INTERFERENCE WITH TELEVISION RECEPTION

Visual Effects of Receiver Maladjustments, Faults, and External Interference

[*NOTE :—Copies of this Instruction may be lent to complainants if it will help in the investigation of interference complaints*]

1. General.—This Instruction shows pictorially the effects of incorrect adjustments of the receiver, of fault conditions, and of common types of interference. The Instruction is intended to help in diagnosing the causes of faulty reception (see Table 1). The receiver controls should of course be checked for correct adjustment at the commencement of an investigation.

2. The appearance of pulse types of interference, which may be caused by ignition systems, may vary to a certain extent, depending upon whether or not the receiver is fitted with an interference limiter, and on the type of limiter used.

3. Effects similar to those shown in Figs. 1 to 11 can also be caused by faults in the receiver.

TABLE 1.—DIAGNOSIS GUIDE

SYMPTOM	PROBABLE CAUSE	SEE FIG. NO.
Poor definition or picture blurred	Brightness control too far advanced	1
	Incorrect focusing	2
	Vision interference limiter too far advanced	11
	Poor E.H.T. regulation	14
	Receiver fault	—
Picture distorted	Line hold control incorrectly adjusted	3 and 4
	Line linearity control incorrectly adjusted	7
	Frame ,, ,, ,, ,,	8
	Line amplitude ,, ,, ,,	9
	Frame ,, ,, ,, ,,	10
	Hum (inadequate or defective smoothing component in receiver)	13
	Receiver fault	—
Bright spots or dashes	Ignition interference	15
	Interference from sewing-machine motor	16
	,, ,, hair-drier motor	17
	,, ,, electric drill motor	18
	Radar (Gee) interference	19
	Interference from high-voltage overhead power lines or from neon signs	20 and 21
	Interference from violet ray apparatus	22
	,, ,, spark-type diathermy apparatus	23
	Receiver fault	—
Bright lines or bars	Line hold control incorrectly adjusted	3 and 5
	Frame hold ,, ,, ,,	6
	Sound on picture	12
	Hum	13
	Interference from sewing-machine motor	16
	,, ,, hair-drier motor	17
	,, ,, electric drill motor	18
	,, ,, valve-type diathermy apparatus	26
	,, ,, a vacuum lamp	27
	Receiver fault	—

TABLE 1.—(*Cont.*)

SYMPTOM	PROBABLE CAUSE	SEE FIG. No.
Patterning	Sound on picture	12
	Interference from valve-type diathermy apparatus ...	24, 25 and 26
	,, ,, a vacuum lamp	27
	,, ,, R.F. heating apparatus	28
	,, ,, radio transmitter or superheterodyne receiver	33, 34 and 35
"Ghost" images	Feeder-cable of incorrect impedance in use	29
	Multipath reception	29, 30 and 31

4. Receiver Maladjustments.

FIG. 1. BRIGHTNESS CONTROL TOO FAR ADVANCED
The definition is poor and flyback lines appear on the picture.

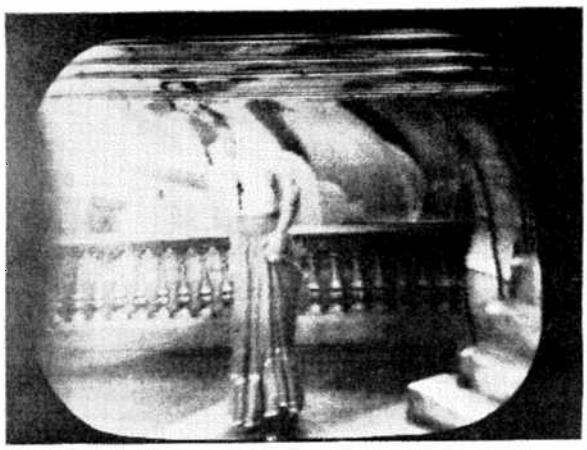

FIG. 3. LINE (OR HORIZONTAL) HOLD CONTROL INCORRECTLY ADJUSTED

FIG. 2. INCORRECT FOCUSING
The line structure is not visible and there is loss of resolution in the picture.

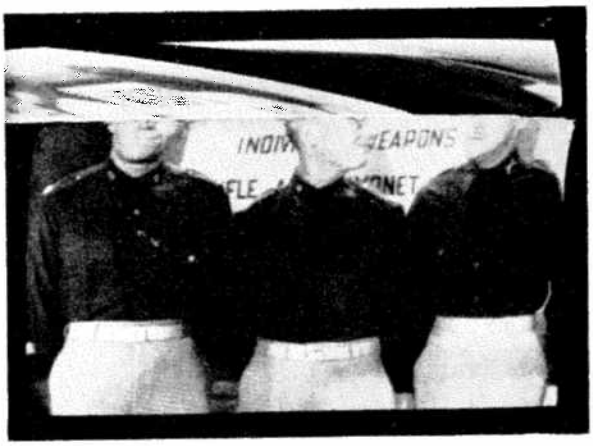

FIG. 4. LINE (OR HORIZONTAL) HOLD CONTROL INCORRECTLY ADJUSTED

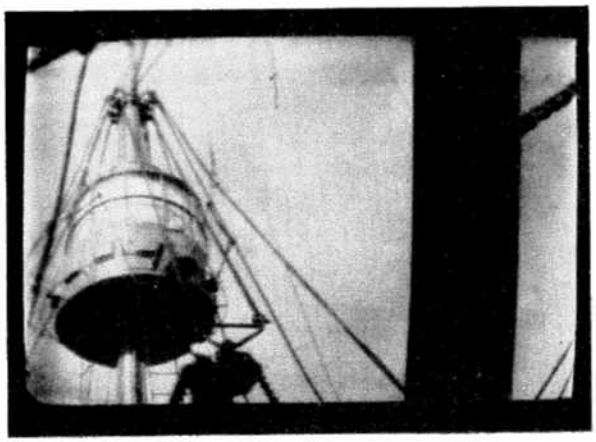

FIG. 5. LINE (OR HORIZONTAL) HOLD CONTROL INCORRECTLY ADJUSTED

In Figs. 3 and 4 the lines are only partly synchronized and the top of the picture is torn ; if the control is moved farther from the correct setting the whole picture will break up. Fig. 5 shows the line time-base running at the correct frequency but not synchronized correctly, the line synchronizing pulses appearing as a black bar on the picture.

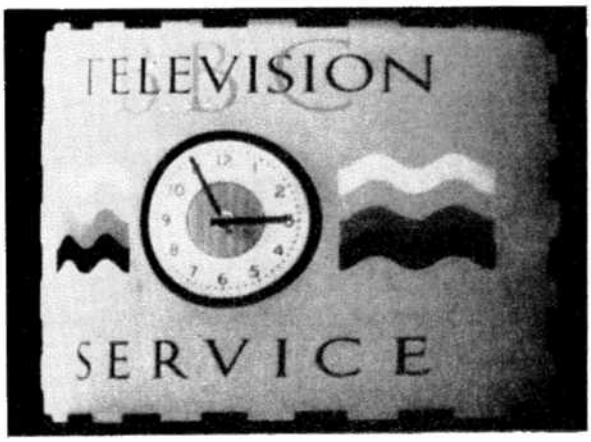

FIG. 7. LINE LINEARITY CONTROL INCORRECTLY ADJUSTED

One side of the picture is cramped and the other is expanded. This effect is most noticeable when objects or persons in the picture move across the screen.

FIG. 6. FRAME (OR VERTICAL) HOLD CONTROL INCORRECTLY ADJUSTED

The interlacing is incorrect and generally causes the picture to move vertically up or down at a speed depending upon the degree of maladjustment of the control. This effect may also be caused by insufficient signal due to a receiver or aerial fault. The picture sometimes remains steady, showing a horizontal black bar across the screen.

FIG. 8. FRAME LINEARITY CONTROL INCORRECTLY ADJUSTED

The top of the picture is expanded. The lines can be seen to be farther apart, and the effect is most noticeable when there is a vertical movement in the picture.

FIG. 9. LINE AMPLITUDE (OR PICTURE WIDTH) CONTROL INCORRECTLY ADJUSTED

Picture expanded or contracted horizontally. The illustration shows expansion.

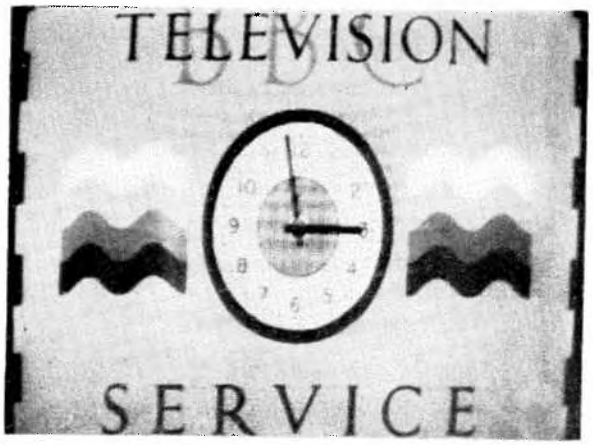

FIG. 10. FRAME AMPLITUDE (OR PICTURE HEIGHT) CONTROL INCORRECTLY ADJUSTED

Picture expanded or contracted vertically. The illustration shows expansion.

FIG. 11. VISION INTERFERENCE LIMITER CONTROL TOO FAR ADVANCED

The video signal is clipped at grey level, and no highlights can be seen in the picture.

5. Receiver Faults.

FIG. 12. SOUND ON PICTURE

This fault is made apparent by the presence of light and dark bands across the picture, which vary in intensity in accordance with the loudness of the sound. This fault is often due to poor sound rejection in the vision channel, but the effect is sometimes produced mechanically by sound waves from the loud-speaker vibrating faulty or loose components in the video stages.

FIG. 13. HUM BARS

The number of dark bands on the picture resulting from hum is dependent upon whether full or half-wave rectification is used in the power supply. Fig. 13 shows the effect of faulty smoothing of a full-wave H.T. supply. Alternate dark and light stationary bars appear if the picture is locked, and the vertical edges of the picture are curved as shown. Faulty smoothing of the cathode-ray tube E.H.T. supply (half-wave) causes a single dark band to appear if the picture is locked. If the picture is not locked, the dark bands move vertically over the screen.

FIG. 14. POOR E.H.T. REGULATION

The effects are :—

(*a*) The value of the E.H.T. voltage varies with picture content, being lower for the part of the picture (i.e. the white part) where the beam current of the cathode-ray tube is high. Consequently, at this part the deflexion sensitivity is higher and the picture width is increased.

(*b*) Because of the changing E.H.T. voltage the picture only focuses at one particular level of brightness. Brighter and darker parts of the picture are out of focus.

6. Other Receiver Faults.—Some other faults which may arise are as follows :—

(*a*) Interference similar in appearance to that caused by car ignition (see Fig. 15), accompanied by a crackling on the sound channel, caused in some cases by faulty insulation in the " pinch " of the line or frame output valves.

(*b*) Interference due to corona or breakdown within the receiver, producing a somewhat similar effect to E.H.T. power-line brush-discharge (see Figs. 20 and 21), but appearing as a vertical band over the picture. This effect, which may be continuous or present only in humid weather, is caused by ionization at a high-voltage point during the flyback.

(*c*) Double images may be caused by impedance-mismatch between aerial-feeder and receiver, but are usually caused by multi-path reception (see Figs. 29 to 31).

(*d*) Self-oscillation caused by faulty decoupling capacitors, producing oscillatory patterns on the screen (see Figs. 33 to 35).

7. Interference from External Sources.

FIG. 15. IGNITION INTERFERENCE

Ignition interference produces high-intensity white dots which may occur in bands moving up or down the picture or as many isolated spots all over the picture.

Figs. 16, 17 and 18 show the effects of interference from various types of commutator motors. A sewing-machine motor causes two fairly well-defined broad horizontal stationary bands of white spots to appear anywhere on the picture (Fig. 16). This interference is usually intermittent and of short duration with distinctive starting " splashes ". The bands caused by a hair-drier motor (Fig. 17) are not so clearly defined and the duration may vary from a few minutes to an hour. The interference from an electric drill motor (Fig. 18) usually occurs in short bursts and is more intense than that from either a hair-drier or a sewing machine.

FIG. 16. INTERFERENCE FROM A SEWING-MACHINE MOTOR

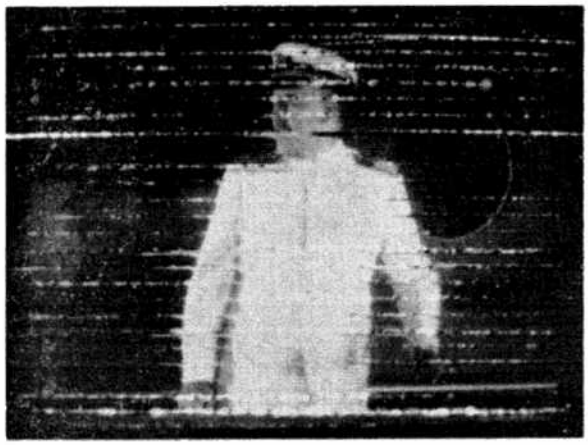

FIG. 17. INTERFERENCE FROM A HAIR-DRIER MOTOR

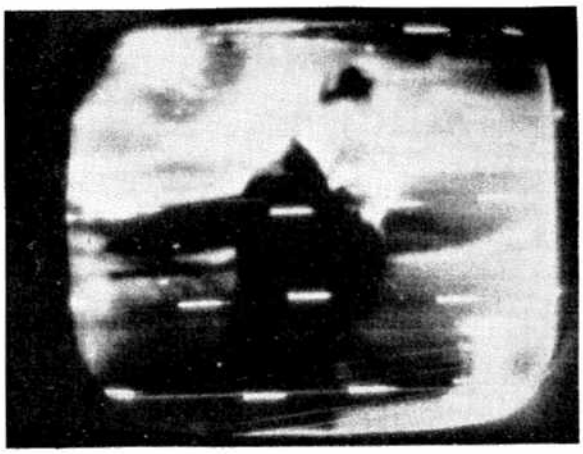

FIG. 19. RADAR (GEE) INTERFERENCE

In a typical instance of interference from a radar (Gee) station, interference was caused with reception from Alexandra Palace by the second harmonic (45.8 Mc/s.) of the fundamental frequency of the radar station. The pattern caused by this interference is regular, and drifts across the screen, sometimes remaining stationary and then reversing its direction. The interference is usually continuous.

FIG. 18. INTERFERENCE FROM AN ELECTRIC DRILL MOTOR

Figs. 20 and 21 show the effects of discharge across insulators of high-voltage overhead power-lines. These effects are similar to those caused by commutator interference, but the bands are very clearly defined and the interference is normally intermittent, recurring at intervals of several seconds. Interference caused by neon signs produces similar effects.

FIG. 20. INTERFERENCE FROM HIGH-VOLTAGE OVERHEAD POWER LINES

FIG. 22. INTERFERENCE FROM VIOLET-RAY EQUIPMENT

Interference from this source produces lines of white dots across the picture which move up or down in a random fashion for periods of up to 20 minutes.

FIG. 21. INTERFERENCE FROM HIGH-VOLTAGE OVERHEAD POWER LINES

FIG. 23. INTERFERENCE FROM SPARK-TYPE DIATHERMY APPARATUS

The effect of this type of interference is very similar to that produced by commutator motors. This type of interference usually persists for periods of up to 20 minutes.

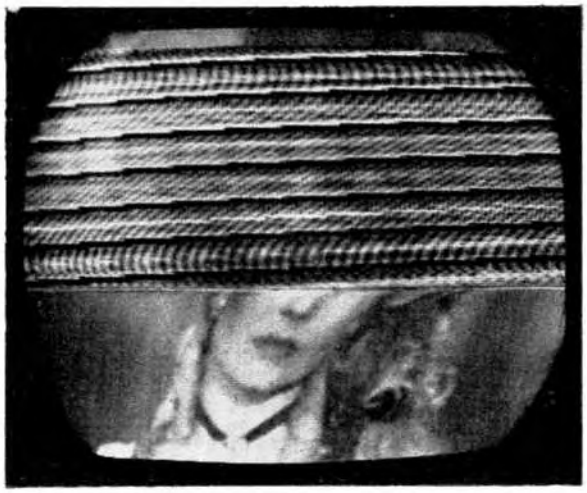

FIG. 24. INTERFERENCE FROM VALVE-TYPE DIATHERMY APPARATUS (UNSMOOTHED H.T.)

FIG. 26. INTERFERENCE FROM VALVE-TYPE DIATHERMY APPARATUS

Usually a broad band of interference, horizontal and stationary, occupies about half the picture area (Figs. 24, 25 and 26). If the intensity is high, one half of the picture may be nearly all white, but unless the interference is severe the typical changing pattern can be seen. In its severe form it can cause the picture to lose synchronism.

The interference causes a characteristic hum on the sound channel, not unlike the sound of the picture transmission. The interference may be present for up to 20 minutes at a time.

FIG. 25. INTERFERENCE FROM VALVE-TYPE DIATHERMY APPARATUS

FIG. 27. INTERFERENCE FROM A VACUUM LAMP
An oscillating lamp produces a distinctive type of pattern on the picture in very narrow bands.

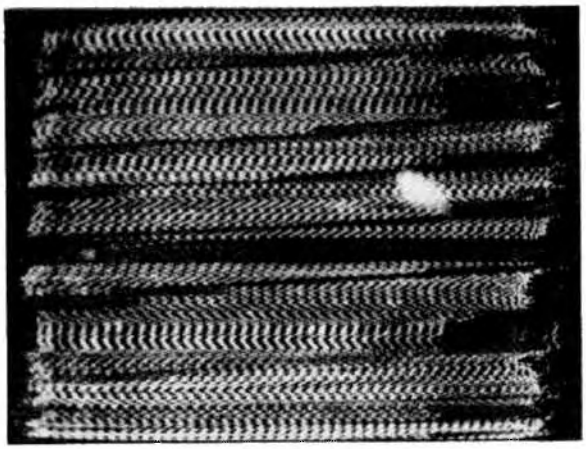

FIG. 28. INTERFERENCE FROM R.F. HEATING APPARATUS

This interference consists of narrow vertical bars which are broken and give the wavy pattern shown. The intensity and duration may vary considerably.

FIG. 29. MULTIPLE IMAGES CAUSED BY MULTI-PATH RECEPTION

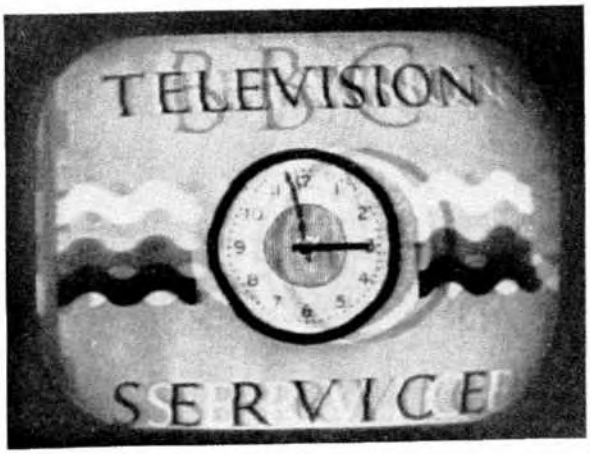

FIG. 30. MULTIPLE IMAGES CAUSED BY MULTI-PATH RECEPTION

FIG. 31. MULTIPLE IMAGES CAUSED BY MULTI-PATH RECEPTION

Fig. 29 shows a second image to the right of the main picture. This second image is due to the reception of a reflexion of the signal. Figs. 30 and 31 show second and third images caused by two reflexions of the signal being received. The main signal is received direct from the transmitter and the others arrive slightly later, being reflected from high ground or some prominent structure such as a gasholder, a power-station cooling-tower or from an aeroplane. The ghost picture may be a positive or negative reproduction of the picture. It will be seen in Fig. 30 that the first reflexion (second image) is negative and that the second reflexion (third image) is positive. Fig. 32 shows a section of a map of the actual location in which the ghost images illustrated in Figs. 30 and 31 were experienced. Replacing the original half-wave dipole by a dipole and reflector, suitably orientated, eliminated the interference, but it has sometimes been necessary to use a more complex directional aerial system. Reflexions caused by aeroplanes produce violent fluttering or wavering of the picture, but this effect only lasts for a short period.

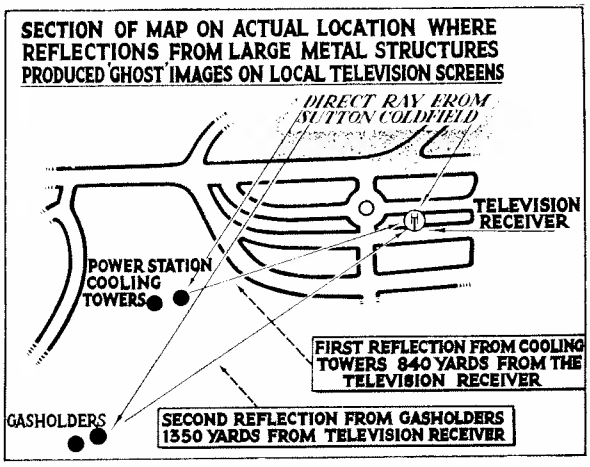

FIG. 32. MULTI-PATH RECEPTION

FIG. 33. RADIO TRANSMITTER INTERFERENCE

FIG. 34. RADIO TRANSMITTER INTERFERENCE

FIG. 35. RADIO TRANSMITTER INTERFERENCE

The pattern caused by radio-transmitter interference does not usually remain stationary. The lines do not remain in one position, but often wander through varying angles across the screen. Another source of interference giving a similar pattern is the local oscillator of a nearby superheterodyne receiver. The duration of the interference varies considerably.

Reference :—None
(WP 2/3)
Instruction Cancelled :—B 0007

END

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