

## Chapter 9

## A.R.I.23143/1

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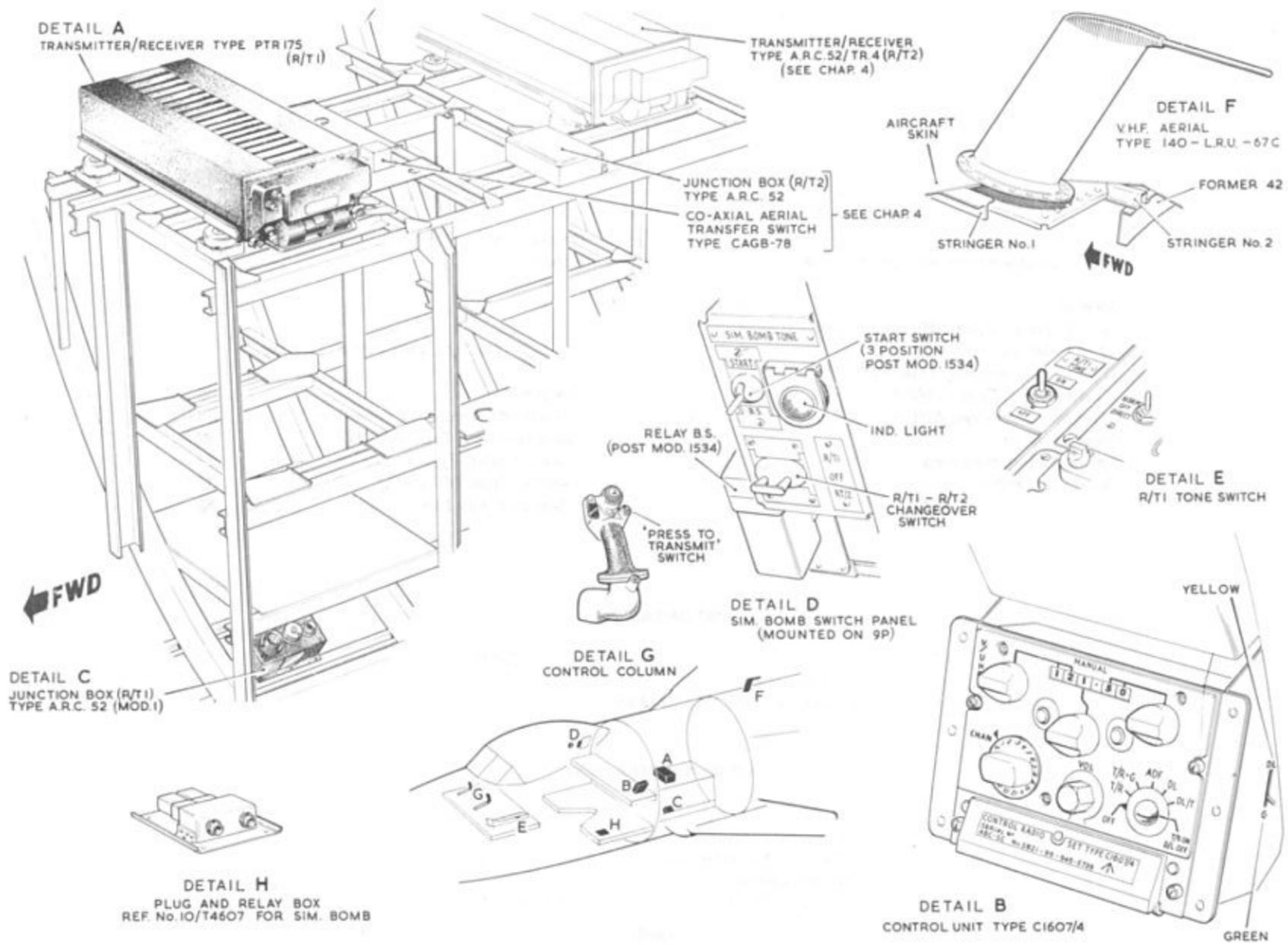


Fig. 1. Component location.

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### Introduction

1. This chapter deals with ARI-23143/1 (dc version) which is a combined multi-channel VHF/UHF transmitter-receiver installation. This installation is a derivative of the existing UHF system ARI-18124/2 which is dealt with in Sect.8, Chap.4.

### General

4. The installation is remotely controlled from a control unit, Type C1607/4, in conjunction with an aerial change-over switch and tone switch. The control unit is mounted at the AEO's position as shown in fig.1 and the aerial and tone switches are located on the pilot's port console. The existing UHF aeriels (upper and lower) belonging to ARI-18124/2 are shared with this installation as described later, and also the existing VHF aerial is connected to the VHF section of this installation.

5. The associated transmitter-receiver, Type PTR 175 and the junction box, Type AN/ARC52, are both located in the nose wheel bay as shown in fig.1. It should be noted that the junction box, Type AN/ARC52, used in this installation, has Mod.1 embodied and therefore should not be confused with a similar junction box, with the same reference number, used in the ARI-18124/2 installation.

6. The aircraft designation for both the ARI-18124/2 and ARI-23143/1 is R/T2 and R/T1 respectively and these references will be used from time to time throughout the following text. Routing charts and the various associated labels in the aircraft carry these references.

2. The transmitter-receiver may be set to operate on any of the 3 500 frequency channels in the 225.0 to 400 MHz UHF range, and 420 frequency channels in the 117.45 MHz to 135.95 MHz VHF range. In addition to R/T transmission and reception, facilities are available for MCW transmission, simulated bombing tone and direction finding purposes.

3. A location illustration of the major components is provided in fig.1, routing charts and a connector table will be found at the end of the text. Descriptive and servicing details for the ARI-23143/1 are given in AP 116D-0105-1 and the reader is advised to consult this AP in conjunction with the information contained in this chapter and also Sect.8, Chap.4.

### DESCRIPTION AND OPERATION

#### VHF aerial, Type 140-LRU-67C

7. The VHF aerial, Type 140-LRU-67C, is connected directly to the transmitter-receiver (R/T1) VHF aerial socket. The vent sleeve aerial is of shark fin design with a short rod projecting horizontally at the rear of the blade. The aerial is mounted on the top of the aircraft fuselage above No 2 fuel tank bay as shown in fig.1.

#### UHF aeriels

8. The two UHF aeriels (upper and lower) used in ARI-18124/2 (R/T2) are shared with this installation (R/T1). The aerial change-over switch and aerial relay, which are part of ARI-18124/2, operate in the following way. When the upper UHF aerial is selected for operation with R/T2 via the aerial change-over switch on the pilot's port console, the lower UHF aerial is automatically connected to the UHF aerial socket of the transmitter-receiver R/T1.

9. When the upper UHF aerial is selected for operation with the R/T1 installation, the lower UHF aerial is automatically connected to the transmitter-receiver R/T2. Further information concerning the UHF aeriels may be found in Sect.8, Chap.4.

#### Transmitter-receiver, Type PTR 175

10. The transmitter-receiver unit comprises a front panel and a main chassis, the unit being mounted on an anti-vibration tray. The front panel contains:-

- Pressure air valve (Scrader)
- External combined dynamotor/airblower
- Multi-pole plug
- UHF aerial socket
- VHF aerial socket

The main chassis, which has various sub-assemblies fitted to it, is enclosed in a double walled aluminium case (pressurised to 18 psig) which functions as a heat exchanger between the outside air and the air inside the case. Air forced between the walls by the blower fitted at both ends of the dynamotor shaft, dissipates the heat absorbed by the inner wall and is exhausted out through vents on the top of the outer case.

11. The transmitter-receiver unit has crystals fitted in the unit to provide 420 channels at 50 kHz spacing in the VHF range and 3 500 channels at 50 kHz spacing in the UHF range. A facility for presetting 18 channels is

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provided, and also a guard receiver which is permanently tuned to monitor the U.H.F. distress frequency band of 238.0 Mc/s to 248.0 Mc/s.

12. A.M.C.W. tone of approx. 1 000 c/s is automatically transmitted when the pilot's tone switch is operated and may be used for emergency or direction finding purposes. The tone generator is also employed in providing a simulated bombing tone as described later.

### *Control unit, Type C.1607/4*

13. The control unit, Type C.1607/4, provides remote control of the installation by operation of various switches, mounted on the front panel. The function switch has seven positions, four of which are used for normal operation. The remaining three positions are not applicable to the Vulcan aircraft installation. The switch positions are as follows:-

- (1) OFF. The power supplies are switched off.
- (2) T/R. The power supply is switched on and the equipment is automatically set for receiving purposes. When it is required to transmit, the push-to-transmit switch must be operated.
- (3) T/R + G. The guard receiver is switched on, while normal transmit-receive facilities on the selected channel are retained.
- (4) A.D.F. The transmitter-receiver is switched to A.D.F. with the appropriate airborne equipment, and includes facilities to permit normal transmission and reception when the A.D.F. position is in use.

- (5) DL. These last three positions are for use with special data link equipment not fitted to Vulcan aircraft.
- (6) DL/T.
- (7) T/R ON  
DL OFF

14. The volume control (VOL) permits the level of the audio signal to be set to the required level. The channel selector switch (CHAN) is a 20-position rotary switch labelled 1 to 18 inclusive, and a further two positions labelled G and M. Each numeral position indicates a preset frequency, which on selection selects the frequency automatically.

15. With the channel selector switch switched to G and the function switch selected to T/R, the guard receiver output is cut off and the main receiver can now receive or transmit at this guard frequency.

16. With the channel selector switch switched to M, the preset frequency selection becomes inoperative and the required frequency is then obtained by manual adjustment of three manual frequency selector switches. The manual frequency selection switches permit one of the 3 500 (U.H.F.) and 420 (V.H.F.) channels to be selected. Figures indicating the selected frequency appear in a small window above the manual control knobs as shown in fig.1.

17. Frequency adjustments for pre-selected channels are made by first pulling down a small hinged panel cover to expose the pre-set frequency switch actuator. Actual setting up is done by means of switch actuators mounted on a drum, there being one bank of actuators for each channel. A special pre-setting tool, normally stowed in the cover panel when not in use, is used to slide the actuators to the required position. The actuators operate certain switches when the drum is revolved via

the movement of the channel selector switch. Two lamps are arranged to provide diffused illumination of the main panel controls.

### *NOTE...*

*The Type C.1607/4, control unit has a two-position switch visible through the case on the right hand side as shown in fig.1. In this installation this switch should remain in the green G (guard) position.*

### *Junction box, Type ARC/52*

18. The junction box, Type ARC/52, is the main distribution point for the R/TI installation and its location in the nose wheel bay is shown in fig.1. The junction box is equipped with five multi-pole sockets which provide the following facilities:-

- (1) Connects the microphone input and output audio circuits from the transmitter-receiver to the aircraft inter-communication system.
- (2) Links the control unit to the transmitter-receiver unit.
- (3) Connects the aircraft d.c. power supply to the transmitter-receiver unit.
- (4) Connects the tone control circuit and control unit lights to the appropriate control and dimmer switches.

### **Power supplies**

19. When the function switch, on the control unit, Type C.1607/4, is rotated from the OFF position to either T.R., T.R. + G or A.D.F., a power relay in the transmitter-receiver power unit is energised by a 28-volt d.c. supply from fuse 1379 in panel 16P. This same supply is

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used to energise an internal combined dynamotor/blower which in turn provides the transmitter-receiver with the necessary a.c. supplies.

20. When the console red flood dimmer, mounted on panel 70P, is operated a 28-volt d.c. supply from fuse 677 in panel 3P, is fed to the lamps which illuminate the dials and switches on the control unit, Type C.1607/4. Power supplies for the radio installation are fully described in Sect. 6, Chap. 7.

## SIMULATED BOMBING TONE

21. The simulated bombing tone system is operated from panel 9P at the navigator's bomb station. When the system is primed, a 1 000 c/s tone is transmitted, via the R/T1 or R/T2 (Chap. 4) installations, until the bomb firing switches at the prone bomb aimer's station or the navigator's bomb aimer's are depressed, thus cancelling the tone circuit.

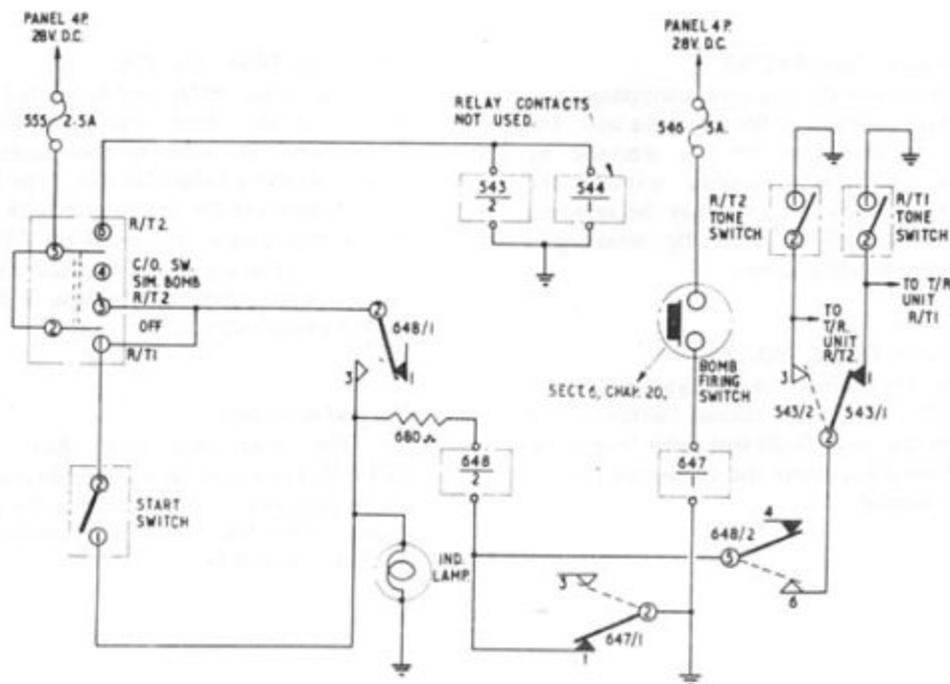


Fig. 2 Simulated bombing tone

## Circuit operation

22. With the R/T1 installation switched on, a simulated bombing tone is transmitted in the following manner (refer to fig. 2). When the change-over switch labelled SIM. BOMB is selected to R/T1 and the start switch momentarily depressed, a 28-volt d.c. supply from fuse 555 in panel 4P will be fed through the sim. bomb and start switches to the energising coil of relay 648 via a 680 ohm resistor, and earthed via relay contacts 647/1. The relay 648 is held in by its own contacts 648/1 and the indicator lamp will now light.

23. The earth return to tone relay K904 in the transmitter-receiver, Type PTR175, (R/T1) is normally earthed via a tone switch situated on the port console 6P as shown in fig. 1. When relay K904 is energised in this way thereby switching on the tone generator, the press-to-transmit relay K901 is also energised and thus transmits the tone automatically.

24. For simulated bombing purposes the earth return for K904 is completed via terminal 2 of the pilot's R/T1 tone switch and relay contacts 543/1, 648/2 and 647/1. The tone will therefore be automatically transmitted when R/T1 is selected on the simulated bombing changeover switch and the start switch operated. The side tone to the crew's intercomm. system is routed via R/T1 junction box, Type ARC/52.

25. On depressing the bomb firing switch in the prone bomb aimer's position or the bomb aimer's switch, on panel 9P, the tone is cancelled by energising relay 647 via fuse 546 (panel 4P) and the bomb firing switches. Relay contacts 647/1 open and therefore de-energise relay 648, opening contacts 648/2 and thus removing the earth connection from the tone switch (R/T1) terminal 2. The indicator lamp is also extinguished by the opening of relay contacts 648/1.

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### SERVICING

#### Precautions

26. Servicing personnel in particular are warned that a.c. and d.c. voltages in excess of 100 volts can be dangerous to the extent of causing personal injury, fatal or otherwise. It is essential that the utmost attention be given to servicing instructions where matters of safety

are concerned. It is essential that maximum co-operation be maintained between trades mutually concerned in servicing operations.

#### General

27. The setting up, operating and servicing

instructions for the installation and its components are contained in A.P.116D-0105-1. The security of all components should be checked regularly. All connectors, plugs, sockets and terminal blocks should be examined for damage and ingress of dirt and moisture.

### REMOVAL AND INSTALLATION

#### General

28. Access to the components is straightforward, but the following points should be observed. When it is necessary to remove or replace any components, secure all loose connectors to the adjacent aircraft structure, to prevent damage.

#### *Transmitter-receiver, Type PTR 175*

29. On the front panel of the unit disconnect the V.H.F. and U.H.F. aerial connections and the multipole plug, unscrew the two knurled nuts at the base of the unit, take hold of the transport handle and slide the unit off its anti-vibration mounting tray.

#### *Junction box, Type ARC/52.*

30. Disconnect the five connector plugs from the sockets attached to the lid of the unit. The lid of the unit can now be removed by releasing the three securing screws. The remaining part of the unit may be removed from the aircraft structure by releasing a further four securing screws.

#### *Control unit, Type C.1607/4*

31. On the control unit, Type C.1607/4, release the four quick release fasteners, and withdraw the unit. Sufficient cable length has been allowed to enable the connector plug to be disconnected.

#### *Aerial Type 140-L.R.U.-67C*

32. The aerial feeder lead is located forward and above the front spar, and should be disconnected. In order to gain access to the aerial, a servicing ladder Giraffe, Type D4, may be used. Remove the ten countersunk securing bolts at the base of the aerial and lift off the aerial. On replacing ensure that there is a good bonding surface between the base of the aerial and the aircraft structure.

#### *Plug and relay box*

33. The plug and relay box, Ref.No. 10/T4607 (mounted on an anti-vibration plate) can be removed by disconnecting the plug and socket connectors, and then removing two securing nuts and bolts.

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TABLE 1

## Unit location

Unit	Type	Location
Transmitter-receiver	PTR 175	Nose wheel bay (starboard crate)
Control unit	C.1607/4	A.E.O.'s position
Junction box (Mod.1)	ARC/52	Nose wheel bay (starboard crate)
V.H.F. aerial	140-L.R.U.-67C	Aircraft fuselage (above No.2 fuel tank)

TABLE 2

## Connectors for A.R.I.23143/1

H.S.A. Part No.	Cableform	Connecting
2/T6206	Uniradio 67	T/R, Type PTR 175 U.H.F. aerial socket to aerial transfer switch
3/T6206	3a-30 cores **	R.P.B. plug 1198 to control unit, Type C.1607/4
5/T6206	Uniradio 67	T/R, Type PTR 175 V.H.F. aerial socket to V.H.F. aerial
7/T6206	Min. 6D	R.P.B. plug 1199 to I/C junction box 54P

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**TABLE 2 Cont'd**  
Connectors for A.R.I.23143/1

H.S.A. Part No.	Cableform	Connecting
11/T6206	Min.6D	Junction box, Type ARC/52 to R.P.B. plug 1199
12/T6206	Min.4A	Junction box, Type ARC/52 to R.P.B. plug 1200
13/T6206	3a-30 cores **	Junction box, Type ARC/52 to R.P.B. plug 1198
14/T6206	39 cores *	Junction box, Type ARC/52 to T/R, Type PTR 175 (pin-to-pin connection)
1/FR.848	UNINYVIN 14	Junction box, Type ARC/52 to aircraft earth connection
2/FR.848	UNINYVIN 14	Junction box, Type ARC/52 to fuse 1379 panel 16P
1/FR.864	UNINYVIN 20	P.P.B. plug 1200 R/T1 tone switch on console 6P
2/FR.864	UNINYVIN 20	R.P.B. plug to T.B.1665

\* NOTE...

This cableform is made up of 39 cable cores using four types of cables as follows:-

- (1) Equipment wire Type 3 - 70/.0076 White (8a) - 2 cores
- (2) Equipment wire Type 2 - 14/.0076 Black (8b) - 33 cores
- (3) Equipment wire Type 2S - 14/.0076 individually screened - 2 cores  
Black (8c)
- (4) Ristscable 103/202/GY common screen (8d) - 2 cores

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TABLE 2 Cont'd  
Connectors for A.R.I.23143/1

## \*\* NOTE...

These two cableforms are each made up of 30 cable cores using equipment wire, Type 2 (3a 14/.0076 white), for each core. As these two particular cableforms do not have corresponding pin-to-pin connections at each end of the cable, the following pin-to-pin connection chart has been provided:-

Cableform 3/T6206 30 - Cores

Control unit, C1607/4 Socket Pin End 'A'		R.P.B. SKT. 1198 Socket Pin End 'B'
A	to	D
T	to	J
S	to	R
R	to	Z
P	to	f
N	to	m
M	to	s
L	to	r
K	to	p
J	to	n
H	to	g
F	to	a
E	to	S
D	to	K
C	to	E
B	to	A
V	to	C
U	to	B
d	to	H
c	to	P
b	to	X
a	to	l
Z	to	k
Y	to	j
X	to	h
W	to	b
g	to	F
f	to	G
h	to	T
i	to	L

Pins N,M,W,V,d,c, at end 'B' not used

Cableform 13/T6206 30 - Cores

R.P.B. Plug 1198 Plug Pin End 'B'		Junction Box, ARC/52 Plug Pin End 'A'
D	to	A
J	to	T
R	to	S
Z	to	R
f	to	P
m	to	N
s	to	M
r	to	L
p	to	K
n	to	J
g	to	H
a	to	F
S	to	E
K	to	D
E	to	C
A	to	B
C	to	V
B	to	U
H	to	d
P	to	c
X	to	b
l	to	a
k	to	Z
j	to	Y
h	to	X
b	to	W
F	to	g
G	to	f
T	to	h
L	to	i

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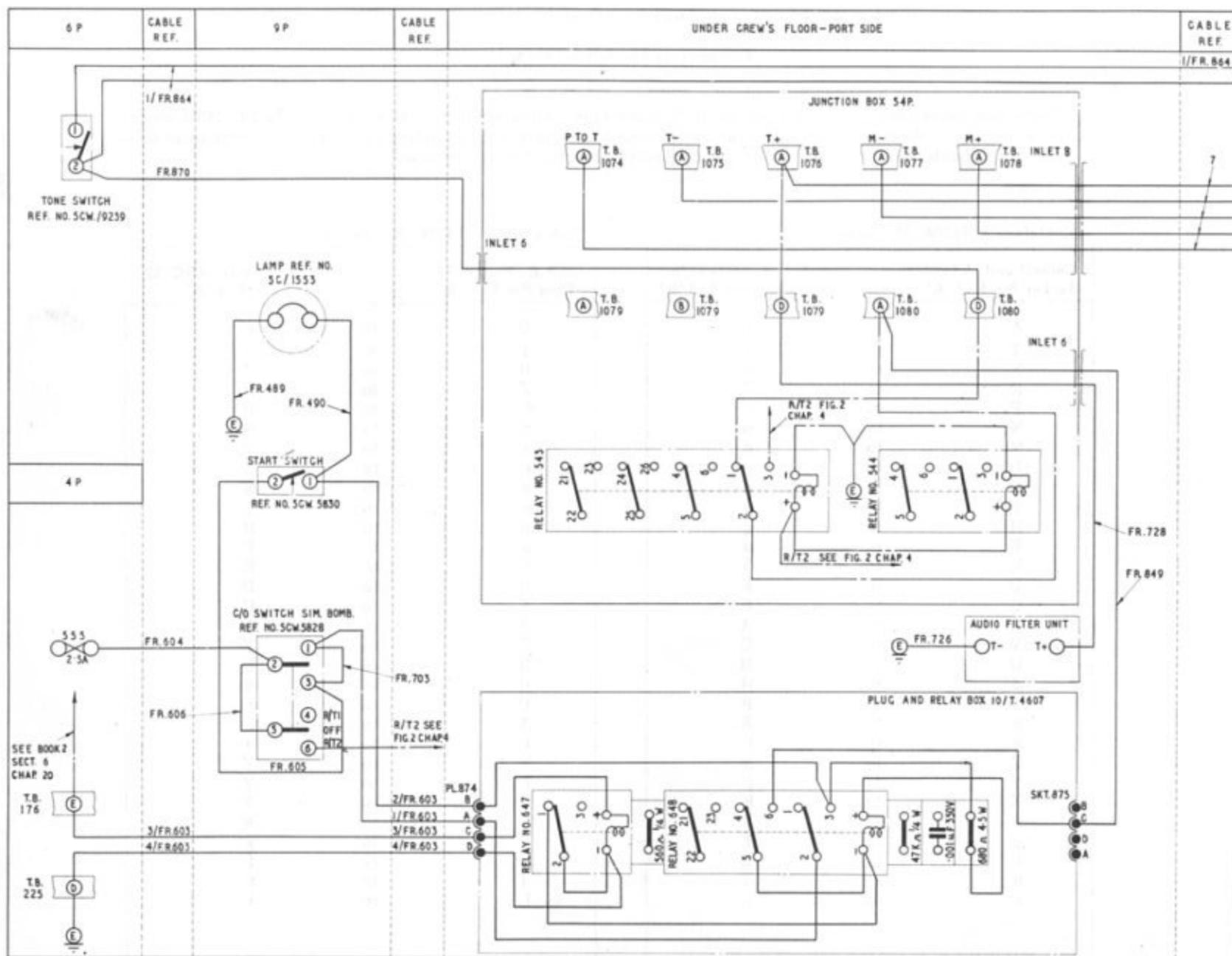
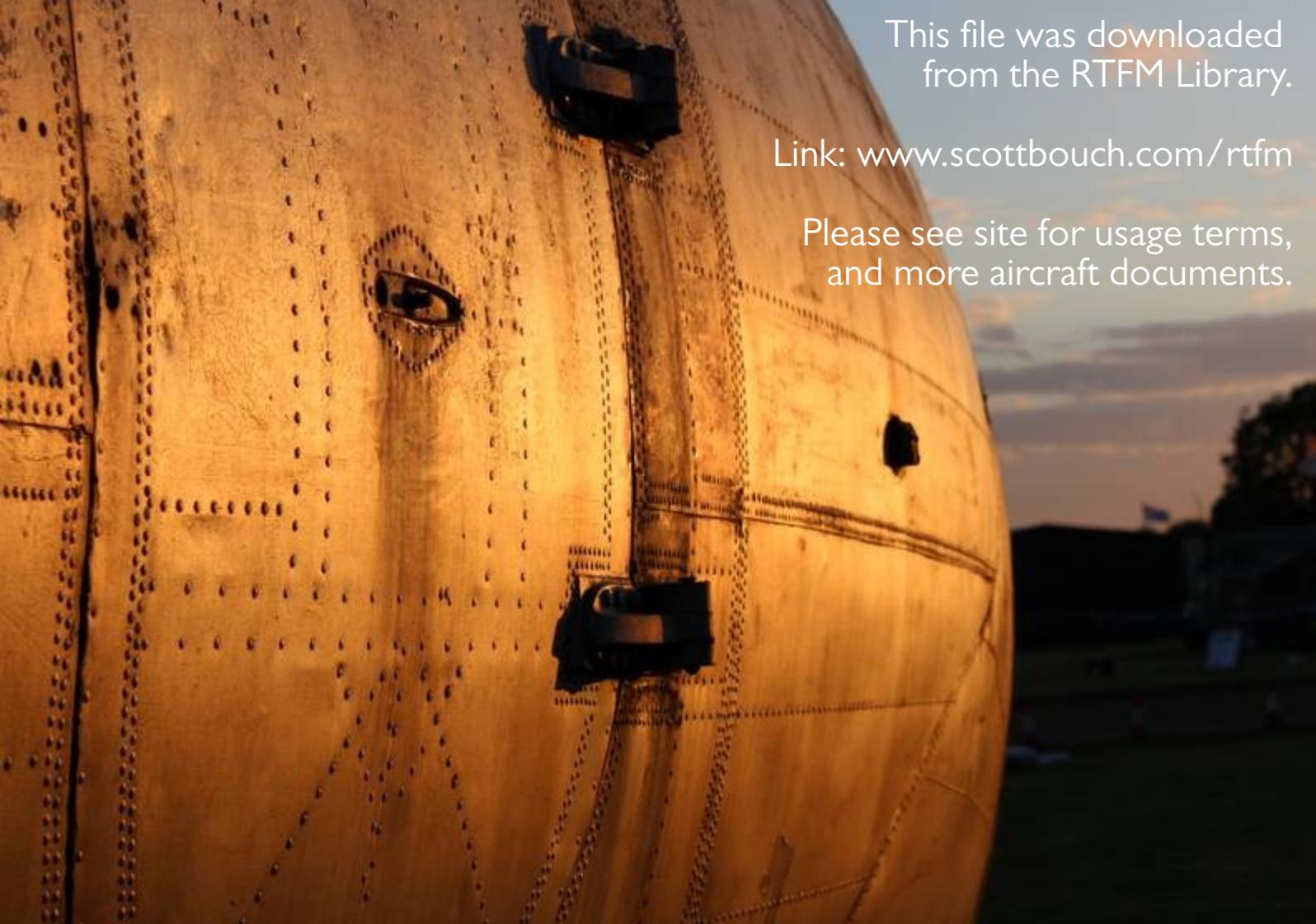


Fig. 3 (I) A.R.I. 23143/1 (R/T1)

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