Model X-60
X-Mark™ Xeptors®

Smart Multi-Coin And Multi Metal Token Acceptors

The IDX model **X-60 X-Mark Xeptor** is a "large diameter" multi-coin acceptor which can be field programmed to distinguish and accept any of up to six coins or tokens, including the X-Mark optically encoded tokens minted exclusively by **Osborne Coinage**. Multi-coin acceptance offers the possibilities of mixing promotional tokens with standard tokens, accepting older tokens with new tokens in the process of changeover, or replacing expensive feeder bowl currency with tokens while still accepting either tokens or currency. Its hinged opening coin chute will make coin jams a pain in the past. Its built-in multi-color indicator LED provides operational status and field diagnostic information. Personality Plug modules ensure plug compatibility in field retrofit applications and while novel communication protocols make it ideal for the coming generation of smarter machines. The X-60 is the one-piece upgrade version of the two-piece X-50.

X-60 PRODUCT FEATURES

- Reads **X-Mark®** optically encoded token codes for exceptional security.
- Reads and discriminates based on edge and center alloy composition.
- Distinguishes and accepts any of up to six different coins or tokens.
- Diameter range: 1.34" to 1.97" (34mm to 50mm)
- Thickness range: .080" to .140" (2mm to 3.5mm)
- Built-in coin releasing hinged opening coin chute.
- Up to 10 coins per second of mixed acceptance/rejection.
- Eliminates coin shaving by measuring coin diameter to +/-.007" typical.
- Multi-color indicator LED for operational status and field diagnostics.
- Advanced serial data communications for configuration and operation.
- Optional diverter control sorts different accepted coin types in real time.
- Optional built-in credit sense optics ensure full coin drop before credit issue.
- Personality Plug connector modules flexibly allow one coin acceptor model to have plug compatibility with all popular newer and older machines.
- Program coins into Xeptors at the touch of a button with the *X-60 Coin Selector*.
- Programming secured and tracked with optional *X-Key and X-Tracker* PC software

X-60 Series
Installation & Operation Manual
Rev-10/2003

Table of Contents

> **Note: You may download and view or print the most up to date version of this manual from the Web page for this product at www.idxinc.com/x60.htm**

Section 1.1
Five Simple Steps To Success

Introduction
There are only five simple steps to remember for achieving a successful installation. Each one is as important as the next. They are also your key to diagnosing and correcting problems that may arise later.

Step 1. Mechanical Alignment
Note that the X-60, like it's predecessor the X-50, is designed for the <u>reverse drop configuration</u> where an accepted coin crosses from right to left as it passes through the X-60. After mounting the acceptor in the bracket, and before you turn on the power, you must make sure that the coin may easily enter and exit the coin acceptor with <u>no possibility of catching a coin edge</u> due to front/back alignment problems, and with <u>no significant right/left jog at entry or exit</u>. Failure to have proper mechanical alignment may lead to coin jams or sporadic machine tilt/error signals. A bracket change may be required in some machines to achieve proper alignment. See Section 1.2 for details.

Step 2. Coin Chute Diameter
The model X-60 covers token diameters from 1.34" to 1.97" (34mm to 50mm. In order that the smaller coins are properly centered for the sensors, the X-60 has adjustable coin chute rails to restrict the horizontal movement of the coin. IDX provides a Coin Chute Width Alignment Guide for the X-60 to simplify setting the coin chute rails for proper width and centering.

Step 3. Coin Chute Thickness
If the coin chute thickness is not enough, coins may hang up and jam. Conversely, if the cute is open too wide, there is a large gap between the inductive alloy sensor coils and the coin resulting in poor discrimination. As a rule of thumb, try to use an adjustment that is about .010" to .020" thicker than the coin. More information is available on this in section 1.3.

Step 4. Electrical Interface
The X-60 Series uses the same set of Personality Plugs used by other IDX Xeptors to provide the connectors and signals required for compatibility with the different machine OEMs. Section 1.4 contains specific information about each Personality Plug model. After selecting the correct electrical interface, you must verify that the machine is actually registering the credit pulses. Check Section 4.1 if power is on, but no credit pulses are being recognized.

Step 5. Coin Programming
Coins may be programmed manually per Section 2.1, or downloaded from a Coin Selector per Section 3.4. Be aware that when there is more than one minting of coins or tokens, sometimes the later alloy may be slightly different to greatly different from the original. There are numerous examples of casino tokens that look identical but have slightly different alloy signatures in a later purchased group, requiring coin programming as two separate coins to achieve an excellent acceptance rate. Likewise, governments sometimes make big changes in the alloy of a coin, as is the case with Canadian nickels and quarters.

Section 1.2
Alignment & Brackets

Proper Alignment Is Critical

Failure to have proper mechanical alignment may lead to either coin jams or sporadic machine tilt/error signals. IDX Xeptors always position coins in the center of the coin chute (as opposed to edge referenced methods used in simple comparators) in order to achieve precision diameter measurement and separately measure edge and center metal alloys on bimetal coins. This difference in coin positioning requirements can sometimes be the source of an alignment problem when converting from a simple comparator to an IDX Xeptor. One way to ensure proper alignment is to order the machines form the OEM with IDX Xeptors already installed. For retrofits, one may sometimes correct small alignment by repositioning or bending the existing bracket. In most cases, the machine OEMs actually have more than one bracket style and coin-head style in order accommodate all of the minor mechanical variations in coin acceptors available in the market.

Verify Alignment With Power Off

One of the best ways to verify proper alignment is to deposit coins into the machine with no power to the coin acceptor so you can observe how the coins flow through the entry and exit of the coin acceptor. You must make sure that the coin may easily enter and exit the coin acceptor with no possibility of catching a coin edge due to front/back alignment problems, and with no significant right/left jog at entry or exit.

If you have problems during acceptance, you might also try opening the X-60 and putting a piece of tape over the gate relay to keep it retracted. Then re-install the X-60 in the bracket and deposit numerous coins into it to verify the accept path has no coin flow problems. Remove the tape and apply power when you are done verifying the mechanical alignment is correct.

Section 1.3
# Diameter & Thickness

You Can't Measure A Floppy Fish.
To make a decent measurement of either a fish or a coin, we have to get reasonably close to it and get its position reasonably under control. That means we must control the coin's position in the coin chute if we are to be successful in measuring its diameter and metal alloy content with the X-60's sensors.

Diameter Setup
The X-60 Xeptor has been designed to incorporate field adjustable coin chute width rails (see picture to the right) as a means for adjusting the coin chute width to optimize performance for a wide range of coin diameters. In order to properly read the X-Mark optical code, read both the edge and center metal of a bimetal coin, or to properly measure the diameter of the coin, it is imperative that the coin be reasonably centered in the coin chute a reasonably presented in a repeatable manner form coin to coin.

IDX provides a Coin Chute Alignment Guide, as shown to the lower right, to aid in proper positioning of the coin chute width rails. As can be seen on the graphics of the Alignment Guide, there are groups of precision milled slots, sets for two different sized coins, on each its four sides. To adjust the coin chute width rails follow these steps:

1.) Use a 1/4" nut driver to loosen the four nuts that fasten the coin chute width rails on the rear side of the X-60 as indicated by the yellow arrows in the figure to the lower right. Make sure they slide freely. (Note: Some nut drivers have a thick barrel diameter making removal of the rear circuit enclosure lid helpful for getting the driver on the nut.)
2.) Identify the slots in the Coin Chute Alignment Guide associated with the size / denomination of token you wish to set the X-60 to accept.
3.) Position the Coin Chute Alignment Guide on the X-60 as shown in the figure to the right so that the left most slot, marked "Xeptor Frame", slips over the left side of the X-60 metal frame.
4.) Position the left and right coin chute width rails to slip into the two slots identified in Step 2 for the coin you wish to accept.
5.) Push the Coin Chute Alignment Guide down onto the X-60 so that the Xeptor frame and the two coin chute width guides are deep into their respective slots.
6.) Make sure the coin chute width guides are fairly vertical in alignment from top to bottom, then tighten the four nuts.
7.) Remove the Coin Chute Alignment Guide and check to see if your coin fits well in the coin chute without too much slop in the fit.
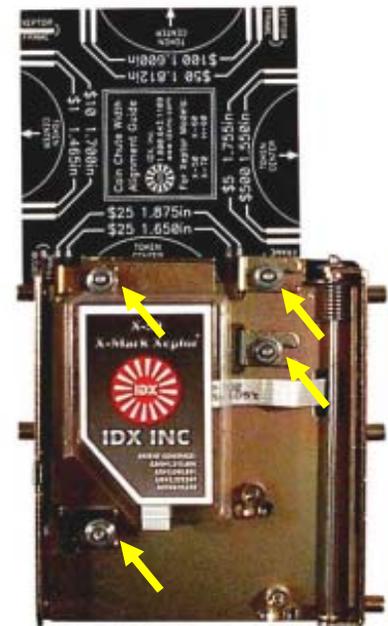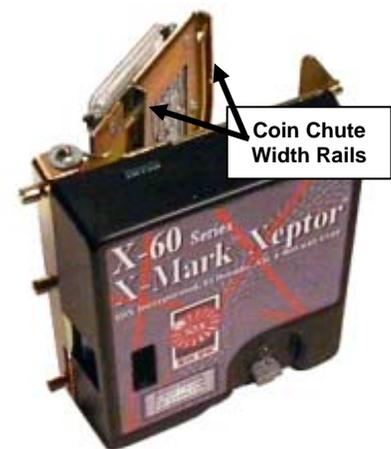
X-60 Rear View With Coin Chute Width Guide In Place.

Thickness Setup

The X-60 Xeptor side view figure below shows a series of three holes and a sliding adjustment with a detent that centers itself over one of the selected holes. The dimensions referring to each of the eight holes is the chute thickness achieved at each position of the sliding adjustment. A good rule of thumb would be to set the adjustment for about 0.010" to 0.020" more than the thickest coin you intend to accept. If you go under .010", you risk the possibility that a bent coin, one with a bur, or one that has something sticky on it will jam in the coin chute. If you go over .020" then you are starting to sacrifice the accuracy to which the metal alloy can be discriminated. Recommended positions for the thickness setting are marked in the table below, and on the reverse side of the Coin Chute Width Alignment Guide.
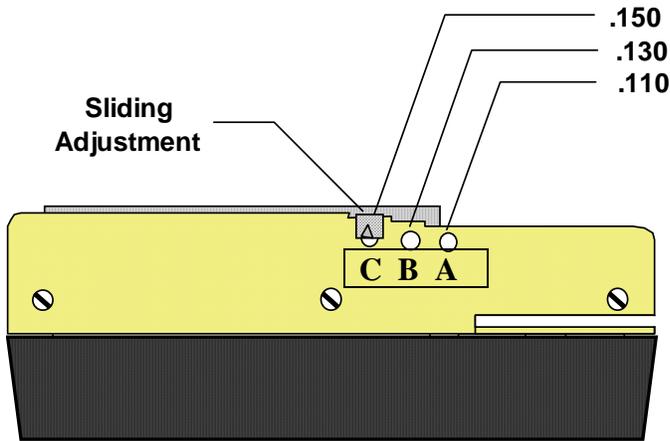
X-60 Side View - Coin Chute Thickness Adjustment

TYPICAL CASINO TOKENS

VALUE	THICK	SET TO
$1 Token	.100	.110
$2 Token	.100	.110
$5 Token	.122	.130
$10 Token	.136	.150
$25 Token	.100	.110
$50 Token	.115	.130
$100 Token	.080	.110
$500 Token	.089	.110

| For Coin Thickness	Set Adjustment To Position
.080" to .102"	A: .110"
.103" to .122"	B: .130"
.123" to .140"	C: .150"

Section 1.4
Personality Plugs™

The Xeptor® Electrical Interface

Personality Plugs are small connector conversion modules about as big as the last segment of your little finger. The Personality Plugs allow only a single Xeptor design to be connected by the OEM machine manufacturer, or be installed in the field as a retrofit upgrade. With over a dozen different Personality Plugs available, there will be little need to make up special cables to interface to all the different makes and models of machines in a single establishment. There are Personality Plug types for each of the older Coin Mechanisms CC-series acceptors, plus many other special purpose Personality Plugs for a variety of machine interface needs, including replacing and simulating the credit optics signals produced in the Credit Sensor modules of some slot machines. If needed, we are happy to design new Personality Plugs to meet the specific interface requirements for OEM machine manufacturers not already covered by the available models. The tables below, and on the next page, will help you select the proper one for your needs and define the electrical specifications for each of the signals.
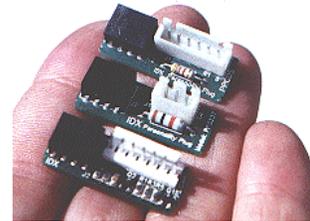
Personality Plug Connection

Personality Plug Model:	PPNRI-6	PPNRI-3	PPIGTDC	PPCDS	PPSIGMA	PPCWR	PPMOX
Compatibility Connector	NRI 10pin IDC	NRI * 10pin IDC	IGT DC Slots Molex-6	JST-6	Molex-7	Wires	Wires *
Pin 1	Ground	Ground	Inhibit	/Tilt	Ground	Yel-24VAC	Yel - 24VAC
Pin 2	12VDC	12VDC	/Sense	Inhibit	Sense	Red - Relay	Blk - Ground
Pin 3	/Output5	-----	-----	/Credit	/Credit-A	Red - Relay	Wht - Inhibit
Pin 4	/Output6	-----	-----	24VAC	/Credit-B	Blk - Ground	Blu - /Output1
Pin 5	Coin Return	-----	12 VDC	+12VDC	-----		Pur - /Output2
Pin 6	Inhibit	Inhibit	Ground	Ground	+12VDC		Brn - /Output3
Pin 7	/Output1	/Output1			Inhibit		
Pin 8	/Output2	/Output2					
Pin 9	/Output3	/Output3					
Pin 10	/Output4	-----					

* Note: PPNRI-3 and PPMOX output a 3-bit binary code as opposed to the 1 of N style of PPNRI-6. The output code (or wire assignment) is determined by the output pulse number selected during coin programming. See additional notes in the pages below regarding NRI emulation.

Personality Plug Model:	PP16	PP16IC	PP40	PP46	PP62	PP3337	PPUNI
Compatibility Connector	*CC-16 JST-6*	*CC-16 12V JST-6*	*CC-40 JST-6*	*CC-46 Molex-6*	*CC-62 Molex-7*	*CC-33,-37 JST-3*	*Universal JST-6*
Pin 1	1K to Gnd.	Inhibit	/Tilt	Inhibit	Ground	24 VDC/AC	Inhibit
Pin 2	Sense	Sense	Inhibit	/Tilt	/Sense	Sense	/Coin Optics
Pin 3	48 VDC/AC	-----	/Credit	/Credit	/Tilt	Ground	-----
Pin 4	24 VDC/AC	24 VDC/AC	24 VDC/AC	/Sense	/Credit		24 VDC/AC
Pin 5	12 VDC	12 VDC	12 VDC	12 VDC	Key Pin		-----
Pin 6	Ground	Ground	Ground	Ground	12 VDC		Ground
Pin 7					Inhibit		

SIGNAL:	ELECTRICAL CHARACTERISTICS (pulse widths programmable)
INHIBIT	Inhibit = float or >3.5VDC, Enable = < 1.0VDC
SENSE	Active high 30ms pulse, PNP 12V pull-up 10mA max, 3.3K pull-down.
/SENSE	Active low 30ms pulse, NPN sinking 10mA max, 47K 5V pull-up.
/CREDIT	Active low 30ms pulse, NPN sinking 10mA max, 47K 5V pull-up.
/TILT	Active low >30ms pulse, NPN sinking 10mA max, 47K 5V pull-up.
/OUTPUT-n	Active low >30ms pulse, NPN sinking 10mA max, 47K 5V pull-up.
RELAY	Relay contact terminal. 40V 0.2A peak rating.
/Coin Optics	Wire-OR optics outputs enable, 100ms low pulse, 100K 12V pull-up.
48VDC/VAC	Power input 38 to 55VDC, 38 to 55VAC, 35mA max @idle.
24VDC/VAC	Power input 14 to 32VDC, 16 to 32VAC, 35mA max @idle.
12VDC	Power input 11.5 to 16VDC, 25mA max @idle, 240mA accept gate.
1K to Ground	1K 1W resistor to circuit ground. (for triac holding current)
Ground	Circuit common.

Tilt Timer, Tilt Output, & Self Inhibit

The Tilt Timer and Self Inhibit functions are activated by any of the following: 1.) slow or struck coin, 2.) reverse direction coin, 3.) BadCoinCount Defense, or 4.) other system function problem. The purpose of the Self Inhibit self defense is to reject, for a short period of time, all other coins inserted by a perpetrator after he has triggered the Tilt Timer. For any activity detected during the Tilt Time period, the Tilt Timer will be set back up to the full Tilt Time value to ensure that continued stringing or slugging attempts will fail. The Tilt Time value is set in 1/3 second increments using the P command of the Serial Port Protocol. The factory default value of 4 (providing 4/3 seconds) is recommended for best performance. By the time the perpetrator leaves, the Self Inhibit TiltTime will have expired and the Xeptor will be ready to accept coins again from an honest customer.

There are some special rules/features associated with the Tilt Output are as follows.

Tilt Time = Odd	Tilt Output will **pulse 6 times per second** for duration of Tilt Time.
Tilt Time = Even	Tilt Output will **remain on solid** for duration of Tilt Time.
No Credit Optics	Tilt Output will comes on for BadCoinCount Defense
Credit Optics Installed	Tilt Output **will not** come on for BadCoinCount Defense
Tilt Time > $BF	If the Tilt Output is triggered by a reverse or slow coin, but not by BadCoinCount Defense the Tilt Output will latch on until the power to the Xeptor is cycled or the Inhibit input signal is cycled.

Sense, Credit, & Tilt Functional Logic

The table below shows the conditions which will produce Sense, Credit, and Tilt outputs during normal use of the coin acceptor. The following points are worthy of note:

- An Xeptor without built-in Credit Optics will still generate a Credit output signal for accepted coins, however, since there are not internal Credit Optics, this output is not conditioned on verification that the coin actually passed through the accept path correctly. Thus we recommend that, Xeptors with out built-in Credit Optics should only be used in machines having their own Credit Optics external to the coin acceptor.
- With built-in Credit Optics, an Xeptor produces Sense, Credit, and Tilt output pulses in the same manner regardless of the Enabled/Inhibited state of the unit. The Xeptor will attempt to accept or reject a coin based on the state of the Enable/Inhibit input, however, a coin may take the unexpected path due to; a) a late change in the Enable/Inhibit signal when the coin is already in process, b) a malfunctioning gate relay, c) an alignment obstruction, or d) fraudulent activity.

Output Signal Logic For X-60 V4.0 Firmware

Conditions of Coin and Xeptor				Sense Output	Credit Output	Tilt Output
Built-In Credit Optics	Enabled	Good Coin	Accept Path	✓	✓	
			Reject Path	✓		
		Bad Coin	Accept Path			✓
			Reject Path			
	Inhibited	Good Coin	Accept Path	✓	✓	
			Reject Path	✓		
		Bad Coin	Accept Path			✓
			Reject Path			
No Internal Credit Optics	Enabled	Good Coin	Accept Path	✓	✓	
			Reject Path	✓	✓	
		Bad Coin	Accept Path			
			Reject Path			
	Inhibited	Good Coin	Accept Path	✓		
			Reject Path	✓		
		Bad Coin	Accept Path			
			Reject Path			

NRI Emulation Notes

The NRI emulation mode provides a 10-pin IDC connector interface with multiple wire outputs for the Credit Pulse that specify which of the signatures in Coin Memory were matched by the accepted coin. To configure a coin acceptor for NRI emulation, order it pre-configured from the factory, or do the following:

1. Select either the PPNRI-3 or the PPNRI-6 personality plug. Both have the 10-pin IDC connector, however the simpler PPNRI-3 unit outputs a 3 bit binary code versus a 1-of-6 type code for the PPNRI-6. If you require 3 or fewer coin denominations (although a given denomination may have more than one signature), the PPNRI-3 can still provide individual outputs using binary codes 1, 2, and 4, and is less expensive than the PPNRI-6.
2. Enable NRI output mode by setting bit-1 of the SysConfig byte using the "s0A" command per Section 2.3.2 ASCII Hexadecimal Protocol Specification. (note: Check over the SysConfig bit definitions in Section 2.3.2 to verify this value that pertains to most units also pertains to your unit.)
3. Set the Output Credit Pulse to 100ms (64 Hexadecimal) using the "P64008004" command per Section 2.3.2.
4. When manually learning a coin, press the button N times for output code N (instead of for N output pulses).

Section 2.1
Coin Learn Procedure

COIN SIGNATURE LEARN PROCEDURE
1. On the front face of the X-60 identify the three controls to be used in this procedure:
   - Push button SW1 near center bottom above the LED.
   - LED indicator under the push button. (Green in RUN mode, red in LEARN mode)
   - 16 position rotary switch to the right of the push-button. (#0 is normal RUN position, #1-#6 are for learning each of 6 possible coin types that can be accepted)
2. Turn the rotary switch to one of the six Coin Memory positions, #1 - #6. The LED will turn red if that particular Coin Memory is empty, and Orange if it already holds coin signature data. (**Note 1**: If the LED flashes amber in switch positions 1-6, the Xeptor is secured from hand programming unless an X-Key or Coin Selector is plugged in.) (**Note 2**: The X-60 will normally erase the coin signatures from previously learned coins when learning a new coin in order to prevent unexpected acceptance of a prior coin… unless the X-60 determines that a prior coin signature is nearly identical to the current coin signature and therefore represents a minted coin from a slightly different batch.)
3. Push the push button SW1 once to start the LEARN sequence. Note that when using the PPNRI-3 or the PPNRI-6 multi-output personality plugs (along with setting bit 1 of SysConfig), then the output channel (wire/code) is specified by the number times the button is pressed.
4. Show the unit 6 samples of the coin by depositing them into the acceptor as usual. It is best to use 6 different coins since there are typically slight variations from coin-to-coin.
5. After the 6th sample coin is deposited, the LED will flash red-green a few times to indicate the LEARN procedure is complete and the coin parameters are stored in memory.
6. Turn the rotary switch back to position #0 and observe the LED turning green. Check that you have not accidentally turned it too far to position #15, which is a field test function position, in which it will not accept coins.

COIN SIGNATURE ERASE PROCEDURE
1. Turn the rotary switch to the coin # position you wish to ERASE.
2. Push the push button SW1 once to initiate the LEARN sequence.
3. Turn the rotary switch back to position #0 without depositing any coins to signal the unit that you wish it to erase the parameters for this coin. The LED will flash red-green to indicate completion.
4. Alternatively, turn the rotary switch to position #7 and press the push button SW1 3 times to ERASE all of Coin Memory. The LED will flash red-green to indicate completion.

Button SW1
Indicator LED
Rotary Switch

Section 2.2
Unwanted Shadow Coin

INTRODUCTION

The Unwanted Shadow Coin feature of the Xeptors allows you to teach it the characteristics of both a Valid Coin and an Unwanted Shadow Coin in order to further eliminate false acceptance of a particularly troublesome coin, token, or slug which has a set of characteristics nearly identical to the Valid Coin.

UNWANTED SHADOW COIN

A coin acceptor normally has one or more parameters it measures to determine if a deposited coin is to be accepted. Due to slight variations in coins and in how the coin physically passes through the acceptor, it reads a distribution of values about a central value. Coins with parameter readings falling between an upper and lower limit about a central acceptance value, the acceptance window, will be accepted. (See Figure 1)

Sometimes a second Unwanted Shadow Coin can have its parameters overlapping the distribution of the Valid Coin and fit within the acceptance window of the Valid Coin. Examples of this include a.) a 0.984 70/30 brass token and a 0.984 85/15 brass token, b.) a $1 alloy 752 casino token and a lead slug, and c.) a Brazilian 25 Centavo coin and a "smashed to larger diameter" 10 Centavo coin. The typical solution to this problem is to tighten the acceptance limits. While in some cases this may help, in the example shown in Figure 2, there becomes a serious trade-off between eliminating the Unwanted Shadow Coin and reducing the rate of acceptance for the Valid Coin, neither of which is desirable.
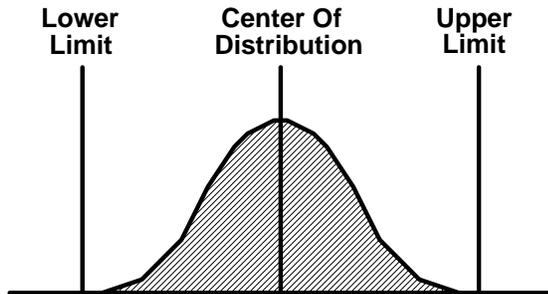
Figure 1. Distribution of parameter readings and typical limits of aceptance.
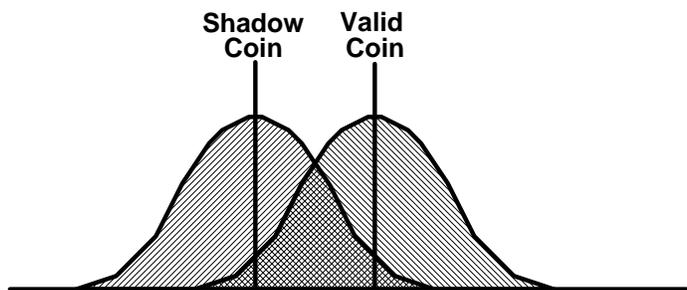
Figure 2. Unwanted Coin in the Shadow of a Valid Coin showing overlap of parameter distribution.

In order to simultaneously eliminate the Unwanted Shadow Coin and maintain a high rate of acceptance for the Valid coin, provision has been made to teach the X-60 Xeptor the properties of the Unwanted Shadow Coin. Having done so, when the Xeptor finds that a deposited coin falls in the acceptance window of both the Valid Coin and the Unwanted Shadow Coin, it will further look more closely at the individual errors from seven separate measurement types it makes, each with their own probability distributions, and use them jointly to determine which of the two coins it most closely matches. This method has been proven quite successful for achieving excellent discrimination in these tough situations.

HOW TO USE THE UNWANTED SHADOW COIN FEATURE

To teach the Xeptor the Unwanted Shadow Coin, go through the usual Coin Signature Learn procedure (turn the rotary switch to any coin memory #, push button SW1 13, drop 6 sample coins). Note that you must press the push button 13 times to identify the coin as an Unwanted Shadow Coin (13 $\Rightarrow$ unlucky, bad, unwanted). Any of the X-60's six coin memories (and multiples of them) can be used for this function.

Tip #1

The diameter also plays a role in the test for an Unwanted Shadow Coin. For defending against stamped currency or tokens from another country or institution, this is helpful if there is a slight (less than .015") difference in diameter. However, if you are defending against crude slugs with a variety of diameter sizes, you should make sure that you train the Xeptor with slugs that are similar in diameter to your good coin because if the diameter of the learned Unwanted Shadow Coin is more than about .015" different from the good coin, it will likely not help with slugs that are very nearly identical in diameter to the good coin as they may be different enough from the learned Unwanted Shadow Coin that they will not qualify as an Unwanted Shadow Coin. Slugs that are different enough in diameter from your good coin will be rejected anyway, and thus are not the threat coin to be learned as the Unwanted Shadow Coin.

Tip #2

When an Unwanted Shadow Coin is programmed into (learned by) the Xeptor, the Xeptor also takes this information as a signal that there is a real threat out there and that it should automatically raise its other defenses against various other kinds of slug threats, including automatically tightening the tolerance on the ensemble of six alloy readings by 40%.

Tip #3

If your Unwanted Shadow Coin is too identical to the Valid Coin, it may not be possible to eliminate the Unwanted Shadow Coin. You will know this is the case if you have followed all of the instructions above and find that the accept rate for the Valid Coin becomes excessively poor.

Section 2.3
Serial Port Interface

INTRODUCTION

IDX Xeptors support both an ASCII hexadecimal based and binary based RS-232 compatible protocol. The ASCII hexadecimal protocol is readable by humans and used with a "dumb terminal emulator", such as ProComm or HyperTerminal, to change configuration parameters and to view diagnostic information about the Xeptor. The binary based protocol is more suited for use in communication with other computing devices such as slot machines and tracking systems. The ASCII hexadecimal protocol is described in detail below, and the binary protocol will be provided on request to interested OEMs.

2.3.1 The Serial Port Connection

ProComm for Windows is available from Symantec at http://www.symantec.com/procomm/. **HyperTerminal** comes as part of the Windows operating system. It is normally found in Start-Programs-Accessories-Communications, but you may have to load that as part of your Windows System if it is not already present by going through Start-Settings-Control Panel-Add/Remove Programs-Windows Setup. Another way to find it is through Start-Find-Files and enter hypertrm.exe, and search the C: drive. After starting the program, name your New Connection "Xeptor". In the Connect To screen, select Direct To Com 1 (or Direct To Com 2). For Port Settings select: Bits Per Sec = 9600, Data Bits = 8, Parity = None, Stop Bits = 1, and Flow Control = None. Then select File-Save As and select Save In = Desktop, and click Save, and you will have a desktop shortcut with all the operating parameters ready to go.

Xeptor Serial Port Cable: Model X10199-1

IDX produces the Model X10199-1 six foot long cable with a PC compatible DB-9 serial port connector on one end and an Xeptor compatible JST-3 connector on the other end.

If you desire, you may produce your own cable using the information below. Xeptors implement a very basic three wire RS-232 interface including only TxD, RxD and Ground as indicated in the diagram below. The connector has .1" spaced pins with signals assigned as shown below. There are two preferred cable connectors for mating with the Xeptor's 3-pin JST style RS-232 port connector listed below. They are distributed by Kensington Electronics: (714) 588-0575 and Interconnect Specialties: (714) 674-5090. The part numbers are:

1. JST # **XHP-3** with **SXH-001T-P0.6** crimp type contacts.
2. JST # **03NR-E4K** for AWG #24 Insulation displacement type contacts.

1. TxD
2. RxD
3. Gnd
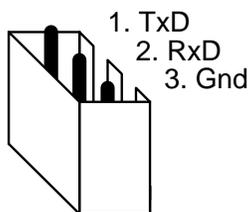
Function	Color	DB-9	DB-25
Transmit	Red	Pin 2	Pin 3
Receive	Green	Pin 3	Pin 2
Ground	Black	Pin 5	Pin 7

Xeptor Connector Pin Assignment

2.3.2 ASCII HEXADECIMAL PROTOCOL SPECIFICATION

➢ At power up this is the default communication mode for the X-60 (and for other Xeptors with V4.0 or later firmware. Previously one was required to enter HH to first leave binary mode.)
➢ All characters entered are echoed back to the screen and a CR-LF terminates all responses.
➢ Some nice ASCII text is additionally part of some of the command responses.

TABLE 1. ASCII HEX MODE COMMANDS.

Command	Response	Description
B		Binary mode. (Hex is power up default)
H		ASCII Hex mode. (Power up default)
I		Inhibit input = logic 1
i		Inhibit input = logic 0
L	Text	List Coins in Coin Memory with detailed description.
P(d₀… d₃)		Pulse time in ms: credit/sense, diverter, diverter delay, tilt(1/3sec)
R	Text	Report system configuration including coin memory, optical and inductive sensor values, pulse times, and option configuration
r	r₀,r₁	Report diagnostic health: failure, maintenance
S		Save current configuration, use after s and P commands.
s(d₀)		Set SysConfig byte: SysConfig
V	r₀… r₃	Version report; model, version, ID#, ROM-Sig, EE-Sig

B: Binary Mode
The normal operating mode is Hexadecimal at power up. Upon going Binary Mode, the Executive Mode bit is reset and auto-reporting is turned off in favor of queued reporting to support the Q command. Binary Mode is the expected mode of operation for machine communication.

H: Hexadecimal Mode
In Hexadecimal mode, data is communicated in dual nyble Hex characters. The normal operating mode is Hexadecimal at power up.

i: Inhibit Low
This command will cause the Xeptor to reject all coins if the external Inhibit control line is taken low. It is required to use the S (save) command following this command to save this setting through power cycling.

I: Inhibit High
This command will cause the Xeptor to reject all coins if the external Inhibit control line is taken high. It is required to use the S (save) command following this command to save this setting through power cycling.

P(d₀ to d₃): Pulse Set (credit pulse)(diverter delay)(diverter pulse)(tilt time)
This command allows the change in credit pulse width and diverter parameters in milliseconds, and the TiltTime parameter in 1/3 second increments. TiltTime will cause the Tilt output to be on solid if it is an even number, and pulse 3 times a second if it is an odd number and credit optics are not installed. For TiltTime values $C0 or larger, the Tilt output will latch on until reset or toggling inhibit.

r(r₀r₁): Report (tilt/fail)(maintenance)
This command reports the Tilt, Fail, and Maintenance status as specified in the tables below. These are reported in nice text in the Hexadecimal mode

Tilt/Fail Byte Definition

Bit	Name	Comments
0	Credit Optics	Credit optics blocked or dead.
1	Diameter Optics	Diameter optics blocked or dead.
2	Coil Open	Flat cable probably pulled out.
3	Coil Load	Coin probably stuck in chute.
4	uCMemory	Program memory bad.
5	EEMemory	Configuration memory bad.
6	Slow Coin	Coin slow, stuck, or strung.
7	Reverse Coin	Coin took reverse path.

Maintenance Byte Definition

Bit	Name	Comments
0	Credit Optics	Credit optics dim.
1	Diameter Optics	Diameter optics dim.
2	Reserved	Reserved for X-Mark code optics
3	Switch Not 0	Rotary switch not at operating mode position 0
4	Ambient Light	Too much ambient light on the optics
5	Reference Cal.	Calibration Reference Coins not programmed.
6	Wrong Model	Likely from change of processor chip to different model, or to earlier version.
7		

R: Report

This big status report combines many of the smaller reports but is only for hexadecimal mode.

S: Save All

This command saves all operating parameters to nonvolatile EEPROM and is required following any command which changes operating parameters if they are to survive through a power cycle.

s(d_0): SysConfig (sysconfig)

This command writes a new value to the SysConfig byte. The Security bit and the Credit Sensor bits may be read, but not written to.

SysConfig Byte Definition

Bit	Name	Comments
0	Credit Sensors	1 = Credit Sensors are installed. (read only)
1	NRI Emulation	1 = Coin Value becomes output # assignment on PPNRI-3 or PPNRI-6
2	One Pulse/Coin	1 = Limit output pulse count to 1, limit coin signature to one coin type.
3	Inhibit Sense	1 = Inhibit input high for to inhibit acceptor.
4	Reserved	Reserved for X-Mark security.
5	Reserved	Reserved for X-Mark security.
6	Tight Metal Tol.	1 = Tighter tolerance (smaller accept window) for all coins.
7	Security	1 = Acceptor secured from programming without X-Key or Coin Selector.

Note: The default factory setting for SysConfig is 0C or 0D depending on Credit Sensor installation.

V(r_0 to r_6): Version (model)(revision)(ID high)(ID low)(ROM Sig)(EE Sig)(SysCnfg)

This command returns the model number, such as 22 (Hex) for an X-62, and revision numbers starting with $40. The 16 bit ID number is randomly selected upon initialization at the factory. ROM and EE Signatures verify the program memory and the Coin ID memory. The SysConfig bits are as identified above in the "s" command.

2.3.3 COIN DATA AUTO REPORTING

When a coin has been deposited, the Xeptor will take all of the necessary sensor measurements, compare the measurements against coin signature data in the six Coin Memories, start the SENSE output pulse(s) if it was a good coin and then automatically report the disposition of the coins and sensor readings taken via the serial port. If internal credit optics are installed, a subsequent report on slow or reverse coins may additionally occur. The auto report message consists of 7 data bytes as shown below in ASCII Hex format.
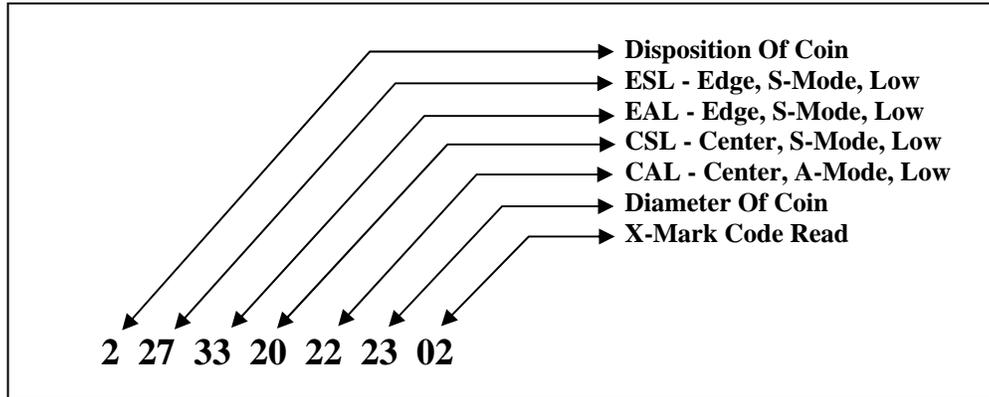
The disposition of the coin may have a numeric value or a letter as shown in the table below in order to indicate which coin was accepted, or the reason for rejection.

Value	Disposition Value Meaning
1-6	The Coin Memory number which had parameters matching the accepted coin.
D	No Coin Memory had a DIAMETER matching the rejected coin.
M	No Coin Memory had a METAL measurement matching the rejected coin.
U	Parameter matched the designated UNWANTED coin, and was rejected.
S	A SLOW coin passed through the Xeptor, could be a stringer or sticking problem.
R	An accepted coin REVESED direction, credit may or may not have issued.
L	The rotary switch was turned to one of the 6 LEARN positions.
I	The Xeptor was INHIBITED when the coin was deposited, coin rejected.
Z	There are no coin signatures in Coin Memory.

Following the disposition, there are 6 metal measurements. Measurements are taken in three ways on the edge and three ways in the center of the coin. S-Mode and A-Mode represent two different electromagnetic field configurations, and High and Low represent two different frequencies of operation. Between all of these measurements, the X-60 is second to none in distinguishing coins on the basis of: a) alloy conductivity, b) magnetic properties, c) thickness, d) clad metal layering, and d) bi-metal (edge/center) construction.

Finally, the diameter value corresponds directly to the diameter of the coin. To convert the diameter reading to diameter in inches, the formula for the X-60 is D = 1.300 + 0.00275 x Diameter Reading.

2.3.4 REPORT EXAMPLES AND EXPLANATION

The "R" Report command produces the first report below, containing first an identification of the unit, then the contents of Coin Memory, then under the dashed line are the system configuration and sensor diagnostics information. We can glean the following information from the report: There are 4 coins programmed into Coin Memory. The 3rd coin has a value of 0D (Hex) = 13 which means that it is programmed as an unwanted coin. The 5th coin is programmed to produce 8 credit pulses. The Diameter Optics all report in the normal range of 1-8. The Credit Optics are reporting zeros, indicating there are none installed. The inductive sensor tank circuit calibrations are all in the range of about 40 indicating they are just fine. The SysConfig indicates the only thing special is it is set for Inhibit High and that Credit Optics are installed. The TiltTime is set for 4/3 seconds. The Sense and Credit Pulses will be 20(Hex) = 32ms. And, finally, if there is a secondary diverter, it will fire 10(Hex)ms after coin validation and the pulse will last 80(Hex)ms.

```
Xeptor X-60 V4.0 ID#:CD87
Coin Memory: 01 02 03 04 05 06
Coin Value : 01 01 0D 00 08 00
Coin Code:   02 00 03 00 00 00
Metal-ESL:   35 32 1B 00 22 00
Metal-EAL:   3B 36 1E 00 23 00
Metal-CSL:   3C 38 1D 00 2A 00
Metal-CAL:   3B 36 1F 00 2B 00
Diameter:    66 93 8F 00 B2 00
Tolerances:  00 10 00 80 00 80
------------------------------
DiamOptc: 01 05 05 CrOp: 02 03
XMark:    08 08 08 08
Tank Cal: 4E  Now: 48 56
Sys Cnfg: 09  Tilt 1/3 Sec: 04
Cred ms:  20 Dvt D/P ms: 10 80
```

One or more of the below messages may also be printed out immediately following the "R" command report above should any of the conditions apply at the moment.

```
=>Xeptor Inhibited
=>Switch Not Zero
=>High Reject Rate

=>SERVICE: High Ambient Light
=>SERVICE: Diameter Optics
=>SERVICE: Credit Optics

=>FAILURE: Diameter Optics
=>FAILURE: Credit Optics
=>FAILURE: Metal Sensor Coils
=>FAILURE: Processor Memory
=>FAILURE: EE Memory Whacked
```

The listing in the box below is an exaple of the Auto-Reporting the X-60 does each time a coin is deposited. Descriptions of features that are important to understand are indicated to the right.

```
1  35  3B  3C  35  65  02
1  36  3B  3C  35  65  02
2  32  36  38  2E  95  01
2  32  36  38  2F  90  01
U  1B  1F  1D  21  8F  00
U  1B  1F  1D  21  8D  00
M  1D  21  1F  21  62  00
M  1E  21  1E  21  61  00
D  37  3D  3C  37  16  02
D  36  3D  3A  36  1E  02
I  00  00  00  00  00  00
2  32  36  38  2F  93  01
1  36  3C  3C  35  67  02
X  32  36  38  30  91  03
1  36  3B  3C  35  67  02
S  00  00  00  00  00  00
R  00  00  00  00  00  00
2  32  36  38  2F  92  01
1  36  3B  3C  35  6B  02
```

Coins matching Coin Memory #1 and Coin Memory #2 have been accepted.

The coin best matched the Unwanted coin and was rejected.

Rejected on the basis of Metal.

Rejected on basis of Diameter

The Xeptor was Inhibited when this coin was deposited.

Everything was right except the X-Mark Code was wrong.

The X-60 first detected a Slow or Strung coin, then a Reverse direction coin.

The "**L**" **List Active Coins** command will produce a report something like the one shown in the box below. Coin Memory #2 and #3 were programmed by the usual manual method and indicate output value that it was learned, and the diameter measured.

```
Index Of Active Coins:
1) Memory Empty
2) Output-1 Learn   1.749"
3) Unwanted Learn   1.759"
4) Memory Empty
5) Memory Empty
6) Memory Empty
```

The "**V**" **Version** command tells you the model#, the firmware revision, the unit ID#, the checksum signature of the processor ROM, the checksum signature or the EEProm where coin signatures are held, and the System Configuration or the unit.

```
Xeptor X-60 V4.0 ID#:CD87
ROMSig:E8 EESig:6E SysCnfg:08
```

2.3.5 System Configuration Details

The table below (same as in section 2.3.2) shows the specific meaning of each of the bits in the SysConfig byte. There is an example of how to modify SysConfig in the next section.

SysConfig Byte Definition

Bit	Name	Comments
0	Credit Sensors	1 = Credit Sensors are installed.
1	NRI Emulation	1 = Coin Value becomes output # assignment on PPNRI-3 or PPNRI-6
2	One Pulse	1 = Only output one pulse irrespective of button presses during Learn.
3	Inhibit Sense	1 = Inhibit input high for to inhibit acceptor.
4	Code Threshold	1= Raise X-Mark sensor threshold.
5	Code Both	1 = Require both leading and trailing edge code reading.
6	Tight Metal Tol.	1 = Tighter tolerance (smaller accept window) for all coins.
7	Security	1 = Acceptor secured from programming without X-Key or Coin Selector.

Bit-0 Credit Sensors

This is a read only bit that is set to "1" by the system if it detects the presence of built in Credit Sensors. See Section 3.1 for additional details about the functionality of this installed option.

Bit-1 NRI Emulation

When this bit is set, the Coin Value parameter is used to determine output code, rather than output pulse count. Although this is primarily intended for use with the PPNRI-3 and PPNRI-6 personality plugs for compatibility with the NRI 10pin IDC connector, it may also be used with the PP46 and PP62, both of which bring out all three of the /Tilt, /Credit and /Sense signals which are re-assigned during NRI emulation as binary output code bits 0, 1, and 2 respectively. The PPNRI-6 outputs are exclusive "1 of N" style, whereas the PPNRI-3 outputs are of the binary code style. If three or fewer coin types are to be accepted, using Coin Values of 1, 2, and 4 will provide a separate output signal for each of the 3 coin types for the PPNRI-3, PP46 or PP62 Personality Plugs. Finally, if there is a Tilt condition, output code 7 (all three binary bits) will be issued with the same pulse width, repetitively until the condition is cleared.

Bit-2 One Pulse

This bit is normally set to "1" by the factory so that the X-60 acceptor will only ever produce a single Sense and Credit pulse per coin. In special cases where multiple denominations are to be accepted and credited by different pulse counts for each coin type, then the "s" command and "S" commands should be used to set this bit to 0.

Bit-3 Inhibit Sense

When this bit is set, the acceptor will be inhibited when the Inhibit input is high or open, and enabled when the Inhibit input is pulled low. The operation is reverse when Bit-2 is low.

Bit-4 Code Threshold

When this bit is set, the X-60 requires a higher level of reflection from the X-Mark facets before it will accept them as valid. Normally this bit is not set so that worn or soiled tokens will still have a high rate of acceptance. However, in the case of an attack by a counterfeiter or in case some other token has reflective areas in its minted graphics that are similar in character to an X-Mark token, it will be useful to set this bit to raise the threshold so that the infringing coin will more likely be rejected for having insufficient reflectivity. IDX does not recommend setting this bit, except for good cause.

Bit-5 Code Both
When this bit is set, the X-60 requires that the X-Mark code be read on both the leading and trailing edge of the coin to be accepted. When the bit is reset, the X-Mark code will be considered valid if it is read on either of the leading or trailing edges of the coin. Normally this bit is not set so that worn or soiled tokens will still have a high rate of acceptance. However, in the case of an attack by a counterfeiter, or in case some other token has reflective areas in its minted graphics that are similar in character to an X-Mark token, it will be useful to set this bit to eliminate infringing coins that only have a few spots in their graphic patterns that produce reflections similar to X-Mark facets. IDX does not recommend setting this bit, except for good cause.

Bit-6 Tight Metal Tolerance
When this bit is set, the discrimination algorithm will additionally utilize an algorithm which sums the errors in each of the six metal alloy measurements and limits the total error for acceptance to approximately 1/2 the sum of tolerances allowed for each measurement separately. This strategy generally only reduces the acceptance rate a few percent, but may have a significant effect on a similar foreign coin or slug. IDX does not recommend setting this bit and degrading the acceptance rate and enjoyment level of the end customer even a little, except for cause.

Bit-7 Security
Once this bit is set by using the X-Key or the Coin Selector, the unit may no longer be hand programmed without the X-Key or Coin Selector plugged in. When secured, the usual green LED indicator will have a very short red flash three times pre second.

2.3.6 Serial Port Command Examples

The examples commands below assume that a connection has been successfully established through a PC serial port using a terminal emulator program as described in Section 2.3.1. Please refer to the earlier portions of Section 2 for more information about the commands used.

Humanly Hexadecimal Interface

The normal communication mode for the X-60 is human readable ASCII Hexadecimal. ASCII is just the binary code produced when you hit a key on the keyboard and Hexadecimal is a way to use a pair of keys to represent a binary byte using a pair of ASCII Hexadecimal characters with values 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F, where A-F represent values 10-15 respectively. (see conversion table below) Note: There is also a Binary mode of communication invoked with the **"B"** command. If you get into that mode you will need to enter **"HH"** to return.

View The Report Screen

Send the "R" command to see the coin data stored in memory and the operating parameters for various sensors and the timing of the credit pulse and other signals.

Change Inhibit Line Logic

Xeptors have a hardware inhibit line that is used to prevent acceptance of coins even when power is applied to the unit. When inhibited, the Xeptor LED will flash amber color to indicate the inhibit state. Send the "**I**" command to change to "inhibit high" or send the "**i**" command to change to "inhibit low". Note: You must send the "**S**" command to save the new configuration to non-volatile memory.

Change Credit Pulse Or Tilt Timing

The "Pccddddtt" command is used to change the output credit pulse width (cc), the diverter output option delay and pulse width (dddd) and the tilt time (tt). Assuming you do not have a diverter option and you would like the credit pulse to be 24ms (18 Hex) and the self inhibit after a tilt to last 4 seconds (12/3 sec $\Rightarrow$ 0C Hex) then you would enter the command **"P1800000C",** followed by the "**S**" command to save the new configuration to non-volatile memory.

|		Least Significant Hex Digit															
		0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
Most Significant Hex Digit	**0**	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
	3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
	4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
	5	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	6	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
	7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	8	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
	9	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
	A	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
	B	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
	C	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
	D	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
	E	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
	F	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

Section 3.1
Credit Optics Option

Background

In recent past years, the coin acceptor was a device that simply validated the coin, and the slot machine manufacturer installed their own Credit Optics (or Coin In Optics) modules beneath the coin acceptor for verification of coin direction and coin count. The coin acceptor produces a SENSE pulse to indicate that it has validated the coin, and it is then used to trigger a time limited window in which the slot machine Credit Optics is enabled to verify direction and count of the coin. Recently, as the sophistication of electronic coin acceptors has continued to advance, the Credit Optics function has been brought into the coin acceptor and not only provides the lowest installed cost and smallest space consumption for the function but additionally provides superior sequence and timing logic to detect stringing, coins on a stick, reverse coins and other fraudulent activity.

Recognizing The X-60 Credit Optics Option

If the Credit Optics option is installed, you can see the external plastic periscope reflector optics installed in the holes in the metal frame just above and just below the accept gate relay rake as shown in the figure below to the right. In addition, the least significant bit of the SysConfig byte will be set indicating that they are recognized by the X-60 as installed and functional. Internal to the circuitry there is an LED and phototransistor for each of the periscope reflectors. The LED transmits a beam of light across the coin chute to the periscope. The periscope reflects the beam 90° twice to return it across the coin chute, 1/4 inch away from the original beam, back to the phototransistor for detection. The dual path ensures detection of even the smallest coins. The sensor thresholds are self calibrating to eliminate effects of dust and dirt. This robust design is the same as used in the X-10 and X-50 Xeptors which have never experienced field failure from dirt.
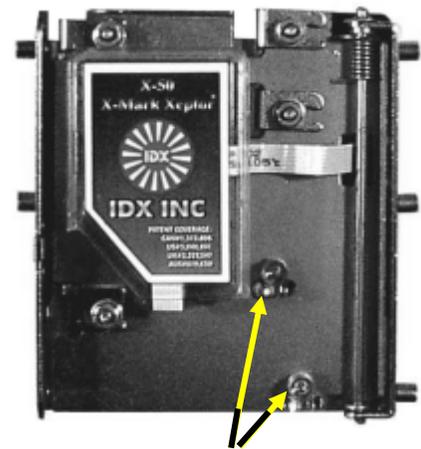
Installed Credit Optics

Credit Optics Timing And Sequencing Logic

When a coin is dropped into the X-60 coin chute it passes a series of diameter measuring optics and the inductive metal sensor coils. All coin measuring sensors have finished reporting their data when the coin is approximately half way through the Xeptor. If everything measured matches the coin signature stored in one of the six coin memories, then the Sense output pulse is initiated and a flag is put into an escrow buffer to later issue the Credit Pulse, pending the successful sequential blocking and unblocking of the Credit Optics above and below the accept gate relay rake. Only when the coin has been tracked all the way past the bottom Credit Optic will the Credit Pulse be issued. If the coin takes too long or reverses direction, the Tilt Pulse will be issued and the Xeptor will self inhibit for a period specified by the TiltTime parameter. If a coin is to be rejected but it goes through the accept gate (due to fraudulent activity) the Tilt Pulse will be issued, but not a Credit Pulse. Bench testing has proven that the X-60 can successfully track, separate, and credit coins at over 10 coins per second.

Section 3.2
Diverter Driver Option

General Description

IDX Xeptors can be ordered with a built-in Diverter Driver (see How To Order page in the manual) to control an external coin diverter for the purpose of sorting the end destination of two classes of accepted coins. There are two primary situations calling for this capability. First, one may wish to accept multiple denominations, and direct only one to a change hopper, and the others to a vault drop. Second, one may wish to accept a promotional token in addition to the usual coin, but always have the promotional token diverted to the vault drop. The Diverter Driver works in tandem with existing controls for the "hopper full" diverter as without the need for formal communication or software changes in the host machine.

Theory Of Operation

The diverter mechanism traditionally directs accepted coins to the payout hopper until it is filled, and then is controlled by the machine processor to direct coins to the drop vault. When it is desired to additionally accept a second type of coin, such as a second denomination or a promotional token, the second coin generally must always be diverted to the drop vault to prevent having multiple denominations or multiple size coins in the payout hopper. In order to successfully accomplish this task the diverter must be controlled on a coin-by-coin basis.

When the coin is passing through and IDX Xeptor, the Xeptor knows the coin's identity when the leading edge of the coin is about 2 inches from the bottom of the Xeptor. However, the host machine may typically not know the coin's identity until the coin has fully passed through the Xeptor and been validated by the credit sensors of either the Xeptor or the host machine. By this time the coin is already entering the diverter, or is so close to the diverter that it is too late for the host machine to move the diverter to the other position. Therefore, coin-by-coin diverter control must be provided by the Xeptor and must work in tandem with the existing diverter control signals of the host machine.

X-60 Diverter Driver Circuit

The diverter driver circuit for the X-60 consists of a ground referenced NMOS FET capable of driving up to 500mA at up to 60VDC. The FET device is protected by a MOV snubber from power supply and inductive coil flyback related voltage spikes. Because it is a ground referenced switch, it must only be used in a ground referenced switching configuration as described below. However, should the need arise for an isolated switching configuration or a non-ground referenced switching configuration, IDX would be happy to help you implement that configuration. Unlike the X-10 and X-20, the X-60 has no indicator LED for the diverter.

X-60 Xeptor
Diverter Driver Circuit

2N7000

500mA
60VDC

Circuit
Common
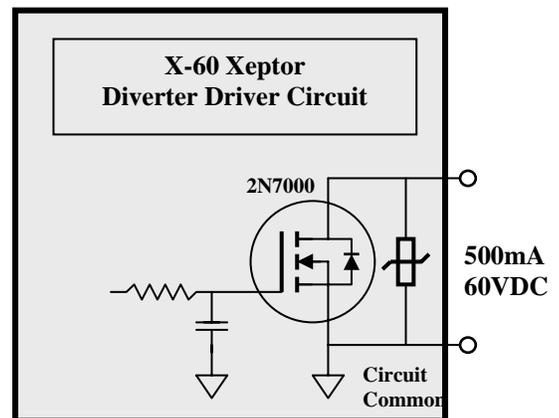
Diverter Driver Connection / Logic

To The <u>Drop</u> Vault For Activate Diverter: Most host machines have a sensor that detects the hopper fill condition. The sensor signal is provided to the machine processor, which filters the often-erratic signal and controls an NPN Darlington transistor to activate the diverter coil. The necessary logic for this connection, as shown in the table to the right, is an "OR" connection such that either the host machine or the Xeptor can independently

	Hopper Coin	Drop Coin
Hopper Full	Divert	Divert
Hopper Empty	-----	Divert

activate the diverter to send the coin to the drop vault. The block diagram below shows how to connect the Xeptor Diverter Driver into the machine circuitry to implement what is called a wired-OR control circuit. Remember, coins programmed in Coin Memories 4-6 are diverted.
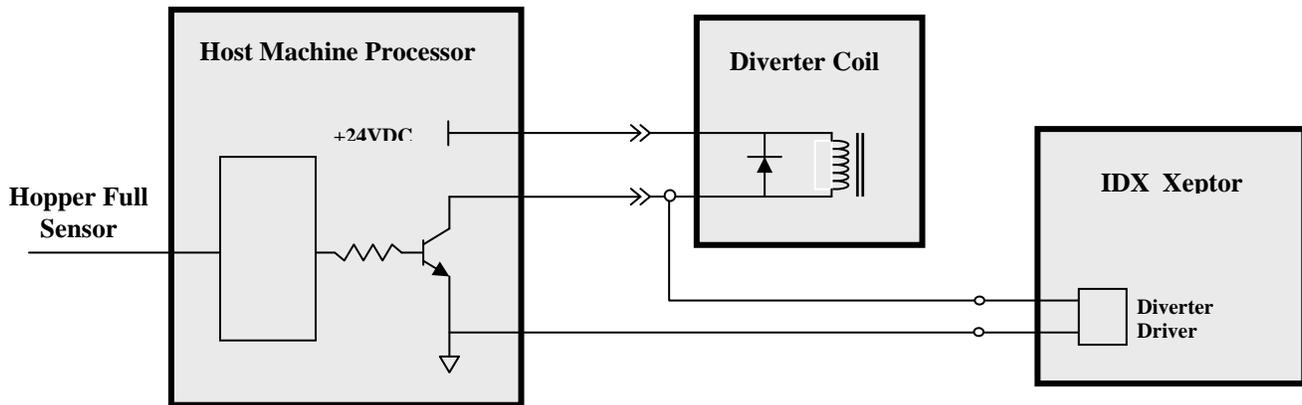
Example Connection For: Active Diverter Sends Coin To <u>Drop Vault</u>.

<u>Diverter Pulse Timing</u>

The Xeptor Diverter Driver output pulse timing sequence is triggered at the point when the coin's leading edge is 2.25 inches from the bottom of the Xeptor, as show on an earlier page. The pulse timing sequence includes **Divert_Delay and Divert_Pulse values,** which are programmed into the Xeptor using the "P" command and "S" command (see Serial Port Protocol in manual). Starting at the trigger point, there is a delay of Divert_Delay milliseconds before the start of the output pulse of duration Divert_Pulse milliseconds.

The values for Divert_Delay and Divert_Pulse are chosen so that the diverter flapper is reliably in position by the time the coin reaches it, but no sooner than is really necessary. If the diverter flapper is moved too quickly, it could interfere with the path of a coin in front of it that is not supposed to be diverted.

1. **Divert_Delay** should be lengthened until coins to be diverted are no longer diverted reliably, then reduce Divert_Delay by about 8ms (about 1/2 inch of coin travel). This provides some margin for reliability, particularly if the flapper had momentum in the other direction due to a prior coin.

2. **Divert_Pulse** should normally be at least 16ms (about 1 inch of coin travel) longer than the diverter activation time, or about 8ms more than lowest reliable value Divert_Pulse. If it gets too short, then some coins will not be diverted, particularly if they are falling a little slower than most coins. Increasing Divert_Pulse to some very large value will normally work well because a following coin that is not to be diverted will commandeer the timer for its own needs. However, if the deactivation time of the diverter is much longer than the activation

time, it will be important to keep the Divert_Pulse as reasonably short as possible because a tailgating coin that should not be diverted may well slip through the wrong path because the diverter mechanism is too slow in the deactivation direction.

Test The Parameters for reliable behavior by doing the following:
1. Single feed numerous of each of the two types of coins.
2. Fast feed groups of the coin to be diverted.
3. Fast feed mixed groups of coins.

Remember, coins signatures learned for Coin Memories 1-3 will not activate the diverter, those for Coin Memories 4-6 will activate the diverter. When going through the coin learn procedure, the output channel/code is specified by the number times the button is pressed.

Be aware that the response time to fully move a typical diverter flapper from one position to the other is approximately 50ms. As the time-distance between coins becomes shorter than 50ms, the probability for clean separation of coin types may seriously degrade. Although it is theoretically impossible for hand fed coins to be closer than this, if the coin path is not free of edges and bends that may catch or delay the coins fall, a trailing coin could possibly catch up to delayed leading coin and reduce the gap between coins such that it is impossible for the diverter flapper to change positions between them.

Summary Check List Notes
- **Diverter Driver connection depends on path (hopper or drop) active diverter sends coin.**
- **Verify response time suitability of existing diverter mechanism with pulse generator test.**
- **The coin is moving about 70 inches per second.**
- **Timing sequence starts the coin is 2.25 inches from the bottom of the Xeptor.**
- **Set Divert_Delay for about 8ms less than highest reliable value.**
- **Set Divert_Pulse for about 8ms more than lowest reliable value.**
- **Use "P" command to set diverter timing values. Use "S" command to save to EEROM.**
- **Use NRI Emulation for output pulses on separate wires for different coins.**
- **Coin Memories 1-3 do not activate the diverter while 4-6 do activate the diverter.**

Additional application notes are available online at www.idxinc.com/features.htm

Section 3.3
X-Key, Electronic Security Key

General Description

The **X-Key** provides a means for securing the programming environment of an Xeptor in order to prevent fraudulent behavior of inside personnel. Normally an Xeptor may be put into the LEARN mode by anyone with access and procedural knowledge. However, a secured Xeptor may be programmed only if the X-Key is plugged into the 3-pin Serial Data Port socket on the Xeptor. Electronic verification of random encrypted codes shared between the Xeptor and X-Key is required before the Xeptor will enable itself to be programmed to accept new coin types. As a result, if you control the X-Key, you will control your Xeptor security by eliminating the potential threat from marginal personnel with inside knowledge and access. The same X-Key may be used for all IDX Xeptors. Further security can be obtained by using the X-Key in conjunction with the X-Tracker software described in Section 3.4 so that personnel ID cods and time and date stamps are recorded in the X-Key and the Xeptors they enable.

X-KEY PRODUCT FEATURES

- Must be plugged into an Xeptor to enable its Coin Memory manual LEARN function.
- Xeptor and X-Key exchange randomized encrypted codes before enabling LEARN function.
- Xeptors automatically become "secured" after the first coin LEARN with X-Key attached.
- When the X-Key is not attached, secured Xeptors with rotary switch SW2 in a LEARN position (1-6) will exhibit a flashing amber LED, indicating the LEARN function is inhibited.
- Xeptors that become secured will indicate so by emitting a very short red LED pulse 3 times per second during the otherwise normally green LED indication in SW2 position 0.

OPERATION

- Remove the Xeptor cover and identify the three terminal serial port connector identified as J4 located adjacent to the Personality Plug, and plug the connector cable of the X-Key into J4.
- Change rotary switch SW2 position from 0 (normal operating mode) to one of the coin memory LEARN positions 1 through 6. You should see the Xeptor LED turn bright red and the X-Key LEDs should turn on and be green. This confirms that the X-Key has powered up and has enabled the Xeptor to learn a coin.
- Follow the LEARN procedure outlined in Section 2.1.
- When complete, turn rotary switch SW2 back to position 0 and remove the X-Key plug from socket J4. If the Xeptor was not initially secured, it now will be.

Section 3.4
X-Tracker, X-Key Security Management Software
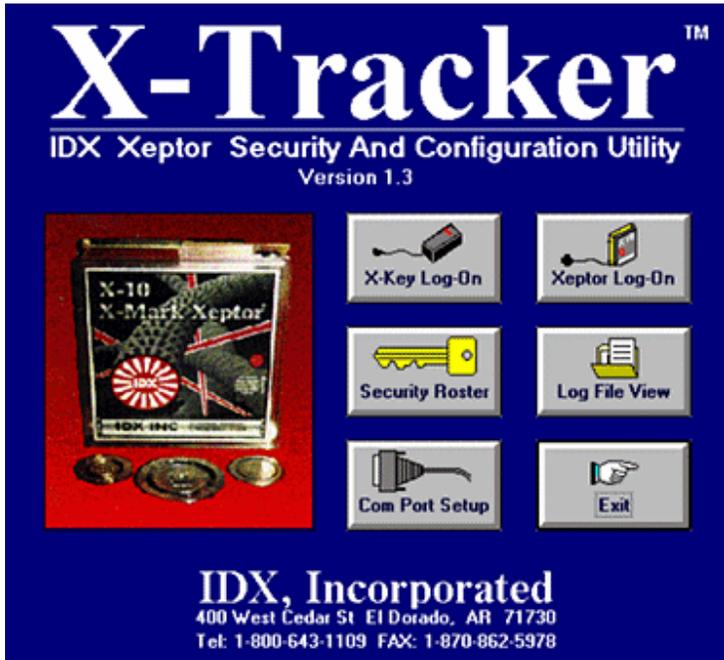
The X-Tracker is a Windows based software utility for managing and tracking X-Key (release-2) activity. An authorized personnel roster is set up and enables these personnel to "log-on" to an X-Key, which enables it to communicate with and enable an Xeptor. The personal ID and a time and date stamp are stored in an encrypted redundant file system on the PC and in the X-Key. When the X-Key is used to enable changes to the "learned coins" of an Xeptor, this same information is stored in the Xeptor and the serial number of the Xeptor is stored in the X-Key. Responsibility for the X-Key is terminated by X-Tracker "log off". This disables the X-Key and stores the log-off information, including the Xeptor serial numbers in the redundant encrypted PC log files.

X-TRACKER PRODUCT FEATURES
- Two level Security Roster for: a) personnel management, b) X-Key log on/off.
- Redundant encrypted files of all activity ensure reliable, tamper proof records.
- X-Key is enabled only by authorized personnel who remains responsible until disabled.
- Authorization ID and time and date stamp stored in local files and in Xeptor memory.

INSTALLING X-TRACKER SOFTWARE
Use Windows Explorer to find the file called SETUP.EXE on the installation disk. Double-click it to start it. The SETUP program will create a new folder called XTracker and copy the files from the installation disk to your computer. Right click on the XTracker icon in the folder and follow the menu to Send To Desktop as a shortcut. When your computer runs the program for the first time, you will be instructed to call IDX for authorization to install the program. Follow the instructions and input the code given to you.

COM PORT SELECTION
The first time you run the program, click the "COM Port Setup" button and select the correct serial port (see figure at right) for use with the X-Key.

SECURITY CHECK
Access to all other screens requires a Security Check as shown at far right. Until you change the Security Roster, the only valid names and secret code that will work are Demo, Demo, and Demo.

SECURITY ROSTER

The Security Roster Screen is used to determine access authority for each of the screens. Those at the Master Security Level can access all screens. Those at the Basic Security Level can only access the X-Key Log On / Log Off screen shown below. Be careful to remember that all entries are case sensitive. Names must be 2 to 15 letters long and the secret code must be 4 to 6 letters/numbers long. The ID number in the far right column is a 16 bit number computed from the First Name and Last Name entries and is the personnel ID number actually stored in the Xeptor by an enabled X-Key.

The information on this form is stored in an encrypted file to deter hacking by an employee with less than honorable intentions. If this form is printed to maintain a record of authorized personnel, IDX recommends that it, and any copy of it, be stored only in the locked files of management not normally accessible to others.

X-KEY LOG ON / LOG OFF

When this screen is activated, the PC will try to communicate to the X-Key over the specified serial COM port. The X-Key should **NEVER** be connected to the PC and an Xeptor at the same time. Information about the last four "Logs" on the X-Key are displayed in the window on the left. The serial numbers of any Xeptors that have been enabled for programming by the X-Key will be listed in the right window. When the X-Key is enabled, its LEDs will be green and the Current Log will display only Log On information, but no Log Off information.

VIEW ACTIVITY LOG FILES

The Activity Log File is a simple list of all activity, including Log On / Log Off of an X-Key, the list of Xeptor serial numbers enabled by an X-Key, who viewed, changed or printed the Security Roster, and who viewed the Activity Log File. This information is also kept in an encrypted file to deter hacking by an employee with less than honorable intentions. This file may be viewed by log-date or by user name. When the file length grows larger than the window, a scroll bar will appear. Any Xeptor serial numbers are associated with "Log Off" activity. Click this record, and an additional window to the right will appear to show the serial numbers.

28

Section 3.5
Coin Selector, Programming Tool

Programming Coins Just Got Simpler!

All You Have To Do Is Push A Button To:
- Program in a specific coin, like a $5 Token.
- Copy a coin from one Xeptor and Clone it to another.
- Copy an entire Xeptor configuration and Clone another.

Forget manually programming each Xeptor by hand dropping sample coins through each of them. Programming time is cut to a small fraction of what it used to be, programming errors are eliminated, there is no question about what is in the coin memories, and the security of your casino is improved.

The Coin Selector significantly improves security of coin programming for the following reasons:

1. If you press the $5 TOK button, it will program it into Xeptor Coin Memory #1. There will no longer be any question about what is programmed into Coin Memory #2 through #6 because the Coin Selector automatically erases unused Coin Memories.

2. If you Copy a custom coin signature or all of the configuration data from an Xeptor into the Coin Selector and then Clone other Xeptors, then all units will operate identically. There will no longer be any question about whether any of them were accidentally programmed or setup differently from that one which was confirmed perfectly set up and programmed.

3. Once the Coin Selector has programmed an Xeptor, the Coin Selector puts it into the "Secured" mode, meaning that it can no longer be hand programmed without the presence of the Coin Selector (or an X-Key). If you control access to the Coin Selector, you control access to coin programming.

4. Furthermore, for the security fanatic, the Coin Selector optionally operates with all of the properties of the X-Key. This means that it can be enabled and disabled through connection to a PC running our X-Tracker utility which requires personal sign-in and sign-out. This process leaves a time, date, and name stamp in the Coin Selector and in any Xeptor it programs, and leave the serial number of each Xeptor programmed back on the PC in encrypted files so that on can later see who actually made changes to the Xeptor in question, and when they did it.

Contact the IDX Factory for a list of available Coin Selectors, or request one with custom capability as required for your local market needs.

Section 3.6
Xaminer Diagnostic Tool

Diagnostic Tool For Xeptors

The Xaminer software is designed to run on handheld computers based on the Palm® OS or Microsoft® Windows® Pocket PC OS platforms. A handheld running the Xaminer connects via cable to the serial port of the Xeptor and provides a graphical interface for diagnosis and configuration of the Xeptor. Using Xaminer, one can examine or set all of the operational parameters, see the coin parameter readings to diagnose troublesome acceptance, and see all of the self-diagnostic information in English to troubleshoot and maintain proper operation of all of the Xeptor sensors.

The Xaminer was designed to be easily upgraded to keep up with Xeptors as they evolve to include with new options and features.

XAMINER Features

- Connect directly to any IDX Xeptor with a serial port cable.
- Change credit, self-inhibit, and diverter timing.
- Change tolerance window for individual coins.
- Change X-Mark detection strategy for higher security.
- Change metal alloy detection strategy for higher security.
- Identify reason for poorly accepted coins.
- Check health of all system functions with English descriptions.
- Perform coin analysis through data collection.
- Record and export coin data to text file for further analysis.

Xaminer Bundle Package (Everything you need to get started):
- Xaminer Software
- Palm Handheld Computer (Palm m130)
- IDX Xeptor X10199-1 Serial Cable
- Palm Serial HotSync® Cable
- DB9-M/F Null-Modem adapter
- 16MB SD Memory Card

Section 4.1
Troubleshooting Guide

During Normal Run Operation ➔ Rotary Switch SW2 = 0

LED Color	What To Check For
Black - Off	There is no power to the Xeptor. • Check cable and connectors to verify they are not at fault. • Check controls that may switch power off when machine access door is open.
Solid Green, Or Green With Very Short Red Flashes	Green LED indicates the Xeptor knows of no problem it can detect. The short red flashes indicate it is secured from had programming. • Verify the unit is programmed for the specific coin having a problem. • Not all coins that look alike are alike, check to see if that coin is different. • Check for alignment problems on entry and both exits of the Xeptor. • Check for reasonable diameter and thickness settings for the specific coin. • Pres button SW1 and verify accept gate relay functionality. Check its connector. • Connect to HyperTerminal, check system Report and coin Auto-Report.
Red / Green Alternating	The Xeptor thinks that some critical function has a problem. • Check both ends of the flat cable on the back side of the unit. • Check the coin chute to verify nothing is blocking the diameter or credit optics. • Proceed with the Field Test Procedure in Section 4.2 • Connect to HyperTerminal, check system Report and coin Auto-Report.
Yellow Flash	The Xeptor is inhibited. • Some machines inhibit the acceptor when the door is open. • Check INHIBIT the input signal. • Connect to HyperTerminal; check SysConfig for proper Inhibit setting. • Connect to HyperTerminal, check TiltTime for > C0 Hex which latches self inhibit.
Red - Solid	The rotary switch SW2 is probably not in "run" position 0. It is probably in 1 to 6.

During Coin Learn Operation ➔ Rotary Switch SW2 = 1-6

LED Color	What To Check For
Red Or Orange	Normal color at the start of, or during, the Coin Learn Procedure. • Red indicates there is no prior coin data in the selected Coin Memory location. • Orange indicates there is prior coin data in the selected Coin Memory Location.
Yellow Flash	This indicates that the Xeptor has been "Secured" from manual coin programming unless an "Enabled" X-Key or Coin Selector is connected to the serial port. In SW2 run position 0 you should also see a short red flash in the otherwise green LED.
Green Flash	This normally occurs as you drop each of the 6 sample coins during the learn procedure after initiating it by pressing SW1 one or more times.
Red / Green Alternating	This normally occurs at the end of dropping the 6th sample coin to indicate that all sample coins have been registered and the data saved.

WARNING: Do not use cleaners containing ammonia. It will chemically attack the Lexan housing material causing it to become brittle and possibly break in areas of high stress or impact such as the coin chute rails.

Other chemicals that attack Lexan include: Acetone, Toluene, MEK, DMSO and Gasoline.

Section 4.2
Field Test Procedure

Field Tests & Diagnostics
The normal operation mode of the Xeptor is with the rotary switch position #0 where the LED is green. If the LED is flashing yellow, it means that the Xeptor is inhibited. This can be caused by an external control line such as from a door switch or otherwise as controlled by the machine that it connects to. It may also (although less likely) be caused by improper setting of the Inhibit bit in the SysConfig control byte. If the LED is alternating red-green, it indicates a malfunction has been detected. Some malfunctions can be corrected in the field. See below.

Gate Relay Test (rotary switch #0)
Press the test button to activate the gate relay. If it does not activate, it may be physically obstructed or its wire unplugged. This would be one cause for rejection of all coins.

Inductive Metal Sensor Tests (rotary switch #E, #F)
Turn the rotary switch to positions #E and #F to test the inductive sensor. Normal LED color is green. A red color most often indicates either there is metal in front of the inductive sensors or that the flat cable going to the small sensor housing has been unplugged.

Diameter Optics Sensor Tests (rotary switch #B, #C, #D)
Turn the rotary switch to positions #B, #C, and #D to test each of the three diameter thru-beam optical sensors. Normal LED color is green or mostly green. A red or orange color most likely indicates either there is an object or dirt blocking one of these three sensors and cleaning of the coin cute is required, or that the flat cable going to the small rear sensor housing has been unplugged.

X-Mark Sensors (rotary switch #9, #A)
Tests #9, and #A perform a check on the ability of the X-60 to correctly read an X-Mark on a token. Test #9 checks the X-Mark reading optics on the back side while test #A checks the X-Mark reading optics on the front side. When operating properly, the LED will be green when there is no X-Mark detected and red when a proper code angle X-Mark is presented to the sensors.

Credit Sensor Test (rotary switch #8)
The credit optics (if installed) are located just above and below the gate relay rake. If they are not installed the LED will flash amber to indicate that the credit optics were not detected at power-up. If they are installed, the LED is normally green for proper function, and will become orange to red as they become blocked by dirt or other obstructions.

Memory Test (rotary switch #7)
Turn the rotary switch to positions #7 to test the validity of memory. Normal LED color is green. Alternating red-greed indicates that memory is corrupted. In rare cases where electrostatic shock has corrupted stored coin data, it may be possible to correct this by re-learning the coins. If this occurred after you replaced the processor chip, it is possible that it is not compatible with the data in the EEProm memory. If you cannot correct this problem, contact the factory for help.

Section 4.3
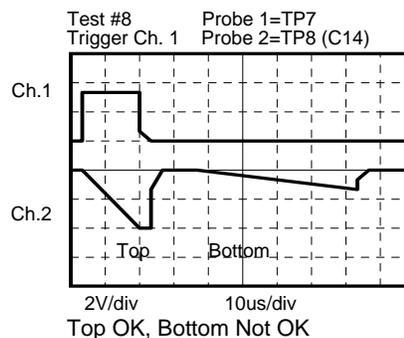## Bench Test Procedure

INTRODUCTION

On power up reset, the Model X-60 Xeptor performs a series of self tests. If it passes all tests, the indicator LED turns green and normal operation commences. If any of the self tests failed, the indicator LED repetitively flashes red/green. If the Xeptor is 'Inhibited" the LED will flash amber. The X-60 Xeptor was designed with built in field test and diagnostic capability to aid in trouble shooting problems away from the test bench. You can determine what has caused a failure by accessing rotary switch SW2 in the lower right corner of the circuit board and selecting positions 7, 8, 9, A, B, C, D, or F and observing the color of the indicator LED. The descriptions of each field test function additionally include expected oscilloscope waveforms which may be useful in a test bench environment. In order to return the Xeptor to normal operation, it is imperative that the SW2 be returned to position 0.

TEST #7

Turn SW2 to position #7. Test #7 performs a checksum of the X-60 memory, both the program ROM and the non-volatile operating parameter EEPROM. The LED will be green if the test is passed and will flash red/green if the test fails. Unless one of the chips has physically failed or been incorrectly replaced, the failure may likely have been caused by electrostatic shock or power interruption in the middle of writing parameters to the EEPROM after a learn cycle or during a download of parameters over the serial communication port. To clear this problem either repeat the parameter download procedure or re-learn any coins to be accepted. If problems persist, call the factory for assistance.

TEST #8

Turn SW2 to position #8. Test #8 performs a check on the optional credit sensor optics just above and below the gate relay rake which verify that the coin passed in the proper direction with the proper timing. If not installed, the LED will flash amber to indicate this function is not available. When installed and operating properly, the LED will be green. When a coin interrupts either sensor beam the LED will turn red and the ramp-down waveform extends further to the right.

Test #8　　　Probe 1=TP7
Trigger Ch. 1　　Probe 2=TP8 (C14)

Ch.1

Ch.2

Top　　Bottom

2V/div　　10us/div
Top OK, Bottom Not OK

TEST #9, AND #A: X-MARK OPTICS TEST

Tests #9, and #A perform a check on the ability of the X-60 to correctly read an X-Mark on a token. Test #9 checks the X-Mark reading optics on the back side while test #A checks the X-Mark reading optics on the front side. When operating properly, the LED will be green when there is no X-Mark detected and red when an X-Mark is presented and detected. There are two X-Mark detectors on each side of the coin chute and detection by either one of them will cause the LED to turn red.

Test #A — Trigger Ch. 1 — Probe 1=TP7, Probe 2=TP5

Ch.1 0V --

Ch.2 0V --

2V/div 2V/div 50us/div

Front Side, Mark A, Not Mark B

Test #9 — Trigger Ch. 1 — Probe 1=R18, Probe 2=TP6

Ch.1 0V --

Ch.2 0V --

2V/div 2V/div 50us/div

Back Side, Mark B, Not Mark A
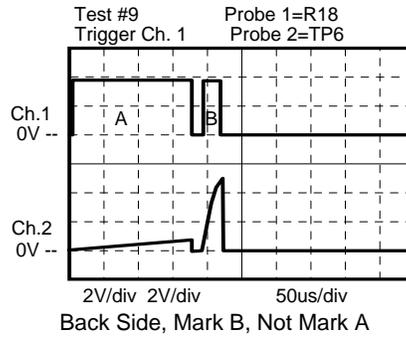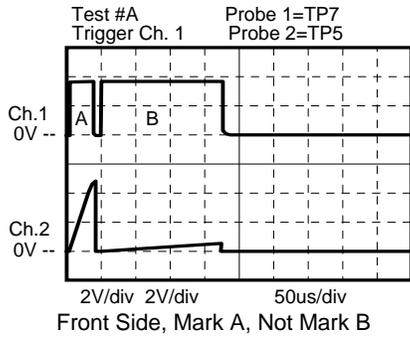
TESTS #B, #C, AND #D: DIAMETER OPTICS TEST

Tests #B, #C and #D perform beam strength tests on the three optical thru-beam sensors used to measure coin diameter. Test #B checks the bottom beams, about 1.6" from the coin chute top. Test #C checks the middle beams, about 1.3" from the coin chute top. Test #D checks the top beam, about 0.4" from the coin chute top. When operating properly, the LED will be green when the beams are not blocked and red when they are blocked or otherwise non-functional. The ramped-up waveform extends further to the right as the beam becomes blocked.

Tests #B, C, D — Trigger Ch. 1 — Probe 1=TP7, Probe 2=TP5

Ch.1 0V --

Ch.2 0V --

2V/div 2V/div 10us/div

Typical For LED = Green

Tests #B, C, D — Trigger Ch. 1 — Probe 1=TP7, Probe 2=TP5

Ch.1 0V --

Ch.2 0V --

2V/div 2V/div 10us/div

Typical For LED = Red
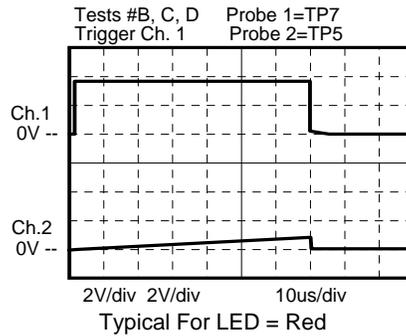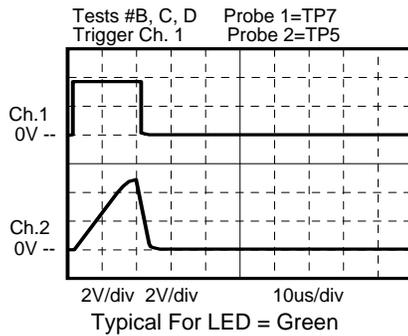
TESTS #E AND #F: INDUCTIVE COIL TEST

Turn SW2 to positions #E or #F. Tests #E and #F perform a check on the inductive coils operated in both series aiding and series opposing modes. When operating properly, the LED will be green with no coin between the sensor coils, and red with an inductively lossy coin between the sensor coils. If no coin is present and the flat cable to the rear box is disconnected or the circuit is otherwise non-functional, the LED may flash red/green twice per second or turn red. There are two damped sinusoids in each of the figures below. The narrower one at a higher frequency and the wider one at a lower frequency. Only the envelope of the waveform is shown below.

Test #E — Probe 1 = TP2

5V —

2V/div .5ms/div

Test #F — Probe 1 = TP2

5V —

2V/div .5ms/div
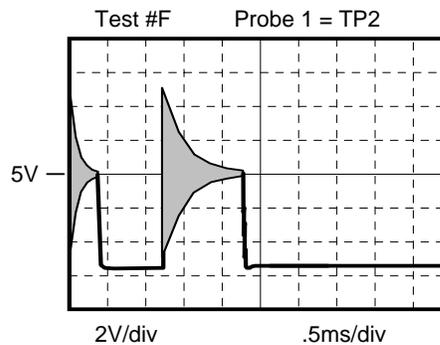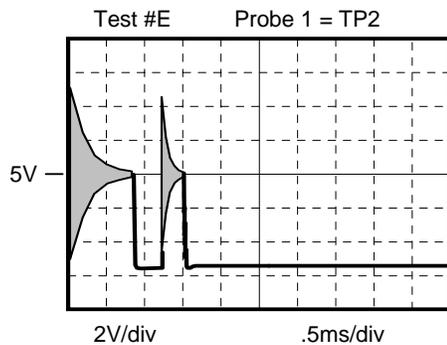
Section 4.4
Xeptor Maintenance Guide

> Xeptors are specifically designed so that its parts are relatively maintenance free... no worn out parts.... nothing to clean... under normal circumstances. However, when circumstances aren't normal, the below suggestions may help.

1. Check For Clean Optics

Xeptors use optics for diameter measurement, for reading the X-Mark code, and for detecting coin direction through the unit. The optical paths through the transparent enclosure normally will stay free of dirt and dust... unless some sticky residue from a spilled beverage dries on the coin chute surface and causes dust to stick and start to block the optics more and more over time. Generally, if it looks clean it is clean. If it looks dirty, use soapy water on a paper towel to clean the surface... but always make sure the cleaning fluid has **no ammonia**, or other chemicals that will attack the polycarbonate housing.

2. Check Diameter Spacers

Normally diameter spacers are well fastened in place by glue or screws. During the course of normal operation, it is not uncommon for some service personnel to jam screwdrivers and other tools down the coin chute rather than use the built-in coin release capability... sometimes resulting in damage or degradation as the fishing trip with their tool continues. If the diameter spacers should become loose, broken, or fall of for any reason, coin acceptance will suffer. Replace and/or re-fasten any that are not installed and fastened as expected.

3. Check Opening Return

Normally a spring holds the plastic electronics enclosure tight to the metal frame, forming a defined thickness coin chute between them. When the unit is programmed to accept specific coins, the coin chute thickness significantly affects the metal alloy readings, and thus must be maintained for normal operation of the Xeptor. However, there are a few things that can cause the electronics enclosure to not seat tightly against the metal frame. To determine if there may be a problem, take note if there is a nice crisp closing feel and sound as the coin chute is closed, or a kind of mushy close. The mushy close can be caused by a.) a wire harness that is too tight and pulls against the plastic electronic enclosure, b.) the red gate relay wires becoming pinched between the metal frame and the plastic enclosure, c.) the hinge screw on top being too tight, or d.) someone having opened the unit too far and permanently stretching the return spring. In any case, a good crisp tight close is required to maintain consistent readings from the coins.

Section 5.1
Mechanical Dimensions

IDX, Inc.
400 W. Cedar St. El Dorado, AR 71730

Title	X-60 Mechanical Dimensions		Rev	0
Size	B	Number	X60-MECH.DXF	Drawn by	SMluds
Date	3/25/03			Sheet	1	of	1
Filename	X60-MECH.DXF				D

X-60 SERIES
X-Mark Xeptor

ACCEPT SIDE

REJECT SIDE

BODY WIDTH
CHUTE INSIDE EDGE
COIN CHUTE CENTER
0.19 CHUTE OUTSIDE EDGE

1.17
2.15
3.50

COIN PATH REFERENCE WALL

0.512
0.315
0.225
1.200
0.240

1.500
1.875
4.000

Section 5.2
Xeptor Comparison Chart

	Xeptor Model	Accept Path	Diameter Range	Clad Coin Alloy Sense	Optical Code Read	Diameter Accuracy	Coins Per Second
	X-10	Straight On Left Side	.65-1.47in / 16-37mm	---	X-Mark, SmartMark	.005" / .125mm	20
	X-20	Straight On Left Side	.65-1.10in / 16-28mm	Yes	---	.005" / .125mm	20
	X-22	Straight On Left Side	1.0-1.47in / 25-37mm	Yes	---	.006" / .15mm	16
	X-50	Cross Left To Right	1.34-1.97in / 34-50mm	---	X-Mark, SmartMark	.007" / .18mm	10
	X-60	Cross Left To Right	1.34-1.97in / 34-50mm	---	X-Mark, SmartMark	.007" / .18mm	10
	H-60	Cross Left To Right	1.34-1.97in / 34-50mm	Yes	X-Mark, H-Mark, SmartMark	.007" / .18mm	10
	X-70	Straight Right Side	1.34-1.97in / 34-50mm	---	X-Mark, SmartMark	.007" / .18mm	10

Xeptor Common Features

Physical Size	IDX coin acceptors have the industry standard 3.5" wide and 4.0" tall dimensions with three shoulder screw locations on each side. See dimensional drawings for details. Note that the X-50 and X-70 units have a separate electronics control module not shown above.
Electrical Interface	Each IDX coin acceptors has an 8 pin header which connects to one of many Personality Plugs which adapt it to all popular connector types used in the industry.
Coin Memory	IDX coin acceptors do not hold a physical sample coin, but rather learn and hold the electronic coin signature for as many as 6 different coins or tokens.
Center & Edge Metal	IDX coin acceptors have a unique coin centering coin chute and small metal alloy sensors which enable them to separately measure the alloy on the edge and center of bi-metal coins.
Credit Optics Option	All IDX coin acceptors can be optionally ordered with or without built in credit optics used to verify that the coin has passed the gate relay in the proper direction and speed.
Coin Programming	All IDX coin acceptors may be programmed by hand using a procedure for dropping sample coins through the unit. Xeptors with version 4.0 and later firmware can be programmed at the touch of a button using a hand held Coin Selector device.
Program Security	Our Electronic Security Key and X-Tracker software allow you to secure the programming of the unit once complete and track personnel whom have made changes to the programming.
Hinged Opening	The hinged opening door-like construction of all IDX coin acceptors allows for easy release of bent or shingled coins without the worry that someone will do damage with a screwdriver.
Built In Diagnostics	In order to quickly diagnose possible causes for operational trouble, one only needs to turn the built-in rotary switch and observe an LED to check the operation of each part of the unit.
Auto Tune Technology	Long term stability of acceptance is assured via firmware that automatically compensates for component age, temperature effects, and other physical configuration changes.

Notes For Selection Table Information

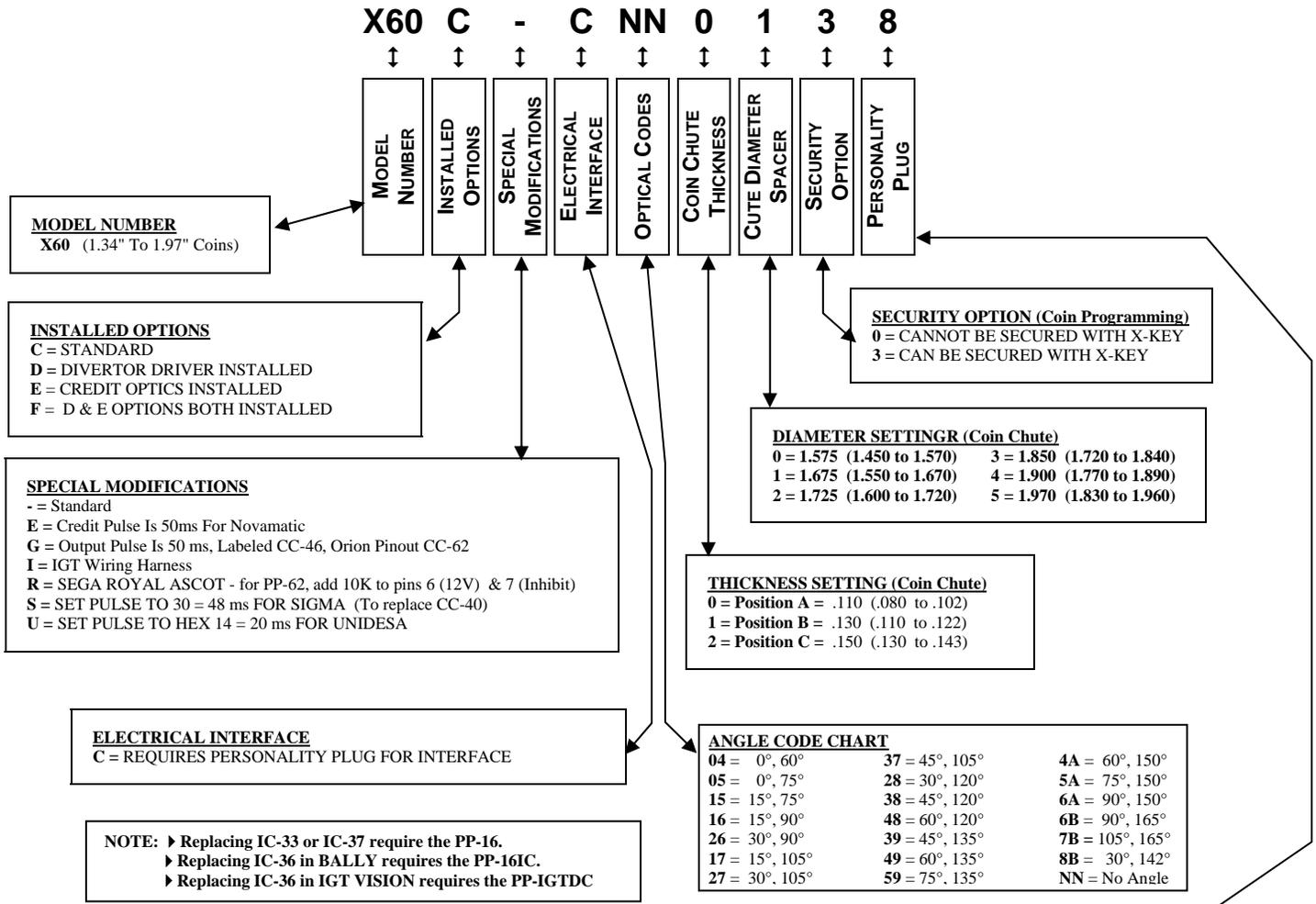|	
Clad Coin Alloy Sense	Clad coins have an inner alloy clad by a distinctly different outer alloy on some security tokens and some government issued currency. Some IDX Xeptors have advanced non-contact inductive sensing circuitry that can actually read the center layer separately from the outer layer.
Optical Codes Read	IDX holds patents covering the X-Mark and SmartMark "minted facet" technology and the new H-Mark "holographic facet" technology, each of which add security against cross play and counterfeiting. X-Mark and H-Mark tokens are produced under license by Osborne Coinage, and SmartMark tokens are produced under license by Roger Williams Mint.
Diameter Accuracy	The diameter accuracy quoted is based on the statistical standard deviation in the measurement of a large number of coins. (This pretty much means the average error.) The cut-off point for acceptance/rejection is typically approximately 3 times the standard deviation value in the table.
Coins Per Second	This is the rate for rejecting a bad coin among a stream of otherwise good coins. The rate for acceptance of a stream of 100% good coins is approximately 33% higher. The quoted rate is based on coins in the mid range of diameters the unit accepts. The rate is generally a bit higher for smaller coins and a bit lower for larger coins.

IDX, INC.
400 West Cedar Street
El Dorado, AR 71730
☎:800-643-1109 Fax:870-862-3472

How to Order X-60 Series Xeptors
Rev: 07/25/2003

X60 C - C NN 0 1 3 8

↕ ↕ ↕ ↕ ↕ ↕ ↕ ↕ ↕

| MODEL NUMBER | INSTALLED OPTIONS | SPECIAL MODIFICATIONS | ELECTRICAL INTERFACE | OPTICAL CODES | COIN CHUTE THICKNESS | CUTE DIAMETER SPACER | SECURITY OPTION | PERSONALITY PLUG |

MODEL NUMBER
  X60 (1.34" To 1.97" Coins)

INSTALLED OPTIONS
C = STANDARD
D = DIVERTOR DRIVER INSTALLED
E = CREDIT OPTICS INSTALLED
F = D & E OPTIONS BOTH INSTALLED

SPECIAL MODIFICATIONS
- = Standard
E = Credit Pulse Is 50ms For Novamatic
G = Output Pulse Is 50 ms, Labeled CC-46, Orion Pinout CC-62
I = IGT Wiring Harness
R = SEGA ROYAL ASCOT - for PP-62, add 10K to pins 6 (12V) & 7 (Inhibit)
S = SET PULSE TO 30 = 48 ms FOR SIGMA (To replace CC-40)
U = SET PULSE TO HEX 14 = 20 ms FOR UNIDESA

ELECTRICAL INTERFACE
C = REQUIRES PERSONALITY PLUG FOR INTERFACE

NOTE: ▸ **Replacing IC-33 or IC-37 require the PP-16.**
       ▸ **Replacing IC-36 in BALLY requires the PP-16IC.**
       ▸ **Replacing IC-36 in IGT VISION requires the PP-IGTDC**

SECURITY OPTION (Coin Programming)
0 = CANNOT BE SECURED WITH X-KEY
3 = CAN BE SECURED WITH X-KEY

DIAMETER SETTINGR (Coin Chute)
0 = 1.575 (1.450 to 1.570)   **3** = 1.850 (1.720 to 1.840)
1 = 1.675 (1.550 to 1.670)   **4** = 1.900 (1.770 to 1.890)
2 = 1.725 (1.600 to 1.720)   **5** = 1.970 (1.830 to 1.960)

THICKNESS SETTING (Coin Chute)
0 = Position A = .110 (.080 to .102)
1 = Position B = .130 (.110 to .122)
2 = Position C = .150 (.130 to .143)

ANGLE CODE CHART

04 = 0°, 60°	**37** = 45°, 105°	**4A** = 60°, 150°
05 = 0°, 75°	**28** = 30°, 120°	**5A** = 75°, 150°
15 = 15°, 75°	**38** = 45°, 120°	**6A** = 90°, 150°
16 = 15°, 90°	**48** = 60°, 120°	**6B** = 90°, 165°
26 = 30°, 90°	**39** = 45°, 135°	**7B** = 105°, 165°
17 = 15°, 105°	**49** = 60°, 135°	**8B** = 30°, 142°
27 = 30°, 105°	**59** = 75°, 135°	**NN** = No Angle

PERSONALITY PLUGS

CODE	MODEL	COMPATIBILITY	ALSO REQUIRES
N	NONE	XEPTOR REPLACEMENT WITHOUT PP	---
1	PP-62	RETROFIT FOR CC-62, IC-62, MC-62	CREDIT OPTICS, INHIBIT LOW (OR HI)
I	PP-62	RETROFIT FOR CC-62, IC-62, MC-62 – KOAMI & SEGA	CREDIT OPTICS, INHIBIT HI W/1N4148
2	PP-46	RETROFIT FOR CC-46	CREDIT OPTICS
3	PP-3337	RETROFIT FOR CC-33 & CC-37	
4	PP-40	RETROFIT FOR CC-40 & MC-40	CREDIT OPTICS
5	PP-16IC	RETROFIT FOR 12VDC CC-16, AND IC-36	INHIBIT HIGH FOR IC-36
6	PP-16	RETROFIT FOR CC-16, IC-33, IC-37 &* MC-16	
7	PP-UNI	SIMULATES CREDIT OPTICS ON UNIVERSAL SLOTS	CREDIT OPTICS
8	PP-IGTDC	IGT 12VDC SLOTS, RETROFIT FOR CC-32, CC-36	
9	PP-CDS	MODIFIED PP-40 FOR CDS	CREDIT OPTICS
A	PP-SIGMA	SIMULATES SIGMA CREDIT OPTICS SIGNALS	CREDIT OPTICS, TILTTIME=06
B	PP-NRI3	VIDEO LOTTERY, 3 OUTPUTS, 10 PIN IDC	SET BIT-0 SYSCONFIG
C	PP-NRI6	VIDEO LOTTERY, 6 OUTPUTS, 10 PIN IDC	SET BIT-0 SYSCONFIG
D	PP-ARIST	MODIFIED PP-62 FOR ARISTOCRAT	CREDIT OPTICS
R	PP-CWR	ONE SPST N.O. RELAY OUTPUT.	
M	PP-CWR	ONE SPST N.O. RELAY OUTPUT.	CREDIT OPTICS
U	PP-USB	UNIVERSAL SERIAL BUS – PC BASED INTERFACE	CREDIT OPTICS

Section 5.4
Company Information

IDX, Incorporated

400 West Cedar Street, El Dorado, AR 71730
Phone: 1-800-643-1109   FAX: 1-870-862-3472

Web Site: **www.idxinc.com**

Email: **sales@idxinc.com**

Company History

IDX was founded in 1987 by with the vision of bringing an optically encoded token and acceptor to market to eliminate counterfeiting and unwanted cross-play. IDX started its business with numerous products for the car wash market; including the model MA711 optically encoded token and quarter acceptor which utilized 0.984" injection molded polycarbonate prismatic facet tokens. For the first time, the car wash market had the ability to eliminate acceptance of tokens from other near by establishments.

In 1994, IDX formally ventured into the casino gaming market by meeting with major OEMs and casinos to determine the specific needs and wants of the industry. From these meetings and follow on design reviews with the same group, the model X-10 Xeptor and X-Mark token code were developed. IDX selected and exclusively licensed Osborne Coinage as a partner to mint and market the X-Mark tokens. The X-10 Xeptor was introduced in 1997. Since then the company as introduced many other coin acceptors and added numerous features related to security.

IDX is an aggressive privately held company without corporate molasses, focused on customer service before and after the sale. Product engineering uses modern computer aided design tools. IDX holds dominant US & foreign optical encoded token/acceptor patents, and has other patents pending. The X-10 and X-50 Xeptors are approved throughout North America by gaming boards and agencies, and in many foreign countries, and have become the standard coin acceptor for production by many important slot machine manufacturers. Our built-in-test software, established written quality standards, and specially designed test equipment for both the IDX Xeptors and the minted X-Mark tokens ensures a reliable system in the field, first time - every time, and is fundamentally what sets us apart from the competition.

US & Foreign Patents

U.S.#5,046,841   U.S.#6,021,882   U.S.#6,112,876   Japan #2,228,791   U.K.#8,929,131   U.K.#2,227,347   U.K.#9,905,044   GB 2,357,620

U.K.#2,335,297   German #4,000,197   Canada #1,313,806   Canada #2,265,244   Canada #2,323,844

Australia #4,788,290   Australia #619,639   Australia #1,952,499

--- Other Patents Pending ---