

RADIO SYSTEM

Description of Equipment

1. All radio receiving and transmitting units plus the junction box, with individual circuit breakers for each unit, are mounted in or on the radio rack on the right hand side of the aircraft immediately forward of the passenger compartment.
2. The radio equipment may be divided in three basic groups as follows:
 - (1) Communication Equipment:
 - One RT-18/ARC-1 Unit (VHF Transmitter-Receiver)
 - One RTA-1B Unit (HF Transmitter-Receiver)
 - One TA-12 Unit (HF Transmitter)
 - One RA-10 Unit (LF-HF Receiver)
 - (2) Navigation Equipment:
 - Two ARN-6 Automatic Radio Compass
 - Two "Voice Range" Filters
 - One MB-3 Marker Beacon Receiver
 - (3) Miscellaneous Equipment:
 - One DS-5 Isolation Amplifier
 - Two Jack boxes
3. Six (6) Overhead Remote Controls and the two Jack boxes are provided in the cockpit for the control of the above mentioned equipment. There is a Remote Control associated with each piece of communication and navigation equipment while the Jack boxes provide a Microphone selector switch, a Range filter switch and the Audio Selector switches in addition to a VHF Audio volume control and a master Audio volume control.

Communication Equipment

4. The two-way communication equipment consists of the RT-18/ARC-1 unit covering VHF frequencies and the RTA-1B (HF-1) unit covering HF frequencies. Both units consist of receiver and transmitter sections operating on frequencies determined by channel selector switches located on their respective remote controls. In addition to the above sets there is an Auxiliary transmitter TA-12 (HF-2) and receiver RA-10 (AUX) working in conjunction for two-way communication. They are operated independently one from the other since each set has its separate remote control.

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5. The transmitters are controlled by the Microphone selector switch on the Jack boxes and the "Press-to-Talk" switch on the Microphone. A sensitivity control on each receiver remote permits independent adjustment of the gain of the set, while the audio level can be adjusted by the Captain and First Officer using the Audio volume control on each jack box.
6. A frequency chart has been provided above the Magneto switches, listing the frequencies available and the channel they correspond to on the different remote controls.
7. The VHF (RT-18/ARC-1) Communication unit is a ten (10) channel, crystal controlled transmitter-receiver set. It has an output of approximately 8 watts between the frequency range of 100 to 156 megacycles. The antenna is a mast type about twenty-two inches in length, located on the roof of the aircraft near the HF antenna feed-through. Some antenna are straight masts while others are bent at a 90° angle pointing towards the rear of the aircraft. The Remote control for this equipment is identified as a C-45/ARC-1 unit.
8. The controls associated with this equipment are:
 - A. On the Remote control: (above left-hand windshield)
 - (1) One ON-OFF switch
 - (2) One function switch
 - (3) One frequency selector switch
 - B. On each Jack box:
 - (1) The Microphone and Transmitter selector switch (VHF)
 - (2) The "Press-to-talk" switch on the microphone
 - (3) One VHF Audio volume control
 - (4) One VHF Audio selector switch (VHF)
 - (5) The Audio volume control
9. On the front of the VHF set there is a screw type control marked SENSITIVITY. It controls the squetch of the set and is adjusted so that no back ground noise is heard when nil signal is being received. If it is backed off too much it will decrease the sensitivity of the receiver. The VHF volume control on the jack box is connected in the headset circuit just ahead of the common Audio volume control explained under: ~~Isolation~~ Amplifier (in step 29). This control does not affect the gain of the set: it takes part of the audio from the receiver and passes it on to the earphones. The function switch on the remote is labelled: BOTH, GUARD & MAIN T-R. The Guard channel feature has been eliminated from these sets so the switch should be left in the BOTH or MAIN T-R only.

10. The HF 1 (RTA-1B) Communication unit is a ten (10) channel crystal controlled transmitter-receiver set. It has an output of approximately 50 watts on transmit, between the frequency limits of 2.5 to 13 megacycles. The antenna (common to both transmitter and receiver sections) goes through a relay in the TA-12 transmitter, out through a feed-through mast on top of the aircraft (just above the transmitters) and back to the top of the rudder. The Remote control for this equipment is a MS-44D unit.
11. The controls associated with this equipment are:
- A. On the Remote control (above the right-hand windshield):
- (1) One 2-way master switch
 - (2) One transmitter ON-OFF switch
 - (3) One channel selector switch
 - (4) One sensitivity control
- B. On each Jack box:
- (1) The Microphone and Transmitter selector switch (HF 1)
 - (2) The "Press-to-talk" switch on the microphone
 - (3) One Audio selector switch (HF)
 - (4) The Audio volume control
12. The 2-way master switch provides power to the channel selector motor and to the receiver section of the unit. To make use of the transmitter, the Transmitter ON-OFF has to be ON. The sensitivity control (labelled VOLUME) controls the gain of the receiver. It also actuates two back-mounted controls acting in the audio output circuit of the set to further control the output of the receiver.
13. The HF 2 (TA-12) Communication unit is a four (4) channel crystal controlled transmitter set. The number one channel is a low frequency channel and is not used in the aircraft. The transmitter has an output of approximately 50 watts and uses a separate power supply and modulator unit. The Remote control for this set is a MT-51C unit.
14. The controls associated with this unit are:
- A. On the Remote control (above co-pilot sliding window):
- (1) One ON-OFF switch
 - (2) One function selector switch
 - (3) One channel selector switch
 - (4) One SEND switch

- B. On each Jack box:
- (1) The Microphone and Transmitter selector switch (HF 2)
 - (2) The "Press-to-talk" switch on the microphone
 - (3) One Audio selector switch (LF-HF or AUX)
 - (4) The Audio volume control
15. The function selector switch provides three different modes of operation: MCW, CW and R/T (radio-telephone). It is normally left on R/T position. The SEND switch when turned to a SEND position operates the transmitter the same way as a "Press-to-talk" switch. Since the microphone is provided with a "Press-to-talk", the SEND switch is not to be used. Sidetone provision for this transmitter is through part of the Auxiliary receiver. The receiver and its audio selector switch have to be ON to hear the sidetone.
16. At this point it will be noted that when using HF 1 transmitter, its output will be received by the Auxiliary receiver if the latter is tuned to the operating frequency of the former. The same is true if HF 2 (Trans.) is used on the same frequency as HF 1 (REC.) As a very strong signal will be present at the input of the receivers their gain will be quite increased and the appropriate audio switch should be left OFF so as to prevent this strong signal from going through to the earphones. Therefore, before using a transmitter it is good practice to turn ON only the audio switch associated with the specific transmitter. (The VHF and ADF audio switches may be left ON as these receivers are not affected by the HF transmitters).
17. The Auxiliary (RA-10) Communication unit is a four-band receiver covering the following ranges: Band 1: 150 - 400 kcs, Band 2: 400 - 1100 kcs, Band 3: 2.0 - 5.0 mcs, Band 4: 5.0 - 10.0 mcs. The antenna for this receiver is located on top of the aircraft parallel to the one described in paragraph 10. The receiver gain is limited during transmission (by anyone of the transmitters) by means of two relays in series with the antenna. This receiver is operated by MR-9B Remote Control unit.
18. The controls associated with this receiver are:
- A. On the Remote Control (in the center, above the Magneto switches):
- (1) One band selector switch
 - (2) One tuning control with dial
 - (3) One AVC - MVC - CW switch
 - (4) One VOLUME control with back-mounted ON-OFF switch
 - (5) One Crystal ON-OFF switch

B. On each Jack box:

- (1) One Audio selector switch (LF/HF or AUX)
- (2) The Audio volume control

19. The volume control of this receiver has two different functions: On AVC, the gain of the set is controlled automatically and the volume control only varies the amount of audio output; on MVC, the volume control acts as a sensitivity control and adjusts the gain of the set manually. The crystal ON-OFF switch is supposed to bring a crystal in the oscillator circuit of the receiver on bands 3 & 4. It also disables the oscillator. As these crystals are not provided in the sets, the switch is to be left in the OFF position.
20. (Unassigned)

Navigation Equipment

21. The two ADF's (automatic direction finder) (ARN-6) are identified as RED and GREEN receivers. They have special circuits and accessory units which cause the pointer of an indicator mounted in the instrument panel of the aircraft to indicate the relative bearing of the station to which the receivers are tuned. The automatic feature of these sets has a limited range. Under normal conditions it can be depended upon for a distance of 60 to 70 miles although bearings can very often be obtained from stations hundreds of miles away. When heavy precipitation static is encountered it may become extremely hard to get a range of more than 40 miles from a station. Night flying and over the water flying may give erroneous bearings even close to a station.
22. In addition to the automatic function, it is possible to use this equipment as a direction finder receiver with manual control over the movement and position of the loop. When tuned to a station and rotating the loop a full 360°, two maximum and two minimum (null) points will be observed in the strength of the signal being received. The minimum points occur when the loop is facing or looking away from the station. The pointer will then indicate the relative bearing to or from the station. The null points can also be used for "anti static" reception as the noise level is cut by a large amount in proportion to the signal level.
23. This equipment can also be used as straight receiver covering the Range and Broadcast bands. The frequencies covered by the four bands of this equipment are as follows: Band 1: 100 - 200 kcs, Band 2: 200 - 410 kcs, Band 3: 410 - 850 kcs, Band 4: 850 - 1750 kcs, This set is operated by a C-149/ARN-6 Remote control.

24. The controls associated with each radio compass are:
- A. On each Remote control (above both sliding windows)
 - (1) One tuning control with dial
 - (2) One band selector switch
 - (3) One function switch : OFF - COMP - ANT - LOOP
 - (4) One loop LEFT - RIGHT switch
 - (5) One sensitivity control (labelled AUDIO)
 - (6) One CW - VOICE switch
 - (7) One LIGHT control
 - (8) One CONTROL push-button (not used)
 - B. On each Jack box:
 - (1) One Audio selector switch (RED or GREEN)
 - (2) The Filter switch
 - (3) The Audio volume control
25. Two indicators are located in the instrument panel: the one on the left hand side of the pedestal works in conjunction with the remote control mounted above the left sliding window. This set is identified as the RED ADF. The second indicator mounted to the right of the pedestal is controlled by the remote above the right-hand sliding window. This second set is referred to as the GREEN ADF. The sense antenna associated with this equipment are located on the belly of the aircraft while some loops are located on top and on other aircraft they are belly mounted.
26. A tuning indicator is provided in the remote control as a visual aid in the tuning of a station. So as to obtain maximum efficiency on automatic (COMP) position, the set works at full gain and the AUDIO control on the remote only varies the audio output level. The circuit is so arranged that although the control is turned fully counter-clockwise there is still a certain amount of audio signal going through to the earphones providing a means of double-checking the continuous operation of the set. On ANT and LOOP positions the AUDIO control acts as a sensitivity control and varies the overall gain of the receiver and to a certain amount, the audio output.
27. The VOICE-RANGE filters are provided for use on simultaneous type radio ranges. The audio from the RED and GREEN compass receivers goes through each filter and is then selected by the filter switch before going to the audio selector switches. When the filter switch is in the both position voice and range signals from either compass go through to the audio switches. If a switch is turned to a position like: GREEN-RANGE, the range signal only from the GREEN receiver will go through to the audio switch while the voice and range signals of the RED receiver will not be affected. When the switch is turned to a RED position, the signals from the GREEN receiver will not be affected.

28. The Marker receiver (MB-3) is a fixed-tuned receiver installed solely for the reception of 75 mcs signals at cone of silence, fan or other high frequency markers. This receiver has a separate antenna located on the belly of the aircraft. A sensitivity switch marked HI-LO is provided in the instrument panel together with the three indicator lights. As the only marker transmitters used at present in the DOT system are installed at "cone-of-silence", the White light only is used. It is operated by a 3000 cycle note from the transmitter. The other lights would be operated in order by a 1300 cycle note and a 400 cycle one. It is also possible to hear the actuating note by using the audio switch marked MKR on the jack boxes.

Miscellaneous Equipment

29. The Isolation Amplifier (DS-5) with its associated Jack boxes is used to isolate, mix and select the output from the different receivers. This amplifier has no separate ON-OFF switch and starts to operate when the Radio master switch is turned On. It is a two channel amplifier: one is for the pilot's station, the second for the co-pilot's station. The audio signals from the receivers are all fed in this amplifier and then selected individually by any one of the ten Audio volume control on the jack boxes is connected in the earphone circuit and will adjust the listening level of the incoming audio signals. It is to be noted that this Audio volume control has no effect over the gain of the receiver (their gain being controlled by the sensitivity controls on their remotes). The operation of the other controls on the jack boxes has been explained with their associated equipment.
30. Underneath each jack box there are two jacks for plugging in the headphone and the microphone. There is also a NORMAL-EMERGENCY switch. In the event of failure of the audio system on either headset (Pilot or co-pilot) the switch is turned to the EMERGENCY position and all the audio selector switches turned to the normally ON position (handle UP). The output from one receiver only can now be listened to without interference from the other sets. To listen to the chosen receiver turn its audio selector switch to the normally OFF position. From the above it is to be seen that on EMERGENCY position, the operation of the audio selector switches is being reversed.

General Information

31. A Radio Master switch is provided on the electrical control panel near the Battery master switch. It actuates a relay in the radio junction box providing power to all the radios.
32. Circuit protection is provided by the use of circuit breakers mounted on the side of the junction box. They are covered by a hinged door and are identified by the name of the equipment they protect. The names are stamped underneath each breaker.

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33. If an overload occurs, the handle will snap to the OFF position cutting the power to its associated equipment. It will be impossible to reset the breaker by turning it to the ON position if it has not cooled off or if the short persists. If after two or ~~two~~ three resets the breakers continues to trip it may be assume the fault is permanent and nothing further can be done.
34. If any malfunctioning of equipment occurs, it is only necessary to ascertain that all breakers are in the ON position. If all breakers are O.K. it may be assumed that the fault lies elsewhere.

ISSUED: February 15, 1957.

EFFECTIVE: February 20, 1957.

RADIO SYSTEM

CF-QBF and CF-QBG

Description of Equipment

1. All radio receiving and transmitting units plus the junction box and DC switch breaker panel with individual breakers for each unit, are located in or on the radio rack on the left hand side of the aircraft immediately forward of the passenger compartment.

NOTE: The fluxgate compass switch breaker, amplifier and junction box (entirely separate electrically from the radio system) and two 400 cycle inverters are also located on the radio rack.

2. The radio equipment may be divided into three basic groups as follows:

(1) Communication Equipment:

One RTA-1C (QBA 75.804) Communication Unit
(HF Transmitter - Receiver)
One Western Electric RT-18/ARC-1 Communication Unit
(VHF Transmitter - Receiver)

(2) Navigation Equipment:

Two Bendix MN-31 Automatic Radio Compass
One Bendix MN-53 Marker Receiver
Two TCA "Voice-Range" Filters
One Bendix MN-46 Fixed Loop

(3) Instrument Landing Equipment:

51V-2 Glide Slope Receiver
RC-103A Localizer Receiver (also VHF range) Equipment

3. A Pedestal Control Panel and an Overhead Control Panel are provided in the cockpit for the control of the above equipment.

Communication Equipment

4. The two-way communication equipment consists of the RTA-1C communication unit covering HF frequencies and the RT-18/ARC-1 communication unit covering VHF frequencies. Both units consist of receiver and transmitter sections operating on frequency determined by selector switches located on the overhead control panel. The transmitters are controlled by the microphone control switch (described below under Pedestal Control Panel) and the "press-to-talk" microphone switch. Two sets of audio volume controls are installed on the overhead control panel for independent adjustment of volume of either unit by the Captain and First Officer. ~~Each~~ of these units have their own self-contained power supplies.

5. The HF (RTA-1B) communications unit has an output of approximately 50 watts on ten crystal controlled channels, between the frequency limits of 2.5 and 13 megacycles. The antenna (common to both transmitter and receiver sections) is located on top of the aircraft running from a point above the cockpit to the top of the fin.
6. The controls associated with this unit are:
 - (1) One ten position HF frequency switch
 - (2) Two volume controls (for dual audio output)
 - (3) One sensitivity control
 - (4) Four DC switch circuit breakers
7. The VHF (RT-18/ARC-1) communications unit has an output of approximately 8 watts on 19 crystal controlled channels, between the frequency limits of 100 and 156 megacycles.
8. The controls associated with this unit are:
 - (1) One 19 position VHF frequency switch.
 - (2) One A-B Group frequency switch. This switch works in conjunction with the one above to give 38 VHF frequencies.
 - (3) Two volume controls (for dual audio output)
 - (4) One sensitivity control. This control will adjust the squelch threshold. It should be operated when no signal is being received by turning the control clockwise until background noise is heard. If no background noise is heard control should be left full clockwise and VHF unit "logged" as low in sensitivity. Normally the control should be backed off just enough to cut off the noise but no further. After leaving the airport or an area of high RF noise level, this control should be readjusted as above to take care of distant reception (40 to 140 miles)
 - (5) One DC switch circuit breaker.
9. (Unassigned)
10. (Unassigned)
11. A microphone switch selector located on the pedestal panel, switches the microphone and the other control circuits to either of the above transmitters.
12. An interphone system is provided for inter-communication between the Captain, First Officer and Stewardess. This system makes use of circuits in the RTA-1B Communication Unit.

Navigation Equipment

13. The main units of navigation equipment are the two automatic radio compasses identified as RED and GREEN. These are radio receivers with special circuits and accessory units which cause pointers in the dual bearing indicator mounted on the instrument panel of the aircraft to indicate the relative bearings of the station to which the receivers are turned.

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14. In addition to the radio compass function, it is possible to use this equipment as a direction finder receiver with manual control over the movement and position of the loop. For "anti-static" reception, the loop should be rotated until the pointer is at either 90 or 270 degrees. The control for the rotation of the loop is located on the Pedestal Control Panel.
15. The third function of this equipment is as a straight receiver on either the range band, broadcast band or 278 kilocycles (in the case of the RED Compass receiver) or on the high frequency band, 2.9 to 6.0 megacycles (in the case of the GREEN Compass receiver). The tuning dials and band change switches for these receivers are located on the Overhead Control Panel. The function switches and sensitivity controls are provided on the Pedestal Control Panel. Two sets of audio volume controls are installed on the Overhead Control Panel for independent control by both the pilot and co-pilot. The frequencies of the three bands available on this equipment are as follows:

	<u>Red Compass</u>	<u>Green Compass</u>
Band 1	200 - 410 Kc.	200 - 410 Kc.
Band 2	550 - 1200 Kc.	550 - 1200 Kc.
Band 3	278 Kc. Fixed	2.9 - 6.0 Mc.

16. The controls associated with each of these radio compasses are as follows:
- (1) One Tuning Control
 - (2) One Band Change Switch
 - (3) One Function Switch
 - (4) One Left-Right Switch
 - (5) One sensitivity Control
 - (6) Two Volume Controls with back-mounted Switches
 - (7) One Filter Switch
 - (8) Two D.C. Switch Circuit Breakers
17. A dual bearing indicator is located on the left hand instrument panel and has a RED and GREEN pointer. These pointers correspond to the RED and GREEN compass receivers.
18. The loops, contained in streamlined housings, are located on the belly of the aircraft. The forward loop is associated with the GREEN compass and the aft loop with the RED compass. The sense antenna are "T's" located between the two pilot masts and the two rear masts on the belly. The left hand antenna is associated with the RED compass and the right hand antenna with the GREEN compass.
19. (Unassigned)
20. (Unassigned)
21. "Voice-Range" filters are provided primarily for use on simultaneous type radio ranges. Switches for the use of these filters are located on the Overhead Control Panel.

22. The marker receiver is a fixed tuned receiver installed solely for the reception of 75 Mc. signals at cone of silence, fan and other high frequency markers. This receiver has a separate antenna located on the same mast as the RED sense antenna. A sensitivity switch for BROADSHARP operation is provided on the Pedestal Control Panel together with two audio volume controls and switches mounted on the Overhead Panel for control by either the pilot or co-pilot, but not both. In addition to the usual aural signal, there is also visual communication provided by an amber light on each cross-pointer indicator.

Instrument Landing System

23. The Instrument Landing System consists of one 51V-2 Glide Slope receiver and one BC-733D Localizer (or VHF Range) receiver, located in the radio compartment. Two combination Localizer and Glife Slope cross-pointer indicators are provided, one on the Left and the other on the Right Instrument Panel. If either the Localizer or the Glide Slope receiver is in an unserviceable condition, a red fluorescent flag alarm indicator with OFF in black letters will appear at the tip of the pointer associated with the unserviceable receiver. The antenna is a streamlined array located over the flight compartment on the centerline of the aircraft. The equipment can be operated on six channels and in addition to visual indication of Glide Slope and Localizer signals, aural indication is provided by the Localizer receiver only. Audio is supplied to either the Captain or First Officer but not both.
24. The controls associated with this equipment are as follows:
- (1) One VHF RANGE selector switch located on the Overhead Control Panel.
 - (2) One VHF RANGE sensitivity control located on the Pedestal Control Panel.
 - (3) Two VHF RANGE volume controls located on the Overhead Control Panel.
 - (4) Two Switch circuit breakers, one for each receiver.

Miscellaneous Equipment

25. Jack boxes are located on the wall adjacent to the Captain's and First Officer's chairs and in the companionway adjacent to the Observer's jump seat, for plugging in headphones and microphones. A telephone type handset is provided at the stewardess' station for interphone purposes. This handset has a push button located in the centre of the handle which must be held in when it is desired to converse.

Operation of Equipment

26. The two control panels located in the cockpit contain all the switches and controls required for the operation of the aircraft radio equipment, except for the D.C. supply circuit breaker switches which are mounted in the side of the radio junction box. The Overhead Control Panel is located on the cockpit roof between the two electrical panels above the windshield. The Pedestal Panel is located on the aft side of the pedestal between the Captain's and First Officer's chairs.

Operation of Overhead Control Panel

27. The Overhead Control Panel contains the following controls:

(1) ADF Tuning Controls

Tuning controls and band selector switches for the RED and GREEN automatic radio compasses are located on the left and right hand side of the panel respectively.

(2) Light Rheostats

Adjacent to each of the above controls is a rheostat for adjusting the brilliancy of the tuning dial light.

(3) Frequency Selector Controls

Three frequency selector controls are located in the centre of the panel marked HF COMM, VHF COMM and VHF RANGE. An A-B Toggle switch is installed adjacent to the VHF COMM switch.

(4) Audio Volume Controls and Switches

Two sets of volume controls with back-mounted switches are provided for individual control of the audio levels to both the pilot's and co-pilot's earphones independently. Note that in the case of the marker receiver and localizer or VHF range receiver, which have only single outputs, the co-pilot's volume controls are dead except when the pilot has switched his associated control to the OFF position. This operates a double throw switch which connects that output to the co-pilot's control.

(5) Filter Switches

Two "Voice-Range" filter switches are located in the left hand and right hand corners of the panel, one for the Captain and one for the First Officer. These switches control the output from either the RED or GREEN compass receivers independently.

Pedestal Control Panel

28. The Pedestal Control Panel contains the following controls:

(1) Sensitivity Controls

Five receiver sensitivity controls are located on the upper part of the panel for controlling the volume of (i) the two automatic radio compasses (ii) the HF communications receiver (iii) the VHF range receiver (localizer) and (iv) the VHF communication receiver squelch level.

(2) Marker Sensitivity

A toggle switch for BROAD-SHARP operation, marked B-S, of the marker receiver is located in the upper right hand corner of the lower face of the panel.

(3) ADF Function Switches

The function switches for the automatic radio compass are located in the lower left and right hand corners of the panel. These switches provide selection of "automatic compass operation", "antenna operation", "loop operation" and "loop operation with the CW oscillator on". This latter function is designated LOOP BFO (Beat Frequency Oscillator).

(4) ADF Loop Rotator Controls

The knobs for the rotation of the automatic radio compass loops are located just above the radio compass function switches. These switches allow rotation left or right as indicated. A slight movement of the switch provides slow speed rotation of the loop and full movement provides full speed operation.

(5) Microphone Selector Switch

A microphone selector switch is located in the top centre of the upper panel. Two transmitter ON lights are located adjacent to this switch. The microphone selector switch is labelled HF, I/C, VHF, STDS., and CALL. The normal position of this switch will be I/C (Interphone) in which position it is only necessary to depress the microphone button for inter-pilot communications. For transmitting on HF or VHF communications, the switch is set to the appropriate positions which puts the respective transmitter in stand-by and lights the respective TRANSMITTER ON warning light. It is then only necessary to depress the microphone button for transmission. For inter-communication with the Stewardess, the switch is to be set to the STDS. position. To call the Stewardess, the switch is set to CALL. The switch is spring loaded in this position and will return to STDS. when released.

29. (Unassigned)

30. (Unassigned)

Master Switches

31. The above description of the various controls will give a general idea as to how to operate the various components of equipment. In addition, the following should be noted:

32. The radio master switch is located in the side of the junction box which is located on the radio rack. This switch must be turned on before any radio equipment will operate. When this switch is turned on, all equipment is set into operation and may then be individually controlled with the controls described on the various panels. Note that the aircraft electrical master switch must be on before it is possible to operate the radio system. The individual D.C. switch breakers are normally left closed at all times, except in case of emergency when it is necessary to reduce load or when a unit fails. In case of failure of any unit to operate after the master switch is turned on, these switches should be checked. Note that inverters must be operating for ADF operation.

Receiver Operation

33. To operate any particular receiver, the following general procedure may be followed:

- (1) Turn on Radio Master Switch. (This sets all receivers in operation)
- (2) Adjust associated audio volume control. (Captain's or First Officer's)
- (3) Set function switch (radio compasses) to function desired (tune in inverters)
- (4) Turn up associated sensitivity control.
- (5) Tune or select desired frequency on associated control.

Transmitter Operation

34. To operate the transmitter, the following procedure may be followed:

- (1) Turn on Radio Master Switch
- (2) Select desired frequency on frequency selector switch (Overhead Panel)
- (3) In the case of the VHF set the A-B Switch in its proper position (Overhead Panel)
- (4) Set microphone selector switch to HF or VHF. (Pedestal Panel)
The associated ON light will light.
- (5) Release microphone button to cease transmission and to receive on communications receiver.
- (6) When a particular series of transmissions are completed, turn microphone selector switch to I/C position. This turns transmitter off and makes interphone available.

Warning and Indicator Lights

35. All warning and indicator lights used in the radio system, including marker lights, may be adjusted in brilliancy by rotating the jewel. The correct direction of rotation for "dim" or "bright" is indicated on the jewel. This allows setting of the desired brilliancy for day and night operation.
36. A "Press-to-Test" feature is also provided on these lights. By pressing inwards on the jewel, the lamp will light. This provides a check on the operation of the bulbs. This feature does not apply to the marker lights due to a peculiarity of this circuit.

Interphone System

37. The interphone system is a part of the radio system. To use the interphone, it is necessary to have the radio system in operation, that is, turn on the radio master switch.
38. With the microphone selector switch (precisely described) set at I/C interphone is available between Captain and First Officer by simply pressing the microphone button to talk and releasing it to listen. Note that when the microphone button is depressed, the communications receiver is muted and the GREEN (or auxiliary) receiver is not muted.
39. (Unassigned)
40. (Unassigned)
41. Communication with the Stewardess may be had by switching the microphone selector switch to CALL. This lights a light at the stewardess station and rings the chime. The selector switch is spring loaded and will return to the STDS, position when released. To complete this circuit it is necessary for the stewardess to switch the Pilot Call Switch to the position marked CALL. This completes her phone receiver circuit.
42. If the Stewardess desires to call the cockpit, it is necessary to switch the call switch adjacent to the Stewardess' handset to position marked CALL. This operates a light in the cockpit on the centre instrument panel. To answer the Stewardess call, set the microphone selector switch to STDS.

Location of Equipment

43. All basic equipment is installed in a rack located in the L.H. side of the fuselage just forward of the passenger compartment. The two control panels are located in the cockpit as previously described.
44. The radio compass dual bearing indicator is a small size instrument and is located in the L.H. instrument panel.

Radio Circuit Protection

45. Circuit protection is provided by the use of circuit breakers. No fuses are used.
46. A chart fastened on the inside of the hinged door covering these breakers identifies them.
47. The circuit breakers are located in the side of the junction box which is installed on the forward face of the radio rack. A small hinged door, available from the companionway, provides access to the circuit breakers. Each breaker is plainly marked and is normally set in the ON position with the handle up. If an overload occurs the handle snaps down thus turning off the associated equipment. The breakers are the trip-free type. That is, they cannot be reset until they have cooled off nor can they be manually held in the ON position.
48. To reset the breaker, push the handle upwards to the ON position. If the breaker continues to trip after two or three resets it may be assumed the fault is permanent and nothing further can be done.
49. If any malfunctioning of equipment occurs, it is only necessary to ascertain that all breakers are in the ON position. If all breakers are O.K. it may be assumed that the fault lies elsewhere.