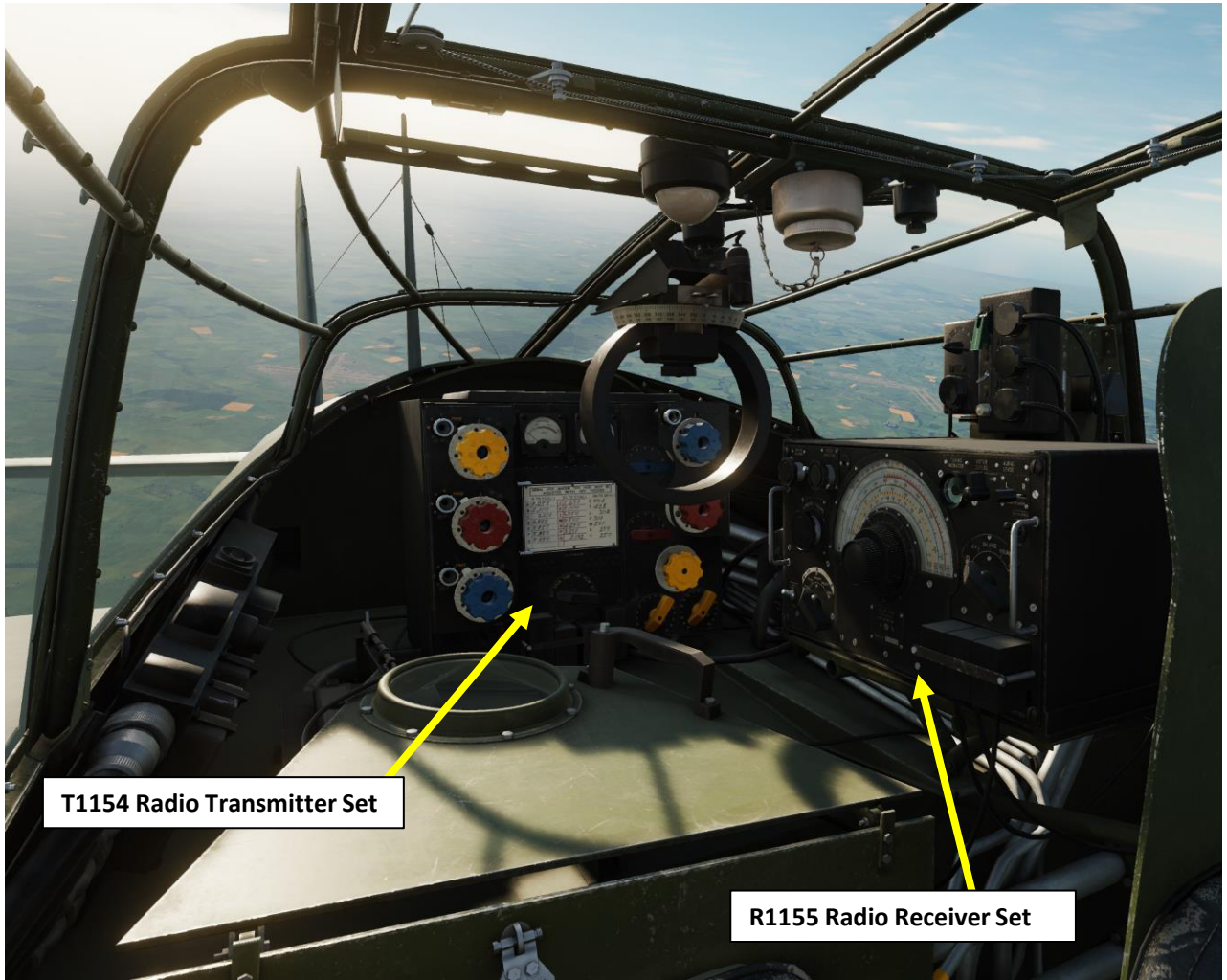
SECTION STRUCTURE

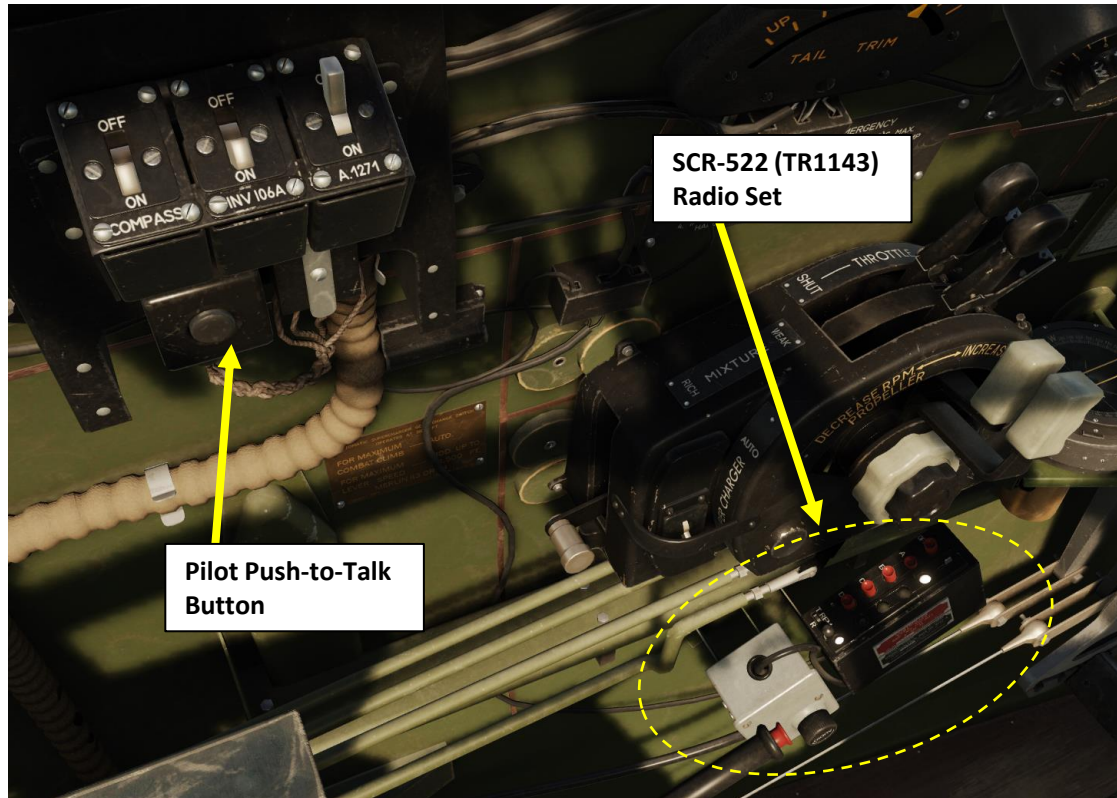
1 – RADIO SYSTEMS OVERVIEW

The Mosquito allows both the pilot and the navigator to communicate on the radio.

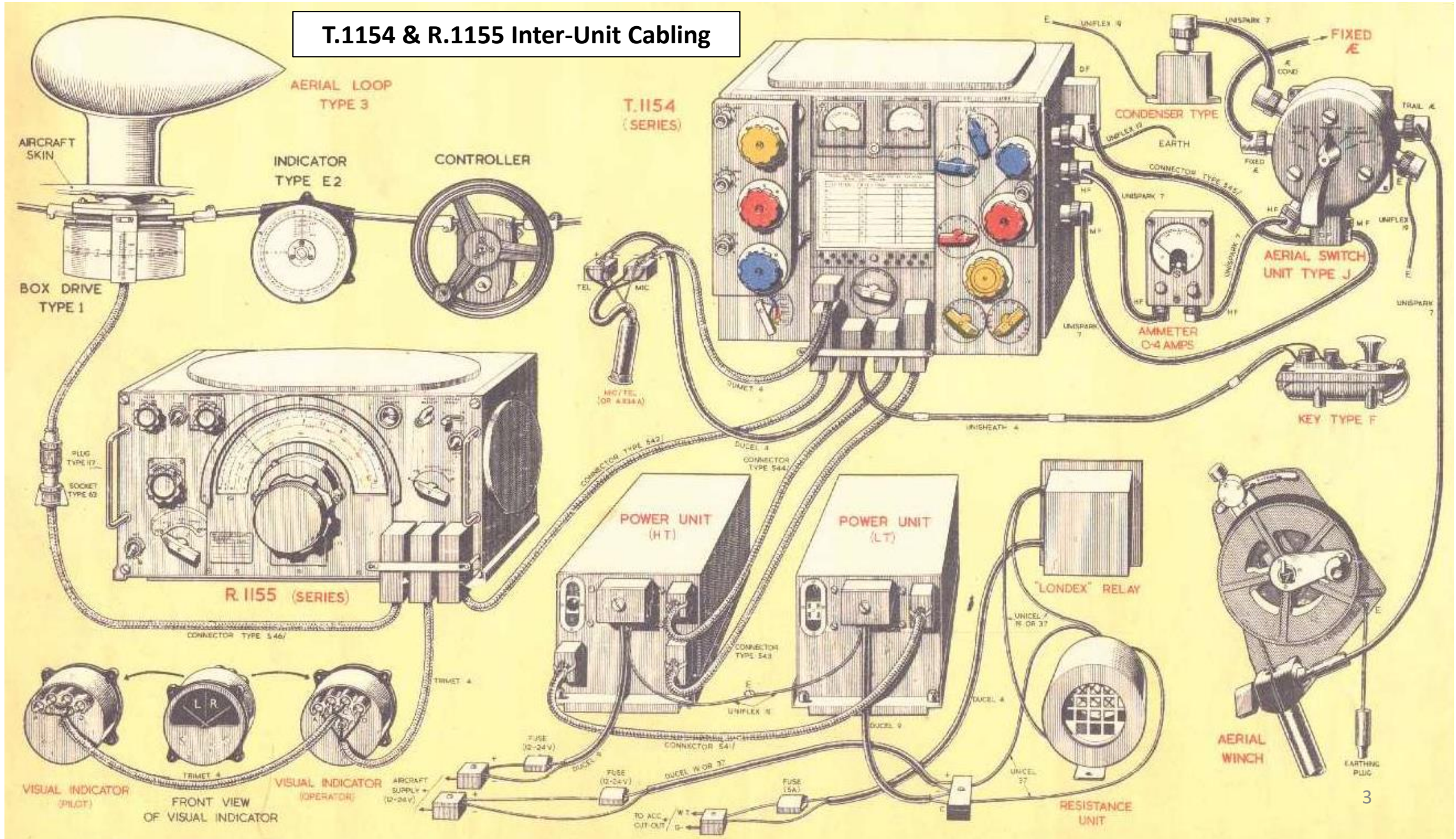
The pilot can use the **SCR-522** Radio set (also referred as **TR1143**), which is a typical radio box installed on fighter planes with four preset frequencies.

The navigator, on the other hand, can use the **T1154** Radio Transmitter to choose what frequency to communicate on, and the **R1155** Radio Receiver set to choose what frequency the radio is tuned to in order to listen to a radio broadcast within a specific frequency band.





1 – RADIO SYSTEMS OVERVIEW



2 – RADIO FREQUENCY SIGNALS SPECTRUM

The Mosquito's radios can pick up a number of different frequency bands. This is the kind of radio set you would have installed on other long-range bombers like the Lancaster. An interesting question to ask would be… what were these frequencies used for? Luckily, a gentleman called John Fallows (VE6EY) wrote an interesting article titled "WW2 Signals Spectrum – A Quick Survey", which explains what you could expect to hear on the radio bands between 1939 and 1945.

See this link for reference: http://play.fallows.ca/wp/radio/shortwave-radio/ww2-signals-spectrum-detail/

Signal Spectrum Below 2 MHz (VLF, LF, MF)

(covered by the R1155 radio receiver range and by the T1154 radio transmitter yellow range 3)

Low and medium frequency waves (LF and MF) provide reliable communication up to 1,000 km by ground wave, especially over water. High power is required to overcome atmospheric noise, especially in tropical areas. Good skywaves can span oceans. Very long frequency waves (VLF) have the added benefit of penetrating into salt water for a short distance.

Navies used high power LF to communicate with ships at 100 – 500 kHz. Germany used LF for naval and air force homing and navigation, as well as some high power VLF for sending instructions to submarines, such as "Goliath". Goliath was a VLF transmitter used by the Kriegsmarine U-boats and was capable of transmitting power between 100 and 1000 kW. Also, LF was used by armored forces for regimental signals. Most transmissions were done by Morse code, a method used in telecommunication to encode text characters as standardized sequences of two different signal durations, called *dots* and *dashes*, or *dits* and *dahs*.

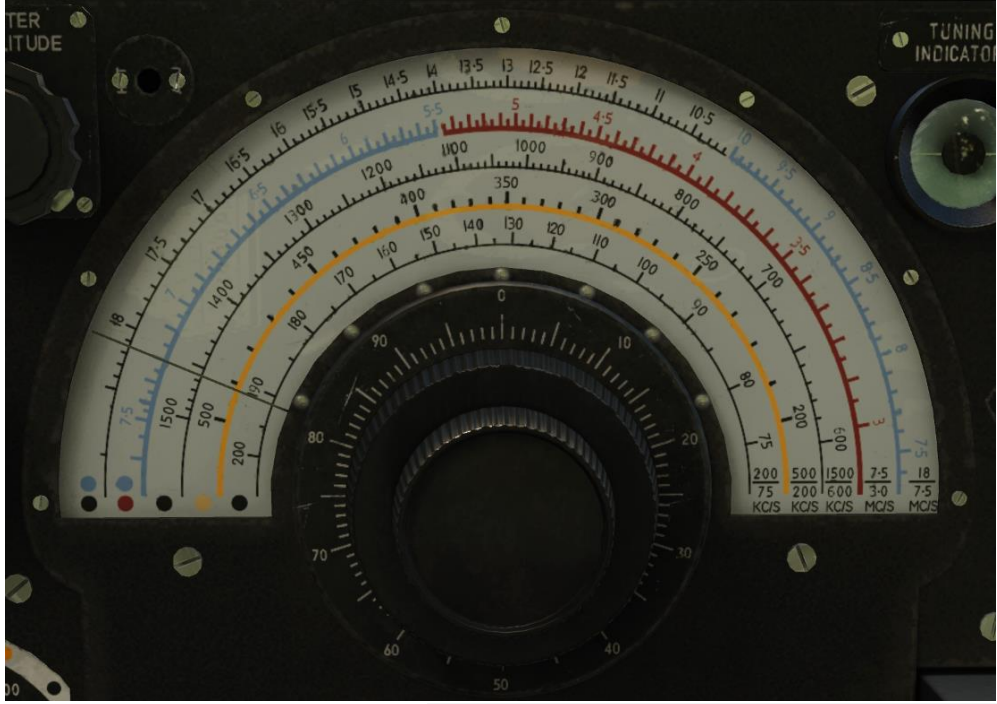
Signal Spectrum From 2 to 12 MHz (Lower HF)

(covered by the R1155 radio receiver range, and by the T1154 radio transmitter blue range 1 and red range 2)

Lower HF frequencies were the work horse for military communications over all distances, especially at night and during winter when absorption is lower. Both ground and sky waves were used, and "skip zones" were avoided by NVIS arrangements (Near Vertical Incidence Skywaves). All forms of modulation were used including W/T (wireless telegraphy), R/T (radio telephony) and data. U-boats used 10 and 12 MHz for long distance communication at night. Luftwaffe did long range navigation, and artillery and infantry ran low power communications. Some V1 missiles sent telemetry on these frequencies.

The Allies ran AM infantry man-pack, walkie talkies and mobile rigs on 5 – 9 MHz. British tanks communicated over 2-6 MHz in the early stages of the war. During the Battle of Britain, Spitfires used 5 MHz for air-to-air and air-to-ground. Interestingly, during this period, German fighters used R/T while bombers used W/T. Even though they were on similar frequencies, they could not communicate with each other during the air battles.

Long and short distance communication by warships was common in 2-5 MHz. LORAN (Long-Range Navigation) navigation showed up at 2 and 11 MHz, which was a was a hyperbolic radio navigation system developed in the United States. It was similar to the UK's GEE system but operated at lower frequencies in order to provide an improved range up to 1,500 miles (2,400 km) with an accuracy of tens of miles. Fun fact: this was also the spectrum used by most spy suitcase radios.



R1155 Radio Receiver Set Frequency Range Switch

- ***18/7.5:*** *Range from 18.5 MHz to 7.5 MHz (H/F)*
- ***7.5/3.0:*** *Range from 7.5 MHz to 3.0 MHz (H/F)*
- ***1500/600:*** *Range from 1500 KHz to 600 KHz (M/F)*
- ***500/200:*** *Range from 500 KHz to 200 KHz (M/F)*
- ***200/75:*** *Range from 200 KHz to 75 KHz (M/F)*

T1154 Radio Frequency Range Selector (S1)

- ***Blue Range 1:*** *10.0 MHz to 5.5 MHz*
- ***Red Range 2:*** *5.5 MHz to 3.0 MHz*
- ***Yellow Range 3:*** *500 KHz to 200 KHz*

2 – RADIO FREQUENCY SIGNALS SPECTRUM

Signal Spectrum From 12 to 25 MHz (Upper HF)

(HF covered by the R1155 radio receiver range, but not covered by T1154 radio transmitter)

During sunspot highs (a natural phenomenon that occurs due to magnetic activities on the Sun's surface), certain HF frequencies are mainly long distance using skywaves. In radio communication, "skywave" (or "skip") refers to the propagation of radio waves reflected or refracted back toward Earth from the ionosphere, an electrically charged layer of the upper atmosphere. Since it is not limited by the curvature of the Earth, skywave propagation can be used to communicate beyond the horizon, at intercontinental distances. It is mostly used in the shortwave frequency bands.

Interestingly, both the Allied and German militaries tried a lot of short range communication within this frequency band. The venerable Sherman tank did its R/T in upper HF, as did much of German armor. Wehrmacht short range infantry and close support showed up at 20 MHz. Both Japanese and German naval forces did long distance around 16 MHz. Britain's Chain Home radar system blanketed frequencies between 20-30 MHz.

Signal Spectrum From 25 to 75 MHz (Lower VHF)

(Not covered by the DCS Mosquito radios)

The Lower VHF band wave reception is line-of-sight over distances up to 100 km. Some skip can occur during sunspot highs, but mostly the cause of longer distances is ducting. Atmospheric ducting is a mode of propagation of electromagnetic radiation, usually in the lower layers of Earth's atmosphere, where the waves are bent by atmospheric refraction. In over-the-horizon radar, ducting causes part of the radiated and target-reflection energy of a radar system to be guided over distances far greater than the normal radar range. It also causes long distance propagation of radio signals in bands that would normally be limited to line of sight.

Americans were fast with the development of FM tactical communications, especially to mitigate ignition noise in vehicles. FM backpacks used 28-52 and 40-48 MHz. Popular vehicular FM covered 20-28 MHz. Similar frequency use occurred with German tanks and low power infantry backpacks, although more on AM. Navy and U-Boats did short range voice. American navy used this band for Talk Between Ships (tactical). Sharing this band was navigation. German bombing beams ran on 30-35 and 60 MHz. Meanwhile, the Allies GEE Bomber Navigation system covered 20-85 MHz.

Signal Spectrum From 75 MHz and Up (VHF, UHF)

(VHF covered by the SCR-522 radio)

By the end of the Battle of Britain, the RAF moved to 100-124 Mhz. British ground forces took on low power R/T on 229-241 MHz. The Germans used UHF for military phone networks and infantry truck mounted voice and teletype.

But mostly, it was radar. Early US radar operated on 105 and 205 MHz. (That Pearl Harbor radar station in the movie was was the SCR-270 on 105 Mhz.) These frequencies were also used for gun control. Chain Home Low operated at 200 MHz during Battle of Britain. Early German radar was also on these frequencies, while Soviets used 75 MHz. OBOE navigational transponders were on 200 MHz.

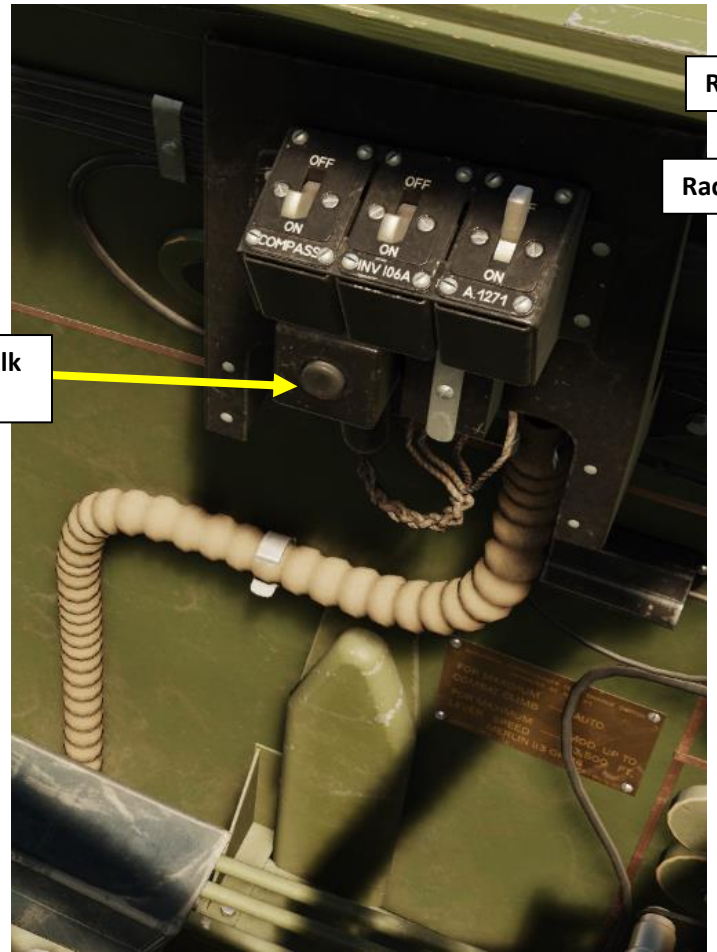
3 – SCR-522 (TR1143) VHF RADIO
3.1 – COMPONENTS

The Mosquito is equipped with a SCR-522 type VHF radio, which is an American-built TR1143 british radio manufactured as part of the Lend Lease agreement between the United Kingdom and the United States. Radio frequencies are preset in the mission editor in 4 different channels and cannot be tuned manually during flight; you have to use these 4 preset frequencies.

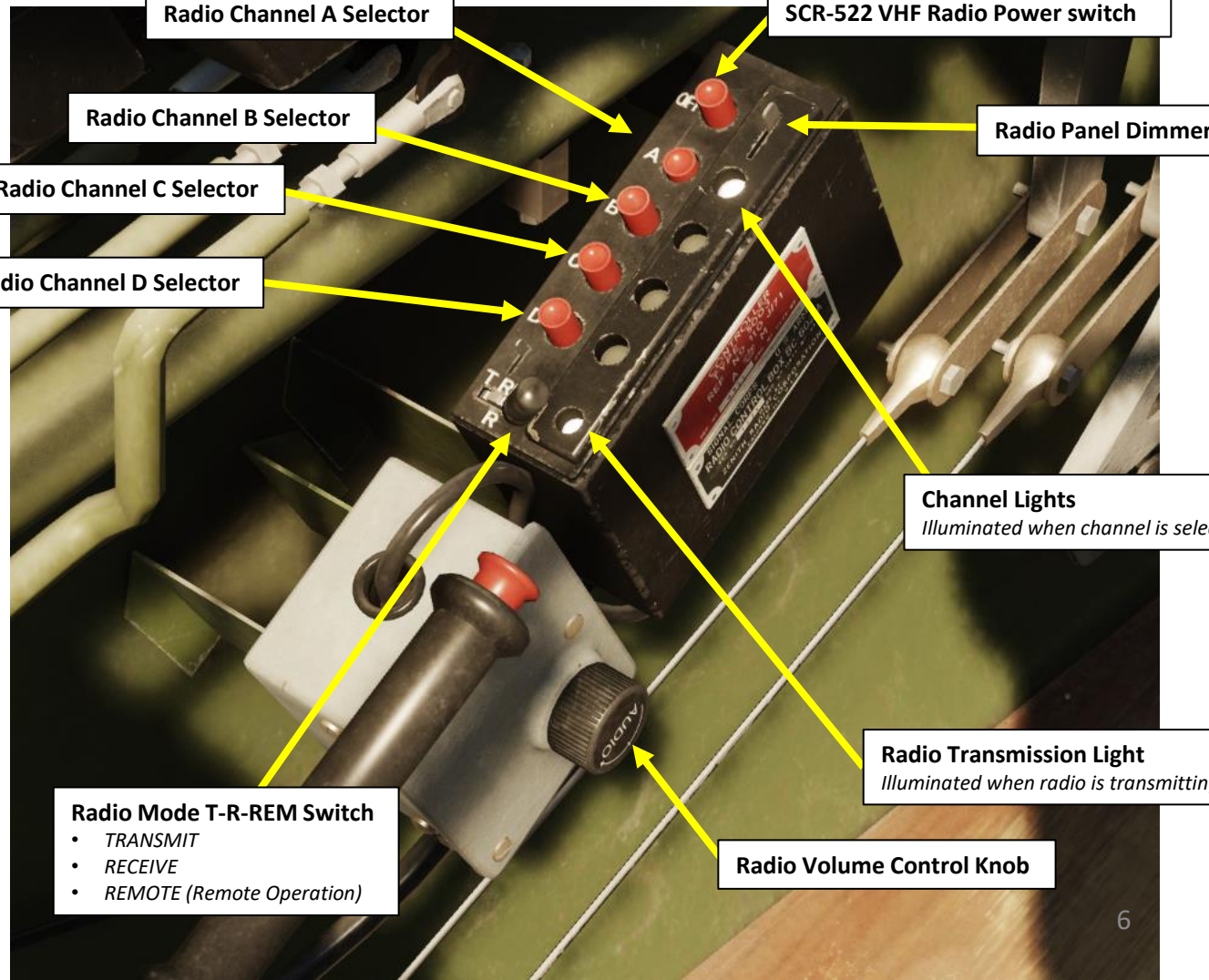
RADIO FREQUENCY RANGE:
100 - 156 MHz

Maximum Radio Range

Altitude, Feet	Range, Miles
1000	30
3000	70
5000	80
10000	120
15000	150
20000	180



Radio Push-to-Talk Button



Radio Channel A Selector

Radio Channel B Selector

Radio Channel C Selector

Radio Channel D Selector

SCR-522 VHF Radio Power switch

Radio Panel Dimmer

Channel Lights
Illuminated when channel is selected

Radio Transmission Light
Illuminated when radio is transmitting

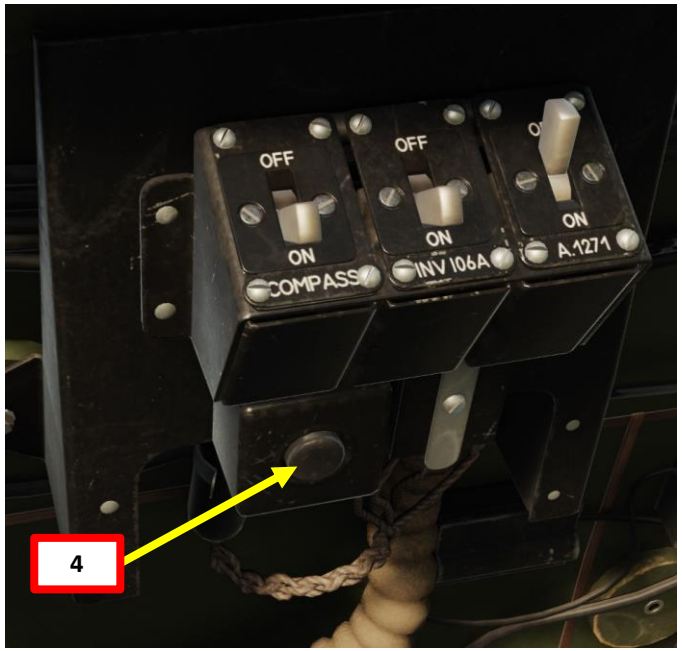
Radio Volume Control Knob

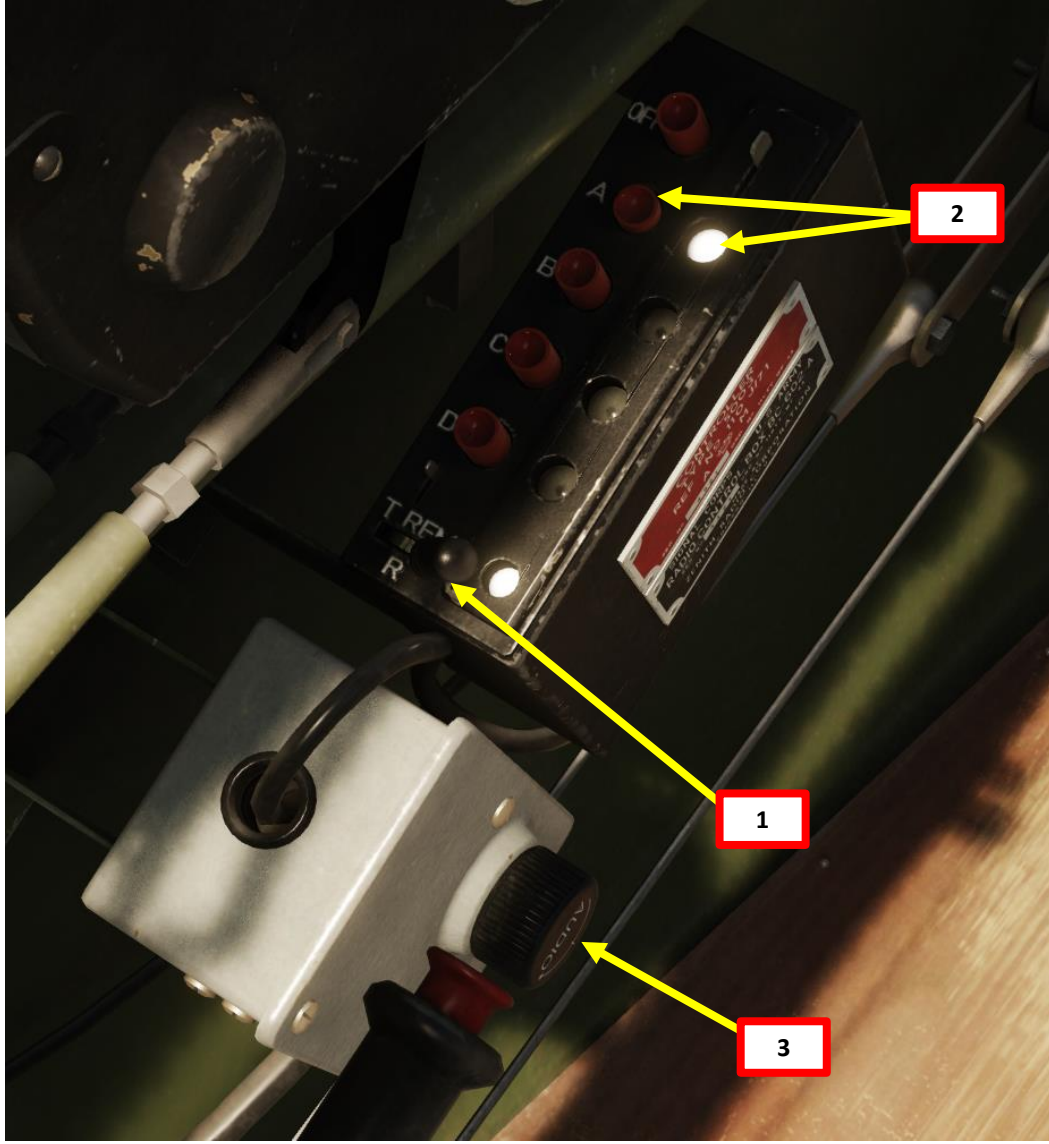
Radio Mode T-R-REM Switch
- *TRANSMIT*
- *RECEIVE*
- *REMOTE (Remote Operation)*

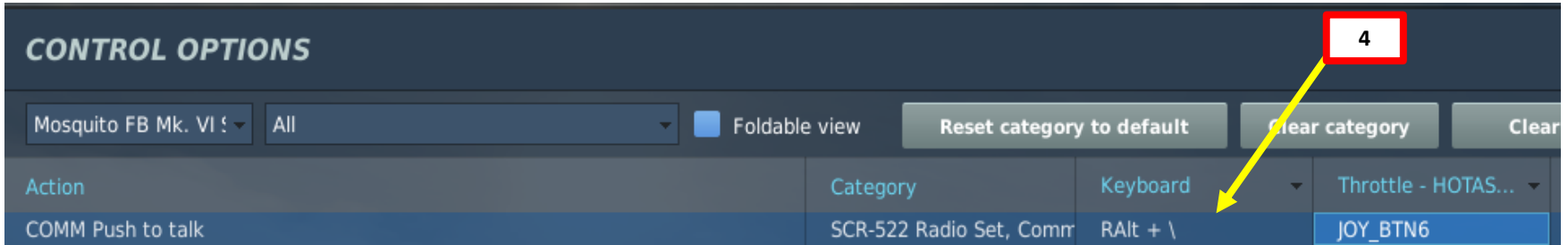
3 – SCR-522 (TR1143) VHF RADIO
3.2 – TRANSMISSION TUTORIAL

To use the SCR-522 radio:

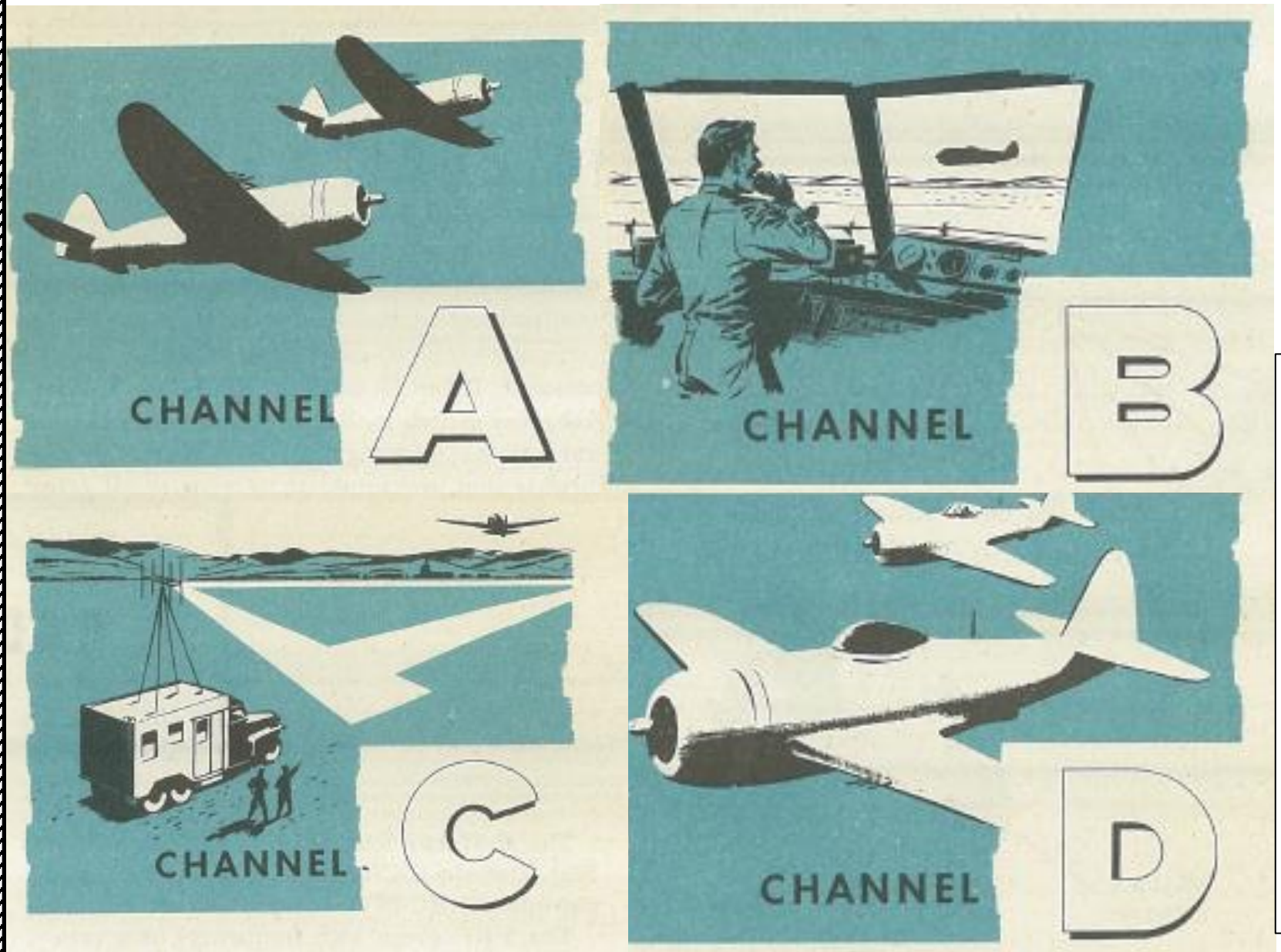
1. Set the radio transmit-receive switch to REM (Remote Operation)
2. Select desired channel (A, B, C or D)
3. Adjust Volume knob – As required
4. Press the “COMM – Push to Talk” binding “RALT+ /” to transmit.

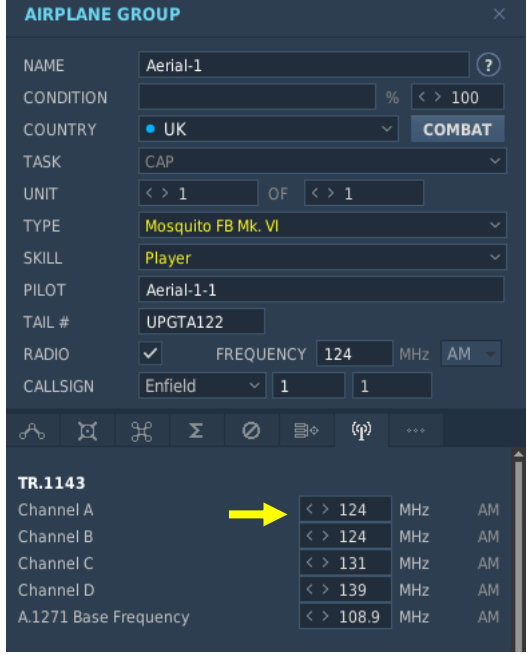






3 – SCR-522 (TR1143) VHF RADIO
3.2 – TRANSMISSION TUTORIAL





Channel A:
- Plane-to-plane communication on local flights
- Communication with controller in your own region.

Channel B:
- Common to all VHF-equipped control towers. It is normally used to contact the control tower for takeoff and landing instructions

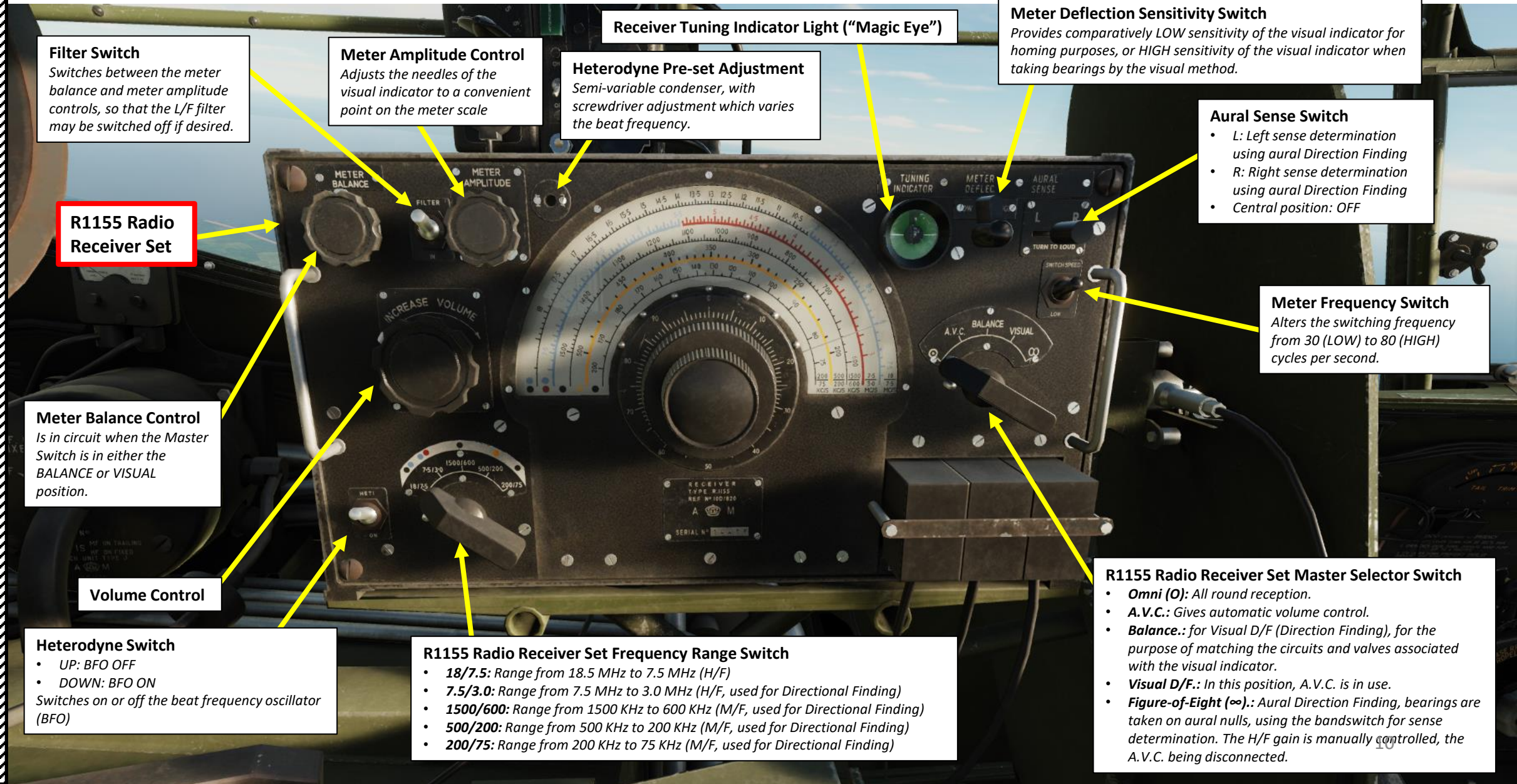
Channel C:
- Frequently used in contacting homing stations

Channel D:
- Plane-to-plane contact between a pilot practicing fighter instrument flying and his safety pilot.
- Normally used for plane-to-ground contact with D/F (Directional Finding) stations. The pip-squeak (contactor), used in conjunction with the D/F fixing provides controllers and intercepts officers with an accurate minute-by-minute position report of your plane. The contactor clock consists of a dial and two switches.

4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS

The navigator can access the rear compartment and use the R1155 receiver to select what radio frequency to receive and the T1154 transmitter to select what radio frequency to transmit on.

4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS



Filter Switch
Switches between the meter balance and meter amplitude controls, so that the L/F filter may be switched off if desired.

Meter Amplitude Control
Adjusts the needles of the visual indicator to a convenient point on the meter scale

Heterodyne Pre-set Adjustment
Semi-variable condenser, with screwdriver adjustment which varies the beat frequency.

Receiver Tuning Indicator Light ("Magic Eye")

Meter Deflection Sensitivity Switch
Provides comparatively LOW sensitivity of the visual indicator for homing purposes, or HIGH sensitivity of the visual indicator when taking bearings by the visual method.

Aural Sense Switch
- *L: Left sense determination using aural Direction Finding*
- *R: Right sense determination using aural Direction Finding*
- *Central position: OFF*

R1155 Radio Receiver Set

Meter Frequency Switch
Alters the switching frequency from 30 (LOW) to 80 (HIGH) cycles per second.

Meter Balance Control
Is in circuit when the Master Switch is in either the BALANCE or VISUAL position.

Volume Control

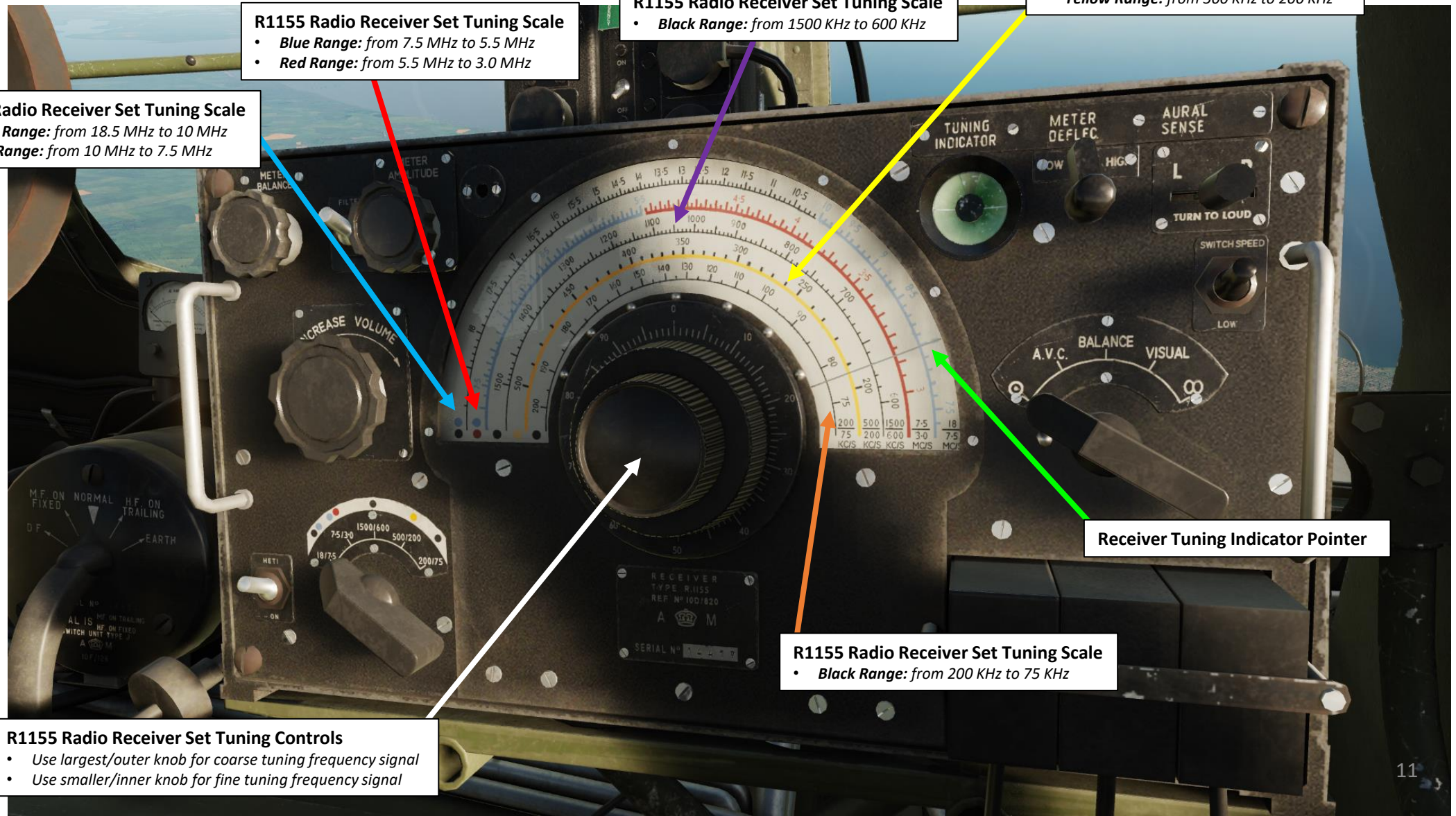
Heterodyne Switch
- *UP: BFO OFF*
- *DOWN: BFO ON*

Switches on or off the beat frequency oscillator (BFO)

R1155 Radio Receiver Set Frequency Range Switch
- ***18/7.5:*** *Range from 18.5 MHz to 7.5 MHz (H/F)*
- ***7.5/3.0:*** *Range from 7.5 MHz to 3.0 MHz (H/F, used for Directional Finding)*
- ***1500/600:*** *Range from 1500 KHz to 600 KHz (M/F, used for Directional Finding)*
- ***500/200:*** *Range from 500 KHz to 200 KHz (M/F, used for Directional Finding)*
- ***200/75:*** *Range from 200 KHz to 75 KHz (M/F, used for Directional Finding)*

R1155 Radio Receiver Set Master Selector Switch
- ***Omni (O):*** *All round reception.*
- ***A.V.C.:*** *Gives automatic volume control.*
- ***Balance.:*** *for Visual D/F (Direction Finding), for the purpose of matching the circuits and valves associated with the visual indicator.*
- ***Visual D/F.:*** *In this position, A.V.C. is in use.*
- ***Figure-of-Eight (∞).:*** *Aural Direction Finding, bearings are taken on aural nulls, using the bandswitch for sense determination. The H/F gain is manually controlled, the A.V.C. being disconnected.*

4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS



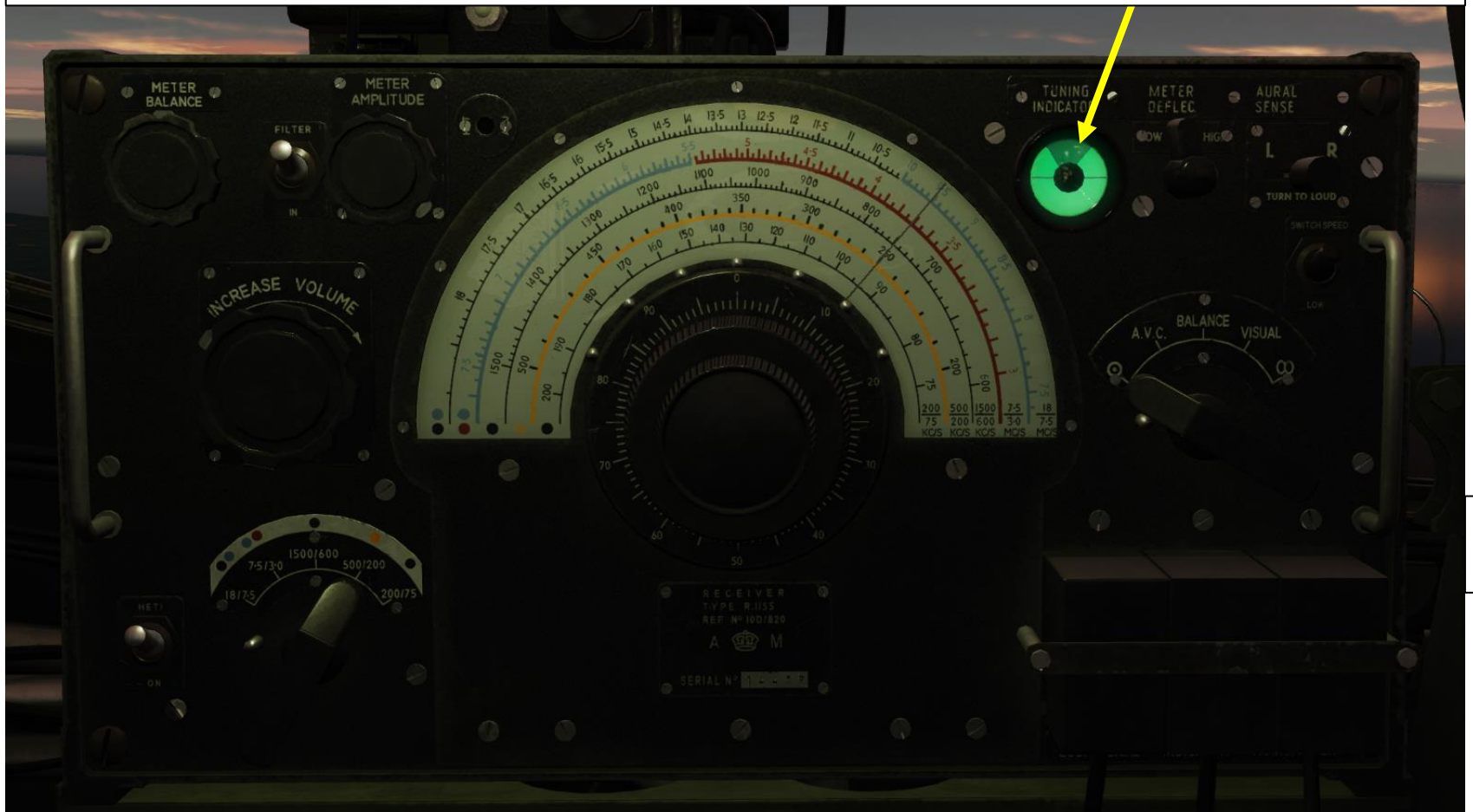
4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS

Receiver Tuning Indicator Light ("Magic Eye")

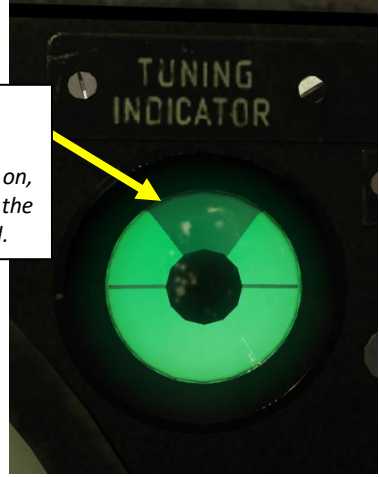
A magic eye tube is an electronic vacuum tube that provides visual indication, usually in the form of green light, on an area called the target inside the tube. The target is partially illuminated with the exception of the shadow area, which varies in size and shape depending on the signal applied to the tube. The phrase "magic eye" became a trade-mark of Radio Corporation of America in the mid 1930s, who introduced the tube as a visual tuning aid for radio receivers. Other names for the magic eye tube included "tuning eye" and "cat's eye" as well as its technical name, cathode ray indicator. Occasionally, skeptics or pundits would call it an « idiot lamp".

The first broad application of the magic eye was as a tuning indicator in radio receivers, to give an indication of the relative strength of the received radio signal, to show when a radio station was properly tuned in.

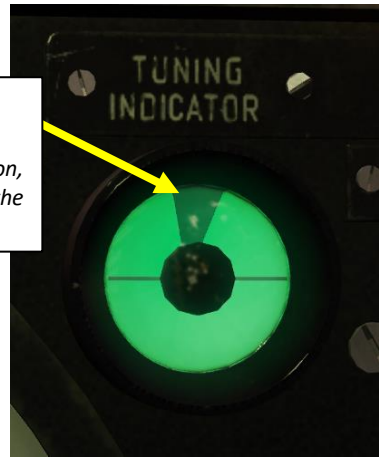
Reference: http://www.magiceyetubes.com/



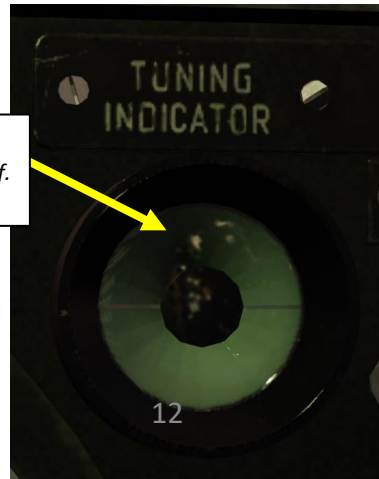
Large Shadow Area
Weak Signal
Scenario 1: Radio is turned on, but a very weak signal on the reception frequency is received.



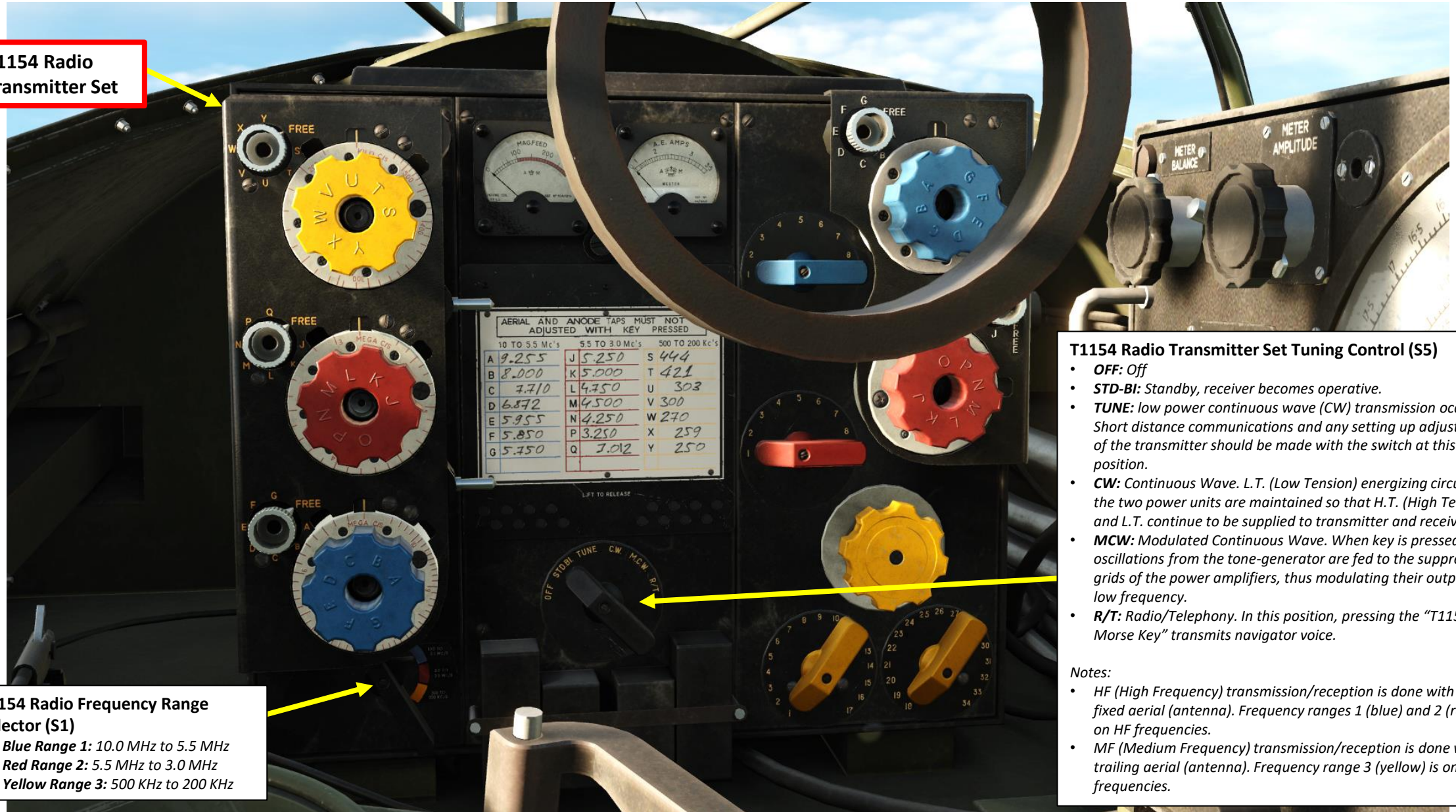
Smaller Shadow Area
Strong Signal
Scenario 2: Radio is turned on, and a strong signal on the reception frequency is received.



Radio is OFF
Scenario 3: Radio is turned off. Magic Eye is extinguished.



4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS



T1154 Radio Frequency Range Selector (S1)

- ***Blue Range 1:*** *10.0 MHz to 5.5 MHz*
- ***Red Range 2:*** *5.5 MHz to 3.0 MHz*
- ***Yellow Range 3:*** *500 KHz to 200 KHz*

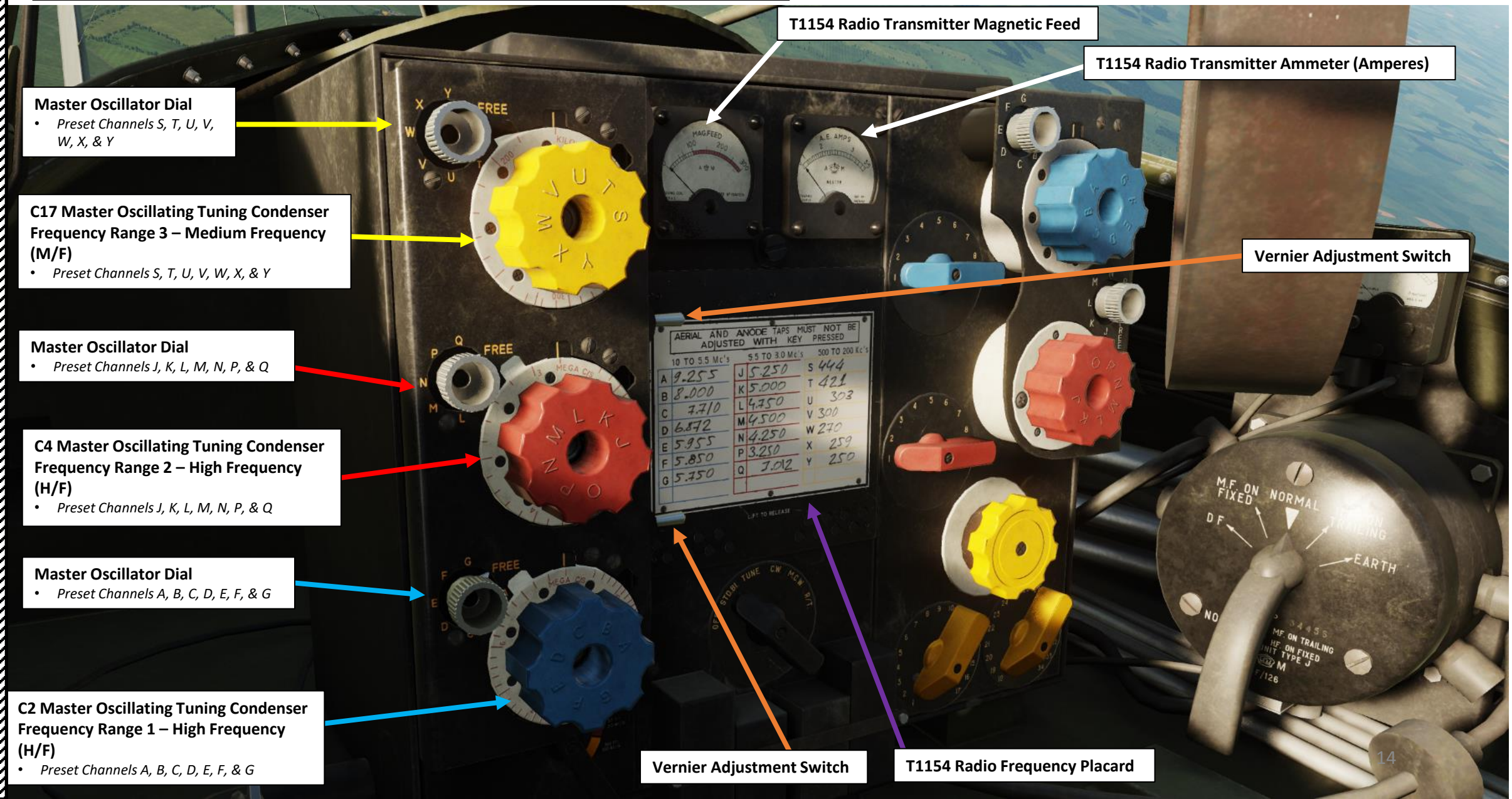
T1154 Radio Transmitter Set Tuning Control (S5)

- ***OFF:*** *Off*
- ***STD-BI:*** *Standby, receiver becomes operative.*
- ***TUNE:*** *low power continuous wave (CW) transmission occurs. Short distance communications and any setting up adjustments of the transmitter should be made with the switch at this position.*
- ***CW:*** *Continuous Wave. L.T. (Low Tension) energizing circuits of the two power units are maintained so that H.T. (High Tension) and L.T. continue to be supplied to transmitter and receiver.*
- ***MCW:*** *Modulated Continuous Wave. When key is pressed, oscillations from the tone-generator are fed to the suppressor grids of the power amplifiers, thus modulating their output at low frequency.*
- ***R/T:*** *Radio/Telephony. In this position, pressing the "T1154 Radio Morse Key" transmits navigator voice.*

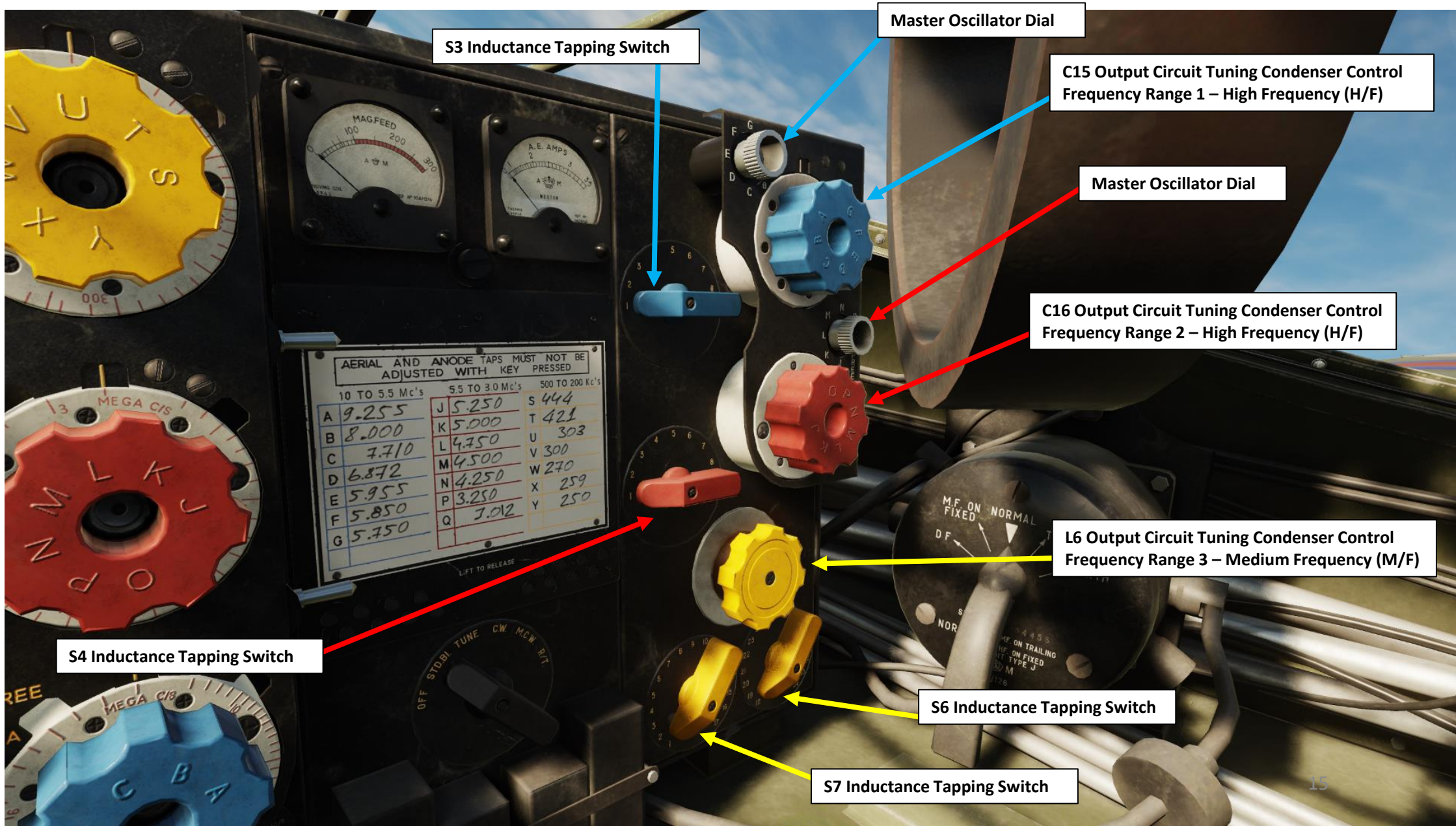
Notes:

- *HF (High Frequency) transmission/reception is done with the fixed aerial (antenna). Frequency ranges 1 (blue) and 2 (red) are on HF frequencies.*
- *MF (Medium Frequency) transmission/reception is done with the trailing aerial (antenna). Frequency range 3 (yellow) is on MF frequencies.*

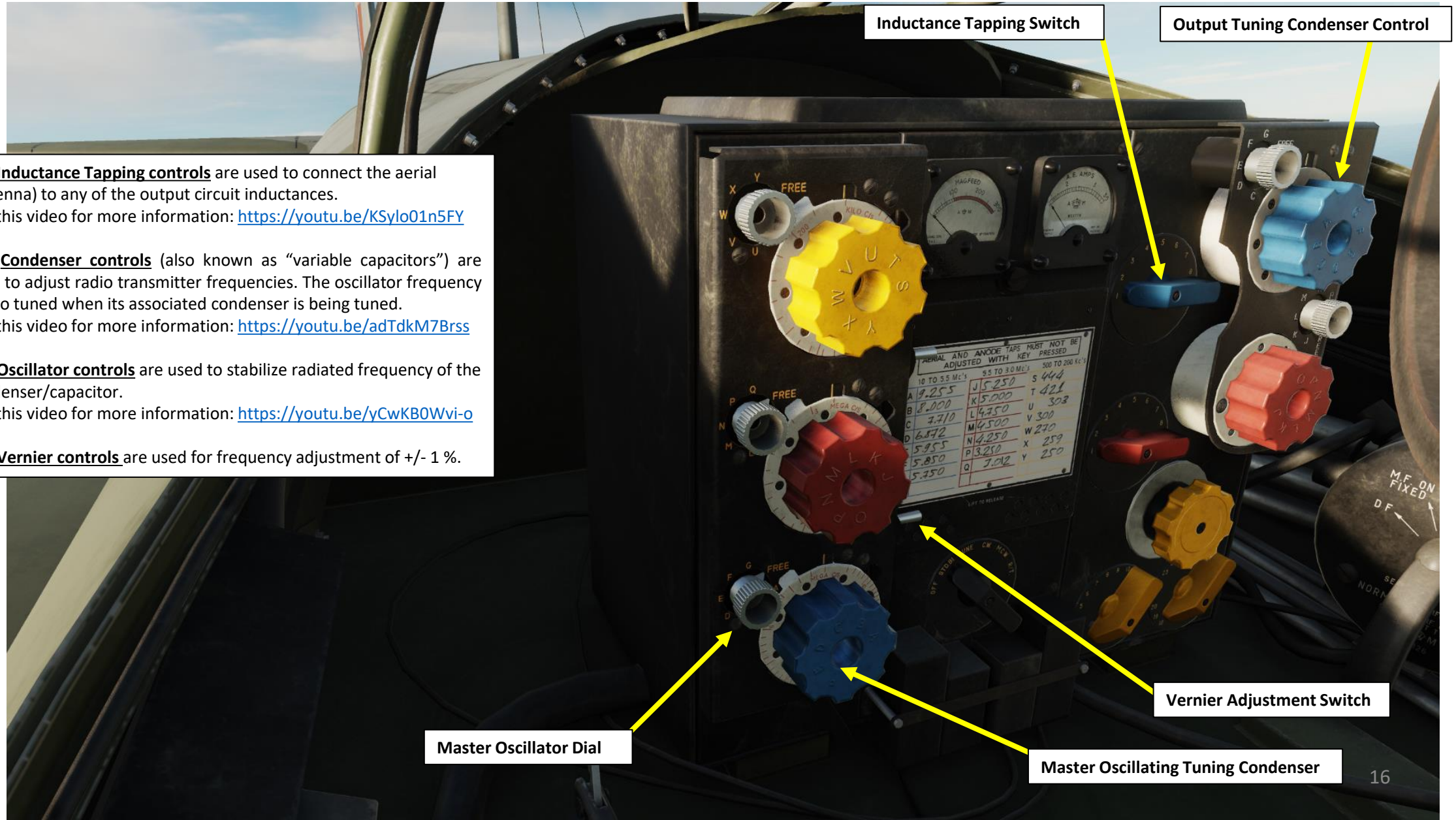
4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS



4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS



4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS



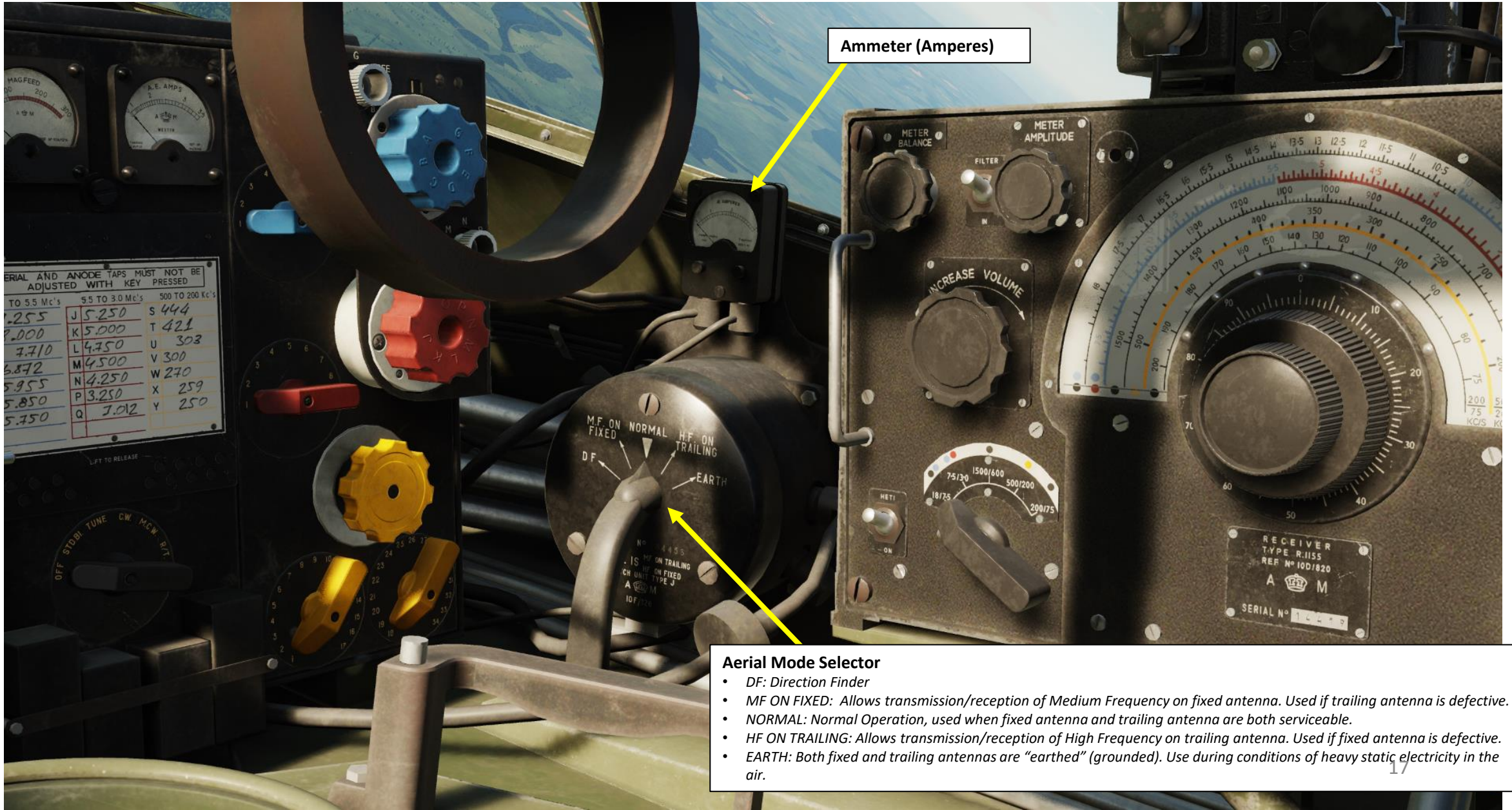
The **Inductance Tapping controls** are used to connect the aerial (antenna) to any of the output circuit inductances.
See this video for more information: https://youtu.be/KSylo01n5FY

The **Condenser controls** (also known as "variable capacitors") are used to adjust radio transmitter frequencies. The oscillator frequency is also tuned when its associated condenser is being tuned.
See this video for more information: https://youtu.be/adTdkM7Brss

The **Oscillator controls** are used to stabilize radiated frequency of the condenser/capacitor.
See this video for more information: https://youtu.be/yCwKB0Wvi-o

The **Vernier controls** are used for frequency adjustment of +/- 1 %.

4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS



Aerial Mode Selector

- *DF: Direction Finder*
- *MF ON FIXED: Allows transmission/reception of Medium Frequency on fixed antenna. Used if trailing antenna is defective.*
- *NORMAL: Normal Operation, used when fixed antenna and trailing antenna are both serviceable.*
- *HF ON TRAILING: Allows transmission/reception of High Frequency on trailing antenna. Used if fixed antenna is defective.*
- *EARTH: Both fixed and trailing antennas are "earthed" (grounded). Use during conditions of heavy static electricity in the air.*

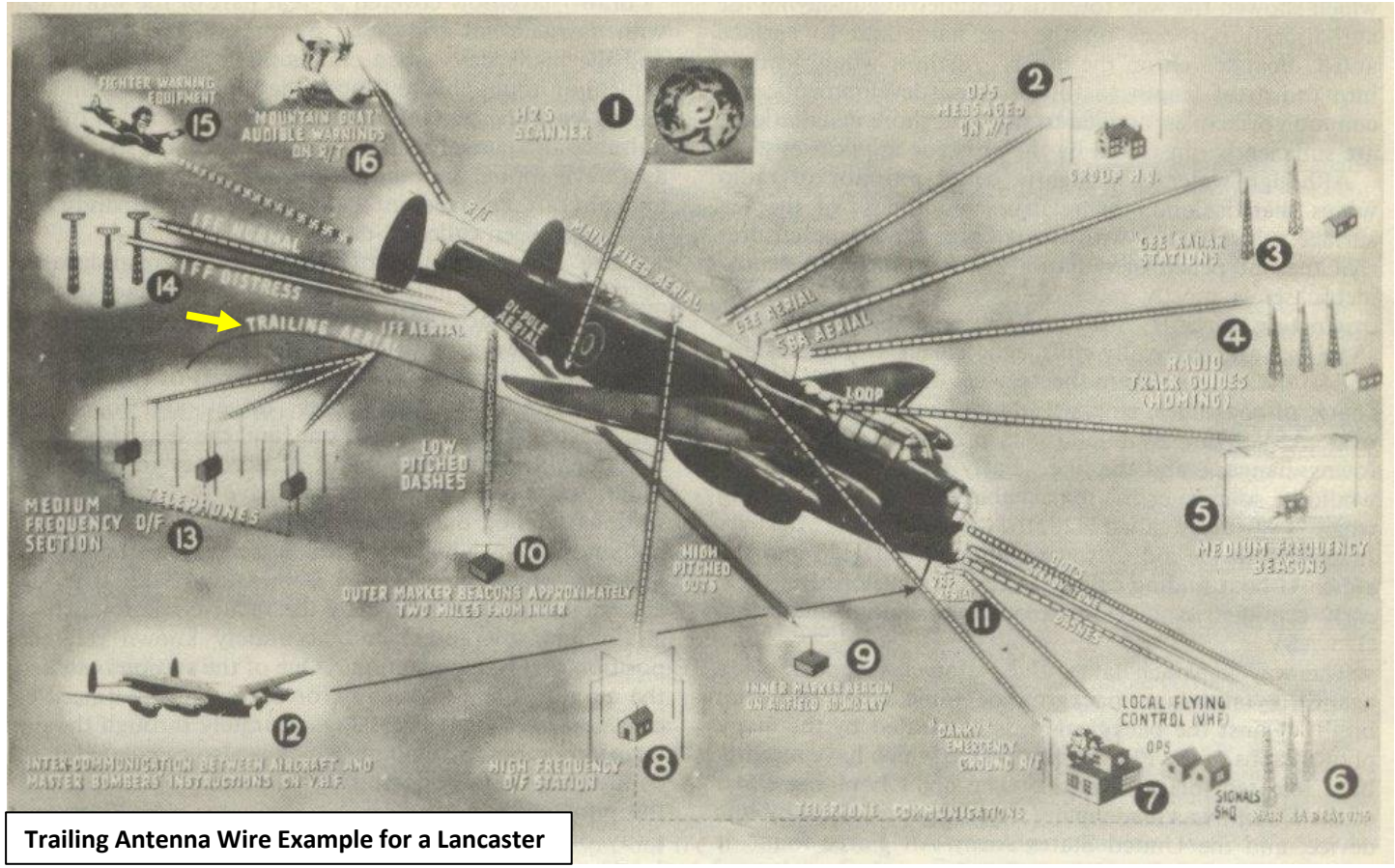
4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS

T1154 Radio Morse Key
This key is used to transmit morse code or navigator voice via the T1154 Radio Transmitter

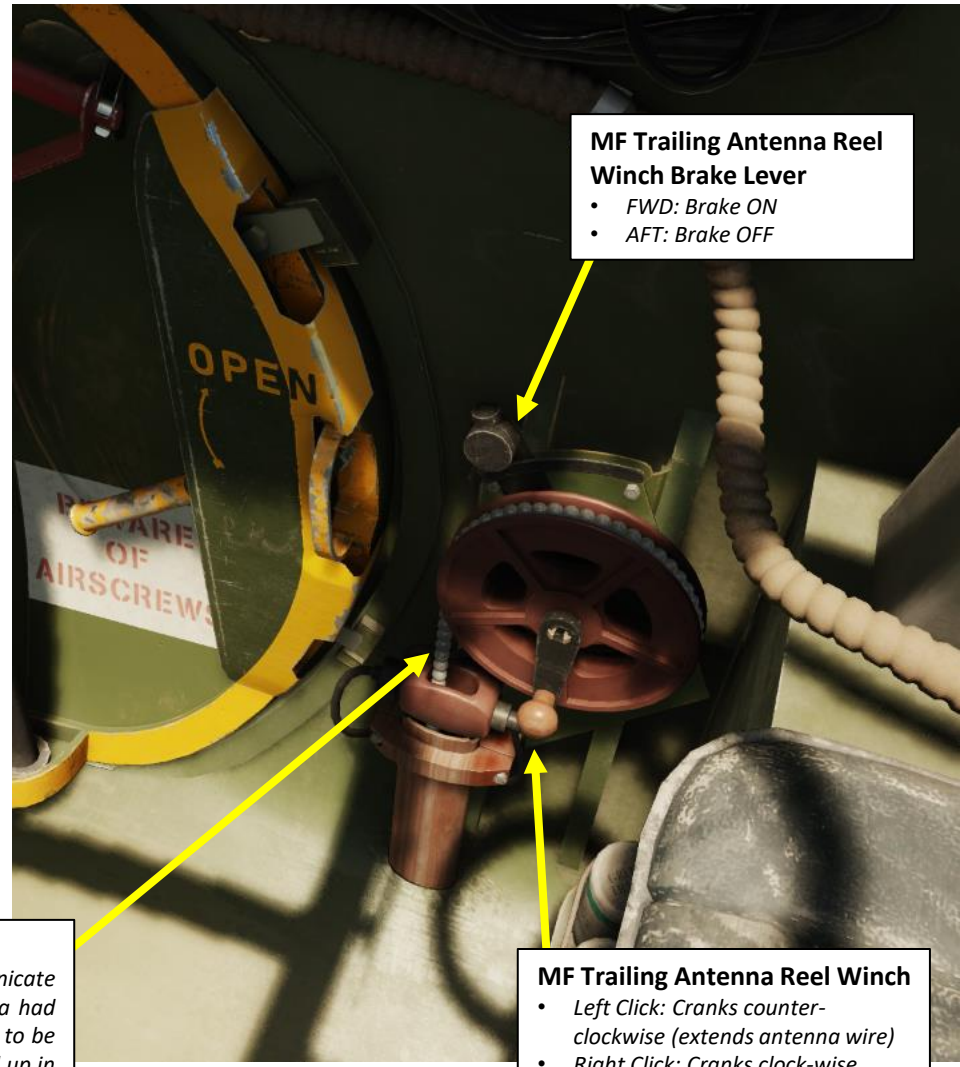
T1154 Radio Transmitter Low Voltage Power Switch
- *Right: OFF*
- *Left: ON*

T1154 Radio Transmitter High Voltage Power Switch
- *Right: OFF*
- *Left: ON*

4 – T1154 & R1155 RADIO SET
4.1 – T1154 TRANSMITTER & R1155 RECEIVER COMPONENTS



Trailing Antenna Wire Example for a Lancaster



MF Trailing Antenna Reel Winch Brake Lever
- *FWD: Brake ON*
- *AFT: Brake OFF*

MF Trailing Antenna Wire
In certain variants of the Mosquito, in order to communicate on MF (medium frequencies), a long "trailing" antenna had to be reeled out of the plane. The antenna would have to be reeled back in in order to avoid having the wire tangled up in trees or electrical power lines.

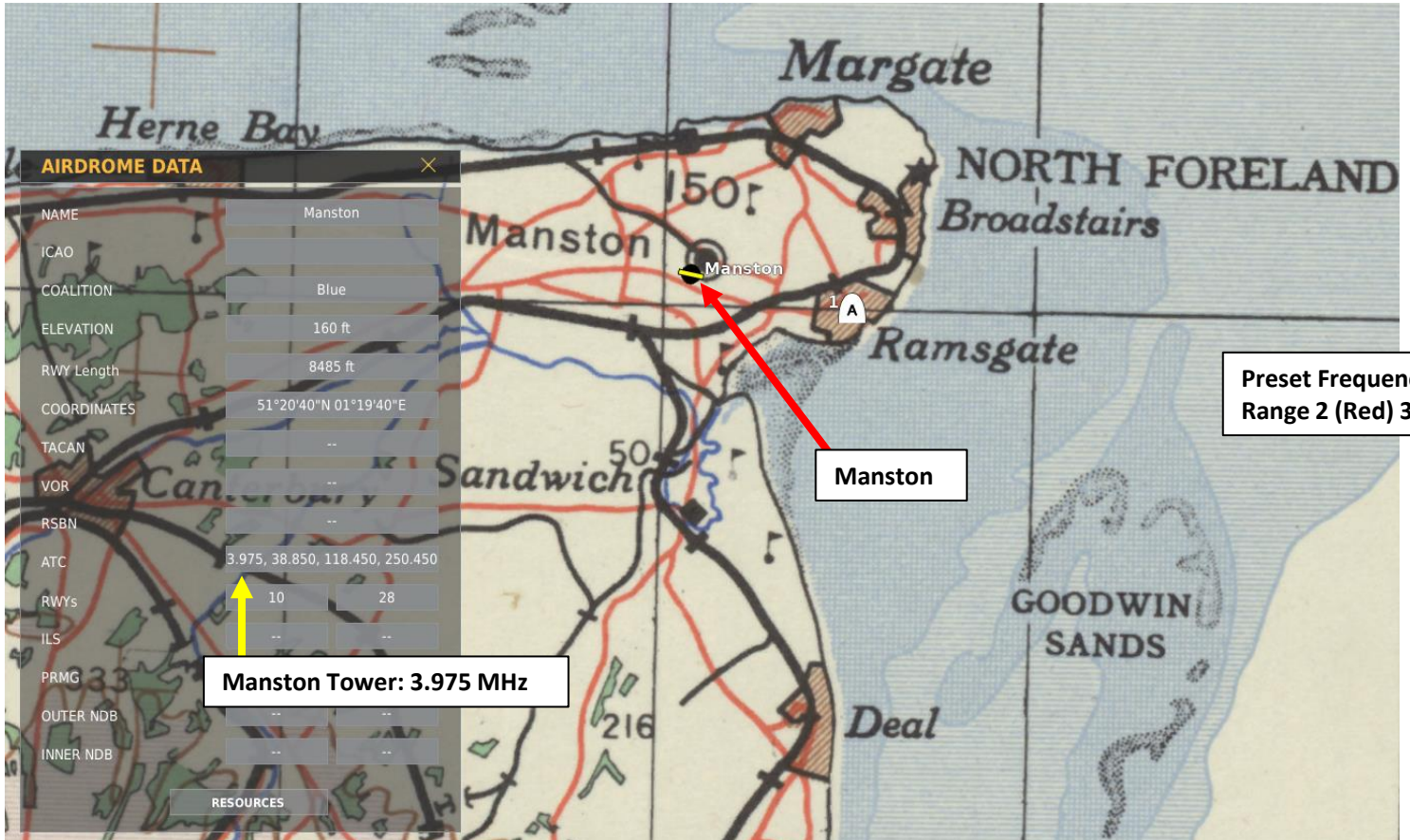
MF Trailing Antenna Reel Winch
- *Left Click: Cranks counter-clockwise (extends antenna wire)*
- *Right Click: Cranks clock-wise (retracts antenna wire)*

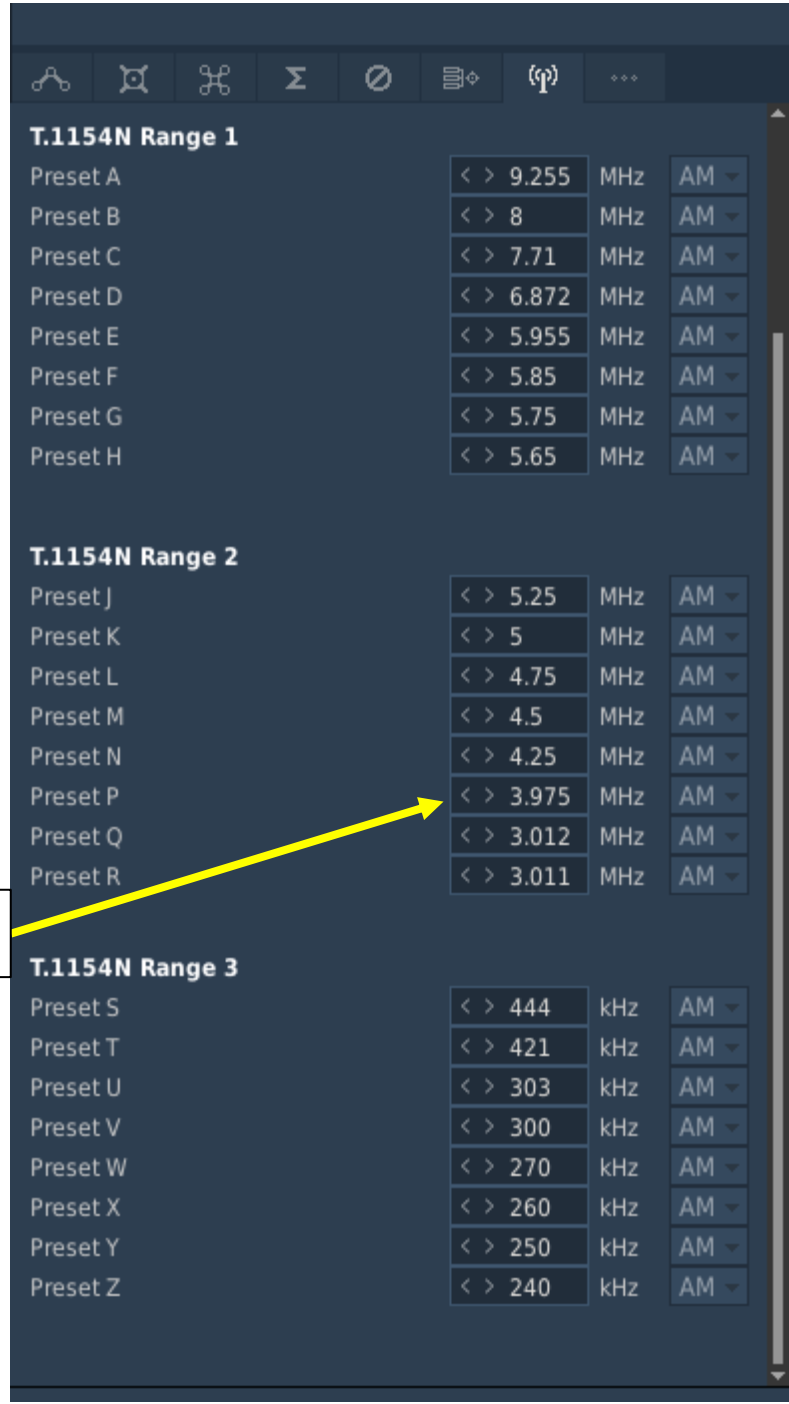
4 – T1154 & R1155 RADIO SET
4.2 – TRANSMISSION & RECEPTION TUTORIAL (HF)

In this tutorial, we will communicate with the **Manston Control Tower**, which is set to a **HF (High Frequency) range of 3.975 MHz** (or MegaCycles/Second). We will need to set both the T1154 Transmitter to transmit our request to the tower and the R1155 Receiver to receive the tower's response. You can have preset frequencies for three frequency ranges, but these frequencies are set via the Mission Editor. It is possible to manually adjust a frequency, but it isn't necessarily recommended due to the difficulty to be precise.

Since we cover a frequency in the second frequency range (red range), we will use the fixed antenna. The T1154/R1155 radio can cover three sets of frequency ranges:

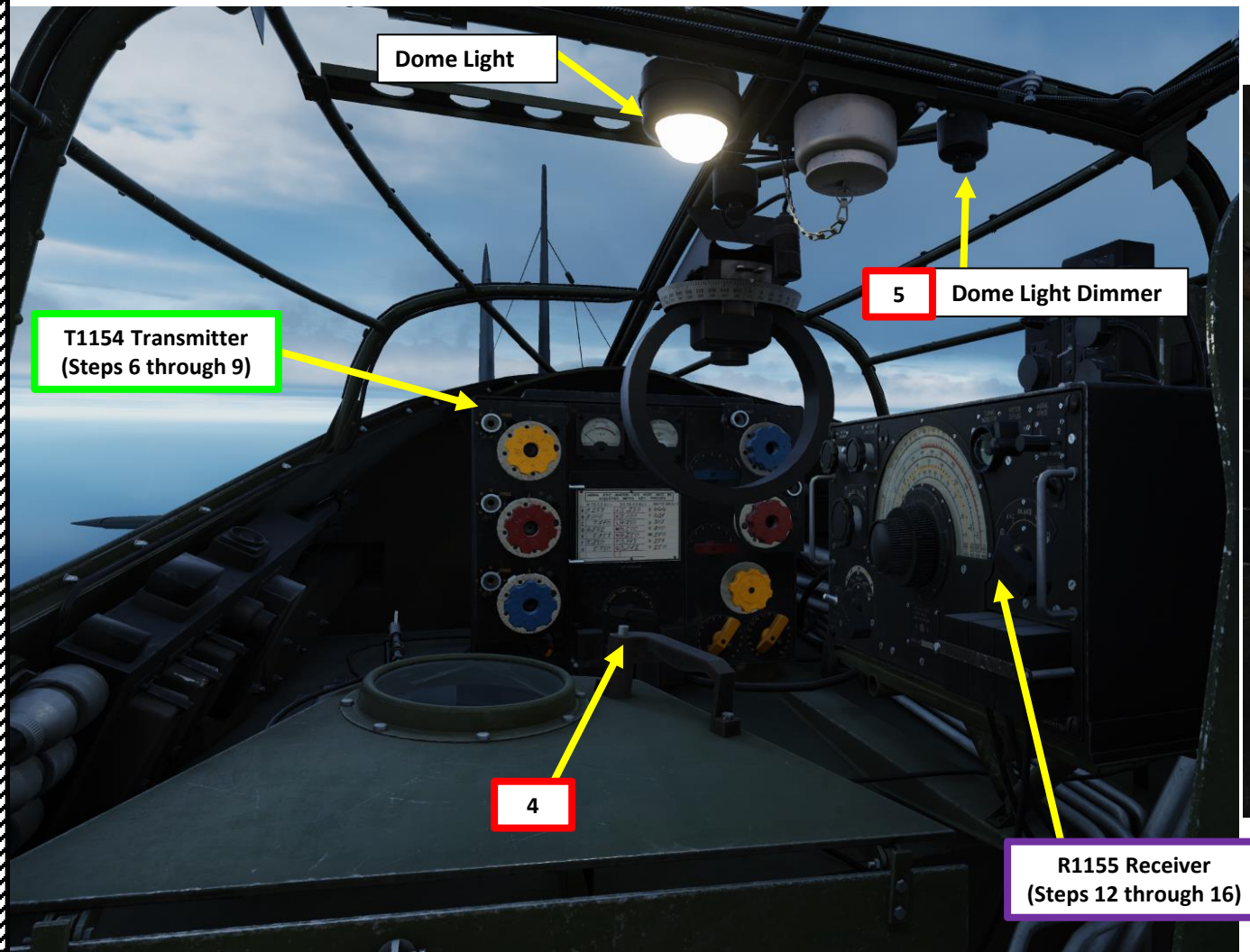
- ***Blue Range 1 (HF, with Fixed Antenna):*** *10.0 MHz to 5.5 MHz*
- ***Red Range 2 (HF, with Fixed Antenna):*** *5.5 MHz to 3.0 MHz*
- ***Yellow Range 3 (MF, with Trailing Antenna):*** *500 KHz to 200 KHz*

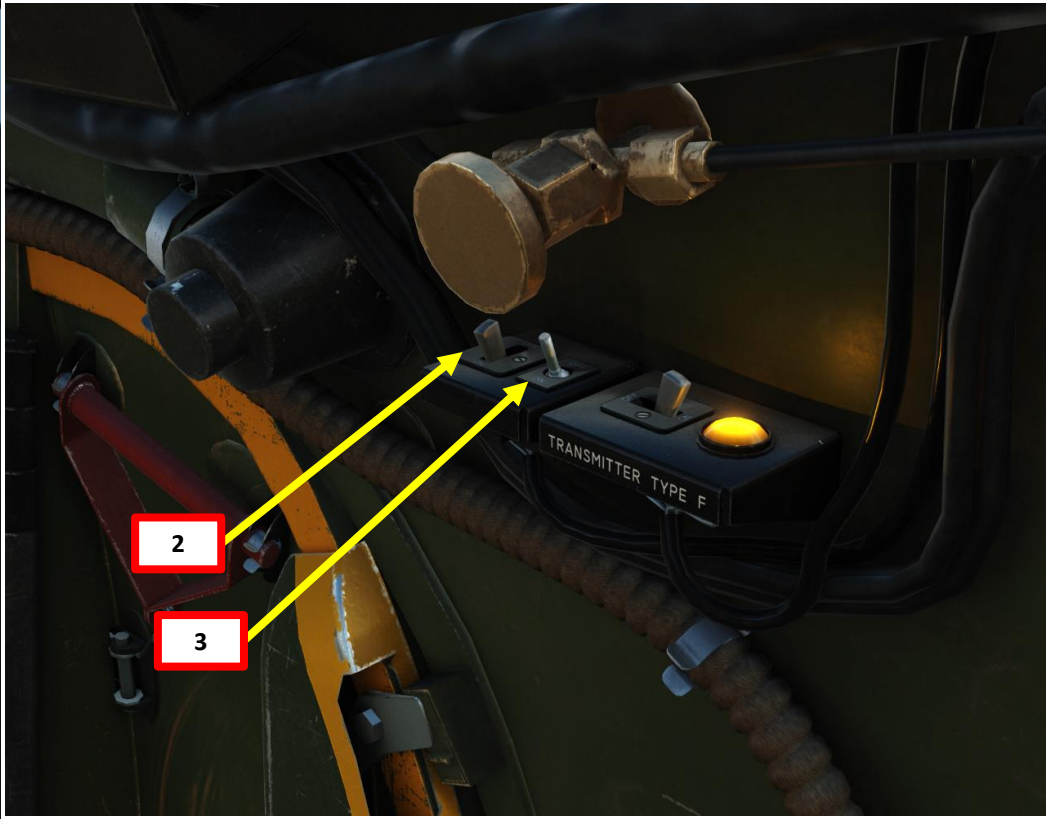




4 – T1154 & R1155 RADIO SET
4.2 – TRANSMISSION & RECEPTION TUTORIAL (HF)

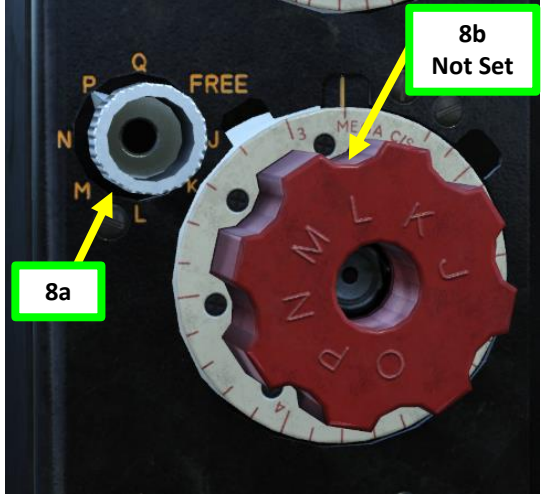
1. Select the Navigator Seat by pressing “2”.
2. Set T1154 Radio Transmitter Low Voltage Power Switch – ON (LEFT)
3. Set T1154 Radio Transmitter High Voltage Power Switch – ON (LEFT)
4. Lower the armored headrest of the navigator seat to access the radio compartment by clicking on the headrest handle.
5. In low visibility conditions, I would advise you to turn on the Dome Light and use the flashlight (LALT+L).

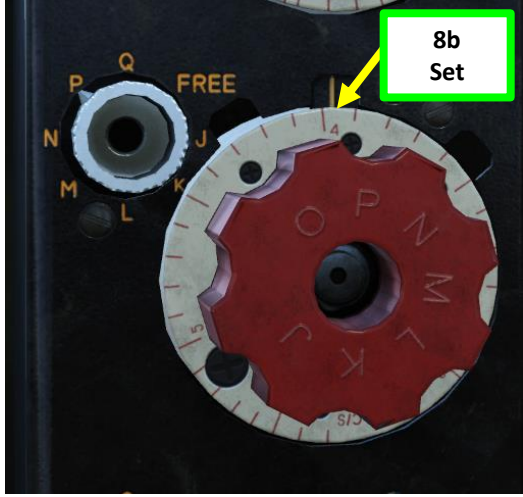


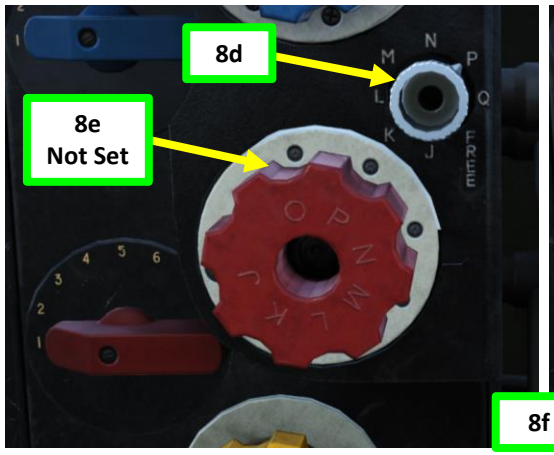


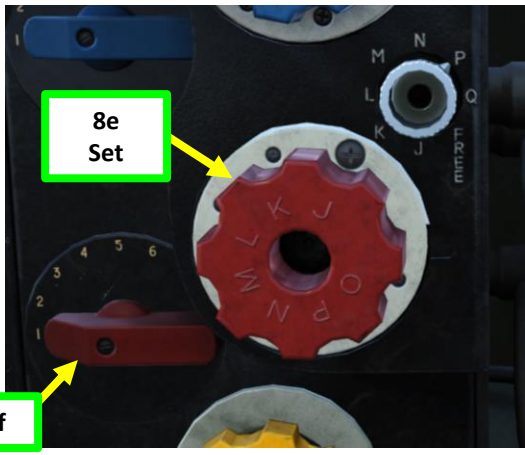
4 – T1154 & R1155 RADIO SET
4.2 – TRANSMISSION & RECEPTION TUTORIAL (HF)

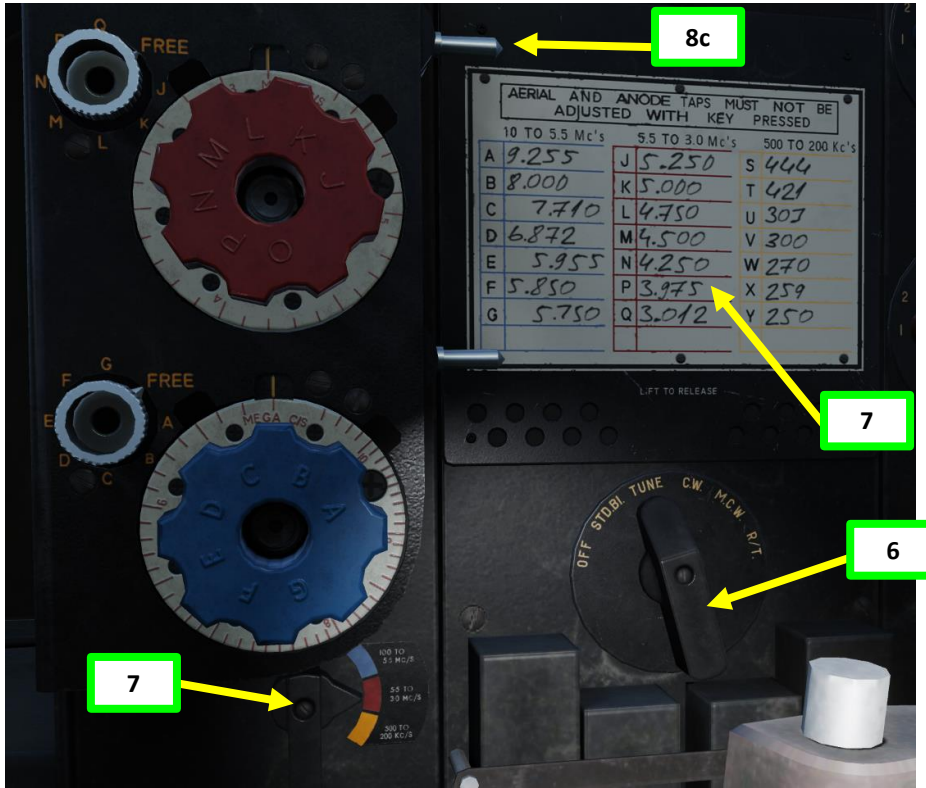
6. Set T1154 Radio Transmitter Set Tuning Control knob to STD-BI (Standby) position, then to TUNE position.
7. Set T1154 Radio Frequency Range Selector to the required frequency range. We want to transmit on Preset Channel "P", which is in the No. 2 Range (Red). Check the placard on the T1154 set to see which preset channel is in which range according to its color code.
8. To select Preset Frequency "P" (Frequency Range 2, Red):
    a) Set Range 2 Master Oscillator Dial to "P".
    b) Turn Range 2 Master Oscillating Tuning Condenser until it "clicks" (click-stop mechanism) when reaching the preset position near 3.975 MHz.
        - When the condenser "clicks", it becomes locked into position and can only be moved if the associated Master Oscillator Dial is reset to "FREE".
    c) Use Vernier Adjustment Switch for fine tuning if required.
    d) Turn Range 2 Output Master Oscillator Dial to "P"
    e) Turn Range 2 Output Circuit Tuning Condenser Control until it "clicks" (click-stop mechanism) when reaching the preset position near 3.975 MHz. See note for step b), which is applicable here as well.
    f) If required, adjust Range 2 Inductance Tapping (not simulated).

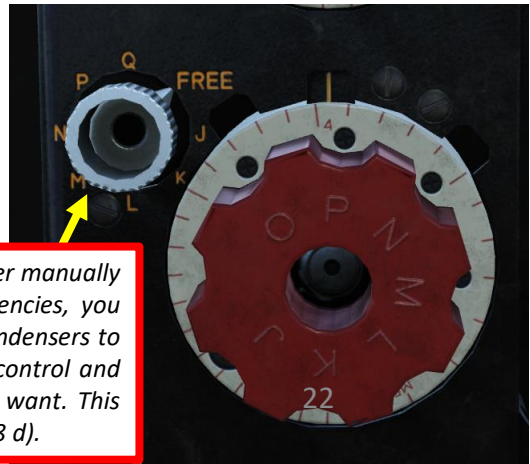








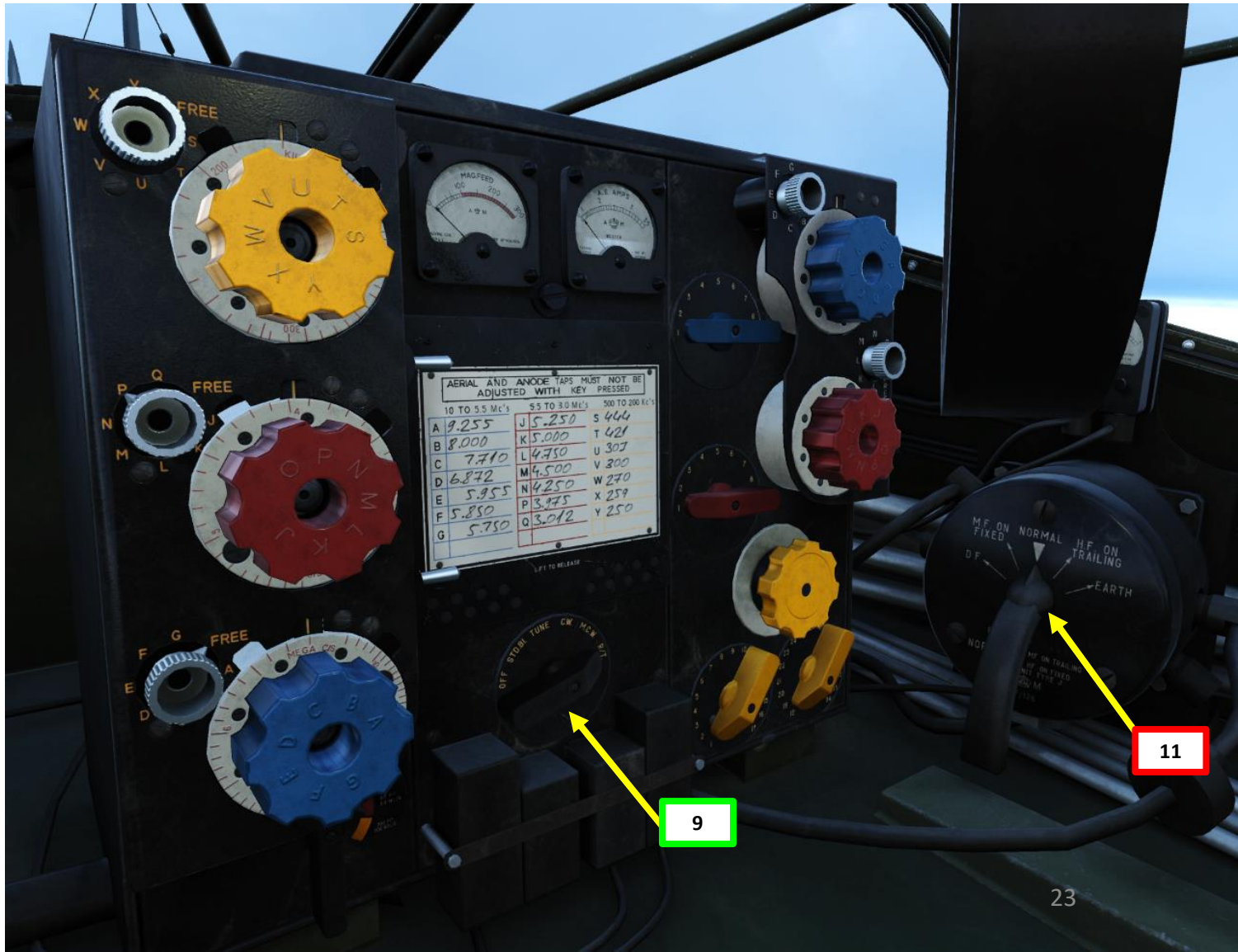




Note: *If you want to tune the transmitter manually without using one of the preset frequencies, you can set the Master Oscillator for the condensers to "Free". This will unlock the condenser control and allow you to set it at any position you want. This step would only apply to steps 8 a) and 8 d).*

4 – T1154 & R1155 RADIO SET
4.2 – TRANSMISSION & RECEPTION TUTORIAL (HF)

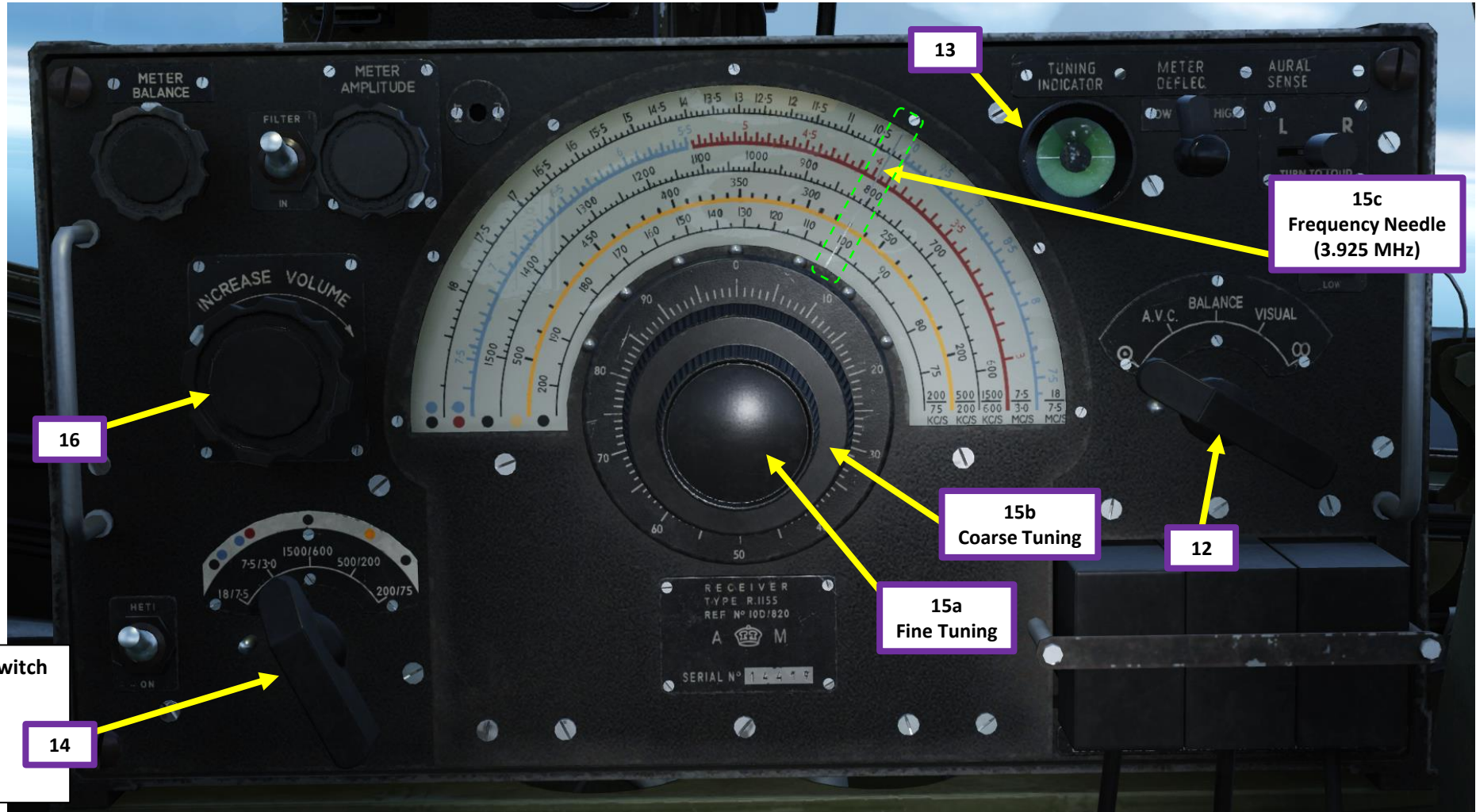
9. Now that we have set the transmitter frequency, set T1154 Radio Transmitter Set Tuning Control knob to R/T (Radio/Telephony). This will allow you to transmit voice signals.
10. Since we transmit and receive on a HF frequency, we can use the Fixed Antenna.
11. Set Aerial (Antenna) Mode Selector – NORMAL



4 – T1154 & R1155 RADIO SET
4.2 – TRANSMISSION & RECEPTION TUTORIAL (HF)

12. Set R1155 Radio Receiver Set Master Selector Switch – Omni (O)
13. Confirm that the Tuning Indicator Light illuminates
14. Set the R1155 Radio Receiver Set Frequency Range Switch to the appropriate frequency range ("7.5/3.0" for frequency 3.925 MHz).
15. Use tuning knobs to set radio frequency needle to the appropriate frequency (3.925 MHz). Since we use the 7.5/3.0 frequency range, we use the fourth band from the bottom (in red).
    - Use the outer tuning knob for coarse tuning (big needle movements) and the inner tuning knob for fine tuning (small needle movements).
16. Adjust Volume Control.

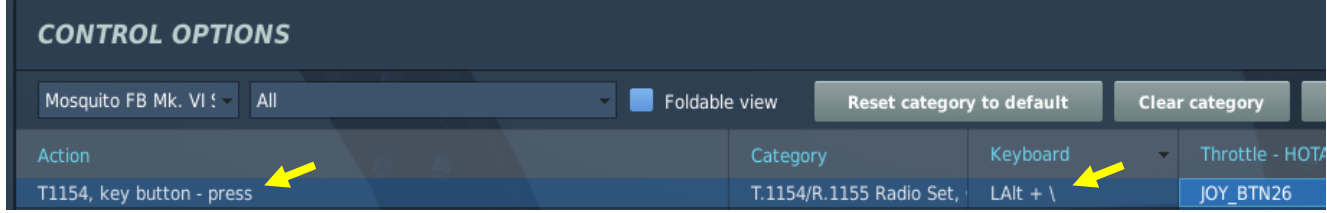
Note:
"Back Tuning" is not simulated yet. "Back tuning" is basically the process of setting the receiver frequency first, and then tune the transmitter to match the receiver frequency. This ensures both the transmitter and the receiver have matching frequencies.

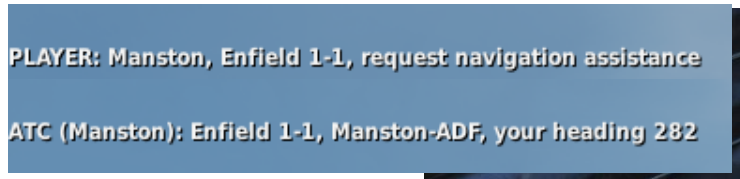


R1155 Radio Receiver Set Frequency Range Switch
- ***18/7.5:*** *Range from 18.5 MHz to 7.5 MHz (H/F)*
- ***7.5/3.0:*** *Range from 7.5 MHz to 3.0 MHz (H/F)*
- ***1500/600:*** *Range from 1500 KHz to 600 KHz (M/F)*
- ***500/200:*** *Range from 500 KHz to 200 KHz (M/F)*
- ***200/75:*** *Range from 200 KHz to 75 KHz (M/F)*

4 – T1154 & R1155 RADIO SET
4.2 – TRANSMISSION & RECEPTION TUTORIAL (HF)

17. Now that we have set both the T1154 Transmitter and the R1155 Receiver, we can communicate with the tower.
18. Press the T1154 Radio Morse Key to transmit on the set frequency. The default binding is "LALT + \".



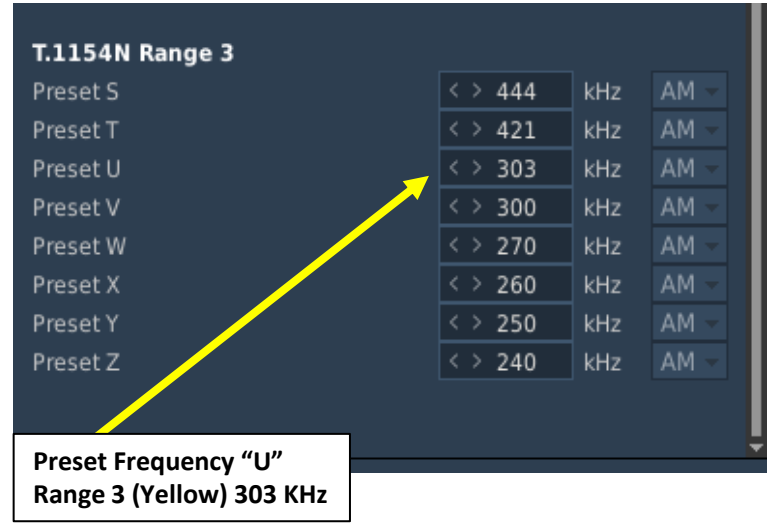


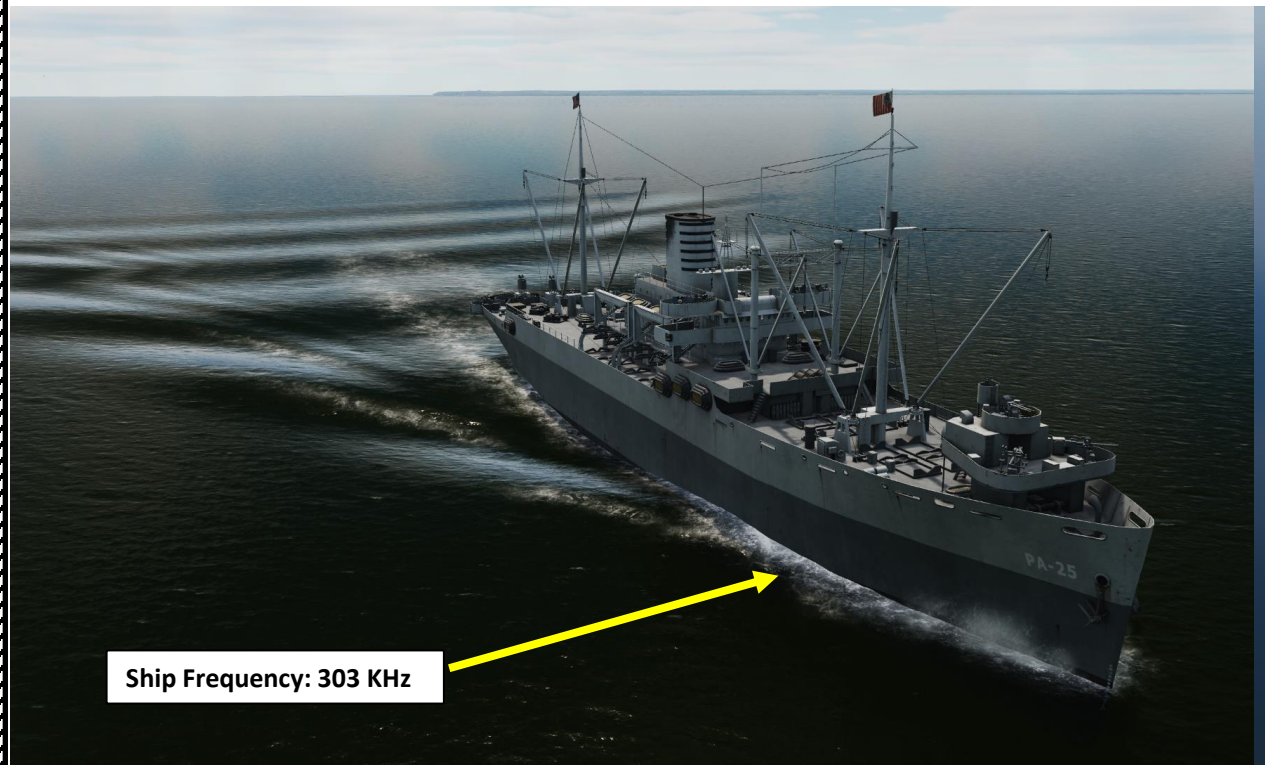
4 – T1154 & R1155 RADIO SET
4.3 – TRANSMISSION & RECEPTION TUTORIAL (MF)

In this tutorial, we will communicate with a **Ship**, which is set to a **MF (Medium Frequency) range of 303 KHz** (or KiloCycles/Second). We will need to set both the T1154 Transmitter to transmit to the ship and the R1155 Receiver to receive the ship's response. You can have preset frequencies for three frequency ranges, but these frequencies are set via the Mission Editor. It is possible to manually adjust a frequency, but it isn't necessarily recommended due to the difficulty to be precise. Using MF frequencies is better suited for communications over long distances, especially for naval missions of the RAF Coastal Command. You could, for instance, gain information from friendly ships to hunt for U-Boats or other german naval forces.

Since we cover a frequency in the third frequency range (yellow range), we will use the trailing antenna. The T1154/R1155 radio can cover three sets of frequency ranges:

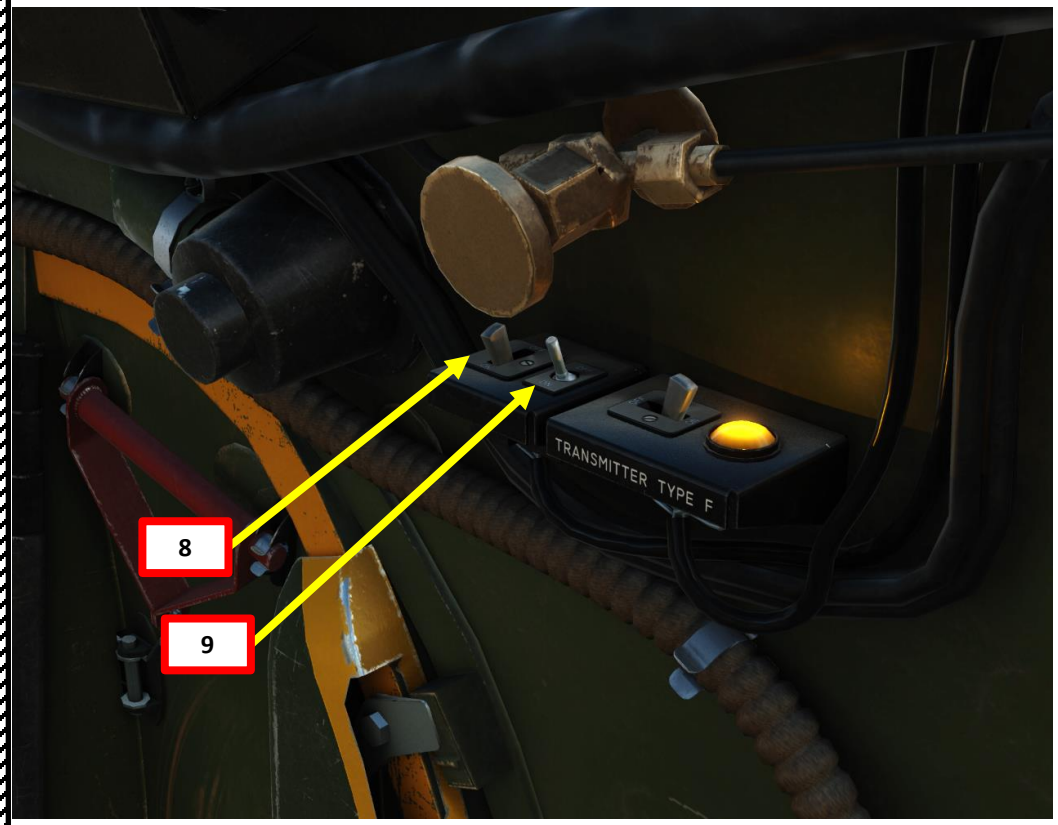
- ***Blue Range 1 (HF, with Fixed Antenna):*** *10.0 MHz to 5.5 MHz*
- ***Red Range 2 (HF, with Fixed Antenna):*** *5.5 MHz to 3.0 MHz*
- ***Yellow Range 3 (MF, with Trailing Antenna):*** *500 KHz to 200 KHz*

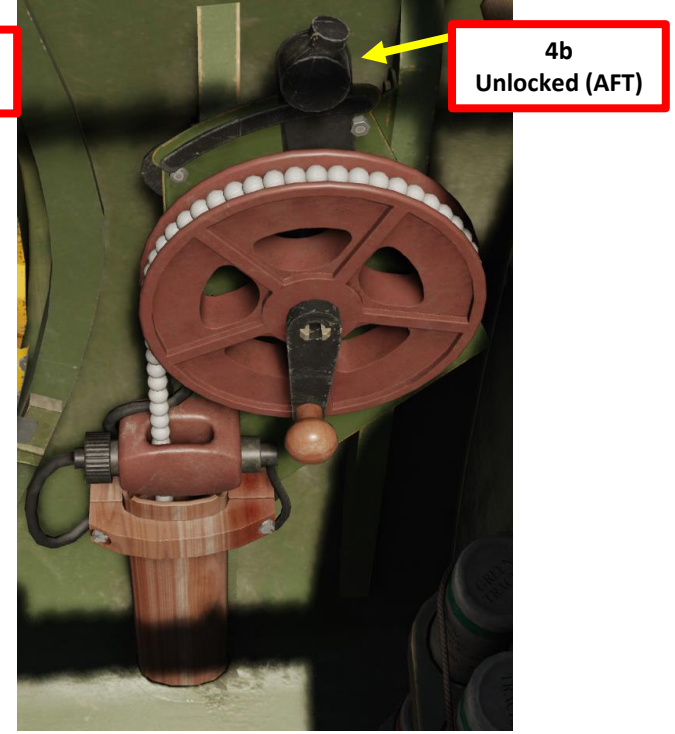


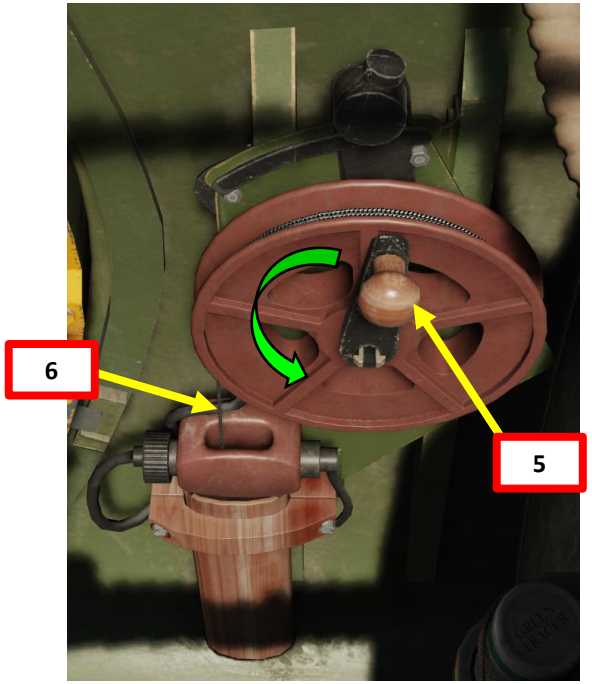


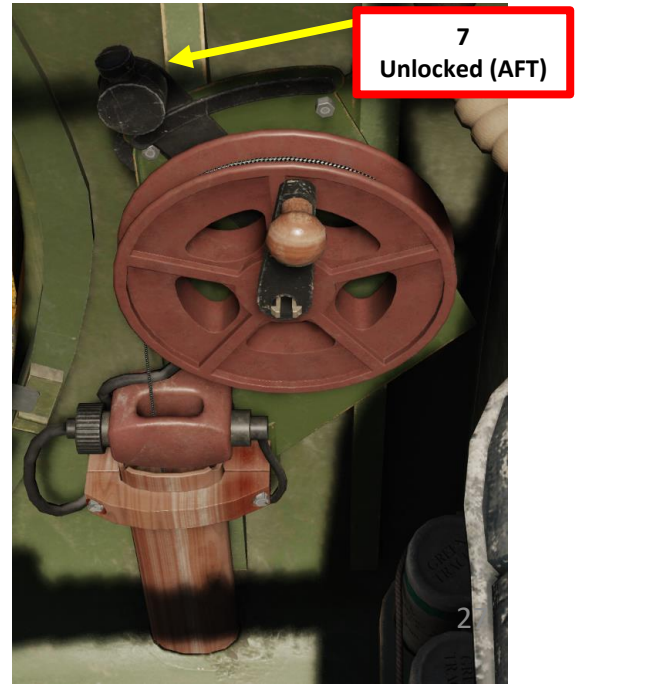
4 – T1154 & R1155 RADIO SET
4.3 – TRANSMISSION & RECEPTION TUTORIAL (MF)

1. Select the Navigator Seat by pressing “2”.
2. Since we transmit and receive on a MF frequency, we can use the Trailing Antenna.
3. Verify that you have sufficient altitude in order to avoid having the antenna tangle in anything on the ground.
4. Set the Trailing Antenna Reel Winch Brake Lever – OFF (AFT)
5. Left click on the Trailing Antenna Reel Winch to turn the crank counter-clockwise. This will extend the trailing antenna.
6. Crank until a few meters of antenna wire is extended.
7. Set the Trailing Antenna Reel Winch Brake Lever – ON (FWD)
8. Set T1154 Radio Transmitter Low Voltage Power Switch – ON (LEFT)
9. Set T1154 Radio Transmitter High Voltage Power Switch – ON (LEFT)



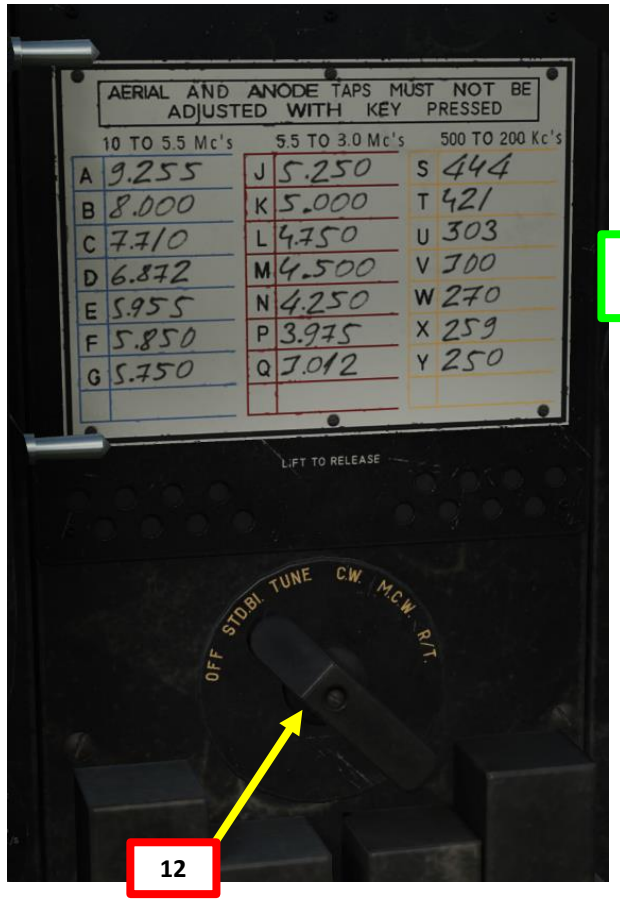


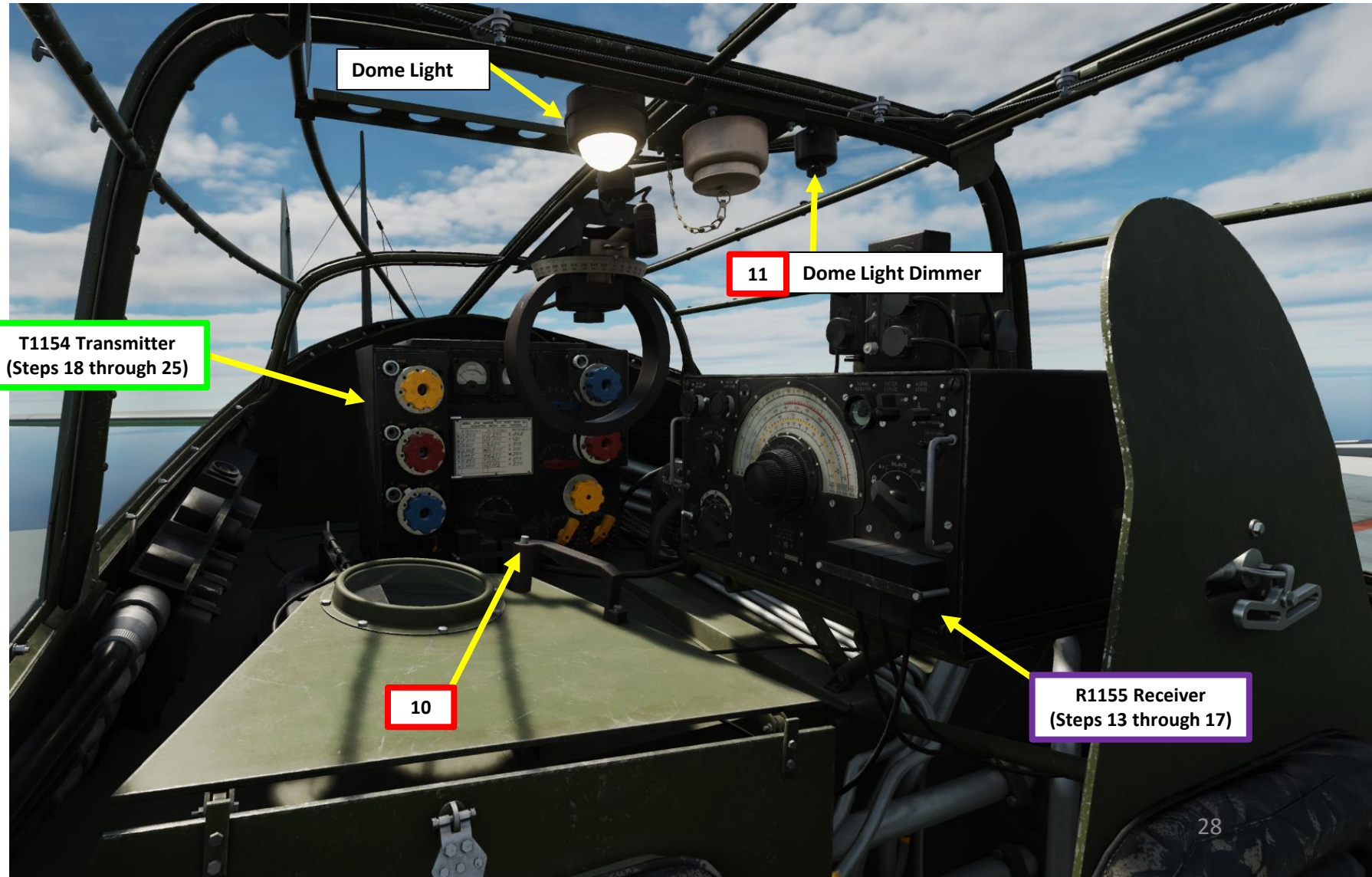




4 – T1154 & R1155 RADIO SET
4.3 – TRANSMISSION & RECEPTION TUTORIAL (MF)

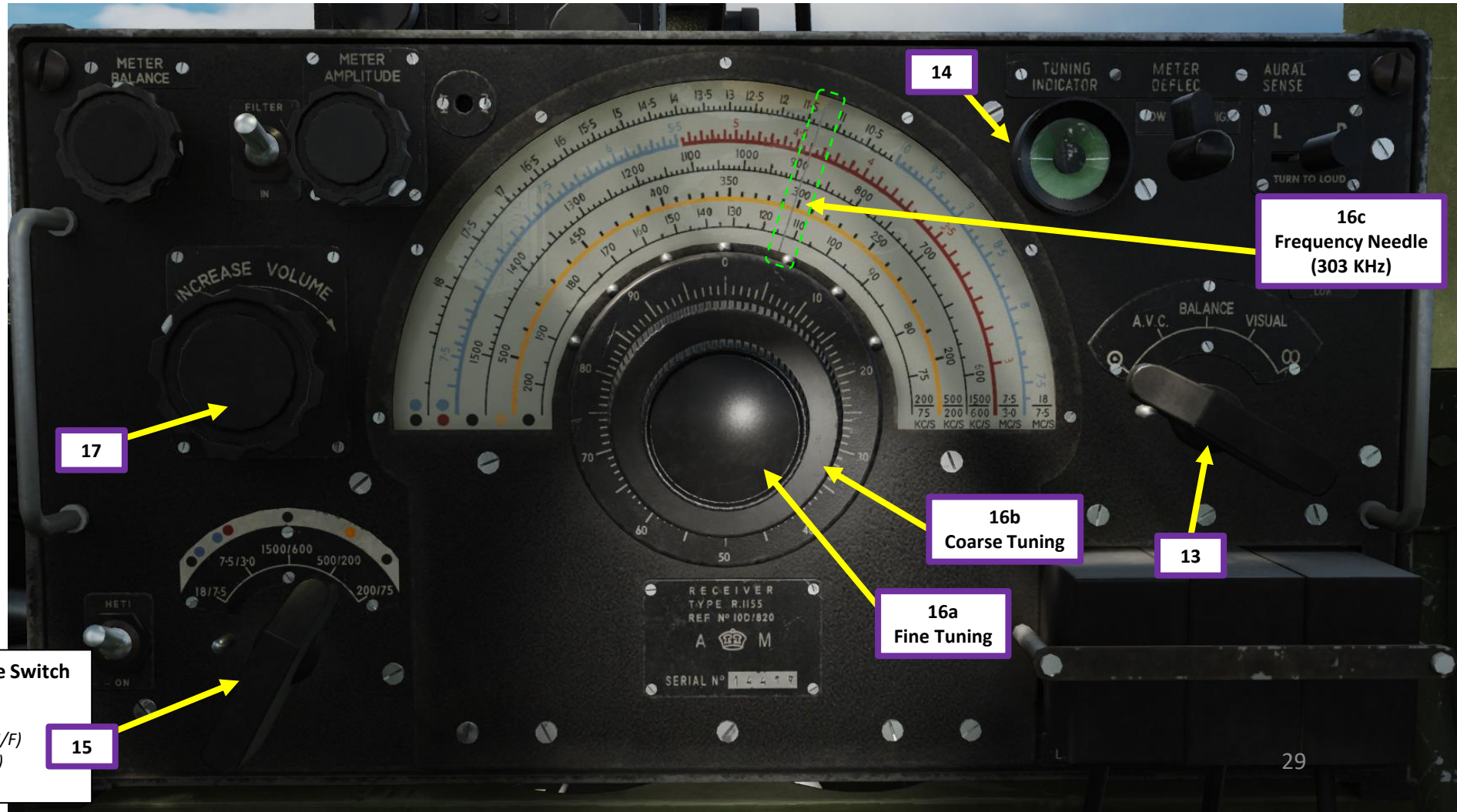
10. Lower the armored headrest of the navigator seat to access the radio compartment by clicking on the headrest handle.
11. In low visibility conditions, I would advise you to turn on the Dome Light and use the flashlight (LALT+L).
12. Set T1154 Radio Transmitter Set Tuning Control knob to STD-BI (Standby) position.





4 – T1154 & R1155 RADIO SET
4.3 – TRANSMISSION & RECEPTION TUTORIAL (MF)

13. Set R1155 Radio Receiver Set Master Selector Switch – Omni (O)
14. Confirm that the Tuning Indicator Light illuminates
15. Set the R1155 Radio Receiver Set Frequency Range Switch to the appropriate frequency range ("500/200" for frequency 303 KHz).
16. Use tuning knobs to set radio frequency needle to the appropriate frequency (303 KHz). Since we use the 500/200 frequency range, we use the second band from the bottom (in yellow).
    - Use the outer tuning knob for coarse tuning (big needle movements) and the inner tuning knob for fine tuning (small needle movements).
17. Adjust Volume Control.

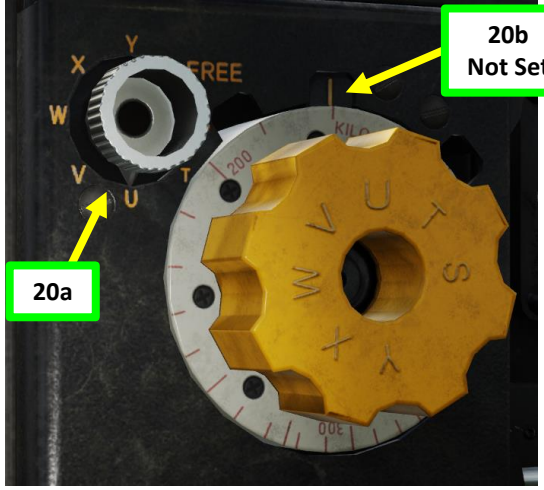


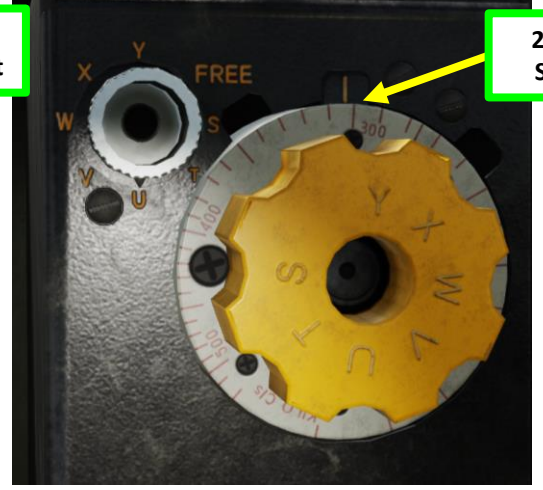
R1155 Radio Receiver Set Frequency Range Switch

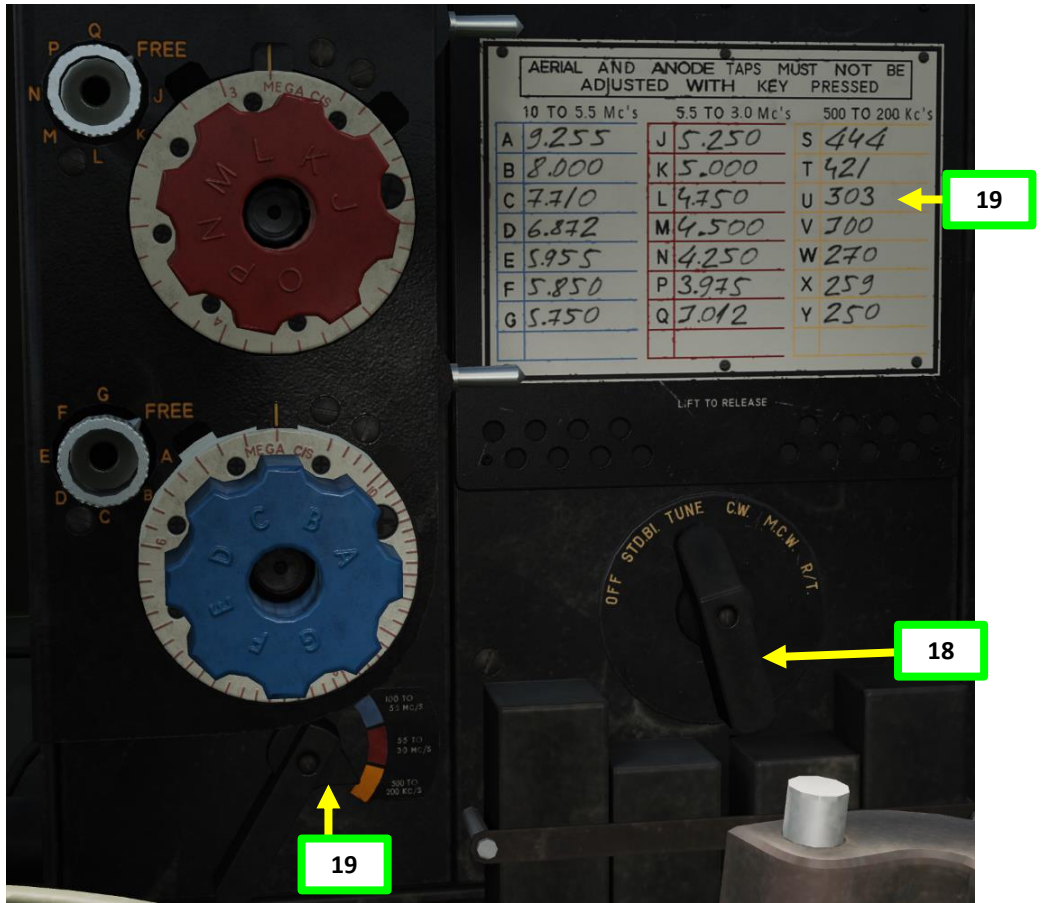
- ***18/7.5:*** *Range from 18.5 MHz to 7.5 MHz (H/F)*
- ***7.5/3.0:*** *Range from 7.5 MHz to 3.0 MHz (H/F)*
- ***1500/600:*** *Range from 1500 KHz to 600 KHz (M/F)*
- ***500/200:*** *Range from 500 KHz to 200 KHz (M/F)*
- ***200/75:*** *Range from 200 KHz to 75 KHz (M/F)*

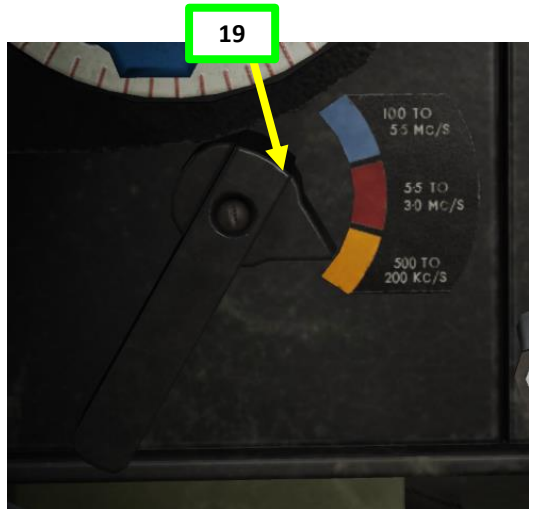
4 – T1154 & R1155 RADIO SET
4.3 – TRANSMISSION & RECEPTION TUTORIAL (MF)

18. Set T1154 Radio Transmitter Set Tuning Control knob from STD-BI (Standby) position to TUNE position.
19. Set T1154 Radio Frequency Range Selector to the required frequency range. We want to transmit on Preset Channel "U", which is in the No. 3 Range (Yellow). Check the placard on the T1154 set to see which preset channel is in which range according to its color code.
20. To select Preset Frequency "U" (Frequency Range 3, Yellow):
    a) Set Range 3 Master Oscillator Dial to "U".
    b) Turn Range 3 Master Oscillating Tuning Condenser until it "clicks" (click-stop mechanism) when reaching the preset position near 303 KHz.
        - When the condenser "clicks", it becomes locked into position and can only be moved if the associated Master Oscillator Dial is reset to "FREE".





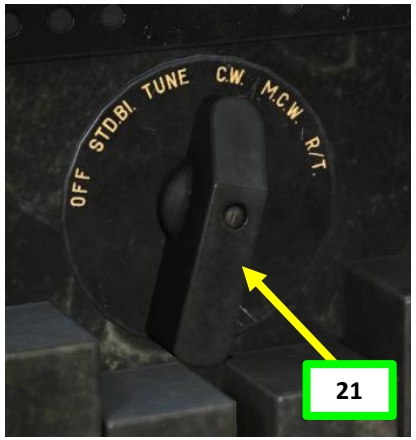


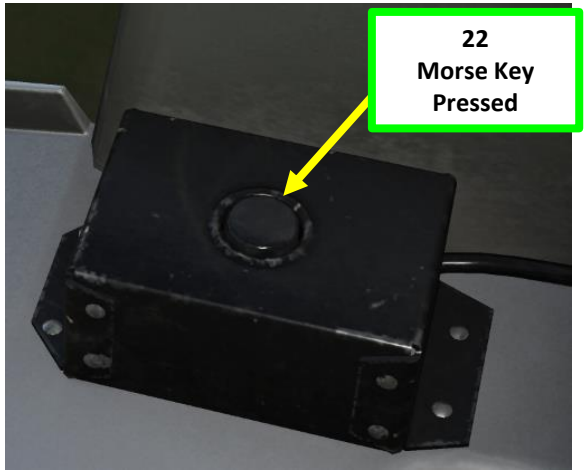


Note: *If you want to tune the transmitter manually without using one of the preset frequencies, you can set the Master Oscillator for the condensers to "Free". This will unlock the condenser control and allow you to set it at any position you want. This step would only apply to step 20 a).*

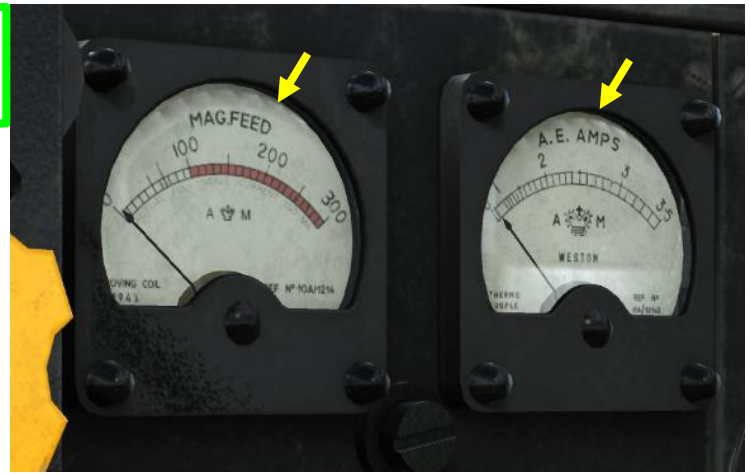
4 – T1154 & R1155 RADIO SET
4.3 – TRANSMISSION & RECEPTION TUTORIAL (MF)

21. Set T1154 Radio Transmitter Set Tuning Control knob to CW (Continuous Wave) position.
22. Press the T1154 Radio Morse Key. The default binding is "LALT + \". You should hear a morse "beep" through your headset.
23. While the T1154 Radio Morse Key is pressed, check Magnetic Feed and Amperemeter readings. If the values seem ok (they should be), you shouldn't need to adjust the Range 3 Output Circuit Tuning Condenser Control and the Range 3 Inductance Tapping switches.
24. If Magnetic Feed and Amperemeter readings are at 0 while the Morse Key is pressed:
    a) Turn Range 3 Output Circuit Tuning Condenser Control and tap the T1154 Radio Morse Key until the Magnetic Feed and Amperemeter readings are acceptable while Morse Signal is sent.
    b) Adjust Range 3 Inductance Tappings and tap the T1154 Radio Morse Key until the Magnetic Feed and Amperemeter readings are acceptable while Morse Signal is sent.

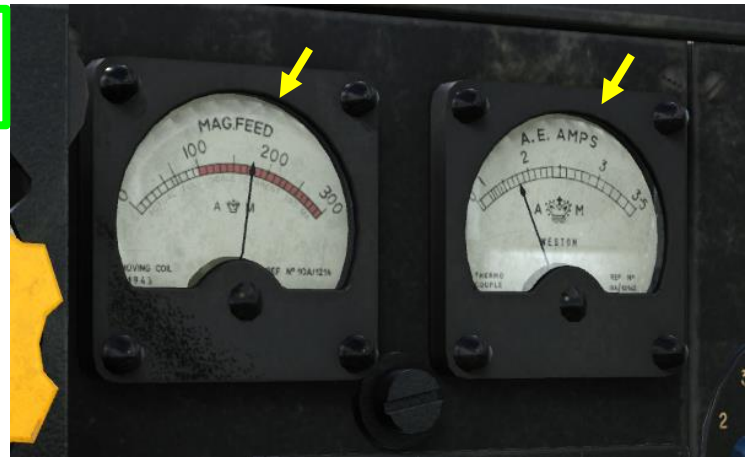


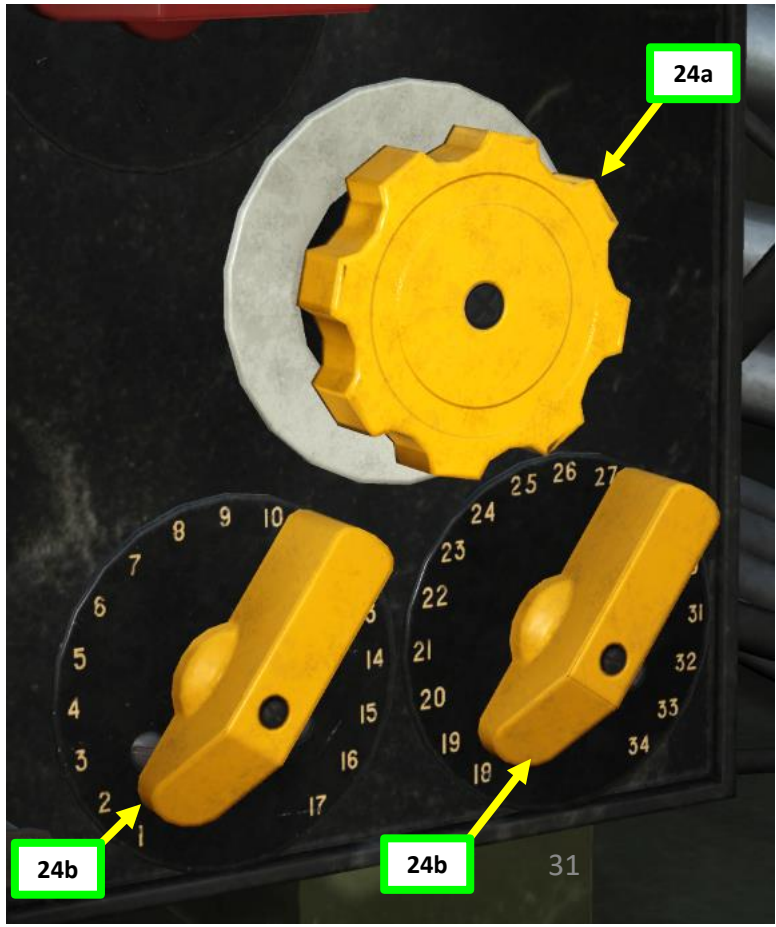


23a
Morse Key
Not Pressed



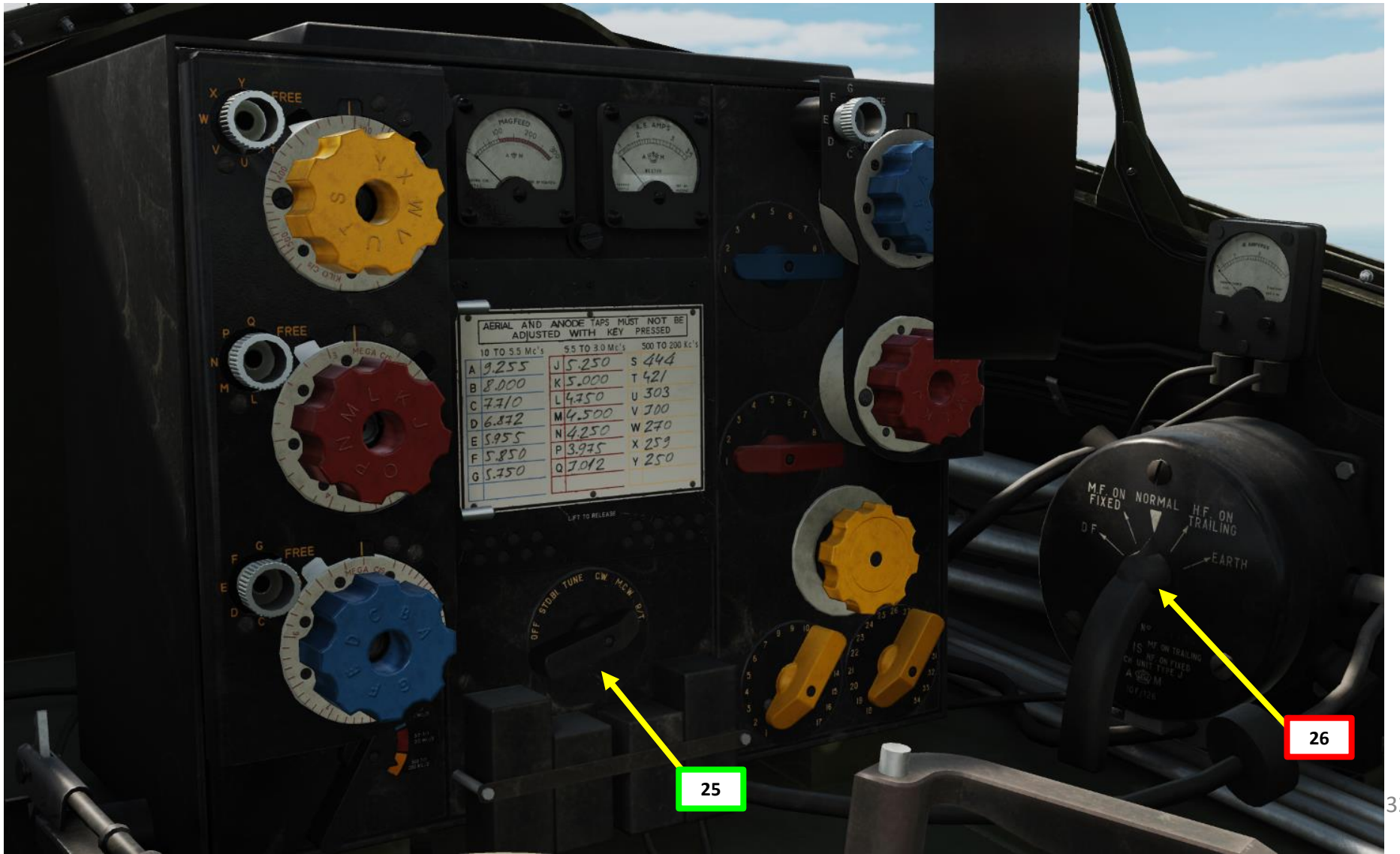
23b
Morse Key
Pressed





4 – T1154 & R1155 RADIO SET
4.3 – TRANSMISSION & RECEPTION TUTORIAL (MF)

25. Now that we have set the transmitter frequency, set T1154 Radio Transmitter Set Tuning Control knob to R/T (Radio/Telephony). This will allow you to transmit voice signals.
26. Set Aerial (Antenna) Mode Selector – NORMAL



4 – T1154 & R1155 RADIO SET
4.3 – TRANSMISSION & RECEPTION TUTORIAL (MF)

27. Now that we have set both the T1154 Transmitter and the R1155 Receiver, we can communicate with the ship.
28. Press the T1154 Radio Morse Key to transmit on the set frequency. The default binding is "LALT + \".
29. Don't forget to reel the trailing antenna back in once you no longer need to use it.