

PART 1

Chapter 9 — RADIO AND RADAR CONTROLS

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1 UHF equipment

(a) The UHF installation comprises two sets, one ARC 52 (main) for normal use and a standby set. The main set provides 1750 channels from 225.0 MHz to 399.9 MHz at 100 KHz spacing. The standby set provides two channels only, normally pre-tuned to 243.0 MHz and 243.8 MHz.

(b) The ARC 52 control unit is on the centre panel and has integral illumination controlled by an adjacent dimmer switch. A press-to-transmit switch is on each throttle lever twist grip and a press-to-mute switch is on the centre pedestal. The control unit has the following controls:

<i>Control/Marking</i>	<i>Function</i>
Four-position function switch: OFF/TR/TR +G/ADF	<p>OFF — The main set is switched off.</p> <p>TR — Transmission and reception of signals on the selected frequency are possible.</p> <p>TR + G — In addition to normal communication facilities on the selected channel a separate receiver provides a listening watch on the guard frequency of 243.0 MHz.</p> <p>ADF — Non-operative in this installation.</p>
Twenty-position selector switch: CHAN — 1 to 18/M/G	Selects any one of 18 pre-tuned channels, manual tuning (M) or guard frequency (G) on the main set.
Four rotary controls with digital indicators: MANUAL	Used for manual selection of any one of 1750 frequency channels. The knobs from left to right select hundreds, tens, units and tenths of MHz, the appropriate digits appearing in windows above the knobs.
Rotary selector: VOL	Controls the volume of the audio output.

(c) On the cockpit port wall are:

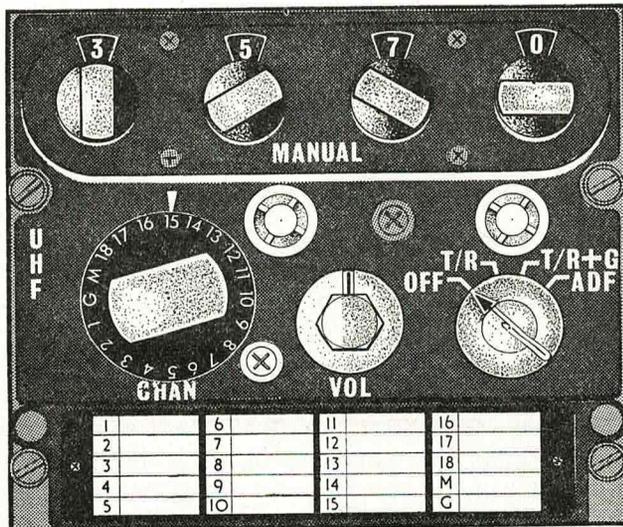
(i) A MAIN/STBY/STBY EMERG BATT switch. When MAIN is selected, the mic/tel socket and press-to-transmit switch are connected to the main set. At STBY the mic/tel socket and press-to-transmit switch are transferred to the standby set and the standby set is switched on. When STBY EMERG BATT is selected the standby set remains in use but the power supplies are switched from the aircraft's DC busbar to the emergency battery. To conserve the aircraft main batteries in generator failure conditions, STBY

EMERG BATT should be selected and the UHF control unit switched off.

(ii) A STBY — GUARD/ALTVE switch to select the guard frequency or the alternative channel of the standby set. It should be left at GUARD (243.0 MHz), the ALTVE (243.8 MHz) is normally only used for testing purposes.

(iii) A TONE — ON/OFF switch. When ON is selected the main transmitter is modulated between 920 and 1120 Hz for direction finding or emergency purposes. The switch is spring-loaded to the off position.

(d) Post SRIM 3130, PTR 175 v/UHF is fitted in lieu of ARC 52 UHF. The equipment provides 370 channels in the VHF band (117.50 to 139.95 MHz) and 3500 channels in the UHF band (225.0 to 399.95 MHz) at 50 KHz spacing. The controls are similar to those on the ARC 52 except that only three rotary controls are provided for frequency selection and the function switch has an additional three positions all of which are inoperative in this installation. Frequencies outside the operating band of the equipment can be selected but are inoperative.



UHF (ARC 52) Control Unit

2 Telebriefing

The landline socket is at the underside of the rear fuselage, forward of the tail bumper. When the plug is connected the UHF circuit is de-energised and an amber warning light on the port shelf indicates that telebriefing is in use. The pilot's press-to-speak button is adjacent to the warning light.

3 Intercomm A 1961

(a) The intercomm amplifier is controlled by two switches above the starboard shelf labelled ON/OFF and EMERGENCY/NORMAL.

(b) When the ON/OFF switch is set to ON the amplifier warms up and is available within 30 seconds. With the EMERGENCY/NORMAL switch at NORMAL all intercommunication is via the A1961 amplifier. Pressing either pilot's press-to-transmit switch isolates that pilot's microphone from the circuit.

(c) If the power supply to the amplifier fails, or if switched off, setting the EMERGENCY/NORMAL switch to EMERGENCY connects the pilot's microphones to the microphone line of the UHF transmitter-receiver and the pilot's earphones to the audio-frequency output line of the transmitter-receiver, thus providing emergency intercomm. It should be noted that all conversation will be broadcast should either press-to-transmit switch be pressed.

(d) If the amplifier fails, both intercomm and UHF reception is lost until the amplifier is switched to OFF or EMERGENCY.

4 DME — Rebecca Mk 8 (pre Mod 1321)

(a) DME is capable of measuring ranges from selected beacons up to a maximum of 200 nm at a height of 25000 feet or above. Range and homing information is presented on a meter on the centre instrument panel; a DME control unit is above the port shelf.

(b) The control unit has the following controls and switches:

(i) A six-position OFF/SB/200/20/BAT/BAH rotary control; this is the main function and range control. SB is the standby position, selected to allow the set to warm-up prior to use. When 200 is selected the range pointer of the range and heading meter sweeps the scale from 0 to 200 nm every 17 seconds until the equipment locks on to a beacon. Selection of 20 reduces the maximum range indication

to 20 nm and the rate of sweep from 0 to 20 nm every 3 seconds. BAT and BAH are not in use.

(ii) A transmitter frequency selector, TX, which selects any one of eight interrogator channels, lettered from A to H.

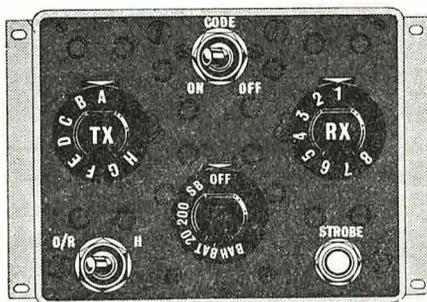
(iii) A receiver selector switch, RX, which selects any one of eight receiver channels, numbered from 1 to 8.

(iv) A CODE — ON/OFF switch which provides audio muting of the beacon call sign when OFF is selected.

(v) A two-position aerial switch labelled O/R and H which selects an omni-directional aerial for the reception of beacon signals when in the O/R position and port and starboard directional aerials when in the H position. The omni-directional aerial is positioned to give maximum range to the equipment.

(vi) A STROBE release button which disconnects the lock circuit and permits the equipment to recommence searching.

(c) The DME indicator has a range pointer moving over a scale calibrated from 0 to 20, indicating range up to a maximum of 200 nm when 200 is selected on the function switch and 20 nm when 20 is selected. Homing information is provided by a vertical pointer moving relative to a fixed datum and indicating the direction in which the



DME Control Unit

aircraft must be turned to head towards the beacon. An OFF flag appears on the face of the indicator when the function switch is at OFF or SB.

NOTE: When the function switch is set to SB and the aerial switch set to H, a $\frac{1}{2}$ or 5 nm deflection is shown on the indicator. The flag shows OFF and serves as a reminder that the equipment is in the SB condition.

(d) Four aerials are fitted, a transmitter aerial in the engine starter door, an omni-directional receiver aerial in the engine access door and a directional receiver aerial in each air intake.

(This equipment is replaced by Tacan when Mod 1321 is embodied).

5 Radar ranging (pre Mod 1321)

NOTE: The aircraft should not be landed with the system switched on.

(a) The radar ranging ON/OFF switch is on the forward end of the port shelf. An adjacent magnetic indicator shows white when radar ranging is in use and black when not in use.

(b) Radar ranging automatically provides the GGS with target range information within the limits of 200 — 800 yards. The radar searches from maximum range down to minimum range until a target is found. If no target is found within the search area the search is automatically repeated. When a target is found the radar locks on to it, and a blue light on the right of the GGS illuminates. An adjacent amber light illuminates at a pre-set range from the target to indicate that the target is within firing range. The radar ranging lights may be tested by pressing the TEST button on the instructor's GGS control unit with the GGS master switch ON.

(c) A spring-loaded TARGET REJECTION — IN/OUT switch is on the port wall. Its function is to unlock the radar from an unwanted target or to check that it is locked on to the correct target. When IN is selected, the radar unlocks from the target and searches inwards to minimum range. If no fresh target is found the normal search cycle commences whether the switch is retained at IN or not. When OUT is selected the radar unlocks from the target and searches outwards to maximum range. It will remain at maximum range if the switch is retained at OUT but, when released, the normal search cycle is commenced. A second target rejection switch is on the centre panel for use by the instructor.

(d) A RADAR PRESENTATION — ON/OFF switch is on the port side of the pupil's instrument panel. At the OFF position the radar ranging is disconnected from the range mechanism of the gunsight to counteract the effect of a target using ECM; manual ranging may then be accomplished.

6 Radio compass

(a) When Mod 995 is embodied a sub-miniature radio-compass is fitted. The radio compass provides automatic direction finding and normal MF radio reception. The bearing indicator is on the central instrument panel and the system is controlled by a control unit and a UHF/MIX switch, also on the central instrument panel.

(b) The control unit has the following facilities:

(i) An ON/off switch which controls the DC supply to the instrument.

(ii) An ADF/REC switch which controls the RF and IF amplifiers. When switched to ADF, automatic direction finding is in operation. When set to REC, the automatic direction finding is inoperative and the unit functions as a conventional MF receiver.

(iii) A frequency band three-position lever-operated rotary selector switch.

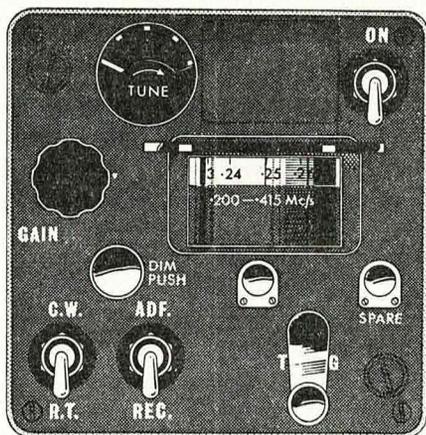
(iv) A TUNING control handle and TUNE indicator. Indication of signal frequency is given by the scale on the tuning dial drum and signal strength is indicated by a clockwise deflection of the tuning indicator needle.

(v) A GAIN control to regulate the output of the received signals at the pilot's headset.

(vi) A beat frequency oscillator valve CW/RT switch. When set to CW, keyed continuous wave stations are received; when set to RT, normal RT signals are received.

(vii) A panel illumination DIM PUSH switch to control the brightness of panel and tuning scale illumination.

(c) The UHF/MIX switch is used to control the audio-output of the compass to the pilot's headset. With the switch at MIX, both radio compass and UHF signals are received. When set to UHF, only UHF is received.



ADF Control Unit

7 Tacan

(a) Post Mod 1321 Tacan replaces DME and ADF; radar ranging and the single Aden gun are also removed by this modification. The control unit is on the centre instrument panel and has the following controls:

- (i) An ON/OFF switch.
- (ii) A BRG/DIST BRG switch. With BRG selected, only magnetic bearing information is presented. At the DIST BRG position both magnetic bearing and distance information is shown. On T Mk 7A aircraft, the BRG position is inoperative.
- (iii) Four channel selector buttons. The top two buttons increase the units and tens by one and the bottom pair decrease the numbers in a similar manner. The channel numbers appear in a central window.
- (iv) A VOLume control.

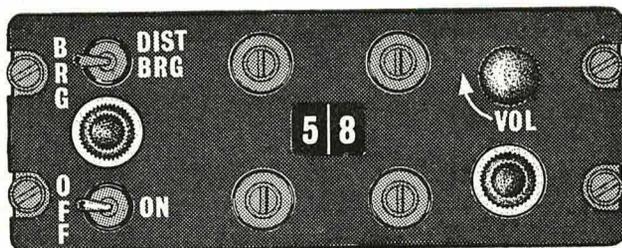
(b) An RT/MIX/BEAC switch is on the cockpit port wall. Tacan signals only are heard on the UHF with the switch selected to BEAC. Both Tacan and UHF reception is heard at the MIX position and only UHF R/T reception when RT is selected.

(c) (i) Tacan bearing and distance information is presented on an indicator on the centre panel. Above the indicator is a TACAN

POWER SPLYS RESET button and a FAILURE magnetic indicator.

(ii) The FAILURE indicator shows black when electrical supplies are available for Tacan, and black/white stripes if they fail or are lacking. Power for Tacan is available whenever a generator is on-line and the weight of the aircraft is taken from the main wheels on take-off; the supplies are maintained after landing and can only be cut by operation of the RESET button prior to the generators coming off-line on shut-down.

(iii) The RESET button may be used to restart the system following a transient failure.



Tacan Control Unit

8 IFF/SSR

(a) Post Mod 1356 (aircraft with Tacan) or Mod 1357 (aircraft without Tacan) IFF/SSR is fitted. The equipment provides automatic identification of the aircraft by transmitting coded pulsed replies in answer to interrogation signals transmitted in various modes by military radar (IFF) stations or by civil secondary surveillance radar (SSR) stations.

(b) A control unit below the starboard instrument panel (Mod 1357) or in place of the port GGS (Mod 1356) has the following controls and indicators:

<i>Control/Marking</i>	<i>Function</i>
<p>Five-position rotary master switch:</p> <p>OFF/SBY/LOW/ NORM/EMGY PUSH</p>	<p>OFF: Inverter and equipment switched off. IFF FAIL light on steady (provided battery master switch on). When set from OFF to any other position, 50 seconds required for warm-up</p> <p>SBY: AC power to equipment. After warm-up, equipment is ready for full operation when selected. Transponder accepts interrogations on a selected mode, but cannot respond. When interrogated, the IFF FAIL light flashes</p> <p>LOW: Transponder functioning but with reduced receiver sensitivity. Used at request of ground station to reduce clutter</p> <p>NORM: Equipment functioning fully, accepting interrogations and responding on selected modes</p> <p>EMGY PUSH: When pressed and turned to EMGY, transponder transmits immediate replies with emergency coding to Modes 1, 2, 3A or B (see also CIVIL/MIL switch) irrespective of settings of mode switches</p>
<p>Four on/off MODE selector switches (up for on):</p> <p>1/2/C/D</p>	<p>1: Transponder will accept Mode 1 interrogation and will reply using selected Mode 1 code</p> <p>2: Transponder will accept Mode 2 interrogation and will reply using a Mode 2 code preset before flight, unique to aircraft</p> <p>C: Transponder will accept Mode C interrogation and in reply will transmit aircraft altitude information when a height encoding altimeter is fitted</p> <p>D: Not in use</p>

<i>Control/Marking</i>	<i>Function</i>
Three-position rotary Mode selector: 3A/OFF/B	OFF: Transponder isolated from Mode 3A or B interrogations 3A: Transponder will accept Mode 3A interrogation and will reply using selected Mode 3 code B: Transponder will accept Mode B interrogation and will reply using selected Mode 3 code
Code number selector for Mode 1 and Mode 3A or B transponder reply: MODE 1 (four digit selectors and digit indicators) MODE 3 (four digit selectors and digit indicators)	Each set of four selectors used to set appropriate code number. Indicators show 0000 to 7777 allowing 4096 possible codes to be set Use MODE 1 selectors for coding Mode 1 replies Use MODE 3 selectors for coding Mode 3A or B replies <small>NOTE: Mode 2 reply codes are preset at the transponder before flight and are not accessible from the cockpit</small>
Two-position emergency coding switch: CIVIL/MIL	Used only in conjunction with EMGY PUSH selection to establish emergency reply codes for 3A/B modes MIL: Normal position. Selected Mode 3 code transmitted CIVIL: Code 7700 automatically selected for emergency reply transmission
Two-position switch (spring-loaded off): I/P	2-second operation triggers an identification signal for 20 seconds, to enable ground station to identify the aircraft from other aircraft replying with the same selected code

Control/Marking	Function
Self-test push switch incorporating a double filament green light: TEST	With equipment switched on and warmed up, pressing switch self-tests receiver sensitivity, transmitter power output and mode serviceability. Set NORM, press TEST button (after 50 second warm up). If check satisfactory TEST light comes on (IFF FAIL light should be/go out). Unsatisfactory test indicated by steady FAIL light and no TEST light. Flashing FAIL light if master switch at SBY. Steady FAIL light if switch at OFF or LOW. Pressing TEST when LOW selected may inhibit self-test process. To reset, select NORM press TEST

(c) The operating modes and codes to be used are normally established before flight, but the ground radar station controlling the flight can, using voice communication, request particular modes and codes to be selected as required. Codes 7600 and 7700 are selected only in emergency situations to give the ground station a particular read-out alarm signal.

- (i) Code 7600 — to indicate that the aircraft has suffered total voice communication failure.
- (ii) Code 7700 — to indicate that a special emergency exists in the aircraft.

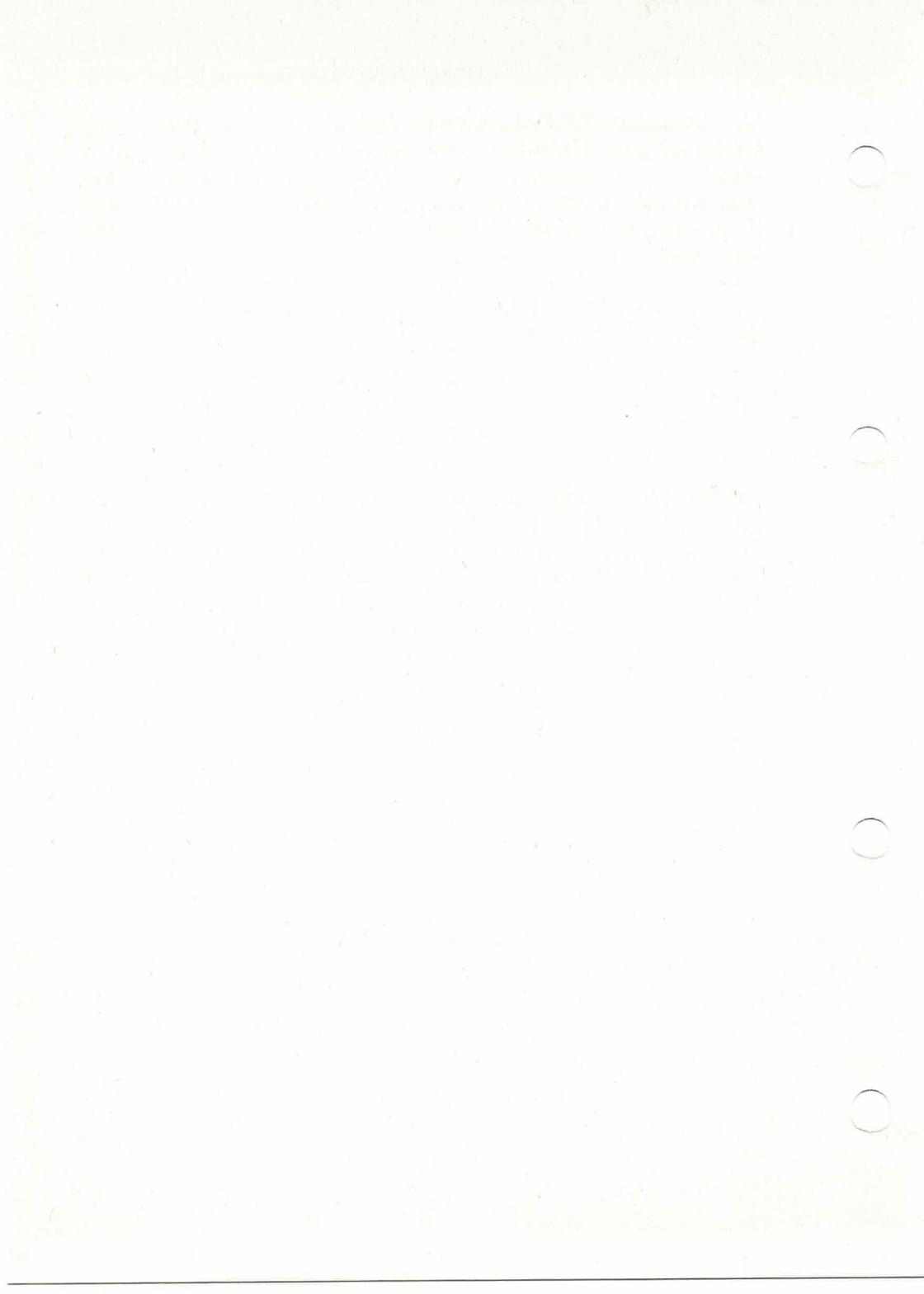


IFF/SSR Control Unit

(d) An amber IFF FAIL warning light with a press-to-test facility for checking the filaments of both the fail light and the test light is adjacent to the control unit. The light illuminates with the battery master switch on and the IFF/SSR master switch off. The light flashes if the transponder is being interrogated but is unable to reply because the master switch is at SBY. If the light comes on steady with the master switch at NORM, operate the test switch on the control unit; if a fault condition is confirmed, switch off the equipment to avoid the possibility of overheating.

(e) The lighting of the control unit is controlled by a DIM/off/BRIGHT switch adjacent to the control unit (Mod 1356) or by one of the two centre instrument panel dimmer switches on the centre panel (Mod 1357).

(f) The 28v DC supply is taken from the main electrical system. In Mod 1356 aircraft the 115v 400 Hz AC supply is provided by the type 108 (Tacan) inverter with a type E182 static inverter as standby; the changeover is automatic if the type 108 inverter fails. The type E182 inverter may be checked by switching on the IFF/SSR before take-off. In Mod 1357 aircraft AC power is provided by a type E182 static inverter which is controlled by the master switch on the IFF/SSR control unit; there is no standby AC power supply.



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