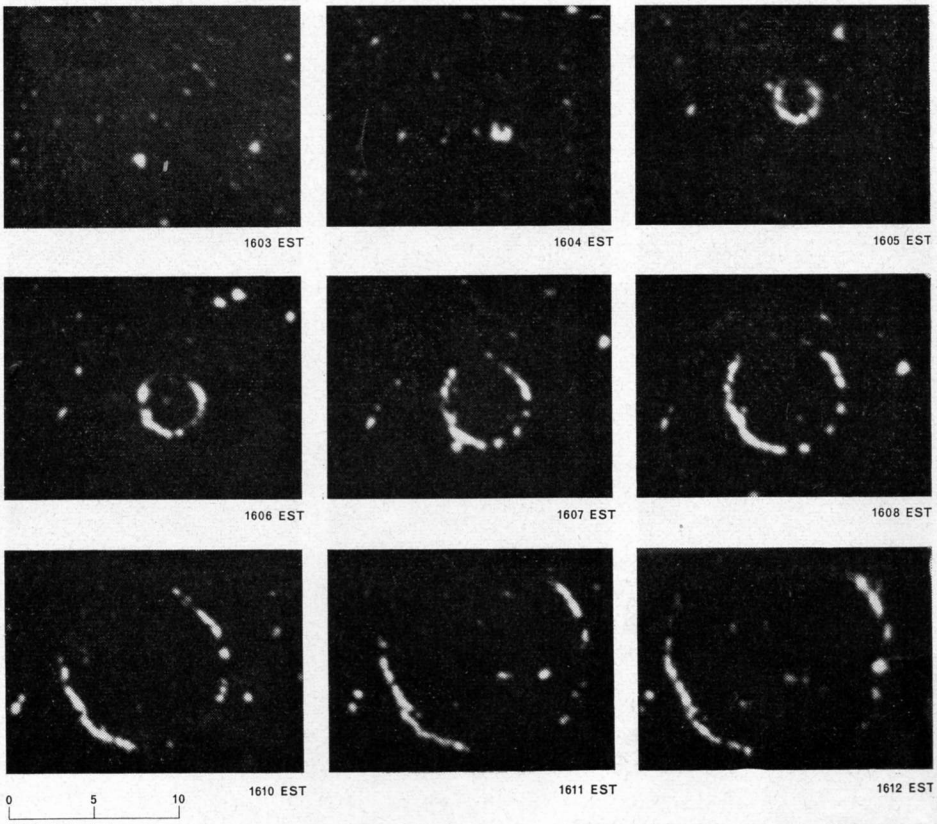

Fig. 1 Ring echo detected by the radar at Willow Run Airport, Detroit, Michigan, January 17, 1956. Note that ring does not get thicker with increasing size

Five or six months later, in routine inspection of radarscope film from another station operating under different conditions, somewhat similar echoes were noted. An example is shown in fig. 2. Here, the center of the ring is located about 30 miles from the radar, and the echo expands at a speed of about 15 miles an hour.

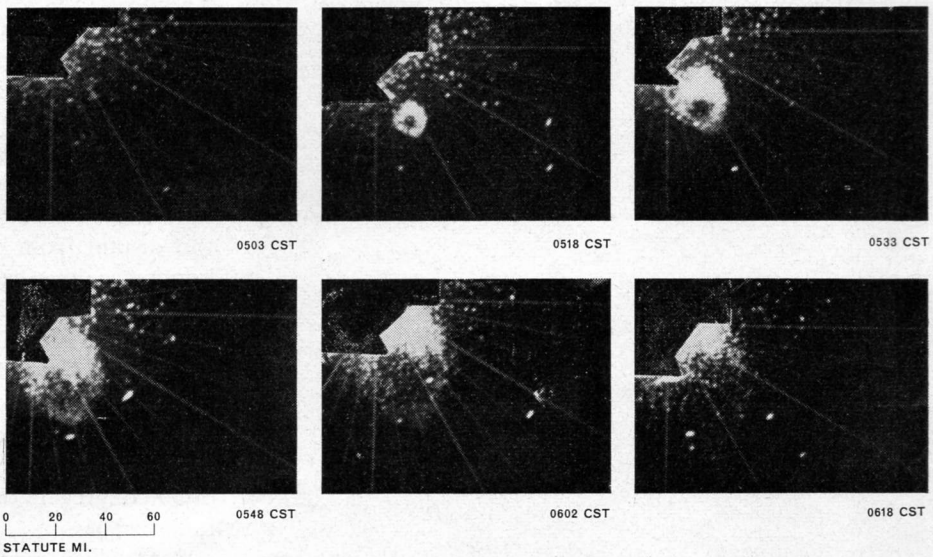

Fig. 2 Ring echo detected by the radar at Texarkana, Arkansas, airport, August 9, 1957. Note increasing thickness of ring as it grows

It was several weeks before the film could be studied more closely, but during the interval the question of the origin of the echo was never far from the mind of the author. When the films were again viewed, it was quickly determined that but one echo appeared each day during about a three-week period, and this echo appeared every morning about the time of local sunrise. Sometimes the area was clear of precipitation echoes and sometimes there were showers in the area. Inspection of a detailed map of the region failed to suggest any source for such an echo.

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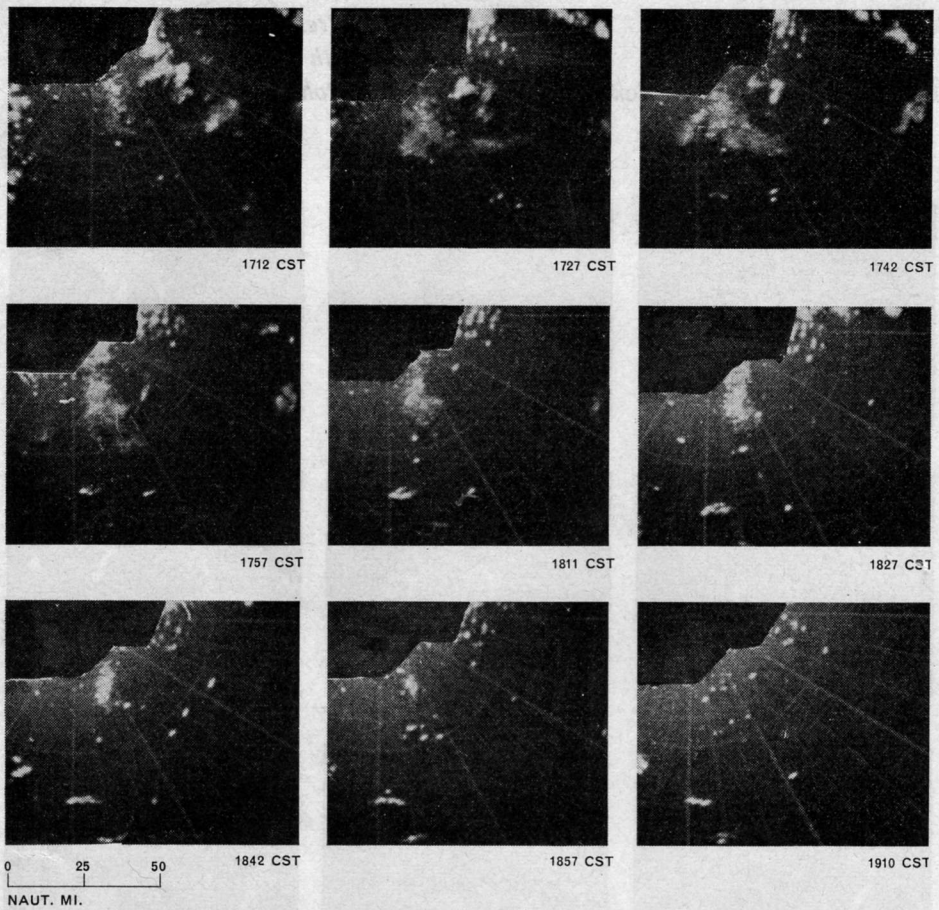
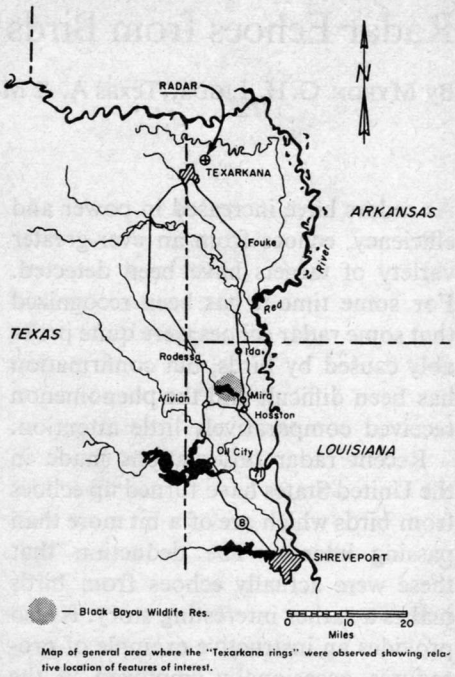


Fig. 3 Contracting echo detected by radar at Texarkana airport, July 24, 1957. Other irregularly-shaped echoes which change but little are caused by small rain showers



Map of general area where the "Texarkana rings" were observed showing relative location of features of interest.

Fig. 5 The location of the roosting grounds is near the Wild Life Reservation south of Texarkana where the Radar is located

Continued examination of the film then provided another clue which is shown in fig. 3. Here, a faint, irregularly shaped echo *converges* on the same spot where the circular echo is observed to originate. This also occurred only once a day—but around sunset.

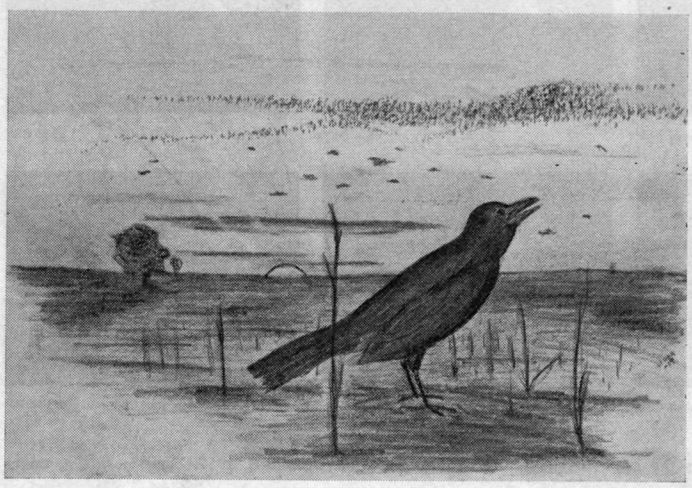


Fig. 4 Millions of blackbirds cause the radar echoes of fig. 2 and 3, flying out to their feeding grounds at sunrise (fig. 2) and returning to their roosting grounds at sunset (fig. 3)

It was this converging echo which provided the explanation, for a familiar sight in the area at sunset is what must be millions of *blackbirds* (fig. 4) returning from feeding grounds to swamplands where they roost for the night, safe from predators. Less familiar, especially to those who don't get up at the crack of dawn, is the outbound flight, which must start within ten or fifteen minutes of the same time for all birds. The gradual broadening of the ring is explained by the slight difference in speed of flight of the different flocks. The irregular-shaped echo at dusk is caused by the birds in different areas starting back to the roosting grounds at somewhat different times. The birds exhaust the available feed in one area, then move on to another, so the echoes are not observed for more than a few weeks by any one station. The roost must not be too distant from the radar or the birds will be below its horizon, neither can they be too close or the ground pattern will obscure their echoes. The location of the roosting grounds is near the Wild Life Reservation south of Texarkana where the radar is located (fig. 5).

Other species have been tentatively identified, but these do not give such spectacular echoes. Sea gulls, geese, ducks, pigeons, swallows, and so on are all examples of birds that often congregate or fly in flocks and should give discernible radar echoes.

Bats, which swarm from local caves at dusk should be observable, and echoes from these have undoubtedly been recorded.

It would appear that this would be an observation of some interest to glider pilots and to ornithologists who might be able to glean such information as the speed of flight of species, traveling habit, height of flight (with suitable radar), weather effects on habit, and so on. No doubt, radar echoes of soaring birds will reveal details on vertical aircurrents.