

X-20 Series X-Metal Xeptors®



Its Time To Stop Simply Comparing, And Actually Start Measuring Coins!

X-Metal Xeptors set new world-class performance standards in both acceptance security and acceptance rates. Advanced sensor design provides distinct and separate readings for both the edge and center alloys of bi-metal coins, such as the Canadian \$2 coin, and further provides distinctive readings for the clad and plated alloy layering of US, Canadian, and Euro coins. Fast-fed coins will never be a problem with these Xeptors. Lab tests show they can properly sense and credit a stream of US Nickels at rates over 25 coins per second, and can properly reject a bad coin among them at a rate of 20 coins per second. Precision diameter measurement totally eliminates the shaved coin acceptance problem. Our unique Personality Plug adapter modules flexibly allow one coin acceptor model to be plug-compatible with all prevalent newer and older machines. And, coin programming has never been easier... just push the button on a Coin Selector and download perfect coin signatures instantly.



Models X-20, X-21 & X-22 PRODUCT FEATURES

- Eliminates coin shaving by measuring coin diameter to +/- .005" typ.
- Reads and discriminates metal based on edge, center, and clad alloy composition.
- X-20 diameter range: 0.65" to 1.110" (16mm to 28mm), no adjustments.
- X-21 diameter range: 0.80" to 1.255" (20mm to 31mm), no adjustments.
- X-22 diameter range: 1.00" to 1.470" (25mm to 37mm), no adjustments.
- Distinguishes and accepts any of up to six different coins or tokens.
- Up to 20 coins per second of mixed acceptance/rejection.
- Built-in coin release with hinged door opening coin chute.
- Slide on water resistant access covers with no screws to lose.
- New coin types can be field programmed without extra equipment.
- 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 X-20, X-21 or X-22 Coin Selectors.
- Programming secured and tracked with optional X-Key and X-Tracker PC software.

X-Metal™ Technology Performs!

Its Time To Stop Simply Comparing Coins And Start Measuring Coins

Bi-Metal Coin Signature

The X-20 has unique small geometry metal sensor coils that measure the signature of the coin on both the edge and the center of the coin. The large, oblong and deep-seated coils of other acceptors haven't a real chance of separating the signatures of edge and center alloys.



Clad Coin Signature

The X-20 uses advanced multi-frequency sensing techniques to resolve separate layer signatures from clad or plated coins, such as the nickel clad copper construction of the US 50¢ in the picture. Most currency produced today for US, Canadian and the new Euro coins is clad or plated, and is a vital security feature.



Diameter Measurement

Precision optical diameter measurement with 0.005" resolution allows the X-20 to eliminate the shaved coin problem that plagues simple comparators and results in tricking hopper counters to overpay customers. The solution: Just Don't Accept Shaved Coins!



Triple Track™ Technology

Your best customer can insert 10 to 15 coins per second. With Triple Track Technology, the X-20 can measure, track, and properly credit as many as 3 coins simultaneously traveling down the coin chute, resulting in an unrivaled speed of over 20 coins per second. You can't beat that!



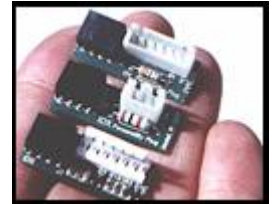
Sophisticated Credit Optics Logic

All IDX Xeptors optionally can be ordered with built-in credit optics. The X-20's sophisticated sequencing and timing logic combine information from the credit sensors and other internal sensors to provide a complete defense against stringing, soda straw tricks, and taped coins, based on coin speed, direction and path.



Personality Plugs™

Personality plugs adapt a single Xeptor model to any of many industry standard electrical interfaces. More than a dozen Personality Plug modules are available to ensure compatibility with machines requiring any of 24VAC, 24VDC, 12VDC, Tilt, Credit, Sense, and Inhibit signals... or custom..



Learn'n Run™ Or Download

Manually program the X-20 by pressing buttons and dropping coins, or just use a Coin Selector to download coin signatures at the touch of the button. The X-20 Coin Selector can optionally secure the Xeptor from manual programming if it is not present.



Spill Proof Construction

Xeptors are the only coin acceptors designed to shed spilled liquid. No exposed card edges, no gaping holes for wires and pots. We just keep all of that sticky conductive liquid out.



Full-Open Coin Release

Stop digging bent coins out of comparators with screwdrivers that just rip them up. Even those half-flap acceptors require the screwdriver treatment now and then. Only Xeptors are designed to fully open on your command.



Auto-Tune™ Technology

Mr. Xeptor never sleeps on the job. When no coins are coming through, he is busy re-calibrating the nine optical sensors and two inductive sensors. He also tracks long term coin data averages so acceptance windows for coins stay centered and perfectly tuned.



X-20 Series

Installation & Operation Manual

Rev-5 12/20/2004

Table of Contents

1. Installation

- 1.1. Five Simple Steps To Success
- 1.2. Alignment And Brackets
- 1.3. Diameter And Thickness
- 1.4. Electrical Interface - Personality Plugs

2. Operation

- 2.1. Coin Learn Procedure
- 2.2. Unwanted Shadow Coin
- 2.3. Serial Port Interface
 - 2.3.1. The Serial Port Connection
 - 2.3.2. ASCII Hex Protocol Specification
 - 2.3.3. Coin Data Auto Reporting
 - 2.3.4. Report Examples And Explanations
 - 2.3.5. System Configuration Details
 - 2.3.6. Serial Port Command Examples

3. Accessories & Options

- 3.1. Credit Optics Option
- 3.2. Diverter Driver Option
- 3.3. X-Key, Electronic Security Key
- 3.4. X-Tracker, X-Key Management Software
- 3.5. Coin Selector, Programming Tool
- 3.6. The Xaminer, Pocket PC Diagnostic Tool

4. Troubleshooting

- 4.1. Troubleshooting Guide
- 4.2. Field Test Procedure
- 4.3. Bench Test Procedure
- 4.4. Xeptor Maintenance Guide

5. Appendix

- 5.1. Mechanical Dimensions
- 5.2. Xeptor Comparison Chart
- 5.3. How to Order An X-20
- 5.4. Company Information

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/x20.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

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 no possibility of catching a coin edge due to front/back alignment problems, and with no significant right/left jog at entry or exit. 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-20 covers .65" to 1.11" (16.5mm to 28mm), the X-21 covers .80" to 1.255" (20mm to 31mm), and the model X-22 covers 1.02" to 1.47" (26mm to 37mm) coins. In order that the smaller coins are properly centered for the sensors, the X-20 series has factory installed coin chute rails to restrict the horizontal movement of the coin. Coins smaller than the specified range may be accepted, but possibly at the expense of some reliability. Conversely, coins larger than the specified range will not fit through the coin chute and will cause coin jams. Look at the model number label on the top of the Xeptor to determine which one you have.

Step 3. Coin Chute Thickness

If the coin chute thickness is not enough, coins may hang up and jam. Conversely, if the chute 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-20 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. 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 wholesale changes in the alloy or a coin, for example, 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 from 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. Some of them are listed below for your reference.

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. To verify there is not problem in the accept path, you can use a wad of paper to hold the accept gate open.

The Right Bracket And Coin-Head May Help

The information below may help you obtain the right hardware when retrofitting an Xeptor into machine.

IGT S+ & PE+ Upright \$1 (1.465" x .100") Machines

These machines were produced with the reverse mount CC-33 Coin Mechanism acceptors. To convert to straight the drop X-20 you will need to order kit #59924133 (it includes small coin base #63317500, entry head #59923484, nut-lock #42101590, and screw cap #41460092.) There may be alignment issues with some older S+ machines, additionally requiring small coin chassis #14321800.

IGT S-2000 Upright, VSNIB (960) \$1 (1.465" x .100") Machines

Same as above, except the coin head should be #59947040

IGT Slant Top \$1 & \$2 Machines

These machines were produced with the reverse mount CC-33 Coin Mechanism acceptors. The bracket used for converting slant top machines to \$1.00 or \$2.00 tokens X-20 is IGT Part # 57816004, which consists of modified base IGT Part # 63316600 and coin head IGT Part # 59919700.

IGT Slant Top Machines Under \$1

The bracket used to correct the misalignment problem with the coin head for IGT Slant Top Machine under \$1 denomination using the X-20 is IGT Part # 63317400; Qty 1: 65377500 Mounting Plate; Qty 2 needed: 44991500 Alignment Pins; Qty 2 needed: 8/32 Nuts.

IGT Slant Top Small Coin Machines

IGT Part # 63317600-New base and bracket for all small coins.

IGT Models #: S+; PE Upright Small Coin Machines

IGT Part # 63317500-Complete base and bracket for all small coins for IDX.

WMS GAMING

For a Model 400/401/40S5 Upright Reel Slot Machine the IDX Xeptor requires the use of an IDX Top Coin Entry Alignment Plate Part Number: 01-13676-18.

For a Model 550 Upright Video Slot Machine the IDX Xeptor requires the use of an IDX Top Coin Entry Alignment Plate Part Number: 01-002738-17.

For a Model 35S/360/35S1/3601 Slant Top Slot or Video Machine the IDX Xeptor requires the use of the following Top Coin Entry Front Pieces:

<u>TOKEN</u>	<u>WMS P/N</u>
\$0.05 U.S. Small Token	21-004272-20ZZZ
\$0.25 U.S. Token	21-004274-21ZZZ
\$0.50 U.S. Token	21-004274-22ZZZ
\$1.00 U.S. Token	21-004274-23ZZZ
\$0.10 U.S. Token	21-004274-24ZZZ
\$1.00 OLC Token	21-004274-25ZZZ
\$0.50 OLC Token	21-004274-35ZZZ

ZZZ is replaced by the appropriate plating finish suffix per WMS Gaming plating specifications.

Section 1.3

Diameter & Thickness



You Can't Measure A Floppy Fish.

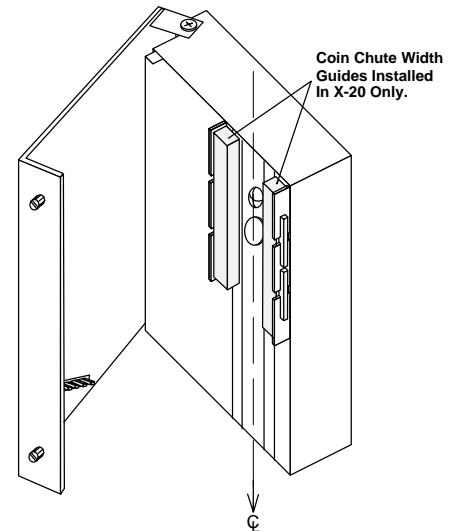


To make a decent measurement of either a fish or a coin, we have to get reasonably close to it and get its position reasonably under control. That means we must control the coin's position in the coin chute if we are to be successful in measuring its diameter and metal alloy content with the X-20's sensors.

Diameter Considerations

The X-20 Series sensor configuration covers the .65" to 1.47" diameter range in just two models; the X-20 for smaller coins, and the X-22 for larger coins. The X-21 optionally just covers the mid range. To ensure that the smaller coins are properly centered for the sensors, the X-20 has factory installed coin chute rails to restrict the horizontal movement of the coin. Very small coins may be accepted by the X-22, but with poor reliability. Large coins, over 1.11" in diameter will not fit through the X-20 and will cause coin jams. Look at the model number label on the top edge of the Xeptor to determine which one you have.

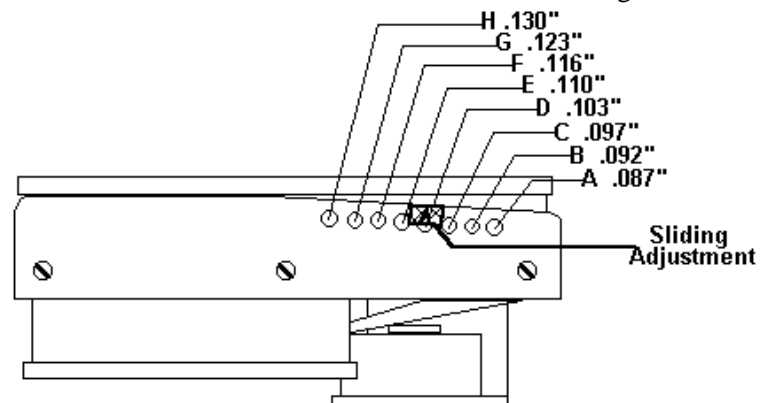
- X-20 Range: 0.65" to 1.110" (16.5mm to 28mm)
- X-21 Range: 0.80" to 1.255" (20mm to 31mm)
- X-22 Range: 1.02" to 1.470" (26mm to 37mm)



Note: An X-20, X-21, and X-22 differ only in the range of coin diameters they can measure, all other properties are identical. Thus, if one orders an X-20 with coin chute diameter spacer #0, or #2, it is equivalent to having ordered an X-22 or X-21 respectively. For ease in field identification, X-20, X-21, and X-22 labels will be used.

Thickness Setup

The X-20 side view figure to the lower right shows a series of eight holes and a sliding adjustment with a detent that centers itself over one of the selected holes. The dimension referred to for each of the eight holes is the chute thickness achieved at that position. A good rule of thumb to use in setting the adjustment is to have .010" to .020" more than the thickest coin in the intended coin set. If you go under .010", you risk the possibility that a coin that is bent, has a bur, or has something sticky on it will jam in the coin chute. If you go over .020" then you are starting to sacrifice the accuracy which the metal alloy can be discriminated. For example, the thickest US coin (excluding the 50¢ coin) is .079". Position B will provide .013" tolerance for this coin, and more for other thinner US coins. The table on the following page show IDX recommendations for a variety of coins.



1. Select the proper thickness for your coin size from tables below.
2. Move the sliding adjustment to adjust the coin chute thickness.
3. A bent tip needle nose pliers may be helpful in the adjustment.

EXAMPLE THICKNESS SETTING

Coin Type	Xeptor	Setting
U.S. Coins	X-20	B
Canadian Coins	X-20	B
Euro Coins	X-20	D
Small Tokens	X-20	B
Large Tokens	X-22	F

Thickness Setup & Coin Signature Downloading

The Coin Selector hand-held coin programming units are described later in Section 3.5 of this manual. When using Coin Selectors, or other IDX products that download Coin Signatures to Xeptors, special care must be taken with regard to the relationship between thickness setup and calibration of the X-20 Xeptors. In the factory, we must calibrate each X-20 Series Xeptor with standard reference coins that provide it sufficient information with which to adjust standard Coin Signature data for use in the Xeptor. This must be done because of slight component variations from unit-to-unit, and because the thickness adjustment may be different, thus causing the metal alloy sensors to read the coin slightly different from the Xeptor used to generate the Coin Signatures.

For all of the above reasons the following very important rule applies: In order to successfully use an IDX Coin Selector (or other Coin Signature downloading products), one must have the Xeptor coin chute thickness setup the same as when the Xeptor was calibrated in the factory before shipment. Changes to the thickness setup may reduce the acceptance reliability or cause total rejection altogether. Please note, however, that if you manually program coins into the Xeptor, the factory calibration is irrelevant as it is not required as part of the manual coin learn process.

Starting in year 2005, the factory started placing a mark adjacent to the sliding adjustment to indicate the location of the thickness adjustment when the Xeptor was calibrated so that you can be sure it is in the expected location so as to achieve successful download and use of coin signatures. Should you require a change in the thickness setting for calibration of some Xeptors, please contact technical support at the factory.

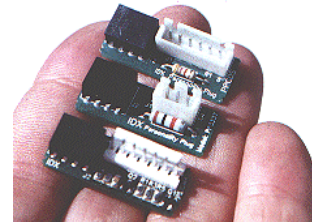
Section 1.4

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 Model:	PPNRI-6	PPNRI-3	PIPIGTDC	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	PP161C	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 come 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.

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, use an appropriate Coin Selector, 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 using the “P” command to the appropriate value for the machine 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



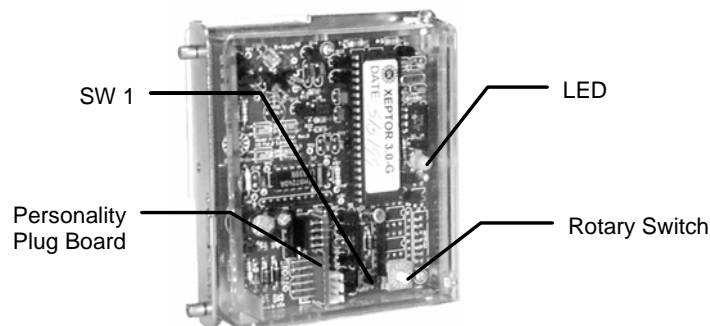
Note: If the rotary switch SW2 is in position 0 (Run Mode) and the LED is green with very short red flashes about 3 times per second, the Xeptor is secured from hand programming unless an X-Key or Coin Selector is plugged in.

COIN LEARN PROCEDURE

1. Slide the front cover up and identify the three controls to be used in this procedure:
 - The push button SW1 near center bottom. (Used to input the number of credit pulses)
 - 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)
 - LED indicator half way up on the right side. (Green in RUN mode, red in LEARN mode)
2. Turn the rotary switch to one of the LEARN positions #1-#6 (for example, pick #3 for learning the 3rd coin type) and observe the LED turns red to indicate it is now ready to learn.
3. Push the test button once for each Credit (and Sense) pulse you wish to have issued for this coin. Generally slot machines utilize only as single Credit pulse. However, when using the PPNRI-3 or the PPNRI-6 multi-output personality plugs (along with setting bit 1 of SysConfig), then the output channel is specified by the number times the button is pressed.
4. Slide the cover back on the unit to make sure outside light is does not interfere with the sensors.
5. 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. Be aware that in some cases, such as with Canadian nickels and quarters, the government has made wholesale changes in the alloys, and although the coins of different alloys may look alike, their signatures are quite distinct and they need to be learned as separate coins.
6. 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.
7. Slide the front cover open again and 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.
8. Slide the front cover back down and you should now be able to accept the new coin.

COIN UN-LEARN PROCEDURE

1. Slide the front cover up and turn the rotary switch to the coin # position you wish to UN-LEARN.
2. Push the test button 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. Slide the front cover back down.



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.

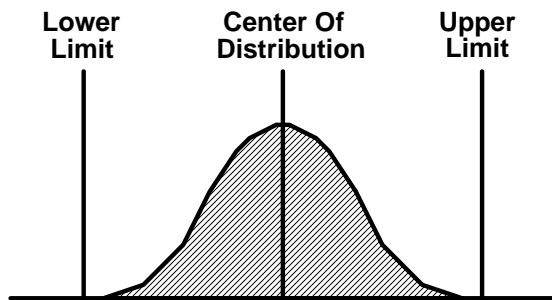


Figure 1. Distribution of parameter readings and typical limits of acceptance.

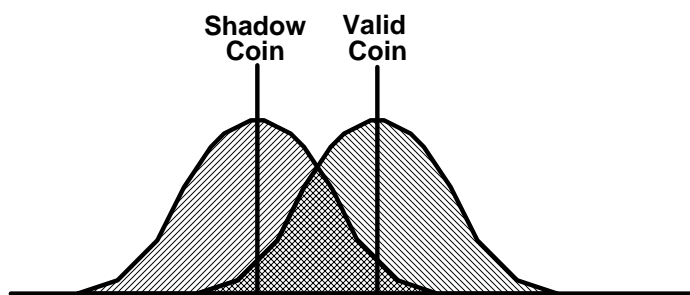


Figure 2. Unwanted Coin in the Shadow of a Valid Coin showing overlap of parameter distribution.

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 an X-20 Series 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 LEARN procedure as usual (turn switch to coin memory #, push button SW1, drop 6 sample coins) with the exception that to identify the coin as an Unwanted Shadow Coin, you must press the button 13 times (13 ⇒ bad). Any of the X-20'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% (same as setting Bit-6 of SysConfig)

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

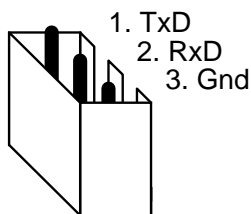
ProComm for Windows is available from Symantec at <http://www.symantec.com/procomm/>. **HyperTerminal** comes as part of the Windows operating system. It is normally found in Start-Programs-Accessories-Communications, but you may have to load that as part of your Windows System if it is not already present 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.



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 V4.0 firmware. Previously V3.0 firmware required one to enter “HH” to first leave binary mode. V4.1 firmware may also require the “HH” command if it has been configured to communicate with host machines.
- 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	uC Memory	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(d₀): 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 diameter size.
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.

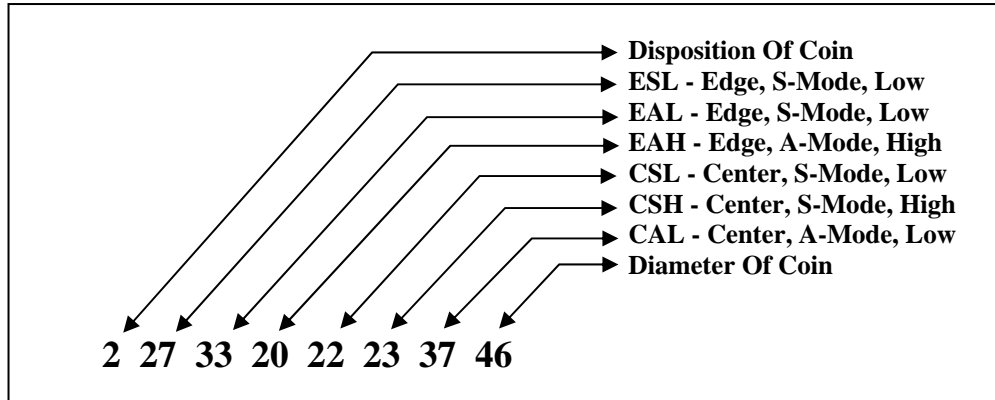
Note: The default factory setting for SysConfig is 0C or OD depending on Credit Sensor installation.

V(r₀ to r₆): 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-22, 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 8 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-20 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-20 is $D = 0.750 + 0.0021 \times \text{Diameter Reading}$, and for the X-22 is $D = 0.830 + 0.00256 \times \text{Diameter Reading}$.

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. 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-20 V4.0 ID#:CD87
Coin Memory: 01 02 03 04 05 06
Coin Value : 01 01 0D 00 08 00
Metal-ESL:   35 32 1B 00 22 00
Metal-EAL:   3B 36 1E 00 23 00
Metal-EAH:   34 2E 23 00 23 00
Metal-CSL:   3C 38 1D 00 2A 00
Metal-CSH:   35 2F 21 00 28 00
Metal-CAL:   3B 36 1F 00 2B 00
Diameter:    66 93 8F 00 B2 00
Tolerances:  00 10 00 80 00 80
-----
DiaOp: 05 08 05 07 CrOp: 00 00
Tank Cal: 40 Now: 40 4A 3C 40
Sys Cnfg: 08 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 example of the Auto-Reporting the X-20 does each time a coin is deposited. Descriptions of features that are important to understand are indicated to the right.

1	35	3B	35	3C	35	3B	65	← Coins matching Coin Memory #1 and Coin Memory #2 have been accepted.
1	36	3B	36	3C	35	3B	65	
2	32	36	2E	38	2E	36	95	← The coin best matched the Unwanted coin and was rejected.
2	32	36	2E	38	2F	36	90	
U	1B	1F	23	1D	21	1F	8F	← Rejected on the basis of Metal.
U	1B	1F	23	1D	21	1F	8D	
M	1D	21	24	1F	21	20	62	← Rejected on basis of Diameter
M	1E	21	24	1E	21	20	61	
D	37	3D	37	3C	37	3D-16	← The Xeptor was Inhibited when this coin was deposited.	
D	36	3D	37	3A	36	3C-1E		
I	00	00	00	00	00	00	00	← The X-20 first detected a Slow or Strung coin, then a Reverse direction coin.
2	32	36	2E	38	2F	36	93	
1	36	3C	36	3C	35	3B	67	
2	32	36	2E	38	30	36	91	
1	36	3B	35	3C	35	3B	67	
S	00	00	00	00	00	00	00	
R	00	00	00	00	00	00	00	
2	32	36	2E	38	2F	36	92	
1	36	3B	35	3C	35	3B	6B	

The "L" **List Active Coins** command will produce a report something like the one shown in the box below. Coin Memory #1 and #5 have specific identification which comes from having been programmed by the X-20 Coin Selector. The currency designator is per ISO 4217 Currency Symbols. The Thick-B means that the coin signature downloaded is intended for use with the X-20 in coin chute thickness setting B. 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)	Output-1	USD 0.25	Rev-0
2)	Output-1	Learn 1.049"	
3)	Unwanted	Learn 1.039"	
4)	Memory	Empty	
5)	Output-8	EUR 2.00	Rev-1
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-20 V4.0 ID#:CD87
BuildID: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/Coin	1 = Limit output pulse count to 1, limit coin signature to one diameter size.
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.

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 output ia an exclusive "1 of N" style. The PPNRI-3 outputs a 3-bit binary code. 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. During a Tilt condition, if TiltTime is set to FF, then output code 7 (all three binary bits) will be issued repetitively until the condition is cleared and TiltTime will default to value 04. (prior to V4.0e code 7 was always output for Tilt.)

Bit-2 One Pulse/Coin

To help eliminate various manual coin learning problems, when this bit is set, one cannot accidentally program a coin for putting out more than one Sense or Credit pulse per coin, and when a new coin is manually learned, any other coin signature in memory having a different coin diameter is erased.

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-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-20 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 "Pccdddt" command is used to change the output credit pulse width (cc), the diverter output option delay and pulse width (ddd) 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 ⇒ 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 the old days, the coin acceptor was a device that simply validated the coin, and the machine OEM installed their own Credit Optics (or Coin In Optics) modules beneath the coin acceptor for verification of direction and count of coins. With the advance from mechanical to electronic coin comparators, the electronics produced a SENSE pulse to indicate that it had validated the coin. The SENSE signal was then used to trigger a time limited window in which the OEM Credit Optics would be enabled to verify direction and count of the coin. The sophistication of coin acceptors has continued to advance, now bringing the Credit Optics function into the coin acceptor. A well implemented Credit Optics function integrated into the coin acceptor will provide the lowest installed cost of this function along with the optimum of sequence and timing logic to detect stringing, coins on a stick, reverse coins and other fraudulent activity.

Recognizing The X-20 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 as installed and functional by the X-20. 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-20 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-20 can successfully track, separate, and credit coins at over 20 coins per second.

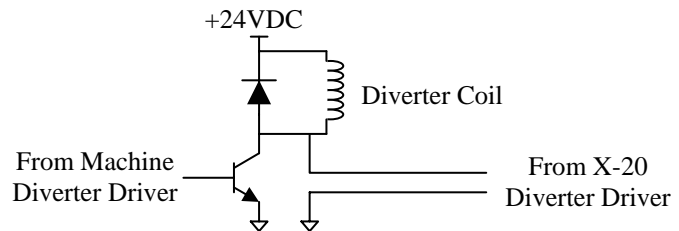
Section 3.2

Diverter Driver Option



General Description

The X-20 can be ordered with a built-in Diverter Driver 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. In typical use, the Diverter Driver works in tandem with existing controls for the "hopper full" diverter as shown to the right.



Example Circuit For Simultaneous Control of Diverter Coil.

Diverter Driver Features

- Optically coupled AC/DC circuit drives source or sink, AC or DC diverter coils.
- Output switching device is rated at 400mA, 60V, AC/DC.
- Output is snubber protected from inductive load fly back spikes.
- Direct plug connection to Xeptor J3
- Two-wire connection into diverter solenoid circuit. (see specific installation notes that apply)
- Diagnostic green LED indicator shows when Xeptor activates Diverter Driver.

Operation Notes

- There are 6 Coin Memories in an Xeptor. Xeptors are pre-configured at the factory to activate the diverter if the coin matches the coin signature data in Coin Memory 4, 5 or 6, but not in Coin Memory 1, 2 or 3. If it is important for this configuration to be different, please contact the factory
- When a coin is accepted, there are two timers that take effect if the coin is to be diverted; Divert Delay, and Divert Pulse. After the coin has been validated (about mid way through the Xeptor), the Xeptor waits for Divert Delay milliseconds before turning on the Diverter Driver, and then keeps it on for Divert Pulse milliseconds. The factory preset values are 10Hex (16)ms for Divert Delay, and 80Hex (128)ms for Divert Pulse. You may change these using the "P" command in the Serial Port Protocol, or you may special order them from the factory preset to other values of your choice.
- In the case of a closely following coin, these values may be altered to suit the best compromise to ensure both the leading and trailing coins can be properly handled.
- 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.
- Contact IDX Engineering for additional technical information you may need.

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

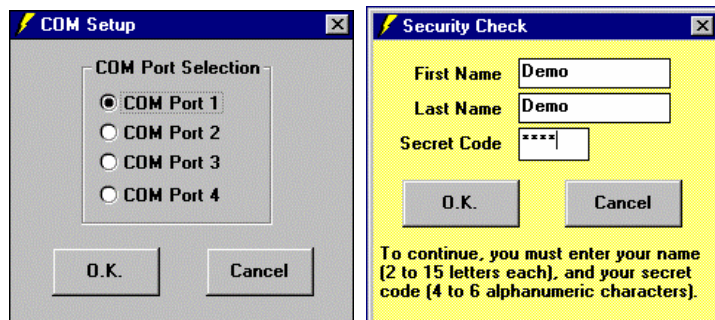
Use Windows Explorer to find the file called SETUP.EXE on the installation disk. Double-click it to start it. The SETUP program will create a new folder called XTracker and copy the files from the installation disk to your computer. Right click on the XTracker icon in the folder and follow the menu to 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.



Section 3.5

Coin Selector, Programming Tool



Coin Programming Just Got Simpler!

How Simple?

1. Plug the Coin Selector into an IDX Xeptor.
2. Press the button for the coin to accept.
3. Unplug the Coin Selector and off you go!

General Description

Coin Selectors allow you to change the acceptance parameters in a coin acceptor at the press of a button. Coin programming has never been simpler. Thanks to innovative patent pending mathematical transformations that take place between the Coin Selector and the Xeptor, the new coin signature is downloaded and adjusted for minor component variations in the particular Xeptor resulting in user simplicity without compromising acceptance security, first time or any time. Because the data is transformed to the exact needs of the specific Xeptor this transformation technology is called **XactData**.



Coin Selectors were designed to save time and reduce errors in programming large numbers of Xeptors without sacrificing either acceptance or security performance. They will never become obsolete because in addition to being able to download updated coin signature profiles to the Coin Selectors, the **Copy&Clone** technology lets you manually program one Xeptor in any way that they like, push a button to copy it into the Coin Selector, then using it to clone other coin acceptors also at the push of a button. Coin programming has never been so simple!

What Advantages?

- **Save Time:** The press of a single button is much faster than passing numerous coins through a coin acceptor in a manual procedure to change its acceptance parameters, and particularly results in significant time savings when large numbers of coin acceptors must be changed.
- **No Errors:** The Coin Selector downloads a perfect set of coin signature data every time, eliminating the possibility of any manual programming error related to having the correct coin(s), pulses, or techniques.
- **Better Accuracy:** The IDX coin signature database is produced using a broad range of sample coins to ensure proper centering and width of the acceptance windows for each parameter so that inaccuracies from using a non-representative sample set of coins are eliminated. **XactData** technology then ensures proper adjustment for each Xeptor.
- **Complete Profile:** Many coins have multiple personalities, such as the Canadian nickel with three radical changes to its alloy compositions in the past 25 years. Still, a single Coin Selector button allows you to download all three signatures without the need to find representative samples of each for hand programming.

- **Copy&Clone™:** When you want to program an Xeptor for a coin signature not provided by one of the buttons on the Coin Selector, this handy feature allows you to copy the coin signature data from a manually programmed Xeptor, and then clone as many other Xeptors as you like to operate with the same **XactData**.
- **Highest Security: XactData** technology assures tight acceptance windows immediately after downloading coin signature data from a Coin Selector. The Coin Selector also deletes all other coin signatures previously programmed into the Xeptor coin memory.
- **Coin Selector Setup Utility:** IDX Coin Selectors will never go out of date. You can update them in the field with the Coin Selector Setup button configuration utility. You can not only download updated coin signatures from the web when your country changes its currency again, but you can also change the function of the buttons should you have reason. Download it from our Web site.

How Secure?

- Coin Signatures data for standard coins is controlled by IDX.
- Secured Xeptors may not be hand programmed without a connected Coin Selector.
- Button-programming any coin automatically deletes all coin signatures previously in the Xeptor Coin Memory to ensure it accepts only what is defined by the pressed button.
- When a Coin Selector is connected to an Xeptor, the Xeptor receives and saves in Xeptor memory the Coin Selector ID No., the ID of the authorized person/company and Time and Date the Coin Selector was enabled for later possible examination.
- An encrypted handshake is required to enable an Xeptor for coin signature download.
- For additional security, the Copy and Clone functions may be individually disabled.

End User Coin Selector Models

Button Number	<u>CS20x-USA1</u>	<u>CS20x-CAN1</u>	<u>CS20x-CAN2</u>	<u>CS20x-EUR1</u>	<u>CS22x-USA1</u>	<u>CS22x-CAN1</u>
1	6 Coins	6 Coins	Add \$2 Can, #3	6 Coins	6 Coins	6 Coins
2	Config	Config	Add \$1 Can, #2	Config	Config	Config
3	Xeptor	Xeptor	Add 25¢ Can, #1	Xeptor	Xeptor	Xeptor
4	Token #1	Token #1	Clear Coin Mem.	Token #1	\$2 Token	\$5 Token
5	Token #2	Token #2	Note: This will produce multi-denomination Xeptors with 3 outputs requiring Personality Plug PPNRI-3, PP46 or PP62 for proper output interface.	Token #2	\$1 Token	\$2 Token
6	Token #3	Can \$2		Token #3	50¢ Token	\$1 Token
7	Clear	Can \$1		Eur €2	US 50¢	50¢ Token
8	US \$1	Can 50¢		Eur €1	1.340" T6	1.340" T6
9	US 25¢	Can 25¢		Eur 50¢	1.340" T2	1.340" T2
10	US 10¢	Can 10¢		Eur 20¢	1.465" NS	1.465" NS
11	US 5¢	Can 5¢		Eur 10¢	1.465" T6	1.465" T6
12	US 1¢	Can 1¢		Eur 5¢	1.465" T2	1.465" T2

Note: Visit our Web site Coin Selector page for information on other standard coin selector models and the Coin Selector Button Configuration Utility for customizing your Coin Selector.

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 → SW2 = 0	
LED Color	What To Check For
Black - Off	<p>There is no power to the Xeptor.</p> <ul style="list-style-type: none"> • Check cable and connectors are not at fault. • Check controls that may switch power off when access door is open.
Solid Green, Or Green With Very Short Red Flashes	<p>Green LED indicates the Xeptor knows of no problem it can detect. The short red flashes indicate it is secured from hand programming.</p> <ul style="list-style-type: none"> • 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	<p>The Xeptor thinks that some critical function has a problem.</p> <ul style="list-style-type: none"> • 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	<p>The Xeptor is inhibited.</p> <ul style="list-style-type: none"> • Some machines inhibit the acceptor when the door is open. • Check INHIBIT at the connector on the Personality Plug with a voltmeter. • Connect to HyperTerminal; check SysConfig for proper Inhibit setting. • Connect to HyperTerminal, check TiltTime for > C0 Hex which latches self inhibit.
Red - Solid	<p>The rotary switch SW2 is probably not in "run" position 0. It is probably in 1 to 6.</p>

During Coin Learn Operation → SW2 = 1-6	
LED Color	What To Check For
Red Or Orange	<p>Normal color at the start of, or during, the Coin Learn Procedure.</p> <ul style="list-style-type: none"> • Red indicates there is no prior coin in the selected Coin Memory location. • Orange indicates there is a prior coin in the selected Coin Memory Location.
Yellow Flash	<p>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 position 0 (Run) you should also see a short red flash in the otherwise green LED.</p>
Green Flash	<p>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.</p>
Red / Green Alternating	<p>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.</p>



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 chute is required, or that the flat cable going to the small rear sensor housing has been unplugged.

No Function (rotary switch #9, #A)

On other Xeptor models these switch positions test the X-Mark optics. The X-20 does not read optical codes and so indicates the flashing amber color to mean function not available.

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. A red color indicates that memory is corrupted. It may be possible to correct this by re-learning the coins. It may also be that a new processor chip was put in that 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

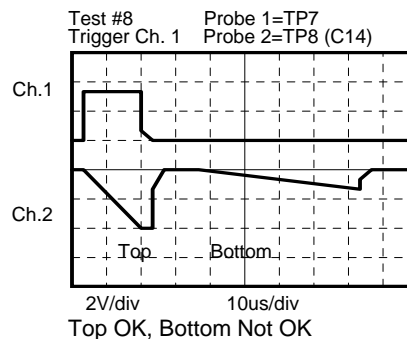
On power up reset, the Model X-20 Xeptor performs a series of self tests. If it passes all tests, the indicator LED turns green and normal operation commences. If any of the self tests failed, the indicator LED repetitively flashes red/green. If the Xeptor is 'Inhibited' the LED will flash amber. The X-20 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-20 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, the failure may likely have been caused by 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. This should repair the EEPROM checksum and this test should hopefully then pass. 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 there are no credit sensors installed, the LED will flash amber to warn that this function is not available. When 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.

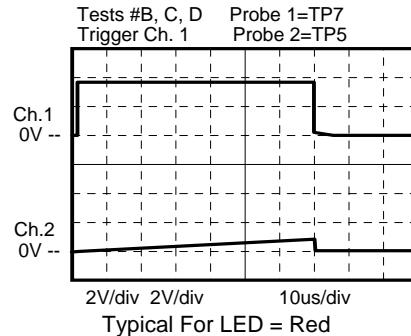
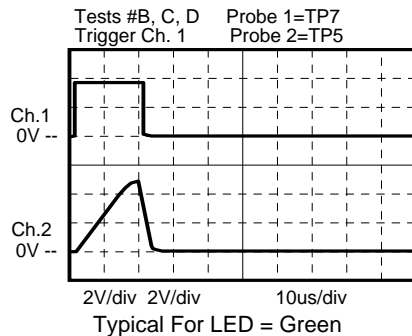


TEST #9, AND #A: NONE:

Test #9 and #A perform no task and only causes the LED indicator to flash amber indicating there is not test function available in this position.

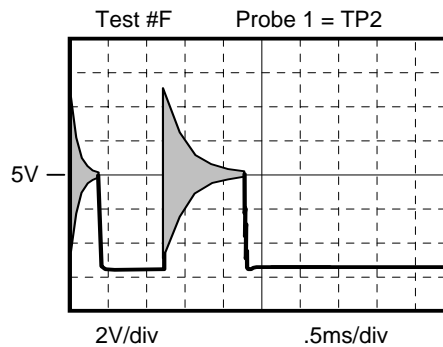
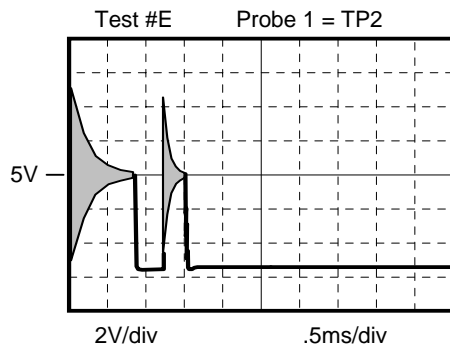
TESTS #B, #C, AND #D: DIAMETER OPTICS TEST

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 #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.



Section 4.4

Xeptor Maintenance Guide



The Xeptor 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

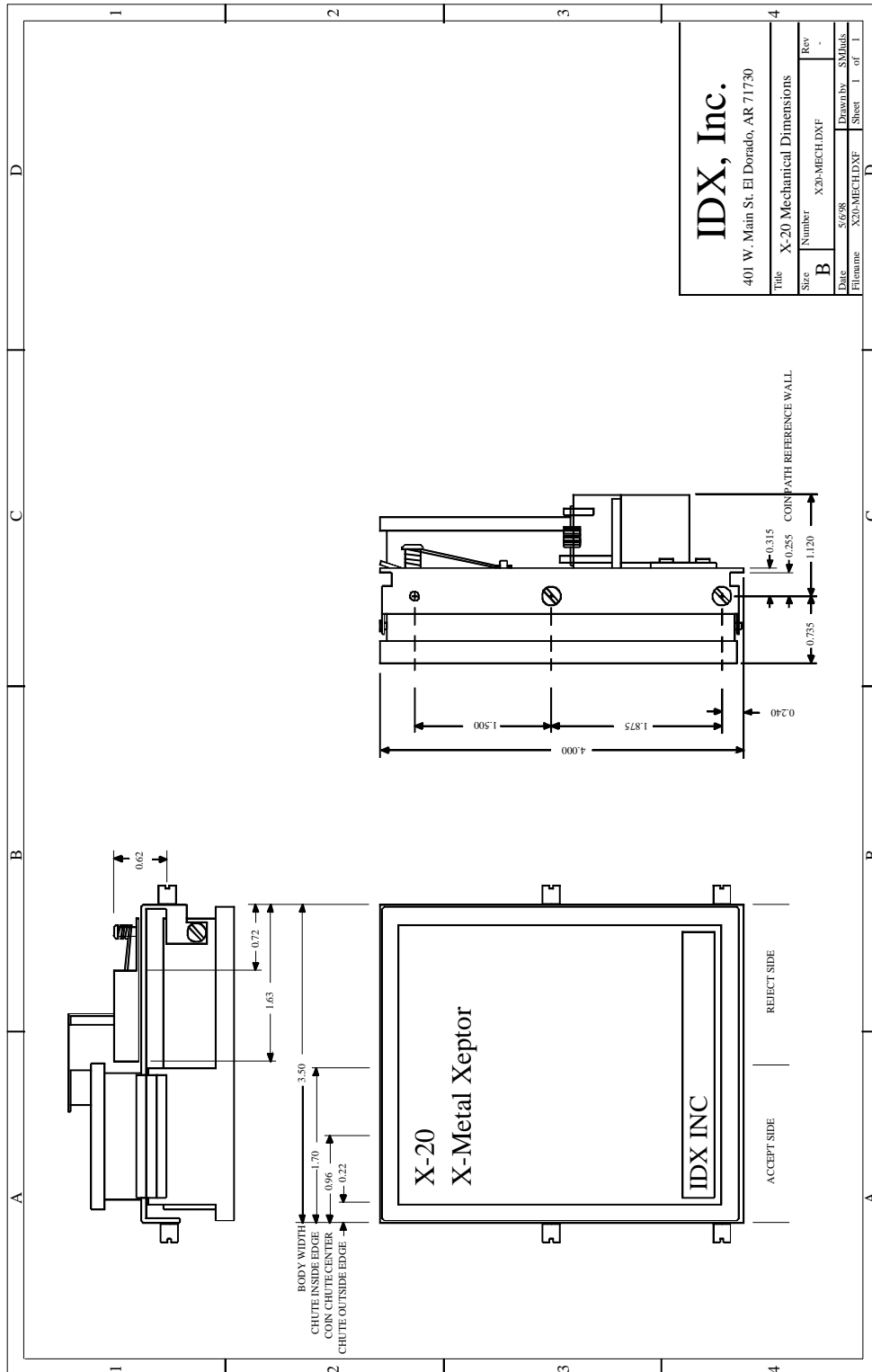
Normally diameter spacers are well fastened in place by glue or screws. During the course of normal operation, it is not uncommon for some service personnel to jam screwdrivers and other tools down the coin chute rather than use the built-in coin release capability... sometimes resulting in damage or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



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	---	X-Mark, SmartMark	.005"	16
			16-37mm			.125mm	
	X-20	Straight On Left Side	.65-1.11in	Yes	---	.005"	20
			16-28mm			.125mm	
	X-21	Straight On Left Side	.80-1.25in	Yes	---	.006"	18
			20-31mm			.15mm	
	X-22	Straight On Left Side	1.0-1.47in	Yes	---	.006"	16
			25-37mm			.15mm	
	X-50	Cross Left To Right	1.3-1.95in	---	X-Mark, SmartMark	.007"	10
			34-49mm			.18mm	
	X-60	Cross Left To Right	1.3-1.95in	---	X-Mark, SmartMark	.007"	10
			34-49mm			.18mm	
	H-60	Cross Left To Right	1.3-1.95in	Yes	X-Mark, H-Mark, SmartMark	.007"	10
			34-49mm			.18mm	
	X-70	Straight Right Side	1.3-1.95in	---	X-Mark, SmartMark	.007"	10
			34-49mm			.18mm	

Xepton 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.

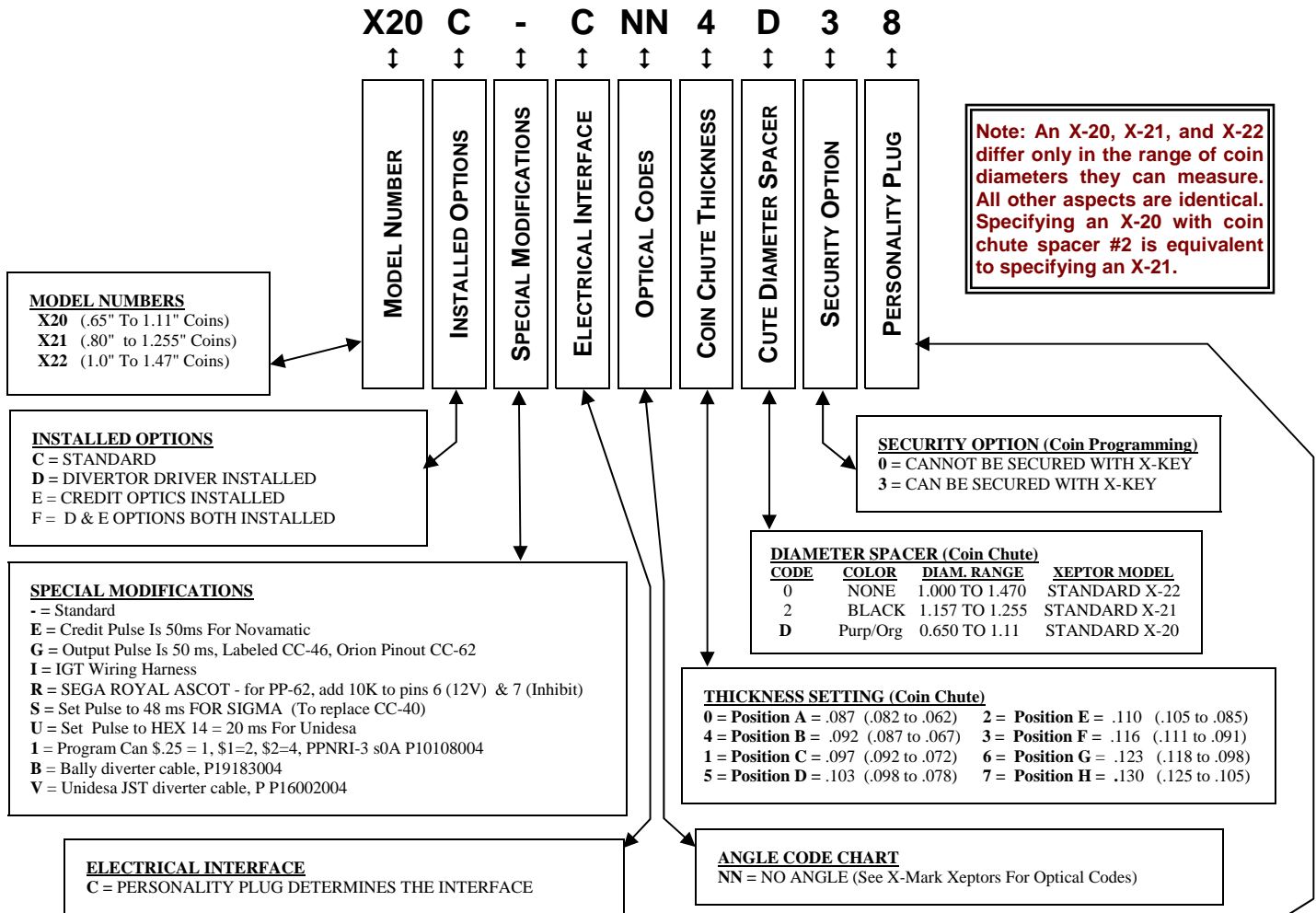


IDX, INC.
 400 West Cedar Street
 El Dorado, AR 71730
 ☎:800-643-1109 Fax:870-862-3472



How to Order X-20 Series Xeptors

Rev: 12/20/2004



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
I	PP-62	RETROFIT FOR CC-62, IC-62, MC-62 - KOAMI	CREDIT OPTICS, INHIBIT HI
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	T.B.D. EST 2004 - CONSULT FACTORY	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 ---