



MICROFLECT™ PASSIVE REPEATERS

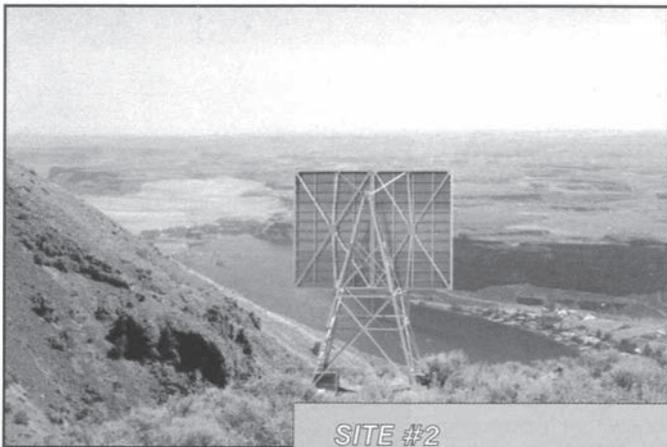
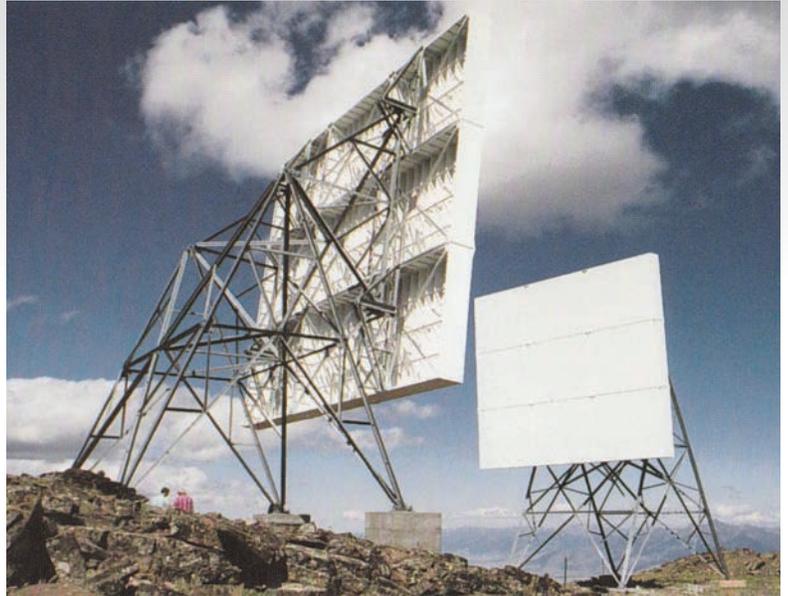


PASSIVE REPEATERS

Valmont Microflect Passive Repeaters are highly efficient devices for directing microwave signals over or around obstructions. Our expertise is drawn from 50 years of experience involving thousands of successful passive repeater installations throughout the world.

OUR PASSIVE REPEATERS...

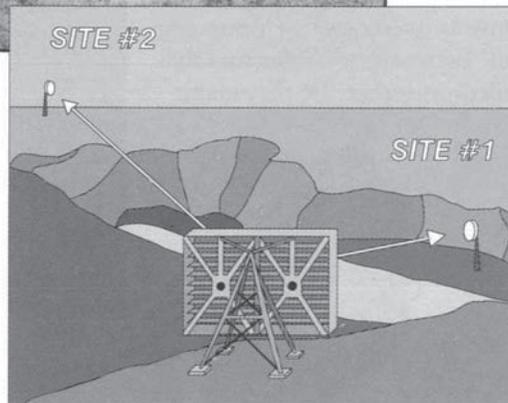
- Are simple, reliable, and proven tools.
- Allow line-of-sight microwave communication in rough terrain.
- May be used with multiple frequency bands between 1.7 and 40 GHz.
- Accommodate any modulation scheme.
- Provide reliable maintenance free operation.
- Eliminate the need for power lines, generators, batteries or solar panels.
- Reduce costs by minimizing the number of active repeaters.
- Enable installation and operation in remote areas without access roads.



NATURAL OBSTRUCTIONS

COLUMBIA BASIN, WASHINGTON

A common challenge for radio engineers is to provide communication between two sites when the line-of-sight is blocked by an obstruction. In this illustration, a microwave link is required between a small community located in a canyon, site #1, and a switching center, site #2. A Passive Repeater is used to redirect the signal from the canyon, over the ridge line, and to the switching center.

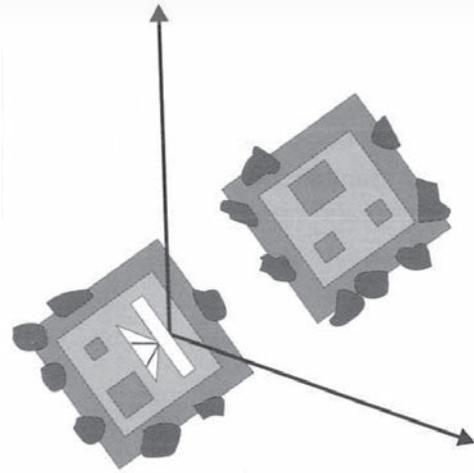
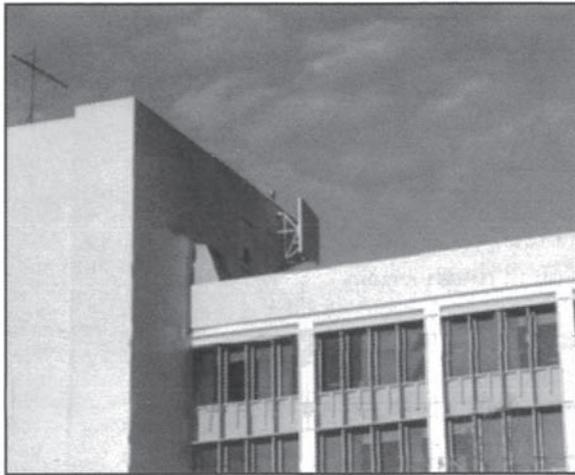


APPLICATIONS & ADVANTAGES

MAN-MADE OBSTRUCTIONS

SEATTLE, WASHINGTON

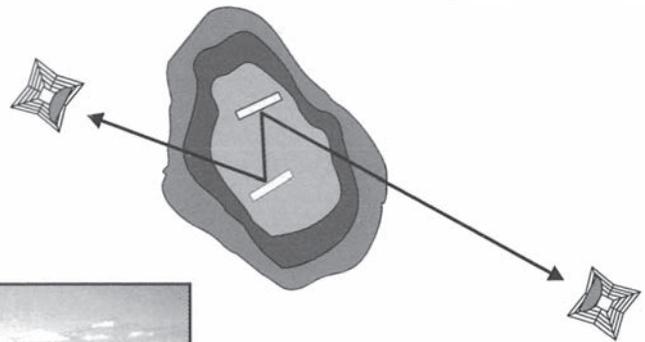
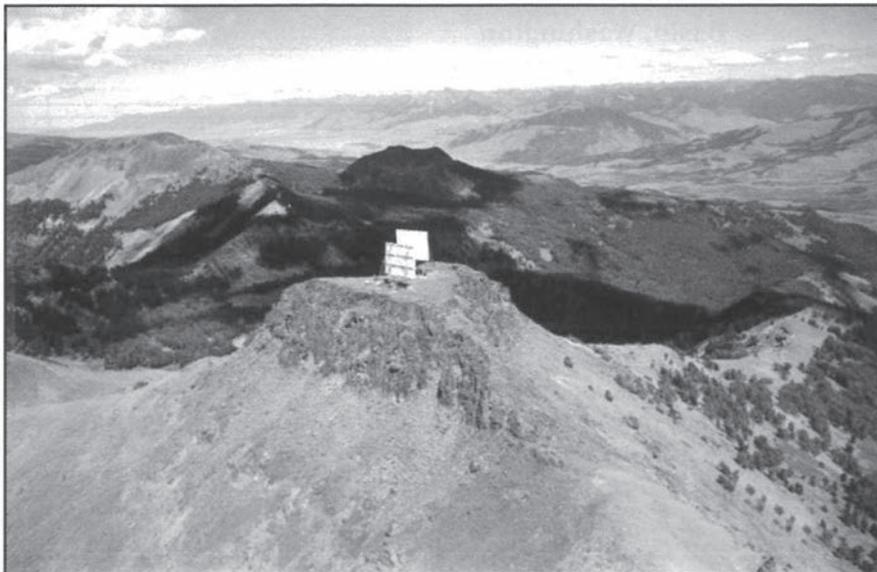
Natural terrain features like canyons and hills are not the only path obstructions that confront the transmission engineer. Man-made obstructions, such as this building, also create applications where Passive Repeaters can be effectively employed.

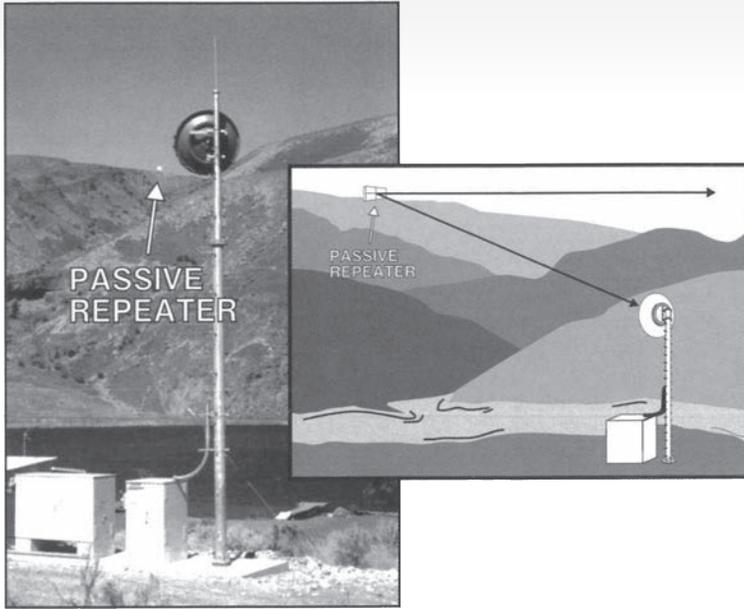


GOING OVER OBSTRUCTIONS

BIG SKY, MONTANA

When an obstruction is directly in line between two sites, a double Passive Repeater configuration can be used to redirect the radio signal over the obstruction. The mountain in this photograph is overcome by "bouncing the signal" between two reflectors that are installed on top of the mountain.





UTILIZING THE TERRAIN BLUE LAKE, WASHINGTON

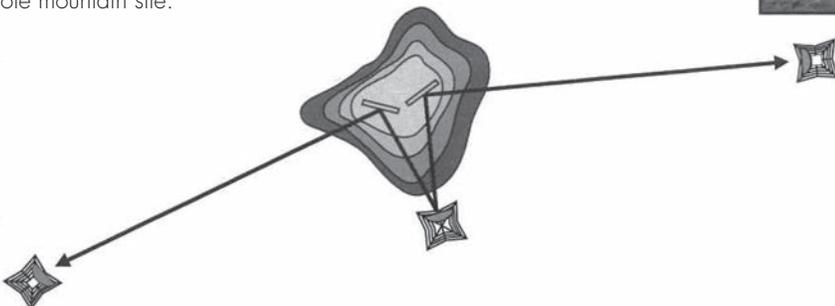
Passive Repeaters can also utilize the surrounding terrain to the engineer's advantage. A nearby hill or tall building, in conjunction with a Passive Repeater, will often eliminate the need for a tall, expensive tower.

The small Passive Repeater in this example is installed on a hill less than a mile (1 km) from the terminal site. The hill provides an elevation gain of over 1,000 feet (300 meters), well above what is required to establish a clear path. The combined use of the Passive Repeater and the short monopole at the terminal site results in a significant savings over the cost of a tall antenna tower.

ENABLE RADIO REPEATERS TO BE LOCATED NEAR EXISTING ROADS AND POWER LINES

YELLOWSTONE NATIONAL PARK

In this example, two terminal sites are a long distance apart and a radio repeater is required to amplify the signal at an intermediate location along the route. Two passive repeaters, painted to blend in with the terrain, redirect the signal between the terminal sites and the radio repeater. The passive repeaters enable the radio repeater to be located near an existing road and power line. This greatly reduces not only the cost, but also the environmental problems that are associated with building an access road and a power line to a remote mountain site.

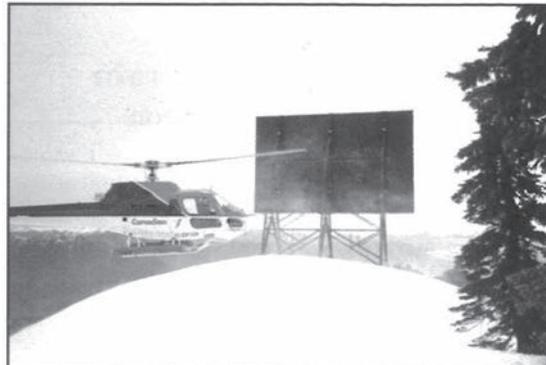


APPLICATIONS & ADVANTAGES

REMOTE, INACCESSIBLE LOCATIONS

VANCOUVER ISLAND, BRITISH COLUMBIA CANADA AND PAPUA NEW GUINEA

Passive Repeaters are designed to be installed in remote locations. They function by reflecting the radio signal from a distant antenna, without the need for their own power. The piece parts are small and light weight for easy transportation by small trucks or helicopters. Power tools, cranes and specialized equipment are not needed for assembly. Because Passive Repeaters are virtually maintenance free, access roads are not required.



The Vancouver Island Passive Repeater is one of thousands used to provide telecommunications to the mountainous regions of the world.

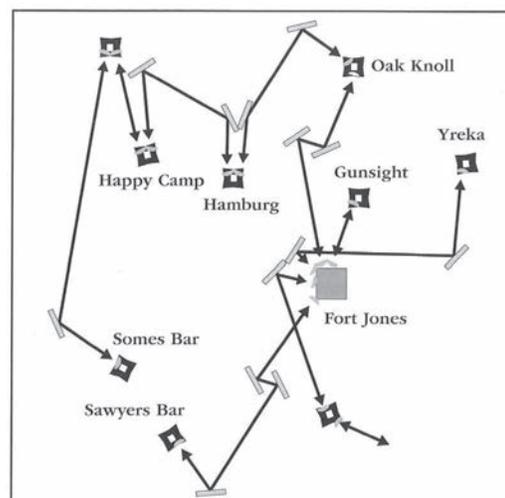
The Papua New Guinea Passive Repeater is installed in a remote jungle site accessible only by helicopter. Hand tools and a portable rigging hoist were used to erect the structure.



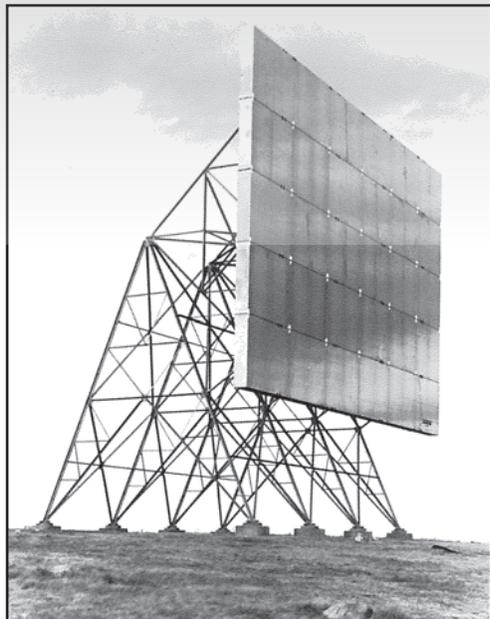
LOW COST, LOWER MAINTENANCE, AND MORE RELIABILITY

SISKYOU TELEPHONE COMPANY, FORT JONES, CALIFORNIA

This company employs thirteen Passive Repeaters to provide telecommunications to eight communities. Incorporating Passive Repeaters in the system's microwave link designs provided lower initial costs and substantially lower maintenance costs. The resulting system is simpler and more reliable than would have been possible with any other alternative design.



GROUND MOUNTED PASSIVE REPEATERS



FEATURES

DESIGN

Microflect passive repeater design criteria is based on RS-222-C specifications and designed for wind loads of 62.5 psf or the equivalent wind velocity of 125 mph.

REFLECTING FACE

Microflect passive repeaters are designed and manufactured to meet or exceed face flatness and rigidity requirements for 13 GHz operation. A system using a passive repeater with these specifications will not require future modification if a low frequency is changed to a higher one. Faces of panels should be painted white to minimize thermal distortion at 11-13 GHz.

FACE ANGLE AND ADJUSTMENT

Each passive repeater is supplied with "K" members that are of proper length to suit the mechanical center of the adjustment range of a particular vertical face angle. (See drawing side views and "K" indication.) Optimizing is accomplished manually by turning crank type mechanisms: 10 turns of vertical adjustment will rotate the passive face 0° 25' 30" vertically, and 10 turns of horizontal adjustment will rotate the passive face 0° 20' 12" horizontally.* Adjustments are made quickly and easily for recording transmission data used in plotting the radiation pattern.

For face angles in excess of ten degrees downward, the limit of the "K" members is exceeded. In these instances, which are infrequent, the entire supporting structure is rotated forward by sloping the foundation piers.

*24x30 Passive Repeater

ALLOWABLE STRESSES

In accordance with EIA Spec. RS 222C for steel and MIL-SPEC-5 for aluminum.

DESIGN LOADING

- (a) 125 mph wind, no ice
- (b) 100 mph wind, 2" of ice on one face
- (c) 75 mph wind, 4" of ice on one face

RIGIDITY

All units are designed to meet rigidity requirements of EIA RS-195A for 13 GHz operation.

FACE FLATNESS

Under no load the face flatness will be plus 0" and minus 1/8" where negative values indicate a concave surface.

FACE DEFLECTION

Under 75 mph winds the deflection of the face stiffeners will be less than 1/8" from the no load position.

ADJUSTABILITY

Units up to 30x48 have maximum adjusting ranges of $\pm 4^\circ$ about either axis or $\pm 2^\circ$ about both axes simultaneously. Sizes 40x50 and 40x60 have azimuth only $\pm 1^\circ 42'$, elevation only $\pm 2^\circ 33'$, combined azimuth $\pm 0^\circ 51'$ and elevation $\pm 1^\circ 16'$.

CORROSION PROTECTION

All structural steel is galvanized after fabrication in accordance with ASTM A-123 for structural members and A-153 for hardware.

REFLECTING FACE

Reflecting face is 0.063 solid aluminum without perforation. All aluminum fabrication follows aircraft riveting standards.

TYPHOON MODELS

Typhoon models, based on 187 mph design (240 mph wind survival) are available for application in areas known to have severe wind conditions.

ARCTIC MODELS

Arctic passives are designed in accordance with E.I.A. Specifications RS-222-C for the following load conditions.

- (a) 60 psf wind (122 mph) plus 4" of radial ice at 50 lbs/ft³.
- (b) 30 psf wind (86 mph) plus 12" of radial ice at 30 lbs/ft³.

The reflecting surface of the Arctic Passives will remain in position within $\pm 0.25^\circ$ under loading (a) or (b) above.

ERECTION

Hinged shoe plates allow a complete side that has been assembled on the ground, to be tipped up into position by a simple hand winch or a vehicle power winch. Panels assembled in horizontal tiers are lifted into position by the use of outriggers at the top of each frame station. Erection drawings are supplied with each passive repeater for fast, safe erection.

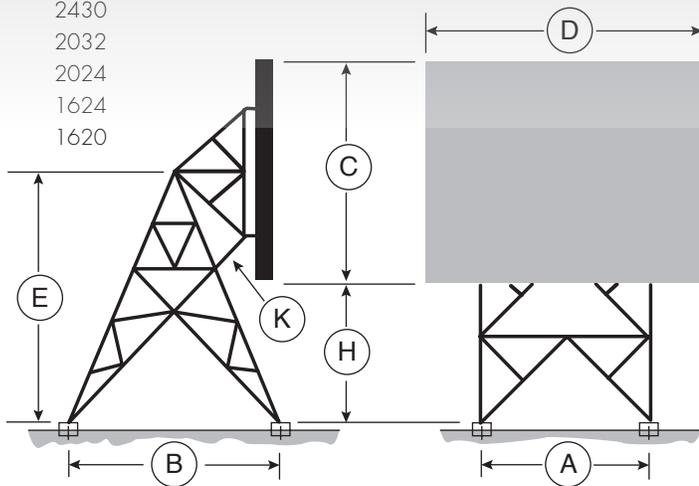
Helicopters are used for remote inaccessible site installation. The aluminum panels weigh 270 pounds each. A helicopter is normally capable of transporting two panels each trip. The maximum length of structural steel is 20 feet and is transported easily.

APPLICATIONS & ADVANTAGES

DIMENSIONS

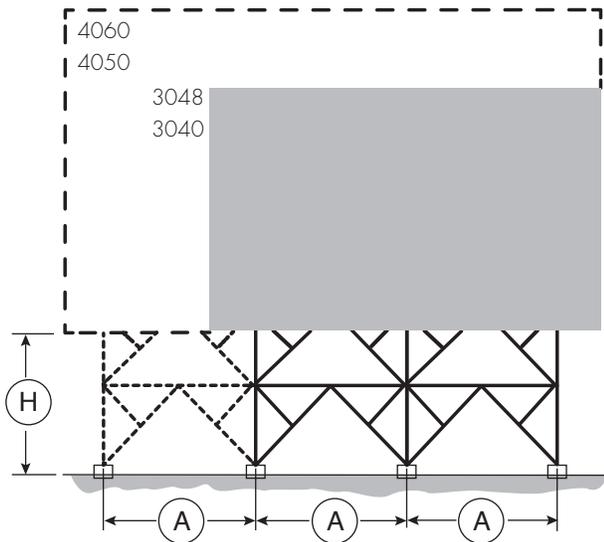
MODEL:

- 3032
- 2430
- 2032
- 2024
- 1624
- 1620



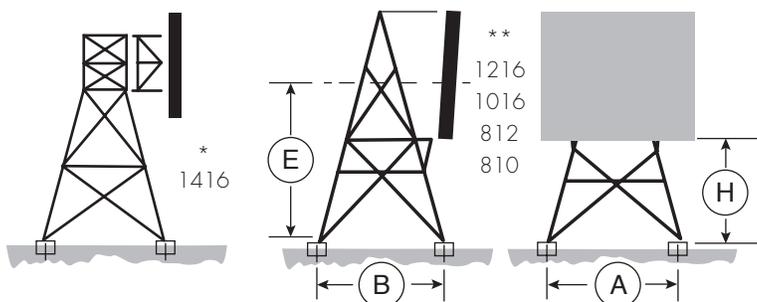
H 8' GROUND CLEARANCE

Model	No. of Frames	A Ft.-In.	B Ft.-In.	C Ft.	D Ft.	E Ft.-In.
3048-8	3	16-0	19-2	30	48	23-0
3040-8	3	14-0	19-2	30	40	23-0
3032-8	2	18-3	19-2	30	32	23-0
2430-8	2	18-0	16-8	24	30	20-0
2032-8	2	16-0	15-0	20	32	18-0
2024-8	2	16-0	15-0	20	24	18-0
1624-8	2	12-0	13-4	16	24	16-0
1620-8	2	12-0	13-4	16	20	16-0
1416-8	*	11-0	9-6	14	16	15-0
1216-8	**	10-0	10-0	12	16	14-5
1016-8	**	10-0	10-0	10	16	13-5
812-8	**	8-9	8-9	8	12	12-0
810-8	**	8-9	8-9	8	10	12-0



H 15' GROUND CLEARANCE

Model	No. of Frames	A Ft.-In.	B Ft.-In.	C Ft.	D Ft.	E Ft.-In.
4060-15	4	15-0	29-2	40	60	35-0
4050-15	4	15-0	29-2	40	50	35-0
3048-15	3	16-0	25-0	30	48	30-0
3040-15	3	14-0	25-0	30	40	30-0
3032-15	2	18-3	25-0	30	32	30-0
2430-15	2	18-0	22-6	24	30	27-0
2032-15	2	16-0	20-10	20	32	25-0
2024-15	2	16-0	20-10	20	24	25-0
1624-15	2	12-0	19-2	16	24	23-0
1620-15	2	12-0	19-2	16	20	23-0
1416-15	*	14-0	12-1½	14	16	22-0
1216-15	**	13-5	13-5	12	16	21-0
1016-15	**	13-5	13-5	10	16	20-0
812-15	**	12-5	12-5	8	12	19-0
810-15	**	12-5	12-5	8	10	19-0



* Three-legged configuration
 ** Four-legged pyramid configuration

Microflect Engineering manual 161A, describing in detail the application of passive repeaters to line-of-sight microwave systems, is available in either English or Spanish language upon request.



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