Washington Times

Newsletter

Issue 12

Spring 2007


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Front Cover

Top: WF512 (44 Squadron) at dispersal, RAF Coningsby (***Ernest Howlett***)

Lower: Nose of B-29-45-MO 44-86292 better known as *Enola Gay* on display at the Smithsonian's Udvar Hazy Center, Washington Dulles Airport, Maryland, USA. (***Chris Howlett***)

Inside Front Cover

Top: *It's Hawg Wild* at Duxford (***Chris Howlett***)

Lower: *Enola Gay* being reversed over the atomic bomb loading pit. (***USAF***)

This Page

Enola Gay photographed while being stored at Davis Monthan AFB 23 July, 1947 as part of the collection destined for preservation. The Circle R tail markings were probably added post the retirement of *Enola Gay* since *Enola Gay* and the 509th CG aircraft reverted to the Circle Arrow marking once WWII ended. Also note the 'fat man' symbols on the nose denoting pumpkin bomb missions (although one may also represent the actual atomic mission). The Smithsonian is restoring *Enola Gay* to the condition she was in on the 6 August, 1945 mission so neither these symbols nor the red tip to the tail are present on the aircraft as displayed.

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It's Hawg Wild in the American Air Museum, Duxford. (***Chris Howlett***)

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Introduction

Welcome to issue 12 of Washington Times. This issue could also be termed the 'Reunion Special' as it is intended to complement the reunion being held at the Imperial War Museum (IWM), Duxford, Cambridgeshire, 18 – 20 May 2007.

As I am sure you are all aware, it had been hoped that part of the reunion would be access to the interior of *It's Hawg Wild*, the B-29 preserved and displayed in the American Air Museum at Duxford. Unfortunately, such access was not possible so here, as an alternative, is a pictorial tour.

The tour is based on a set of interior photos of *Enola Gay* and the forward part of *It's Hawg Wild.* The photos of *Enola Gay* were mainly supplied by Scott Willey and Mike Hanz while those of *It's Hawg Wild* were provided by Ivor Warne and Martin Claydon. Scott Willey and Mike Hanz are volunteers at the Smithsonian's National Air and Space Museum (NASM) Udvar Hazy Center at Washington Dulles airport and are some of the many people who helped with the huge restoration project that returned *Enola Gay* to near pristine condition and put her on public display. Mike Hanz also maintains an excellent web site on USAAF radios which includes much detail and many photos of *Enola Gay's* radio and countermeasure fit (http://aafradio.org/). Ivor Warne is an Explainer at the IWM, Duxford and took the photos especially for this issue of Washington Times. Martin Claydon maintains a web site dedicated to Duxford (http://www.duxford-update.info/). Other significant contributors were Taigh Ramey who flew on *It's Hawg Wild* during her delivery flight to Duxford and now operates a vintage aircraft company in California (http://www.twinbeech.com) and finally Mike Vosin who maintains a web site upon which are many USAAF manuals (http://www.aafcollection.info/index.html).

Scott's, Mike's, Ivor's and Martin's photos are superb and illustrate the B-29 nearly as well as being in one. *It's Hawg Wild* is a standard B-29A and as such is representative of the vast majority of the RAF's Washingtons (84 of the 87 Washingtons were B-29As). Unfortunately, only the forward section of *It's Hawg Wild* has been restored and access is denied beyond this area. Consequently, the more complete set of photographs are for *Enola Gay*. However, although *Enola Gay* is almost certainly the most famous B-29 of them all (and maybe the most famous plane of all time) modifications made to her in preparation for the atomic mission mean that she is not representative of most B-29s including the RAF's Washingtons. Having said that, the differences are interesting in themselves and these are indicated with (where known) the reasons for the changes in the text that accompanies each set of photos.

I hope you enjoy this compilation and that it compensates, in part at least, for the lack of an interior tour.

Chris Howlett

Above: *It's Hawg Wild* on a test flight around Tucson, Arizona shortly after being rescued from China Lake Naval Weapons Center, China Lake, California. (***Taigh Ramey***)

Silverplate, Enola Gay and the First Atomic Mission

Silverplate was the code name for the US Army Air Force's project to modify B-29s to enable them to deliver the atomic bomb although it later also included the training and operational aspects of the program as well. Silverplate was a part of the larger Project Alberta or Project A that was responsible for developing the means to deliver the atomic bomb. This included designing the bomb shape, the radio altimeters and pressure sensors required to allow the bomb to explode at the optimum altitude, modify the bomber to be able to carry it and train the air, ground and special ordnance crews needed to support the mission when it had deployed overseas. Project Alberta was, in turn, a part of the overarching Manhattan Project that covered all work relating to the design and delivery of the atomic bomb.

Initially the USAAF had a serious problem in that they had no plane that was suitable to carry a bomb of the anticipated size and weight. The B-29, then still very much under development, showed promise but there was no clear indication that the design would work. Dr Norman Ramsey, one of the two top men in Project Alberta (the other being Captain William Parsons USN), seriously considered using Avro Lancasters since at that time these were the only allied planes with a proven ability to carry bombs of the required size and in October 1943 discussions were held in Canada between Ramsey and Roy Chadwick (the Lancaster's chief designer) on this issue. However, when Captain Parsons recommended the Lancaster to General Hap Arnold, the Commanding General, US Army Air Forces, Arnold made it quite clear that if the new super bomb being developed at such great expense by the US was to be dropped then it would be from a USAAF crewed B-29 so the Lancaster idea was dropped! Hindsight has shown this to have been a correct decision for even had the Lancaster's limited range been taken care of by staging the raid out of Iwo Jima or Okinawa, the Lancaster was both speed and altitude limited and would almost certainly not have survived the shock wave from the explosion.

The prototype Silverplate B-29 was a standard B-29, B-29-5-BW, serial 42-6259 that was delivered to Wright Field, Ohio on 2 December, 1943 where it was modified, largely by hand, to carry the dummy atomic bomb shapes then being evaluated. At that time, one of the anticipated designs for the atomic bomb was a long thin 'gun type' Plutonium (Pu-239) bomb of about 17 foot length codenamed *Thin Man*. To be able to carry this shape of bomb, extensive modifications were required to the B-29's bomb bays since the bomb, although carried in the rear bay extended into the forward one. The modifications included the removal of all four bomb bay doors and the outer fuselage section between the two bomb bays. Even with these modifications, it was a tight fit as the existence of the main wing spar between the bomb bays only allowed a 2 foot diameter bomb to be carried. Twin release points modified from glider tow and release mechanisms were fitted in the rear bomb bay to secure the bomb.

The other shape of bomb was for an implosion type device and this, largely spherical device (codenamed *Fat Man*), would fit into the forward bomb bay where it was secured to another twin set of modified glider tow and release mechanisms.

Testing of the bomb shapes started when a *Thin Man* shape was dropped on a bombing range near the US Army Air Field of Muroc, California on 6 March, 1944. On 14 March two further drops were made, both of these being of the *Fat Man* shape. All these drops were successful although in all cases the bomb failed to drop immediately which frustrated many of the calibration tests being run on the ballistic properties of the shapes. When the fourth test resulted in the test bomb (a *Thin Man* type) dropping prematurely and seriously damaging the aircraft the release mechanism was changed to the British system of using a single release mechanism for large bombs. Consequently a British Type G single point attachment and Type F release mechanism were obtained and installed in the B-29.

As the bomb development advanced, it became evident that *Thin Man* would not work. *Thin Man*'s design was based upon the fissibility of pure Pu-239 but, at that time, it was not possible to create pure Pu-239 as traces of Pu-240 kept creeping in and the increased fissibility of this mixture made it impossible to merge two pieces of Pu before fission would start which would have resulted in a fizzle. So, on 17 July, 1944, the Pu gun type weapon was dropped and work pressed on with a Uranium (U-235) gun type weapon. Due to U-235's slower fission rate the length of this gun type bomb (code named *Little Boy*) was significantly less and it too could fit wholly into the forward bomb bay, simplifying the modifications needed and leaving the rear bomb bay free for the carriage of long range fuel tanks.

With the B-29 proving to be capable of carrying the atomic bomb, in August 1944 a batch of 17 'production' Silverplate B-29s was ordered – to be taken from the production lines at Martin's production and modification centre at Omaha, Nebraska. These were delivered, essentially as standard B-29s, to Wendover AAF where the turrets were removed and the planes used to train the crews of the newly formed 393rd Bomb Squadron of the 509th Composite Group (CG) – the crews who would eventually take the Silverplate B-29s into combat. One of the things that had to be devised was how the dropping plane could survive the explosion and this resulted in the crews practising a full power turn through 155 degrees as soon as they had dropped their bomb. Such a turn would place the plane as far from the point of explosion as possible, a necessity given the immense shock wave that the bomb was expected to generate.

The intensive training programme effectively wore out these planes and consequently a third batch of 20 Silverplate B-29s was ordered. The first 5 of these went to the test unit (216th Base Unit) for continued development work while the next 15, so called combat models, went to the 393rd Bomb Squadron with the first being delivered in April 1945. These were all modified to Silverplate standard at the Martin modification centre at Omaha (having also been built at the same facility) before being delivered to Wendover. Subsequently they were delivered to North Field Tinian by their crews arriving in theatre in June and July 1945. *Enola Gay* was one of these planes (in fact the 31st Silverplate B-29) and arrived on Tinian on 2 July, 1945.

Although the 509th CG was an independent unit, when at North Field, Tinian, it came under the resident conventional B-29 Bomb Wing (the 313th BW) for administrative purposes. Shortly after they arrived on Tinian the 509th CG planes were painted with an Arrow in a Circle tail marking to denote them as belonging to the 509th CG. However, to try and confuse the Japanese, these group markings were soon removed and replaced with markings from other B-29 units. *Enola Gay* took on the Circle R identity of the 6th BG that was also based at North Field as part of the 313th BW.

Left: North Field, Tinian (photographed from the north) with its four parallel 8,500 ft long runways was home to the 180 B-29s of the 313th BW and, later, the 15 Silverplate B-29s of the 509th CG.

In the distance West Field Tinian can just be made out. West Field supported another 180 B-29s, these being from the 58th BW.
(***Earl Johnson***)

Having arrived in theatre the crews of the 509th CG began an intensive period of training with practice bombing missions, using standard 500 and 1,000lb bombs, being carried out against the small island of Rota in the Marianas chain that was still held by Japanese forces. As the crews grew more proficient they began to range further afield to bomb other Japanese held islands. Truk was attacked on 5 July, 1945 with Marcus Island being attacked the following day. Marcus Island counted as an operational mission and became a regular destination although much to the disgust of the crews who bombed it after 20 July it had by then been reclassified as only a training mission!

On 20 July, 1945 the 509th crews finally got to bomb mainland Japan when 10 Silverplate B-29s each dropped a single 'pumpkin' bomb that simulated the size, shape and weight of the *Fat Man* type of atomic bomb but contained 5,500lb of conventional explosives. Three further missions to Japan took place on subsequent days (23, 26 and 29 July) resulting in a total of 37 pumpkin bombs being dropped. To simulate the planned atomic mission, each plane was given an individual target so only one or sometimes two planes would be above each city as it was bombed. It was hoped that the Japanese would become used to the sight of the solitary B-29s and their single bomb and they would not consider them a worthy target for interception.

Clearance for the atomic mission was given on 25 July, 1945 with a message to General Carl A. Spaatz, commander of the U.S. Strategic Air Forces in the Pacific that authorised the 509th CG to "deliver its first special bomb as soon as weather will permit visual bombing after about 3 August, 1945". On 2 August Major

General Curtis LeMay, Chief of Staff, US Strategic Air Forces Pacific, issued Special Bomb Operational Order No. 13 to the 509th CG to carry out the attack and when, on 5 August the weather forecast for the next day was suitable the mission was set for the 6th. Later that day Tibbets named his B-29 *Enola Gay* after his mother and the plane was then towed to the special bomb loading pit where the *Little Boy* bomb was lifted into the forward bomb bay. The load was completed by 16:00 that afternoon.

The crew of *Enola Gay*
Standing: Maj Porter (509th CG ground maintenance officer), Maj Van Kirk (Navigator), Maj Ferebee (Bombardier), Col Tibbets (Airplane Commander), Capt Lewis (Copilot), Lt Beser (Radar Countermeasures)
Kneeling: Sgt Stiborik (Radar Operator), S/Sgt Caron (Tail Gunner), PFC Nelson (Radio Operator), Sgt Shumard Assistant Engineer), S/Sgt Duzenbury (Flight Engineer) Not shown are Capt Parsons (USN) and Lt Jeppson who also flew on the mission. (***USAF***)

Briefings for the special mission were held at around 11 pm then at 1:30 am on 6 August the three weather reporting planes (*Full House, Jabbitt III* and *Straight Flush*) took off. These would report the weather over the three potential target cities which were, in order of priority, Hiroshima, Kokura and Nagasaki. At 2.45 am the *Enola Gay* started her take off run accompanied by three other Silverplate B-29s. *The Great Artist* which would carry special instruments to assess the strength of the explosion and No 91 (later named *Necessary Evil*) which would act as the photo plane would accompany *Enola Gay* to Japan while *Top Secret* would go as far as Iwo Jima where she would wait as a reserve in case *Enola Gay* developed a fault. A special bomb loading pit, similar to the ones on Tinian, had also been built on Iwo Jima to cater for this possibility.

As history has recorded, *Enola Gay* did not develop any faults and, after *Straight Flush* radioed a coded message to confirm that the weather over Hiroshima was suitable the fate of the city was sealed.

At 9:15 am the *Little Boy* bomb dropped from *Enola Gay* 31,600 ft above Hiroshima. The instant the bomb had left the plane Tibbets began the maximum rate turn through 155 degrees that would place them as far from the point of blast as possible. The bomb fell for some 45 seconds before detonating 1,900 feet above the city. The shock wave, expanding away from the epicentre at the speed of sound, caught up with *Enola Gay* less than a minute later. Despite being an estimated 15 miles 'slant range' away at that time *Enola Gay* still suffered two sever jolts in quick succession (the direct shock wave and a reflected one), although no damage was done.

After turning back over Hiroshima to survey the damage Tibbets turned *Enola Gay* for home, landing back on Tinian at 2:58 pm – a mission of 12 hours and 13 minutes. The earlier deception seems to have worked for the three planes on the atomic mission went unchallenged by the Japanese defenders.

When this mission was followed on 9 August, 1945 by the bombing of Nagasaki (*Bockscar* dropping a *Fat Man* bomb) the Japanese surrendered on 14 August.

After the war a further 27 Silverplate B-29s were delivered bringing the total (including the prototype) to 65 nuclear capable B-29s delivered between 1943 and 1946. Given the extensive modifications required to carry and successfully drop an atomic bomb it is clear that, despite numerous claims to the contrary, no RAF Washington was capable of carrying or delivering a nuclear bomb – even had Britain possessed such a weapon at that time (although Britain detonated her first atomic device on 3 October, 1952 this was not a bomb and it was not until 11 October 1956 that the first British atomic bomb was detonated – dropped by a Valiant on the Maralinga bombing range in South Australia)!

Forward entry hatch

Top: A general view of the *Enola Gay* in the Smithsonian's Udvar Hazy Center, Washington Dulles Airport. She is perched atop 9 foot high jacks which serve two purposes. Firstly, they allow other artefacts to be placed underneath and secondly they help protect *Enola Gay* from the attention of vandals intent of protesting against the atomic missions.

Note the lack of gun turrets and faired over sighting blisters for the gunners – the most obvious outward changes made to the Silverplate B-29s. The Smithsonian is restoring *Enola Gay* to the condition she was in on the 6 August, 1945 atomic mission which accounts for the Circle R tail marking. (***Chris Howlett***)

Right: The inside of the nose wheel bay with the entry hatch to *It's Hawg Wild* – the normal means of entry for those who inhabited the forward pressurised compartment. (***Ivor Warne***)

The cylinder mounted by the ladder at upper right (rear of nose wheel bay) and a similar one barely visible at upper left are the two CO_2 fire extinguishers for the engines. These were controlled from the Flight Engineer's control panel.

The hand crank is for the emergency operation of the nose wheel. It was inserted into a gear box between the Copilot and Flight Engineer – 257 turns being needed to raise or lower it.

Bombardier Station

Top: The Norden M-9B bombsight mounted in the nose of *It's Hawg Wild*. (***Ivor Warne***)

Bottom: The equivalent bombsight mounted in *Enola Gay*. (***Scott Willey***)

The bombsights used by the Silverplate B-29s were standard models and therefore represent the bombsights in all B-29s. However, the sharp sighted amongst you may have noticed a few differences. Firstly, the rectangular box to the left of *It's Hawg Wild's* sight is missing from the one in *Enola Gay*. This is the interface to the Honeywell C-1 autopilot and should be present. It has now been fitted. Secondly, the glass item mounted just above the eyepiece (upper centre top of the lower photo). This is an X-1 reflex sight, designed and built by the W. L. Maxson Corp. of New York. This unit was installed by the Victor Adding Machine Co and became part of the overall bombsight (i.e. you did not simply remove it when you did not want to use it). Its purpose was to provide the bombardier with a greater field of vision when he first swung the sight onto the target. Because of its optics, it also gave him a better ability to see targets in darker conditions. It could be clutched in to the bombsight and engaged to the lateral cross hairs or rate system in the bombsight sighthead. Although not present on *It's Hawg Wild*, this was not Silverplate specific and at least some of the RAF's Washingtons were also fitted with these devices.

Of interest, the bombsight mounted in *Enola Gay*, Norden M-9B V-4120 built by the Victor Adding Machine Co, is the actual bombsight used in *Enola Gay* on the 6 August, 1945 atomic mission. The Victor Adding Machine Co bought back the surplus stock and, upon discovering this bombsight in their inventory, donated it to the Smithsonian so that it could be reunited with *Enola Gay* then awaiting restoration in the Smithsonian's care.

RESTRICTED MARCH, 1945 BIF 6-1-1

NOMENCLATURE AND OPERATION

1. LEVELING KNOBS
2. CAGING KNOB
3. EYEPIECE
4. INDEX WINDOW
5. TRAIL ARM AND TRAIL PLATE
6. EXTENDED VISION KNOB
7. RATE MOTOR SWITCH
8. DISC SPEED GEAR SHIFT
9. RATE AND DISPLACEMENT KNOBS
10. MIRROR DRIVE CLUTCH
11. SEARCH KNOB
12. DISC SPEED DRUM
13. TURN AND DRIFT KNOBS
14. TACHOMETER ADAPTER
15. RELEASE LEVER
16. CROSSHAIR RHEOSTAT
17. DRIFT SCALE
18. PDI BRUSH AND COIL
19. AUTOPILOT CLUTCH ENGAGING KNOB
20. AUTOPILOT CLUTCH
21. BOMBSIGHT CLUTCH ENGAGING LEVER
22. BOMBSIGHT CLUTCH
23. BOMBSIGHT CONNECTING ROD
24. AUTOPILOT CONNECTING ROD

The bombsight has 2 main parts, **sighthead** and **stabilizer.** The sighthead pivots on the stabilizer and is locked to it by the dovetail locking pin. The sighthead is connected to the directional gyro in the stabilizer through the **bombsight connecting rod** and the **bombsight clutch.**

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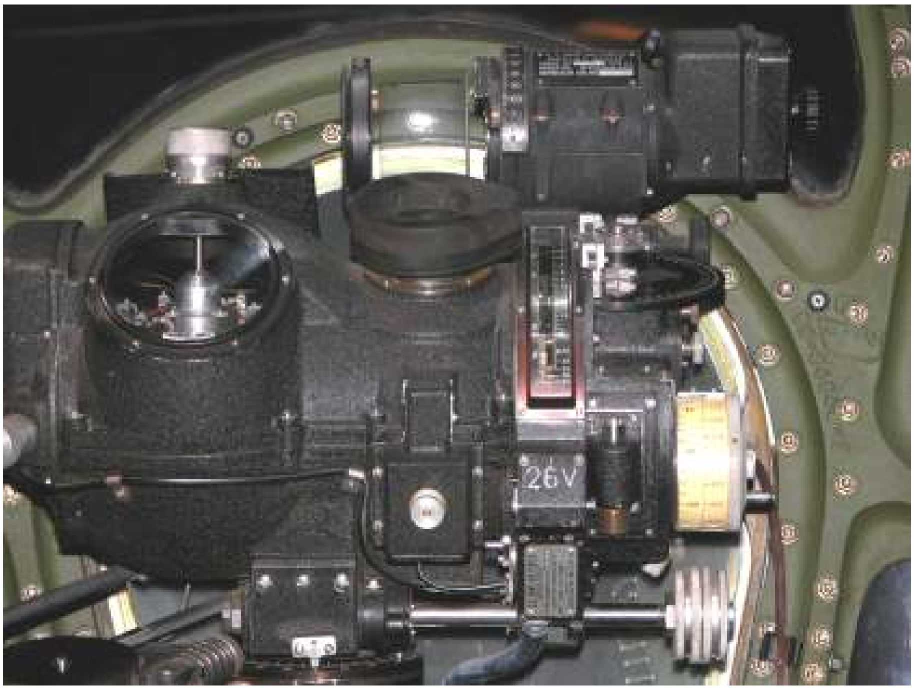
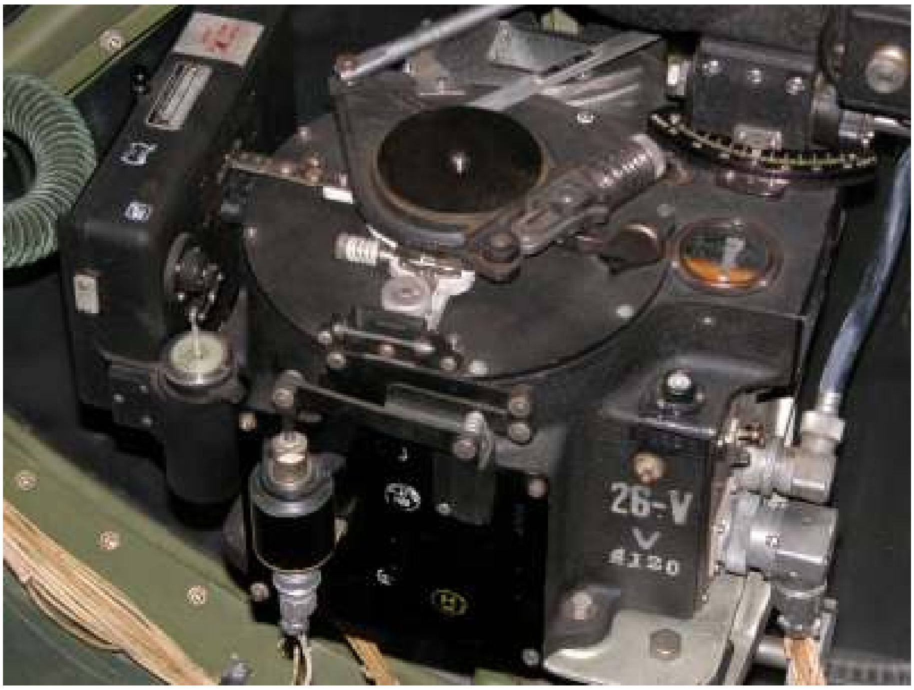
Above: An extract from the USAAF publication 'Bombardier's Information File' containing a schematic identifying the various dials and knobs of the Norden bombsight. Not identified is the rectangular box located under the row of numbers 19 – 22. This is the interface to the Honeywell C-1 autopilot. (***Mike Voisin***)





Top: The bombsight sighthead in *Enola Gay*. (***Scott Willey***)

The bombsight optics in the sighthead were stabilized in the vertical plane (for deviations in pitch and roll) by a gyro mounted under the glass window to the left of the photo. The window allowed the bombardier to see the top of the gyro mount upon which were fitted two spirit levels, one pointing fore and aft the other left to right. If both were in the centre the gyro was vertical and therefore so too were the optics.

Middle: The Stabilizer unit in *Enola Gay*. (***Scott Willey***)

The sighthead mounted onto the stabilizer unit. Both combined to make the bombsight assembly. The sighthead would not work without the stabilizer unit. The stabilizer unit contained a gyro that stabilized the bombsight in the horizontal plane (for deviations in yaw). Thus, when the sighthead was combined with the stabilizer unit the two gyros combined to fix the bombsight optics in space regardless of aircraft motion.

Honeywell C-1 Autopilot.

Unlike the sighthead that was only used while bombing, the stabiliser unit was also an integral part of the Honeywell C-1 autopilot within which it was used to sense deviations in yaw. The autopilot interface is the rectangular box mounted on the left hand side of the stabiliser unit shown in the middle photo. Because the sighthead was not part of the autopilot another gyro was required to allow the autopilot to sense deviations about the vertical axis (pitch and roll) as it was the gyro in the sighthead that did this for the bombsight assembly. This gyro was mounted on the cockpit floor just behind the central aisle stand where it was protected by a plywood box under which a heated cover kept the gyro from freezing at altitude.

Further pictures and descriptions of the autopilot are at pages 23 and 24.

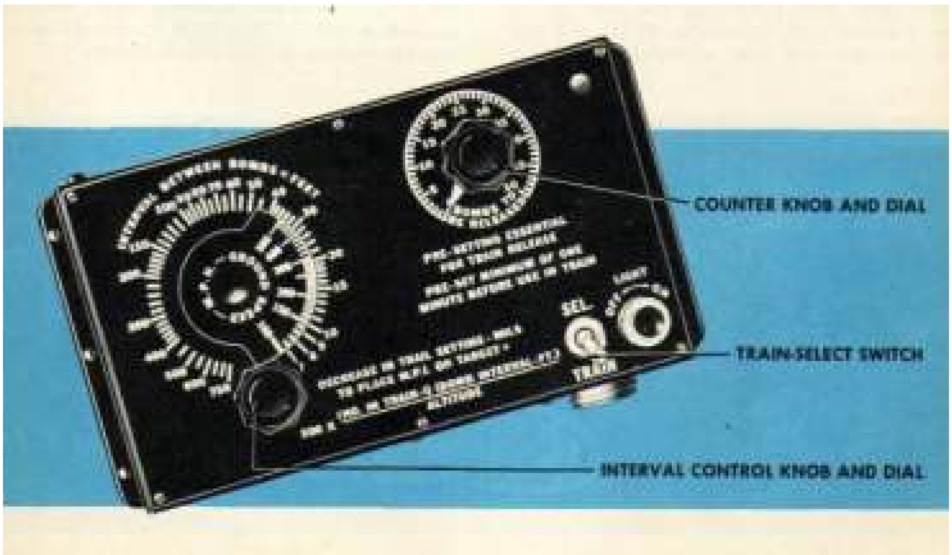
Left: The protective plywood box covering the vertical flight gyro located just behind the central aisle stand in *Enola Gay*. (***Taigh Ramey***)

Top: The bombardier's control panel mounted on the left hand side of the nose of *It's Hawg Wild*. (***Ivor Warne***)

The top panel controlled the cameras while the bombardier's control panel (the green panel on the right) contained all the necessary switches to control the release of the bombs. Other parts of the panel contained the bomb indicator lights (black panel at lower right with 40 indicators – one light per possible bomb location), basic flight controls (large black panel at upper left) with a remote compass read out at top, an altimeter lower left and an air speed indicator lower right. Below the flight instruments is the intervalometer (diagram at **bottom**) that, when fed with details of the aircraft's altitude and speed provided a method of releasing in train (i.e. one bomb after the other rather than salvo when all were released together) a predetermined number of bombs with a predetermined space interval between successive impacts. It also controlled the drop sequence to ensure that the aircraft's centre of gravity remained within limits as the bombs drop free.

The panel in *Enola Gay* (next page – photo by ***Scott Willey***) is almost identical as the Silverplate aircraft had no special modifications made to this area. Indeed, despite the modifications made to the bomb bay to carry the single heavy nuclear bomb the Silverplate planes still retained their standard bomb racks and could drop conventional bombs if required to do so.

There is one notable difference though between the planes as indicated by the substitution of a rate-of-climb indicator in *Enola Gay* where *It's Hawg Wild* has the remote compass readout. This change was a result of *Enola Gay* (and the other Silverplate B-29s) being fitted for a device known as the Glide Bombing Attachment (GBA). Not a Silverplate addition but rather a late war improvement to the bomb aiming equipment.



The GBA was an auxiliary instrument used with the M series bombsights. With it the bombardier could use the bombsight accurately in climbs and glides as well as in horizontal flight. Since the idea was to be able to vary altitude at up to 150 ft/min, the rate-of-climb indicator was more valuable than a compass.

Even before the war the Army had wanted a way to vary the altitude of a bomber during the bomb run to confuse flak. For various reasons, the ability to do this and maintain bombing accuracy took a long time to develop and even then it was only good up to 15,000 ft. Hap Arnold held off putting it out into the units until it could work up to 25,000 ft. When the GBA was finally ready in late 1944, they started going operational, but not many bombers got them before the war ended. *Enola Gay* is equipped to carry the GBA but it is not thought that the 509th aircraft ever carried the actual device or that the crews even trained with them.

Bottom: The 'High Altitude Absolute Altimeter' (SCR-718) in *Enola Gay*. (***Bernie Poppert***)

The SCR-718 was a high altitude absolute altimeter that had a complete radar transmitter and receiver that sent out pulses, received them and timed their return to give the height of the aircraft above the ground directly below. It was primarily an aid to navigation and high level precision bombing. It was also used by the bombardier to determine any error in the altitude delay circuit.

Since this photo was taken research, carried out by Bernie Poppert and Mike Hanz of NASM, has concluded that on the 6 August mission the SCR-718 in *Enola Gay* was mounted on the navigator's table and the SCR-718 has been moved to there. It is thought that the SCR-718 was replaced in the nose for the post war CROSSROADS mission. Standard B-29s had it located in the nose as shown here (see also pages 35 and 42).

Common Equipment

As we move through the B-29 we will come across certain items that are common to all crew stations. To avoid explaining their use many times, these and some personal items, are covered here. There were no differences between this equipment in standard B-29s or the Silverplate versions.

Interphone System

The AM-26/AIC-2 amplifier (silver box top centre of upper photo; ***Mike Hanz***) is located on the Navigator's side of the forward pressurised compartment, but for logical reasons it was usually the radio operator who cared for it. It was the central component of the interphone system, the system which allowed each crewman to talk with another, and selected crewmen (like the pilot) to also talk over the various radios in the aircraft. The amplifier shown was a significant 1944 improvement over an older interphone amplifier designed in the 1930s. It included the ability to increase volume in four steps as altitude was increased – a job carried out by the radio operator. This feature was especially important in planes that were not pressurized like the B-17, less so in the B-29. To the right of and below the amplifier is a typical crewman's jack box for headphones and microphone. These can be found at all crew stations and other points where crewmembers may be expected to alight. Note the volume control at the top of the box. The switch at the bottom allowed the crewman to select between (clockwise from left) **COMP** to listen to the radio compass receiver; **VHF LIAISON** connected the crewman to the long range radio; **COMMAND** connected the crewman to the short range 'plane to plane' radio; **INTER** allowed the user to talk to any other crewmember without being transmitted outside the aircraft and **CALL** was an over-ride switch that allowed the user to be heard on any other station regardless of the setting on their jack boxes.

Earphones (**Far right**: Copilot's earphones in *Enola Gay*, ***Mike Hanz***) were used for listening to the radios - the ambient noise level was simply too high to make a loudspeaker practical.

Throat microphones (**Previous page lower centre**) were generally used unless oxygen masks were donned, in which case a built-in mike in the mask was employed. Hand held microphones (**Previous page bottom centre**) were also available as an alternative.

Unfortunately, intelligibility with the throat microphone was not a strong point. A post-war analysis by the US Office of Scientific Research and Development stated, "[Throat microphones]...would probably have been a very effective instrument but for the fact that the speech signal available at the larynx is intrinsically unintelligible." While we may be amused at this stilted understatement of a serious problem, these microphones were used throughout the war years and beyond because of their "hands off" utility.

Oxygen System

Top: Oxygen distribution outlet at the Flight Engineer's station in *It's Hawg Wild.* (***Ivor Warne***)

Each crew station had an oxygen distribution outlet similar to the one shown above left. The right hand dial showed the oxygen pressure while the left hand dial (blinker) indicated that oxygen was flowing. The large hose connected to the oxygen mask while the small one was for recharging the portable oxygen bottles (an A-4 portable bottle would last for approximately 4 to 8 minutes of use between recharges). The oxygen system used 18 interconnected type C-1, low pressure, shatterproof oxygen cylinders. The entire system was filled from one filler valve located on the outside of the left fuselage just forward of the wing root. When full (400 – 450 psi) and with automix on these provided more than 10 hours' supply for 11 men flying at 15,000 ft (see graph to left). Each oxygen outlet was supplied from two separate distribution lines so the loss of one still left the station with a supply of oxygen.

Heated Flying Suits

Bottom: Power outlet for a heated flying suit. This one is mounted on the armour plate behind the Airplane Commander in *It's Hawg Wild* although all crew stations had similar outlets (***Ivor Warne***)

FLAK SUITS

Flak suits consist of armored vest and apron assemblies. They are not personal issue, but they should be delivered to the plane before the flight and picked up afterward for inspection. You couldn't carry one anyway, with everything else you're lugging. Report to the pilot if you don't find a flak suit in the plane for you.

Wear the suit when you approach the target area. It's heavy but it's guaranteed that you won't notice the weight when the fight begins to get hot.

Note: Ask your Personal Equipment Officer to have a tab sewed on your flak suit for your oxygen mask hose clip.

FLAK HELMETS

The flak helmet is personal issue. If you have worn both your flak suit and flak helmet on the mission, you have a good chance of returning the helmet to the supply room **personally** after the flight.

Bombardier's flak suit has full armor. When he pulls ripcord at suit's center, entire suit falls off.

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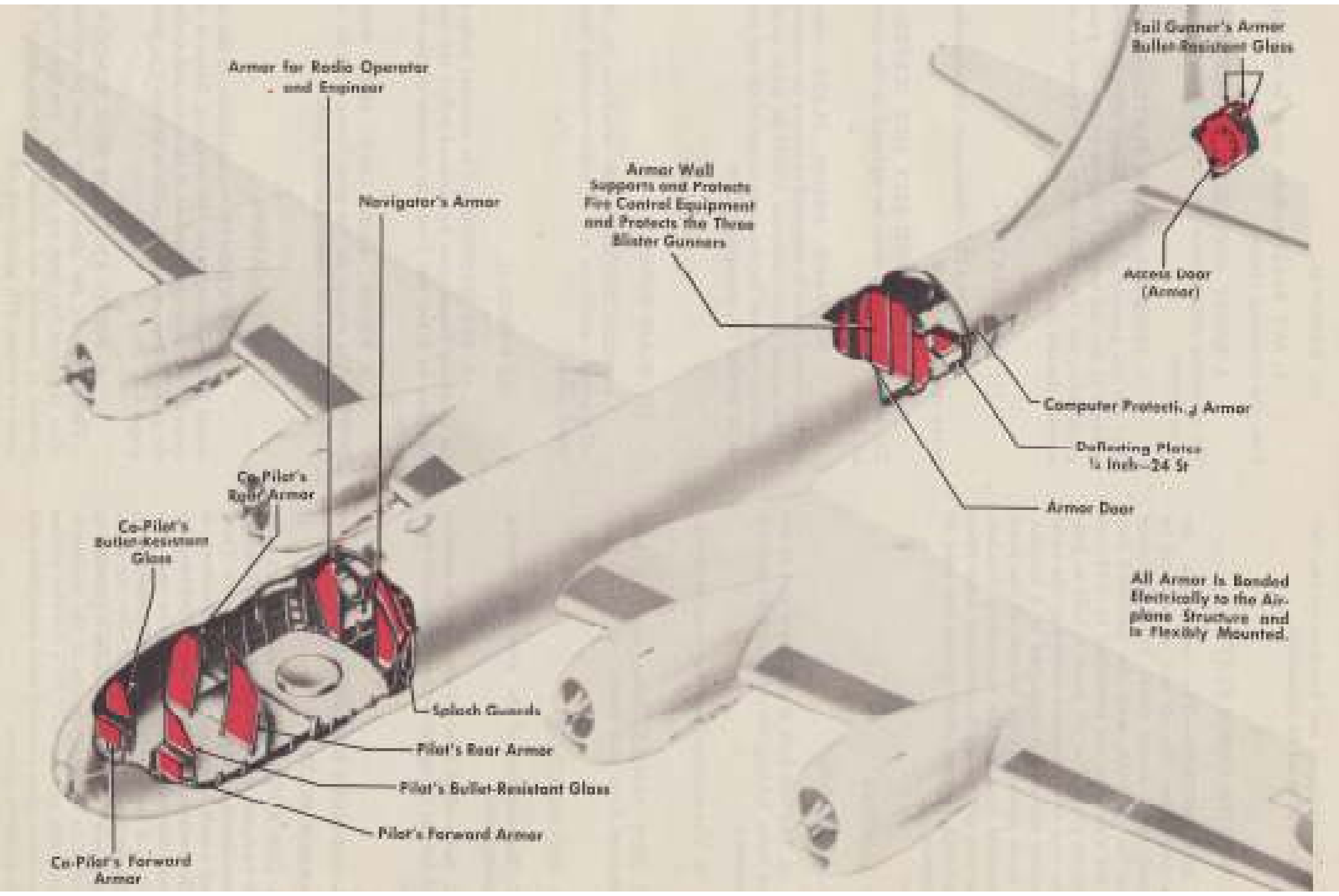
Armour Protection

Above: Extract from the USAAF publication 'Bombardier's Information File' showing what every well dressed B-29 bombardier should wear when in range of the enemy – although it is indicative of all crewmen. (***Mike Voisin***)



Above: In addition to the personal flak suits (previous page), standard B-29s carried a reasonable amount of armour (red in diagram above) to protect not only the crewmembers but also some of the vital electronic equipment. Note 'Deflecting plates' under the floor in the Radar compartment which protected the computers for the top, left, right and tail sighting stations in the CFC system. The nose sighting station computer was located immediately behind the A/C's armour plate and protected by this. In the Silverplate aircraft only the Pilot's, Copilot's and Tail Gunner's armour remained. The rest was deleted to save weight. (***Taigh Ramey***)

Smoking

Smoking was allowed in the aircraft and each crew station even had its own built in ashtray (made by the Ford Motor Car Company!)

Middle: The walls of the B-29 were seemingly completely covered with various placards. This one, on the armour plating behind the A/C's station in *It's Hawg Wild*, states when smoking was not to be allowed. (***Ivor Warne***)

Bottom: The ashtray (green/grey circle below the oxygen distributor) built into the fuselage wall at the Flight Engineer's station in *Enola Gay.* (***Scott Willey***)


WARNING
BEFORE OPERATION OF LANDING
LOWER FWD TURRET GUNS MUST
USE LOWER GUNS ONLY WHEN
LANDING GEAR IS RETRACTED
SERVICE THIS AIRPLANE WITH
OCTANE FUEL.

Remote Control Turret System

Previous page: The nose sighting station in *It's Hawg Wild*. (***Ivor Warne***). This was one of five similar sighting stations in a standard B-29. The others were for the Top Gunner, Left and Right Blister Gunners (or scanners) and the Tail Gunner. Silverplate B-29s only kept the Tail Gunner's sighting station, the others being deleted to save weight.

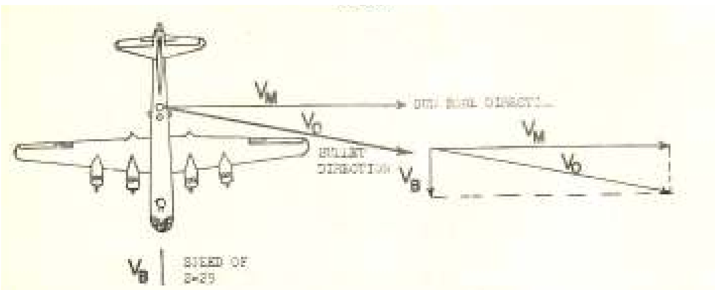
The system was called the Remote Control Turret System (RCT) or the Central Fire Control System (CFC) because the gunner did not occupy the turret. Instead he occupied a sighting station and controlled his turret remotely using a sight at his sighting station. This system allowed the gunners to remain in the heated and pressurised crew compartment which kept them more comfortable and therefore more able to perform their duties well.

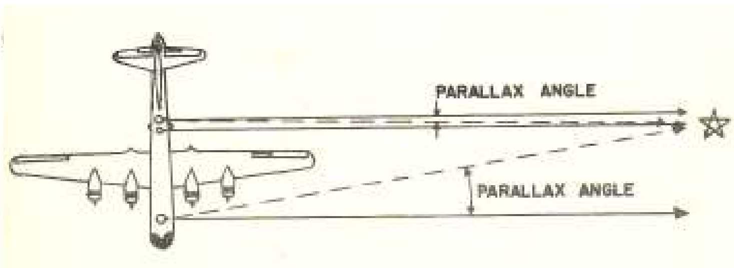
The RCT was designed by General Electric and used one sighting station for each turret although, by using a set of switching boxes, and with the exception of the tail gunner who could only control his own turret, the gunner at each station could take control of other turrets should he have a better sighting angle or should that turret's gunner be incapacitated in any way (see control diagram on next page).

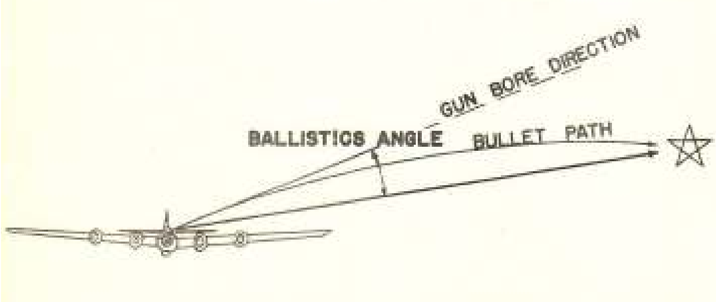
To allow the RCT to operate, the sight at each sighting station was connected to the turret or turrets that it could control via its own mechanical computer. The computer was designed so that, when the gunner sighted directly on his target, it caused the bore axes of the guns, on the turret or turrets, which the gunner was controlling, to be changed from a position parallel to the line of sight to a position which would cause the bullets to hit the target. The computer for the nose sighting station was located between the Navigator and Airplane Commander just behind the Airplane Commander's armour while the computers for the top, left, right and tail sighting stations were all located under the floor in the gunner's compartment.

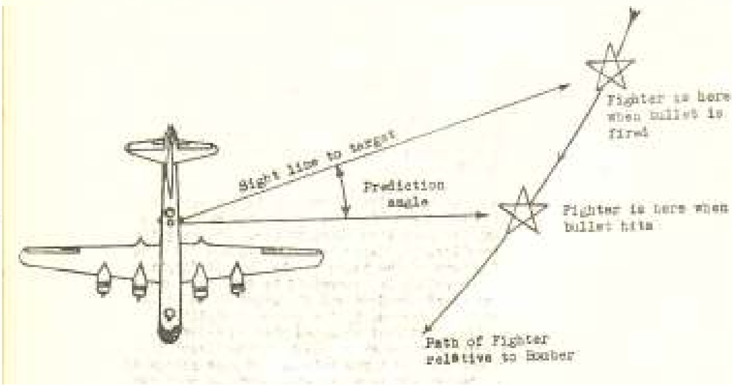
To get the bullets to hit the target, the computer calculated three corrections; Parallax (to compensate for the distance along the longitudinal axis of the airplane between the turret and the sight), Ballistics (to compensate for windage and gravity) and Lead or prediction angle (to compensate for the distance the target would have travelled from the time the bullet leaves the gun until it strikes the target) – see diagrams below taken from the 1948 SAC publication 50-1 'Gunner's Reference File' (***Taigh Ramey***). The three corrections were added together and appeared as a single total correction. Two types of computers were used in the system; Type 2CH1C1 single-parallax computers were used with the nose and tail sighting stations while type 2CH1D1 double-parallax computers were used with the others. The reason for the difference was that the upper and both blister sighting stations could control two or more turrets whole parallax base length was sufficiently different to require two different parallax corrections. Although the nose station could control either or both of the forward turrets, their azimuth parallax base length was approximately the same.

The inputs required by the computers to make these corrections were; azimuth and elevation gun position (obtained from sensors [selsyns] in the sights), true airspeed and air density (calculated from indicated air speed, pressure and outside air temperature as entered by the navigator at the navigator's hand set – see page 37), range to target (from a range potentiometer in the sight that was varied as the gunner adjusted his range hand wheel, or grip, to keep the reticule spanning the target – see page 59) and relative velocity of the target (from two gyros on the sight). See page 58 for a description of the various components on the sights and page 60 for the locations of the various components.









If You Are at This Sight	And Want Control of This Turret	Use Control Switches on This Control Box	AND TURN SELECTOR SWITCH	
			On Blister Selector Switch Box To	On Nose Release Switch Box To
Upper	Upper Rear	Upper System		
	Upper Forward	Upper System		OUT
Nose	Upper Forward	Upper System		IN
	Lower Forward	Nose System		IN
Right Blister	Lower Forward	Nose System	RIGHT	OUT
	Lower Rear	Blister System	RIGHT	
	Tail	Tail System	RIGHT	
Left Blister	Lower Forward	Nose System	LEFT	OUT
	Lower Rear	Blister System	LEFT	
	Tail	Tail System	LEFT	
Tail	Tail	Tail System		

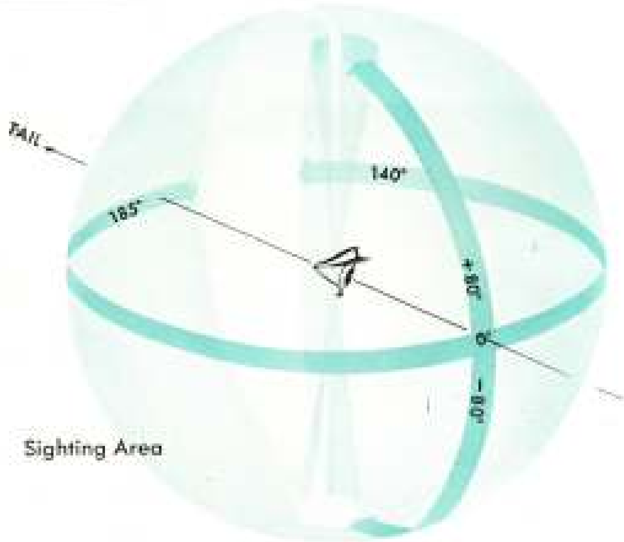
Above: An extract from the USAAF publication 'Gunner's Information File' showing the primary and secondary turret controls and switch settings necessary to take control of a turret. (***William Royster***)

HOW TO TURN ON THE NOSE SIGHTING STATION

FACTS AND FIGURES

Movement of the Nose Gunner's Sight

The nose gunner can swing his sight from almost straight down (—80 degrees) to almost straight up (80 degrees). To the right he can swing the sight a little more than a half circle (185 degrees), and to the left he can swing almost a half circle (140 degrees).



Sighting Area

Turrets He Has First Call On

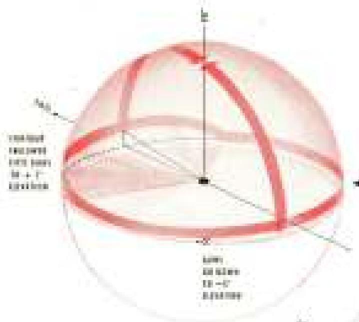
The nose gunner has first call—primary control—on the two forward turrets—upper and lower. Often he will need them both to shoot down a fighter attacking from the front. But he can release the upper forward turret to the top gunner, and the lower forward turret to one of the side gunners. Frequently he will release one of the turrets and keep operating the other one.

Other Turrets He Can Operate None.

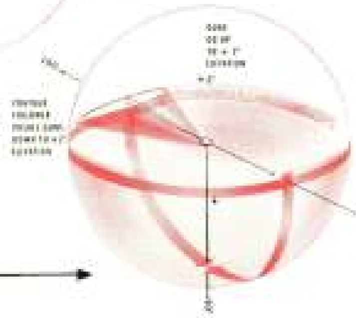
Field of fire of his turrets

The upper forward turret swings a full circle in azimuth. In elevation, it covers the entire upper surface—from a little below horizontal (—5 degrees) to straight up (90 degrees). At one point—when the guns are pointed straight back—the contour follower stops them before they go quite down to level (5 degrees).

The lower forward turret also covers a full circle in azimuth. In elevation, its guns move from a little above level (5 degrees) to straight down (—90 degrees). When the guns point aft, the contour follower keeps them from rising more than 2 degrees above horizontal.



Upper Forward Turret

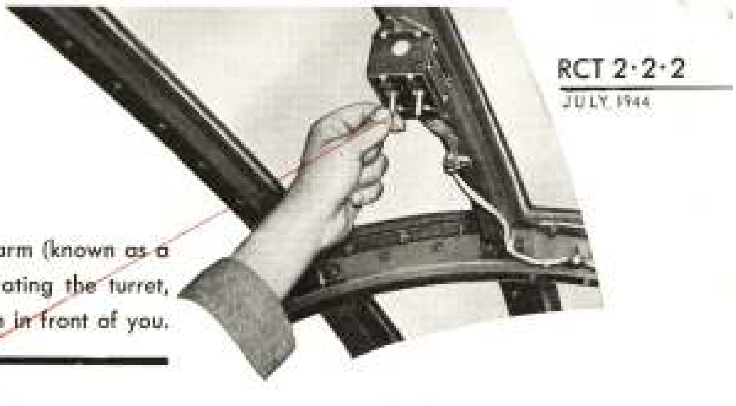


Lower Forward Turret

Stowing Duties

The nose gunner is responsible for stowing the lower forward turret—with its guns pointed straight back and as near horizontal as possible.

This page and next: Extract from the USAAF publication 'Air Forces Manual No. 27 Gunnery in the B-29' relating to the nose gunner's sighting station. (***Taigh Ramey)***



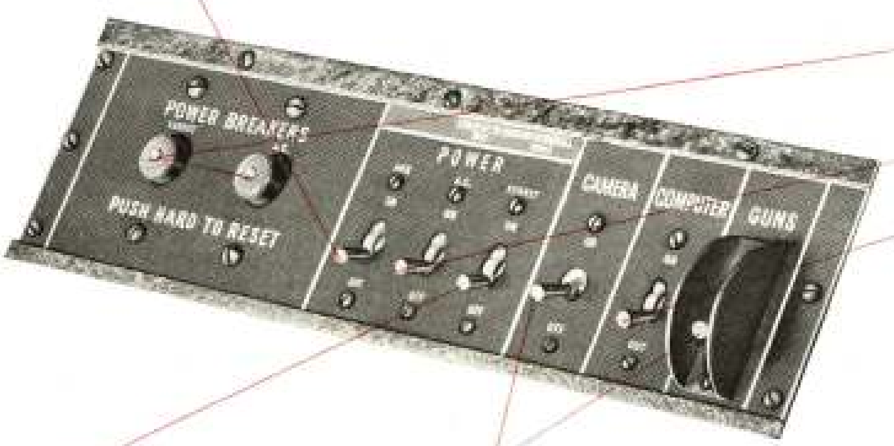
THE NOSE GUNNER'S SWITCHES

At the nose sighting station, the sight is mounted on a long arm (known as a **pantograph**) extending from the fuselage. To begin operating the turret, unsnap the latch on this arm and swing the sight into position in front of you.

Then take these steps in order:

1 Turn on the switch marked **power aux.** This will supply current to warm up the computer, start the air compressor for the gun chargers, and operate the gun firing circuit in the lower forward turret.

2 Above your head you will find a small switch box with toggles marked **upper forward** and **lower forward turret.** When these switches are turned to **in,** you have control of the two turrets; when they are turned to **out,** the top gunner takes control of the upper forward turret, and one of the side gunners takes control of the lower forward turret. Turn these switches to the proper position—which will be determined in combat by your airplane commander or senior gunner.



3 Push the power breaker buttons to make sure the circuits are closed.

4 Turn on **power A.C.** — a main power switch.

5 Turn on the **computer** switch. This starts the computer and the gyroscopes on your sight. Now wait at least 10 seconds to avoid overloading the circuits.

6 Use the 10 seconds to check your sight, as described on page 5-7-1. Then turn on the switch marked **power turret,** which supplies current for operating the lower forward turret.

7 The last two switches can now be turned on in any order you wish. The **guns** switch is a safety switch for the firing circuit in the lower forward turret; on the ground it should be turned on just before testing the triggers, and in the air it should be turned on just before firing test rounds and then left on for the rest of the mission. The **camera** switch supplies current for operating the gun camera.

The power, camera, and gun switches for the upper forward turret are all located in the top sighting station. You will have to depend on the top gunner to turn these switches.

You are now ready to operate the sight, as described in Section 3, and fire the guns in either or both of the two front turrets. As long as the two switches marked **upper forward turret** and **lower forward turret** are both turned to **in,** the guns in both turrets will follow your sight and will be fired by your triggers.

How the nose gunner can transfer control of his turrets

If you want the top gunner to take over the upper forward turret, throw the **upper forward turret** switch to **out.** If you want the side gunners to take over the lower forward turret, throw the **lower forward turret** switch to **out.**

Control of your turrets will also pass on to the top and side gunners when you release your sight's action switch. (For a description of this switch, see p. 3-1-2.)

Airplane Commander's Station

Top: The A/C's window in *Enola Gay*. This, and the similar window by the Copilot's station, opens by coming in and then sliding up (in the photo the window is open). The brick red tubes are part of the demisting plumbing running along the top of the cabin. (***Scott Willey***)

Middle: A general view of the A/Cs station. (***Scott Willey***)

Mounted on the cabin wall to the A/C's right are the throttles (long handled levers with the blue ends), trim wheels (grey wheels), oxygen distribution system (black dials) and communication controls. Note the command radio channel selector switch box immediately behind the throttles. The eight red buttons (labelled A through H) hint at a late modification made to Enola Gay's radio equipment when the 'standard fit' SCR-522 four channel VHF command radio was replaced during a stop on the delivery flight to Tinian with the more advanced eight channel AN/ARC-3 command radio.

Note the Boeing 'hub cap' in the control column yoke (something of a rarity for a Washington to have retained one of these!).

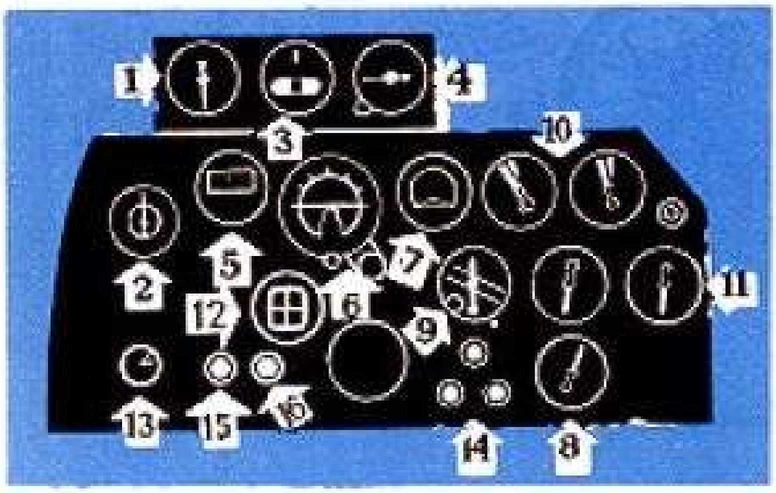
Bottom: A close up of the A/C's control panel this time in *It's Hawg Wild*. (***Ivor Warne***)

Note the missing Boeing hub cap!

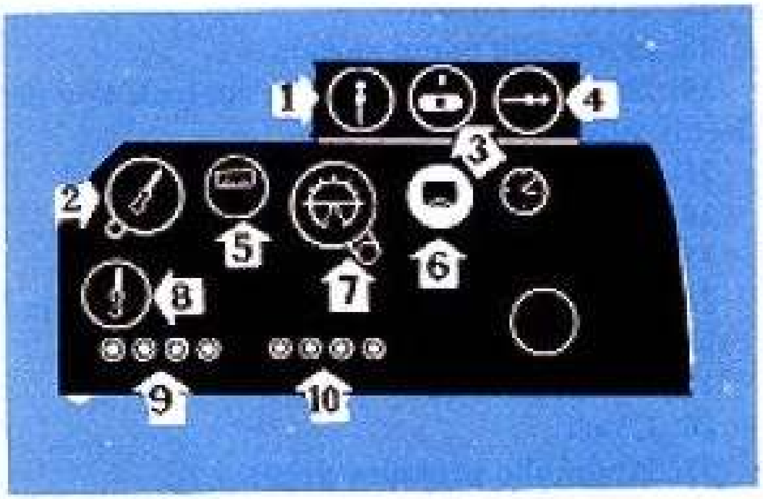
Missing from both *Enola Gay* and *It's Hawg Wild* are the armoured glass panels that mounted above both the Airplane Commander's and Copilot's instrument panels filling the entire area between the panel and the overhead. Since the front of the instrument panel was also armoured the two pilots were relatively well protected. The Smithsonian Institute is currently fabricating replica panels at their Garber restoration facility for fitting to *Enola Gay*.

EXCEPT FOR MANIFOLD PRESSURE GAGES AND TACHOMETERS, THE INSTRUMENTS ON THE AIRPLANE COMMANDER'S PANEL ARE ALL FLIGHT INSTRUMENTS:

1. Airspeed indicator
2. Altimeter
3. Bank-and-turn indicator
4. Rate-of-climb indicator
5. Turn indicator
6. Gyro-horizon
7. Pilot direction indicator (PDI)
8. Radio compass
9. Flux gate compass
10. Manifold pressure gages
11. Tachometers
12. Blind-landing indicator
13. Clock
14. Turret warning lights
15. Bomb release indicator light
16. Vacuum warning light



THE INSTRUMENTS MOUNTED ON THE COPILOT'S INSTRUMENT PANEL ARE:



1. Airspeed indicator
2. Altimeter
3. Bank-and-turn indicator
4. Rate-of-climb indicator
5. Turn indicator
6. Magnetic compass
7. Gyro-horizon
3. Flap position indicator
9. Propeller rpm limit indicator lights
10. Landing gear indicator lights

Above: Excerpt from the USAAF publication 'The B-29 Airplane Commander Training Manual for the Superfortress AAF Manual No 50-9' identifying the dials on the Airplane Commander's and Copilot's instrument panels.

Right: General view of the A/C's and Copilot's instrument panels in *It's Hawg Wild*. (***Martin Claydon***)

Copilot's Station

Top: The Copilot's station in *It's Hawg Wild*. (***Ivor Warne***)

Middle: The Copilot's instrument panel in *Enola Gay*. (***Scott Willey***)

The large grey wheel to the lower right is the pitch trim control wheel. Above this and to the right is the Copilot's hydraulic instrument panel. The hydraulic system was only used for braking and an electrically driven pump kept the system at a pressure between 1,025 and 1,225 psi.

Bottom: A close up of the side wall of the Copilot's station showing the Prop Reversing button that was unique to the phase three Silverplate B-29s. The button was located on the wall just behind the throttle levers (the A/C had a similar button beside his station). (***Mike Hanz***)

The prop reversing button was relevant to the phase three Silverplate B-29s because they were fitted with reversible Curtiss-Electric reversible propellers instead of the Hamilton-Standard propellers of the normal B-29s. The reason why they were fitted with these propellers was given by Scott Willey of NASM: "Col Tibbets (C/O of 509th CG) decided to have Curtiss-Electric propellers fitted to the operational Silverplate planes because they could be reversed and not just feathered. The reasoning was that if you were in some kind of emergency situation and had to return to base heavy, in a standard B-29 you'd just go ahead and drop your bombs in the drink to get down to a safe weight. I don't think Tibbets thought it would be a great idea to plop a billion-dollar nuclear weapon in the ocean in order to lighten up the aircraft. So, if a Silverplate B-29 was coming in heavy, the reversible-pitch props gave a lot more braking to hopefully get the bird stopped on those 8,500-ft runways in the Marianas. Boeing had looked at the Curtiss props early on, but they deemed them less reliable (they were, especially in the CBI theatre on C-46s). So, although they would reduce braking distance by about 50%, Boeing stuck with the relatively reliable Hamilton-Standards."

Central Aisle Stand

Top: The central aisle stand in *Enola Gay*. (***Scott Willey***)

Bottom: The central aisle stand in *It's Hawg Wild*. (***Ivor Warne***)

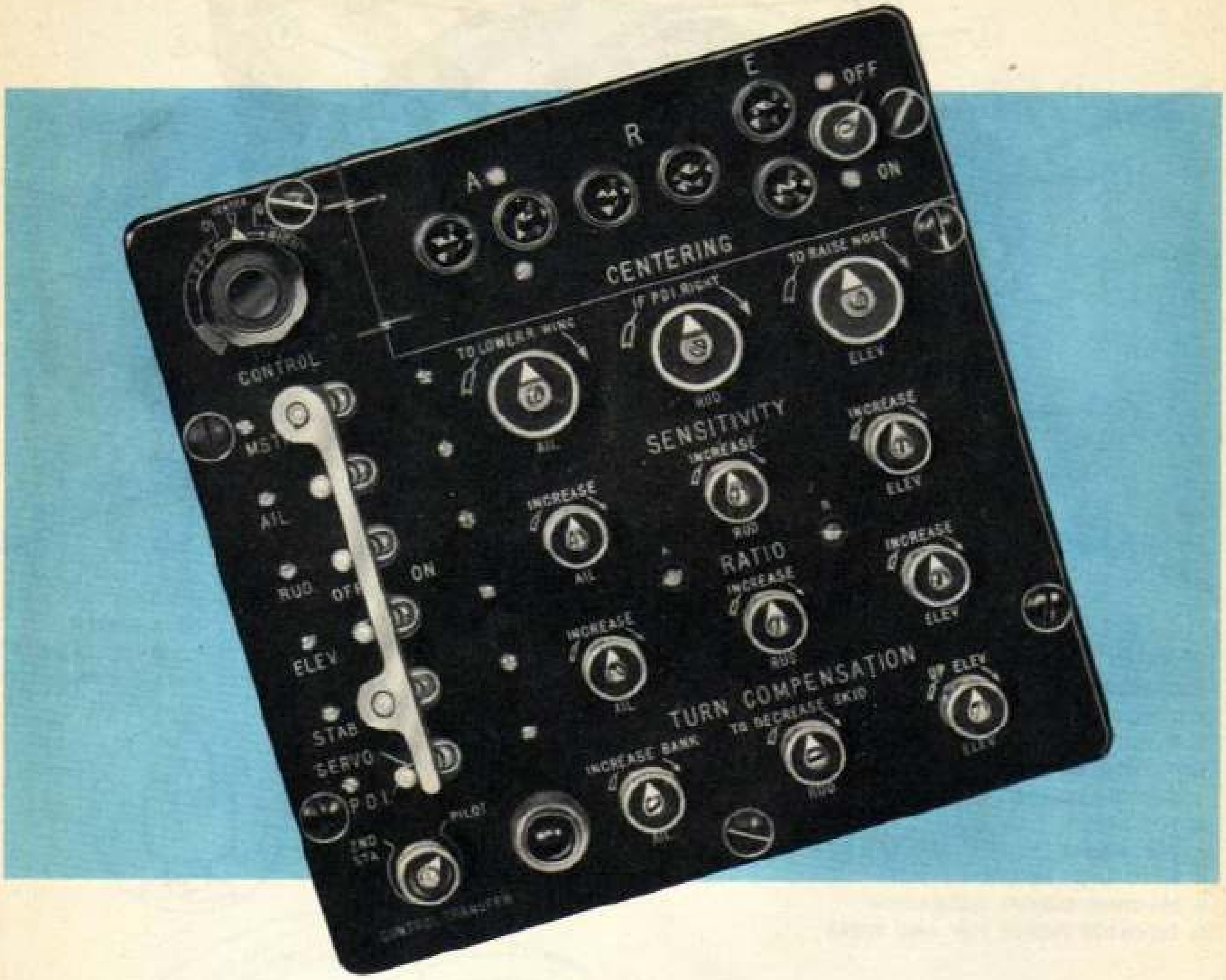
The aisle stand in *Enola Gay* and *It's Hawg Wild* are essentially the same and, apart from two items, just show detail differences that reflect the different times of manufacture of the two aircraft.

The two Silverplate differences both relate to the Curtiss-Electric propellers fitted to *Enola Gay*. The four feathering buttons of the standard B-29 (lower photo – red buttons labelled 1 - 4) are replaced by switches allowing the A/C to feather or reverse pitch each propeller. The knock on change is the additional panel to the rear of *Enola Gay's* stand that contains switches for the navigation, identification and landing lights. Standard B-29s had these switches in the main panel between the autopilot controls (square black panel to rear left of aisle stand) and the propeller feathering buttons but the need to add the controls for the Curtiss-Electric propellers necessitated their repositioning.

The white lever on the floor in the top photo is the hand pump that was used to build up pressure in the hydraulic system if the electrically driven pump did not work. The hydraulic system was only used for the brakes.

The grey item (it is supposed to be silver wrinkle finish!) toward the bottom of the lower picture is the vertical flight gyro of the C-1 autopilot. The vertical flight gyro sensed deviations in pitch and roll and sent the information the to autopilot amplifier mounted in the adjacent central aisle stand. The gyro should be protected by a plywood box. *Enola Gay's* gyro is covered by such a box (see page 8) and is also partly hidden by the panel containing the switches for the lights.

A description of the various switches on the autopilot control panel (black panel just above the gyro) is given on the next page in an extract from the USAAF publication 'Bombardier's Information File'. (***Mike Voisin***)



Autopilot Control Panel

The autopilot control panel (ACP), located in the pilot's compartment of an airplane, contains the switches, lights, and knobs used to operate and adjust the autopilot.

Tell-tale lights show when the electrical trim of the autopilot agrees with the manual trim of the airplane.

Centering knobs change the electrical trim of the autopilot to agree with the manual trim of the airplane.

Sensitivity knobs regulate the distance the airplane is allowed to deviate from straight and level flight before the servo units apply control to correct the deviation.

Ratio knobs regulate the amount the servo units move the control surfaces for any given deviation of the airplane.

Turn compensation knobs regulate the amount of control necessary when the directional panel is used in making a coordinated turn.

Turn control enables the pilot to make coordinated turns with the autopilot.

Aileron and rudder trimmer screws regulate the amount of aileron and rudder control necessary to make a coordinated turn with the turn control.

Remote control transfer knob shifts the turn control operation to a remote turn control station in either the bombardier's or navigator's compartment.

Tell-tale light shutter knob regulates the brightness of the tell-tale lights.

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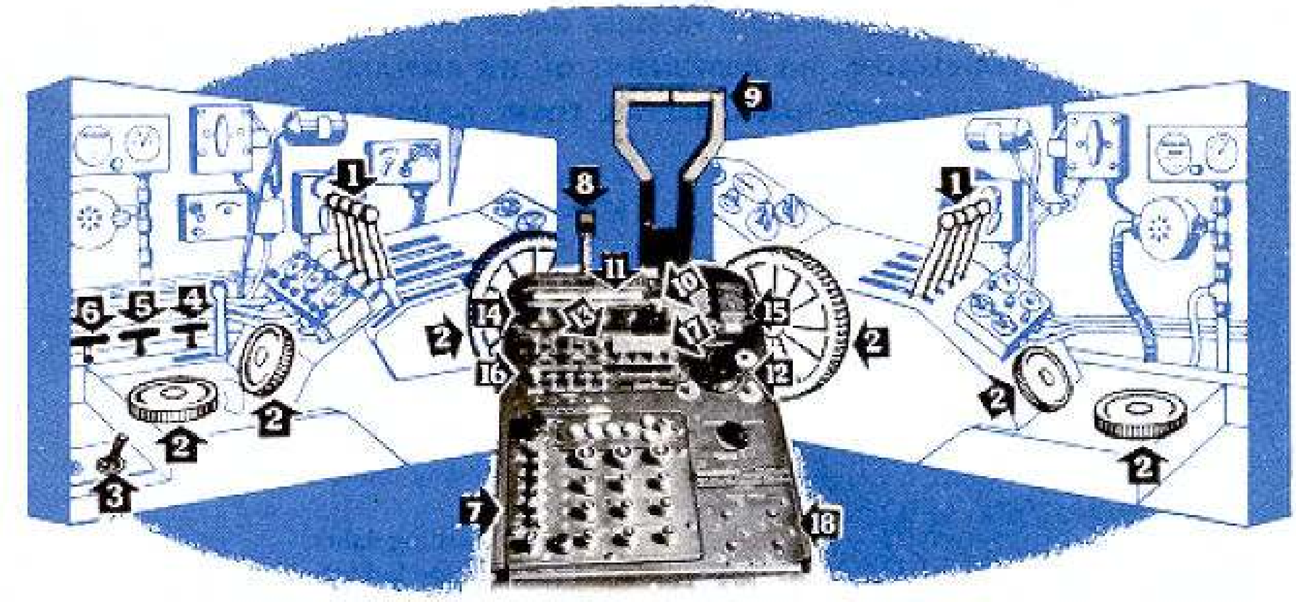


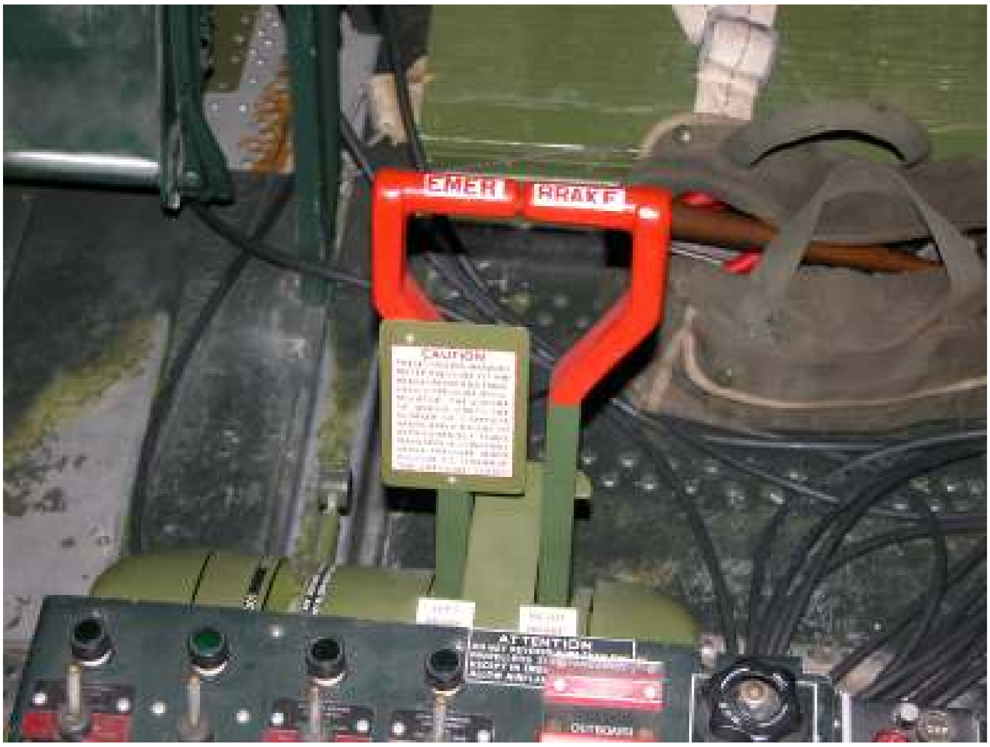
Both airplane commander and copilot have control stands on which throttles (1) and trim tab controls (2) are mounted. The landing gear transfer switch (3) and emergency cabin pressure (4) emergency bomb (5), and emergency landing gear door releases (6) are at the rear of the airplane commander's control stand.

The controls for the C-1 automatic pilot (7), the control surface lock (8), emergency brake levers (9), wing flap control switch (10), propeller feathering switches (11), turbo boost selector (12), phone-call signal light switch (13), alarm bell switch (14), landing gear switch (15), light switches (16), propeller increase and decrease rpm switches (17), and propeller pitch circuit breaker re-sets (18) are on the aisle stand to the right of the airplane commander's seat and within easy reach of the copilot.

Above and Left: Excerpt from the USAAF publication 'The B-29 Airplane Commander Training Manual for the Superfortress AAF Manual No 50-9' identifying the levers, knobs and wheels on the Airplane Commander's and Copilot's side panels and the central aisle stand.

Below: The emergency brake levers located at the front of the aisle stand in *Enola Gay* (***Scott Willey***)

The black cables littering the floor are not original but are part of the fibre optic lighting system installed in *Enola Gay* for display. Fibre optic was chosen to avoid any risk of fire although the lighting it provides also proved to be very effective as can be seen in the photo on the cover.



Top: *It's Hawg Wild's* number 4 engine and it's Hamilton Standard Propeller. (***Chris Howlett***)

Bottom: A close up of *Enola Gay's* number 2 engine with its Curtiss-Electric reversible propeller. (***Chris Howlett***)

In February 1945 it was decided that the 509th CG would get new planes to take overseas. These planes would have all the latest additions including fuel injection engines, Curtiss Electric reversible pitch propellers, pneumatic bomb bay doors, engine mounted front collector rings and other smaller mechanical improvements. It is a bit of a mystery why pneumatic bomb bay doors were included as these were fitted to standard B-29s from production blocks B-29-55-BW, B-29A-15-BN, B-29-30-BA and B-29-25-MO. The phase 3 Silverplate B-29s were later than this being block 35, 40, 45 or 50-MO aircraft.

Note the wider 'paddle' cross section and cooling cuffs of the Curtiss Electric reversible pitch propeller. Although at the time, fuel injection was a Silverplate addition, by the time the RAF received the Washingtons and when *It's Hawg Wild* operated in Korea, fuel injection was a standard feature.

Flight Engineer’s Station

Above: The Flight Engineer’s instrument panel in *Enola Gay*. (***Scott Willey***)

The Flight Engineer was primarily responsible for managing the engines and, by varying the cowl flaps, manifold pressures, fuel mixture and fuel distribution, to extract the maximum possible duration from the available fuel. Fortunately, a fully fuelled B-29 carried an impressive quantity: 1,415 gallons in each inboard wing tank, 1,320 gallons in each outboard wing tank and 1,333 (1,120 in B-29A) gallons in the centre wing tank. In addition, up to four 640 gallon auxiliary tanks could be carried in the bomb bay (2 each in the forward and rear). For the Silverplate aircraft fuel was not too much of a problem as the single 10,000 lb bomb carried in the forward bomb bay allowed a full fuel load and two of the auxiliary fuel tanks to be carried in the rear bomb bay. Standard B-29s (and B-29As) were always being pressurised into carrying a greater and greater weight of bombs at the expense of fuel, making the Flight Engineer’s fuel management task that much more critical.

To complicate his task, the fuel management system fitted to the B-29 changed radically during their production run. Early planes had what was known as the Fuel Transfer System while later planes had a Manifold Fuel System.

Enola Gay had the Manifold System which allowed the fuel in any or all tanks tank to be directed, via a single manifold fuel line and a number of electric pumps and shut off valves, to feed any engine. The pumps and shut off valves were controlled by switches on the Flight Engineer’s control stand (see pages 28 and 29). In the earlier Fuel Transfer System each engine was fed directly from its own tank and could only be fed from that tank. Fuel could however be transferred from tank to tank by two reversible pumps controlled by circuit breakers, directional control switches and tank selector valves on the Flight Engineer’s control stand (see pages 32 and 33).

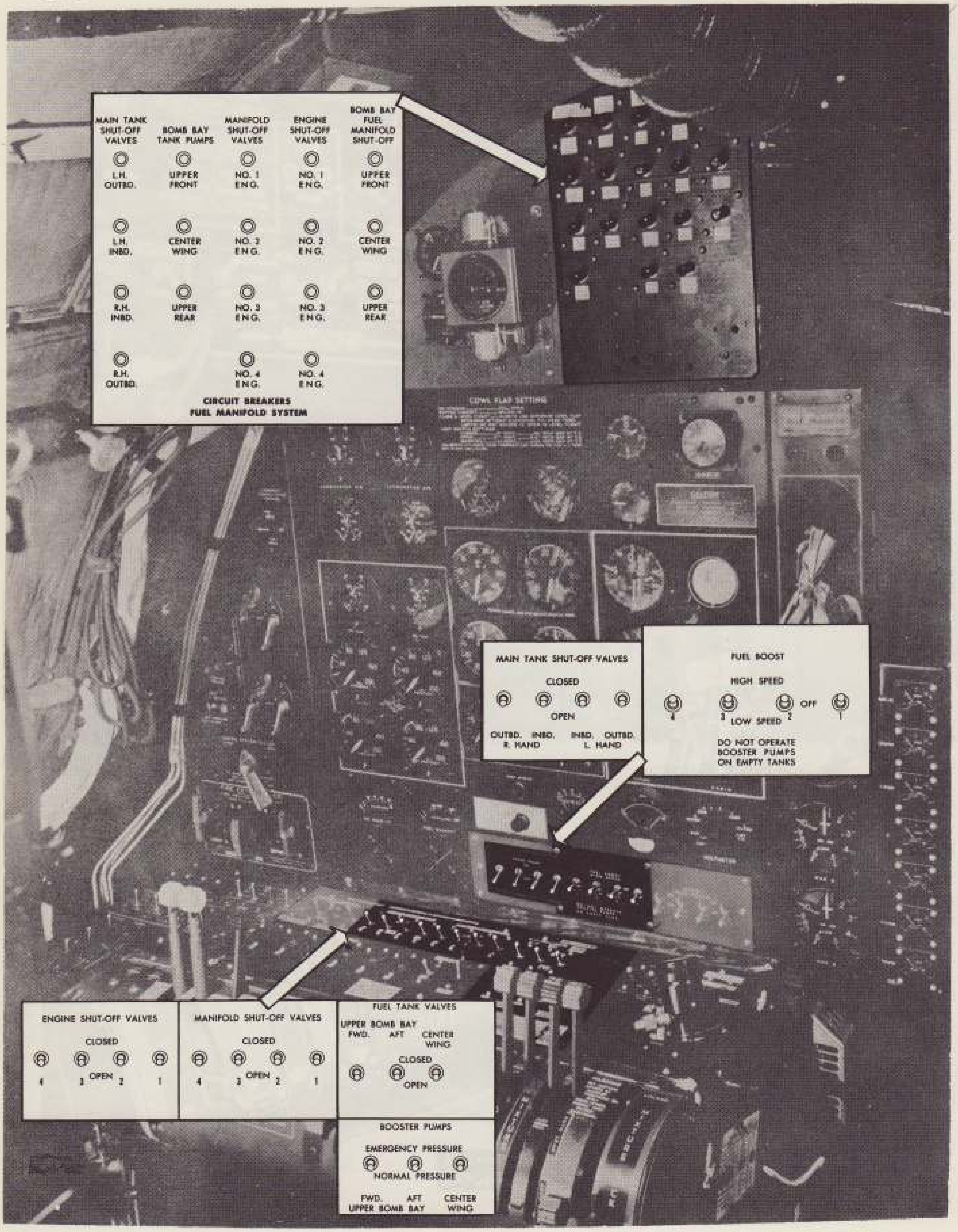


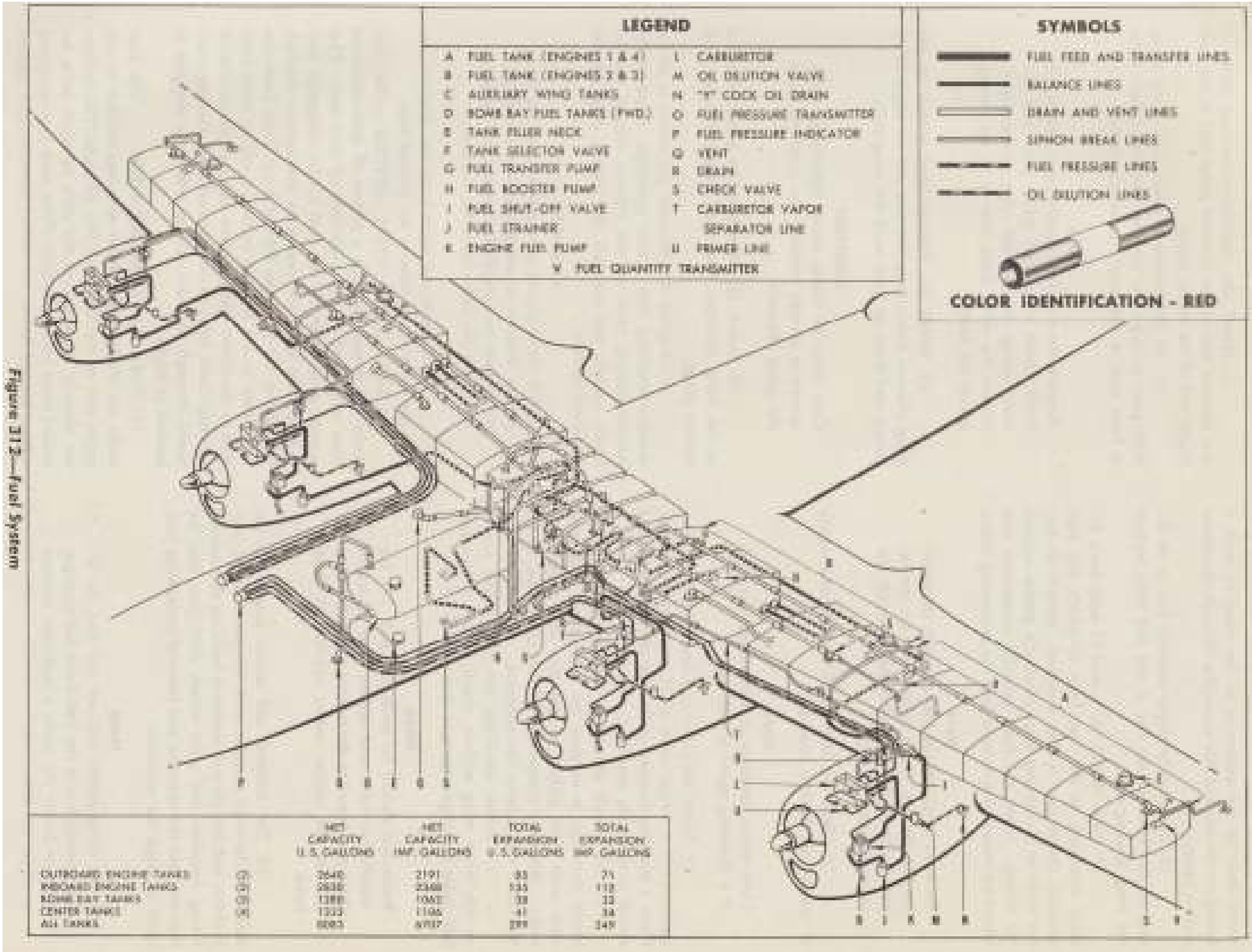
Figure 20A — Engineer's Station (Manifold Fuel System)

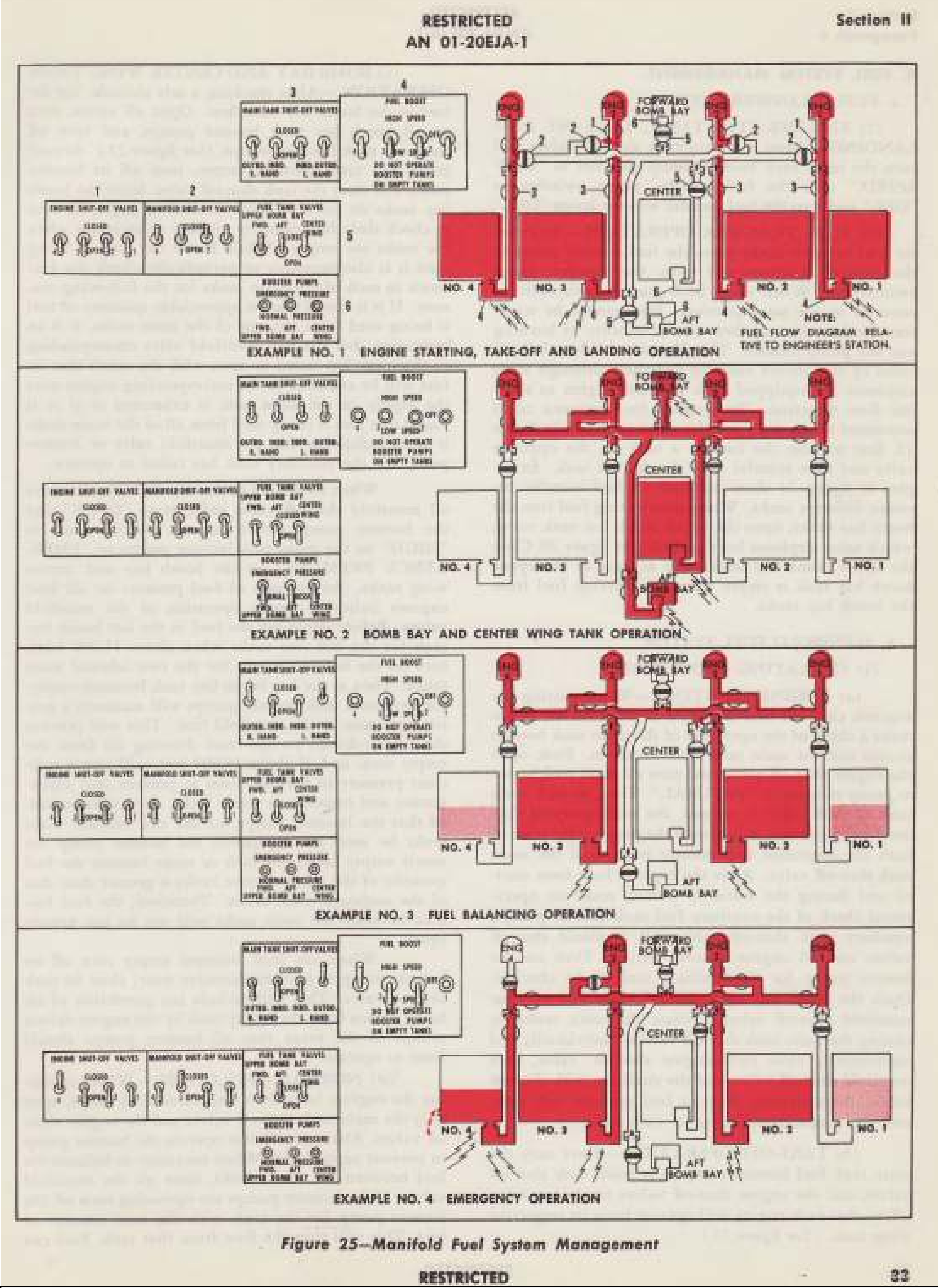
Above: A diagram from the USAF publication AN 01-20EJA-1 identifying the various switches used to control the fuel flow in those B-29s fitted with the Manifold Fuel System. (***Taigh Ramey***)

Above and Right: Two views of the Flight Engineer's station in *Enola Gay*. (***Scott Willey***)

The window was jettisonable although could only be used when the aircraft was on the ground as the number 3 engine's propeller was just outside and would present a serious obstacle if still running!

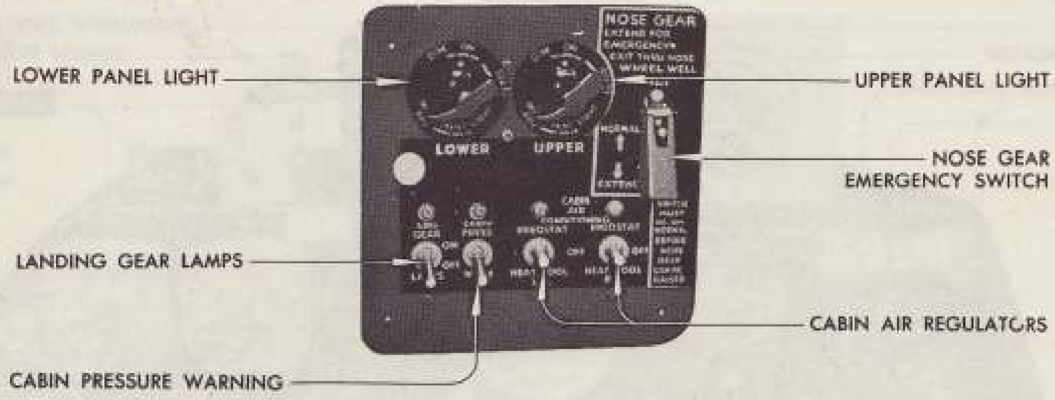
Below: A diagram from the publication AN 01-20EJ-2 showing the Transfer Fuel System in the B-29. (***Taigh Ramey***)



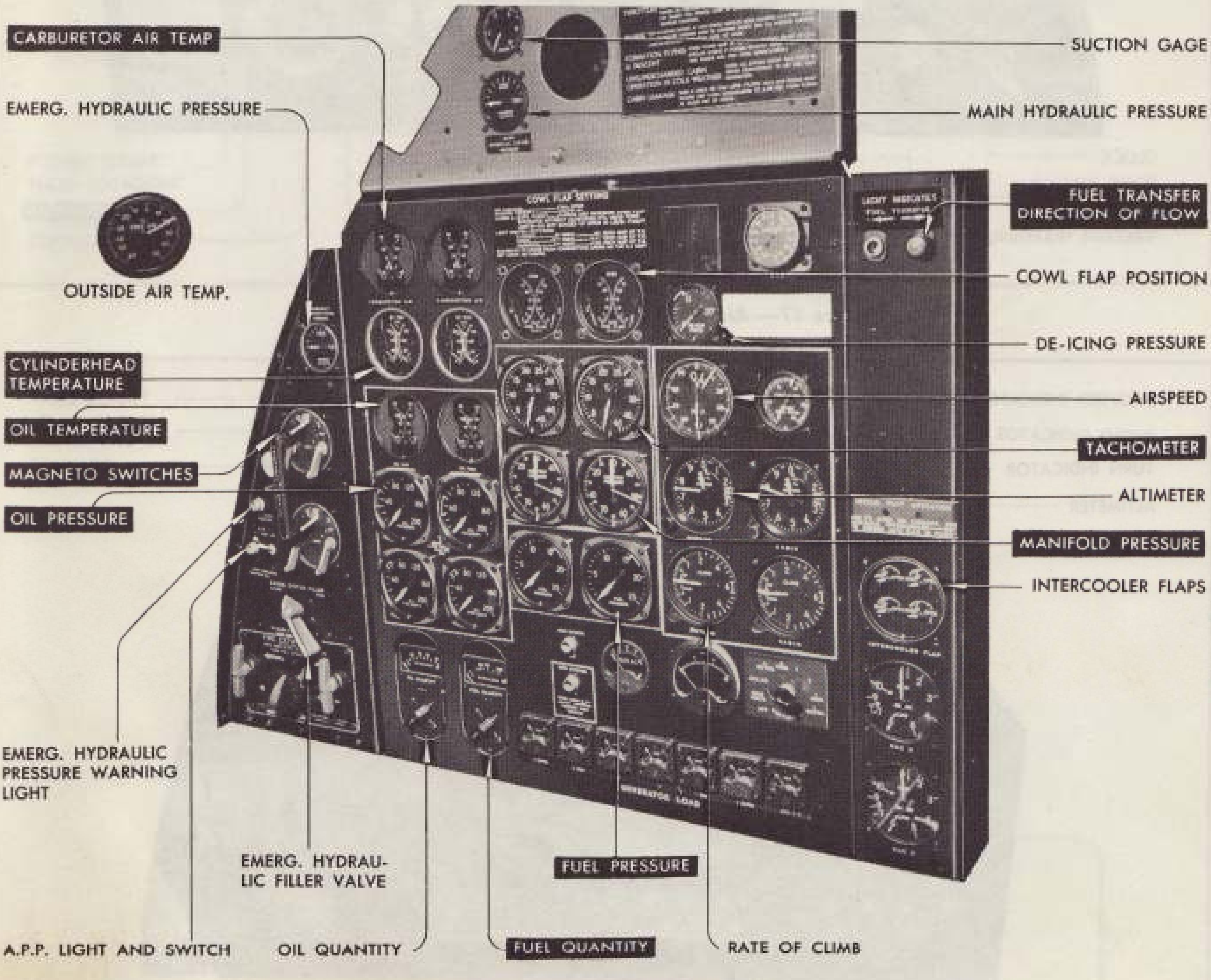


Above: A diagram from the USAF publication AN 01-20EJA-1 showing the switch positions and resultant fuel flow for various combinations of operations. (***Taigh Ramey***)

Above: The Flight Engineer's station in *It's Hawg Wild* – a B-29A fitted with the Transfer Fuel system. (***Ivor Warne***) Note the black box connected to the front of the upper forward gun turret tub. This is the servo amplifier for the lower forward gun turret. The servo amplifier for the upper forward gun turret is located in the rear gunner's compartment (see page 59).



ENGINEER'S AUXILIARY SWITCH PANEL
(ALL AIRPLANES)



ENGINEER'S INSTRUMENT PANEL
(EARLY AIRPLANES)

Above: A diagram from the USAF publication AN 01-20EJA-1 detailing the various switches and dials on the Flight Engineer's instrument panel. (***Taigh Ramey***)
The diagram above shows the panel as fitted to B-29s with the Fuel Transfer System (as in *It's Hawg Wild* on previous page). Planes with the later Manifold Fuel System had a slightly different panel (see page 28) although the majority of the switches and dials are common to both. One notable change between the two panels is the displacement of the 7 DC generator load meters (one for the APU and one each for the 6 engine mounted generators) from their horizontal row at the bottom right of this panel (not annotated but at extreme bottom of panel below the Rate of Climb dial) to a new vertical column to the right of the Intercooler Flap dial. Their place on the main panel being taken by the main tank shut off valve and fuel booster pump switches.

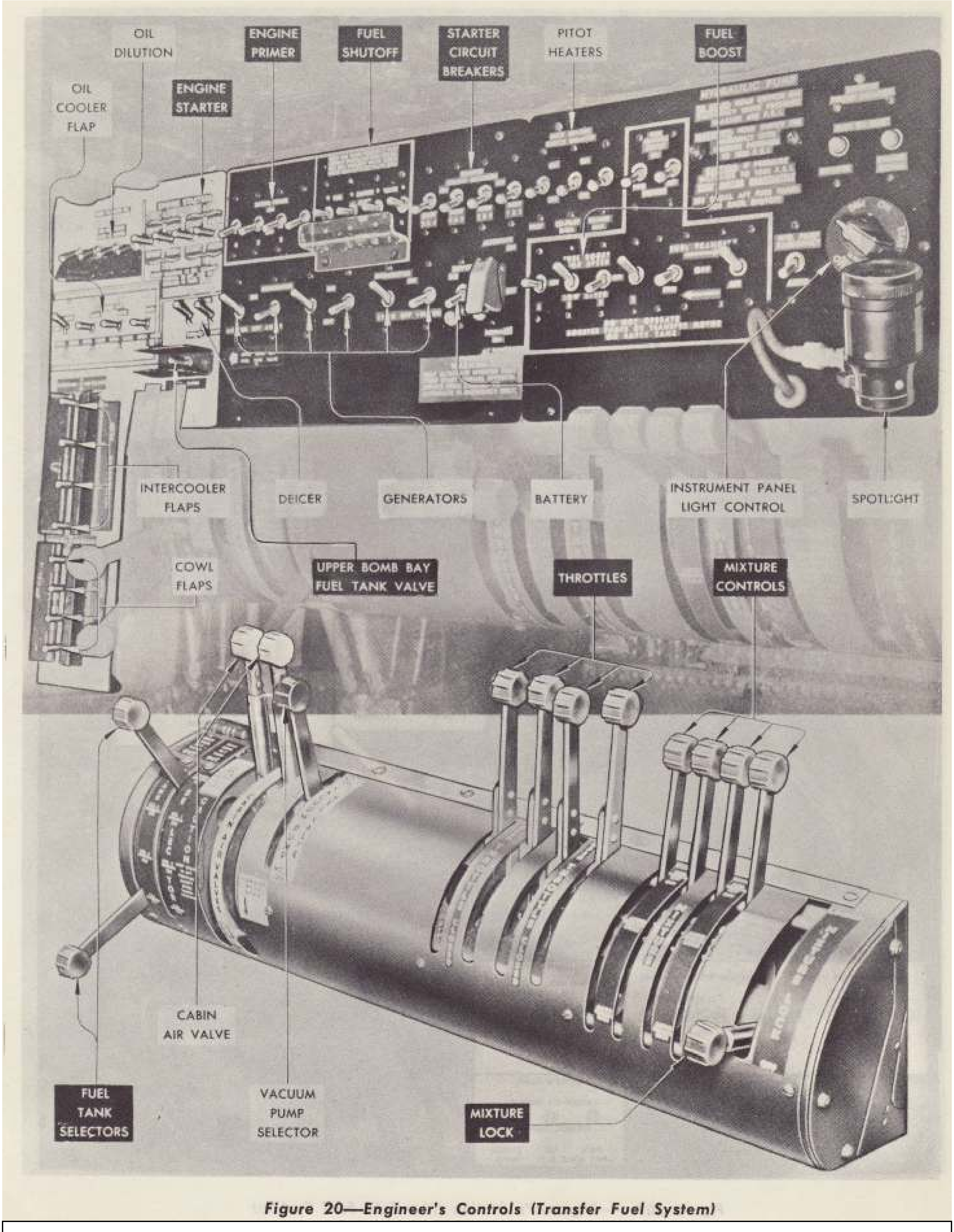


Figure 20—Engineer's Controls (Transfer Fuel System)

Above: A diagram from the USAF publication AN 01-20EJA-1 showing the switches and levers on the Flight Engineer's control stand. (***Taigh Ramey***)
The diagram shows the controls present in those planes fitted with the Fuel Transfer System. As describe on the previous page, the controls in planes fitted with the Manifold Fuel System were largely the same although the Fuel Tank Selector levers (extreme left of stand) were deleted (although the labels and runs remain) and some of the switches repositioned to make room for the Manifold Fuel System's shut off valve and pump switches.

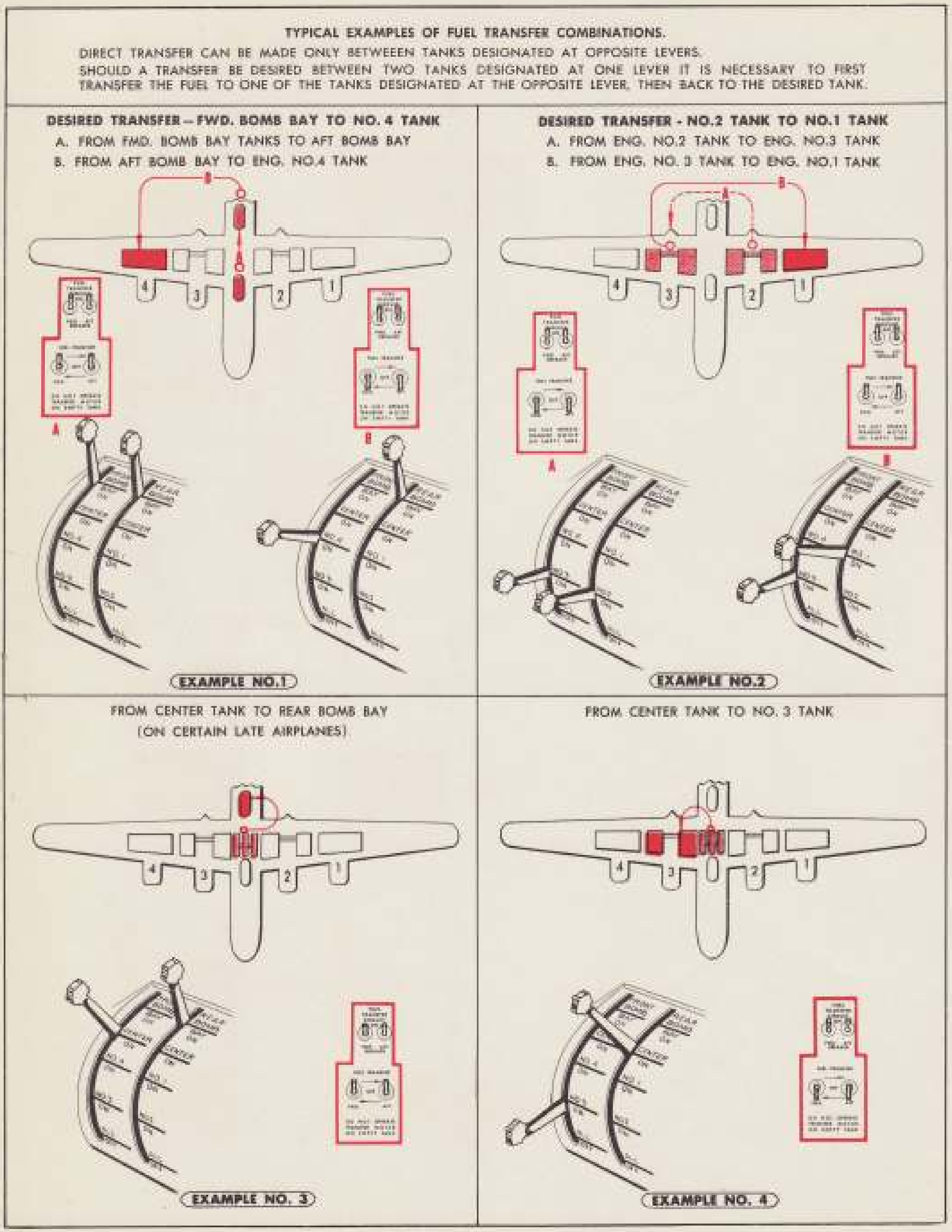


Figure 24—Fuel Transfer System Management

Above: A diagram from the USAF publication AN 01-20EJA-1 showing the lever and switch positions for various fuel transfer combinations in planes fitted with the Fuel Transfer System. (***Taigh Ramey***)

Navigator's Station

Top: The Navigator's Station in *Enola Gay* (***Mike Hanz***)

Bottom: The Navigator's Station in *Bockscar* (***US Air Force Museum via Bernie Poppert***)

The navigator's station was essentially the same in standard B-29s and the Silverplate aircraft. The repeater scope for the AN/APQ-13 radar (orange scope) is prominent with the controls and dial for the radio compass mounted on the fuselage wall to its left. Just visible above the high shelf to the top right of both photos is the amplifier for the Gyro Flux Gate Compass. Behind this are two Turbo Amplifiers, one each for number two and three engines.

One minor difference is the navigator's table. In standard B-29s this folded upwards diagonally across its middle to allow the navigator sufficient room to squeeze past the tub for the forward upper turret and access his seat. With the deletion of the turret and attendant tub the need for the fold also went and in the Silverplate aircraft the table is fixed flat. The hinges are still present but the side panel has a fire extinguisher and medium walk around oxygen bottle mounted to it.

Another noticeable difference is the deletion of the navigator's map case. This should be attached to the fuselage above the table forward of the window. In Silverplate aircraft the case was moved to the aft crew compartment near to where the aft upper turret would have been. The reason for this change was the repositioning of the SCR-718 absolute altimeter from the bombardier's station to the navigator's. When the top photo was taken the SCR-718 in *Enola Gay* was still in the nose (see page 10). The lower photo shows the location of the SCR-718 in *Bockscar* (the black box against the fuselage wall under the APQ-13 repeater scope). Why it was moved is unclear. B-29s completed before November 1944 had it located here but later B-29s had it located in the nose as per the photo on page 10. However, it does seem more sensible to have it on the Nav table where you could read the dial (bright sunlight in the nose would make it really hard to use even with an eyeshade.)

Top: The Navigator's Station in *It's Hawg Wild*. (***Ivor Warne***)

The map case (semi circular tube attached to the wall just ahead and below the window in lower photo) and the folded navigator's table are both evident as is the closeness of the tub for the forward upper turret. To the left of the photo is the side of the APN-9 LORAN receiver.

Bottom: The Drift Meter or Drift Sight in *Enola Gay*. (***Scott Willey***)

The Drift Meter allowed the navigator to assess the drift angle by rotating a grid in the sight until objects on the ground were moving along the grid lines. The angle of drift could then be read off a scale at the base of the drift meter. The Drift Meter sighted through a small glass dome located just between the lower forward gun turret and the forward bomb bay. The photo below (***Scott Willey***) shows the Drift Meter aperture on *Enola Gay* (the small bubble behind and to the right of the plate covering the opening for the removed lower forward gun turret). The hole on the other side is the flare chute.

Note the pale grey items mounted on the bulkhead behind the drift meter (and under the LORAN receiver). These are two (one normal and one emergency) Holtzer-Cabot Type MG-149F, 750 volt-ampere inverters that converted the 28 volts DC to 115 volts AC at 400 Hz for the turbo control, flux gate compass, radio compass and air position indicator. They are located in the navigator's compartment simply because there was room to 'stash' them there.