



**SMART
UNDERGROUND
COMMUNICATIONS**



**UHF IS
COMMUNICATIONS
SYSTEM**

- Two-way radio communications
- Increases safety and production
- Data, telemetry and video capability
- Local and remote diagnostics
- Easy to install and maintain
- Reliable and robust engineering

SYSTEM OVERVIEW

BECKERCOM I.S. RADIO SYSTEM

Beckercom leaky feeder system allows miners to communicate throughout the mine over standard commercial two-way radios significantly increasing productivity and safety. The leaky feeder system allows the monitoring and control of electrical equipment such as fans and pumps.



The Intrinsically Safe (I.S.) Leaky Feeder system can provide 100% coverage of underground mines when used in conjunction with the Becker I.S. portable two way radio.

SYSTEM OPERATION

The system is designed to provide seamless two-way communications throughout an underground mine or tunnel. This is achieved through the use of Leaky Feeder antenna cables. The radio signals from the Head End, which is typically located on the surface, are transmitted throughout the underground travel-ways over the leaky feeder cabling system. The signal is also easily re-transmitted on surface and can cover the surrounding areas for several kilometres.

HEAD END UNIT

The Head End can combine up to sixteen (16) voice or data channels. Integral to each channel is a commercial repeater that is programmed to relevant frequencies. It is common to have channels allocated for general "chat", maintenance, production, emergency and so forth with connectivity to telephone systems to facilitate radio to telephone communications. Radios can be programmed to allow or block access to certain channels.



LEAKY FEEDER CABLE

Coaxial cable is designed to keep as much signal as possible within the cable, and to block any external signals. Leaky Feeder cable is designed to 'leak' or radiate the radio signal out, as well as allow signals in from remote radio transceivers within 50 - 200 meters from the Leaky Feeder cable. To sustain the signal levels over long distances, Line Amplifiers (or boosters) are inserted along the Leaky feeder cable run, nominally every 350m.



LINE AMPLIFIER

SYSTEM DESIGN

Leaky feeder systems are designed in collaboration with customers by certified Becker communication engineers complete with compliance requirements.

SYSTEM OVERVIEW

LINE AMPLIFIERS

The Amplifiers are line powered by 12 VDC via the Leaky Feeder coaxial cable. The power is supplied from Intrinsically Safe Uninterrupted Power Supplies (UPS) in order to allow the system to continue functioning in the event of losing mine power.

Strategic positioning of the Amplifier ensures communications are achieved throughout the mine and importantly all working faces and locations.

BRANCH UNITS

Where coverage is required in a tunnel off the main travel way, such as a conveyor drift, return or cross-cut, Branch Units are installed. Branch Units come in two (2) versions, a three way and a four way Branch. System Branches provide the flexibility to install leaky feeders into all mining areas for complete radio coverage.

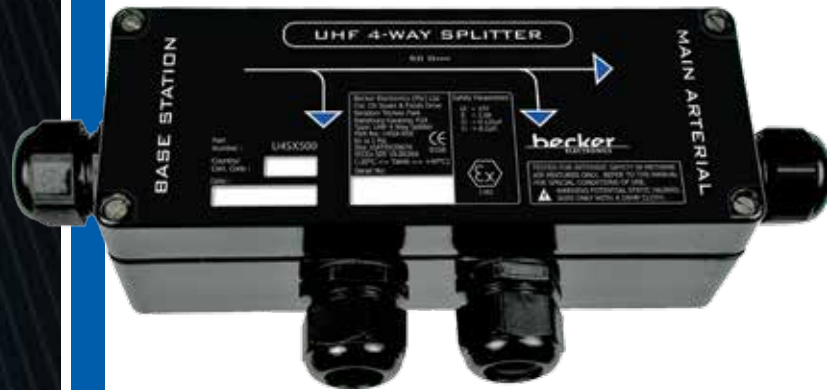
SELF TESTING

Amplifiers include full local diagnostics to simplify the task of maintaining the system in an operating mine or tunnel. Amplifier performance can easily be monitored from a passing vehicle without the need for expensive test equipment. Amplifiers are characteristically spaced every 350m along the Leaky Feeder cable.



GROWING WITH THE MINE

As a mine continues to develop and expand, so too does the Leaky Feeder system. The arterials are extended by adding extra cable and amplifiers as required. Extensions can be performed by site electrical personnel with minimal training required. The connection method is simple, yet effective.



REPAIRS & EXTENSIONS

Leaky Feeder cables need to be extended and sometimes repaired or modified as a mine develops. Making quick connections and repairs is therefore important to ensure minimum downtime and reliable operations. The Becker splice unit accommodates these requirements. Line splices can be used to join two sections of cable where additional signal amplification is not required, or to simply repair a damaged section. Line Terminations are installed at the end of the Leaky Feeder cable to properly terminate the system.

TWO WAY RADIO

The compact Becker UHF intrinsically safe (I.S.) portable radios provide versatility and reliability in a compact and rugged package for use in Australian underground coal mines. (ANZEx 10.2008X)

AMPLIFIERS

Parameter	UHF Technology
Operating Voltage	5-17 volts DC
Local Diagnostics Display	Yes - Down link power, up link AGC, voltage and current
Remote Diagnostics	Yes - Optional card, PC based
Channel Capacity	80
RF Output	+0 db
RF Gain	+22 db
Suggested Amplifier Spacing	310 metres
Data Throughout	2 Mbps
Video Capabilities	Yes - 4 channels

HEADEND

Parameter	UHF Technology
Number of Feeders	4
RF Output	+0 db
Operating Voltage	5-17 volts DC

RADIO COVERAGE

Parameter	UHF Technology
Underground	Up to 200 metres from cable
Surface	Up to 20km

CERTIFICATION

I.S. certificate	IECEX ITA 11.0009X
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OTHER ADVANTAGES

Parameter	UHF Technology
Additional Radios Required for CB operation	None - UHF radios incorporate CB frequencies
Tagging System Capabilities	Yes
Seismic System Capabilities	Yes

Technical data are guiding values. If the product is integrated into systems or operated in combination with other devices, its permissible operating values can deviate from these guiding values. Subject to technical modifications without prior notice.



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