Chapter 5 WIDE-BAND HOMER INSTALLATION

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Introduction

1. This Chapter describes the wideband homer installation, fitted when required, to provide visual and audio indications to the observer of the approximate direction and strength of a pulsed r.f. source which illuminates the aircraft from ahead. From the indications the observer is able to instruct the pilot on the action necessary to remain on the fringe of the enemy's radar horizon to minimize the possibility of detection and/or home on to the transmission while maintaining radar silence.

2. ARI 18218 — dual S-band and X-band homer equipment introduced by special order only role equipment (S.O.O.), Mod 5210, can be fitted to the aircraft when required. The S-band equipment responds to an input pulsed signal within the 2 500 MHz to 4 000 MHz range while that of the X-band includes the 8 000 MHz to 11 000 MHz range. A radar signal simulator (ARI 18225), incorporated in ARI 18218, is used to identify the p.r.f. of signals received by the S-band and X-band installation.

3. Location and wiring routeing diagrams, and a detailed list of the components comprising the installation, are in Sect.9 of the SDM. The List of Components serves as a key to location and includes Part No., identification and access details, and references to associated Air Publications. Instructions for installing ARI 18218 on the aircraft are in A.P.101B-1202-1A, Cover 1, Sect.2, Chap.5R.

Modification standard

4. This Chapter includes Mod 1272, 1302 and 5210.

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Description

5. A brief description of the components of the S-band and X-band homer installation, and of their operation when interconnected

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by the aircraft wiring, is included in the following paragraphs. A more detailed description of the system, including servicing, is in A.P.114G-0300-16 and A.P.114G-0400-16.

6. The main units of the installation are as follows:-

- Two streamlined pods, one on the underside of each wing, each pod containing two aerials, two amplifierdetector units and one test socket.
- (2) Audio frequency (AF) amplifier.
- (3) Audio/video signal selector.
- (4) Video indicator.
- (5) Radar signal simulator.

Aerials

7. A radome at the front of each pod contains an S-band and an X-band aerial. The

four cone-type aerials are mounted to look forwards and outwards from the aircraft in a plane parallel to the vaw plane. The S-band aerial is mounted near the nose of the radome and the X-band aerial, which is the smaller of the two, is mounted above and behind it. The beam width of the aerials varies with the frequency and polarization of the incoming signal, but is approximately 52 deg to 70 deg in the S-band and 39 deg to 50 deg in the X-band, with reception frequency ranges of 2500 MHz to 4000 MHz and 8000 MHz to 11000 MHz respectively. When an incoming r.f. radar pulse is received at the aerials, it is fed via co-axial cable to its respective amplifier-detector unit (para 9), while a further co-axial cable from each S-band aerial is connected to a test socket (para 8) in each pod.

Test sockets

8. A co-axial test socket is provided for each S-band equipment only, the sockets, P-AE and S-AF, being integral with the aerial assembly and connected by co-axial cable to a terminal on the back of each aerial. The sockets, accessible through an access door in the side of the pod, permit test signals to be fed into the aerial circuit during servicing.

Amplifier-detector units

9. The four amplifier-detectors, P-AD and S-AT (S band) and P-AU and S-AU (X band), are matched pairs in each band. The S-band amplifier-detectors are located behind the aerials in their respective pods, while the X-band amplifierdetectors are each located in tandem with and to the rear of the S-band amplifiers. The incoming r.f. pulse from the aerials (para 7) is fed to the associated amplifier-detector unit where a video signal is produced and amplified to a suitable level for transmission to the video indicator (para 12). Signals are also fed to the audio frequency amplifier unit (para 10) for audio monitoring.

Audio frequency amplifier unit

10. The audio frequency (AF) amplifier unit, C-JN, amplifies signals from the amplifier-detector units, in the frequency band not selected for visual display, and converts them to a form suitable for driving the AF amplifier in the video indicator (para 12). When Tacan (Chap. 2, this Section) is transmitting, suppression pulses from that equipment are fed into the unit, modified and routed to either the AF amplifier circuits or the video indicator circuits, depending on the selections of the audio/video signal selector unit switches (para 11). There are five gain controls on the unit which must be set correctly before flight and are masked with domed covers to prevent inadvertent alteration. The controls are marked X-BAND VIDEO GAIN, PORT and STBD, S-BAND VIDEO GAIN, PORT and STBD, and AUDIO GAIN.

Audio/video signal selector

11. This unit, C-JP, contains some of the controls necessary for the operation of the homer equipment, while a cable from the unit terminates in a 10-pole plug for connection into the installation. The controls consist of two tumbler switches and a rotary control. One switch marked VIDEO, X-S, enables selection of the band in which a visual display is desired on the video indicator (para 12), while the other switch marked AUDIO, X-XS-S, selects audio reception on the aircrew's headphones via the CASS installation (Sect. 8, Chap. 2, this Cover). A rotary control marked, AUDIO NOISE LEVEL, adjusts the audio trigger level in the audio frequency amplifier.

Video indicator

12. The indicator, C-BH, above the observer's port console, provides a vectorial presentation of the signal strength and approximate direction to port or star-

board of the aircraft of the transmitting source. The display is presented on a c.r.t. in the form of an orange-coloured straight line trace which is read against a graticule marked with radial and arcuate lines, covering the face of the tube. A vertical trace indicates that the transmitting source is directly ahead, while a trace to left or right of the centre radial indicates a source to port or starboard respectively. The unit amplifies the video output pulses of the pair of S-band or X-band amplifier-detectors (para 9) as selected by the signal selector (para 11) and fed to the deflection plates of the c.r.t. Additionally, they are combined to provide a pulse, the amplitude of which is proportional to the sum of their amplitudes and applied as a bright-up pulse to the modulator grid of the c.r.t.

13. To avoid a continuous watch on the indicator being maintained by the observer. it is arranged in the indicator that a visual signal is accompanied by an audio signal in either or both bands, depending on selection (para 11). This audio signal is fed via the WBH switch on the CASS station boxes (Sect. 8, Chap. 2, this Cover), into the aircrew's headphones; the tone level may be adjusted on the video indicator and also at each crew member's station box. The bright-up pulses (para 14(d)) are amplified to provide the tone, and hence its pitch corresponds to the p.r.f. of the received signal. A power supply unit in the indicator is fed from the aircraft system (para 19) and the unit in turn supplies the remaining components of the installation with the exception of the radar signal simulator.

14. The following controls are incorporated on the indicator :-

(a) A rotary 7-position attenuator switch allowing for selection of six different degrees of signal attenuation. When the switch is selected OFF, all power supplies to the equipment are disconnected, and a very high degree of attenuation is imposed on all signals into the detector units. A mechanical latch on the switch prevents an inadvertent selection to OFF.

(b) A rotary control for adjusting the display brilliance.

(c) A rotary control for adjusting the level of all audio signals routed to the CASS, including those from the radar signal simulator (para 17).

(d) A rotary control (bright-up) for setting the minimum level at which signals selected for visual presentation produce a trace on the c.r.t. and an audio warning.

(e) Two gain controls and a focus control which must be set correctly prior to flight and masked with covers to prevent inadvertent alteration.

15. When Tacan (*Chap.* 2, *this Section*) is transmitting and if the S-band is selected for video display, suppression pulses from Tacan are fed into the indicator to cut off the bright-up pulses and hence the video and audio indications at the particular p.r.f.

16. With the search and fire control radar (*Chap.* 4, *this Section*) operating, irrespective of which band is selected for video display, suppression pulses from the radar are fed into the indicator to cut off the bright-up pulses and hence

the video and audio indications at the particular p.r.f.

Radar signal simulator

17. This unit, C-10, installed above the video indicator, is used to generate an audio signal of variable frequency and duration which can be used to identify the p.r.f. of incoming signals received by the wide-band homer. The observer matches the incoming signal with the known p.r.f. produced in the simulator. by selecting the band of the incoming signal on the audio video signal selector (para 11) and adjusting the simulator controls until the pitch of the signals is nearly identical. The output of the simulator is routed to the audio amplifier in the video indicator where it is mixed with the audio output of the homer installation. thence via the CASS (Sect. 8, Chap. 2, this Cover) to the aircrew's telephones. The frequency generated by the simulator can then be observed on a three digit × 10 display on the unit.

18. The following controls are provided on the unit:-

(a) A rotary six-position switch providing selection of the duration of the pulse outputs from the simulator, at the p.r.f. determined by the p.r.f. controls (b).

(b) P.R.F. A dual rotary switch providing coarse and fine tuning of the simulator output p.r.f.

(c) OPERATE. A spring-loaded twoposition switch, when depressed, connects the output from the simulator at the p.r.f. selected, routeing it to the homer equipment and illuminating the digital display.

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(d) BRIGHT-DIM. A two-position switch at the rear of the unit providing selection of the illumination intensity of the digital display.

(e) RV4. A preset potentiometer, which determines the setting of the output pulse amplitude.

Power supplies

19. 200-V, 400-Hz, single-phase a.c. and 28-V d.c. supplies are fed from fuses 1A6 and 1B6 on panel A-D and fuse G12 on panel C-Q respectively to the video indicator. A power pack incorporated in the indicator then distributes various supplies as required to units of the installation. Further supplies of 200-V. 400-Hz, single-phase a.c. and 28-V d.c. are fed direct from fuses 1A5 and 1B5 (panel A-D) and fuse G12 respectively to the radar signal simulator.

Lighting

20. Panel illumination of the audio video signal selector and radar signal simulator is controlled by the observer's instrument lighting circuit (*Cover* 1, *Sect.* 6, *Chap.* 9B).

Servicing

Setting-up

21. Setting-up procedures for ARI 18218, dual S-band and X-band homer units, and ARI 18225, radar signal simulator, are detailed in A.P.114G-0300-16 and A.P.114G-0400-16 respectively.

Function tests

22. Function tests of ARI 18218, dual S-band and X-band homer, are in A.P.101B-1202-4A3(R).