WILL • BURT
"NIGHTSCAN SERVLITE"
P.O. #VS1078C

DIVELBISS Ref: 0110148
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05/16/2002

Transmitter Operational Description (BM-0110148-3)

Refer to the Block Diagram and Schematic Diagram as required.
The circuitry of the Transmitter consists of:

- 9VDC Battery
- Six Operator Pushbuttons
- A pushbutton "OR" gate (D1~D4),
- Solid-state power switch (Q1 & Q2),
- 6 bit to 4 bit encoder (U1),
- Parallel to serial bit encoder (U2)
- RF Transmitter Module (U3)
- RF Attenuator (R21~R23)
- Antenna

When not in use, Q1 prevents any current flow from the battery to the rest of the circuitry. The unit is "OFF". If any of the Pushbuttons are pressed, Q1 is turned "ON" via the diode "OR" gate (D1~D4) and Base drive transistor Q2. R11, and R18~R20 set up the base bias for Q1 & Q2. In this state, the rest of the circuitry is powered by the battery via Q1 and will remain under power until all pushbuttons are released.

While under power, U1 determines which pushbutton is pressed and presents a unique 4 bit binary pattern to U2 for each pushbutton. These bit patterns are depicted by the truth table shown on the schematic.

U2 converts the 4 bit binary pattern to a serial bit stream required by the RF Module. This serial bit stream is actually a data "packet" which also contains a "signature code" and error detection. A different signature code for each transmitter in a local area prevents a lamp receiver/controller assembly from responding to multiple transmitters. The signature code setting between a transmitter and companion receiver must be the same in order for the system to work.

The signature code is set up by SW1 which is a 5PST DIP switch. This gives 32 different signature code settings. R12~R16 & R26 provide a logic "high" to the inputs of U2 when a given switch pole is open.

R9, R17, and C6 set up internal timing of logic states for U2. Q3 enables U2 via base bias resistors R7 & R8 whenever any of the pushbuttons are pressed.

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The serial data packet from U2 is presented to the RF module U3 via a voltage divider comprised of R24 & R24. This prevents an over-voltage condition to the “DIN” input of U3. The serial data is FSK modulated onto an RF carrier by U3. One of Eight different carrier frequencies can selected by the user. This is set up by jumpers F0~F2. All of the jumpers are installed at the factory which provides a default carrier frequency of 903.70MHz. The end user can change this by cutting jumpers. More of this is explained in the operator manual.

The RF output is presented to the ¼ λ antenna via a “T” pad attenuator comprised of R21~R23. This attenuator reduces the RF output power of the transmitter to within FCC legal limits for this type of device. Copper cladding on the printed circuit board provide a “counterpoise” for the antenna. The antenna is mounted on a type SWA connector and is replaceable by the end user.

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Receiver/Controller Operational Description (BM-0110148-1)

Refer to the Block Diagram and Schematic Diagram as required.
The circuitry of the Receiver/Controller consists of:

- Antenna
- RF Receiver Module
- Serial bit to Parallel bit Decoder
- Binary to one of six Decoder
- Motor Drivers
- Lamp Driver
- Isolated DC Power Supply

PS1 provides electrical isolation between the 10~14VDC power input and the internal control power. This is done for a degree of immunity against electrical noise and for safety. D6 is used for reverse polarity protection. PS1 also provides a regulated output. FU3 and V1 provide protection against current overload and over-voltage respectively. C12 & C13 are power input filters.

The output of PS1 is fed to a π filter comprised of C14, C15, & L1. The +12V from the filter drives the optical isolators U1~U5 and the +5V regulator. The +5V supply powers the control devices.

RF signals of the proper frequency and modulation are demodulated by the RF Receiver module U6. As with the Transmitter, F0~F2 on the receiver are set for operation on one of eight frequencies as described in the manual.

The output of the RF module is a serial data packet that is decoded/converted to a 3 parallel bit pattern by U9. U9 also detects the signature code contained in the data packet. If this code matches what is set by SW1 (on the receiver), a "Valid Transmission" (VT) signal is sent to U10. U10 will then decode the 3 parallel bit pattern to a one-of-eight output. Only six of these bits are used. Depending on which pushbutton was pressed on the transmitter, one of these six bits will go to a logic "1" and turn on the associated isolator/driver for the motors or lamps.

Motor direction control is achieved through relay contacts formed as an "H" bridge. Limit switches LS1~LS1 disable motor movement for a given direction if the mechanism is at its end of travel (EOT) point.

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The ON/OFF control for the Lamps is done through a Flip-Flop U8. This is done since the control signal is lost when the pushbuttons on the Transmitter are released. Control for the motors is temporary while the lamps must remain ON or OFF for long durations.