

Part I

Chapter 12—Radio and Radar

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Radio Communication

1 VHF TR1985/86

(a) Twin VHF sets, TR1985/86, each having ten channels, are installed. The controls are on the roof panel, together with a changeover switch.

(b) Power for the VHF is from the 28-volt system. Selection of No. 2 VHF by the pilot energises the change-over relays.

2 UHF ARC/52 (Mod. 591—Mk. 1A only)

(a) The UHF transmitter/receiver is in the floor of the fin compartment and the selector on panel AE. It is possible to select 1,750 channels at 0.1 mc/s intervals or 19 preset channels, one of which is tuned to 243 mc/s. In addition, a separate receiver allows a guard frequency of 243 mc/s to be superimposed on any selected channel. MCW transmission is available if required.

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(b) The remote control unit on panel AE or, post-Mod. 3881 on panel BF, carries the following controls:

(i) A 20-position rotary switch, giving selection of 18 preset channels, the guard frequency (channel G) and MANUAL.

(ii) Four manual control switches. The first selects either 200 or 300 mc/s, the second selects 0 to 90 mc/s in tens, the third selects 0 to 9 mc/s and the fourth 0 to 0.9 mc/s. These switches are only operative when MANUAL is selected on the 20-position switch.

(iii) A volume control.

(iv) A four-position function switch, giving selection of:

OFF

T/R, normal transmission and reception

T/R + G, as TR with the guard frequency superimposed on reception

ADF (inoperative)

(c) On panel AE is a tone switch.

(d) It is possible to reset the preset channels in the air, if necessary. To do so, the cover plate on the control unit is removed by undoing the milled screws. The channel selector is then turned until the number to be selected is indicated on the resetting panel (this will not correspond to the selector switch indication). The resetting pins are then moved to the required positions and the cover plate closed.

(e) *Power supplies*

The UHF uses 28-volt DC, from feeder 10P7.

3 Tone release

Tone release facilities are available, post-Mod. 745, for simulated bombing practice and may be obtained from either VHF or UHF. The controls are on panel CP and consist of a 2-position UHF/VHF switch, start switch and a light. When the start switch is pressed, the service selected radiates a continuous 1 kc/s note until the bomb is supposedly released.

4 HF STR 18B2

(a) HF communication is by STR 18B2, the control unit being at the AEO's position. The control unit carries a function switch, a channel selector, volume and fine tuning controls. R/T transmission can be made on HF, if required. Also at the AEO's position are the HF SUPPLY circuit breaker and OUTPUT control switch.

(b) The STR 18B2 uses 28-volt DC.

5 Intercomm. general

(a) The intercomm system operates through an A1961 amplifier, controlled by a NORMAL/EMERGENCY switch at the AEO's

position. In addition, a separate A1961 amplifier is provided for conference intercomm and is controlled by an ON-OFF switch at the AEO's position (Panel BF). If the normal intercomm system fails, setting the control switch to EMERGENCY will provide intercomm and call facilities through the amplification stage of the VHF.

(b) Additional intercomm points are provided in the front fuselage, plenum chamber, rear compartment and on the underside of the port side of the nose. These are controlled by two ON/ISOLATE switches at the AEO's position, panel BF.

6 Intercomm. controls (Mk. 1 aircraft)

(a) Normal intercomm. is available between all crew stations providing that:

(i) 1st and 2nd Pilots select VHF on VHF/HF switches and I-C on I-C/ADF switches.

(ii) Navigators select NORMAL/CONFERENCE switch to NORMAL and I-C/ADF switch to I-C.

(iii) AEO selects both VHF and I-C on his VHF/HF and I-C/VHF switches respectively.

(b) *Pilots' controls*

(i) *VHF/HF*. These switches are located on panels AE and AF for the 1st and 2nd pilots respectively. The VHF selection provides normal intercomm. with the rest of the crew whilst permitting transmit-receive operation of the VHF installation. On HF the microphone, telephone and PTT leads are transferred to the STR 18 B2 HF equipment for HF/RT.

(ii) *I-C/ADF*. These switches in the cabin roof positioned aft of panel AL provide the pilots with a means of listening to the radio compass receiver. It is important to note that an ADF selection overrides any other switch position hence it is normally caged to the intercomm. position.

(iii) *Call Switch*. This switch, also located aft of panel AL, is common to both pilots. It is a spring-loaded three-position control with CALL NAV. and CALL AEO selections.

CALL NAV. This superimposes intercomm. to the navigators when they are isolated on the conference circuit

CALL AEO. Intercomm. is superimposed to the AEO irrespective of which service he is operating.

(c) *Navigators' Controls*

(i) *NORMAL/CONFERENCE*. The NORMAL and CONFERENCE selections of this switch provide alternative intercomm. systems for the navigators. The CONFERENCE position isolates the navigators on to a separate intercomm. amplifier. On the NORMAL position the navigators can also hear the VHF output.

(ii) *I-C/ADF*. The ADF position provides the plotter with radio compass receiver output and is similar to the pilots I-C/ADF switch in that it over-rides other selections. When switched to ADF the plotter's mic. is still connected to intercomm.

(iii) *Call Switch*. This is a spring-loaded switch which enables the plotter to call either pilot when the latter are on ADF. It superimposes intercomm. on to the ADF circuit.

(d) *AEO's Controls*

(i) *VHF/HF*. On VHF the AEO has normal intercomm. and can monitor the VHF output. The HF selection isolates the AEO from the rest of the crew and he has control of the STR 18 B2.

(ii) *I-C/VHF*. The VHF position isolates the AEO from the intercomm. circuit and connects a separate PTT switch and volume control to the appropriate VHF box. The AEO thus controls transmission and reception of the VHF and no other crew member can monitor the VHF. However it is possible for the pilots, by selecting CALL AEO, to listen through to the VHF if necessary.

(iii) *Call Pilot*. This is a spring-loaded switch which enables the AEO to superimpose intercomm. on to the ADF circuit.

7 Intercomm. controls (Mk. 1A aircraft)

(a) All crew members have identical station boxes, the controls on which allow any crew member to:

(i) Select any one of five SPEAK/LISTEN services.

(ii) Mix incoming radio and intercomm. signals without interfering with selections made by other crew members.

(iii) Call all other crew members on intercomm. irrespective of the services they may have selected.

(b) The type 7681 station boxes carry the following controls:

(i) Four ON/OFF switches at the top of the box. These provide a mixer service for listening only. They consist of:

HF

Conference I-C

Airborne warning

Normal I-C

(ii) Three volume controls below the ON/OFF switches. These provide further listening services on UHF, ADF or ILS, and VHF. The VHF or UHF volume control must also be turned up when using the appropriate SPEAK LISTEN service (see (iii) below).

(iii) A rotary SPEAK LISTEN switch at the bottom of the box. This switch allows selection of the following five services:

Conference I-C

HF

UHF

VHF

NORMAL I-C

With this switch OFF and the I-C listening switch OFF, a crew member can isolate himself from the rest of the crew when listening to incoming signals.

(iv) A spring-loaded CALL switch on the right of the SPEAK/LISTEN switch.

This switch is used, in conjunction with the I-C position of the SPEAK/LISTEN switch, to call all crew member, regardless of their selections.

(v) A NORMAL/OFF/DIRECT switch, to the left of the SPEAK/LISTEN switch.

On NORMAL, incoming signals are fed through a two-valve amplifier, powered by a fused 28-volt supply. The fuse and a spare are on the front of the box. If fuse or valve failure occurs, selection of DIRECT will by-pass the amplifier and switch it off. Only the selected SPEAK LISTEN facility will be available (at reduced volume) and the LISTEN ONLY switches will be inoperative.

(c) Both pilots have press-to-transmit buttons on their control columns. The AEO has a press-to-transmit button and a morse key. No transmission facilities are provided for the navigators.

(d) *Control of services*

The control of the various services fed to the station boxes is as follows:

(i) *Pilot*

HF control but no selection

UHF (pre-Mod. 3881) and VHF selection

ILS switching and selection

ILS/ADF/TACAN audio selection

UHF tone selector switch

Airborne warning (2nd pilot only)

(ii) *AEO*

Airborne warning /monitor

HF

ECM

I-C/NORMAL/EMERGENCY/switch

Conference I-C ON/OFF switch

UHF (pre-Mod. 3881) and VHF but no selection

(iii) *Nav./plotter*

ADF

(iv) *Nav./radar*

Tone release

Navigation Radio and Radar

8 Radio compass (ADF)

The radio compass controller and the manual loop controller are at the nav./plotter's position, while the selection of either ILS, ADF or TACAN audio signals is controlled by a switch on the 1st pilot's console. A repeater indicator is on the 1st pilot's instrument panel. A circuit breaker on panel BB controls the 28-volt supply.

9 ILS

The ILS channel selector is on the spine between the pilot's escape hatches, the master ON/OFF switch is on the 1st pilot's side panel. Two marker lights are provided on pilot instrument panels AA & AB. The indicator is on panel A (Mk. 1 only).

10 Radio altimeter Mk. 5

NOTE: Mod. 3144 deletes the installation.

A radio altimeter Mk. 5 is on the 2nd pilot's panel AB, with limit lights; limit lights are also provided on 1st pilot's panel AA. The limit switch is on the port console and the supply switch is adjacent.

11 Green Satin and GPI

(a) Green Satin is installed. The control unit and associated GPI Mk. 4 are at the nav./plotter's position.

(b) The system is supplied by the Green Satin type 153 inverter.

12 Gee Mk. 3

The control unit for the Gee Mk. 3 is at the nav./plotter's position. The electrical supply ON/OFF switch is on panel BC. The system uses 28-volt DC from feeder 8P7 and Phase A of No. 2 Type 350 inverter.

13 Radio altimeter Mk. 6A

The radio altimeter Mk. 6A indicator/control unit is on the nav./radar's panel CAJ. The system uses 28-volt DC from feeder 8P7 and Phase A of No. 2 Type 350 inverter. The supplies are controlled by a switch on panel CA.

Operational Radio and Radar**14 NBC and H2S**

(a) The navigational bombing systems (NBS Mk. 1) is installed. The system basically consists of the H2S Mk. 9A installation and the navigation and bombing computer Mk. 2. The controls and indicators for the system are at the nav./radar's position and the pilots' centre panel A.

(b) The system is supplied from No. 1 Type 350 inverter and the 28 volt DC and 112 volt DC bus-bars. The supplies are controlled by switches and circuit breakers on panel CA.

15 IFF Mk. 10

IFF Mk. 10, with SIF and I/P facilities, is installed. The controls are on the AEO's facia panel. The system uses 115-volt AC 1600 c/s from No. 2 Type 350 inverter, 28-volt DC from feeder 8P7. The supplies are controlled by the IFF switch on panel CA.

16 Tacan

Tacan is fitted; it has an AIR/GROUND or AIR/AIR capability and is controlled by an ON/OFF switch at the nav./plotter's position. A repeater indicator is fitted on the co-pilot's front panel. The power supplies are from a 28-volt inverter fed from No. 1 LV bus-bar and controlled by an INVERTER ON/OFF switch also at the plotter's position.

17 UHF D/F

UHF D/F equipment is fitted which provides the ADF facility of the PTR 175 or ARC 52. When used in conjunction with the Tacan installation it indicates the range and relative bearing of the receiver aircraft from the tanker. The bearing indicator is fitted at the nav./plotter's station adjacent to the AIR/GROUND bearing indicator. Power supplies for the D/F circuits are 115-volt AC, from the Flight Instrument inverter and 28-volt DC.

Radio Equipment—Three-point Tanker**18 VHF/UHF, PTR 175**

(a) Twin VHF/UHF PTR 175 sets are fitted in Mk. (K) 1 aircraft and one ARC/52 and one PTR 175 in the Mk. (K) 1A. These are located on the floor of the fin compartment and the plenum chamber respectively and known as RT1 and RT2. It is possible to select 370 channels between 115 and 135.95 MC/S (VHF) and 3,500 channels between 225 and 399.95 MC/S (UHF) or 19 preset channels two of which are tuned to 243 MC/S and 121.5 MC/S respectively. In addition a separate receiver allows a pre-set guard frequency between 238 and 248 MC/S to be superimposed on any selected channel. MCW transmission is available if required.

(b) The two control units which are situated on panel AT (RT1) and at the AEO's position (RT2) have the following controls.

(i) A 20-position rotary switch giving selection of 18 preset channels, the guard frequency (channel G) and MANUAL. ▶

- ◀ (ii) Three manual control switches. The first switch selects the first two figures (hundreds and tens) of the desired frequency in tens, the second selects the third figure (units) and the third selects the decimals. These switches are only operative when MANUAL is selected on the 20-position switch.

(iii) A volume control.

(iv) A seven-position function switch giving selection of:

OFF

T/R (normal transmission and reception)

T/R & G (normal transmission and reception plus the guard frequency superimposed)

ADF (used with direction finding equipment)

DL

DL/T

T/R ON—DL OFF

} inoperative

(c) Tone switches marked RT1, RT2, are on the port console and panel CP.

(d) It is possible to reset the preset channels in the air if necessary. To do so the cover plate on the control unit is removed by undoing the milled screws. The channel selector is then turned until the number to be selected is indicated on the resetting panel (this will not correspond to the selector switch indicators). The resetting pins are then moved to the required positions and the cover plate replaced.

(e) *Power supplies*

The 28-volt DC supplies for the twin installation are derived from the LV bus-bars via the VHF1/VHF2 circuit breakers on panel BB.

19 HF, Collins 618-T3

(a) Collins HF radio is fitted. It provides 21,750 channels spaced 1 K/C apart in the frequency range 2.75 to 24.5 MC/S. The remote controller is at the AEO's station and has the following controls:

(i) Four knobs which select the required frequency in MC/S and to three decimal places of a megacycle.

(ii) A six-position function switch giving selection of:

OFF

USB . . . Upper Side Band R/T

LSB . . . Lower Side Band R/T

AM . . . Amplitude Modulation (Double Side Band) R/T

DATA . . . Inoperative

CW . . . W/T using the AEO's morse key.

(iii) A volume control marked RF SENS.

(b) An antenna control unit is mounted adjacent to the controller, its purpose is to enable the transmitter output to be matched to the suppressed aerial in the wing root.

20 Intercomm, general

(a) The intercomm. system operates through type UA60 station boxes at all crew stations including the sixth seat and prone bombing positions. Each station box incorporates its own amplifier and the whole system is controlled by a NORMAL—I/C—ON/OFF switch at the AEO's position. The power supply is 28-volt DC and each station box has its own fuse. Two additional amplifiers, types UA6070 and UA563A provide external and conference intercomm, the ON/OFF switches for these are also at the AEO's position.

(b) Additional intercomm. points are provided in the external network at the front fuselage, plenum chamber, rear compartment, underside of the port side of the nose, snatch disconnect point, radio rack and airbrake position.

21 Intercomm, controls

(a) All crew members have identical station boxes which provide the following facilities.

(i) Selection of any one of four TRANSMITTER services.

- 4 (ii) Mixing of incoming radio and intercomm. signals without interference with other crew members' selections.
- (iii) The ability to call other crew members on intercomm. irrespective of the services they may have selected.
- (b) The station boxes have the following controls:
- (i) Push on/push off facility switches incorporating a rotary volume control, which allow reception of the following services:
- RT1 and RT2
 - HF
 - CONFERENCE intercomm.
 - I/C
 - ADF (Voice and Range)
 - RADAR WARNING (Monitor and Alarm)
 - ILS
 - TACAN
 - OVERRIDE (To speak to all other crew members irrespective of the services they may have selected).
- (ii) A rotary TRANSMITTERS switch located at the bottom of the box permits selection of the following services:
- RT1 . . . No. 1 PTR 175 set (or ARC 52 Mk. (K) 1A)
 - RT2 . . . No. 2 PTR 175 set
 - HF . . . Collins 618-T3
 - CONF . . . Conference intercomm.
- (iii) A call light which when pressed illuminates the call lights at all other stations thus attracting the attention of any crew member off intercomm.
- (iv) A NORMAL/EMGY switch which when selected to EMGY on a faulty station box, maintains intercomm. provided the offending box is also selected to RT1 or RT2. It should be noted that selection of any other service on the box operating on EMGY causes that service to be heard by all crew members.

(c) Both pilots have press-to-transmit buttons on their control columns. Press-to-transmit switches are also fitted at the nav./plotter and prone bombing positions, whilst the AEO has a press-to-transmit switch and a morse key.

(d) *Control of services*

The control of the various services fed to the station boxes is as follows:

(i) *Pilot*

- HF control but no selection
- RT1 control and selection
- RT2 control but no selection
- ILS control and selection
- Tone selection
- RADAR WARNING (co-pilot only)

(ii) *AEO*

- RADAR WARNING control and selection
- HF control and selection
- RT2 control and selection
- RT1 control but no selection
- NORMAL intercomm.
- CONFERENCE intercomm.
- EXTERNAL intercomm.

} ON/OFF switches

(iii) *Nav./plotter*

- ADF control and selection
- TACAN control and selection
- RT1 control but no selection
- RT2 control and selection (controller is situated between AEO and plotter).

(iv) *Nav./radar*

- TONE RELEASE control and selection
- Navigational Radio and Radar.

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