PART 1

CHAPTER 13—COMMUNICATIONS EQUIPMENT

Contents

CONTROLS AND INDICATORS

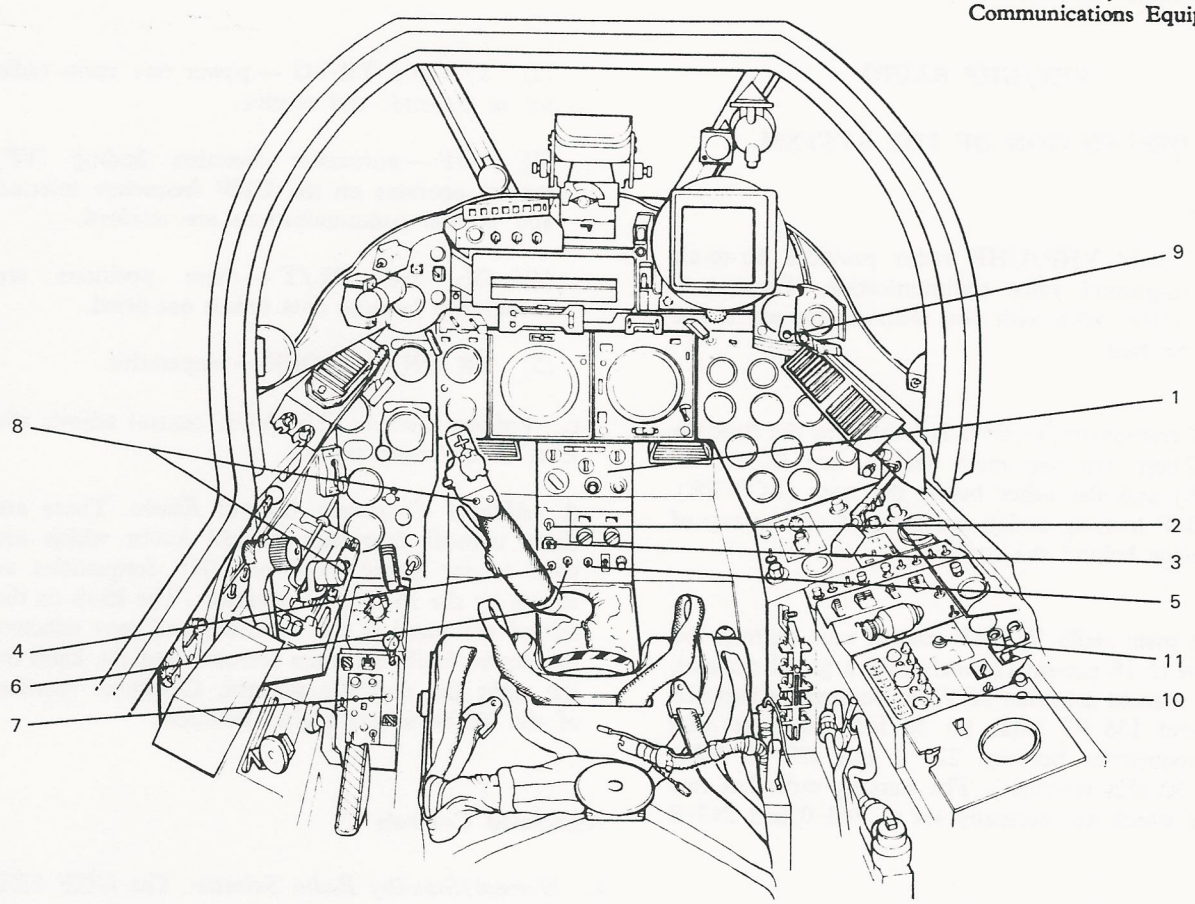
1. The controls and indicators of the communications equipment are listed in Table 1 and their locations shown in Fig 1 for the F Mk 3 and F Mk 6. For details of the T Mk 5, refer to Table 2 and Fig 2.

Table 1 — Controls and Indicators — F Mk 3 and F Mk 6

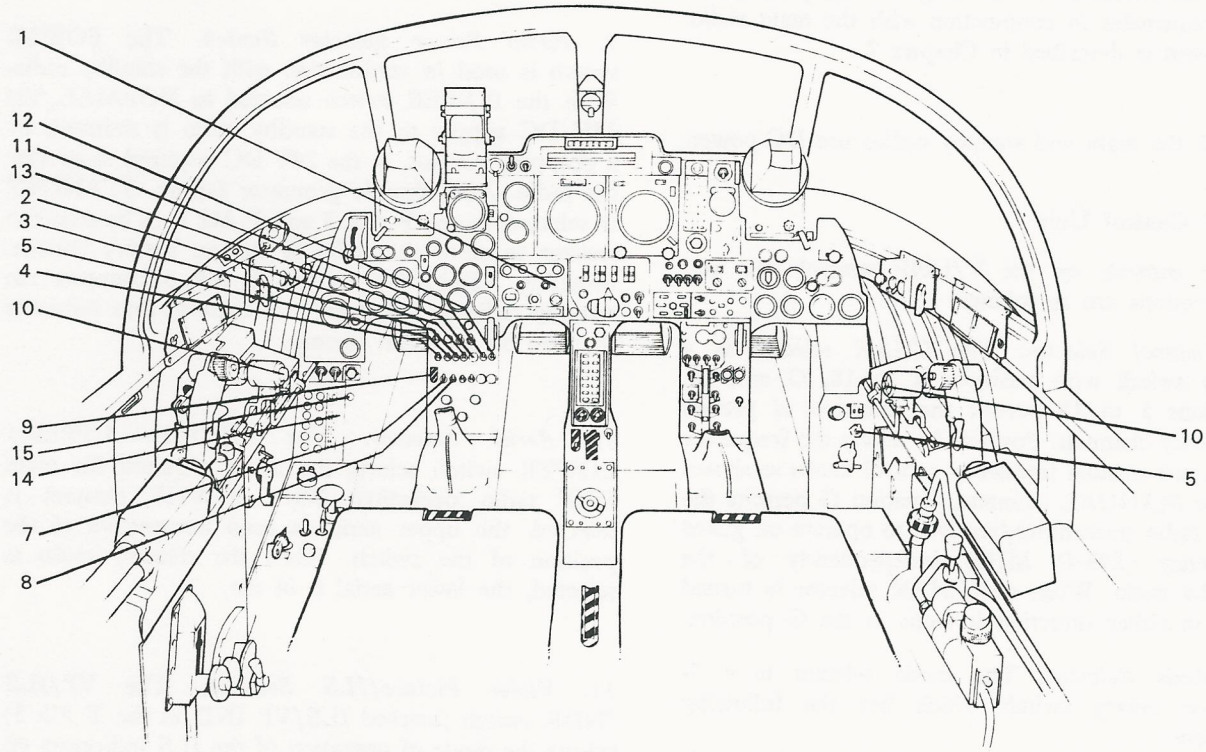
Item No	*Item*	*Markings*	*Remarks*
1	V/UHF control unit	See text	—
2	Normal/standby radio selector	UHF SET — NORMAL/STANDBY	—
3	Radio power selector switch	POWER — NORMAL/STANDBY	—
4	Aerial selector	AERIAL — UPPER/LOWER	—
5	Violet Picture/ILS selector	VP/ILS INDR	—
6	Violet Picture sensitivity switch	VP SENS — MAX/MIN	—
7	Standby radio channel selector	UHF STANDBY — GUARD/ CHANNEL A	—
8	Press-to-transmit switches (2)	—	—
9	Telebrief light/transmit button	TELEBRIEF	—
10	IFF/SSR control panel	See text	—
11	IFF fail light	IFF FAILURE	—

Table 2 — Controls and Indicators — T Mk 5

Item No	*Item*	*Markings*	*Remarks*
1	V/UHF control unit	See text	—
2	Normal/standby radio selector	UHF SET — NORMAL/STANDBY	—
3	Radio power selector switch	UHF POWER — NORMAL/STANDBY	—
4	Aerial selector	UHF AERIAL — UPPER/LOWER	—
5	UHF mute switches (2)	UHF — NORMAL/MUTE	Spring-loaded switches
6	UHF mute button (post-mod 4768)	—	On instructor's control column. Not illustrated
7	Violet Picture/ILS selector	ILS/VP IND	—
8	Violet Picture sensitivity switch	VP METER SENSITIVITY — MAX/MIN	—
9	Standby radio channel selector	UHF STBY — GUARD/ CHANNEL A	—
10	Press-to-transmit switches (4)	—	Those on control columns not illustrated
11	Intercom control switch	INTERCOM — ON/OFF	—
12	Emergency intercom switch	INTERCOM — NORMAL/EMERGY	—
13	Telebrief light/transmit button	TELEBRIEFING	—
14	IFF/SSR control panel	See text	—
15	IFF fail light	IFF FAILURE	—



1—13 Fig 1 — Controls and Indicators — F Mk 3 and F Mk 6



1—13 Fig 2 — Controls and Indicators — T Mk 5

VHF/UHF RADIO

DESCRIPTION OF THE SYSTEM

General

2. The main VHF/UHF radio provides air-to-air and air-to-ground voice communication. There is a standby UHF radio with two channels for use if the main radio fails.

3. The transmitter/receiver is located in the fuselage spine. There are two main aerials, one in the fin (UPPER) and the other below the nose (LOWER). Two UHF homing aerials are situated on the top of the fuselage behind the cockpit.

4. The main radio V/UHF control unit controls the operation of 18 pre-set channels plus a guard channel, and the manual selection of VHF frequencies between 117·5 and 135·95 MHz (at 50 kHz intervals) and UHF frequencies between 225·0 and 339·95 MHz (also at 50 kHz intervals). The standby radio has two channels which are normally set to 243·0 and 243·8 MHz.

5. The Violet Picture (VP) homing facility uses the ILS presentation on the navigation display to indicate homing information. VP homing is only possible on UHF frequencies in conjunction with the main radio. The system is described in Chapter 7.

6. Both the main and standby radios use DC power.

V/UHF Control Unit

7. The controls on the V/UHF control unit and their functions are as follows:

a. *Channel Selector.* The CHAN selector is a rotary switch with positions 1 to 18, G and M. Positions 1 to 18 permit the selection of pre-set frequency channels. Position M selects the frequency set by the manual frequency control knobs as shown on the MANUAL counters. Position G permits the main radio transmitter/receiver to operate on guard frequency (243·0 MHz) independently of the standby radio. When the CHAN selector is turned fully in either direction it stops in the G position.

b. *Mode Selector.* The mode selector is a 7-position rotary switch which has the following positions:

(1) OFF — main radio off.

(2) T/R and TR+G — power on: main radio set to transmit and receive.

(3) ADF — automatic direction finding (VP) system operates on the UHF frequency selected and normal communications are retained.

(4) DL and DL/T — these positions are inoperative because data link is not fitted.

(5) TR ON D/L OFF — inoperative.

c. *Volume Control.* The VOL control adjusts the level of incoming signals.

d. *Manual Frequency Control Knobs.* There are three manual frequency control knobs which are used to set either VHF or UHF frequencies as shown by the MANUAL counters. The knob on the left of the panel is the hundreds and tens selector, the centre knob the units selector, and the knob on the right the decimals selector. Clockwise rotation of the knobs selects higher numbers.

Associated Controls

8. *Normal/Standby Radio Selector.* The UHF SET switch controls the selection of the main radio (NORMAL) or the standby radio (STANDBY).

9. *Radio Power Selector Switch.* The POWER switch is used in conjunction with the standby radio. With the POWER switch selected to NORMAL, the 28V DC supply to the standby radio is reduced, by a dropping resistor, to the 24V DC required to operate the radio. After double generator failure, STANDBY is selected in the F Mk 3 and F Mk 6 to by-pass the resistor to allow the radio to run on battery voltage. Selecting STANDBY in the T Mk 5 connects the standby radio to the emergency battery, thus reducing the load on the main battery.

10. *Aerial Selector.* The AERIAL — UPPER / LOWER switch selects the aerial required for main UHF radio operation. When a VHF channel is selected, the upper aerial is used irrespective of the position of the switch. When the standby radio is selected, the lower aerial is in use.

11. *Violet Picture/ILS Selector.* The VP/ILS INDR switch (marked ILS/VP IND in the T Mk 5) selects the mode of operation of the ILS indicators on the navigation display.

12. *VP Sensitivity Switch.* The VP SENS (VP METER SENSITIVITY, T Mk 5) switch has positions MAX/MIN to select the sensitivity of the homing indication when VP is in use.

13. *Standby Radio Channel Selector.* The UHF STANDBY (UHF STBY, T Mk 5) 2-position switch selects the standby radio frequency. It is normally left at GUARD in flight; CHANNEL A is used for ground testing purposes.

14. *Transmit Switches.* In the F Mk 3 and F Mk 6 there are two press-to-transmit switches, one on the control column and the other on the No 2 engine throttle. In the T Mk 5 four transmit switches are provided, one on each control column and one on each inboard throttle.

15. *Muting Switches (T Mk 5 Only).* Two UHF — NORMAL / MUTE switches, spring-loaded to NORMAL, are on panels A3 and A6 to permit interference-free intercom. ▶◀ A spring-loaded press-to-mute button is also provided on the instructor's control column.

Intercom

16. The T Mk 5 is equipped with an intercom amplifier. The system is controlled by two INTERCOM switches labelled ON/OFF and NORMAL/EMERGY. When ON and NORMAL are selected, normal intercom is provided through the amplifier. If the power supply to the intercom amplifier fails, intercom facilities are automatically provided by the side-tone of whichever radio is in use. If the amplifier itself fails, both intercom and radio reception are lost until EMERGY is selected.

17. In all three marks, provision is made for external intercom via a socket in the right wheel well.

Telebriefing

18. A telebrief line can be connected at a socket in the right wheel well. When the connection is made, the light in the TELEBRIEF button comes on and all mic/tel circuits are transferred from the aircraft's internal circuits. The main and standby radios cannot be used when the telebrief connection is made. To transmit to the telebrief centre, the TELEBRIEF button is pressed.

19. The telebrief system takes its power from the Battery busbar.

MANAGEMENT OF THE SYSTEM

20. With external or internal power on line, check that the POWER switch is to NORMAL and, in the T Mk 5, set the INTERCOM switches to ON and NORMAL. If using the main radio on UHF frequencies, set the AERIAL switch as desired. The main and standby radios are normally tested before taxying.

MALFUNCTION OF THE SYSTEM

Transmitter Failure

21. If it becomes apparent that the transmitter has failed, try the alternative transmit button.

Main Radio Failure

22. If the main radio fails, make the following attempts to regain 2-way communications:

◀ a. Select alternative aerial (see Note).

b. If using a pre-set channel, try a manual frequency (and vice versa).

c. Check the pigtail connection from the helmet.

d. If using UHF, try a VHF frequency (and vice versa).

e. Select the standby radio; if unsuccessful, reselect the main radio on channel G.

f. Check the PEC and relock (leg restraints also have to be relocked).

Note: If both aerials are suspect, select ADF and a UHF frequency and use the VP aerials; reception range is reduced.

23. After main and standby radio failure it is possible to receive one-way voice communication from ATC by switching ON the ILS and turning up the ILS VOL control. The IFF code for radio failure on mode 3A is 7600. ▶

IFF/SSR IDENTIFICATION SYSTEM

DESCRIPTION OF THE SYSTEM

General

24. The IFF/SSR system, when operating, automatically transmits identification signals in reply to

challenge signals from surface or airborne interrogators. In addition, the equipment can be selected to transmit an identification of position (I/P) signal or an emergency signal.

25. The transponder system decodes incoming signals to ascertain the mode. If this mode is selected on the IFF control panel, a coded reply is triggered in response. The IFF/SSR modes are listed in Table 3.

Table 3 — IFF/SSR Modes

Mode	*Use*	*Control*
1	General military control and Command identification. Airways crossing under ATCRU control	Military radar or ATCRU
2	Identification of specific aircraft	Air Defence Radar stations
3/A	ATC purposes and airways crossing	Military, civil and joint ATC centres
B	An extension of mode A to give increased cover in confined spaces which have a dense flow of traffic	As mode 3/A
C	Automatic altitude reporting	As mode 3/A
D	Not used	—

Control Panel

26. The control panel switches and their functions are listed in Table 4.

IFF Fail Light

27. A green IFF FAILURE light is adjacent to the control panel. It has a press-to-test facility which also tests the blue or amber TEST light on the control panel. The IFF FAILURE light comes on if the TEST button/light has been pressed and the equipment has failed the test, or as a result of the signal being low or non-existent. It also comes on when:

a. The rotary function switch on the control panel is set at OFF.

b. The rotary function switch is set to SBY and the transponder is being interrogated but cannot reply (flashing light).

c. Transponder is unserviceable when under interrogation.

d. Rotary function switch is set at LOW during self-test procedure.

Power Supplies

28. The IFF/SSR system uses 115V, single-phase, 400 Hz AC and 28V DC. The system is inoperative after AC failure.

MANAGEMENT OF THE SYSTEM

29. With power supplies available, set the rotary function switch to SBY and, after a 50-second warm-up period, the IFF/SSR is ready for use. Set the required codes and modes and, when appropriate, select NORM and test the system. Re-select SBY until required for use.

30. The operating modes and codes to be used are normally established before flight, but ground radar stations may request particular codes or the de-selection of particular modes.

31. *Emergency Mode.* When the rotary function switch is pressed and turned fully clockwise to the EMGY position, emergency replies are transmitted in response to interrogation in modes 1, 2, 3A and B, irrespective of other control settings. Emergency replies are also transmitted automatically after ejection (either seat in the T Mk 5) providing the set has had a 50-second warm-up period.

MALFUNCTION OF THE SYSTEM

IFF Fail Light

32. If the IFF FAILURE light comes on with the function switch to NORM, press the TEST button. If the light remains on, it is recommended that the equipment be switched OFF as there is a possibility that overheating and internal damage may occur.

Table 4 — IFF/SSR Control Panel

Control: Markings		*Function*
Five-position rotary function switch: OFF/SBY/LOW/NORM/EMGY	OFF	Power supply disconnected. IFF FAILURE light on steady
	SBY	Power to equipment. After 50-second warm-up, transponder accepts interrogations but cannot reply. If interrogated on a selected mode, IFF FAILURE light flashes
	LOW	Equipment functioning but with reduced sensitivity. Used only when requested by ground station to reduce clutter
	NORM	Equipment functioning normally, accepting interrogations and responding on selected modes
	EMGY	When pushed in and turned to EMGY, transponder transmits emergency coding on modes 1, 2, 3A or B (see also CIVIL/MIL switch) irrespective of mode switch positions
Four on/off MODE switches (up for on): 1/2/C/D	MODE 1	Transponder replies to mode 1 interrogations using selected mode 1 code
	MODE 2	Transponder replies to mode 2 interrogations using a pre-set code unique to aircraft
	MODE C	Not in use
	MODE D	Not in use
Three-position rotary switch: 3A/OFF/B	OFF	Transponder isolated from mode 3A or B interrogations
	MODE 3A	Transponder replies to mode 3A interrogations using the mode 3 code set
	MODE B	Transponder replies to mode B interrogations using the mode 3 code set
Code number selectors and indicators for MODE 1 and MODE 3A/B transponder replies	Four selectors and indicators for each. Indicators show 0000 to 7777. 4096 codes may be set	
Two-position emergency coding switch: CIVIL/MIL	Used in conjunction with EMGY position to establish emergency reply codes for mode 3A/B only:	
	MIL	Normally used. Selected mode 3A/B code is transmitted in emergency form in reply to interrogation
	CIVIL	Code 7700 is automatically selected for response to mode 3A/B interrogation
Two-position switch (spring-loaded to off): I/P	When operated momentarily and released, an identification pulse is transmitted, added to selected codes in modes 1, 2 and 3A/B	
Self-test facility, a push-button incorporating a double-filament green light: TEST	When pressed with equipment switched on, the facility carries out a check of receiver sensitivity, transmitter power output and mode serviceability. Select NORM, press TEST button: if check satisfactory, green TEST light comes on, IFF FAILURE light out. Unsatisfactory test indicated by IFF FAILURE light and no TEST light	

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