

PROJECT OLDSTER – THE RAF AND THE U-2 1958-60

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In May 1956, Prime Minister Anthony Eden reversed his recent decision to allow the new U-2 spyplane to be based in the UK for overflights of Eastern Europe and the Soviet Union by American pilots. The CIA's Detachment A moved to West Germany, and flew its first missions across the Iron Curtain the following month. Two years later, however, the RAF became a full partner in the extraordinary project. The 'special relationship' had prevailed.

The first overflights had provided a bonanza of intelligence. Cruising at 70,000 feet, they had proved invulnerable to interception by Soviet fighters, as intended. But contrary to expectations, they had been detected by Soviet radars. Moscow sent a diplomatic protest, and to the CIA's acute disappointment, President Eisenhower only reluctantly and occasionally approved subsequent missions.



The first four RAF U-2 pilots, L-R, Sqn Ldr Chris Walker and Flt Lts Mike Bradley, David Dowling and John MacArthur.

CIA project director Richard Bissell therefore suggested that the UK should make overflights that would be approved in London, rather than Washington. Eisenhower agreed, and an approach was made in October 1957. Discussions followed between CIA Project Headquarters and senior RAF officers in the Air Ministry. An outline proposal was approved by Harold Macmillan, now the British Prime Minister, on 27 February 1958. Even before detailed negotiations took place, the RAF selected four pilots for training: Sqn Ldr Chris Walker and Flt Lts Mike Bradley, David Dowling and John MacArthur. They arrived in the US on 19 March 1958 and four days later flew to the famous Lovelace Clinic in Albuquerque for the intensive, week-

long medical that was obligatory for prospective U-2 pilots. Then came the fitting of partial pressure suits at the David Clark Co. in Worcester, MA; a visit to the decompression chamber at Wright-Patterson AFB; and an escape and evasion course at Camp Peary, VA, the CIA's secret training facility. Then they were sent to Laughlin AFB in Texas, where the US Air Force had established its own U-2 squadron.

Meanwhile, talks in London centred on the extent to which the RAF would operate independently of the US. For example, would a couple of aircraft be legally transferred to the RAF? The key British participants were ACAS(Ops) AVM Ronnie Lees, ACAS(Int) AVM William MacDonald, and Sir Patrick Dean, the Permanent Under-Secretary at the Foreign Office. (MacDonald was succeeded by AVM Sidney Bufton in mid-1958).

Eventually, an integrated operation was arranged. The four RAF pilots would be joined by a navigator (Flt Lt Mike Collingwood) and a medical officer (Flt Lt John Clifford), who would all join the CIA's Detachment B, based at Incirlik in Turkey. But the aircraft would remain US property, and there would be no change to the unusual structure of the detachment. This comprised a USAF commander, between six and eight former USAF pilots now employed as civilians by 'the Agency'; security and communications personnel also employed by the CIA; operations officers and enlisted assistants who retained their USAF status; and civilian contractors who maintained the aircraft and their sensors.

Within the Air Ministry, a small office was created in Room 7323 of the Whitehall Gardens building. It was headed by Gp Capt Thomas Bingham-Hall, assisted by Wg Cdr Colin Kunkler. They reported to DDOps(Recce) Gp Capt Stewart Wise. Wg Cdr Norman Mackie was sent as liaison officer to CIA Project HQ.

By this time, the CIA's codeword for its U-2 operation was CHALICE. But a separate codeword was allocated to the British participation. The first two of these were short-lived, before OLDSTER was adopted.

Of course, Project OLDSTER was Top Secret, and only 24 people were cleared for it in the whole of Whitehall. But there had to be an unclassified cover story. After much discussion, 'meteorological research' was agreed, to match the CIA's own cover story. The Director General of the Met Office was briefed, and a

short statement was inserted in the *Meteorological Magazine*. It said that the US was loaning two aircraft for flights in the UK by RAF pilots.

But because knowledge of the project was so strictly confined within Whitehall and the Air Ministry, there was even a separate cover story for those with Top Secret clearances who might become suspicious: radar reconnaissance and the air sampling of nuclear weapons fallout. The U-2 did indeed also perform those missions, but Project OLDSTER was all about taking photos of the Soviet Union.

There was a protracted and convoluted debate about whether the British U-2 pilots should be civilians to aid in deniability, again matching the American practice. The PM favoured this. Eventually, it was agreed that they should remain as RAF officers. But when they were deployed to Incirlik, they would wear civilian clothes and pretend to be working for the Met Office.

On 8 July 1958, Sqn Ldr Walker was killed when his aircraft went out of control at high altitude and crashed in the Texas panhandle. The next day, a USAF pilot was killed in similar circumstances. Walker's autopsy revealed that he had become hypoxic, and inspections of other U-2s suggested that ice had formed in the oxygen system. But further, Walker had used his ejection seat, which had not separated, and there was evidence of a fire in the USAF pilot's oxygen tube. The U-2 was grounded for a month for reliability checks and modifications. As soon as flying was resumed, another USAF pilot died when he stalled on final approach.

Twelve U-2s had now been lost in accidents. Some were pilot error: this was a difficult aircraft to fly, especially at high altitude where the stall and buffet speeds converged to as little as ten knots. The weight-saving 'bicycle' undercarriage made landing the 80-foot wingspan U-2 a major challenge. There was no dual-seat training version. Instructor pilots first demonstrated some U-2 flying techniques in a T-33. Then came the trainee's first solo, a low-altitude flight which the instructor pilot 'chased' in a Cessna 310, relaying advice by radio. (For more detail on the unique flying characteristics of the U-2, see the following article by Ian McBride).

More inspections followed, which delayed the final qualification of the RAF pilots. Sqn Ldr Robbie Robinson joined them in Texas as a replacement for Walker. He was a test pilot who had already flown to high altitude in the rocket-assisted Canberra WK163. This aircraft currently held the world record of 70,308 feet – but only because the U-2's maximum altitude of 75,000 feet remained secret!

In London, a procedure for securing political approval for British U-2 overflights was devised. A provisional programme for each three months would be submitted to the Secretary of State for Air, the Foreign Minister, and the Prime Minister. The Air Ministry envisaged two flights over the Soviet Union and two over the Middle East each month. It would provide detailed routes to the three politicians and seek their final approval 24 hours before each scheduled take-off.

These plans were soon to prove unduly optimistic. So was Richard Bissell's idea that a British-flown mission – including political approval – could be considered entirely independent of the US. In practice, Projects CHALICE and OLDSTER were too tightly integrated. For instance, all the targets were agreed jointly, and the detailed mission planning was done by the American staff at Project HQ. The film from the U-2's main camera could only be processed in the US. The entire operation relied on USAF aircraft for airlift and passenger shuttle flights.

The final operations plan was signed in London by AVM Bufton and the CIA Deputy Project Director, Jim Cunningham, on 28 October 1958. The three RAF pilots who had qualified arrived at Incirlik in mid-November, plus the doctor. The navigator followed in early January, as did Sqn Ldr Robinson on completion of his flight training. He became commander of the British contingent within Detachment B.

The PM had taken a particular interest in the cover story, and asked that it be reinforced by sending a U-2 to the UK for weather research flights, before any operational mission was flown. (The U-2 could carry a dedicated meteorological package. It had already investigated typhoons over Japan). In early December 1958 therefore,



The U-2 that was deployed to Watton in May 1959, to be flown by RAF pilots on 'meteorological' 'research' flights.

an aircraft was flown to RAF Watton, where a 'Meteorological Experimental Unit' had been established. But severe frost and fog prevented all but one flight in the entire two-week deployment. Det B made two more excursions to Watton, in May and October 1959. Some more 'weather' flights were made over the UK, and the deployments also served to practice the 'Fast Move' technique that had been developed – deploying the U-2 to staging bases with

minimum support equipment, to help disguise and speed operations.

On the last day of 1958, an RAF pilot flew the UK's first operational mission, an eight-hour overflight of Egypt, Syria and Jordan. Previously, coverage of the Middle East had been obtained by Canberra PR7s and PR9s. Imagery from the U-2 flight was shown to the Prime Minister on 4 February 1959 by the Secretary of State for Air, George Ward. He reported that the PM was 'greatly impressed'. A further 18 Middle East missions would be flown by RAF pilots from Det B over the next 15 months, all conducted without the knowledge of the overflown countries, which also included Iraq, Lebanon and Saudi Arabia. However, the PM took a keen interest in the routes, and refused permission to overfly Israel.

In early 1959, planning for the first British overflight of the USSR codenamed Operation MARSHLAND began. The Soviets had not yet installed early warning radars opposite Pakistan, so the mission planners hoped that a U-2 could enter 'denied territory' from there without detection. The British High Commissioner gained permission from Pakistan President Ayub Khan for a U-2 to fly out of Peshawar. London did not tell the British diplomat the true purpose of the flight. He – and therefore also Ayub Khan – was told that an electronic intelligence mission along the Soviet border would be mounted. USAF transport aircraft supporting the mission would refuel en route to Pakistan via one of Britain's colonial possessions in the Gulf.

However, political approval for this operation never came. Sir Patrick Dean believed this was not an opportune time to seek overflight permission from the PM. Nevertheless, Macmillan was informally approached during his tour of RAF stations on 1 April, probably by the Chief of the Air Staff, but to no avail. Throughout 1959, East-West diplomacy and the possibility of a thaw in the Cold War, served to reduce Whitehall's appetite for the potentially risky and provocative U-2 missions, despite their obvious intelligence value.

Two more pilots had been sent to the US for training: Flt Lts 'Bunny' Austin and Brian Cox. They made their first solo U-2 flights at Laughlin in late January 1959. But, as the prospects for regular overflights diminished, they were never deployed to Det B, and returned instead to normal duties.

Meanwhile, the RAF group at Incirlik was under-employed, although there were occasional training flights of up to five hours over Greece and Turkey, and three T-33s were available for proficiency flying. The group was initially confined to base for security reasons, living in trailers within Det B's fenced-off compound. When some larger trailers arrived, the wives of the two officers that were married (Flt Lts Dowling and Clifford) were allowed to join them. Later, the group was allowed by London to venture off-base in escorted parties, to enjoy the exotic delights of Adana, the closest town, and the unspoilt countryside and beaches nearby.

The training flights helped to ensure that the four pilots remained proficient in navigation, for which only basic provision had been made in the U-2. The primary instrument was a driftsight offering different levels of magnification looking down. The optical path could be switched to look up, thus becoming a sextant. Otherwise, there was only a radio compass. That was not much use when flying over desolate areas with few stations.

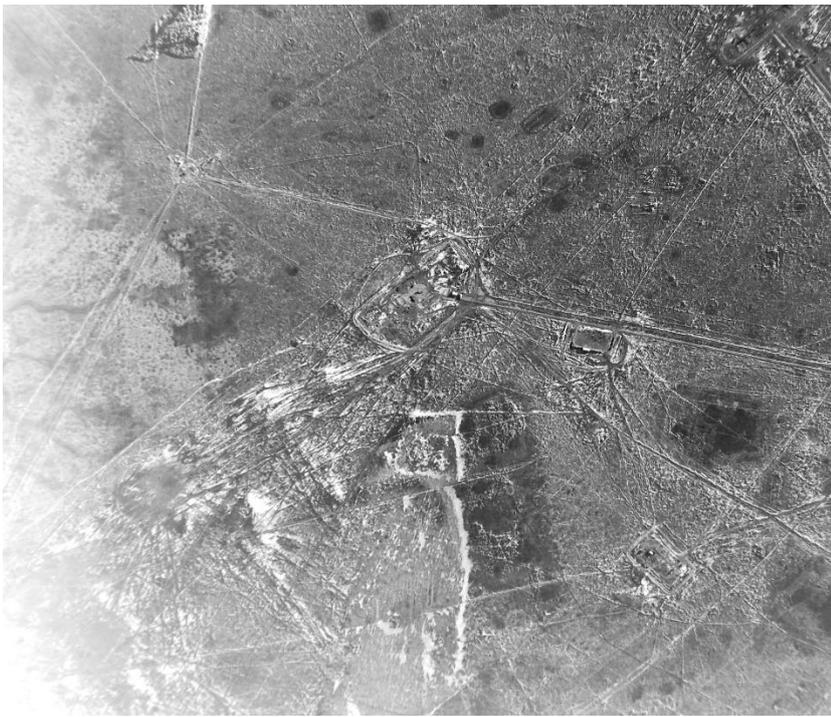
It was essential to carefully study the maps and make annotations to help identify turning points, maintain the desired tracks, and understand where to turn the main camera on and off. To obtain the best imagery, flight line deviations of no more than a quarter mile were required. In variable crosswinds, it was difficult to fly to such fine limits. The detachment navigators provided the pilots with map charts cut into strips and pasted onto up to ten double-sided boards. In the cramped cockpit, these were not easy to handle.

The sextant could theoretically be used on the flights along the Soviet southern border that were flown from mid-1959, usually at night, to intercept telemetry from the ballistic missile test flights from Tyuratam. A special sensor replaced the big B-camera in the large bay behind the cockpit. These missions, codenamed HOT SHOP, were alerted when SIGINT from ground stations or other aircraft indicated that a missile launch was coming. But the take-off time was not known in time for the navigators to pre-compute any star fixes. The pilot's only options were the ADF and dead-reckoning.

The targets deep inside the Soviet Union that had been planned for Operation MARSHLAND were eventually covered on 9 July 1959 by an American mission that President Eisenhower approved. Codenamed Operation TOUCHDOWN, it was a complete success, and by taking off from Peshawar, managed to avoid tracking by Soviet radars. The following month, another plan for a British overflight was devised. This time, it was Ward who declined to recommend the mission to the PM, who was involved in negotiations for a summit meeting.

In August, the pilots were sent to El Adem in Libya for a desert survival course. They had already flown 12 missions over the desolate terrain of the Middle East by then! None of them had been detected.

In October 1959 the PM agreed to resume the SIGINT flights that the RAF had been flying along the borders of the Warsaw Pact. These had been paused earlier, again for political reasons. The OLDSTER cell in the Air Ministry sensed an opportunity to finally get a U-2 overflight approved. To reinforce the plan, the CIA sent its



*Part of the Kapustin Yar test range, overflown
on 6 December 1959.*

top experts on target planning and imagery interpretation, Jim Reber and Art Lundahl, to brief the great and the good in Whitehall. No fewer than 40 were invited to two presentations in late October on the great intelligence value of U-2 missions. They included the Prime Minister, the Foreign Secretary, the director of GCHQ, the US Ambassador, and various officials and officers from the Foreign Office, the Ministry of Defence, the Joint Intelligence Bureau, the Air Ministry, MI 6, and even the Treasury. Some of them needed clearance for OLDSTER for the first time.

Ward followed up with a memo to the PM. He listed the main targets that would be covered: the Kuybyshev bomber factories, the Kazan and Saratov/Engels bomber bases, the Kapustin Yar and nearby Vladimirovka missile test ranges, and rail lines that might lead to new. and

as yet unknown, missile bases. He explained that the re-engined version of the U-2 was now available, boosting the maximum altitude by 4-5,000 feet. (This was the U-2C with the J75 engine, replacing the J57-powered U-2A).

Like the previous US mission four months earlier, Ward continued, the flight would depart from Peshawar, to avoid detection by Soviet early-warning radars. 'The intelligence prize is great...(and) the flight could be completely undetected,' he concluded.

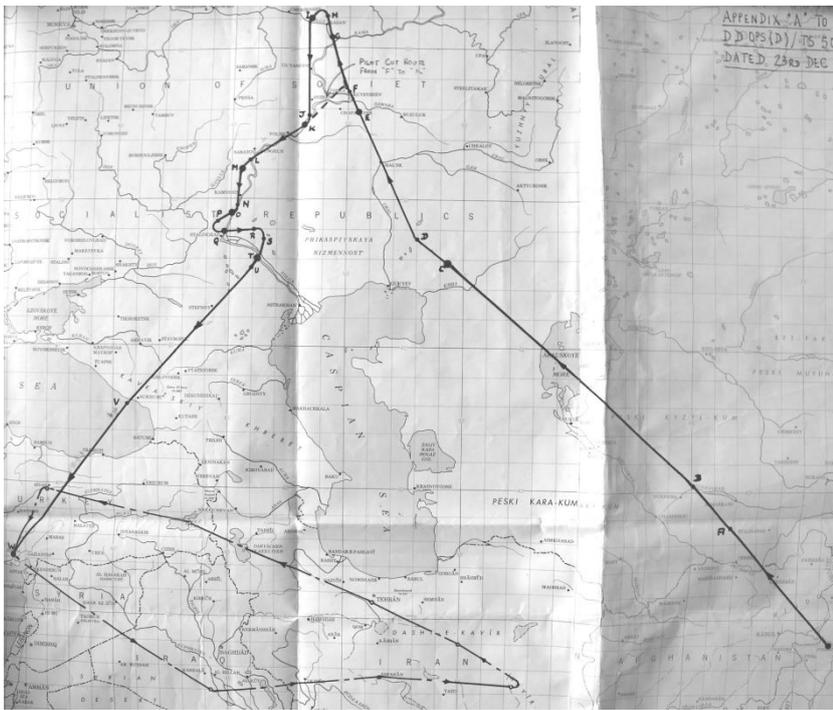
The British High Commissioner in Pakistan would again be enlisted, to seek permission from Ayub Khan for an ELINT flight along the Soviet border. The President would be assured that the U-2 would be ferried in at night, and take-off at sunrise, to limit exposure.

Detailed planning followed for the overflight, which gained the codename HIGH WIRE. The OLDSTER cell communicated with Project HQ by secure cables, discussing various flight profiles and routes. The range of the U-2C was 3-400 nautical miles more if the flight levelled off at 70,000 feet or slightly lower, compared with it cruise-climbing to as high as 75,000 feet. The latest intelligence was that the Soviets still did not have a fighter-interceptor capable of exceeding 60,000 feet. The favoured option at this stage was a 3,300 nautical mile journey ending at Incirlik after 8 hours 15 minutes. It would level off at 68,000 feet so that the standard fuel reserve of 100 gallons would be available at the start of the descent. Two different range/height options would be test-flown in advance on roundtrips from Incirlik.

There was so much else to consider. Was the sun angle and amount of light good enough for useful photography in late November or early December? What was the likely cloud cover? Would high altitude winds affect the flight? Would tell-tale contrails be generated? What arrangements were necessary at RAF Bahrein or Dhahran, which were the staging base options for the two supporting USAF airlifters, one that would carry the special U-2 fuel to Peshawar in drums, the other carrying the mission pilot and support crew? Who would fly the mission? Who would pilot the ferry flight from Incirlik to Peshawar? There was also a deception flight to plan. In order to confuse the Soviet air defence system along the Iranian border, a roundtrip would be flown from Incirlik. This flight was timed and routed so that, if Soviet radars had detected the ferry flight to Peshawar, it would suggest that this was the same aircraft returning westbound

The OLDSTER cell and its superiors in the Air Ministry agonised over the formal request to the PM for approval. The memo was drafted and re-drafted eight times. The Foreign Secretary approved it on 25 November, and forwarded it to the PM, who gave his assent two days later, provided that the Pakistani President allowed the use Peshawar. The PM's approval covered the first 20 days of December. On 4 December, he was given the proposed route, and told that Ayub Khan had agreed the staging through Peshawar.

Operation HIGH WIRE swung into action. Robbie Robinson would fly the mission, and Mike Bradley the deception flight. The weather was good over the highest priority targets, but adverse winds were forecast.



Op HIGH WIRE on 6 December 1959. The solid line shows the route of the overflight, from Peshawar to Incirlik. The most northerly section was omitted due to fuel concerns. The dotted line shows the route of the deception flight from/to Incirlik.

decreased. Robinson climbed to 73,000 feet to eliminate it, until the temperature rose and he could return to 70,000 feet.

But this was much further into the flight, and together with strong headwinds, obliged Robinson to take the cut-off, in order to regain his fuel curve. This eliminated the highly secured bomber production factory at Kazan, but he covered all the other targets, notably Kapustin Yar. In case he ran short of fuel and had to land at one of the airbases in northern Turkey, Det B dispatched a recovery crew and ferry pilot in a C-130. They weren't needed. Robinson landed at Incirlik on schedule at 1415 local time, after 8 hours 15 minutes in the air.

Everyone was delighted. Project Director Richard Bissell cabled, 'Sincere congratulations to all! Outstanding performance by pilot.' The Air Ministry added, 'A first class show all round.'

Now came the waiting. First, for SIGINT indications of whether the flight had been detected. The U-2 carried basic COMINT and ELINT systems, which had to be processed and analysed. But the main indications would come from the ground stations operated by the US National Security Agency (NSA). Then, for the processing and initial analysis of the 6,000 feet of film from the B-camera. This had to be done by Eastman Kodak in Rochester, NY and the CIA's National Photo Interpretation Center (NPIC) in Washington, respectively.



Sqn Ldr Robbie Robinson, seen here in front of the Scorpion rocket-powered Canberra, succeeded Walker as OC the RAF contingent at Det B.

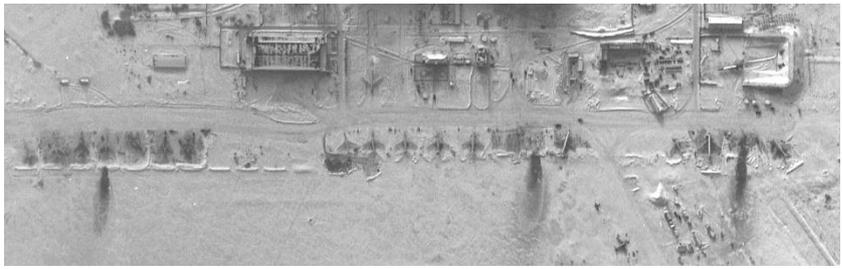
On both counts, HIGH WIRE was a success. There was no evidence that the flight had been detected by Soviet radars. The film was yielding excellent detail on Soviet air and missile forces, and much else. On 16 December, the CIA Director Allen Dulles cabled the Chief of the Air Staff, MRAF Sir Dermot Boyle: 'The entire intelligence community is extremely gratified by the excellent and timely results. We shall be keenly interested in an early return engagement.'

The RAF was happy to oblige. Planning began immediately on a preferred and an alternative route. Operation KNIFE EDGE was the priority. It would fly north to cover Kazan, the suspected strategic bomber base that had been missed on HIGH WIRE, and then go west to survey aircraft factories and missile facilities. Like the previous British overflight, it would take-off from Peshawar and land at Adana. Operation SQUARE DEAL would fly east from Peshawar, to investigate the nuclear test site at Semipalatinsk and the air defence missile test range at Saryshagan. The landing would be in Zahedan, an airbase in northern

Robinson was briefed to cut the flying time by omitting the very northernmost part of the route, if the aircraft was behind the 'fuel curve', ie below the pre-calculated fuel remaining. The last of several adjustments to the flight profile was made.

The airlift support and U-2 ferry flights were staged without a hitch. Robinson and MacArthur (the backup pilot) managed to sleep on the C-130 thanks to sedatives and warm sleeping bags. After arrival at Peshawar, they studied the route and target maps in more detail. On 6 December at 0900 local time, Robinson took off and climbed rapidly to 70,000 feet. There was solid undercast for the first 700 miles, and the pilot had to rely on dead reckoning. The sextant was only useful for checking ground speed, and there were no radio stations. Although contrails ceased at 55,000 feet in the climb, a slight trail resumed at 70,000 feet as the outside air temperature

Iran, which had been used for the same purpose by Operation TOUCHDOWN the previous July. As with previous overflights, the actual day of operation would depend on a good weather forecast. If the primary route was cloudy, the alternative route would be flown.



Op KNIFE EDGE on 5 February 1960 – a line-up of newly discovered (to Western intelligence agencies) Tu-22 Blinders on the snow-covered airfield at Kazan.

The preliminary plans ascended the approval chain. On the last day of 1959, PM Macmillan agreed to another overflight.

In the meantime, at Det B the RAF pilots took their turn with their American counterparts in waiting on alert for more HOT SHOP missions. They flew two of the three that were launched in January. One of these produced prized telemetry from the first Soviet ICBM, designated by Western intelligence as the SS-6 *Sapwood*. There was also another flight over the Middle East.

After the same meticulous planning that had characterized HIGH WIRE, Operation KNIFE EDGE was flown, but not until 5 February 1960 because of poor weather over the key target areas. John MacArthur covered 3,000 miles in a flight lasting 8 hours 40 minutes. David Dowling flew the deception flight, lasting 6 hours 40 minutes.

But there was a potentially serious hitch in the operation, when the first two attempts to ferry the mission U-2 from Incirlik to Peshawar were aborted due to unserviceabilities after take-off. The third attempt was successful, but the aircraft landed at Peshawar only one hour before the scheduled departure of the overflight. The ground crews worked frantically to turn it around, but there was still a short delay, and no time for the navigator to adjust the celestial precomputations. Once again, the pilot had to rely on dead-reckoning across a solid undercast on the first portion of the flight.

Nevertheless, KNIFE EDGE was another success. MacArthur flew over new Soviet radar and missile sites, missile test and launch facilities, a key military shipyard, arms factories and nearly 100 airfields. At Kazan, the U-2's camera captured a previously-unknown supersonic bomber aircraft, later identified as the Tu-22 Blinder. The image quality was variable, due to ground haze, cloud cover, and heavy snow in some areas. US SIGINT indicated that Soviet radars had not identified the flight, although they tracked an unidentified aircraft for 15 minutes as the U-2 left Soviet airspace en route Incirlik.

On behalf of Det B and Project HQ, Mackie cabled London from Washington: 'appreciate your backing and confidence in us, in particular during the final difficult stage.'

MacArthur then took leave, but not before he visited the Air Ministry to describe his flight in person. There was little activity at Det B, except for test flights of new 'slipper' tanks on the wings that added a precious extra 200 gallons. One of them, flown by David Dowling, lasted 11 hours 5 minutes – the longest yet with the U-2C.

Despite the success of KNIFE EDGE, the attitude in Whitehall towards another overflight was to, 'let sleeping dogs lie for a time,' noted Gp Capt Kunkler in the OLDSTER cell. The Foreign Office was more nervous than ever about the illegal missions, even though the Foreign Secretary said that he was 'very impressed' with a presentation by the Air Ministry on 29 March. 'Quite apart from the obviously vital intelligence that these flights produce, they must gain us a lot of credit with the Americans,' he said.

In Project HQ meanwhile, there was renewed optimism that President Eisenhower would approve another American overflight. He was under intense pressure from the US intelligence community, not least because the two recent RAF missions had overflown multiple SA-2 surface-to-air missile sites. This was the new SAM that potentially posed a threat to the U-2, although most analysts believed it was not capable of reaching 70,000 feet. The creation of a widespread SAM network was clearly a Soviet priority. But none of the sites had yet been assessed as operational, and in any case, Soviet air defence radars had failed to detect the flights. Notably, though, one US intelligence assessment warned that a successful intercept was highly probable, 'providing that detection is made in sufficient time to alert the site.'

Therefore, permission to take-off from Pakistan was still the key to success. Wg Cdr Mackie cabled London from Project HQ: 'the feeling here is that Ayub Khan knows a lot more about our purpose for using Peshawar than he has been told.' There was speculation in Washington, that the Pakistani President would extract a price for continued use of the airbase: the US to supply his air force with supersonic F-104 fighter-interceptors.

Planning for Operation SQUARE DEAL continued, mostly in London, with a British pilot to fly. But Project HQ also worked on two more missions, prompted by the latest intelligence indications that the Soviets were developing their first operational ICBM base in the far North, at Plesetsk. More prime targets were situated

there, such as naval shipyards and another nuclear test site. One option was to stage a flight out of Thule in Greenland. The other was to take-off from Peshawar and fly all the way across the Soviet Union to a landing in Bodø, Norway. This operation was codenamed GRAND SLAM.

In the event, SQUARE DEAL was flown on 9 April from Pakistan with Eisenhower's approval and an American pilot. But the flight was detected upon entry: the Soviets had now closed their early warning radar 'gap' along the southern border. MiG-19 and Su-9 fighters made multiple unsuccessful attempts to intercept.

The lessons from this episode went unheeded in Project HQ. Planning continued for the GRAND SLAM option, which was also approved by the US President. On 1 May, Gary Powers took off from Peshawar, and was shot down by an SA-2 missile near Sverdlovsk. This was a seminal event in the Cold War, but is beyond the scope of this article.

There had been much discussion and refinement of cover stories over the previous three years. They were devised for each overflight, as well as the overall U-2 programme. In London, the government agonised about how to keep the RAF participation secret. It was public knowledge that Sqn Ldr Walker had been killed in 1958 during U-2 training. The media suspected a cover-up. The Labour opposition tabled questions in Parliament.

The RAF pilots were withdrawn from Turkey immediately, and quizzed in London on what they thought had happened to Powers, and whether he would reveal the British involvement. They couldn't provide much help. In fact, Powers did not tell his captors. But the full story of the RAF and the U-2 remained concealed for many years.

Eisenhower banned future U-2 overflights, and the overseas detachments were withdrawn. But a slimmed-down U-2 unit was established by the CIA at Edwards AFB, with the capability to deploy at short notice. The RAF assigned two pilots, a navigator and a flight surgeon to this unit throughout the 1960s and early 1970s.

Notes:

Most of the details in this article come from Air Ministry files that were declassified and transferred to The National Archives (TNA) in 2019. There are 24 of these in total, mostly covering the years up to 1960. The TNA reference numbers for those used by the author are AIR40/2734, 2735, 2743, 2744, 2746, 2747, 2750, 2751, 2753, 2754 and 2755.

For the wider context, and a comprehensive history of the U-2, please refer to the author's book, *50 Years of the U-2* (Schiffer; 2005).