1

General Class Unit 8
Question Pool §4

Station Operation and Setup,
Test Equipment and Monitoring,
Amateur Operating Practices

5 Questions

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2

Electronic Keyer

G4A10 G4A02

An electronic keyer *automatically generates the strings of dots and dashes for CW operation*.

It can be a separate unit or built into a radio.

Paddle keys can be separate units or integrated with an electronic keyer.

When receiving CW, it might be useful to try the opposite sideband to *possibly reduce or eliminate interference from other signals*.

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3

Split Mode Operation

G4A03 G4A12

When a transceiver is operating in "split" mode, *the transceiver is set to different transmit and receive frequencies*.

A common use for the dual-VFO feature on a transceiver is *to permit monitoring of two different frequencies*.

It is used to spread out calling stations and prevent calling stations from interfering with one's transmitted signal.

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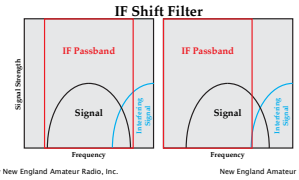
4

IF Shift Control

G4A11

The intermediate frequency (IF) shift control is used *to avoid interference from stations very close to the receive frequency*.

It works by shifting the IF frequency slightly to remove nearby adjacent signals.



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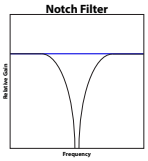
Notch Filter

5

G4A01

Notch filters are used *to reduce interference from carriers in the receiver passband*.

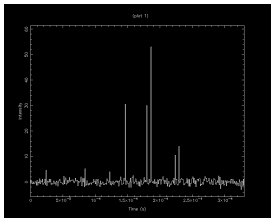
They remove a very narrow range of frequencies, cutting out a narrow interfering signal or carrier.



Noise Reduction

6

G4A16 G4A17



A noise blanker works *by reducing receiver gain during a noise pulse*.

As the noise reduction control level in a receiver is increased, *received signals may become distorted*.

RF Power Amplifiers

7

G4A08 G4A04

The correct adjustment for the load or coupling control of a vacuum tube RF power amplifier is the *maximum power output without exceeding maximum allowable plate current*.

A pronounced dip on the plate current meter of a vacuum tube RF power amplifier indicates correct adjustment of the plate tuning control.

RF Power Amplifiers

8

G4A07 G4A05

Excessive drive power can lead to permanent damage when using an RF power amplifier.

The reason to use an Automatic Level Control (ALC) with an RF power amplifier is *to reduce distortion due to excessive drive*.

RF Power Amplifiers

9

G4A14 G4A15

If a transceiver's ALC system is not set properly when transmitting AFSK signals with the radio using single sideband mode, *improper action of ALC distorts the signal and can cause spurious emissions*.

A symptom of transmitted RF being picked up by an audio cable carrying AFSK data signals is:

the VOX circuit does not un-key the transmitter.

the transmitter signal is distorted.

frequent connection timeouts.

Transceiver Functions

10

G4A09 G4A13

A time delay is sometimes included in a transmitter keying circuit *to allow time for transmit-receive changeover operations to complete properly before RF output is allowed.*

The attenuator function can be used *to reduce signal overload due to strong incoming signals*.

Voltmeters

29

G4B06 G4B05 G4B14

An advantage of a digital volt meter over an analog voltmeter is *better precision for most uses*.

High input impedance is desirable for a voltmeter because *it decreases the loading on circuits being measured*.

The use of an instrument with analog readout may be preferred over an instrument with digital readout *when adjusting tuned circuits*.

Oscilloscope

30

G4B02 G4B01

An oscilloscope is a type of voltmeter that shows varying signals over time on a display.

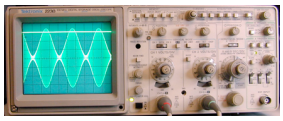
Complex waveforms can be measured which is an advantage over a simple voltmeter.

An oscilloscope is made up of horizontal and vertical channel amplifiers.

Oscilloscope

31

G4B04 G4B03



The attenuated RF output of the transmitter is connected to the vertical input of an oscilloscope when checking the RF envelope pattern of a transmitted signal.

An oscilloscope is the best instrument to use when checking the keying waveform of a CW transmitter.

Field Strength Meter

32

G4B08 G4B09

A field strength meter measures the RF field strength at a given point.

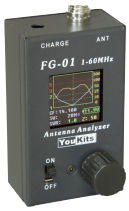
A *field strength meter* can be used for monitoring relative RF output when making antenna and transmitter adjustments.

It can be used to determine *the radiation pattern of an antenna*.

Antenna Analyzer

33

G4B11 G4B12 G4B13



An antenna analyzer can measure a number of different properties of an antenna setup.

When measuring SWR, the *antenna and feed line* need to be connected to the meter.

Strong signals from nearby transmitters can affect the accuracy of measurements.

An antenna analyzer can also be used to *determine the impedance of a coaxial cable*.

Directional Wattmeter

34

G4B10

A directional wattmeter measures how much power is going though a feed line.

It can measure in the forward, towards the antenna, direction, as well as the reverse, or back from the antenna direction.

The forward and backward values can be used to calculate the *standing wave ratio*.

Two-Tone Test

35 G4B15 G4B07

A two-tone test is used to test the *linearity* of a transmitter.

In a two-tone test the tones are *two non-harmonically related audio signals*.

RF Interference

56 G4C02 G4C04 G4C03

Arcing at a poor electrical connection could be a cause of interference covering a wide range of frequencies.

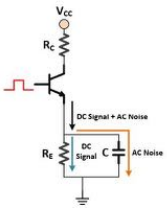
On-and-off humming or clicking might be heard on an audio device when there is interference from a nearby CW transmitter.

Distorted speech might be heard on an audio device or telephone system if there is interference from a nearby single-sideband transmitter.

RF Interference

57 G4C01

A *bypass capacitor* might be useful in reducing RF interference to audio frequency devices.



Grounding Issues

58 G4C05 G4C06

Connect all equipment grounds together to avoid unwanted effects of stray RF energy in an amateur station.

If you receive an RF burn when touching your equipment while transmitting on an HF band, assuming the equipment is connected to a ground rod, *the ground wire has high impedance on that frequency.*

A resonant ground connection can cause *high RF voltages on the enclosures of station equipment*.

Grounding Issues

59

G4C13 G4C11 G4C07

The metal enclosure of every item of station equipment should be grounded to *ensure that hazardous voltages cannot appear on the chassis*.

To minimize RF "hot spots" in an amateur station use the technique of *bonding all equipment enclosures together*.

Soldered joints should not be used with the wires that connect the base of a tower to a system of ground rods as *a soldered joint will likely be destroyed by the heat of a lightning strike*.

Ground Loops

60

G4C10 G4C09

A ground loop is an unwanted current connecting two points together that should be at the same voltage potential but actually have different potentials.

A symptom of a ground loop somewhere in your station is when *you receive reports of "hum" on your station's transmitted signal*.

Connect all ground conductors to a single point to avoid a ground loop.

Ferrite Choke

61

G4C08

To reduce RF interference caused by common-mode current on an audio cable *place a ferrite choke around the cable*.

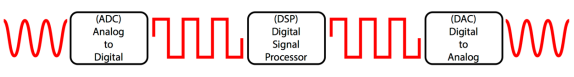
Digital Signal Processors (DSP)

62

G4C12

A Digital Signal Processor in an amateur station can be used to remove noise from received signals.

A wide range of filter bandwidths and shapes can be created.



Speech Processors

79

G4D01 G4D02 G4D03

The purpose of a speech processor is to *increase the intelligibility of transmitted phone signals during poor conditions*.

A speech processor *increases average power* on a transmitted single sideband phone signal.

An incorrectly adjusted speech processor can cause:
distorted speech.
splatter.
excessive background pickup.

S-Meter

80

G4D04 G4D06 G4D07 G4D05

An S-Meter measures *received signal strength.*

An S-Meter is commonly found *in a receiver*.

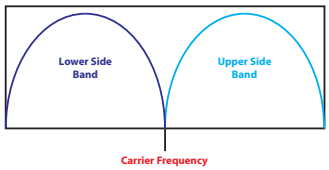
Each step between S levels is +6 dB or *approximately 4 times* stronger.

An S-Meter reading of 20dB over S9 *is 100 times more powerful* than an S9 reading on a properly calibrated meter.

Sideband Frequency Ranges

81

G4D08



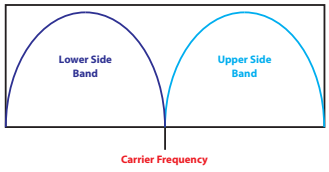
If the displayed carrier frequency is set to 7.178 MHz, what frequency range is occupied by a 3 kHz LSB signal?

7.175 to 7.178 MHz

Sideband Frequency Ranges

82

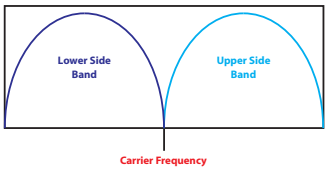
G4D09



If the displayed carrier frequency is set to 14.347 MHz, what frequency range is occupied by a 3 kHz USB signal?

14.347 to 14.350 MHz

Sideband Frequency Ranges



How close to the lower edge of the phone segment should your carrier frequency be when using 3 kHz LSB?

At least 3 kHz above the edge of the segment

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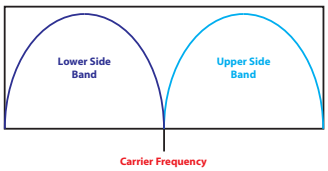
83 G4D10

Sideband Frequency Ranges



How close to the upper edge of the phone segment should your carrier frequency be when using 3 kHz USB?

At least 3 kHz below the edge of the band

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84 G4D11

Mobile HF Installations

When installing a 100 watt HF mobile installation a direct fused connection *to the battery using heavy-gauge wire* is the best.

It is best not to draw DC power for your radio from a vehicle's auxiliary power socket as *the socket's wiring may be inadequate for the current drawn by the transceiver*.

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103 G4E03 G4E04

Mobile HF Antennas

An HF mobile installation is mostly limited by the *efficiency of the electrically short antenna*.

The disadvantage of using a shortened mobile antenna instead of a full-sized antenna is the *operating bandwidth may be very limited*.

The following may cause receive interference in a radio installed in a vehicle:

The battery charging system

The fuel delivery system

The vehicle control computer

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104 G4E05 G4E06 G4E07

Mobile HF Antennas



A corona ball on an HF mobile antenna is placed at the top of an antenna *to reduce RF voltage discharge from the tip of the antenna while transmitting*.

The purpose of a capacitance hat on a mobile antenna is *to electrically lengthen a physically short antenna.*

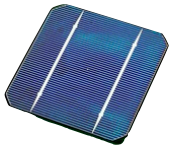
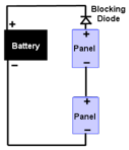
105 G4E02 G4E01

Solar Cells

Photovoltaic conversion is the process by which sunlight is changed directly into electricity.

A fully illuminated silicon photovoltaic cell has an approximate open-circuit voltage of *0.5 VDC*.

A diode is placed in series between a solar panel and a storage battery to *prevent self-discharge of the battery through the panel during times of low or no illumination*.

106 G4E08 G4E09 G4E10

Wind Power

A disadvantage of using wind as the primary source of power for an emergency station is *a large energy storage system is needed to supply power when the wind is not blowing*.

107 G4E11