**Description of Shoe Transmitter Operation (Brief).**

The transmitter electronics is part of a weight bearing shoe product that senses a weight by analog means. The microcontroller converts this signal to an 8 bit digital word. The microcontroller then transmits the word along with a shoe address, Hi/Lo battery indicating bit, and error code correction to a receiver in a train of bursts at a rate 20 per second. An individual burst duration is a little less than 9 ms, and the duration of the train of bursts last for as long as a weight of 10 Lbs. or greater is applied to the force plate. It is a user actuated device and is used while walking for orthopedic patients or patients that need to monitor their weight to one limb. The product unit is to be sold as 3 size shoes, small, medium, and large i.e. 3 transmitters operating identically in the same fashion as described here only with a different shoe address for the different shoe sizes, and a receiver. In some instances it may be required of us to provide up to as many as 32 shoes/shoe addresses per receiver.

**Moderately Detailed Circuit Description.**

Power is applied in the form of 2x1.5 Volt AAA batteries i.e. (a voltage that ranges from less than 1.6 to about 3.3 Volts). This in turn supplies a DC to DC converter, which generates a stable 3.3 Volts. This voltage then supplies power to the microcontroller, which then begins the start up process. It then collects data stored in a memory to identify itself by a shoe address and it reads the calibration data. The program then goes into operation mode. The program at a rate of 20 times a second first wakes up the amplifiers and then sends an 8 bit digital word to the DAC to set the amplifiers offset to the proper value. The microcontroller then pulses the power to the sensor and then takes a reading and converts it to a digital word. This digital word is then corrected by a calibration multiplying factor to adjust the gain due to inaccuracies of part tolerances in the manufacturing of the various passive and active analog parts of the sensing circuitry. This new corrected 8 bit digital word is then evaluated to see if the weight has exceeded 10 Lbs. in which case the word is then merged with the shoe address, Hi/Lo battery indicator bit, error code correction, and then is sent to the transmitting chip. This information is then sent in on/off keyed bursts at a carrier frequency of 418Mhz. Each burst is about 8.5 ms long and continues 20 times per second as long as there is a weight of 10 Lbs. or greater on the force plate of the shoe. The microcontroller is also looking for inactivity in which case the microcontroller after 1 minute of inactivity will shut down the DC to DC converter/power supply and then go to sleep as long as the battery voltage stays above 2.7 Volts. The microcontroller then feeds off the batteries directly in sleep mode. In the sleep mode it wakes up once every 3 seconds to look for activity and to check battery status. If it detects no activity above 10 Lbs., and a battery voltage is above 2.7 Volts then, it goes back to sleep. If the microcontroller detects activity above 10 Lbs. the microcontroller will run in normal operating mode again until another minute of inactivity occurs in which case it will go back into sleep mode. If the battery voltage falls below the 2.7 Volt threshold the power supply will not shut down to protect the power supply to the microcontroller. If the batteries total voltage falls below the 2.7 Volt threshold the microcontroller might not wake up and run properly below 2.5 Volts with out the DC to DC converter running all the time. The circuit will still function properly with the battery voltage below 2.7 Volts, but the power supply will not shut down until the batteries fall below 0.8 Volts. The Hi/Lo battery bit is not changed until the battery voltage falls below 1.6 Volts for reasons of longer operation. Once the batteries reach 1.6 Volts, the battery bit is changed to the Lo setting and during normal activation with a weight of 10 Lbs. or greater, the battery information is sent along in the burst to the receiver for decoding. The transmitter does not transmit unless the user actuates it by stepping on the force plate. The transmitter can be turned off, by removing one or both batteries. The data transfer rate is 9600 baud in each packet or burst. The shoe/transmitter is worn by a patient or individual for periods of minutes up to hours and only transmits the data when the patient or individual steps down on the shoe. When a patient or individual does not wear the shoe the transmitter is rendered inactive and does not transmit data.