TSB-Encoder-Replacement

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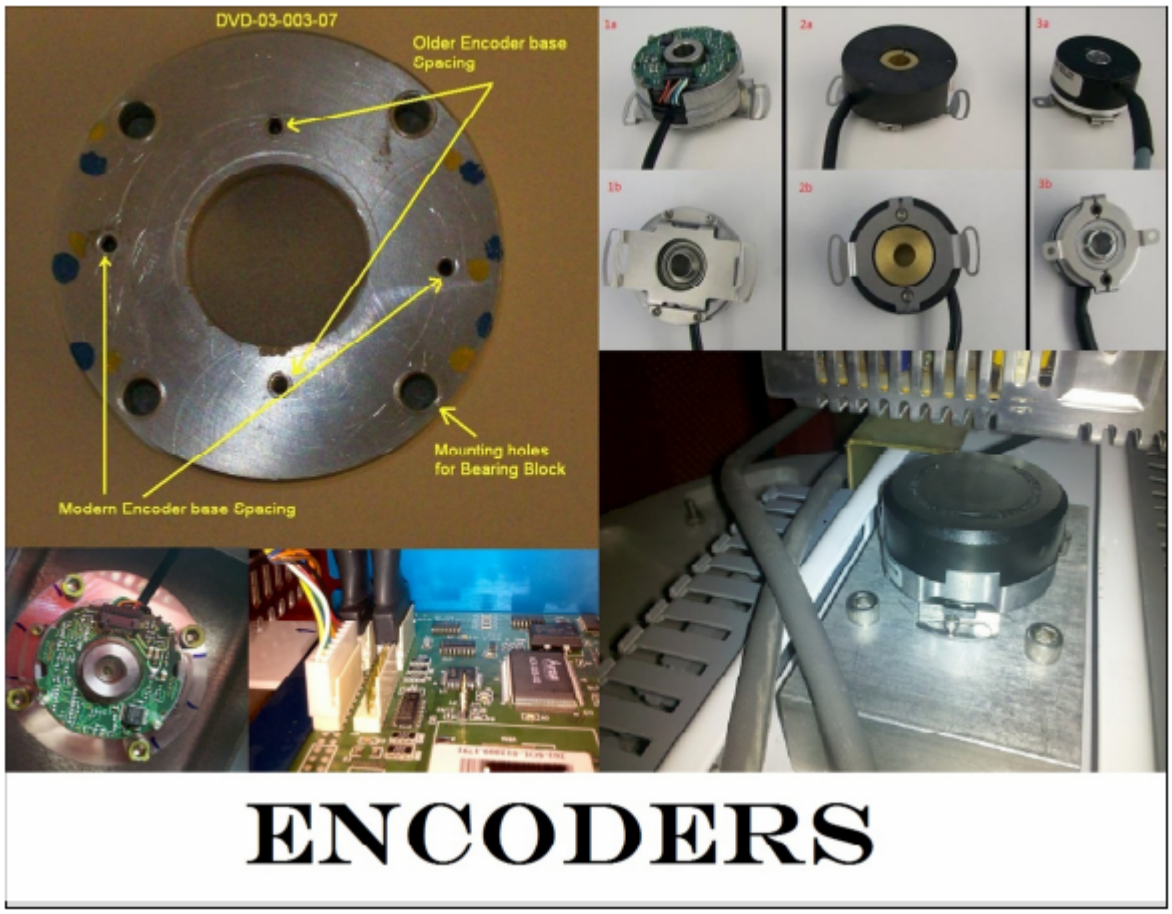
Description: This TSB will detail the history of Redbox encoders, mounting types and techniques. Then, it will cover the procedures for the replacement of an encoder.



Before we jump into the details of the encoder replacement, let's go over the hardware. We will be dealing with the kiosk's upper rail, bearing block, encoder type, encoder mounts and finally the encoder lock-in method.

1. Description of the parts.

- Upper Rail

    o Horizontal rail where the vertical axel of the drum terminates.

    o Mounting point for multiple items (eg. Arcus board, 24v power supply, Bearing block/encoder, etc.).

- Bearing Block

    o Provides a mounting point for the encoder.
        - CRE-007872 marked the cut in for both the wide and narrow mounting points.

    o Attaches to the upper rail via bearing block mounts.
    o Contains upper kiosk axel bearing.
    o Bearing block mounts with four screws that attach the block to the upper rail. These do NOT need to be loosened to remove the encoder.
        - Early kiosks used a nut and locking washer to attach screws.
        - Later kiosks had the mount point pre-drilled into the upper rail.

- Encoder

    o Device mounted on the bearing block and locked into the vertical axel.

    o Measures and reports the rotation of the drum to the Arcus board.

- Encoder mount

    o Thin, flexible metal piece that joins the encoder to the bearing block via two mounting screws. May use a wide base or a narrow base.

    o Narrow Base = ~45mm (1 7/8”)

    o Wide Base = ~60mm (2 3/8”)

- Encoder lock-in method

    o Device used to connect encoder to the vertical center axel. Types are:

- Screw / lock washer.
- Collar + glue or a combination thereof.

2. Understanding the Bearing Block and encoder mounting points.

At the top of the center vertical shaft that runs through all the decks and into the top support cross member, there lies a Bearing Block. Generally, this 1" thick block is obscured from view as it sits inside the upper rail. The encoder mounts on top of it. This block is usually circular, but in older kiosks it might be rectangular. The circular block may be mounted with the orientation as shown here, or it may be turned 90 degrees. Clearly visible are the four mounting screws that hold it in place and protrude out of the bottom of the upper rail. You should never have to remove those four screws unless directed and in anticipation of replacing the entire bearing block. Independent of how it is oriented, there are usually 2 sets of encoder mounting points: one narrow (45mm), one wide (60mm). On the early kiosks, only the narrow spacing mounts may exist and the wide spacing mounts may be absent entirely. The wide encoder base was cut in at CRE007872. Every bearing block from then on should have both the narrow and the wide mounting holes. You only use one set of mounts, either narrow or wide. This will be determined by the mount style of your replacement encoder. ALL kiosks have the narrow mounting point, and the narrow mounting type is the current standard replacement part. Though, there are parts previously issued to the field that may still be the wide mount.

3. Knowing your encoder type.

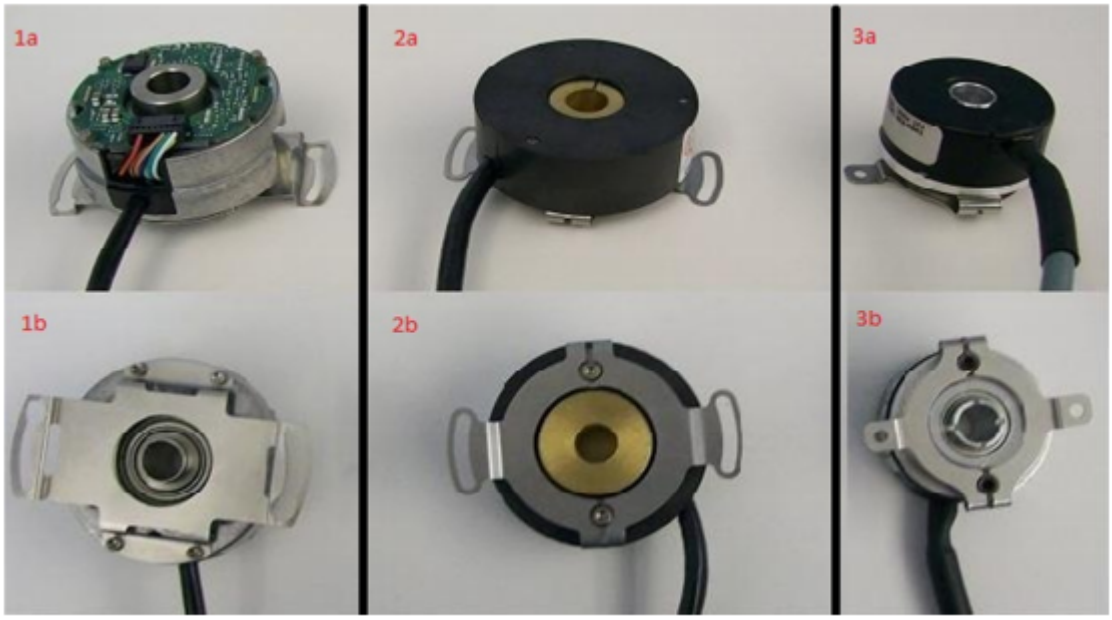
Currently, we use three different encoders*. They are (from oldest to newest):

1a: Renco Encoders – RCH20 (with a removable black plastic cap)

2a: Quantum Devices – Qphase QR200

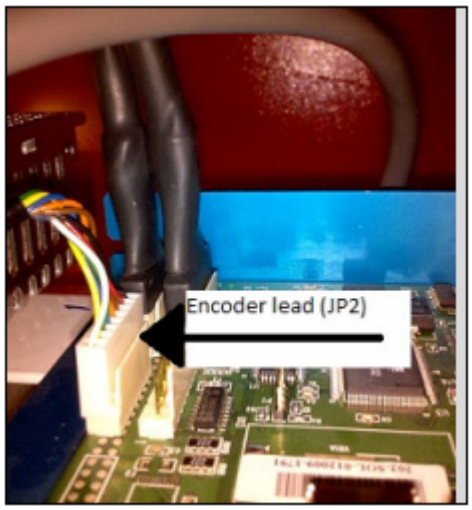
3a: Encoder Products – Accu-Coder 15T

The mounts are fixed or slotted, narrow or wide. Fixed is just that, 2 holes (eg. 3b). Slotted mounts have a channel that allows the encoder to be rotationally adjusted if needed (eg. 1b, 2b). The wide mount is a distance of about 60mm, the narrow is about 45mm. These mounts secure the encoder to the bearing block. To secure the encoder to the center shaft (a very critical point), there is a centrally located internal locking washer/screw combo that was put into use after ~CRE-000700. Prior to that, a collar/Loctite glue combination with set screws under the encoder was used. These must be loosened and the encoder effectively pried off as it will not move freely. Now, let's get to the replacement of the encoder.



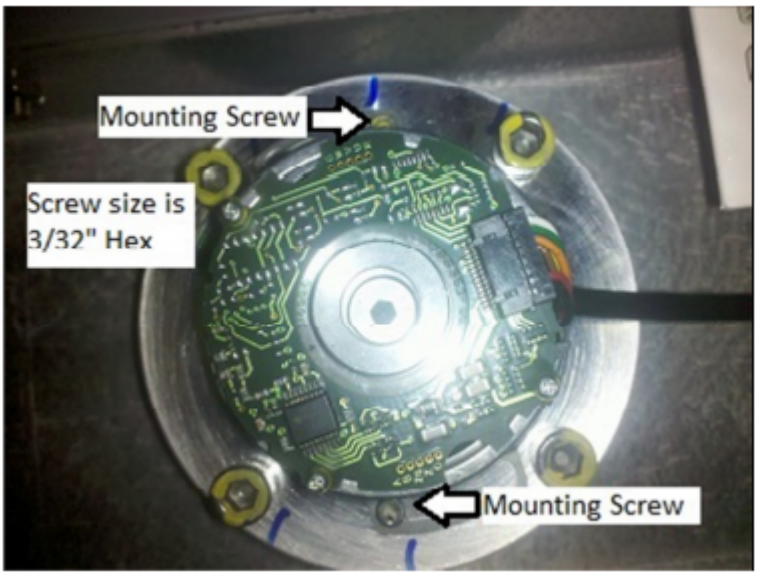
*Note - very early kiosks may have had fourth type of encoder, but this encoder had a very limited run and they were all pulled from the field in 2005

3. Encoder removal.

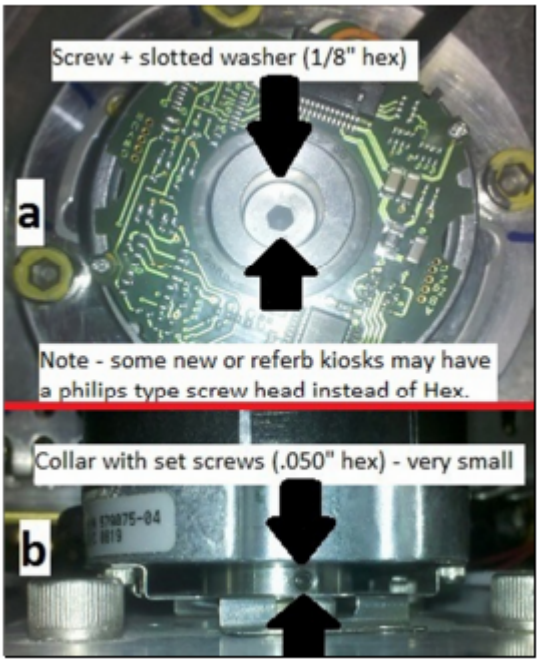


Knowing what we do now, the replacement of the encoder should be quick and easy. Be sure not to lose or drop any screws along the way. They are tiny, hard to find, and are necessary for the reinstall of the new encoder. Use care.

1) We need to power down the kiosk (turn off the UPS). Be sure to lower the picker by hand gently to the bottom of the kiosk. Afterwards, unplug the encoder lead to the Arcus board (JP2). This is located on the left side of the board, in front of the X and Y amplifier connections.



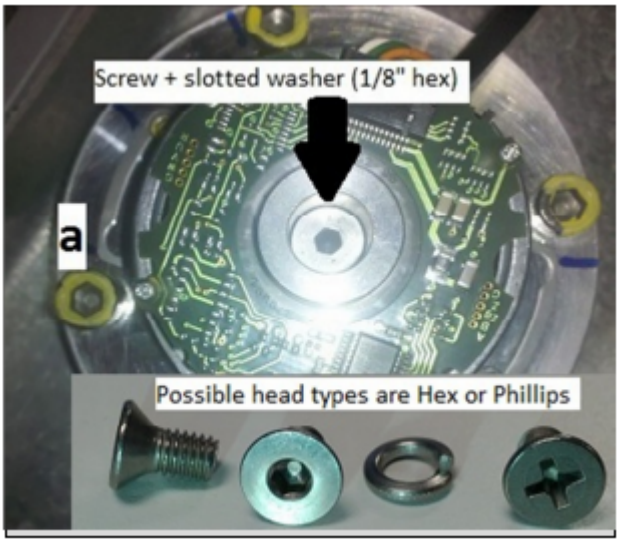
2) Remove the mounting screws on either side of the encoder using your 3/32" hex tool. Don't lose them, they are small. The encoder may now rotate a bit, but it is not free. The connection between center axel and encoder must be loosened.



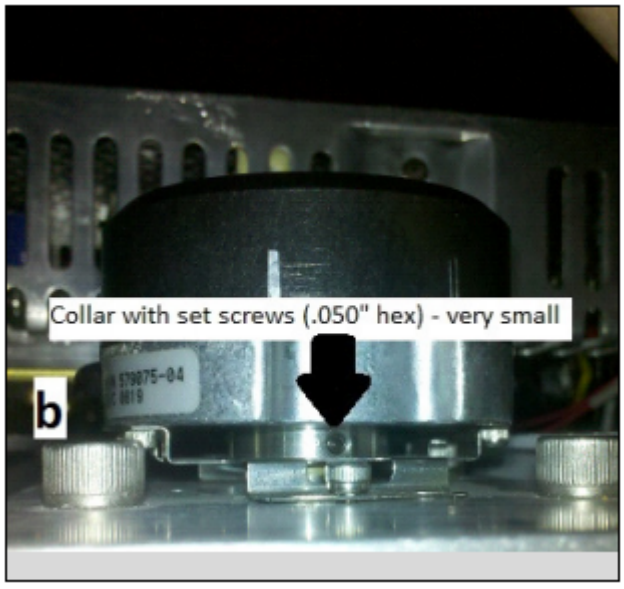
3) Loosen the encoder from the drum's vertical shaft. This will be done one of two ways:

Either, (a), the encoder will have a screw + slotted washer located on the center shaft. This will be either a 1/8" hex head or a Phillips head (crosshead). More than 98% of kiosks use this method.

Or, (b), it will have a collar around the bottom of the encoder maintaining position on the shaft with set screws. Less than 2% of kiosks will have this style.

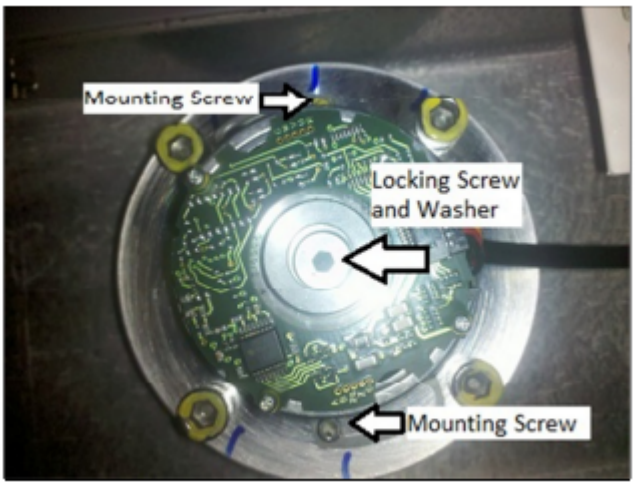


(a) Disengage the encoder locking screw and washer using a 1/8” hex or a short Phillips head screwdriver. Sometimes you can just loosen this screw without removing it. When it is loose, the encoder is able to flex up and down on its mount and should slide right off the top of the shaft. If you remove the screw entirely, don’t worry. Just don’t lose the screw and washer – both parts are critical.



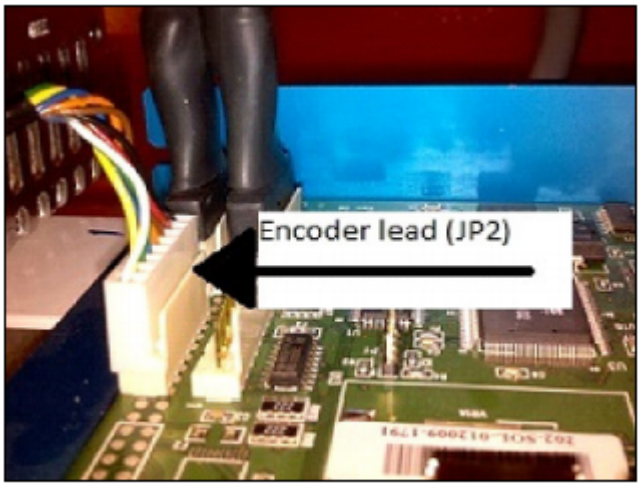
(b) Alternatively, there may be a locking collar on the encoder and glue in the center. The set screws (usually two) need to be loosened to disengage the center shaft. Once loosened, the encoder must be pried off with great force to break the bonds of the glue/Loctite that is used on the shaft. After it is removed, clean the center shaft, glue residue will inhibit a new encoder from being installed.

4. Installing the new encoder.



1) Reversing the steps above, we will place the new encoder on the shaft, then insert and tighten the 2 encoder mounting screws using our 3/32" hex wrench.

2) We then place the washer in the center shaft and tighten it down with our encoder screw using either our 1/8" hex or a short Phillips head screwdriver.



3) Plug the lead from the encoder into the J2 slot on the Arcus board. It is on the left side, in front of the X Amp connection. It is keyed and should only fit one way. To be sure, the white wire is closest to the front of the board, the black wire towards the back of the board.

Things to know about encoder replacement:

• The earliest model kiosks are not center tapped to receive an encoder locking screw. They used a collar and a type of Loctite (think glue). There is no hard data on when the center tap started, but it happened sometime after the first 500-600 kiosks. For our purposes, we will just set the number to being prior to CRE-000700.

• The wide encoder mount point was cut in as of CRE-007872; prior to that, there was only a narrow encoder mount point.

• If your kiosk is CRE-007872 or greater (meaning a newer kiosk), your encoder replacement should take about 10-15 minutes or less. These kiosks should accept either the wide or narrow encoder flex mounts and will have a center axel located locking washer and screw. (about 78% of our kiosks)

• If your kiosk is CRE-007871 or lower (meaning an older kiosk), but greater then CRE-000700, it can still be done quickly, provided your replacement encoder is a

narrow mount. If you only have a wide mount encoder, contact L2 for assistance. (about 20% of our kiosks)

• If you have CRE-000700 or earlier, or think you do, contact L2 for assistance with encoder replacement. These will be most prevalent in our early markets: Houston, Minneapolis, Salt Lake City, Washington DC, and St. Louis – but this is not a definitive list. This is less than 2% of our kiosks, but of course it will be more common in the area's mentioned above. Regardless, check and verify the kiosk CRE number prior to calling so MS can assist you effectively.

Tools/Parts Needed:

Tools/Parts Needed:	**Quantity:**	**Parts Catalog Num**
3/32" Hex Head Driver	1	DVD-99-083-00
3/16" Hex Head Driver	1	DVD-99-083-00
1/8" Hex Head Driver	1	DVD-99-083-00
.050" Hex Head Driver	1 (if needed/optional)	DVD-99-083-00
Short throw Phillips Head Screwdriver	1 (if needed/optional)	Contact Parts
Encoder	1	DVD-01-118-00
Encoder Bearing Block	1 (if needed/optional)	DVD-03-003-07
Encoder Screw/Washer	1 (if needed/optional)	DVD-50-032-00
Encoder Bracket Screw	2 (if needed/optional)	DVD-50-116-00

Owner:	**Department:**
Created by: Mike Pastrick	Machine Support
Published by: Elric Zufan	Machine Support

Associated TSB's:	TSB01-00079 Arcus Board

Revision #:	Date:	Description:
1.0.1	2/29/2012	Entire re-write with accurate information.