BEWATOR COTAG

Federal Communications Commission
Equipment Authorization Division
Application Processing Branch,
7435 OAKLAND MILLS ROAD
COLUMBIA, MD 21046

Date: 3rd March 2000

Form 731 Confirmation No EA96898

FCC ID: EZO5PQ5290: 5298 Pin & Proximity Reader

Dear Sir/ Madam

I hereby apply for a Class II permissive change to the above product and present the following documentation for your attention:

1. Introduction
2. Description of change and circuit diagram
3. Test Report from dB Technology No R1199
4. Items List
5. Installation notes

If there is any problem with this submission please contact me, Martin Young at Bewator-Cotag, Cambridge, England
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yours faithfully,

Martin J D Young Quality & Approvals Engineer

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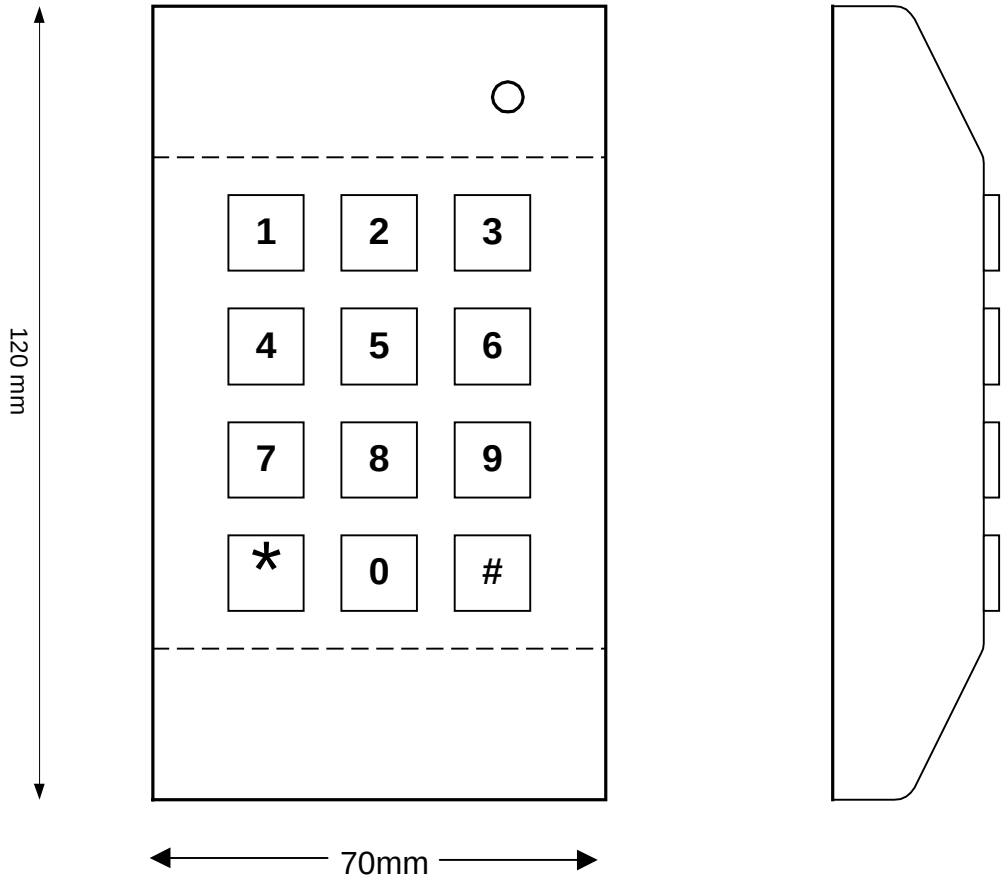
The 5298 Pin and Proximity reader

Introduction:

The 5298 PIN & Proximity Reader is a basic 5290 series Access Control Reader with a Keypad. The 5298 is designed to read the codes contained in Cotag coded cards and tags, and also the cardholder's PIN data. It then passes these codes, if valid, to a host system.

The 5298 reader consists of a printed circuit assembly and keypad mounted inside a plastic (ABS) enclosure. Power Supply: it requires from 4 to 35v dc at 120mA max. and can usually share the same supply as the solenoid door lock.



Description of change:

Our **FCC ID: EZO5PQ5290** certificate is based on our **Model 5291** card reader without pinpad. The 5291 reader transmits to the tag at 132kHz and receives data from the tag at 66kHz.

Model 5298 is virtually the same as the 5291 with the addition of the pin-pad. Both models use the same processor and firmware. The Tx and Rx frequencies are unchanged and the read range of cards and tags remains the same.

We herewith submit our **Model 5298 Pin** and **Proximity** reader under the Modification / Class II Permissive Change rules, and include the following details and test report in support of this submission.

Note circuit numbering differs in several places, and there are some minor differences which are covered in the appropriate section below.

Circuit Description:

Power Supply:
JU1 is used to select upper or lower voltage ranges, nominally 10 to 35 V dc and 4 to 15.6 V dc. The output voltage has been chosen to be 13.8 V, which is as high as possible within the tolerance limits, in order to reduce the heatsink requirements on reg 2.

15v & 5v:
5V is regulated from the +V (5 to 12v) input by reg 1: (MIC29150-5.0BU) which is a 1.5A regulator and dissipates 990mW at 15.6v input and therefore does not require a heat-sink.

Where the switch mode regulator reg 3 is used (as is normally the case), the output of reg 1 will be stepped up to 5.0 volts. Switching frequency is 180kHz nominal. The regulator has been chosen as it always uses PWM as opposed to PFM or burst mode operation. PFM can cause noise at much lower frequencies than the switch frequency.

Crystal frequency 7.392 MHz
Clock frequency 1.848 MHz

Transmitter:
The 132kHz is derived from the Xtal via the E clock (divide by 4) and is further divided by 14 in the shift register (HC164) using a FET to invert the feed-back. HC164 Pin 12 connects to the input of a "low side driver" chip. This simply converts the HC logic signal at 5v into a low resistance FET drive at the voltage supplied by the chip. The output will therefore commonly be a 5v squarewave from a low impedance source (~ 7ohms)

A series tuned output has been chosen as it filters out the harmonics of the square wave and is energy efficient. The coil is tuned using two series capacitors, as this reduces the voltage across each, and balances the voltage on the coil, reducing the electric field which may otherwise interfere with the receiver.

The bandwidth of the Tx coil with the Al backplate in place is approx. 4.5kHz. The Tx is designed to be on-tune when the reader is mounted on Al backplate.

Receiver:
The input to the receiver is parallel tuned in order to maximise the 66kHz voltage. As with the Tx, this circuit is tuned low to approx. 62kHz in the absence of the Al backplate. It is tuned to 66kHz with backplate present.

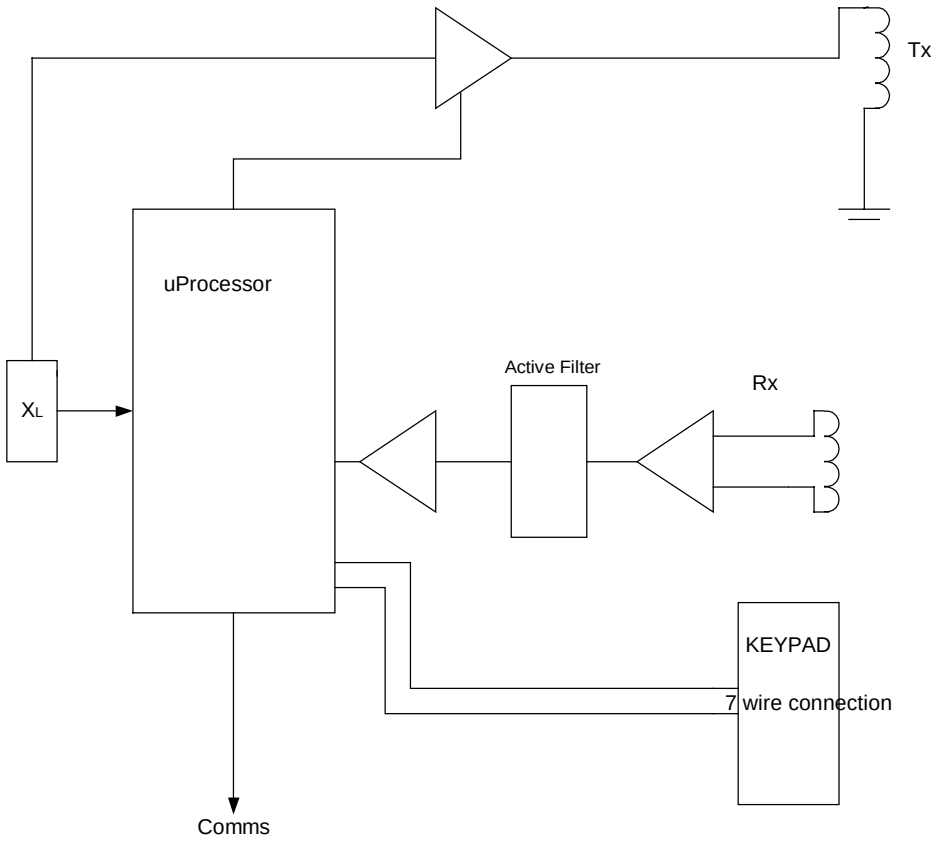
IC2 is a preamp to raise the signal level. This is required as the fliter circuit is slightly noisy. Without some preamplification, the Rx range would be limited by the internal noise. The Tx signal will appear on the output of the preamp TP5. The relative location of the Tx/Rx coils may need to be adjusted to limit Tx pick-up. This is achieved by rotating the Rx coil on an eccentric base. Provided that the pre-amp does not saturate the performance of the circuit is not affected. At 5v operation and 2.5v bias the output of the pre-amp can swing from 1v to 4v pp without affecting performance.

Filter:
IC3 is a MAX 274, 8 pole fliter chip connected as a 4 stage, band state variable filter. In each stage of the filter two resistors define the gain, and a further two, the bandpass centre frequency. Rejection at 132kHz is around 127dB and at 63kHz is about 27dB nominal.

Peak Detector:
The output from the Max chip is peak detected using IC4 op amp with a diode feedback to form a precision peak detector.

Block circuit diagram

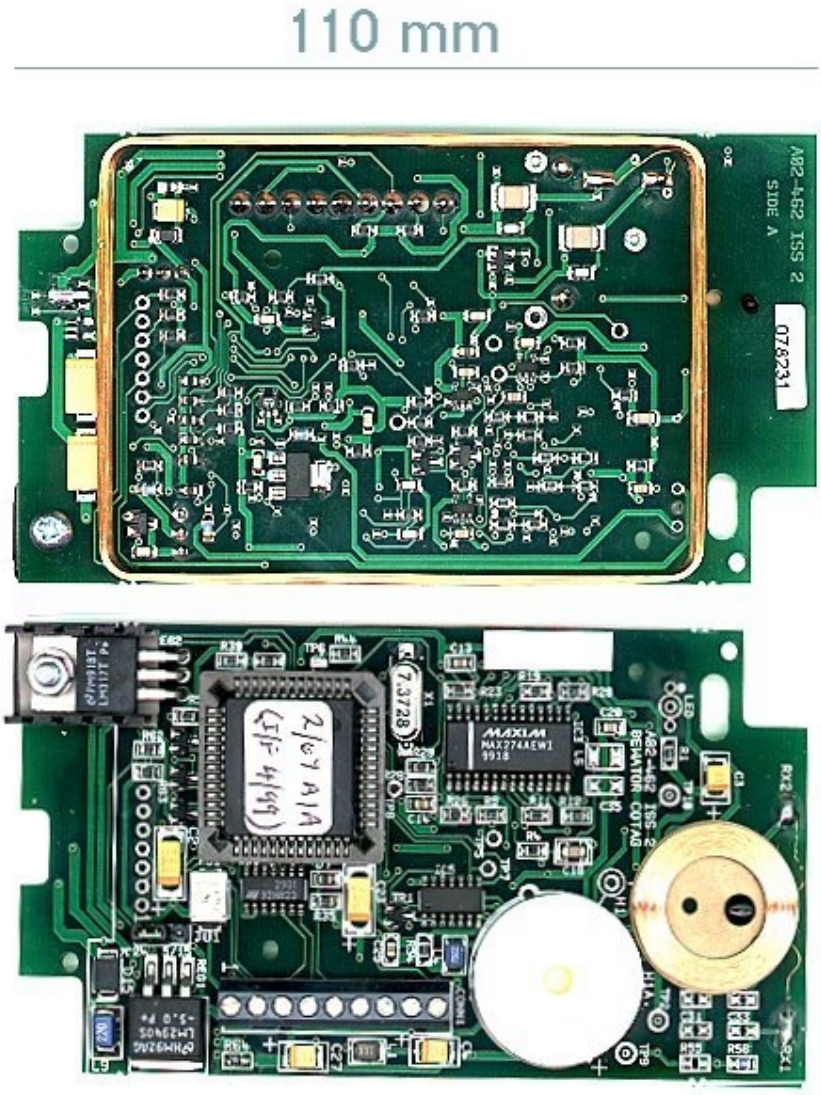
5298 PIN & PROXIMITY READER



FCC Label:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

5298 Reader: Printed Circuit Assembly Issue 2



Upper photograph: front view showing Tx coil
Lower photograph: back view without label, showing prom/processor and Rx coil.

Back view showing label: this label is fixed to PCA with plastic rivets.

Please Note FCC disclaimer is printed in our Installation Note IN062