

**M**anufacturers'  
**B**ill  
**A**ceptor

**INSTALLATION  
SERVICE & PARTS MANUAL**

**Ardac**®  
Incorporated



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## MBA SPECIFICATIONS

	HEIGHT	WIDTH	DEPTH	WEIGHT
ACCEPTOR	3.75"	2.76"	4.0"	2 LBS, 3 OZ.
STACKER	9.7"	3.12"	4.0"	3 LBS, 11 OZ.
CONTROL BOX	7.6"	7.6"	3.0"	4 LBS, 5 OZ.

CONTACT ARDAC FOR DESIGN DETAIL.

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POWER REQUIREMENTS: 97 VAC TO 130 VAC 60Hz 1/4 AMP @ 120 VAC

PROTECTED BY 1/2 AMP CIRCUIT BREAKER.

VEND OUTPUT: ISOLATED RELAY CONTACT WITH A PULSE DURATION OF 50ms TO 100ms DEPENDING ON APPLICATION.

1 OR 4 PULSES PER DOLLAR VALUE ACCEPTED; CUSTOMER SELECTABLE.

\*\*\*\*\*

NOTES ACCEPTED: U.S. \$1 & U.S. \$5 STANDARD. U.S. \$5 SELECTIVE ENABLE/DISABLE, DEPENDING ON APPLICATION.

SINGLE NOTE ESCROW, DEPENDING ON APPLICATION.

OPTICAL AND MAGNETIC SENSING SYSTEMS USED FOR NOTE IDENTIFICATION.

STACKER IS ONE COMPARTMENT WITH A 300-400 NOTE CAPACITY, DEPENDING ON THE CONDITION OF THE BILLS.

VISUAL STATUS DISPLAY SYSTEM TO AID IN TROUBLESHOOTING.

INTERFACEABLE TO MOST DOLLAR CAPABLE CREDIT SYSTEMS.

UL RECOGNIZED.

The ARDAC Universal MBA System is designed to be as flexible as possible. This flexibility provides the ability to install the ARDAC MBA System into virtually any coin operated machine that it will physically fit into and that uses a dollar capable credit system, coin changer, or quarter based pricing.

The ARDAC MBA Systems that are designed to interface to vending machines come complete with the acceptor, stacker, control box, harnesses, and in most cases, all the required mounting hardware. The following chart outlines the contents of the various vending systems that ARDAC has developed and gives the application the system was designed for. Please note the following about vending machine applications:

1. All systems designed to interface to controller board credit systems (dumb coin mech) are unique to the vending machine that the controller board is designed for.
2. All systems designed to interface to dollar capable single price and 4 price coin changers should work in any vending machine that utilizes these changers, regardless of coin changer manufacturer.
3. In all cases in a vending machine application, the MBA System MUST be interfaced to a dollar capable credit system or coin changer. The MBA System only verifies dollar bills inserted and provides a credit pulse to the vending machine. The MBA System does not accumulate credits or provide change. This function is done by the vending machine credit system or coin changer.
4. For retro-fitting to older vending machines that do not have a hole in the door for a bill acceptor, the 88x4001-0003 system with the 48x310 mounting hardware kit is recommended for "universal" applications.

ARDAC has developed numerous MBA systems for video game applications. Unlike the vending machine applications where MBA systems were developed for specific machines, the video game systems were developed on the basis of system function. A look at the video game systems content and applications chart will show the functions of the different systems developed for video games. In addition to the basic systems, there are two special E PROMs available from ARDAC for video game applications. They are:

1. \$1 Inhibit E PROM      Part Number: X-127-01

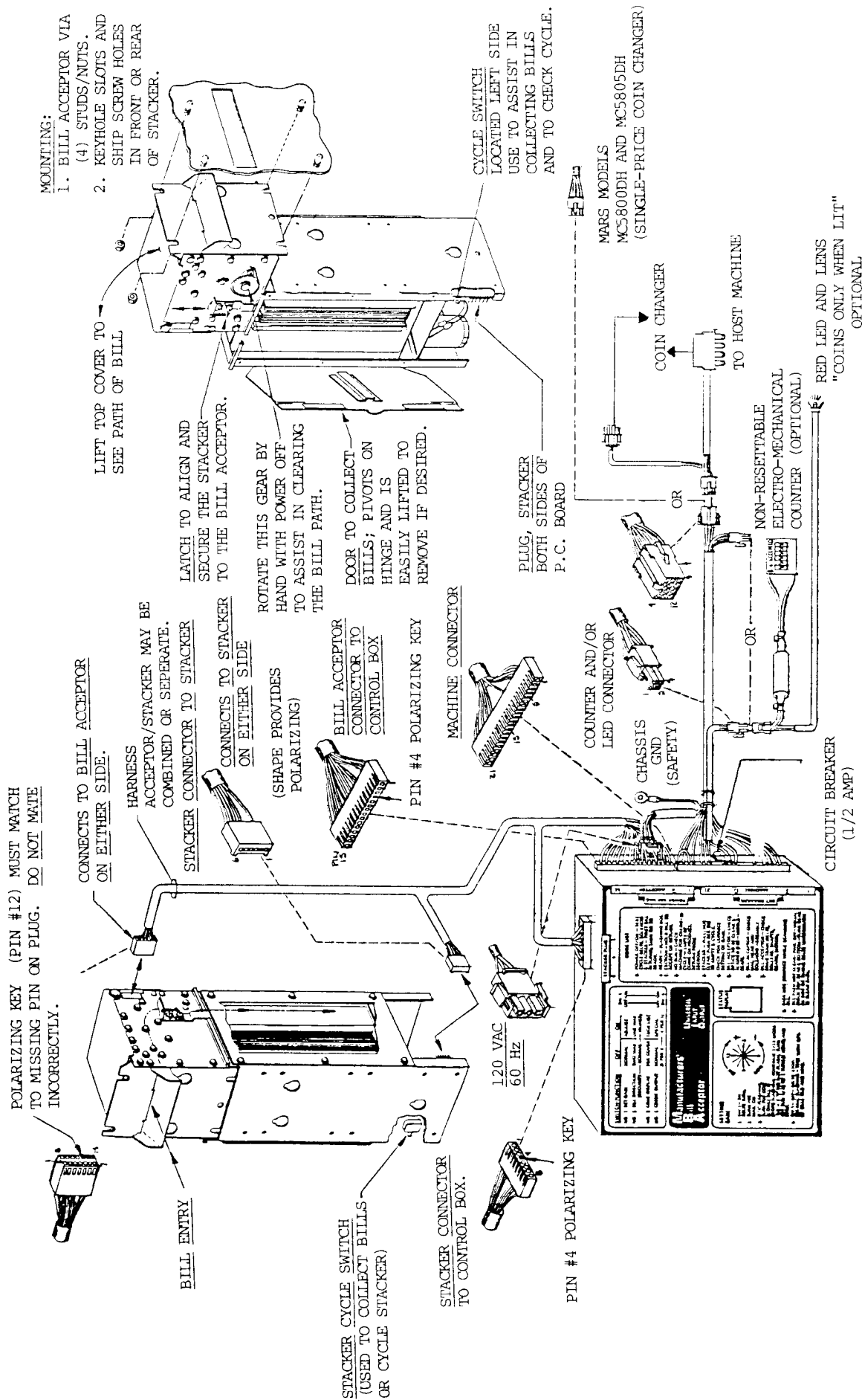
This E PROM provides the ability to inhibit \$1 bills, so that the MBA System can be set to accept only \$5 bills. This E PROM is available for a nominal charge.

2. Attract to Play Mode E PROM      Part Number: X-13200

In some video games, credits can be lost when the game switches from the attract mode to the play mode. This E PROM provides a long pause between the first credit pulse and the rest of the credit pulse train to allow the video game to switch modes without a loss of credits.

**Manufacturers'**  
**B III**  
**Aceptor**

UNIVERSAL  
INPUT  
OUTPUT



MBA SYSTEMS - VENDING APPLICATIONS  
SYSTEM CONTENTS

MBA SYSTEM NUMBER 88X4001-XXXX <sup>5</sup>	BILL ACCEPTOR PART LATCH & NOTE ENTRY NO. (ESCUTCHEON) <sup>1</sup>	BILL STACKER ASSY HINGE NO.	PART NO.	CONTROL BOX EPROM PN	ACCEPTS <sup>3,4</sup>
88X4001-0002 AUTOMATIC PRODUCTS GLASSFRONT 6000 & 7000 SERIES	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0003 ROCKOLA 5/6 SELECT CAN VENDOR	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0003 RMI 850 HOT DRINK	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0003 RMI 8050 LG HOT DRINK	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0007 VENDO/USI 7 SELECT CAN VENDOR	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0007 ROCKOLA CCC-6 CAN VENDOR	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0015 DIXIE NARCO BROWN VENDORS, VERYFINE, & CENTURY	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0015 DIXIE NARCO MAGNUM CAN VENDORS	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0015 RMI/MDM SL45 DRINK VENDOR	1X224- LEFT STD 0501	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0019 USI SMIIB GLASSFRONT VENDOR	1X224- LEFT EXTENDED 0802	48X268- RIGHT FRONT 2004	1X223-0005	57X106- XX	US \$1 ONLY
88X4001-0021 COFFEEMAT 1072	1X224- RIGHT EXTENDED 0801	48X268- LEFT FRONT 1001	1X223-0005	57X106- XX	US \$1 ONLY

NOTES:

- <sup>1</sup> NOTE ENTRY - "STD" IS THE STANDARD ESCUTCHEON FOR U.S. BILLS & OBA COMPATIBLE VERSUS MOUNTING.
- <sup>2</sup> ORDERS MUST INCLUDE THESE PART NUMBERS "IN ADDITION" TO THE SYSTEM NUMBER.
- <sup>3</sup> THE CONTROL BOX REQUIRES 120 VAC, 60 HERTZ TO POWER THE MBA SYSTEM (3 PIN AMP MATE-N-LOK).
- <sup>4</sup> UNIVERSAL EPROM 57X106-XX IS FUNCTIONAL IN ALL CONTROL BOXES (BLK OR BLUE COVERS) AND IS REQUIRED IF BILL ACCEPTOR HAS BLUE MODEL LABEL (NOTE PRESENCE SENSOR IN FRONT OF MAG HEAD).

BILL ACCEPTOR HARNESS	HARNESS ASSEMBLIES STACKER HARNESS	<sup>5</sup> OSW (MACH.)	POWER	<sup>2,8</sup> MTG/HARDWARE KIT NO.	APPLICATIONS INFORMATION
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X4358	2X4057	48X303	MARS CONTROLLER BOARD. SYSTEM UNIQUE TO THIS APPLI- CATION. BILL ENTRY IS SUPPLIED BY AUTOMATIC PRODUCTS, THEIR PART NUMBER 460358.
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X4178-0360 (36 IN.) T-BOX ASSEMBLY 38X59		48X301	SINGLE PRICE AND 4 PRICE COIN CHANGERS. <sup>7</sup>
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X4178-0360 (36 IN.) T-BOX ASSEMBLY 38X59		48X310	"UNIVERSAL" VENDING APPLICATION <sup>6</sup>
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X4178-0360 (36 IN.) T-BOX ASSEMBLY 38X59		48X301	REQUIRES THE RMI MOUNTING HARDWARE KIT, THEIR PART NUMBER 31139.
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X4008-1		48X302	MARS CONTROLLER BOARD SYSTEM UNIQUE TO THIS APPLI- CATION. REQUIRES ACCEPTOR MOUNTING PLATE FROM VENDO, THEIR PART NUMBER XXXXXXXX.
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X4008-1		48X302	SYSTEM UNIQUE TO THIS APPLI- CATION. SYSTEM WILL WORK PROPERLY ONLY WITH A MARS COIN CHANGER.
2X3927- 0880 (88 IN.)	2X3926- 0880 (88 IN.)	2X4178-0680 (68 IN.) T-BOX ASSEMBLY 38X59		48X304	SINGLE PRICE AND 4 PRICE COIN CHANGERS. <sup>7</sup>
2X3927- 0880 (88 IN.)	2X3926- 0880 (88 IN.)	2X4178-0680 (68 IN.) T-BOX ASSEMBLY 38X59		48X304	REQUIRES ACCEPTOR MOUNTING PLATE, ARDAC PART NUMBER XXXXXXXXXX <sup>2</sup>
2X3927- 0880 (88 IN.)	2X3926- 0880 (88 IN.)	2X4178-0680 (68 IN.) T-BOX ASSEMBLY 38X59		99X0016-02	4 PRICE CHANGER ONLY.
2X3927- 0360 (36 IN.)	2X2926- 0360 (36 IN.)	2X4056-1	2X4057-1	48X305	COINCO CONTROLLER BOARD. WILL NOT INTERFACE TO SMIIA'S VENDORS BUILT BEFORE 1988.
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X4178-0360 (36 IN.) T-BOX ASSEMBLY 38X59		48X308	SINGLE PRICE AND 4 PRICE COIN CHANGER. "UNIVERSAL" APPLI- CATION WHERE EXTENDED ESCUT- CHEON IS REQUIRED. <sup>7</sup>

<sup>5</sup> ALL REQUIRED HARNESSING INCLUDED AS PART OF SYSTEM NUMBER (EXCEPT AS NOTED).

<sup>6</sup> IF RIGHT HANDED STACKER ACCESS IS REQUIRED, SUBSTITUTE STACKER PART NUMBER 48X268-2001 FOR PART NUMBER 48X268-1001.

<sup>7</sup> MARS 4 PRICE CHANGER REQUIRES ARDAC INTERFACE HARNESS PART NUMBER 99X0019-10.

<sup>8</sup> FOR MOUNTING HARDWARE KIT CONTENTS, REFER TO THE PARTS SECTION OF THIS MANUAL.

MBA SYSTEMS - VIDEO GAME APPLICATIONS  
SYSTEM CONTENTS

MBA SYSTEM NUMBER <sup>1</sup>	BILL ACCEPTOR			BILL STACKER (300)		PART NO.	CONTROL BOX		<sup>3</sup> <sup>4</sup> ACCEPTS
	PART NO.	LATCH & NOTE ENTRY (ESCUTCHEON)		ASSY NO.	HINGE		EPROM PN		
88X4001-0017 BASIC VIDEO GAME SYSTEM	1X224-0502	NONE	STD	NONE		1X223-0005	57X106-XX	US \$1 US \$5	
88X4001-0020 CREDIT HOLD WITH LIGHTED ESCUTCHEON	1X224-0811	NONE	LIGHTED EXTENDED	NONE		1X223-0007	57X158-XX	US \$1 US \$5	
88X4001-0022 LIGHTED ESCUTCHEON	1X224-0811	NONE	LIGHTED EXTENDED	NONE		1X223-0005	57X106-XX	US \$1 US \$5	
88X4001-0023 PLAYMODE INHIBIT	1X224-0502	NONE	STD	NONE		1X223-0005	57X106-XX	US \$1 US \$5	
88X4001-0024 BIP 5	1X224-0502	NONE	STD	NONE		1X223-0007	99X500-XX	US \$1 US \$5	
88X4099-0001 BASIC SYSTEM WITH STACKER	1X224-0501	LH	STD	48X268-1001	LEFT FRONT	1X223-0005	57X106-XX	US \$1 US \$5	
88X4099-0002 LIGHTED ESCUTCHEON WITH STACKER	1X224-0812	LH	LIGHTED EXTENDED	48X268-1001	LEFT FRONT	1X223-0005	57X106-XX	US \$1 US \$5	
88X4099-0003 CREDIT HOLD WITH STACKER	1X224-0810	LH	LIGHTED EXTENDED	48X268-1001	LEFT FRONT	1X223-0007	57X158-XX	US \$1 US \$5	
88X4099-0004 BIP 5 WITH STACKER	1X224-0501	LH	STD	48X268-	LEFT FRONT	1X223-0007	99X500-XX	US \$1 US \$5	
88X4099-0005 BIP 5 LIGHTED ESCUTCHEON WITH STACKER	1X224-0812	LH	LIGHTED EXTENDED	48X268-1001	LEFT FRONT	1X223-0007	99X500-XX	US \$1 US \$5	

NOTES:

- <sup>1</sup> NOTE ENTRY - "STD" IS THE STANDARD ESCUTCHEON FOR U.S. BILLS & OBA COMPATIBLE VERSUS MOUNTING.
- <sup>2</sup> ORDERS MUST INCLUDE THESE PART NUMBERS "IN ADDITION" TO THE SYSTEM NUMBER.
- <sup>3</sup> THE CONTROL BOX REQUIRES 120 VAC, 60 HERTZ TO POWER THE MBA SYSTEM (3 PIN AMP MATE-N-LOK).

BILL ACCEPTOR HARNESS	HARNESS ASSEMBLIES STACKER HARNESS	OSW (MACH.)	POWER	MTG/HARDWARE KIT NO.	APPLICATIONS INFORMATION
2X3927- 0360 (36 IN.)	NONE	2X3991- 0360 (36 IN.)	2X3992- 0360 (36 IN.)	48X300	
2X3927- 0880 (88 IN.)	NONE	2X4430	2X3992- 0360 (36 IN.)	48X306	FOR USE IN GAMES THAT DO NOT HAVE CREDIT ACCUMULATION. GAME MUST HAVE WORKING COIN BLOCKOUT COIL
2X3927- 0360 (36 IN.)	NONE	2X3991- 0360 (36 IN.)	2X3992- 0360 (36 IN.)	48X306	
2X3927- 0360 (36 IN.)	NONE	2X4515	2X3992- 0360 (36 IN.)	48X300	PLAY MODE INHIBIT ACHIEVED BY WIRING INHIBIT WIRES IN PARALLEL TO COIN BLOCKOUT COIL. GAME MUST HAVE WORKING COIN BLOCKOUT COIL.
2X3927- 0360 (36 IN.)	NONE	99X0040- 010	2X3992- 0360 (36 IN.)	48X300	SYSTEM PROVIDES BONUS CREDIT CAPABILITY. 3 TO 6 CREDITS PER \$1 15 TO 36 CREDITS PER \$5
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X3991- 0360 (36 IN.)	2X3992- 0360 (36 IN.)	48X300	
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	2X3991- 0360 (36 IN.)	2X3992- 0360 (36 IN.)	48X306	
2X3927- 0880 (88 IN.)	2X2926- 0880 (88 IN.)	2X4430	2X3992- 0360 (36 IN.)	48X306	FOR USE IN GAMES THAT DO NOT HAVE CREDIT ACCUMULATION. GAME MUST HAVE WORKING COIN BLOCKOUT COIL.
2X3927- 0360 (36 IN.)	2X3926- 0360 (36 IN.)	99X0040- 010	2X3992- 0360 (36 IN.)	48X300	SYSTEM PROVIDES BONUS CREDIT CAPABILITY. 3 TO 6 CREDITS PER \$1 15 TO 36 CREDITS PER \$5
2X3927- 0360 (36 IN.)	2X2926- 0360 (36 IN.)	99X0040- 010	2X3992- 0360 (36 IN.)	48X306	SYSTEM PROVIDES BONUS CREDIT CAPABILITY. 3 TO 6 CREDITS PER \$1 15 TO 36 CREDITS PER \$5

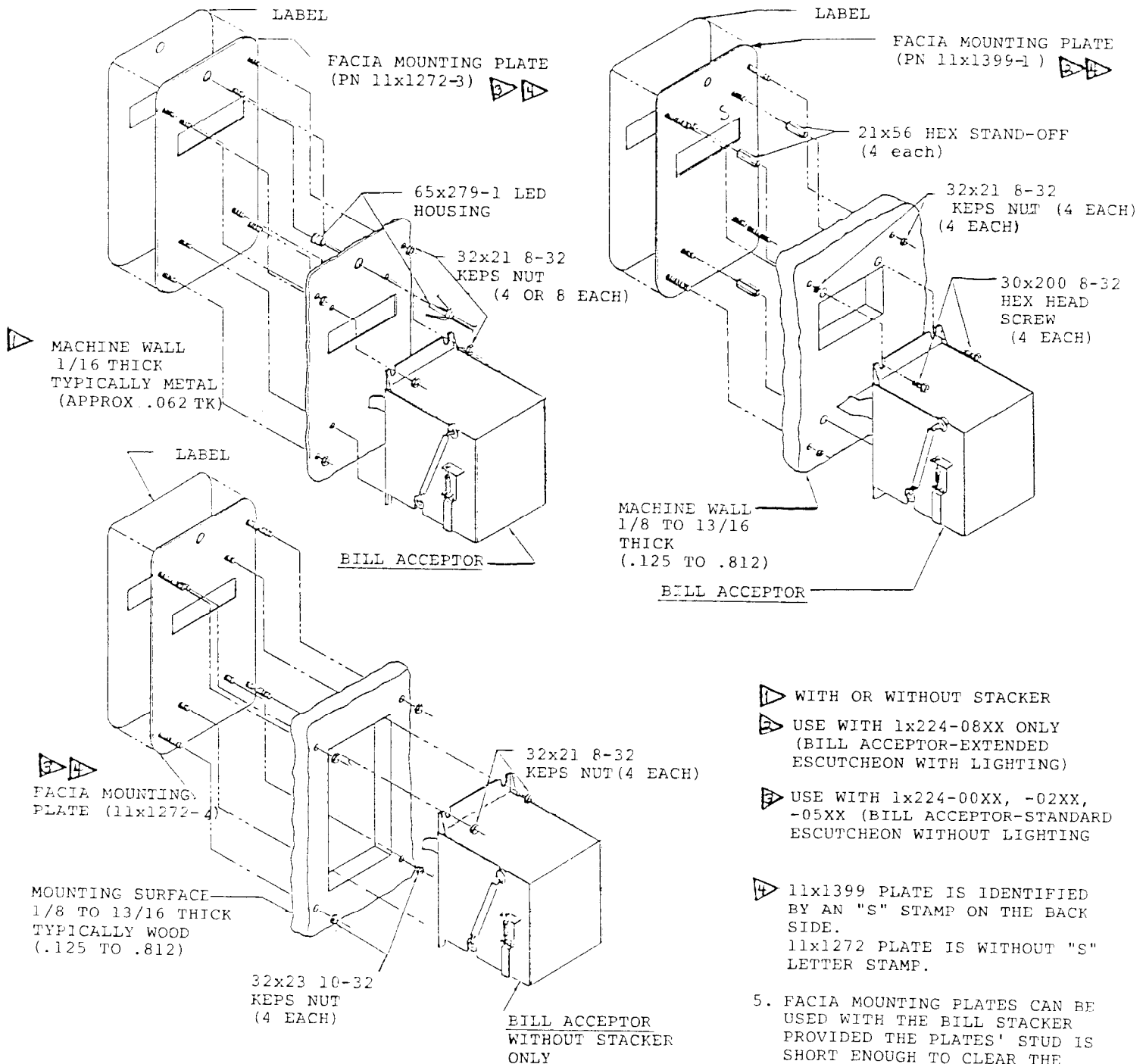
4 UNIVERSAL EPROM 57X106-XX IS FUNCTIONAL IN ALL CONTROL BOXES (BLK OR BLUE COVERS) AND IS REQUIRED IF BILL ACCEPTOR HAS BLUE MODEL LABEL (NOTE PRESENCE SENSOR IN FRONT OF MAG HEAD).

5 ALL REQUIRED HARNESSING INCLUDED AS PART OF SYSTEM NUMBER (EXCEPT AS NOTED).

6 CREDIT OUTPUT TYPICALLY PARALLEL WIRED ACROSS A COIN SWITCH.



MBA RETRO-FIT MOUNTING PLATES  
TYPICAL INSTALLATIONS



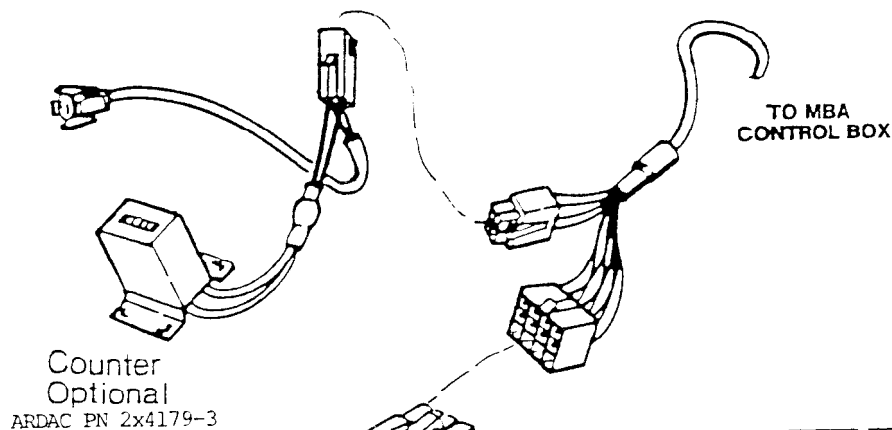
- ▶ WITH OR WITHOUT STACKER
- ▶ USE WITH 1x224-08XX ONLY (BILL ACCEPTOR-EXTENDED ESCUTCHEON WITH LIGHTING)
- ▶ USE WITH 1x224-00XX, -02XX, -05XX (BILL ACCEPTOR-STANDARD ESCUTCHEON WITHOUT LIGHTING)

▶ 11x1399 PLATE IS IDENTIFIED BY AN "S" STAMP ON THE BACK SIDE. 11x1272 PLATE IS WITHOUT "S" LETTER STAMP.

5. FACIA MOUNTING PLATES CAN BE USED WITH THE BILL STACKER PROVIDED THE PLATES' STUD IS SHORT ENOUGH TO CLEAR THE STACKERS' DOOR WHEN IT IS OPENED. (STUD STICK-THRU RELATES TO MACHINE WALL THICKNESS.)

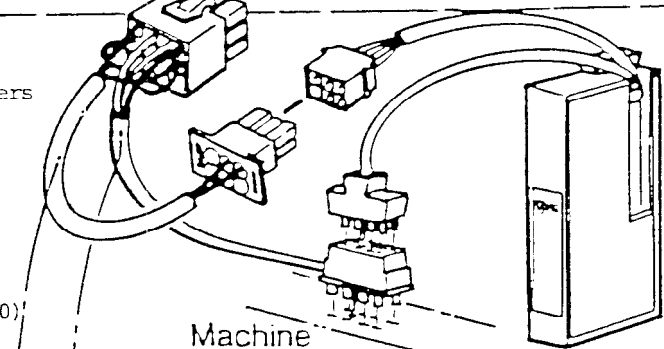
6. FOR OTHER VARIABLES ON MOUNTING AND RETRO-FITS, PLEASE CONTACT THE ARDAC SALES DEPT.

# ELECTRICAL CONNECTIONS



## HI LEVEL INTERFACE

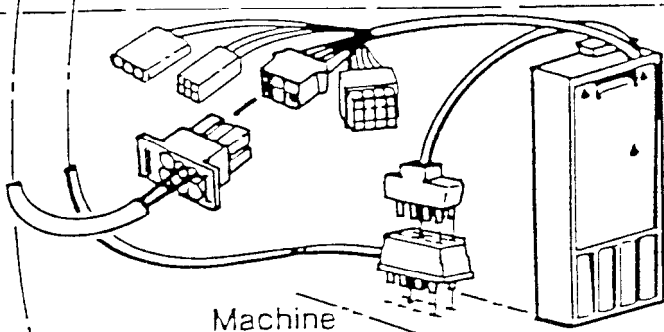
- 1.....MBA T-Adapter shown connected to "HI-LEVEL" changers  
COINCO...models S300E9240  
F300E9210  
(extra adapter CA #406277)  
9340-S  
MARS....models MC5802  
MC6200  
MC5807  
MC5920ADH (4 price)  
(extra adapter ARDAC PN 99x0019-10)  
MAKA.....model US111



## OPTIONAL HI/LOW LEVEL INTERFACE

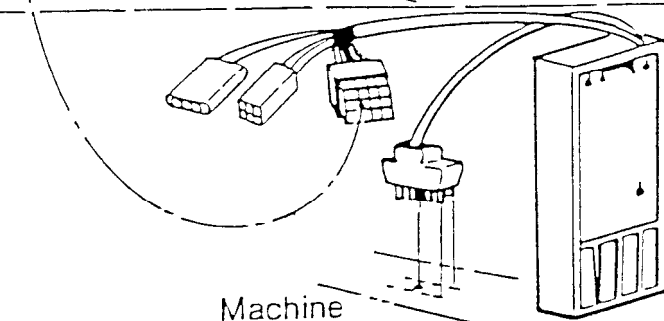
- 2.....MARS.....model TRC6800H

HI-LEVEL Interface shown, LO-LEVEL Interface  
same as 3.



## LOW LEVEL INTERFACE

- 3.....MARS.....models MC5800DH  
MC5805DH  
TRC6800H



The ARDAC MBA interfaces to all dollar capable coin changers by one of 2 methods.

1. HIGH LEVEL: One end of machine harness to Control Box (21-Pin connector), other end must go through ARDAC T-Adapter to the coin changer.  
1) High Level uses 110 VAC.  
12-pin Mate-N-Lock to ARDAC T-Adapters 12-pin Mate-N-Lock.  
6-pin Jones plug to machine along with 8-pin Jones from Coin Mech.  
6-pin Molex from T-Adapter to 6-pin Molex from Coin Mech.
2. LOW LEVEL: One end of machine harness to Control Box (21-pin connector), other end directly to the coin changer (12-pin Mate-N-Lock).  
3) Low Level uses 5 VDC.

NOTE: Some coin changers such as Mars model TRC6800H as shown, will work either way. See Figure 2.

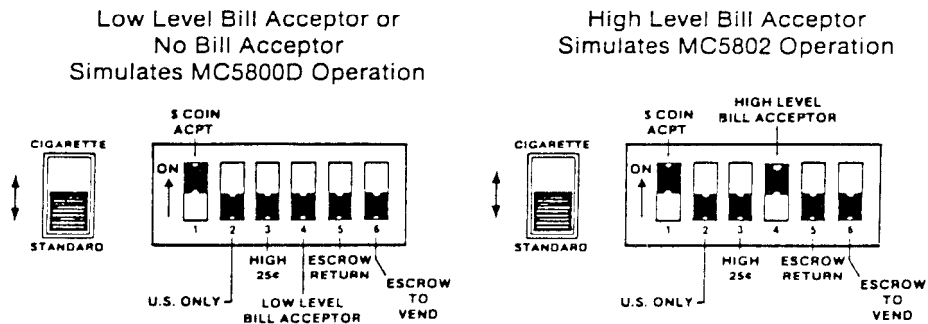
## ADDITIONAL NOTES ON COIN CHANGER INTERFACES

Mars MC5800DH series changers will not work with early "black" control boxes.

Mars TRC-6800H series changers should be connected through the 12-pin Mate-N-Lock connector (low level) and the function switches in the changer must be set up as shown in the figure below "Standard Mode" - Low Level Bill Acceptor".

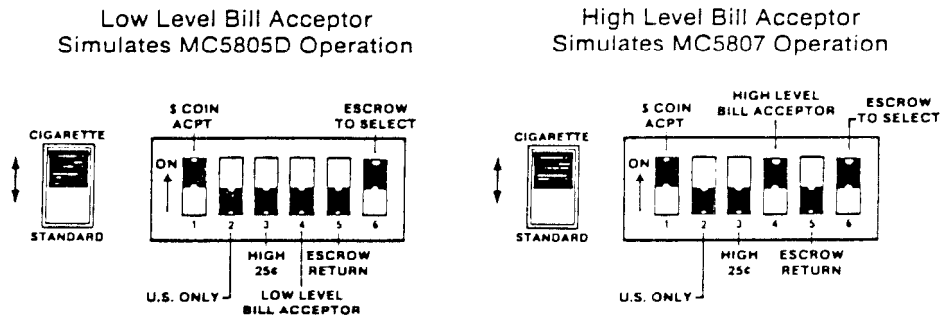
### STANDARD MODE

Escrow to Vend



### CIGARETTE MODE

Escrow to Select



Mars MC5920ADH - Dollar capable 4 price changer requires a special adapter harness available from ARDAC. The adapter harness part number is 99x0019-10. This harness is used between the 9-pin mini Mate-N-Lock plug on the changer accessory harness and the 6-pin connector on the ARDAC T-Box Assembly.

CoinCo F300E9210 - Dollar capable 4 price changer is connected through the ARDAC T-Box Assembly.

All interfaces to controller changer systems (such as the Automatic Products Glassfront Vendor) are unique. Call the ARDAC Service Department for assistance on any controller changer equipped vending machine that is not covered by our standard systems.

At this time, the ARDAC MBA System cannot be interfaced to any 10 price or multi-price changer system.

In all cases where a dollar bill acceptor is desired on a coin operated machine, the machine must have the ability to accumulate credits. The MBA System does not accumulate credits.

## FUNCTION SWITCHES - SPECIAL FEATURES

### SWITCH 1 - SET GAIN

This switch is used to adjust the MBA for an optimum acceptance rate. The adjustment instructions are printed in the lower left-hand corner of the control box. This switch must be off for the MBA to function properly. If Switch #1 is left on, the acceptor will run continuously, and damage to the acceptor may result.

### SWITCH 2 - BILL DIRECTION

This switch is used to set the MBA System to accept bills regardless of which end is presented to the acceptor first (two-way mode; switch off) or to accept the bill only if the black seal end is presented to the acceptor first (one-way mode; switch on).

### SWITCH 3 - CODE DISPLAY or \$5 acceptance yes or no

This switch is used to help service personnel define any kind of problem that may develop in the MBA. In the normal or OFF position, the status display will flash one of the ten codes defined on the right-hand side of the control box cover. If Switch #3 is turned on, the system will flash one of 67 tech codes. Please note that the MBA System will function properly regardless of what position Switch #3 is in.

### SWITCH 4 - CREDIT OUTPUT

This switch is provided because in many of our applications we are required to provide a credit output that would be equivalent to four quarter insertion. When Switch #4 is in the normal or OFF position, the MBA will provide 1 credit pulse per dollar value accepted. If Switch #4 is in the special or ON position, the MBA will provide four pulses for each dollar value accepted. Depending on the credit logic used by the host machine, this could result in a maximum credit of \$4 for each dollar value accepted.

## INITIAL SET-UP

WHENEVER SYSTEM COMPONENTS ARE BEING CONNECTED OR DISCONNECTED, DO SO WITH POWER REMOVED OR DAMAGE TO SYSTEM COMPONENTS MAY RESULT.

1. Plug the stacker, acceptor and machine cables into the control box and into the associated components. Be careful to observe all polarizing pins. Insure that the stacker and acceptor are in alignment by seeing that the latch on the acceptor is into the slot on the stacker rail. Apply power to the system.
2. Move Function Switch #1 to the ON position. The motor in the acceptor will start and run continuously. While the motor is running, adjust the mag gain pot in the control box fully clockwise. A numeral "4" may appear in the L.E.D. status display.
3. If a number "4" appears, adjust the mag gain pot counterclockwise until the "4" disappears, then turn the pot counterclockwise one more hour. If a number "4" does not appear in the status display, turn the pot counterclockwise one hour.
4. Return Function Switch #1 to the OFF position.

## MBA SYSTEM BASIC COMPONENTS

The MBA System consists of: the Control Box, the Acceptor, and the Stacker.

The Control Box provides power distribution for the system and controls operations, such as turning on a motor in the acceptor, and identification of inserted notes. In addition, the Control Box "talks" to the host machine to identify the type of machine it is interfaced to, the condition of the host machine, and to provide the host machine with credit information. The control package can be placed anywhere in the host machine.

The Acceptor transports a note through the sensor arrays and either accepts the note, returns the note to the customer, or holds the note in escrow until a sale/cancel sale decision has been made by the customer.

The Note Stacker provides a convenient place to store bills and mounts directly below the acceptor. The stacker capacity is in excess of 400 mint fresh bills. Stacking capacity is a direct function of the condition of the bills. As the condition of the bills deteriorates, stacking capacity goes down. The stacker should be capable of stacking in excess of 300 bills, regardless of the condition of the bills. When the stacker is full, it sends a signal to the control box to inhibit the MBA System. The stacker can be removed from the MBA System by unplugging the stacker harness from the control box.

#### SEQUENCE OF OPERATION (UNIVERSAL E PROM 57X106-XX)

RESET STATE: (P-O-R...Power On Reset)

The reset state is the first mode entered in the sequence of operations of the MBA System after AC power is connected. In this state, the MBA electronics performs extensive diagnostics which are separated into three levels.

The first level (internal) implements test algorithms to verify minimum system requirements in the control box, such as:

1. Ram operating properly.
2. Rom operating properly.
3. I/O device operating properly.

If these tests indicate less than minimum requirements, the system will disable itself and present a constant (non-flashing) decimal point on the diagnostic display as indication of the internal fault.

The second diagnostic level (peripheral) determines stacker and bill acceptor functionality and configuration. An attempt to cycle the bill acceptor motor will be made in order to detect proper motor/tach operation at the same time the bill acceptor sensors are scanned for correct levels. If there is indication that there is an improper condition, another attempt to cycle the acceptor will be made in order to "clear" the bill path and uncover the suspect sensor(s). This acceptor cycle may involve several forward/reverse jogs in an attempt to clear a possible bill jam. If the bill acceptor fault cannot be resolved, the system will disable itself and flash a "9" or "5" as an indication that acceptor sensor(s) are the cause of the failure, or a flashing "9" or "7" will be displayed as an indication that the acceptor motor was the failure cause, and the bill acceptor could not self-recover. If all second level diagnostic tests are passed, the acceptor solenoid will be pulsed three times for visual inspection of solenoid operation. An attempt to cycle the stacker will then be made in order to detect any fault in the stacker sensor electronics and to "home" the stacker punch. This also serves as verification of stacker configuration type. Should an improper condition or fault occur during this cycle, the system will disable itself and flash a "3" on the diagnostic display as an indication that the stacker has failed and cannot self-recover. Prior to disabling the bill acceptor, the clear routing to "home" the stacker's punch is attempted three times (to self heal fault if possible).

The third diagnostic level (external) determines machine status/type. Inputs from the host machine (controller/coin mech) are scanned in order to determine action to be taken by the MBA System. If conditions exist such as machine inhibit or low coin tube, etc., the system will disable itself and flash a "2" on the diagnostic display as an indication that the MBA System has been instructed to disable itself by the host machine. If normal conditions exist, the MBA System will configure itself for proper operation with the host machine and will annunciate this configuration type by pulsing the bill acceptor solenoid and the "busy"/"coin only" output of the MBA control box as follows:

# OF PULSES	TYPE
0	Disable
1	D-AP
2	SPCC-AC
3	Phono
4	Games

Any reset state diagnostic failure will enable the "busy"/"coin only" output of the MBA control box. This will cause the busy output to be turned on or to flash if the front sensor is detected as covered, depending on host machine configuration. The reset state will be re-entered upon elimination of any level fault. A flashing "0" will be displayed when all reset state diagnostics are properly completed. This indicates that the MBA System has undergone a reset sequence as the result of an AC power loss or system fault that was corrected such as a bill acceptor jam. The flashing "0" also indicates that the acceptor has yet to be configured and that the first bill inserted will be rejected as part of this configuration process. The diagnostic display will flash the decimal point only upon configuration of the bill acceptor.

#### IDLE STATE: (READY TO ACCEPT BILLS)

The idle state is entered after proper completion of all reset state diagnostics. In this state (as in all states) the MBA System continues to perform diagnostics except that the bill acceptor will now react to a bill presented to it by entering the in-cycle state. This state is also entered after all complete bill cycles.

#### IN-CYCLE STATE:

The in-cycle state is entered by presenting a bill to the bill acceptor while the MBA System is in the idle state. Covering the front sensor initiates this cycle by starting the transport motor and pulling the solenoid away from the mag head. The solenoid is then released at an appropriate time after the front sensor is covered or after the note present sensor is covered, as the bill is being drawn into the acceptor, depending on the bill acceptor configuration and security level. As the bill passes under the acceptor sensors, it is subjected to a battery of verification tests such as size and magnetic content. Should any of these verification tests fail, the bill will be returned and the corresponding error code will be displayed on the diagnostic display until the bill is removed from the acceptor escutcheon. Ten consecutive error codes of any type will cause the display code to remain even after the bill is removed. This error display code will be removed after the next bill cycle that does not result in the same error again. If all verification tests are passed, the escrow state is entered.

#### ESCROW STATE:

The bill enters the escrow state after all verification tests are passed. The stacker is first checked for proper orientation and if necessary, the bill acceptor motor will stop until the stacker cycles to the proper position, depending on stacker configuration. If the stacker cannot be properly oriented, the bill will be returned and the stacker error code ("3") will be displayed. The host machine configuration is then checked for escrow functions and the MBA System responds accordingly. If the bill is to be held in escrow a "1" will be flashed on the diagnostic display indicating that a bill is being held in escrow and will remain in escrow until otherwise instructed by the host machine. If the bill is to be held in escrow, the proper credit signal pulses are outputted to the host machine controller and the machine must then command the MBA System to either accept or return the escrowed bill. If the MBA System is instructed to return the bill, it will be returned and a flashing "2" will be displayed on the diagnostic display as an indication of a returned bill from escrow. If the system is commanded to accept the bill, the drive out state will be entered. If no escrow was requested, the host machine configuration is checked to see if the authenticated bill denomination has been inhibited and if so, the bill will be returned and the diagnostic display will flash a "8" indicating an inhibited bill denomination. The absence of a return, inhibit, or stacker malfunction causes the system to enter the drive out state.

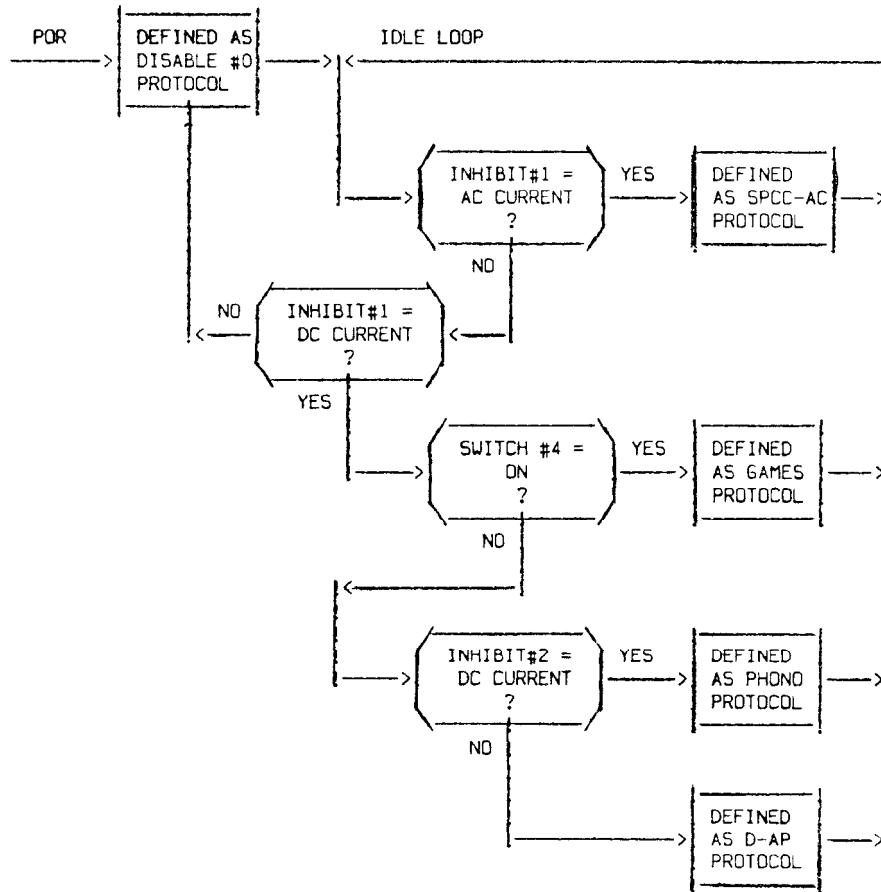
#### DRIVE OUT STATE:

The drive out state is entered after the bill has been completely authenticated and requested by the host machine to accept the bill into the stacker or cash box. The bill acceptor motor is turned on to continue note delivery into the stacker. During this time, sensors are continuously scanned to detect a stringing attempt or possible stacker jam. Should one of these faults occur, the bill will be returned and an appropriate code displayed on the diagnostic display. Once the bill is clear of the bill acceptor and into the stacker, the vend state is entered.

#### VEND STATE:

The vend state is entered after the bill has been delivered from the acceptor and into the stacker. The proper vend and accounting pulses are first outputted according to the host machine configuration requirements and then the stacker is cycled in order to stack the bill. Providing all went well, the idle state would be entered next.

# PROTOCOL AUTO-CONFIGURATION FLOW CHART



PROTOCOL DEFINITIONS (57X106-XX UNIVERSAL E PROM)

0> DISABLE

1. Acceptor disabled
2. Busy output functions as "coin only"
3. Flashing "2" on display

1> D-AP (TRC-6800H & MC5800DH/MC5805DH Coin Changers & Automatic Products 6000 & 7000 Series Glassfront Vendors)

1. \$1 only (\$5 can be enabled by new E PROM)
2. Inhibit #3: Active (DC current) > Escrow Mode  
Inactive (No current) > Non-Escrow Mode/Return Bill  
(Not functional in AP or D changers, 1 pulse/accepted \$)
3. Busy output functions as "coin only"
4. K1 vend/credit 1 pulse/\$ @ 50/100ms  
(Credit/vend to machine or coin changer if inhibit #3 is active, 2 pulses/accepted \$)
5. K2 acct 1 pulse/\$ @ 100/100ms  
(To operate \$'s accepted & stacked counter)

2> SPCC-AC (Coin Changers: MC5802, S300E9240, F300E9210, Maka, National)

1. \$1 only
2. Inhibit #2: Active (AC current) - Acceptor disable (flashing "2")  
(Exact change) Inactive (No current) - Acceptor enable (flashing ".")
3. Inhibit #3: No function
4. Busy output functions as "coin only"
5. K1 vend pulse selectable 1/4 pulse(s)/\$ via Switch #4 @ 100/100ms
6. K2 acct 1 pulse/\$ @ 100/100ms (to count \$'s accepted/stacked)

3> PHONO

1. \$1 & \$5
2. Inhibit #3: Active (DC current) - \$5 enable  
Inactive (No current) - \$5 disable
3. Busy output functions as "coin only"
4. K1 vend 1 pulse/\$ @ 100/100ms
5. K2 acct disabled

4> GAMES

1. \$1 & \$5
2. Inhibit #2: Active (DC current) - \$5 enable  
Inactive (No current) - \$5 disable
3. Inhibit #3: Active (DC current) - K1 vend pulse = 50/75ms  
Inactive (No current) - K1 vend pulse = 75/300ms
4. Busy output functions as "coin only"
5. K1 vend 4 pulses/\$
6. K2 acct 1 pulse/\$ @ 100/100ms (to count \$'s accepted/stacked)



## TROUBLESHOOTING - GENERAL

It must be remembered that many things in a vending machine can disable the MBA System. The fact that the MBA System will not accept bills does not necessarily mean the MBA System is defective. The MBA System is absolutely dependent on the host machine credit system for proper performance.

One of the best methods for troubleshooting the MBA System, especially with a general Code 2 on the control box, is to use the MBA Pocket Tester. This tester should immediately isolate the problem to the MBA System or the host machine. Also stocking the below list of components will further aid isolation of problems through substitution. Careful study of this troubleshooting section, the use of the Pocket Tester, general status codes, tech codes, troubleshooting charts, and substitution should enable a field person to isolate most any MBA System problem to its sub-assembly level.

The following items are recommended to properly troubleshoot and service the MBA System on location.

PART NUMBER	DESCRIPTION
2x3927-0880	Long Acceptor Harness (88 inches)
2x3926-0880	Long Stacker Harness (88 inches)
2x4178-0680	Long OSW Harness (68 inches)
48x268-1001	Stacker
1x224-0501	Acceptor
1x223-0005	Control Box

## TEST AIDES FOR MBA SYSTEMS

1. MBA Pocket Tester.....Part Number 49x273.....Ideal for location use.
2. MBA Machine Simulator Tester (MST).....Part Number 48x579-1.....Ideal for shop and location use.

## GENERAL TROUBLESHOOTING STEPS

1. Make a selection from the host machine.
2. Try a correct change vend.
3. Attempt to insert a bill and make a selection.
4. Make sure that power is applied to the host machine.
5. Check the changer for full coin tubes.
6. Check the ARDAC bill stacker for a full or jammed condition.
7. Check the host machine for an empty condition.
8. Note: After a MBA System is powered up, it will always reject the first bill attempted.

## GENERAL NOTES ABOUT THE STATUS CODES AND TECH CODES

1. The status codes (Function Switch #3 off) are to aid service personnel in identifying problems at the subassembly level. That is to identify a control box, stacker, acceptor, or OSW/host machine problem. They are NOT an aid for the repair of subassemblies.
2. The tech codes (Function Switch #3 on) are to aid service personnel in repairing subassemblies. Not all 67 codes will apply to any given application. The use of tech codes for general troubleshooting may lead to confusion about which subassembly has a problem.
3. If more than one problem is in the system, the status display will show the code for the first problem it recognized until that problem is solved. It will then show the appropriate code for the second problem the system recognizes, and so on.
4. If the MBA has seen the same problem ten (10) consecutive times, the MBA System will flash the appropriate code, but will not be disabled. In the case of a self-heal, the status display will show a flashing dot. This is done to indicate a problem area when the note is removed.
5. Insert a bill and if it is rejected, leave the bill in the acceptor and check the status display. The status display should show a code indicating the reason for the rejection.

## GENERAL STATUS DISPLAY CODES - FUNCTION SWITCH #3 OFF

SOLID DOT.	Faulty Control Box. Replace the Control Box.
FLASHING DOT.	System is ready for operation.
CODE 0.	POWER-UP OK. This code indicates that AC power has been applied and all of the connecting cables are hooked up and the MBA is ready for configuration.
CODE 1.	BILL IN ESCROW. This code indicates that a bill is inside the acceptor and is awaiting a credit taken signal from an external source. This feature is enabled through the OSW harness and does not apply to all MBA applications.
CODE 2.	OSW PROBLEM. This code will appear when the MBA System is inhibited by either the host machine, the coin changer, or a faulty OSW harness.
CODE 3.	CHECK STACKER. The stacker is unable to respond to signals from the control box. Check the stacker for a full or jammed condition.
CODE 4.	ADJUST MAG. The magnetic sensing system is out of adjustment and the mag gain needs to be adjusted.
CODE 5.	CHECK SENSORS. This code indicates a misalignment or failure of the sensors in the acceptor. Occasional flashing of this code is normal.
CODE 6.	CHECK MAG. This code will flash on any rejected bill that was not interpreted by the MBA to be genuine. This can also be caused by mag head misalignment or improperly adjusted mag gain. This will normally occur to genuine notes approximately 2% of the time.
CODE 7.	CHECK ACCEPTOR. This code will appear when the acceptor timing is incorrect. This can be caused by worn or improperly adjusted drive belts or motor gear mesh.
CODE 8.	BILL(S) INHIBITED. This code indicates that the bill rejected has been pre-determined to be inhibited.
CODE 9.	CHECK ACCEPTOR for foreign objects in the bill path and proper connection of the acceptor harness.

## MBA TECH CODE LISTING (E PROM 57X106)

CODE	DISPLAY	DESCRIPTION	POSSIBLE CAUSE(S)
N/A	BLANK	Idle Mode (flashing decimal point only).	No error/fault.....Ready
N/A	BLANK	Failure Mode (solid decimal point).	Logic fault.....Replace box.
01	0	Configuration required. Will automatically configure on first bill insertion.	Power cycle Acceptor changed Stacker changed
02	1	Bill in escrow. Acceptor will be disabled until disposition of escrowed bill is determined.	Escrow mode
03	2	Bill denomination in escrow inhibited. Bill will be returned.	Inhibited denomination
04	2	Acceptor disabled.	No enable current (INH #1) Faulty OSW cable
05	2	Front sensors recovered as "in cycle" bill approaches escrow position. Acceptor will "freeze" until front sensors are uncovered again.	Attempted "tanking" Faulty front sensor
06	3	Stacker not in proper position when bill is inserted. Bill will be returned and stacker cycle attempted.	Faulty stacker/cable Stacker jam/full
07	3	No response from stacker. Acceptor will be disabled until stacker responds.	Faulty stacker/cable Stacker jam/full
08	3	Single direction stacker drifted past stop position. Stacker cycle will be attempted. If drift still occurs, acceptor will be disabled.	Faulty opto wheel Faulty stacker
09	N/A	Single direction stacker capacity limit detected (function inhibited as of 2/22/86).	Stacker full Not reset after unload
10	3	Dual stacker "A" side full. Bill will be returned.	Stacker full
11	3	Dual stacker "B" side full. Bill will be returned.	Stacker full
12	3	Dual stacker not ready. Acceptor will be disabled until stacker is ready.	Faulty stacker; possible AT2 failure; opto disk fell off; possible motor failure; possible relay failure.
13	3	Acceptor will be disabled until stacker repaired.	Faulty stacker (dual) Possible AT3 failure
14	3	Acceptor will be disabled until stacker repaired.	Faulty stacker (dual) Possible AT1 failure

## MBA TECH CODE LISTING (E PROM 57x106)

CODE	DISPLAY	DESCRIPTION	POSSIBLE CAUSE(S)
15	3	Acceptor will be disabled until stacker repaired.	Faulty stacker (dual) Possible relay failure
16	3	Acceptor will be disabled until stacker repaired.	Faulty stacker (dual) Possible motor failure
17	3	Dual stacker full. Acceptor will be disabled until stacker emptied.	Stacker full
18	3	Dual stacker door open. Acceptor will be disabled until stacker door closed.	Door open
19	3	Dual stacker in unload mode. Acceptor will be disabled until stacker door closed.	"Unload" switch active
20	3	Dual stacker communications error. Acceptor will be disabled until stacker responds.	Faulty stacker Faulty stacker cable
21	3	Dual stacker failed to respond. Acceptor will be disabled until stacker responds.	Faulty stacker Faulty stacker cable
22	3	Dual stacker punch cycle time out. Acceptor will be disabled until stacker recovers.	Stacker jam Faulty stacker
23	3	Stacker model type changed. Will reconfigure.	Stacker changed
24	4	Excessive noise detected. Bill will be returned.	Mag adjust Noisy motor Improper grounding Fraud attempt Contaminated bill
25	5	Travel distance for returned bill to cover the front sensors has been exceeded. Motor will reverse and possibly jam/jog to try to clear bill path.	Bill path "slip" Bill path obstacle Potential jam Ripped/torn bill Faulty front sensor Note "fell" out exit during jam/jog Faulty solenoid
26	5	Travel distance for returned bill to uncover note present sensor after front sensor covered has been exceeded. Motor will reverse and possibly jam/jog to try to clear bill path.	Bill path "slip" Bill path obstacle Potential jam Ripped/torn bill Faulty note present sensor
27	5	Travel distance for returned bill to uncover rear clear sensor after front sensor covered has been exceeded. Motor will reverse and possibly jam/jog to try to clear bill path.	Bill path "slip" Bill path obstacle Potential jam Ripped/torn bill Faulty rear clear sensor

## MBA TECH CODE LISTING (E PROM 57X106)

CODE	DISPLAY	DESCRIPTION	POSSIBLE CAUSE(S)
28	5	Travel distance for accepted bill to cover rear clear sensor after front sensor covered has been exceeded. Motor will reverse and possibly jam/jog to try to clear bill path.	Bill path "slip" Bill path obstacle Potential jam Ripped/torn bill Faulty rear clear sensor Faulty solenoid
29	5	Travel distance for accepted bill to uncover note present sensor after rear clear sensor covered has been exceeded. Motor will reverse and possibly jam/jog to try to clear bill path.	Bill path "slip" Bill path obstacle Potential jam Ripped/torn bill Faulty note present sensor
30	5	Travel distance for accepted bill to uncover rear clear sensor after rear clear sensor covered has been exceeded. Motor will reverse and possibly jam/jog to try to clear bill path	Bill path "slip" Bill path obstacle Potential jam Ripped/torn bill Faulty note present sensor Stacker jam
31	5	Excessive rear clear bounce. Motor may reverse and possibly jam/jog.	Faulty rear clear sensor Ripped/torn bill Stacker jam
32	5	Any acceptor sensor still covered after full bill cycle. Motor will reverse and possibly jam/jog. All vends are cancelled.	"Stringing" Faulty acceptor sensor Bill path blocked on power up.
33	5	Insertion time out where the front sensor is covered but no other acceptor sensors are covered in required time. Bill will be returned.	Ripped/torn bill Poor insertion
34	5	Short bill encountered. Bill will be returned.	Ripped/torn bill Faulty front sensors
35	5	Long bill encountered. Bill will be returned.	"Tailgating"
36	5	Invalid bill position during trailing primary scan. Bill will be returned.	Bill path "slip" Bill path obstacle Potential jam Incorrect bill data
37	5	Invalid bill position in escrow mode. Bill will be returned.	"Stringing" "Tailgating" Faulty acceptor sensor Ripped/torn bill
38	6	No magnetic signal detected. Bill will be returned.	Mag Adjustment Bill path "slip" Potential jam Faulty acceptor cable Faulty/misaligned mag head Faulty solenoid Ripped/torn bill Fraud attempt Green side up

## MBA TECH CODE LISTING (E PROM 57X106)

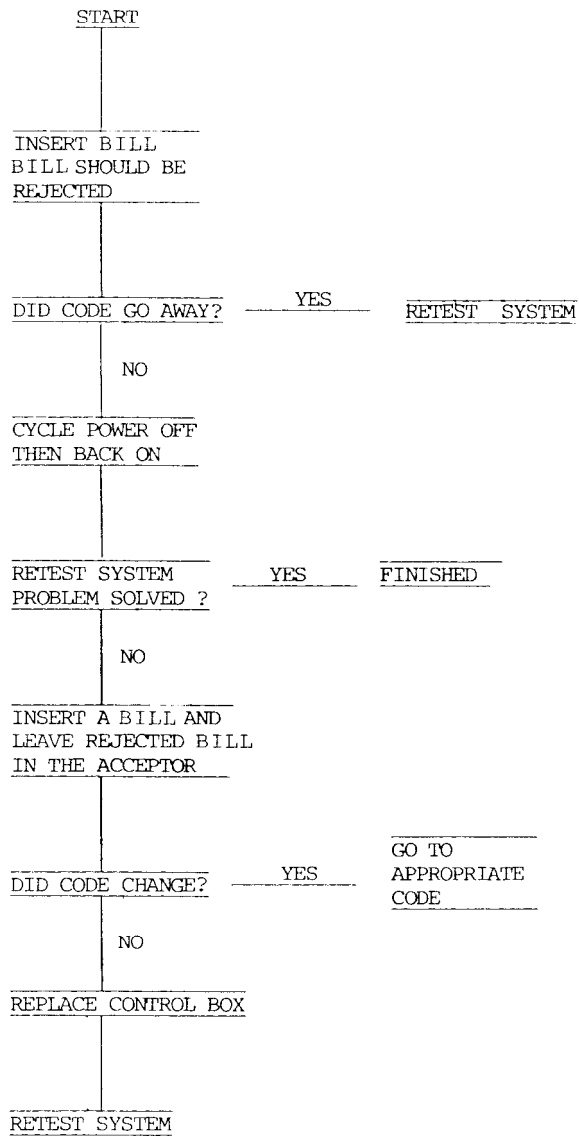
CODE	DISPLAY	DESCRIPTION	POSSIBLE CAUSE(S)
39	6	Leading primary check failed verification. Bill will be returned.	Mag adjustment Mag head alignment Bill path "slip" Tight drive train Faulty solenoid Tight creasing wheels Improper grounding Incorrect bill data
40	6	Trailing primary check failed verification. Bill will be returned.	Mag adjustment Mag head alignment Bill path "slip" Faulty solenoid Tight creasing wheels Incorrect bill data
41	6	Trailing secondary check failed verification. Bill will be returned.	Mag head alignment Ripped/torn bill Incorrect bill data
42	6	Secondary check failed verification. Bill will be returned.	Mag adjustment Mag head alignment Bill path "slip" Faulty solenoid Tight creasing wheels Incorrect bill data
43	7	Motor stalled during cycle. Motor will reverse and possibly jam/jog to try to clear bill path.	Tight drive belts Tight creasing wheels Tight gear mesh Bill path obstacle Inoperative solenoid Mag head too low in path Sensor too low in path Burrs & sharp edges Potential jam
44	7	Motor start cycle failed. Motor will reverse and possibly jam/jog to try to clear bill path.	Tight drive belts Tight creasing wheels Tight gear mesh Bill path obstacle Faulty tach Faulty motor
45	7	Motor drift. Accumulation of 1" travel (tach pulses) with the motor in the OFF state. Motor will reverse and cancel any pending vends.	"Stringing" Manually clearing a jam Loose gear mesh No tach signal
46	8	Bill inserted in wrong direction (optional). Bill will be returned.	Option selected Mag adjustment Incorrect bill data
47	8	Detected bill denomination inhibited. Bill will be returned.	Tight drive train Mag adjustment Mag head alignment Bill path "slip" Faulty solenoid Inhibited denomination Incorrect bill data
50	9	Acceptor sensor failed in idle mode. Acceptor will be disabled until sensor repaired.	Faulty acceptor sensor
51	9	Front sensor failed in idle mode. Acceptor disabled until sensor cleared/repared.	Faulty front sensor

## MBA TECH CODE LISTING (E PROM 57X106)

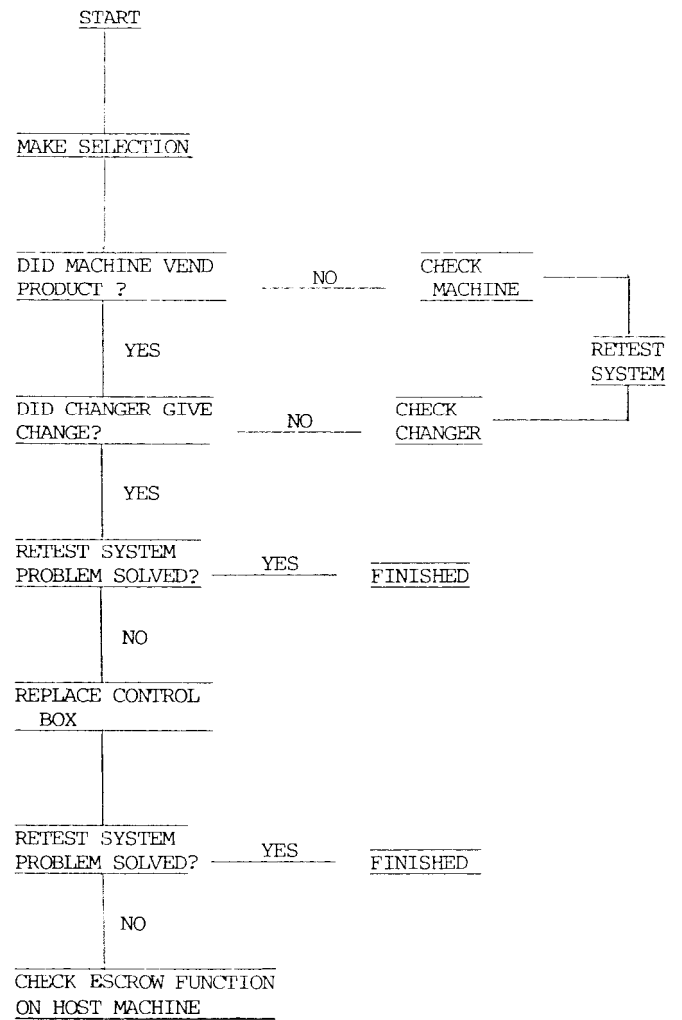
CODE	DISPLAY	DESCRIPTION	POSSIBLE CAUSE(S)
52	9	Note present sensor failed in idle mode. Acceptor disabled until sensor cleared/repaired.	Faulty note present sensor
53	9	Front and note present sensors failed in idle mode. Acceptor disabled until sensors are cleared/repaired.	Faulty note present and front sensors
54	9	Rear clear sensor failed in idle mode. Acceptor disabled until sensor cleared/repaired.	Faulty rear clear sensor
55	9	Front and rear clear sensors failed in idle mode. Acceptor disabled until sensors cleared/repaired.	Faulty rear clear and front sensors
56	9	Note present and rear clear sensors failed in idle mode. Acceptor disabled until sensors cleared/repaired.	Faulty rear clear and note present sensors
57	9	Note present, rear clear and front sensors failed in idle mode. Acceptor disabled until sensors cleared/repaired.	Faulty rear clear, front and note present sensors Faulty acceptor cable
60	9	Acceptor jammed. Acceptor will be disabled until jam is cleared/repaired.	Jam Faulty acceptor sensor
61	9	Acceptor jammed with front sensor covered. Acceptor will be disabled until jam cleared/repaired.	Jam Faulty front sensor Faulty Tach Faulty motor
62	9	Acceptor jammed with bill present sensor covered. Acceptor will be disabled until jam cleared/repaired.	Jam Faulty note present sensor
63	9	Acceptor jammed with bill present and front sensors covered. Acceptor will be disabled until jam cleared/repaired.	Jam Faulty note present and front sensors
64	9	Acceptor jammed with rear clear sensor covered. Acceptor will be disabled until jam cleared/repaired.	Jam Faulty rear clear sensor
65	9	Acceptor jammed with rear clear and front sensors covered. Acceptor will be disabled until jam cleared/repaired.	Jam Faulty rear clear and front sensors
66	9	Acceptor jammed with rear clear and note present sensors covered. Acceptor will be disabled until jam cleared/repaired.	Jam Faulty rear clear and note present sensors
67	9	Acceptor jammed with rear clear, note present, and front sensors covered. Acceptor will be disabled until jam cleared/repaired.	Jam Faulty rear clear, note present, and front sensors Faulty acceptor cable

# TROUBLESHOOTING CHARTS

## STATUS CODE 0



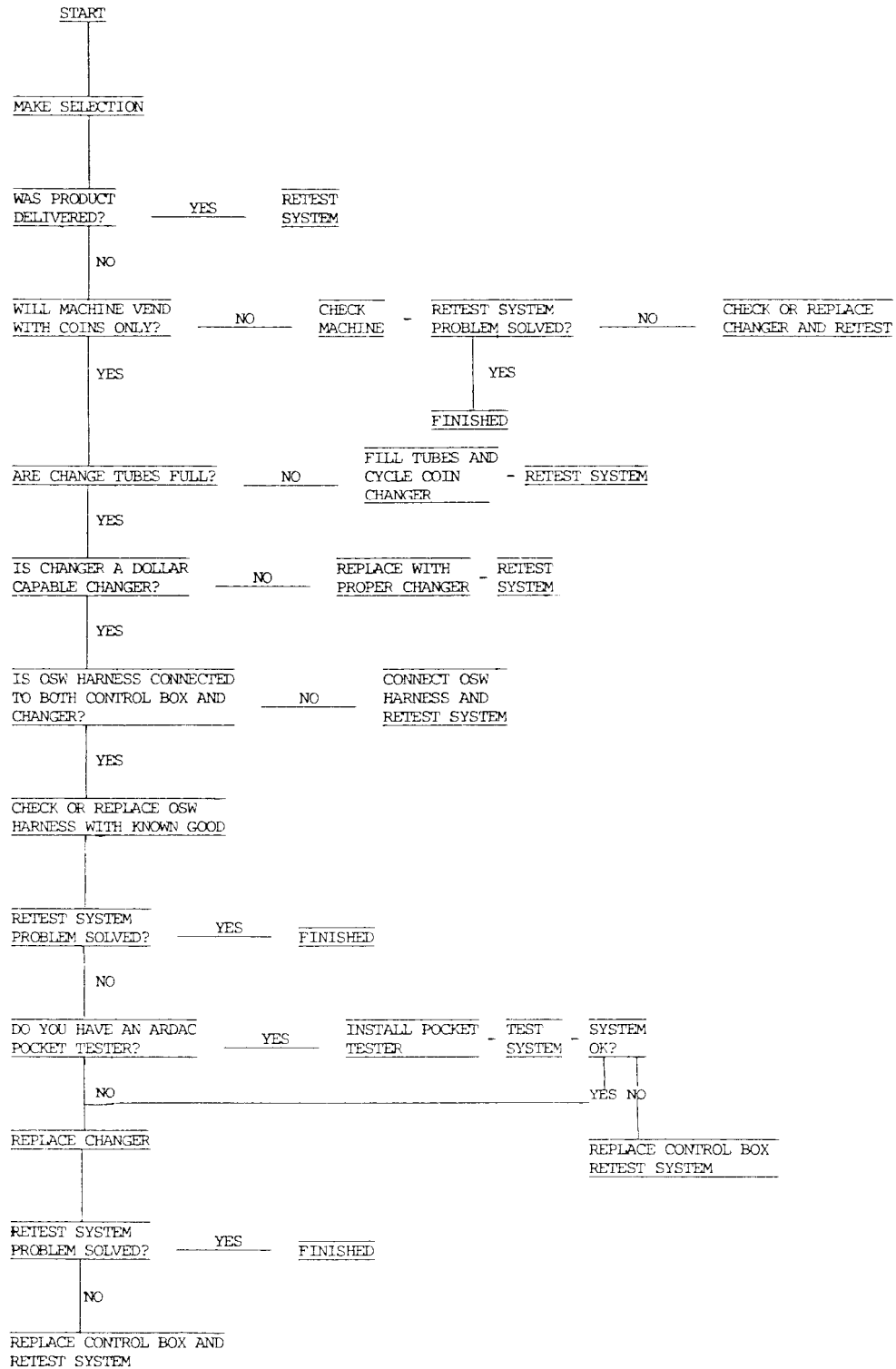
## STATUS CODE 1





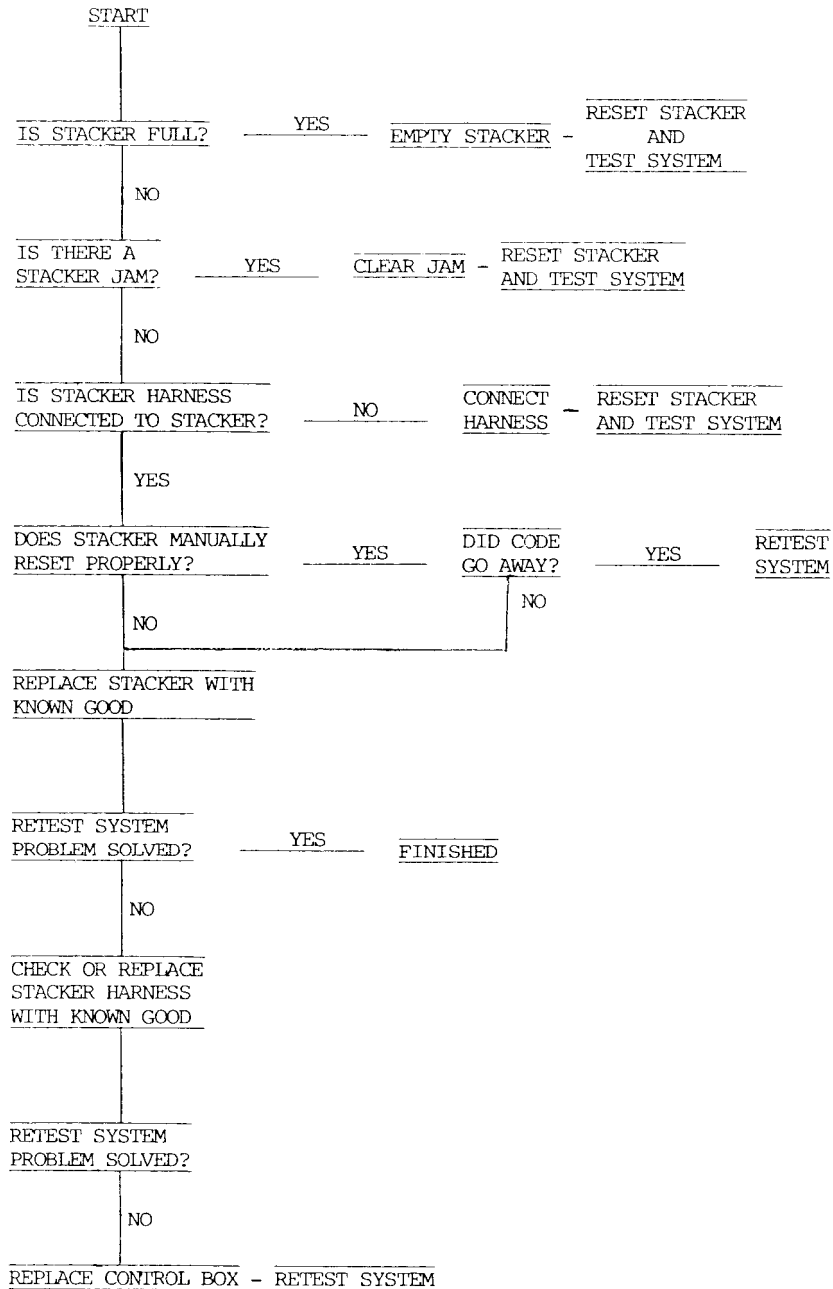
# TROUBLESHOOTING CHARTS

## STATUS CODE 2



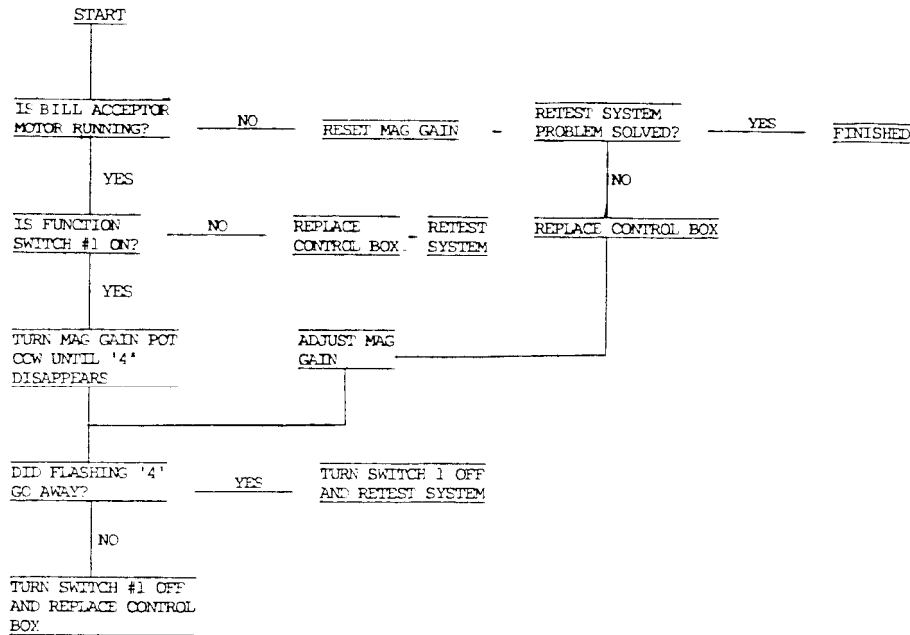
# TROUBLESHOOTING CHARTS

## STATUS CODE 3

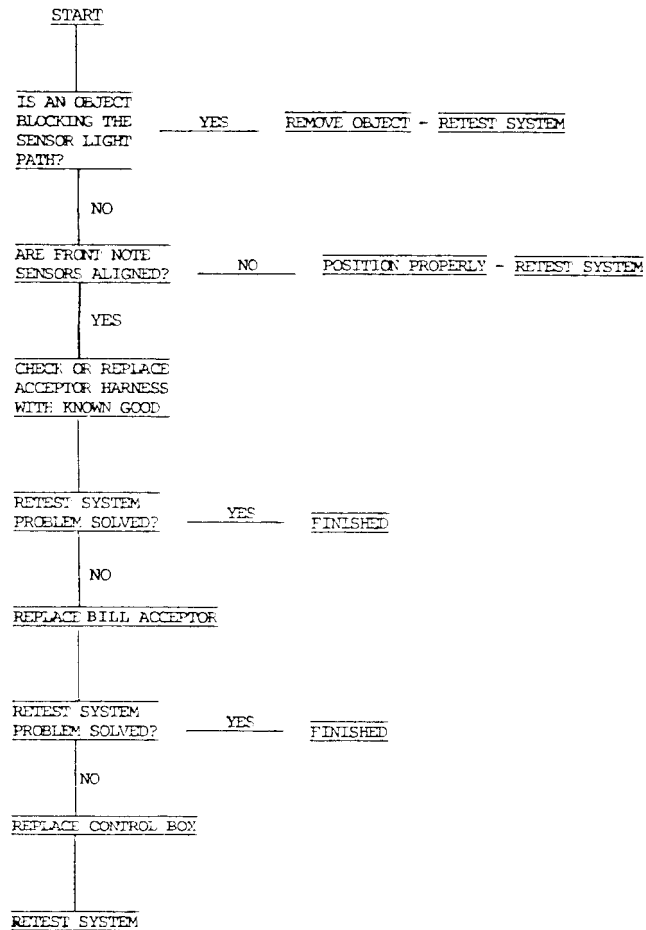
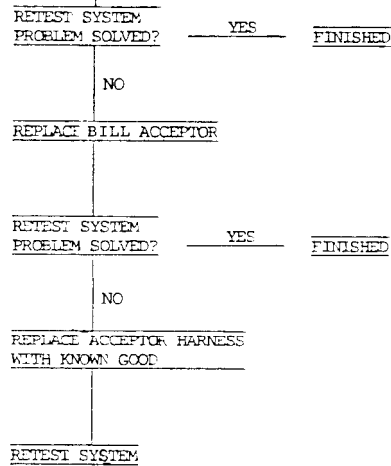


## TROUBLESHOOTING CHARTS

## STATUS CODE 4

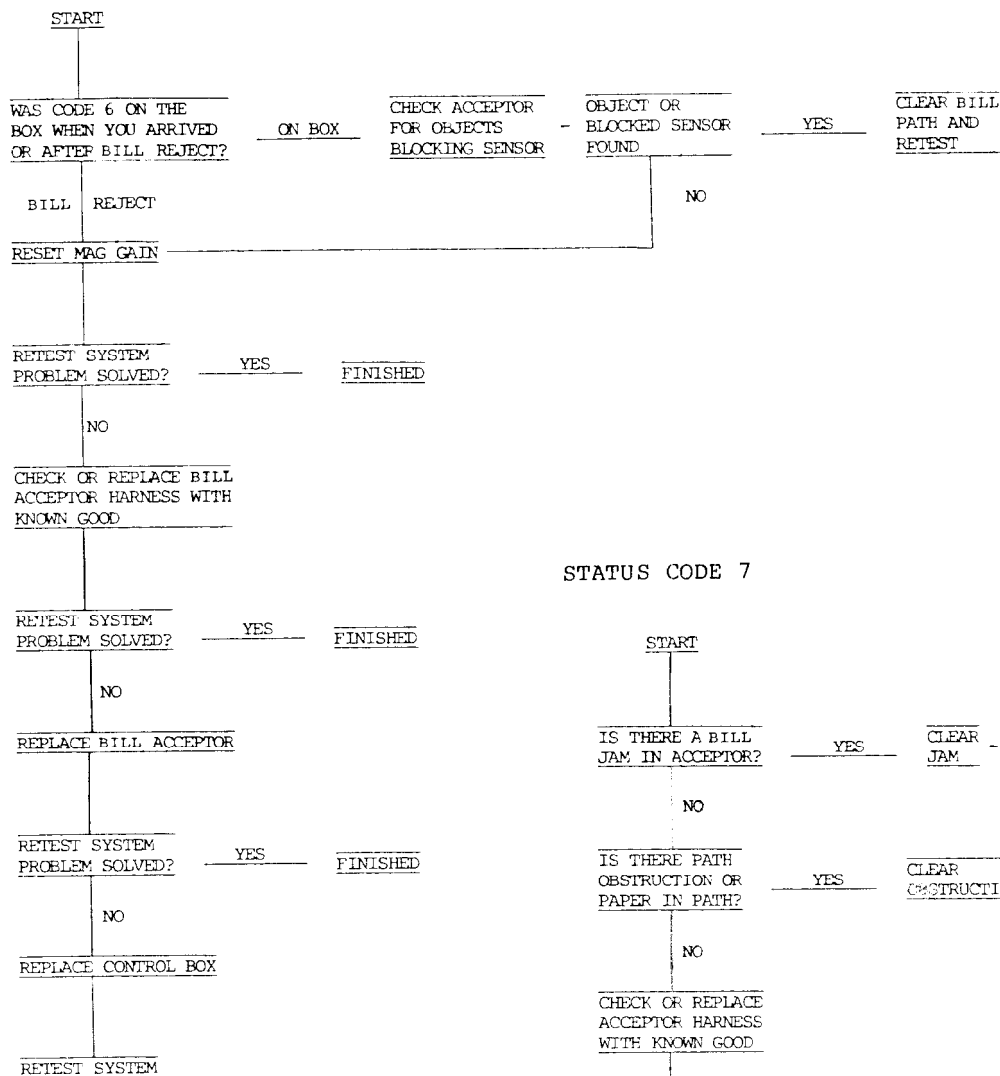


## STATUS CODE 5

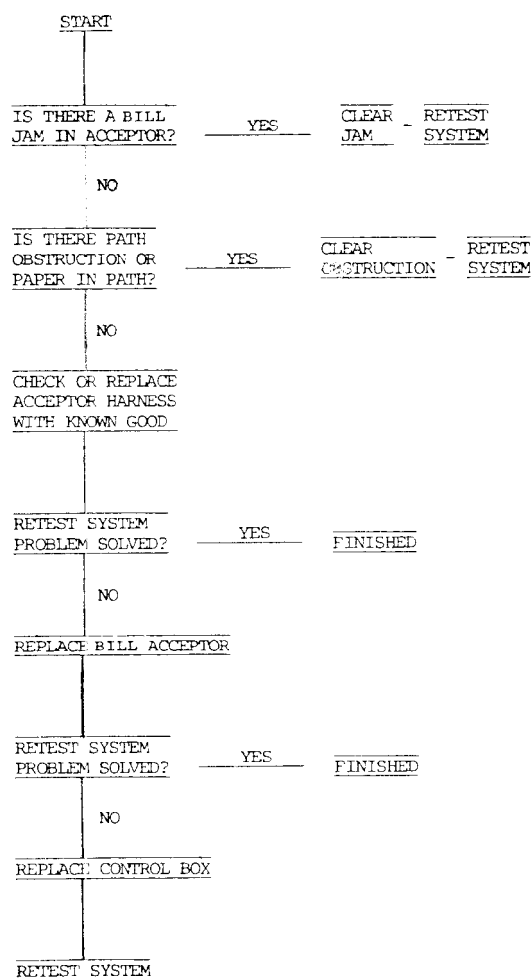


# TROUBLESHOOTING CHARTS

## STATUS CODE 6

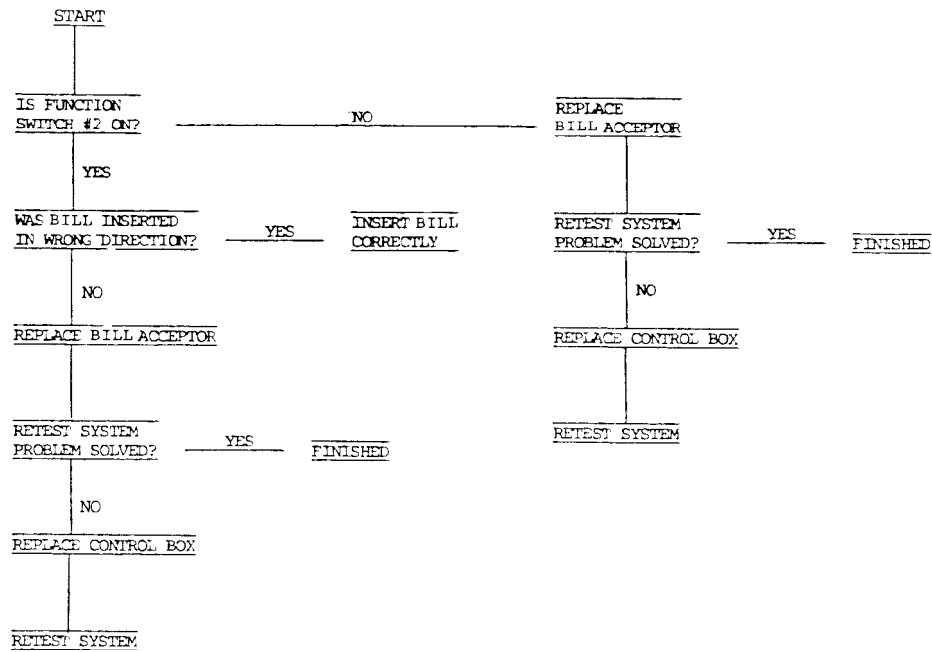


## STATUS CODE 7

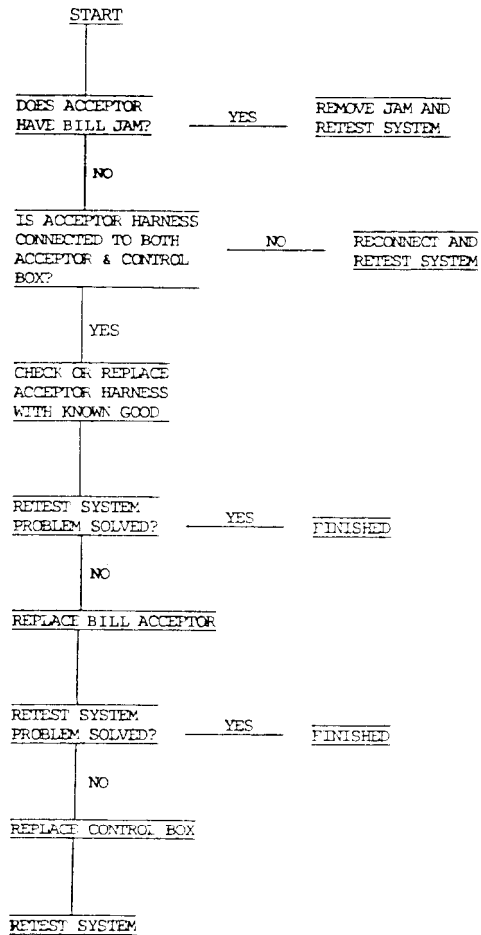


# TROUBLESHOOTING CHARTS

## STATUS CODE 8



## STATUS CODE 9



## RECOMMENDED CLEANING AND MAINTENANCE

Due to the nature of dollar bills and the environment they are exposed to, it is inevitable that dollar bill handling devices will build up a film of oil, grease, and dirt from the dollar bills themselves. The ARDAC MBA Acceptor is no exception, and if enough dirt is allowed to build up on the acceptor drive belts and the magnetic head, poor acceptance will result.

It is recommended that the acceptor note path and drive belts be cleaned approximately once a year or as needs dictate.

The following cleaning procedure will remove any build-up of oil, grease, and dirt that is collected in the acceptor through normal use.

1. Set the acceptor upside down on its lid. Turn Function Switch #1 on. The acceptor motor will run continuously. Apply isopropyl alcohol liberally in drops while the acceptor motor is running.
  - 1a. With the motor still running, use a soft paper towel to dry and clean the belts (see Figure 1), one at a time. Apply as many times as necessary until no more dirt or oil can be removed.
2. The black timing belt may be cleaned in the same manner as above.
3. Open the acceptor cover as shown in Figure 2. With the acceptor motor still running, as above, apply isopropyl alcohol to the idler belts (outer side). See Figure 3, #1.
4. It is necessary to also clean the inner side of the idler belts. If the inside of the idler belts are oily, the idler belts may be driven off their rollers. In this procedure, it is necessary to place a Q-tip soaked with isopropyl alcohol underneath the idler belt (see Figure 3, #2).
5. While the motor is still running, insert a strip of clean bond paper that has been soaked with isopropyl alcohol in the center and let it run through once or twice. Then insert a strip of clean dry bond paper and let it run through once or twice. This will clean off any excess dirt build up on the magnetic sensor.
6. Turn off Function Switch #1.
7. Wipe off any dirt that may have collected on both the gray and the black tension rollers, as well as the idler belt rollers.
8. Wipe the note insertion opening with a soft cloth.
9. Clean the front note emitter (top) and photo sensor (bottom) using a Q-tip applicator and isopropyl alcohol.
10. After cleaning and inspection of the belts, check the appropriate adjustment page for proper tension of the belts.

NOTE: The unit requires no lubrication at any time. The use of lubricants will lead to premature dirt build up and possible drive belt slippage.

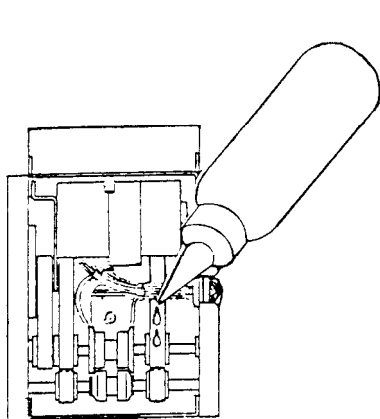


FIGURE 1

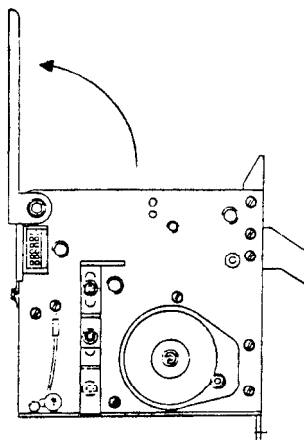


FIGURE 2

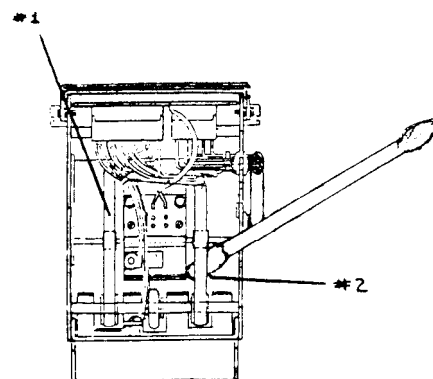


FIGURE 3

## HOW TO CLEAR ACCEPTOR JAMS

To clear an acceptor jam, first remove power from the system. Note: Failure to remove power while clearing an acceptor jam could cause the acceptor motor to run, resulting in damage to the acceptor or personal injury. You will see an opening in the housing with a big plastic drive gear. Manually turn the gear by inserting a pen in one of the holes provided, either forward or reverse, depending on where the jam occurred, to try and drive out the jammed object.

In the case of a smaller object that may not be located under one of the two drive belts, lift the top lid of the acceptor and remove the foreign object with tweezers.

In the case of removing a coin that was inserted into the acceptor, the coin must be driven out the way it entered. Do not try to force the coin through the unit. Damage to the bill path may occur.

After clearing the jam condition in the acceptor, inspect the drive belts and idler belts to insure that no damage to the belts has occurred or that the jam condition has not caused any belts to be driven off their pulleys.

Re-apply power and test the acceptor.

## BILL ACCEPTOR ADJUSTMENTS

Note: After any adjustments are made, a complete system test should be performed.

### ADJUSTMENT 1 - BILL ENTRANCE

The bill entrance escutcheon should be adjusted vertically so that its bill path surface is flush with the bill path surface of the bottom bill path member. To adjust, loosen the four screws(A), (2 of each side), position the escutcheon, then tighten the top screw on the right-hand side and then the bottom screw on the left-hand side, then tighten the remaining two screws. Refer to Figure 1.

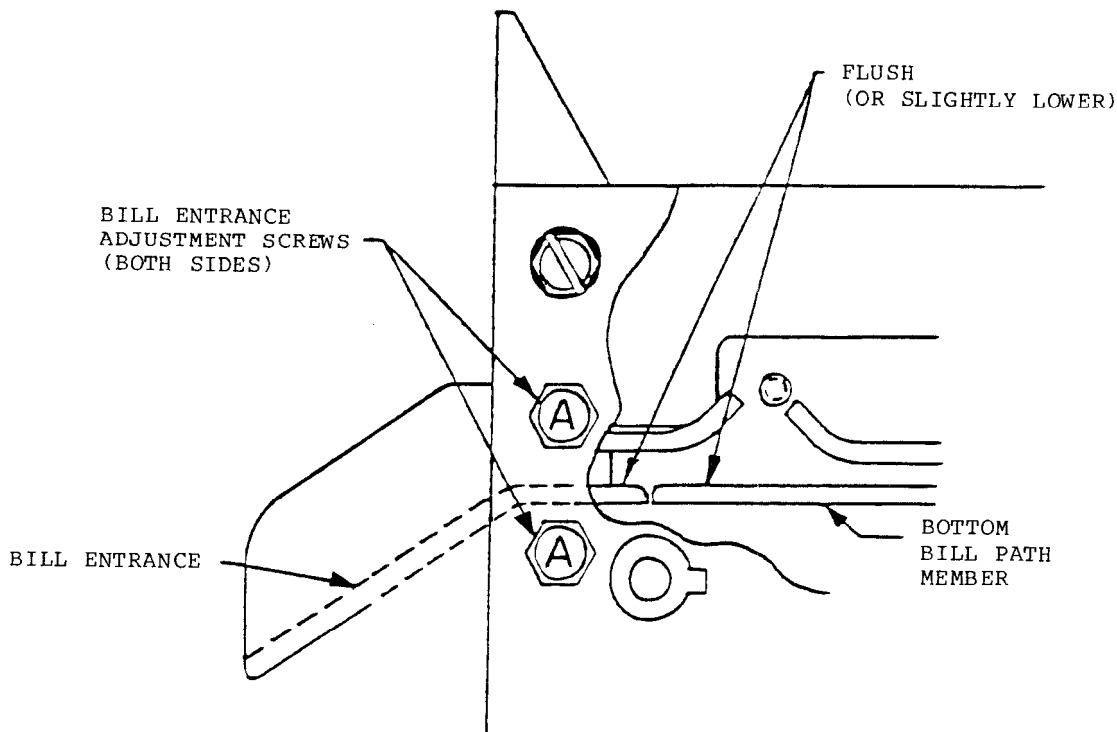
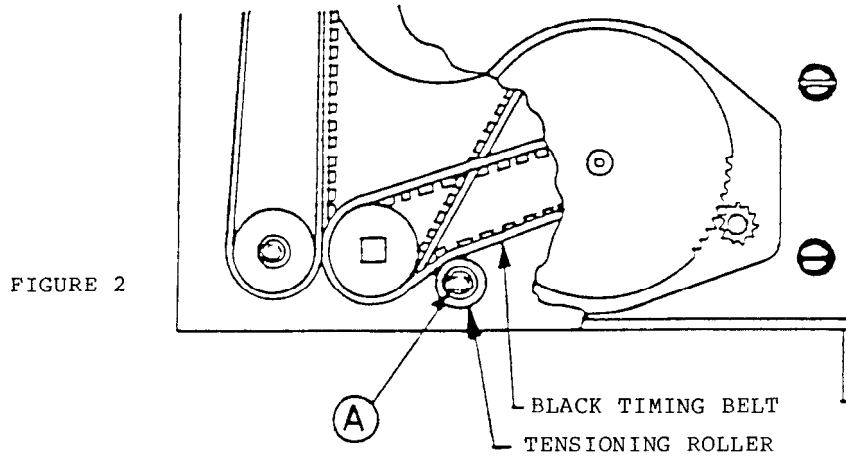


FIGURE 1

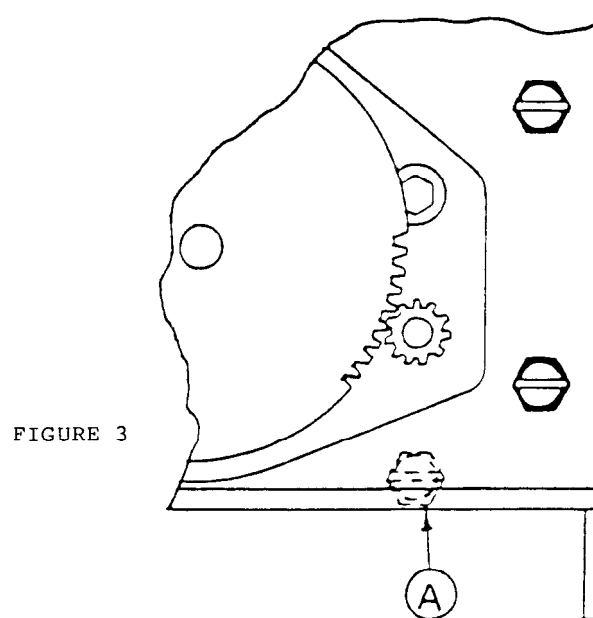
#### ADJUSTMENT 2 - BLACK BELT TENSION

Check the tension of the black timing belt. If an adjustment is required, loosen screw (A) in Figure 2; reposition the roller and tighten screw (A). The belt should be just tight enough to avoid skipping teeth.



#### ADJUSTMENT 3 - GEAR MESH

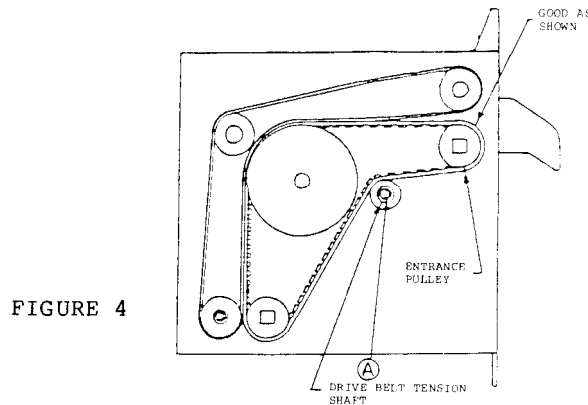
Visually check the gear mesh so that the teeth of both gears overlap approximately 2/3, and so that there is some rotational play in their mesh. These adjustments should be checked in 4 places, 90 degrees apart, which you can mark on the large plastic gear. The adjustment is made by loosening with an open end wrench to a snug position the motor screw (A) in Figure 3, and rotating the motor so that the motor gear moves towards or away from the large plastic gear as required. Tighten screw (A) fully and recheck.





#### ADJUSTMENT 4 - DRIVE BELT TENSION

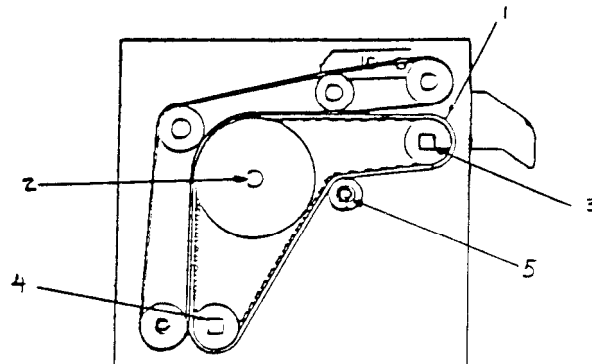
Adjust the tension of the gray timing belts so that no raising of the belts occurs just past the entrance pulleys. Rotate the belts by manually rotating the large drive gear on the left side of the acceptor with the power removed from the acceptor. Adjust the tension by loosening the drive belt tension shaft mounting screws (A) (one screw on each side) and pushing the shaft into the belts to increase the tension away from the belts to reduce the tension; then tighten screws (A). Refer to Figure 4.



#### INSTRUCTIONS FOR INSTALLING MBA BELTS

##### MBA BILL ACCEPTOR TIMING BELT REMOVAL AND REPLACEMENT - GRAY BELTS

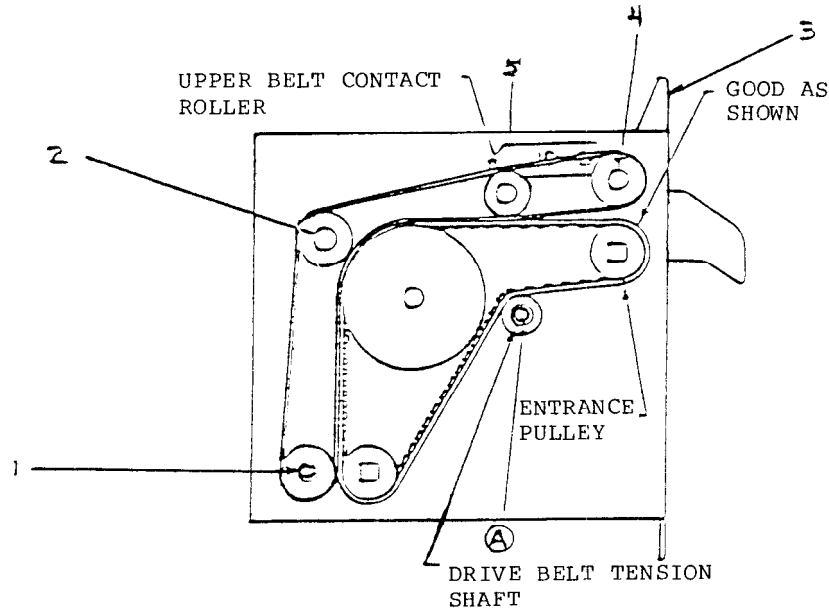
1. Remove the acceptor cover.
2. Remove one side plate at a time; first remove the left-hand side plate by removing all of the side plate screws, including the cover's allen head screw, and the two back plate screws. Leave the latch assembly on the side plate. On 1x224-050X and 1x224-060X series acceptors, remove the E-rings on the side plate where seen.
3. After the left-hand side plate is removed, the gray timing belt can be seen.
4. Cut the timing belt and remove it.
5. When replacing the timing belt (Item 1), carefully place the new belt over the pulley drum shaft (Item 2). You may want to compare the position of the other timing belt when placing the new one on. At the same time, place the belt over the front drive shaft (Item 3) onto the pulley gear and over the main drive shaft (Item 4) onto the pulley gear. Place the belt tension shaft (Item 5) back in place and adjust the tension later. NOTE: TIMING BELTS SHOULD BE REPLACED IN PAIRS! See the figure below.
6. When the timing belt is in position and all of the shafts are in completely, carefully place the side plate on the same way it came off, making sure that the keyed bearings for the front drive shaft and the main drive shaft are in place.
7. Put the screws and E-rings back in. The holes with slots require screws with a lockwasher and a flatwasher.
8. Now the right-hand side plate can be removed and the same procedure as outlined above should be followed for replacing the right-hand timing belt. The wiring harness need not be removed, just carefully move it to the side while removing the side plate.
9. Once all the parts are assembled, adjust the acceptor following the adjustment section of this manual.



### INSTRUCTIONS FOR INSTALLING MBA BELTS

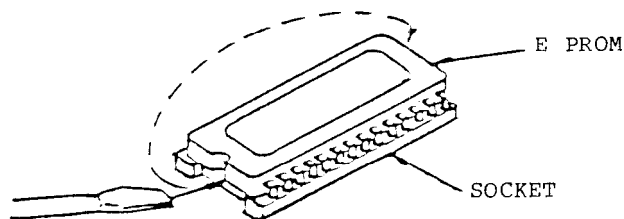
#### MBA BILL ACCEPTOR IDLER BELT REMOVAL AND REPLACEMENT - CLEAR/BLACK BELTS

1. Remove the acceptor cover.
2. Remove the back plate assembly.
3. Remove the rear idler shaft (Item 1) and the corner idler shaft (Item 2).
4. Remove the top front spacer (Item 3) and the front idler shaft (Item 4). On 1x224-050X and 1x224-060X series acceptors, the magnetic head mount shaft must be removed via the E-ring assembly.
5. Now the idler belts (Item 5) can be removed by pulling the belts out near the front of the acceptor. NOTE: IDLER BELTS SHOULD BE REPLACED IN PAIRS! See the figure below.
6. Replace the idler belts and reassemble the acceptor in reverse order.
7. Once all the parts are assembled, adjust the acceptor following the adjustment section of the manual.



### INSTRUCTIONS FOR EXCHANGING E PROMS IN MBA CONTROL BOXES

1. Turn off the power to the control box and disconnect the 120 VAC power cable (3-pin plug).
2. Remove the cover from the control box by removing the (4) screws and disconnecting the stacker plug.
3. Carefully remove the E PROM using a small flat blade screwdriver. Insert the blade BETWEEN the E PROM and it's socket and GENTLY PRY UP on both ends evenly.

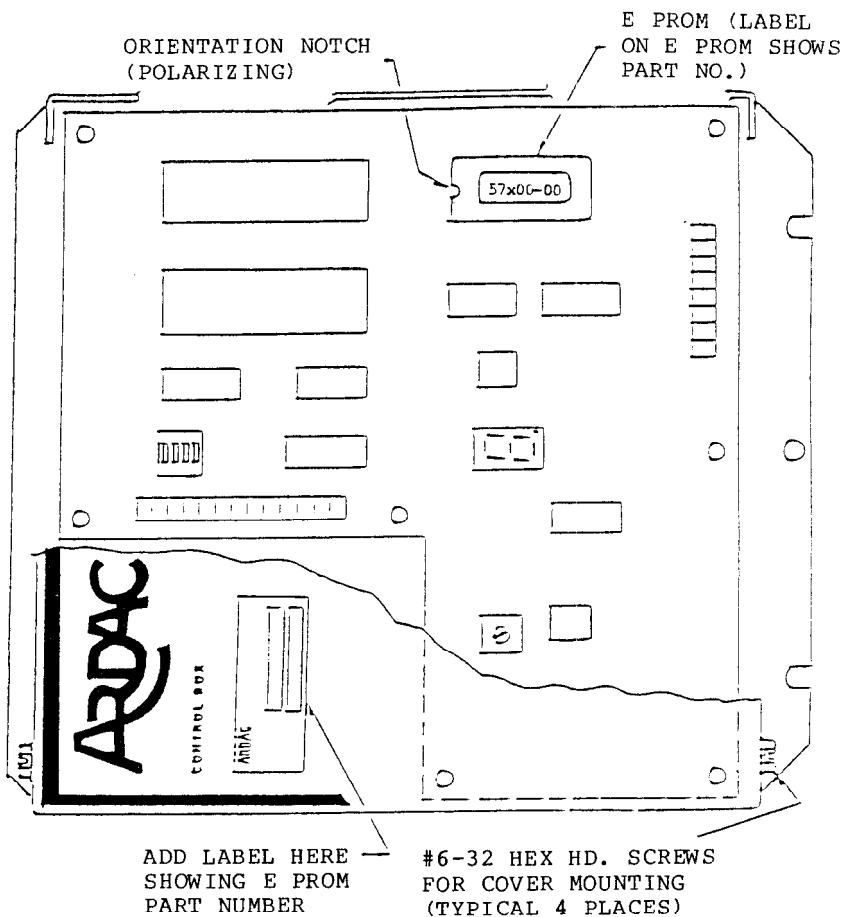


4. Carefully align and match the pins to insert the new E PROM in the socket with the orientation notch toward the center of the board. See the control box diagram.
5. Double check to see that all 28 pins are in the socket correctly.
6. Put the cover back on and plug in the stacker cable.

CAUTION!! Refer to the control box diagram for the location of the E PROM and proper polarization.

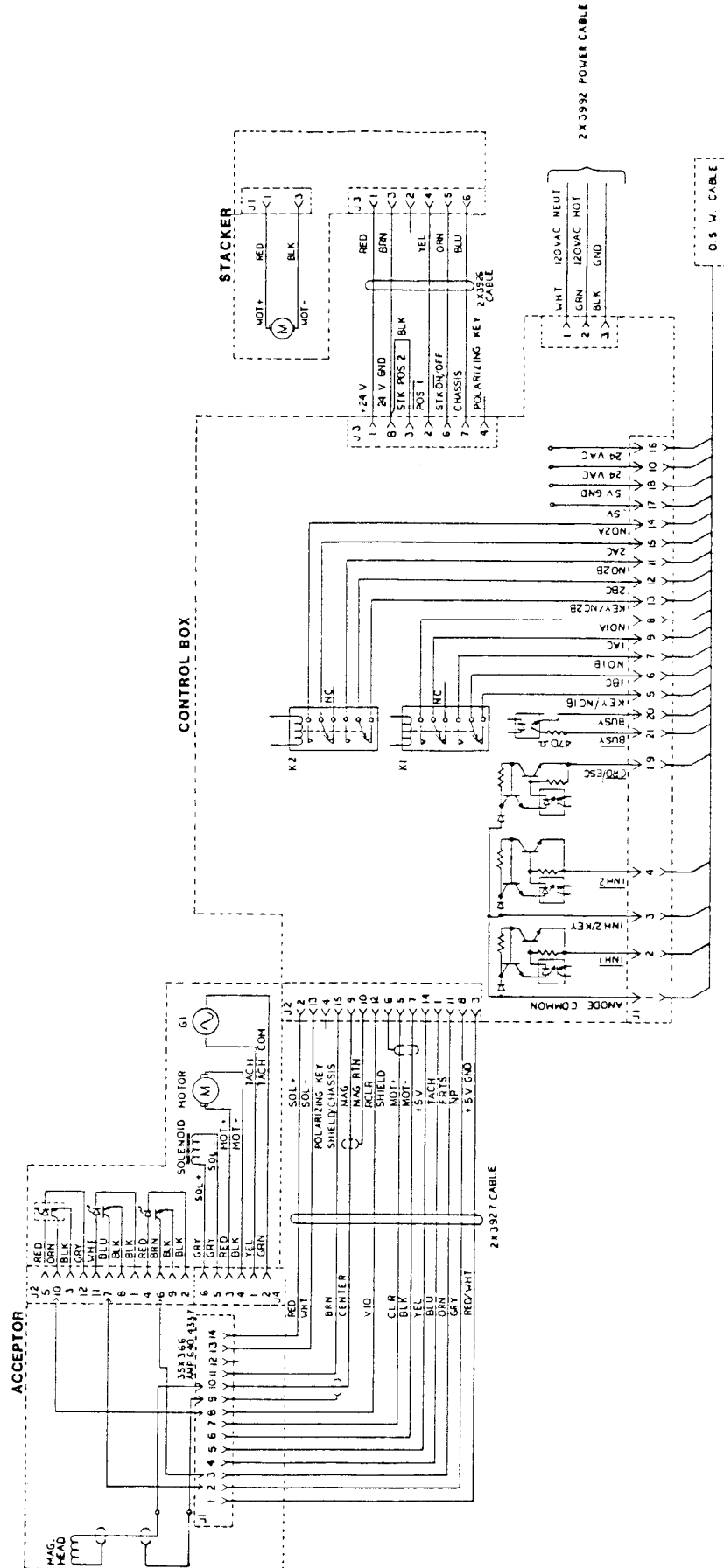
If plugged in wrong, the E PROM will be ruined.

It is suggested that the label included with the E PROM be applied to the outside cover as shown at the bottom of this page to identify converted boxes.

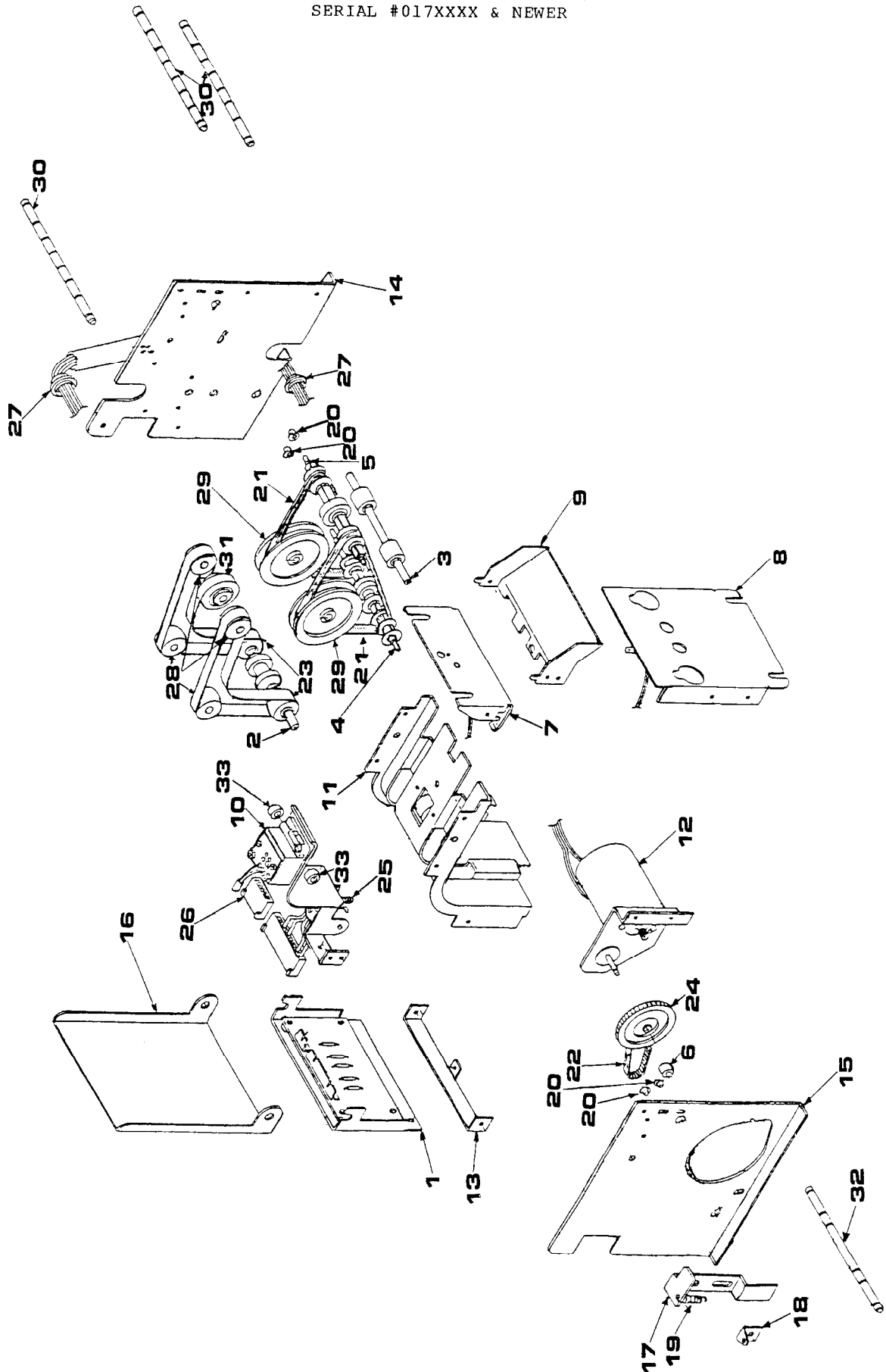


# MBA SYSTEM SCHEMATIC, UNIVERSAL

## MBA SYSTEM SCHEMATIC, UNIVERSAL



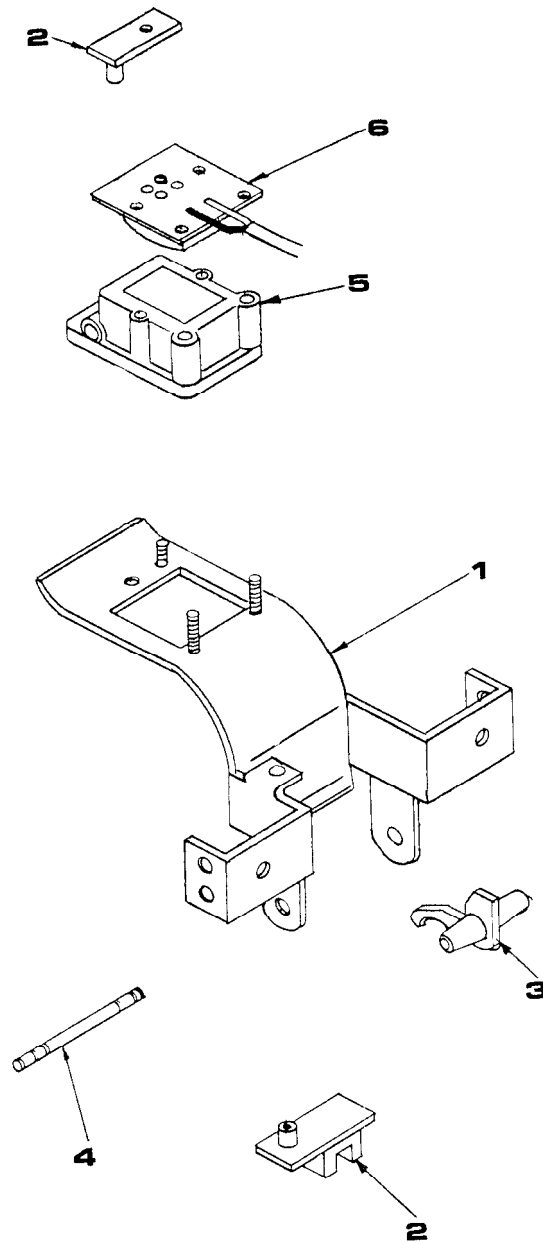
1X224-0501 MBA NOTE ACCEPTOR  
SERIAL #017XXXX & NEWER



1X224-0501 MBA BILL ACCEPTOR

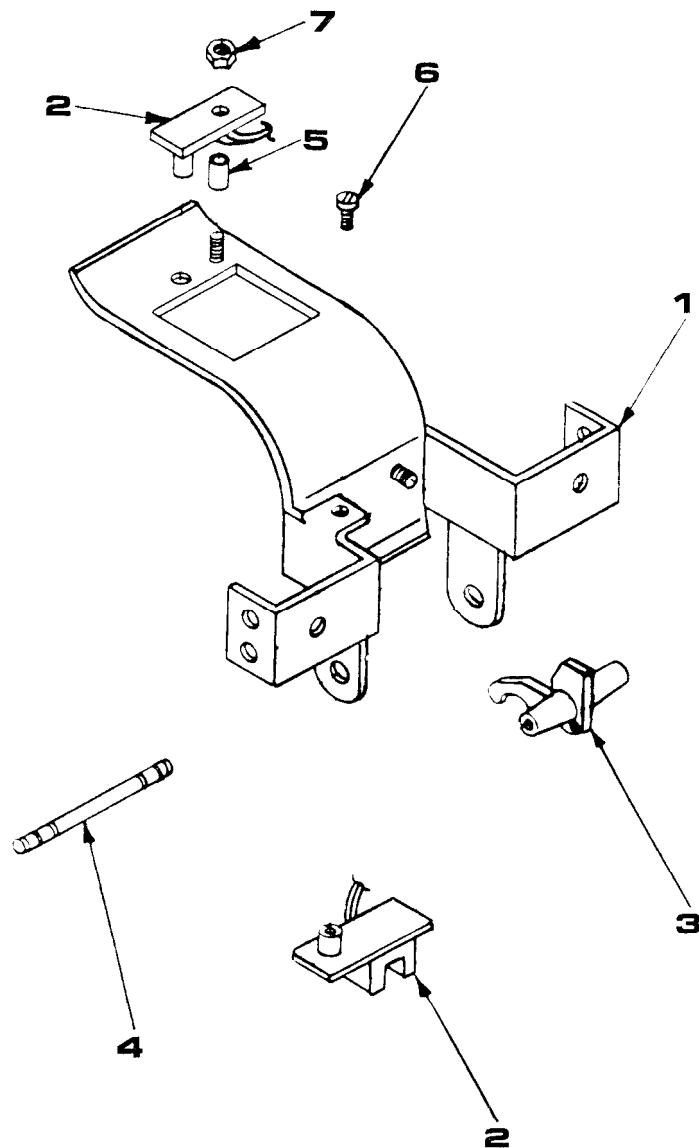
ITEM	PART NUMBER	DESCRIPTION	ITEM	PART NUMBER	DESCRIPTION
1	2x3936-1 2x3968-4 12x460-1	Back Plate Assy P.C. Board Plate	12	11x1166	Rear Spacer
2	2x4360 20x576 17x846 17x800	Rear Idler Shaft Assy Shaft Note Forming Wheel Idler Roller	13	11x1156-2	Plate, Right-Hand
3	2x3944 20x512 17x803	Take-Up Shaft Assy Shaft Take-Up Pulley	14	11x1157-2	Plate, Left-Hand
4	2x4145 20x516 17x848 18x67 18x69	Main Drive Shaft Assy Shaft Note Forming Roller Pulley - Gray Belt Pulley - Black Belt	15	12x455-1	Cover Plate
5	2x3947 20x523 18x67 2x3947-1	Front Drive Shaft Shaft Pulley Note Centering Wheel	16	12x456	Latch Stacker
6	2x3948 20x526 17x811	Drive Belt Take-Up Roller Shaft Roller	17	12x457	Latch Spring Mount
7	2x3950 11x1243 2x4091	Upper Spacer Assy Upper Spacer Detector Assy	18	33x13	Spring Latch
8	11x1161-1	Escutcheon	19	19x9	Bearing, Drive Shaft
9	2x4210	Top Bill Guide	20	29x82	Gray Drive Belt
10	2x4143	Bottom Bill Track	21	29x83	Black Drive Belt
11	2x3964	Motor Assy	22	29x84	Idler Flat Belt
			23	18x71	Pulley & Gear
			24	33x143	Spring
			25	35x357-6	Plug, 6-pin
			26	17x8	Grommet
			27	17x800	Roller
			28	17x802	Pulley Drum
			29	20x555	Shaft
			30	17x813	Note Centering Wheel
			31	20x554	Shaft
			32	17x869	Roller

2X4210 TOP BILL GUIDE  
SERIAL #046XXXX & NEWER



ITEM	PART NUMBER	DESCRIPTION
1	11x1159-1	Top Bill Guide
2	2x4150 56x148	Harness Rear Clear Assembly Rear Clear Opto-Interrupt
3	17x833	Optical Interrupt Vane
4	20x518	Shaft Rear Clear
5	17x868	Mount - Mag Head
6	2x4211	Mag Head

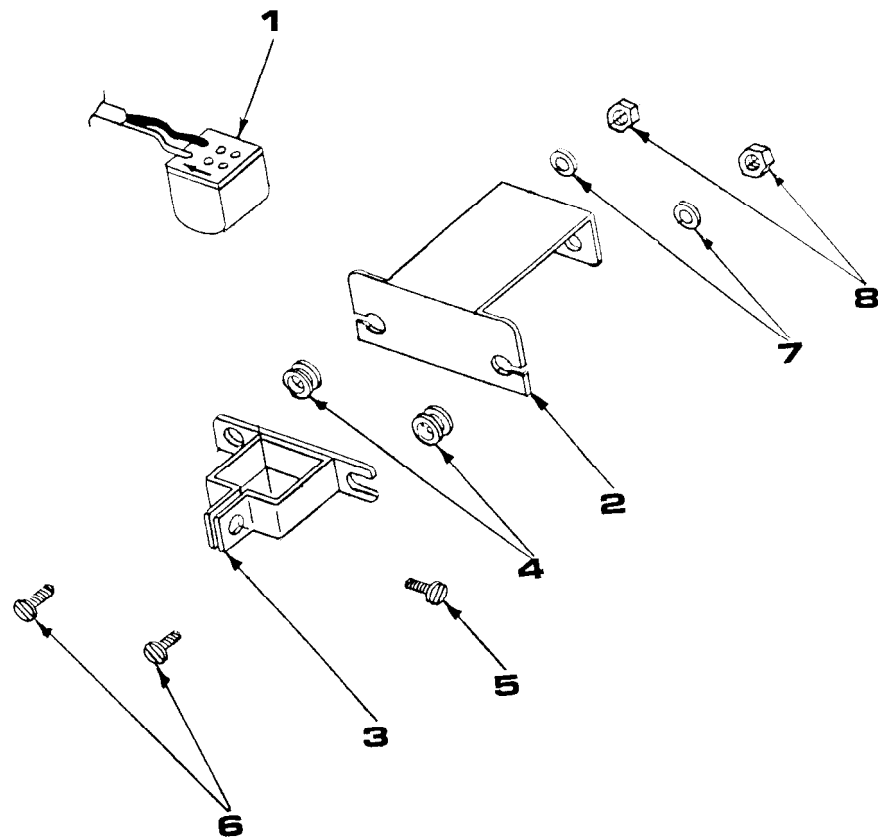
2X4092 TOP BILL GUIDE  
SERIAL #036XXXX & EARLIER



ITEM	PART NUMBER	DESCRIPTION
1	11X1159	Top Bill Guide
2	2x4150 56x148	Harness Rear Clear Assembly Rear Clear Opto-Interrupt
3	17x833	Optical Interrupt Vane
4	20x518	Shaft Rear Clear
5	21x35	Spacer
6	30x44	#2-56 Screw
7	32x22	#4-40 Keps Nut

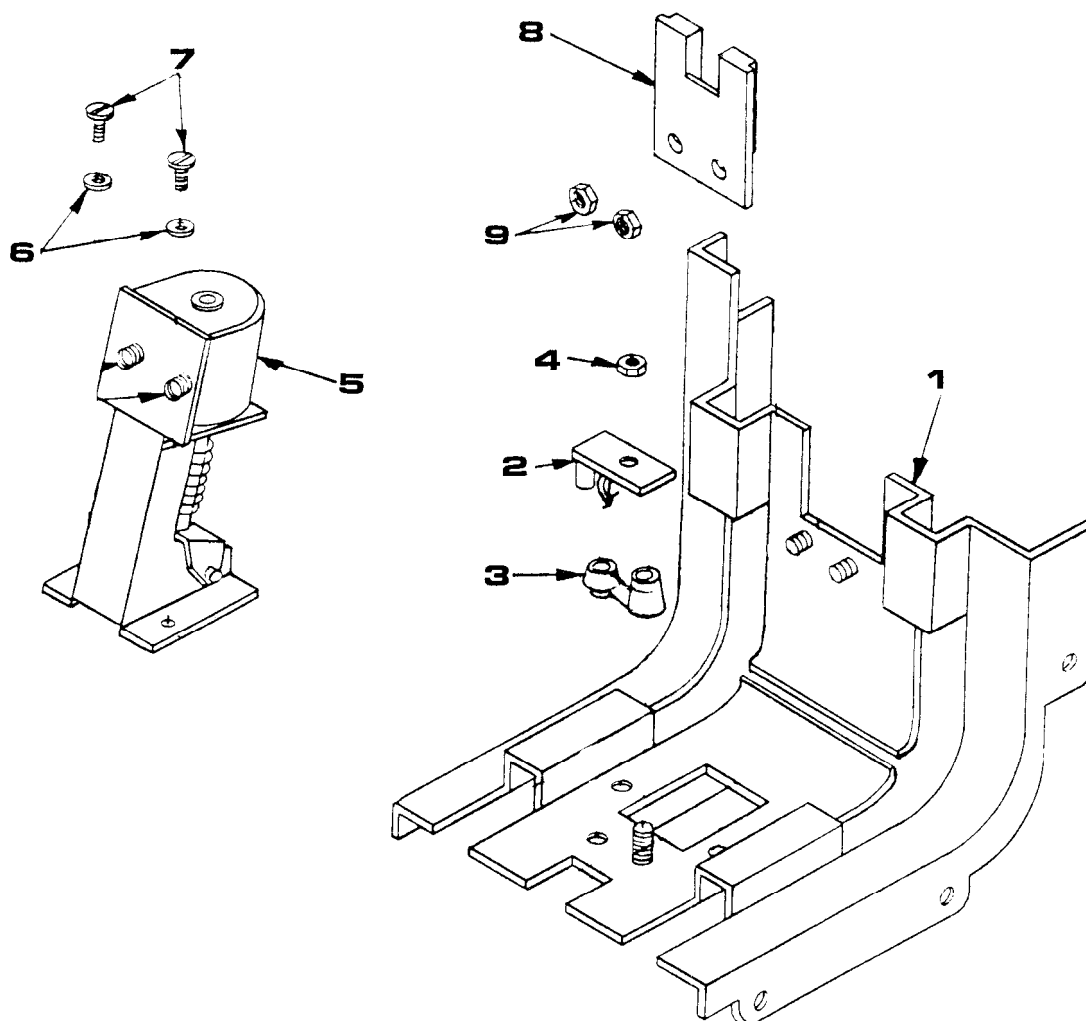


2X3962 MAGNETIC HEAD & MOUNTING  
SERIAL #036XXXX & EARLIER



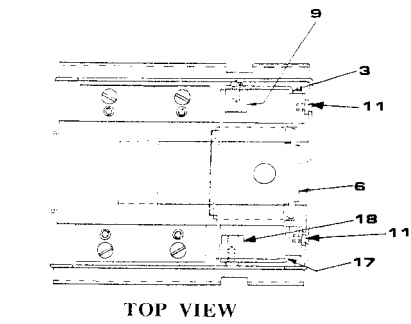
ITEM	PART NUMBER	DESCRIPTION
1	2X3961	Magnetic Head Assembly
2	11x1167	Mounting Magnetic Head
3	11x1168	Magnetic Head Retainer
4	16x43	Grommet
5	30x44	#2-56 Screw
6	30x73	#2-56 Screw
7	31x14	#2 Flatwasher
8	32x12	#2-56 Hex Nut

# 2X4143 BOTTOM BILL TRACK

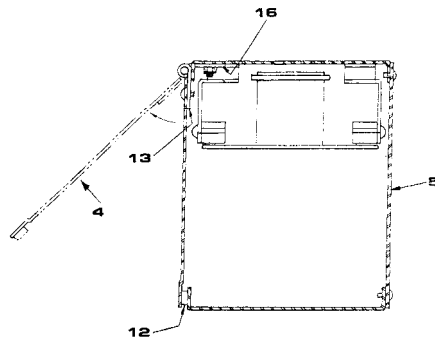


ITEM	PART NUMBER	DESCRIPTION
1	11x1158	Bottom Track
2	2x4149	Bill Present Detector
3	17x874	Emitter-Sensor PCB Mount
4	32x22	#4-40 Hex Nut
5	2x4187	Mag Head Pressure Roller
6	31x59	Flat Washer
7	30x95	#4-40 Screw
8	17x851	Filler, Tine Cutout
9	32x12	#2-56 Hex Nut

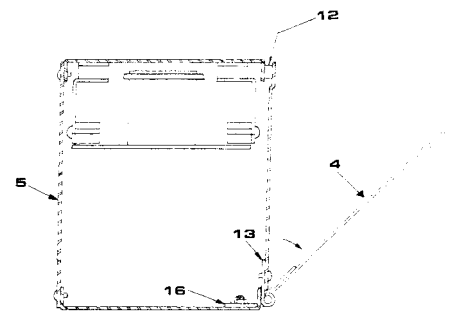
# 48X268-1001 MBA BILL STACKER



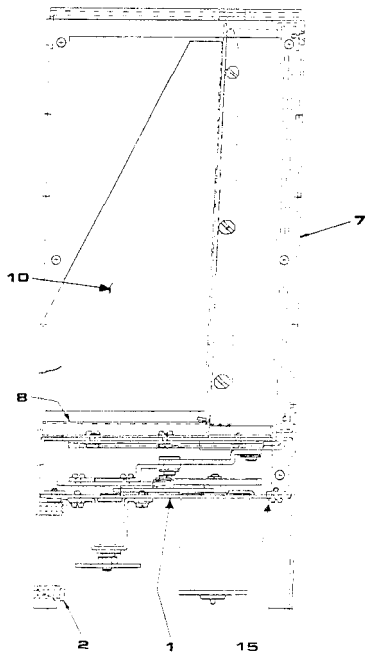
TOP VIEW



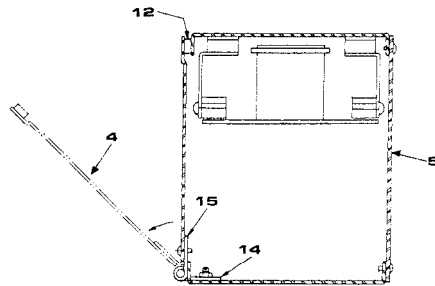
HINGE POSITION (LEFTHAND REAR)



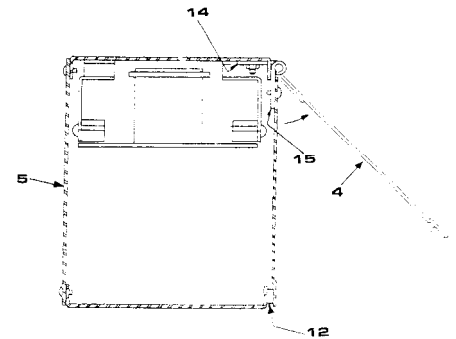
HINGE POSITION (RIGHTHAND FRONT)



RIGHT SIDE VIEW



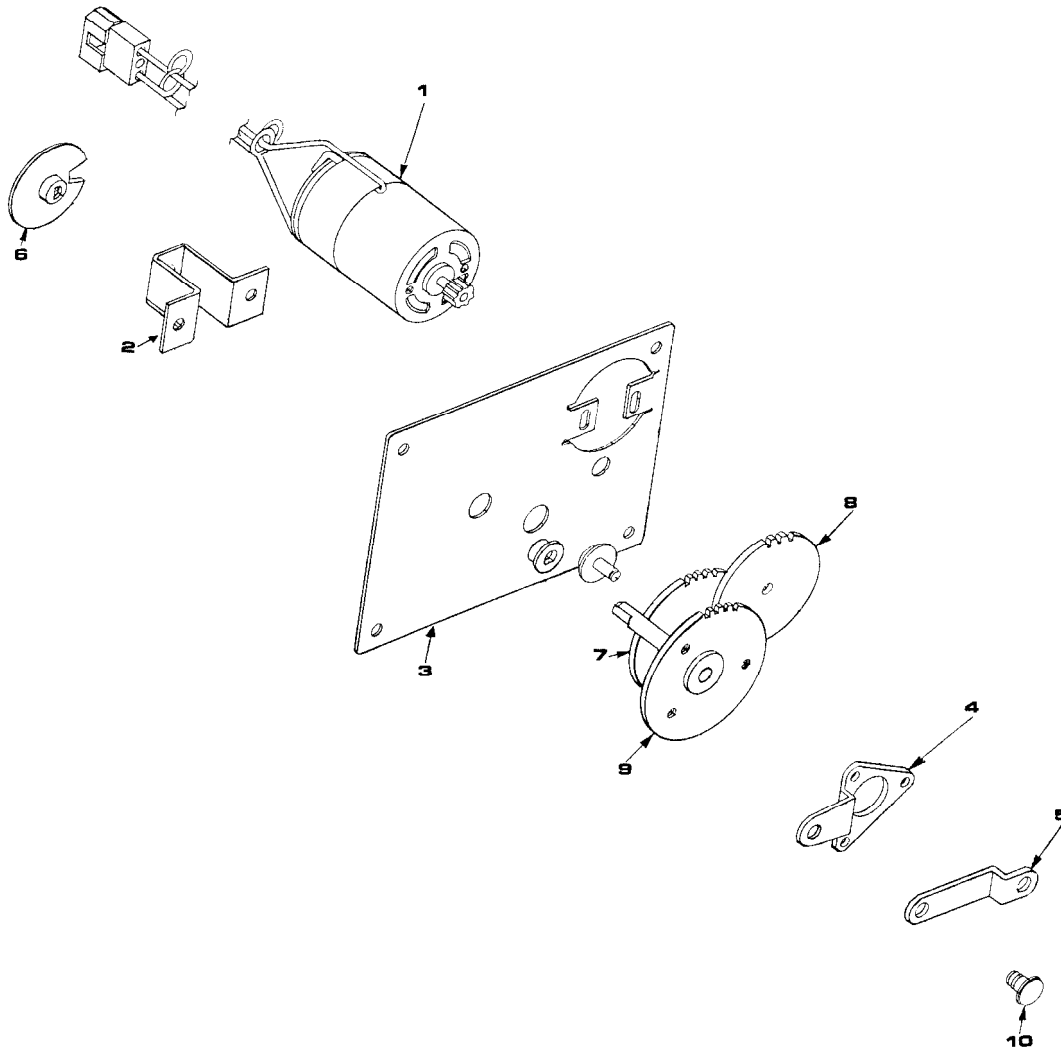
HINGE POSITION (LEFTHAND FRONT)



HINGE POSITION (RIGHTHAND REAR)

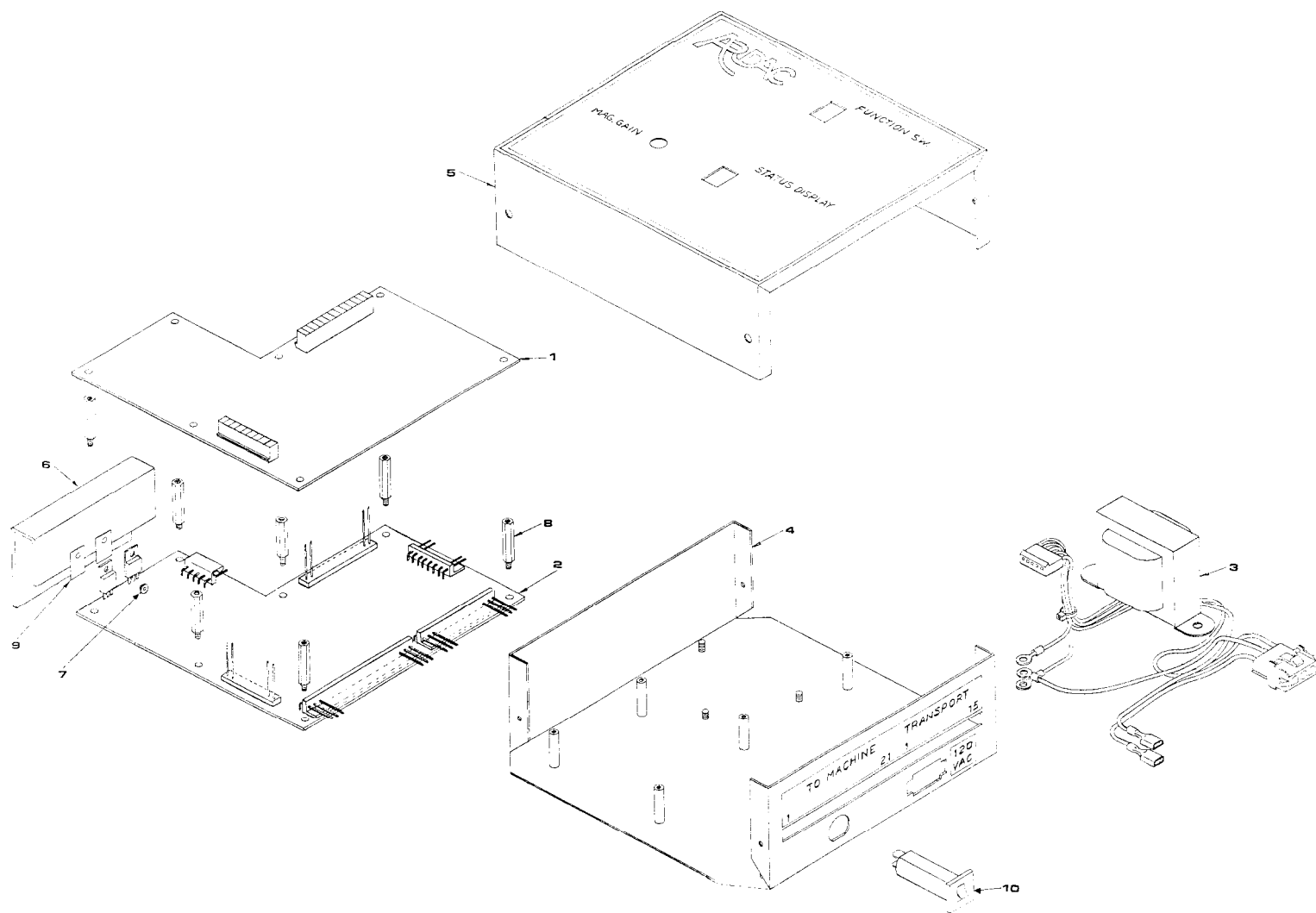
ITEM	PART NUMBER	DESCRIPTION	ITEM	PART NUMBER	DESCRIPTION
1	2x3986-2	Drive Plate Assy	10	17x821	Foam Spacer
2	2x4026	Stacker PC Bd Assy	11	17x871	Spacer, Note Guide
3	11x1260-1	Chute, Left-Hand	12	29x91	Magnetic Strip
4	11x1232	Door	13	29x92-1	Hinge, LH Female
5	11x1238	Side Plate	14	29x92-2	Hinge, LH Male
6	11x1259	Note Punch Weldment	15	29x92-3	Hinge, RH Female
7	11x1234	Stacker Weldment	16	29x92-4	Hinge, RH Male
8	12x468	Bill Spacer	17	11x1260-2	Chute, Right-Hand
9	17x828-1	Spacer, Left-Hand	18	17x828-2	Spacer, Right-Hand

# 2X3986-2 DRIVE PLATE



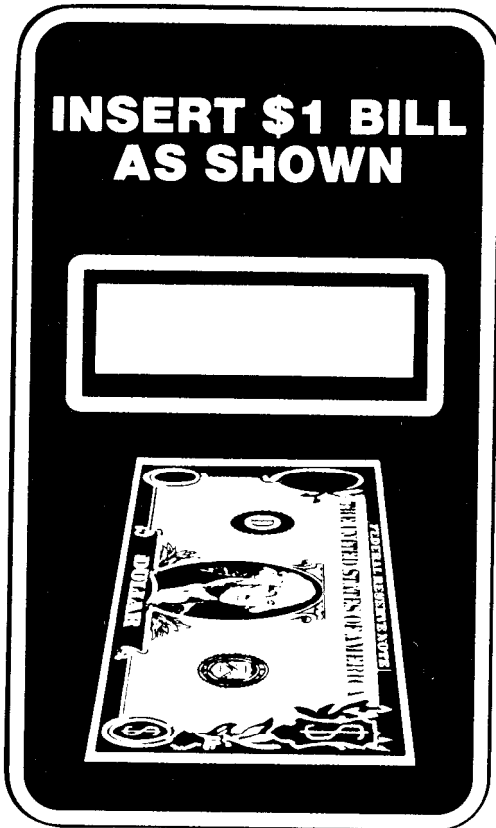
ITEM	PART NUMBER	DESCRIPTION
1	2X3988	Motor w/Plug Assembly
2	2x4181	Bearing Bracket Assembly
3	2x4182	Drive Train Plate Assembly
4	12x466	Crank
5	12x474	Punch Link
6	17x815	Disc, Optical Interrupt
7	18x19	Combination Gear
8	18x39	Combination Gear
9	18x40	Crank Gear Assembly
10	20x349	Crank Link Pin

# 1X223-0005 MBA CONTROL BOX

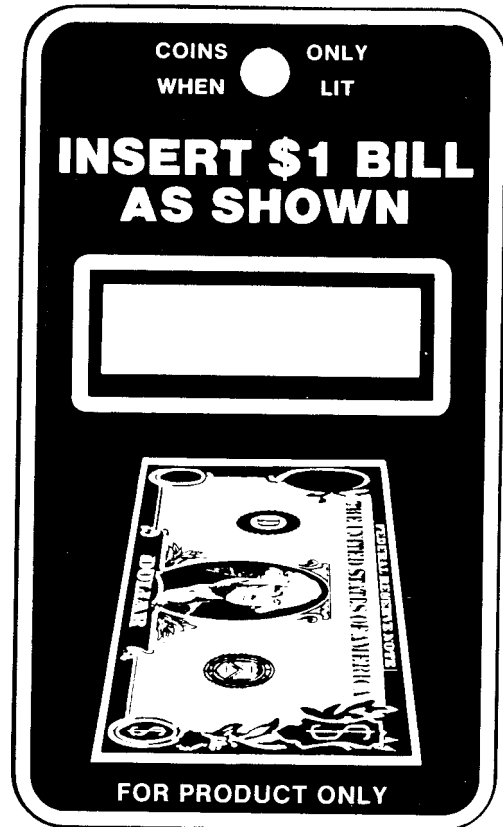


ITEM	PART NUMBER	DESCRIPTION
1	2x3884	Micro PC Board Assembly
2	2x4138 2x3885 2x4031	I.O. & Power PC Bd. (Univ.) I.O. & Power PC Bd. (DC) I.O. & Power PC Bd. (AC)
3	2x4234	Transformer Assembly
4	11x1202	Enclosure, Power Supply
5	9x821	Control Box Cover w/Silk Screen
6	11x1204	Heat Sink Bracket
7	17x258	Insulator Washer
8	21x43	Spacer
9	37x16	Insulator TO-220
10	65x290	Circuit Breaker

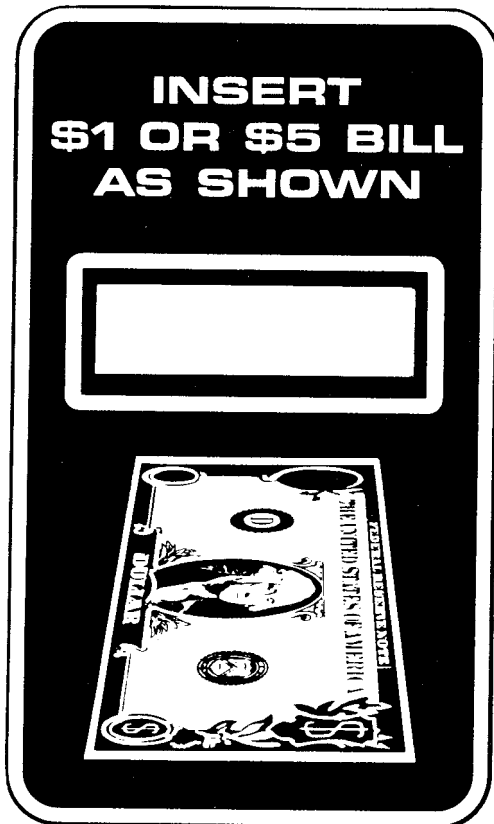
INSERTION INSTRUCTION LABELS  
(TO FIT ARDAC RETRO-FIT PLATES)



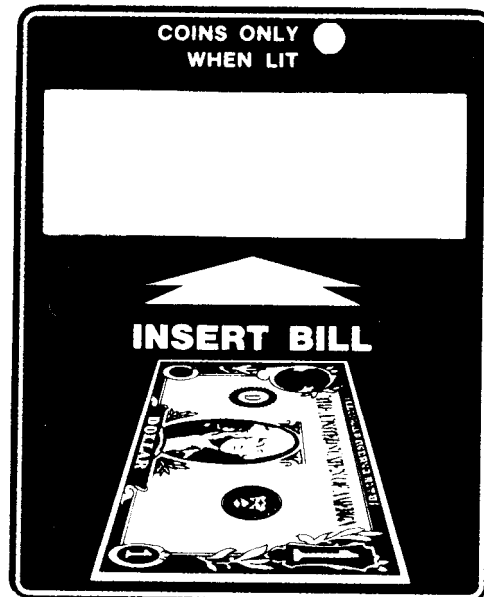
80X631-5



80X631-7



80X631-6



80X722

Color schemes are black background, orange border lines and white for copy and pictorial of bill.

The diagram illustrates the following interconnect cables and their specifications:

- GAMES I/O:** 2 x 3991-360, 36 INCHES. Connects to a Games I/O module.
- GAMES POWER:** 2 x 3992-360, 36 INCHES. Connects to a Games Power module.
- UBI VENDO I/O:** 2 x 4008-360, 36 INCHES. Connects to a UBI Vendo I/O module.
- AUTOMATIC PRODUCTS I/O:** 2 x 3926-360, 36 INCHES and 2 x 3926-880, 88 INCHES. Connects to a Bill Stacker module.
- AUTOMATIC PRODUCTS POWER:** 2 x 3927-360, 36 INCHES and 2 x 3927-880, 88 INCHES. Connects to a Bill Acceptor module.
- UBI VENDO I/O (continued):** 2 x 4358, 6 INCHES. Connects to a UBI Vendo I/O module.
- UNIVERSAL I/O:** 2 x 4178-360, 36 INCHES and 2 x 4178-880, 88 INCHES. Connects to a Universal I/O module.

Each cable is shown with its length and the specific Atari module it connects to. Detailed pinout diagrams are provided for the Atari connectors, showing the pin numbers and the corresponding module pins.

# MBA SYSTEM MOUNTING HARDWARE KITS

## KIT # 48x300

1	11x1272-4	Acceptor Mounting Plate
1	80x631-6	\$1 & \$5 Label
4	31x32	#10 Flatwasher
4	32x21	#8-32 Keps Nut
4	32x23	#10-32 Keps Nut
7	17x167	Cable Tie
7	17x370	Cable Tie Mount

## KIT # 48x301

1	80x676	\$1 Insert Label
1	80x631-7	\$1 Label
4	32x21	#8-32 Sems Hex Nut
7	17x167	Cable Tie
7	17x370	Cable Tie Mount

## KIT # 48x302

1	80x669	\$1 Label
4	32x21	#8-32 Sems Hex Nut
7	17x167	Cable Tie
7	17x370	Cable Tie Mount

## KIT # 48x303

4	32x21	#8-32 Sems Hex Nut
7	17x167	Cable Tie
7	17x370	Cable Tie Mount

## KIT # 48x304

1	11x1339-1	Acceptor Mounting Plate
1	12x505-1	Rain Shield
1	80x722	\$1 Label
4	30x247	#8-18 x 1/2 Self Drill Screw
8	32x21	#8-32 Keps Nut
8	17x167	Cable Tie
8	17x370	Cable Tie Mount

## KIT # 48x305

1	80x696	\$1 Label
4	30x119	#6-32 Hex Head Self Tapping Screw
4	30x261	#8-32 x 3/4 Machine Screw
1	30x23	#10-32 Keps Nut
4	32x21	#8-32 Keps Nut
4	17x167	Cable Tie
4	17x370	Cable Tie Mount

## KIT # 48x306

1	11x1339-1	Acceptor Mounting Plate
1	80x631-6	\$1 & \$5 Label
4	21x56	1/4" Hex Standoff
4	30x200	#8-32 x .37 Machine Screw
4	32x21	#8-32 Keps Nut
3	17x167	Cable Tie

## KIT # 48x308

1	11x1339-2	Acceptor Mounting Plate
1	80x631-6	\$1 Label
4	21x56	1/4" Hex Standoff
4	30x200	#8-32 x .37 Machine Screw
4	32x21	#8-32 Keps Nut
3	17x167	Cable Tie

## KIT # 48x310

1	80x631-7	Label
1	11x1272-3	Plate
1	2x4979-1	L.E.D. Harness
1	65x279-1	Lens Cap
8	32x21	8 x 32 Keps Nut
8	17x167	Cable Tie
6	17x370	Cable Tie Mount



## MBA HARDWARE

SCREWS

DESCRIPTION	PART NUMBER
#2-56 x .375 PHMS	30x73
#2-56 x .25 PHMS	30x44
#4-40 x .125 PHMS	30x95
#4-40 x .125 IHWHMS	30x239
#4-40 x .188 RHMS	30x74
#4-40 x .188 THMS	30x110
#4-40 x .188 FHMS	30x52
#4-40 x .188 Nylon	30x241
#4-40 x .25 PHMS	30x45
#4-40 x .25 RHSTS	30x176
#4-40 x .25 IHWHMS	30x186
#6-32 x .125 AHCS	30x243
#6-32 x .25 RHMS	30x138
#6-32 x .25 HHMS	30x221
#6-32 x .25 AHCS	30x69
#6-32 x .31 RHSTS	30x12
#8-32 x .37 PHMS	30x200
#8-32 x .75 RHMS	30x261
#8-18 x .50 Self Drilling	30x247

NUTS

DESCRIPTION	PART NUMBER
#2-56 Hex	32x12
#4-40 Hex	32x46
#4-40 Keps	32x22
#4-40 Elastic Stop	32x19
#8-32 Hex	32x45
#8-32 Keps	32x21
#10-32 Keps	32x23

WASHERS

DESCRIPTION	PART NUMBER
#2 Flat	31x14
#4 Flat	31x5
#4 Split	31x4
#6 Flat	31x29
#6 Split	31x1
#8 Flat	31x12
#8 Split	31x55
#10 Flat	31x32

WALDES RINGS

DESCRIPTION	PART NUMBER
.125 O.D. Shaft	31x18
.156 O.D. Shaft	31x56
.72 O.D. Shaft	31x57
.187 O.D. Shaft	31x36

ROLL PINS

DESCRIPTION	PART NUMBER
.062 Dia. x .25	20x219-401
.093 Dia. x .88	20x219-614



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216/946-3000

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