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OPERATOR'S MANUAL
SIPS-FAK™ Flexible Antenna Kit

TO REDUCE THE RISK OF INJURY, YOU MUST READ THIS OPERATOR'S MANUAL AND COMPLY WITH ALL INSTRUCTIONS AND PROCEDURES DESCRIBED HEREIN.

FAILURE TO DO SO MAY RESULT IN FIRE, PERSONAL INJURY, AND/OR OTHER DAMAGE.

SIPS-FAK works in conjunction with SIPS-BDA systems. Refer to SIPS-BDA Operator's Manual for important information concerning this product.

PATENTS AND PATENTS PENDING
7,838,142 • 7,990,102 • 8,025,118 • 8,026,698
8,084,154 • D601,088 • D632,649 • 20100197222
20100248616 and others

GENERAL SAFETY RULES

⚠ *WARNING*

READ AND UNDERSTAND ALL INSTRUCTIONS

Failure to follow all instructions may result in electrical shock, fire, equipment damage, and/or serious personal injury.

SAVE THESE INSTRUCTIONS

This manual contains important safety and operating information for the Modtech Corp. SIPS-FAK Flexible Antenna Kit system. Before using the FAK system, read this operator's manual. Also, read and observe all information on the labels attached to the system.

1. ***CAUTION! EXPLOSIVE ATMOSPHERE.*** This product includes an RF switch, which may cause an electrical flash if the switch is actuated. To avoid explosion or fire, do not operate this product in the presence of flammable gases or fumes.

2. ***CAUTION! INDOOR ANTENNA SAFE DISTANCE***. Use a maximum 3 dBi omni-directional antenna. Observe a minimum separation of 20 cm (~ 8 in.) from all users and bystanders so none receive RF exposure beyond the maximum permissible according to section 1.1310. See item 5 below for additional minimum spacing requirements.

3. ***LIGHTNING DISCHARGE***. Do not deploy system antennas or other components outdoors during electrical storms.

4. ***ASSURE PROPER ISOLATION BETWEEN OUTDOOR AND INDOOR ANTENNAS***. Failure to do so may lead to amplifier oscillations which may be detrimental to the radio system and cause the amplifier to automatically disable itself. A minimum separation of ~100 ft. in the back field of the outdoor antenna is recommended.

5. ***AVOID OPERATING POWERFUL RADIO TRANSMITTERS TOO CLOSE TO THE SYSTEM ANTENNAS***. Doing so may overload the system amplifier and cause it to automatically disable itself. Transmitters operating in the downlink frequency band should be kept a minimum of 100 ft. from the outdoor antenna. Transmitters operating in the uplink frequency band should be kept a minimum of 30 ft. from the indoor antenna(s).

⚠ *WARNING*

READ AND SAVE THESE INSTRUCTIONS FOR FUTURE USE.

Failure to follow all instructions may result in personal injury.

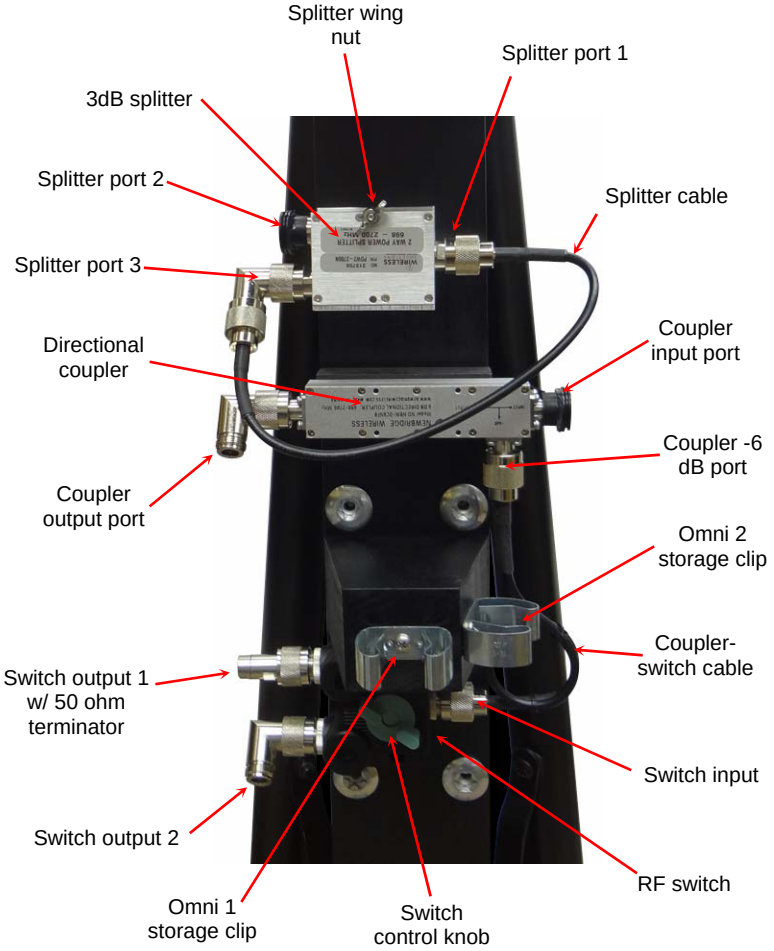
FUNCTIONAL DESCRIPTION

SIPS-FAK Flexible Antenna Kit

FUNCTIONAL DESCRIPTION - cont'd

NOTE:

THE TRIPOD LEGS ARE MOST EASILY EXTENDED AND COLLAPSED WITH THE ANTENNA STAND LYING DOWN ON ITS CABLE ORGANIZER FEET.



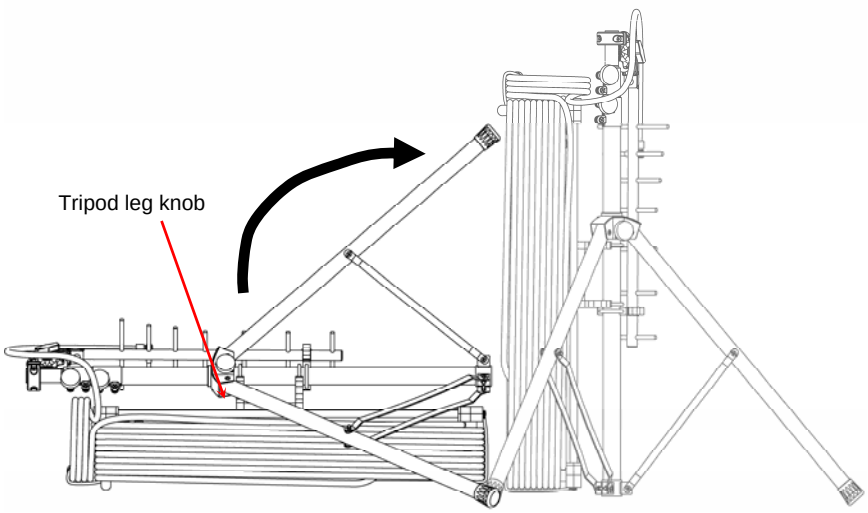
SIPS-FAK Flexible Antenna Kit RF Connection Subsystem

Basic Operation:

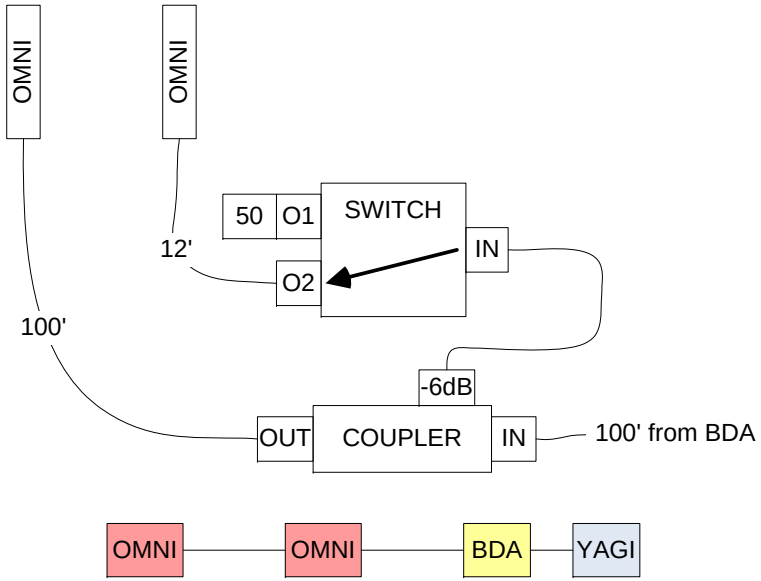
- **Purpose** - the FAK system is used to extend and/or adapt the tactical SIPS-BDA system to circumstances requiring additional antennas and/or added cable lengths when enhancing radio coverage inside structures such as buildings and tunnels.
- **Requirements** - the FAK system is intended to be used in conjunction with the SIPS-BDA tactical BDA system.
- **Antenna Locations** - a variety of cabling and antenna configurations are possible using the FAK. Always follow the recommendations for indoor-outdoor antenna isolation and indoor antenna overload avoidance (e.g., not too close to transmitters).

Basic Operation - Tripod Setup:

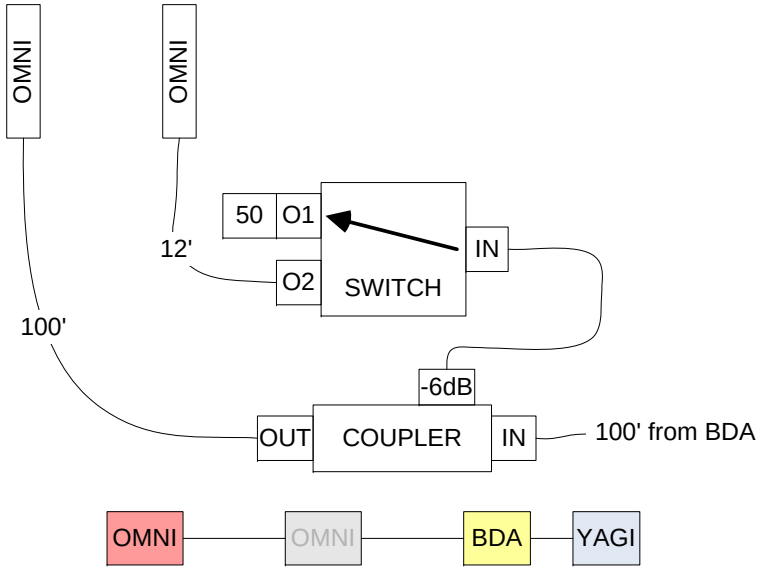
As with the SAK Standard Antenna Kit, the FAK tripod is most easily deployed starting from the horizontal state. Loosen the tripod leg knob and grasping the uppermost tripod leg lift it to extend the legs. Tighten the leg now and then simply rotate the tripod to the upright, vertical position.



Basic Operation - Example Configurations:

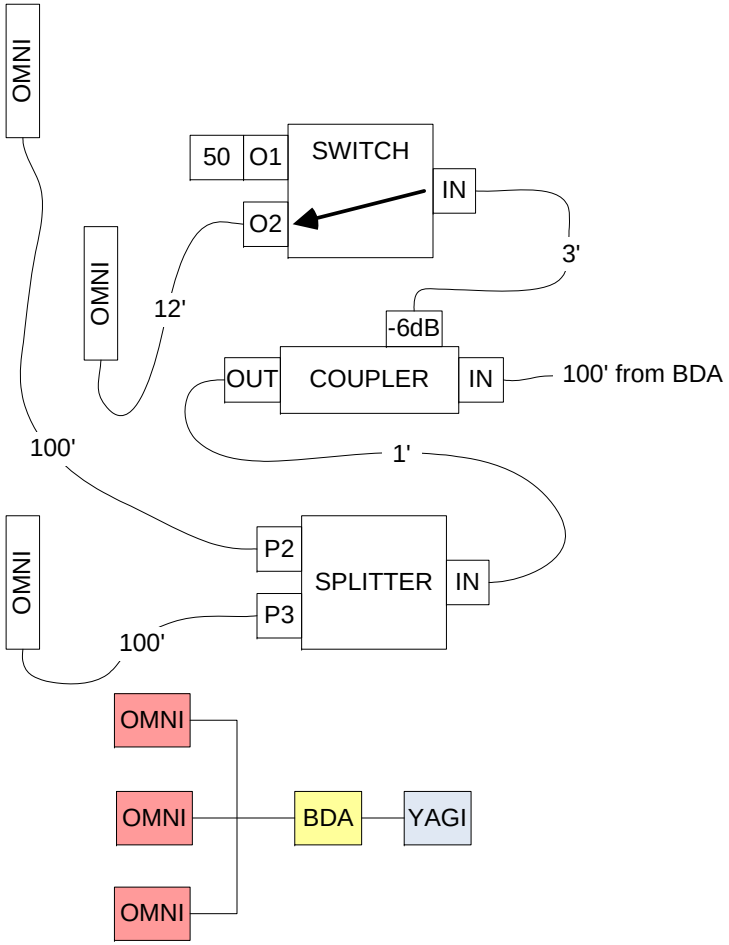


Configuration 1 - dual omni (note switch position)



Configuration 2 - single extended omni (note switch position)

Basic Operation - Example Configurations cont'd:

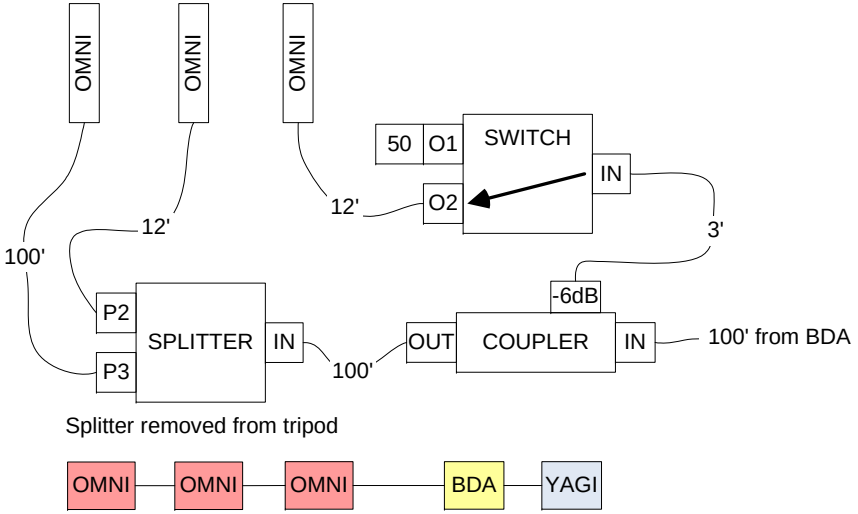


Configuration 3 - triple omni fan out

Configuration 3 is useful, for example, when entering at one level and branching up and down, left and right, or other similar fan out extension of coverage to three separate areas.

Note - additional cable sections (typically from the Auxiliary Cable Reel ACR-500) may be used to implement Configuration 3.

Basic Operation - Example Configurations cont'd:



Configuration 4 - triple omni linear

Note - additional cable sections (typically from the Auxiliary Cable Reel ACR-500) may be used to implement Configuration 4.

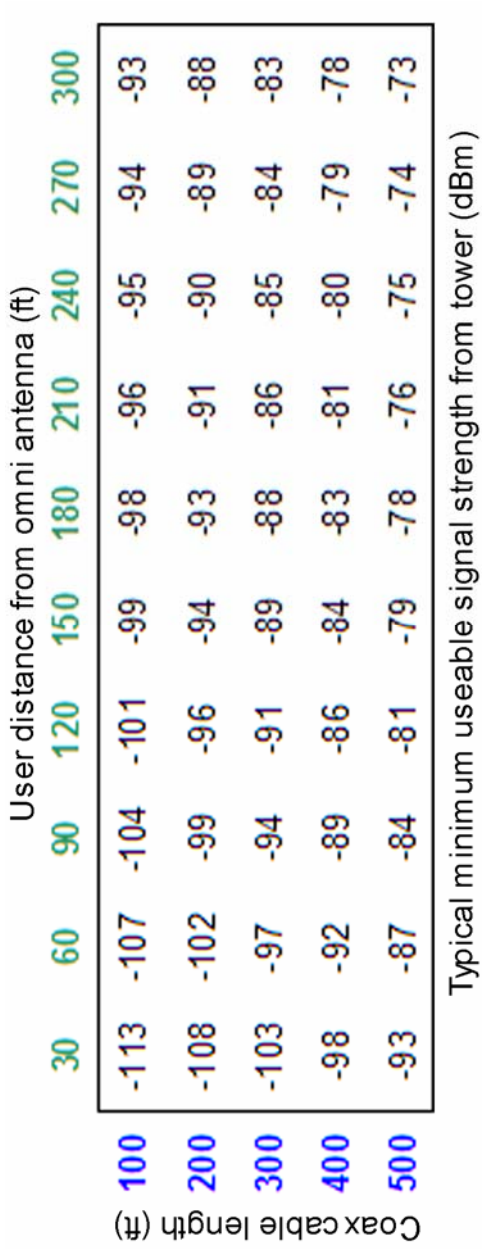
The foregoing configurations are provided by way of example only. It should be noted that many other configurations are possible. In all cases, successful operation will depend upon the following factors:

- Cable in any segment along with splitter and coupler losses will attenuate the signal. The shortest length of cable and least number of antennas needed to be effective should be used to preserve signal strength.

- Isolation between the outdoor Yagi antenna and all omni directional indoor antennas must be maintained to prevent oscillation and subsequent BDA shutdown.

- Omni directional indoor antennas should be placed so that radio transmitters are typically 30 ft. or further away during operations. This limits overload conditions which can ultimately lead to BDA shutdown.

Notes on Signal Strength



A splitter counts as approximately 50' of coaxial cable. The directional coupler counts as 100' of coaxial cable. Values in the chart are typical values only and the quality of signal depends on many factors beyond distance from antenna and coaxial cable length.

Notes on Signal Strength - cont'd

Measured Path Loss Coefficients and Predicted Loss at 10 and 100 m

Location Type	n	Loss at 10m (dB)	Loss at 100m (dB)
Free space	2.0	51	71
Retail store	2.2	53	75
Grocery store	1.8	49	67
Office, hard partitions	3.0	61	91
Office, soft partitions	2.6	57	83
Metalworking factory, line of sight	1.6	47	63
Metalworking factory, obstructed sight	3.3	64	97

Table 2

The preceding Signal Strength Chart assumes n = 2. It can be seen that higher of lower values of n have a major impact on the signal strength (where n depends on the type of radio environment).

Typical Values of Partition Losses

Material Type	Loss (dB)
Concrete block wall	17.0
Moveable wall (cubicle)	1.4
Window	2.0
Metal foil insulation	3.9
Storage rack	5.0

Table 3

Typical Floor Attenuation Factors

Number of Floors	Loss (dB)
1	13
2	19
3	24
4	27

Table 4

MAINTENANCE AND STORAGE

When rewinding coaxial cables, allow gentle bends over the cable organizer to avoid kinking the cable. A slight, cooperative twisting motion while winding and unwinding will also assist in kink free operation.

Visually inspect coaxial cables and antennas for signs of physical damage. Replace worn or damaged components.

Mud and grime may be removed with the use of a soft, water dampened cloth. Solvents are not needed and use of such should be avoided.

Allow the FAK to dry before returning to the duffel bag. If the inside of the duffel becomes wet, keep it unzipped in a well ventilated place to allow it to dry before closing and storing.

SPECIFICATIONS

Indoor Antennas	3 dBi omni-directional
Minimum Operating Temperature	-20 °C
Maximum Operating Temperature	50 °C
Dimensions	12” x 16” x 54”
Weight	50 lb.

MODTECH CORP.

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NOTES: