Technician Licensing Class

Feed Me with Some Good Coax!

Presented by

Amateur Radio Technician Class
Element 2 Course Presentation

ELEMENT 2 SUB-ELEMENTS
(Groupings)

- **About Ham Radio**
- **Call Signs**
- **Control**
- **Mind the Rules**
- **Tech Frequencies**
- **Your First Radio**
- **Going On The Air!**
- **Repeaters**
- **Emergency!**
- **Weak Signal Propagation**

Amateur Radio Technician Class
Element 2 Course Presentation

- **ELEMENT 2 SUB-ELEMENTS (Groupings)**
  - **Talk to Outer Space!**
  - **Your Computer Goes Ham Digital!**
  - **Multi-Mode Radio Excitement**
  - **Run Some Interference Protection**
  - **Electrons – Go With the Flow!**
  - **It's the Law, per Mr. Ohm!**
  - **Go Picture These!**
  - **Antennas**
  - **Feed Me with Some Good Coax!**
  - **Safety First!**

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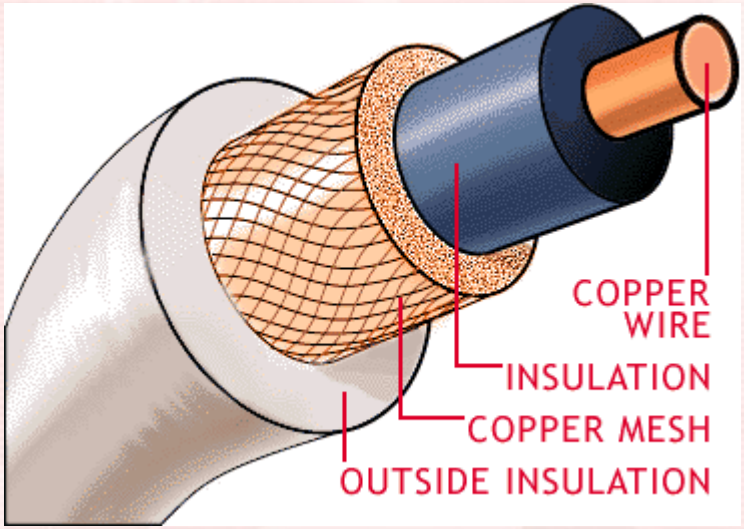
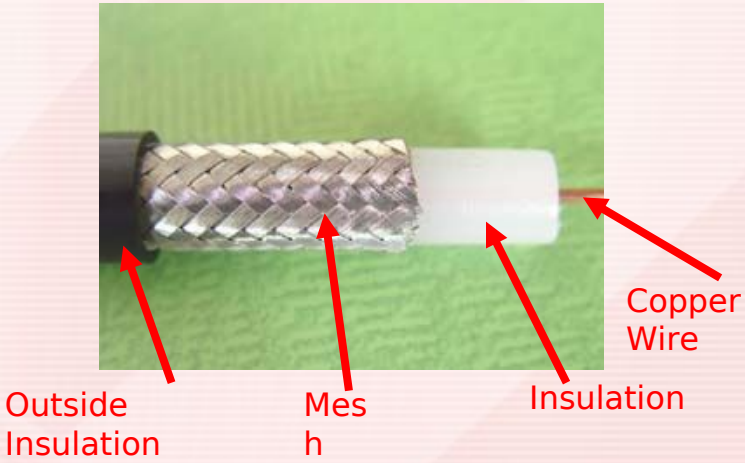
- T6D11 A common use of coaxial cable is to carry RF signals between a radio and antenna.
- T9B3 Coaxial cable is used more often than any other feedline for amateur radio antenna systems because it is easy to use and requires few special installation considerations.





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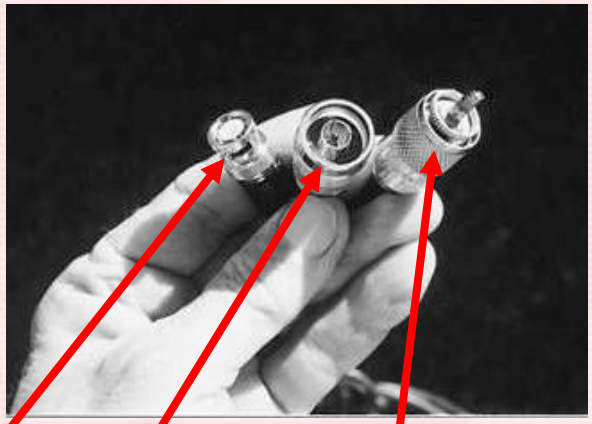
- T9B5 As the frequency of a signal passing through coaxial cable is increased the loss increases.
  - The Higher the frequency the more the loss

- T9B7 PL-259 type coax connectors are commonly used at HF frequencies.



BNC, Type N, and PL 259 Connectors

- T9B6 A Type N connector is most suitable for frequencies above 400 MHz?

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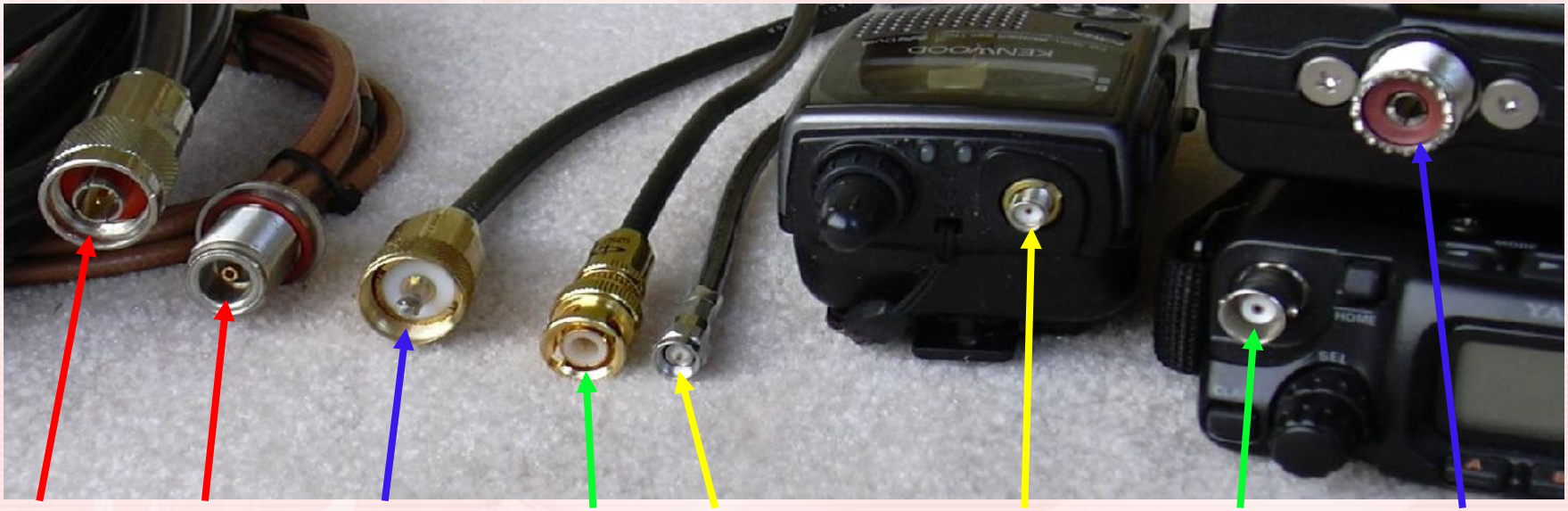

Understand the type of connector on your radio

You may need an adapter from your coax connector to your radio

Never buy cheap coax, connectors, or adapters

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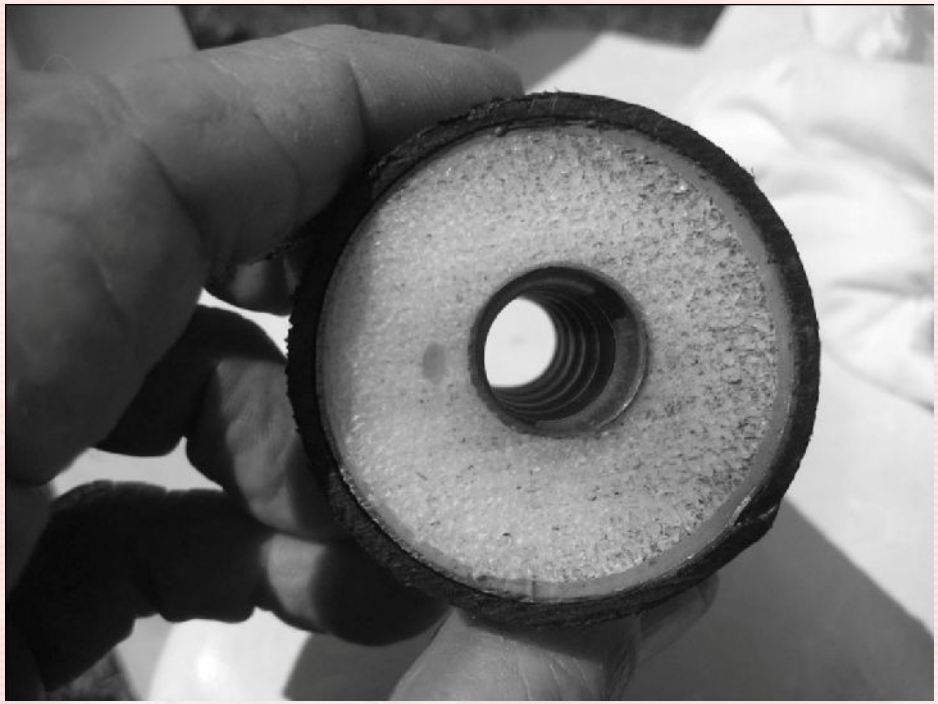
- T7C11 A disadvantage of "air core" coaxial cable, when compared to foam or solid dielectric types is that it requires special techniques to prevent water absorption.

Smaller Heliax



Large coax, with hollow center conductor, low loss

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- T7C9 The most common cause for failure of coaxial cables is moisture contamination.
  - Regular BNC, Type N, and PL259 connectors are not water-tight.
- T9B8 Coax connectors exposed to the weather should be sealed against water intrusion to prevent an increase in feedline loss.
- T7C10 The outer jacket of coaxial cable should be resistant to ultraviolet light because UV light can damage the jacket and allow water to enter the cable.
- T9B10 Electrical differences exists between the smaller RG-58 and larger RG-8 coaxial cables in that RG-8 cable has less loss at a given frequency.

Coax Cable Type, Size, and Loss per 100 feet

Coax Type	Size	Loss @ 100 MHz	Loss @ 400 MHz
RG-58U	Small	4.3 dB	9.4 dB
RG-8X	Medium	3.7 dB	8.0 dB
RG-8U	Large	1.9 dB	4.1 dB
RG-213	Large	1.9 dB	4.5 dB

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Coax Cable Signal Loss (Attenuation) in dB per 100ft

Loss	RG-174	RG-58	RG-8X	RG-213	RG-6	RG-11	9913	LMR-400
1MHz	1.9dB	0.4dB	0.5dB	0.2dB	0.2dB	0.2dB	0.2dB	0.3dB
10MHz	3.3dB	1.4dB	1.0dB	0.6dB	0.6dB	0.4dB	0.4dB	0.5dB
50MHz	6.6dB	3.3dB	2.5dB	1.6dB	1.4dB	1.0dB	0.9dB	0.9dB
100MHz	8.9dB	4.9dB	3.6dB	2.2dB	2.0dB	1.6dB	1.4dB	1.4dB
200MHz	11.9dB	7.3dB	5.4dB	3.3dB	2.8dB	2.3dB	1.8dB	1.8dB
400MHz	17.3dB	11.2dB	7.9dB	4.8dB	4.3dB	3.5dB	2.6dB	2.6dB
700MHz	26.0dB	16.9dB	11.0dB	6.6dB	5.6dB	4.7dB	3.6dB	3.5dB
900MHz	27.9dB	20.1dB	12.6dB	7.7dB	6.0dB	5.4dB	4.2dB	3.9dB
1GHz	32.0dB	21.5dB	13.5dB	8.3dB	6.1dB	5.6dB	4.5dB	4.1dB
Imped	50ohm	50ohm	50ohm	50ohm	75ohm	75ohm	50ohm	50ohm

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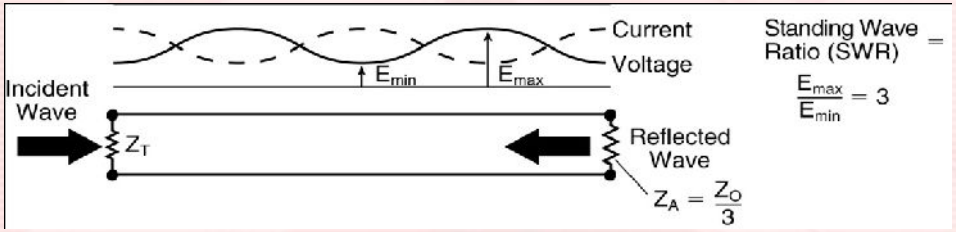
- T9B11 The lowest loss feedline at VHF and UHF is an Air-insulated hard line.
- T7C2 An antenna analyzer can be used to determine if an antenna is resonant at the desired operating frequency.
- T7C3 In general terms, standing wave ratio (SWR) is a measure of how well a load is matched to a transmission line.
- T9B1 It is important to have a low SWR in an antenna system that uses coaxial cable feedline to provide efficient transfer of power and reduce losses.



Impedance Mismatch Causes Reflected Wave

MFJ-269 SWR Analyzer

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- T7C4 A “1 to 1” reading on an SWR meter indicates a perfect impedance match between the antenna and the feedline.

SWR Reading Condition	Antenna
1:1	Perfectly Matched
1.5:1	Good Match
2:1	Fair Match
3:1	Poor Match
4:1	Something definitely Wrong

A battery operated SWR analyzer for tower antenna work

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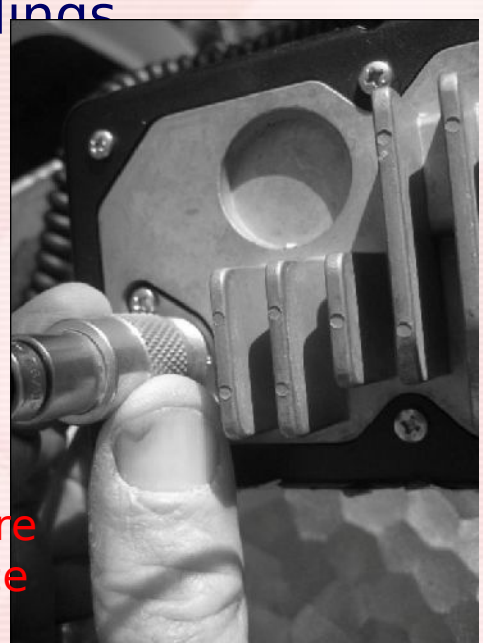
- T7C5 2 to 1 is the approximate SWR value above which the protection circuits in most solid-state transmitters begin to reduce transmitter power.
- T7C6 An SWR reading of 4:1 means there is an impedance mismatch.
- T9B9 A loose connection in an antenna or a feedline might cause erratic changes in SWR readings



Make sure all coax connections are tight to help minimize interference

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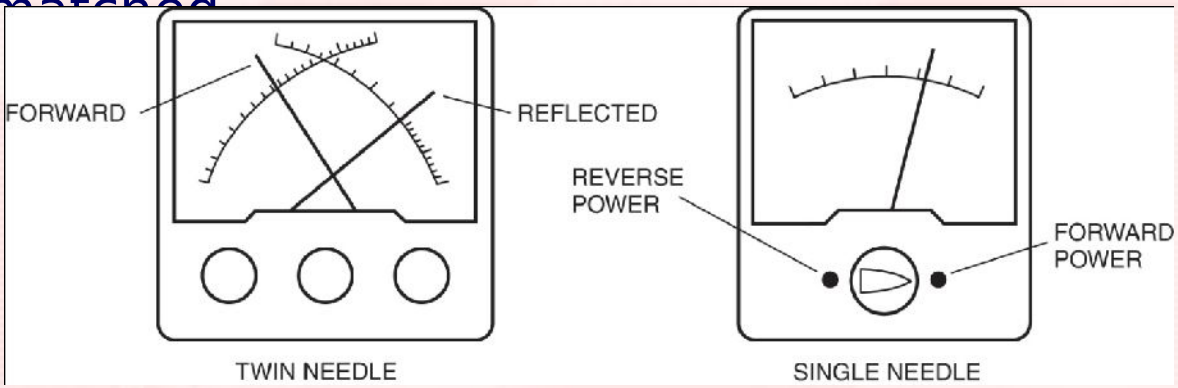
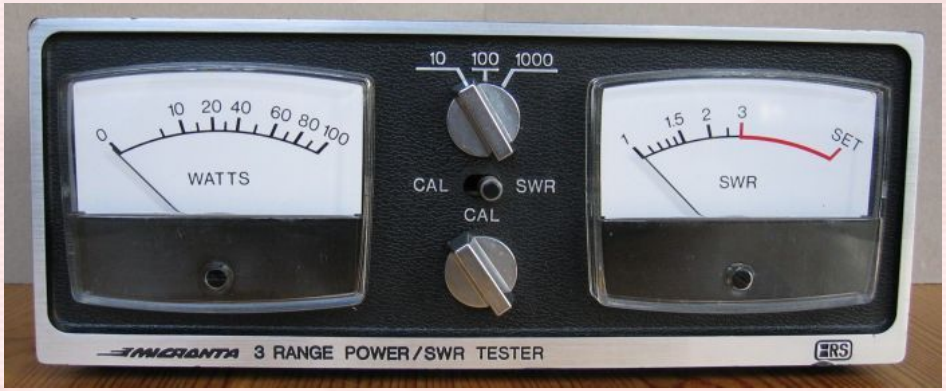
- T7C8 Other than an SWR meter you could use a directional wattmeter to determine if a feedline and antenna are properly matched



Dual/Twin Needle



Single Needle

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- T7C7 Power lost in a feedline is converted into heat.
- T9B4 An antenna tuner matches the antenna system impedance to the transceiver's output impedance.

MFJ-971 Portable QRP 200 Watt Tuner

Icom 7000 with LDG 7000 Auto-Tuner

Miracle QPak 50 Watt Manual Tuner

Palstar 1500 Watt Auto-Tuner

MFJ-994B 1500 Watt Auto-Tuner

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- T7A7 If figure T5 represents a transceiver in which block 1 is the transmitter portion and block 3 is the receiver portion, the function of block 2 is a transmit-receive switch.

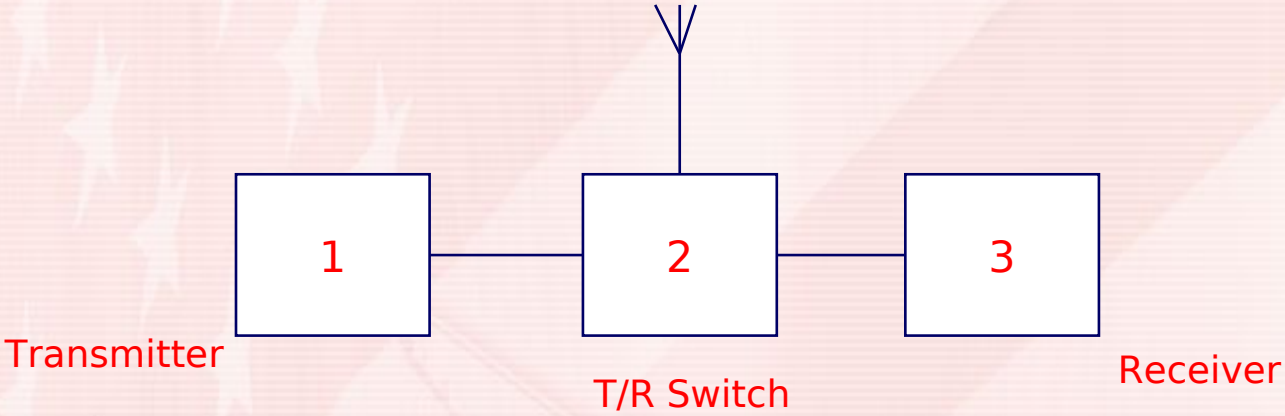

Figure T5

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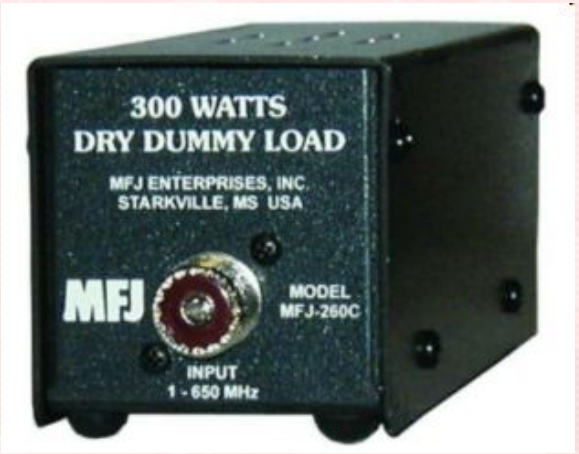
- T7C1 The primary purpose of a dummy load is to prevent the radiation of signals when making tests.
  - Prevents signals from being sent out over the air
  - Allows observation of signal on Spectrum Analyzer



300 Watt Dry Dummy Load

Dummy Load-Can 1kw with oil

Dry Dummy Load

Element 2 Technician Class Question Pool

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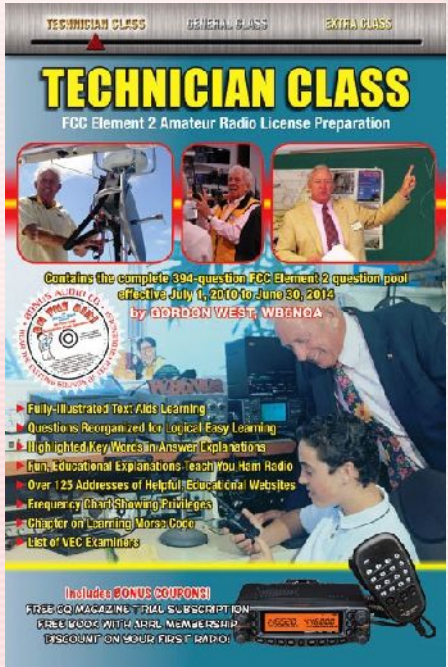
Valid July 1, 2010

Through

June 30, 2014



T6D11 Which of the following is a common use of coaxial cable?

A. Carry dc power from a vehicle battery to a mobile radio

B. Carry RF signals between a radio and antenna

C. Secure masts, tubing, and other cylindrical objects on towers

D. Connect data signals from a TNC to a computer

T9B03 Why is coaxial cable used more often than any other feed line for amateur radio antenna systems?

A. It is easy to use and requires few special installation considerations

B. It has less loss than any other type of feedline

C. It can handle more power than any other type of feedline

D. It is less expensive than any other types of feedline

T9B02 What is the impedance of the most commonly used coaxial cable in typical amateur radio installations?

A. 8 ohms
B. 50 ohms
C. 600 ohms
D. 12 ohms

T6B06 What generally happens as the frequency of a signal passing through coaxial cable is increased?

A. The apparent SWR increases
B. The reflected power increases
C. The characteristic impedance increases
D. The loss increases

T9B07 Which of the following is true of PL-259 type coax connectors?

A. They are good for UHF frequencies
B. They are water tight
C. The are commonly used at HF frequencies
D. They are a bayonet type connector

T9B06 Which of the following connectors is most suitable for frequencies above 400 MHz?

A. A UHF (PL-259/SO-239) connector
B. A Type N connector
C. An RS-213 connector
D. A DB-23 connector

T7C11 coaxial

What is a disadvantage of "air core" cable when compared to foam or solid dielectric types?

A. It has more loss per foot
B. It cannot be used for VHF or UHF antennas
C. It requires special techniques to prevent water absorption
D. It cannot be used at below freezing temperatures

T7C09 Which of the following is the most common cause for failure of coaxial cables?

A. Moisture contamination
B. Gamma rays
C. The velocity factor exceeds 1.0
D. Overloading

T6B06 - Why should coax connectors exposed to the weather be sealed against water intrusion?

A. To prevent an increase in feedline loss
B. To prevent interference to telephones
C. To keep the jacket from becoming loose
D. All of these choices are correct

T7C10 Why should the outer jacket of coaxial cable be resistant to ultraviolet light?

A. Ultraviolet resistant jackets prevent harmonic radiation
B. Ultraviolet light can increase losses in the cable's jacket
C. Ultraviolet and RF signals can mix together, causing interference
D. Ultraviolet light can damage the jacket and allow water to enter the cable

T9B10 What electrical difference exists between the smaller RG-58 and larger RG-8 coaxial cables?

A. There is no significant difference between the two types
B. RG-58 cable has less loss at a given frequency
C. RG-8 cable has less loss at a given frequency
D. RG-58 cable can handle higher power levels

T9B11 Which of the following types of feedline has the lowest loss at VHF and UHF?

A. 50-ohm flexible coax
B. Multi-conductor unbalanced cable
C. Air-insulated hard line
D. 75-ohm flexible coax

T5C02 Which of the following instruments can be used to determine if an antenna is resonant at the desired operating frequency?

A. A VTVM
B. An antenna analyzer
C. A “Q” meter
D. A frequency counter

T7C03 What, in general terms, is standing wave ratio (SWR)?

A. A measure of how well a load is matched to a transmission line
B. The ratio of high to low impedance in a feedline
C. The transmitter efficiency ratio
D. An indication of the quality of your station’s ground connection

T9B01 Why is it important to have a low SWR in an antenna system that uses coaxial cable feedline?

A. To reduce television interference
B. To allow the efficient transfer of power and reduce losses
C. To prolong antenna life
D. All of these choices are correct

T7C04 - What reading on an SWR meter indicates a perfect impedance match between the antenna and the feedline?

A. 2 to 1
B. 1 to 3
C. 1 to 1
D. 10 to 1

T7C05 What is the approximate SWR value above which the protection circuits in most solid-state transmitters begin to reduce transmitter power?

A. 2 to 1
B. 1 to 2
C. 6 to 1
D. 10 to 1

T7C06 What does an SWR reading of 4:1 mean?

A. An antenna loss of 4 dB
B. A good impedance match
C. An antenna gain of 4
D. An impedance mismatch

T9B09 What might cause erratic changes in SWR readings?

A. The transmitter is being modulated
B. A loose connection in an antenna or a feedline
C. The transmitter is being over-modulated
D. Interference from other stations is distorting your signal

T7C08 What instrument other than an SWR meter could you use to determine if a feedline and antenna are properly matched?

A. Voltmeter
B. Ohmmeter
C. Iambic pentameter
D. Directional wattmeter

T7C07 What happens to power lost in a feedline?

A. It increases the SWR
B. It comes back into your transmitter and could cause damage
C. It is converted into heat
D. It can cause distortion of your signal

T9B04 What does an antenna tuner do?

A. It matches the antenna system impedance to the transceiver's output impedance
B. It helps a receiver automatically tune in weak stations
C. It allows an antenna to be used on both transmit and receive
D. It automatically selects the proper antenna for the frequency band being used

T7A07 If figure T5 represents a transceiver in which block 1 is the transmitter portion and block 3 is the receiver portion, what is the function of block 2?

A. A balanced modulator
B. A transmit-receive switch
C. A power amplifier
D. A high-pass filter

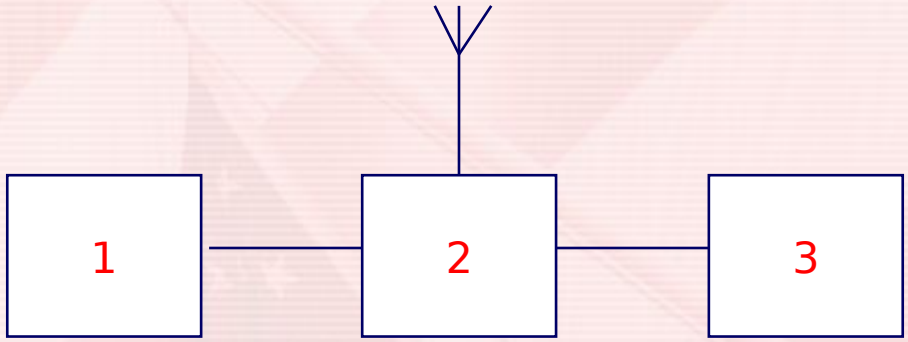


Figure T5

T7C01 What is the primary purpose of a dummy load?

A. To prevent the radiation of signals when making tests
B. To prevent over-modulation of your transmitter
C. To improve the radiation from your antenna
D. To improve the signal to noise ratio of your receiver