# MAYGAY MACHINES LTD

# EPOCH ELEGANCE
# TECHNICAL MANUAL
## MAT00591

## ISSUE A
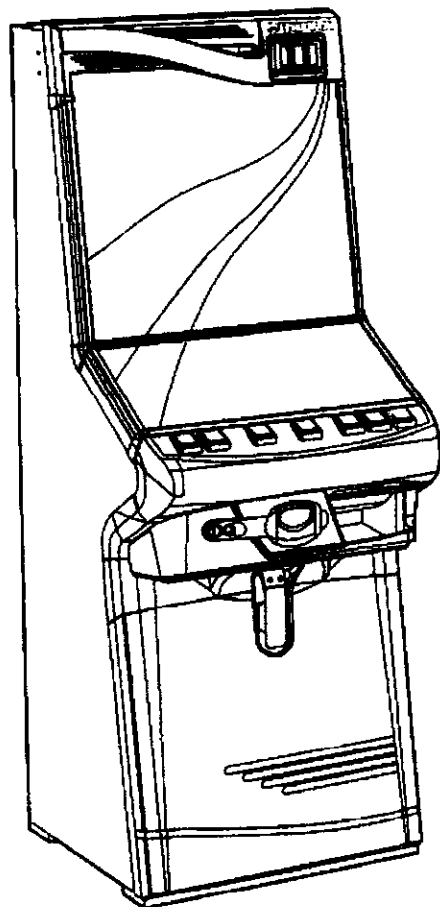
# MAYGAY

# MAYGAY

Maygay Machines Limited have been designing and manufacturing electronic amusement machines for over 25 years. The Company is among the leading manufacturers of coin operated amusement machines, both in Great Britain and Europe.

We are committed to customer satisfaction. Should you have any queries concerning our product, please contact one of our Technical Support Engineers for advice.

| | | |
|---|---|---|
| **Lee Timmins** | - **Customer Support Co-ordinator** | **ext. 294** |
| **Jonathan Clarke** | - **Technical Support Engineer** | **ext. 290** |
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Should you require spare parts for your machine, please contact either of our Spares Administrators on the following telephone numbers:

| | | | |
|---|---|---|---|
| **Tracey Blakemore** | **Spares Administrator** | **01902 713000** | **ext 230** |
| **Louise Braden** | **Spares Administrator** | **01902 713000** | **ext 286** |
| **Spares Fax** | **01902 710981** | | |

# COPYRIGHT NOTICE

# WARRANTY PERIODS

Maygay Machines Limited warrants that all electrical and electronic components within our product range, including the reel mechanism unit, are free from defects in materials and workmanship under normal use for a period of 90 days from the date of despatch.

If these components fail to conform to this warranty, Maygay Machines Limited will repair or replace the said component free of charge, provided it is returned during this warranty period.

All warrantied components carry a bar coded label identifying the date of despatch, and the product serial number. Maygay Machines Limited regrets that any components returned without a label or with an expired date cannot be repaired under our warranty.

In no event shall Maygay Machines Limited be liable for misuse or accidental damage, nor any loss of profit, loss of use, incidental or consequential damage.

Parts covered by the warranty are as follows:

| | |
|---|---|
| **Epoch Microprocessor** | **Stakes & Prizes PCB** |
| **Reel Modules** | **Reel Driver PCB** |
| **Coin Validators*** | **Payout & Meter PCB** |
| **Note Acceptors** | **Hoppers** |
| **Lamps & Switches PCB** | |

* Please note that these components are subject to the Manufacturer's warranty period of 12 months.

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# CONTENTS

**CHAPTER 4    Machine Disassembly and Re-assembly**

**CHAPTER 5    Maintenance Instructions**

**CHAPTER 6    Fault Diagnosis**

MAYGAY

## 1.1 Machine Specifics

> Power: Domestic 230V @ 50Hz
>
> Dimensions:  Height:   1750 mm
>              Depth:    670 mm
>              Width:    660 mm
>              Weight:   110 Kg

## 1.2 Siting the machine

The machine requires a level and stable floor on which to be sited. The location should be indoors and away from direct heat.

Siting on nylon carpets should be avoided where possible, as static electricity carried by this medium can cause interference.

Ambient temperature and humidity at the site does not adversely affect the operation of the machine, although it will be understood that extremes of either factor in the proximity of the machine should be avoided. It is recommended that the machine should operate sufficiently between $5°$ and $40°c$.

If it is required to record data of the machine, ensure the Data Capture Unit is fitted in the space provided beside the meter assembly. Connection to the MPU Chassis is via the RS232 Port labelled Serial Port 1.



Green
Orange
Blue
Red
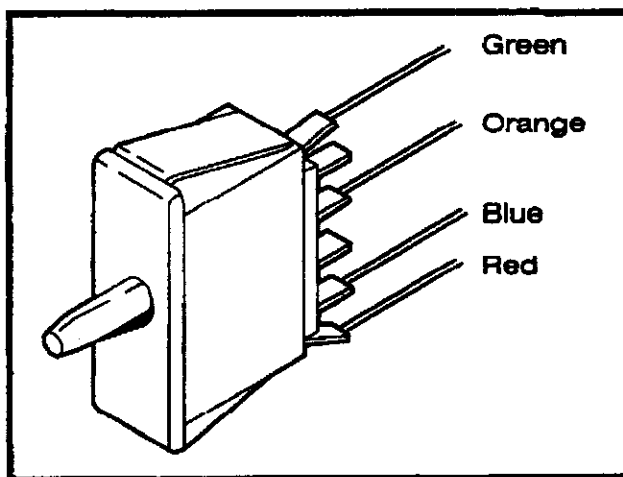
**Door Switch**

**Alarm Door Switch**

Pink
Pink
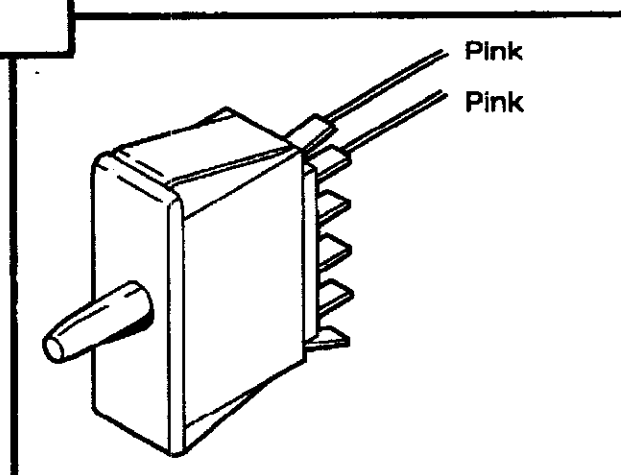
### 2.1 Installation of Machine

**WARNING: FOR SAFETY REASONS, THE FOLLOWING INSTRUCTIONS SHOULD BE CARRIED OUT BY A SUITABLY QUALIFIED OR ADEQUATELY INSTRUCTED AND SUPERVISED PERSON.**

### 2.1.1 Connection

This machine must be earthed by fitting a three pin plug with a fuse rating of 5 amps to the machine supply cable. The supply cable should be no longer than 1.5 meters in length.

### 2.1.2 Setting Up - Pre-start Checks

Before commencing any maintenance on this machine, please disconnect from the mains supply.

**WARNING: UNDER NO CIRCUMSTANCES SHALL CONNECTORS BE REMOVED OR RECONNECTED WHILST THE POWER IS SWITCHED ON. ANY DAMAGE RESULTING IN FAILURE TO OBSERVE THIS WARNING WILL INVALIDATE THE WARRANTY.**

Check that all connectors, assemblies, and wiring harnesses are correctly engaged inside the machine.

Ensure that on the power supply assembly the mains voltage primary connection is set to the correct site voltage.

The voltage is selectable via the slide switch on the PSU case.

Set the DIL switch options on the MPU board to the correct position for the site.

Check that all coins are routed to the correct tube, hopper or cash box.

If it is required to record data of the machine, ensure the Data Capture Unit is fitted in the space provided beside the meter assembly. Connection to the MPU Chassis is via the RS232 Port labelled Serial Port 1.

The sounds on this product form a very important feature during play. Ensure the volume levels are at a sufficient level to provide the player with the full entertainment value. Full details of how to adjust the volume levels can be found in the game manual of this machine.

With the front door open, and no credits on the display, access the test procedure, described in the game manual, to ensure that all machine functions are working correctly.

## 2.2    Percentage Key

The machine allows adjustment of the pay out percentage according to individual requirements. A percentage key is located on the coin mech driver board and includes a D-type socket to receive one of a number of percentage and stake keys. All percentage keys display the key percentage and use a standard colour casing corresponding to the percentage key setting. The different keys and associated part numbers are listed below.

A single site machine is adjustable only using the percentage key.   However, an Arcade machine requires a different percentage selection board including a bank of four DIL switches. Pay out percentage is adjusted according to the switch settings detailed below.

**Percentage Settings**

| Switch Settings | | | | Key | Key Colour | Part Number |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | | | |
| On | Off | Off | Off | 70% | White | EP210018 |
| Off | On | Off | Off | 72% | White | EP210019 |
| On | On | Off | Off | 74% | Red | EP210020 |
| Off | Off | On | Off | 76% | White | EP210021 |
| On | Off | On | Off | 78% | Green | EP210022 |
| Off | On | On | Off | 80% | Blue | EP210023 |
| On | On | On | Off | 82% | Yellow | EP210024 |
| Off | Off | Off | On | 84% | Orange | EP210025 |
| On | Off | Off | On | 86% | White | EP210026 |
| Off | On | Off | On | 88% | White | EP210027 |
| On | On | Off | On | 90% | White | EP210028 |
| Off | Off | On | On | 92% | White | EP210029 |
| On | Off | On | On | 94% | White | EP210030 |
| Off | On | On | On | 96% | White | EP210031 |
| On | On | On | On | 98% | White | EP210032 |

PLEASE NOTE THE PERCENTAGE CAN ONLY BE SET BY USING SWITCHES
(IF FITTED) ON THE PERCENTAGE KEY PCB AND NOT
THE MPU SWITCH BANKS.

### 2.3    Stakes & Prizes Key

The machine allows adjustment of the stakes and prizes according to the individual requirements. The stake and prize is set by inserting one of a number of keys into the D-Type plug on the coin mech board.

### 2.4    Machine Operation On Power Up

**Valid Key**

The machine will read the stake and jackpot prize key and compare it with a table of keys that are valid for the game. If the key matches, the machine allows the game to operate. Before starting the game it shows the selected stake and jackpot on the machine's alphanumeric display if fitted for 2 seconds to allow operation to be checked.

**Invalid Key**

The machine looks for the presence of a valid key on power up. If no key is found, the machine will alarm, error 4.9 STAKE KEY ERROR.

If the machine is operating in front door closed mode, it will lock up whilst displaying the error code and message. The problem should be rectified and the machine should be reset.

## 3.1 General Description

The Elegance machine is housed in a wooden cabinet and fitted with four structurally engineered foam mouldings.

The cabinet is made up of two sections. The top section houses the Epoch microprocessor and the new coin handling system. The paybowl moulding is also housed in the upper section of the cabinet. This has the facility to accommodate a range of note acceptors used within the industry. Also positioned on the paybowl moulding is the refill key switch plus the option of an additional operation key switch and the introduction of an LED which can be used as part of an alarm system or when the machine is in general operation.

The new front door assembly has been developed using the same principle of extrusions and castings that are used in the construction
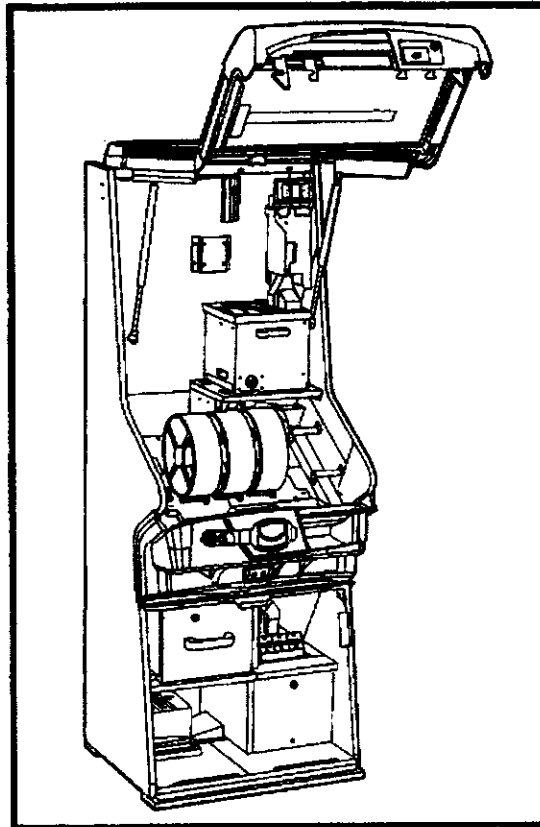


of the top section of the cabinet.

The lower section of the cabinet is secured with a new moulded door of the same materials used in the upper section. It has a metal hasp and staple supplied as a standard feature for improved security. Behind this door is access to the cash boxes via a second lockable cash door. A bank of three 3 meters are positioned on top of the cashbox roof to register the coins/notes coming through the validator or note acceptor and out of the hopper. The lower section also has the facility to house a lockable metal note box and note chute.



TOP COIN ENTRY MOULDING

GLASS DISPLAY AREA

POSI PAN HEAD BOLTS

PLAY PANEL ASSEMBLY

MID BUTTON PANEL MOULDING



STAPLE    HASP

LOCK CROSS
BAR ASSEMBLY    FIXING PLATE
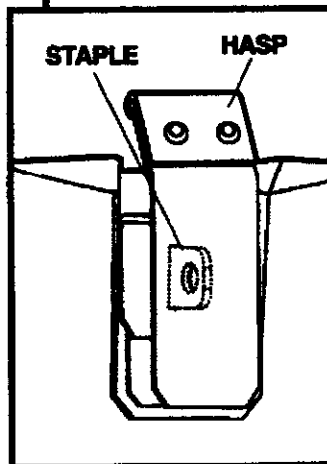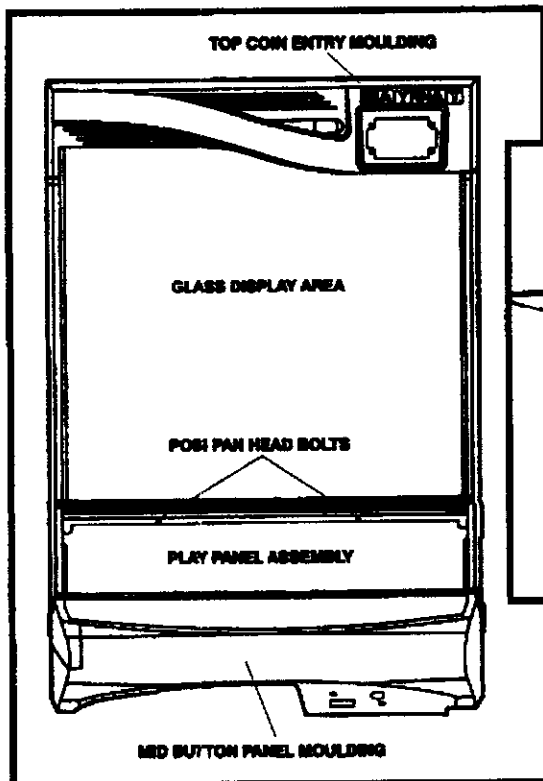
SWIVEL PLATE
LOCKING MECHANISM
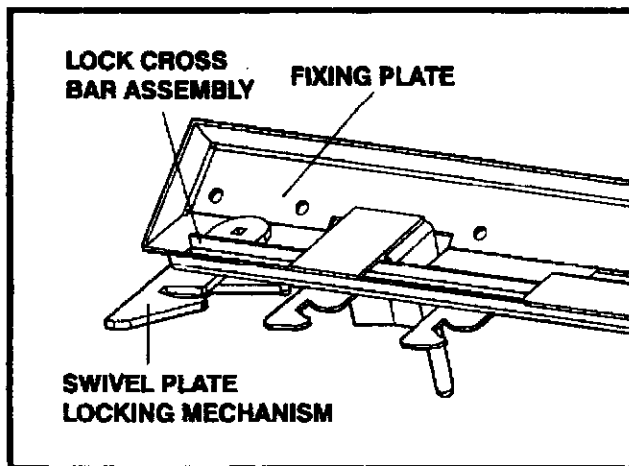
The top door is secured by five swivel plates which are located into the frames fixing plate. These release the sliding lock cross bar which locks on to the rest of the cabinet assembly.

The Microprocessor Unit (MPU), described in paragraph 3.2, is secured to the rear of the cabinet reel shelf along side the reel driver board and adjacent to the hopper driver board. The game and sound proms are plugged directly into the MPU.

A number of wiring harnesses are connected to the MPU, and are used to power the various other system processors within the machine. The harnesses are retained against the inside of the cabinet by plastic trunking.

A Mars Cashflow or Coin Controls C435A top entry coin mechanism, as described later in this chapter, is incorporated into this product. Used for coin validation the unit is secured to the machine by means of a mounting validator chassis. The coin mechanism includes a four way separator for routing coins to the Hopper Unit, which is also described later.

The cabinet can house a number of Starpoint reels. These are positioned behind the lower display glass. An additional feature reel, FM3 is fixed behind the top display glass.

A refill meter is located at the top right of the moulding to meter cash to the hopper.

A double pole switch is mounted behind both the top door and the removable outer cash door. The machine requires both switches to be closed, wherein the top and outer cash doors are closed, to run in normal play mode. If either switch is open, the machine resets and runs in demo mode

The base of the cabinet includes an aperture at each corner for the location of castors. The castors can be ordered in kit form, quoting part number CK000030.

## 3.2 System Overview

The system comprises of five boards of which there is the main processor unit, a coin/stakes and prizes board, payout and meter board, reel driver board and front door board which controls the lamps and switches.

The basic features are as follows;-

- ◆ 32 bit primary microprocessor, 16 bit data bus optimised for 'C' programming.
- ◆ 64 KBytes of on-board battery backed high speed static RAM.
- ◆ 8 channel stereo ADPCM/PCM sound system.
- ◆ 10 + 10 watt RMS stereo power amplifiers.
- ◆ Real time clock with leap year.
- ◆ 3 levels of security via dedicated micro and ASIC gate array provide protection from game copying, reverse engineering & multi user interchange.
- ◆ Infrared TX and RX communications capabilities.
- ◆ 2 full RS232 serial channels supporting baud rates up to 38,400 bps. One of the serial channels also supports the data power connector for industry standard data logging add-ons. The other channel also supports RS232 and TTL voltage level interfacing.
- ◆ On-board 16 option switches with direct write to RAM.
- ◆ Supports up to 512 fully hardware controlled lamps with direct read from RAM. Six independent flash rate controllers, individual phase select, and individual dimming.
- ◆ Overload and lamp failure detection. Lamps are genlocked to the power line to minimise flicker free output.
- ◆ Supports up to 512 fully hardware controlled LED outputs with direct read from RAM. Six independent flash rate controllers, individual phase select, and individual dimming.
- ◆ LEDs monitors for all power rails, reset activity and security warning.
- ◆ Full diagnostic port for hardware manufacture and service.

### 3.2.1 The Link Connector

This unique feature gives the 'EPOCH' system its great I/O flexibility and low cost. This connector is simply a 10 pin DIL IDC header that is routed to the heart of the design, the ASIC gate array. The basic principle of this interface is to provide a high speed multi element interchange interface for external I/O devices. The interface runs at 571KHz and can fully service all external resources in 128uS. The main system processor has no connection with this process, all transfers are performed by the ASIC and data is read or written directly to/from the main battery backed static RAM. There is no limitation on the connectivity of the external resources, each linked interface simply has a link to the next. Any linked interface can have any combination of inputs, outputs, LEDs or lamps. These linked interfaces are very simple in design and need no local intelligence as the main board controls all data sequencing.

### 3.2.2 The Epoch Main Microprocessor Unit

The machine is controlled by an EPOCH microprocessor which currently is the latest technology to be used by Maygay. The 'EPOCH' design has three microprocessors. At it's heart is a member of the latest Hitachi 32 bit microprocessor family known as Super 'H' the device used is the HD6413002FN16. The device is clocked at 16MHz, as can be seen from the part number. This device has a 32 bit processing core operating over an external 16 bit data interface. The device has an address range of 16 MBytes. The processor interfaces directly to the ASIC and does not directly control either the on or off board resources.

The second processor controls the boot up sequence, system configuration and security tasks. The device is a member of the low cost PIC processor range from Microchip. Every game that runs on the 'EPOCH' system has it's own PIC which accompanies the game EPROMs. This device can directly control and configure all system level interfaces including EPROM sizing. Another of it's tasks is board level security. As mentioned previously there are three levels of protection. The first is to make it possible for the system to be customer specific so that one manufacturers game will not be able run on a different manufacturers system. The second makes illegal changes to the game EPROM data areas impossible by using multi direction checksums and pattern checks. The third is to protect the system from reverse engineering, there are several methods employed which make the task of illegal system interrogation practically impossible.

The third processor provides all real time clock functions and power off security support. The device is another member of the low cost PIC processor range from Microchip. The first of it's tasks is to keep a very comprehensive system real time clock that provides secs/hours/weekdays/days/months/years and adjusts for leap years plus it is able to be set to correct for any national summer time. It's second task is to provide application security such as door monitoring and alarm triggering when the power is turned off. Up to six switches can be monitored and two output devices triggered. This device is socketed to allow custom security requirements to be implemented.

There are four game EPROM sockets on the main microprocessor unit which can incorporate 1, 2, 4 or 8 meg devices which are configured by the boot up microprocessor thus not requiring any links or jumpers.

Two sound EPROMS with a combination of either 1, 2, 4 and 8 meg devices are installed on the unit. The configuration of these devices are done as are the game EPROMS, by the boot-up microprocessor.

The sound is regulated by a Yamaha 8 channel sound system. This device can generate up to 8 independent channels of audio that have individual stereo/pan controls. The full stereo output is driven via two high quality power amplifiers, which can provide continuous power on both channels from zero to a full 10 watts RMS.

A display port is housed on the main microprocessor board which can drive numerous types of matrix display panels. This port is operated from the ASIC device thus requiring no support from the microprocessor.

Two banks of option (DIL) switches are also placed on the microprocessor board. These can be configured as to the users requirements.

There are two full featured independent serial communication channels provided via the primary microprocessor. These channels can be operated in a sync mode at baud rates upto 38,400 bps. The first channel has an industry standard female 25 pin 'D' type connector which incorporates power supply pins required by data logging equipment. The second channel is supplied through a special connector that also has the TTL direct drive lines as well as the RS232 levels for the second channel.

The EPOCH Microprocessor has several different power supply monitors. The first monitor detects missing cycle bursts and will initiate a power failure if more than 4 cycles are missing in succession. The second monitor traces the power supplies good input signal. Another monitor is the spark detect circuit. This measures the period of any air borne electro-magnetic interference. If any is detected outside the predetermined window, this will cause a full hardware reset of the system.

### 3.2.3 Front Door Board (Lamps & Switches)

The Front Door Board controls the lamps and switches. The power is connected at plug 4 (PL4) that supplies the +5, +12 and 36 volts. The ribbon cable link from the main board connect at location PL1(Link input). the relevant information for operating the lamps, switches, refill meter and any alphanumeric display is provided at this connector. Information which is not needed for this board is then sent out via PL2 (Link Output) to the next board in line. The lamps are connected at location PL9 which operates the lower glass and PL10 which operates the upper glass. The switches are directly connected at PL5 and PL6. Because this system uses direct inputs, the use of diodes on switches are no longer required. There are provisions to drive 2 x alphanumeric displays which connect at PL7 and PL8. If one alphanumeric display is used in the machine, the unit will connect to PL7. The LED's are connected to a 16 way plug located at PL3. The refill meter is also connected to the board located at PL11. For normal operation, the status LED in the centre of the board will flash to show that it is functioning correctly.

### 3.2.4 Coin Mech Stakes & Prizes Board

This board controls the coin acceptance, credit and stakes and prizes. The power to this board enters connector PL7 and provides +5, +12 and 36 volts to operate the board. The ribbon cable link input at PL1 is receiving information from the front door board, any information which is not required will be sent via PL2 (Link Output) to the next board in line. This board has the industry standard 9 pin 'D' type connectors fitted for Stakes and Prizes and Payout Percentage keys. The coin mechanism and

divert lines are also connected to this board along with the illumination lamps for the coin mech bezel. This board also has an LED for system status.

### 3.2.5 Reel Driver Board

This board is used to drive the reels in the machine. The information required for this operation is supplied via the ribbon cable link in plug (PL1), any data which is not required is fed back out to the hopper drive board via PL2 (Link Output). The power enters on plug PL8. This plug supplies 5, 12, 36 and 3 zero volt connections. The board is fitted with 6 fifteen way plugs, these supply the connection to reel modules and 18 lamps. An LED fitted between PL1, and PL2 flashes to indicate correct operation.

### 3.2.6 Hopper Drive Board

This board controls the hopper, meters and cabinet switches in the machine. The data required for this operation enters the board via the ribbon cable link PL1. The power to this board enters on PL3. This plug supplies 5, 12, 24 and 3 zero volt connections.

The hopper refill and test button are connected to PL7, whilst all other cabinet switches are connected to the 12 way connector PL6.

Four 12 volt meters are connected to the 8 way connector PL5 and provision for a note acceptor is supplied via connection to plug PL4.

### 3.3 Power Supply Unit

The machine includes a Power Supply Unit.

The PSU assembly contains parts which carry mains voltage. The PSU must not be disassembled. No user serviceable parts inside.

The Power Supply Unit is housed in a steel case and is mounted on a quick release chassis in the base of the cabinet. The unit comprises a Voltage Transformer, an Auxiliary Mains Output and the necessary rectifying, smoothing and regulating circuits to transform a mains voltage to the required voltages for the various sub-assemblies of the machine.

The transformer is mounted inside the PSU case to prevent accidental access. The unit accepts either 115V or 230V AC. Either voltage can be set by the slide switch on the rear of the PSU unit.

The Mains Input Voltage passes through a switch, fuse, filter and system voltage selector before passing to the primary of the transformer.
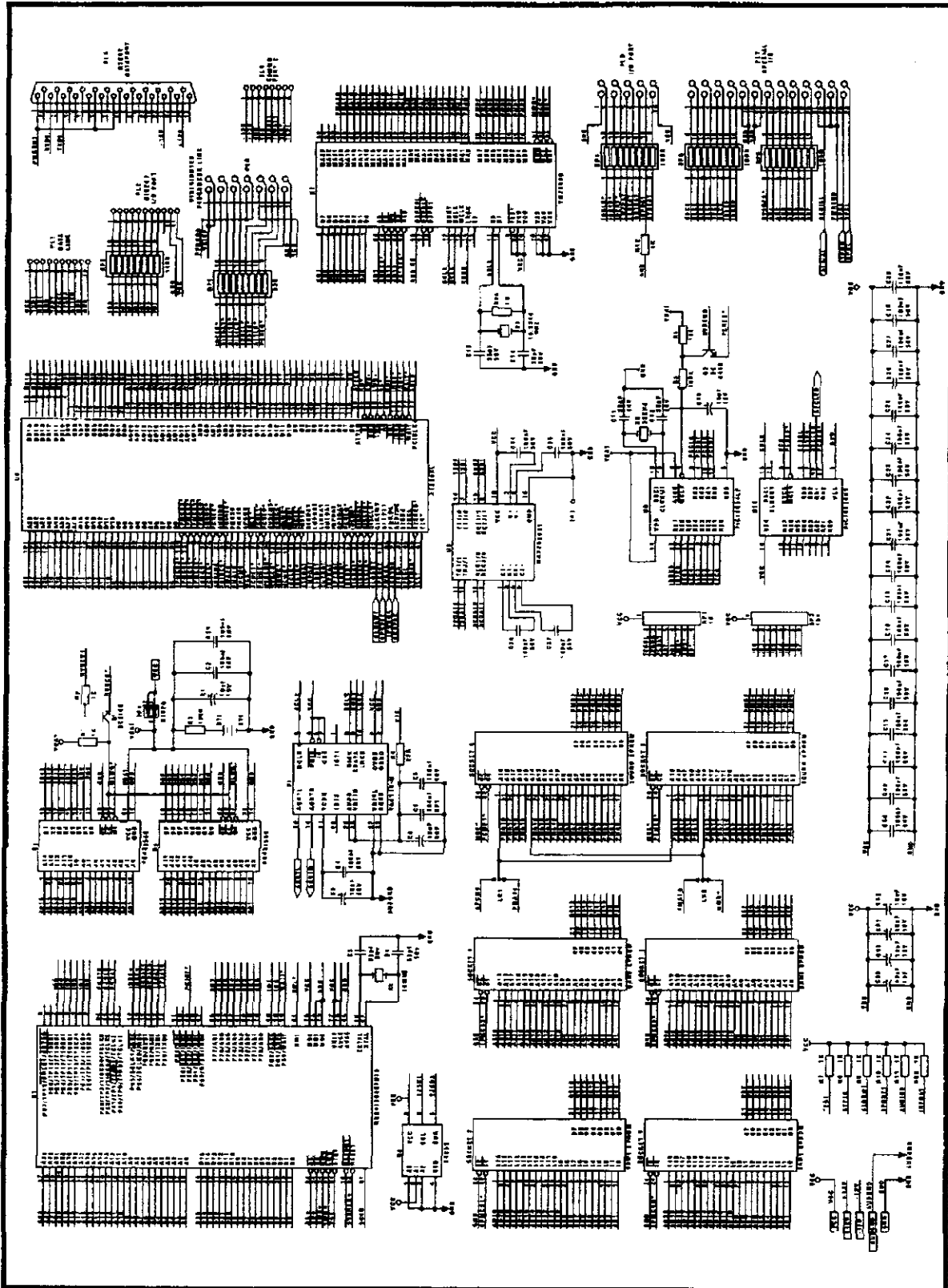
Five secondary output voltages are provided to power various units in the machine.
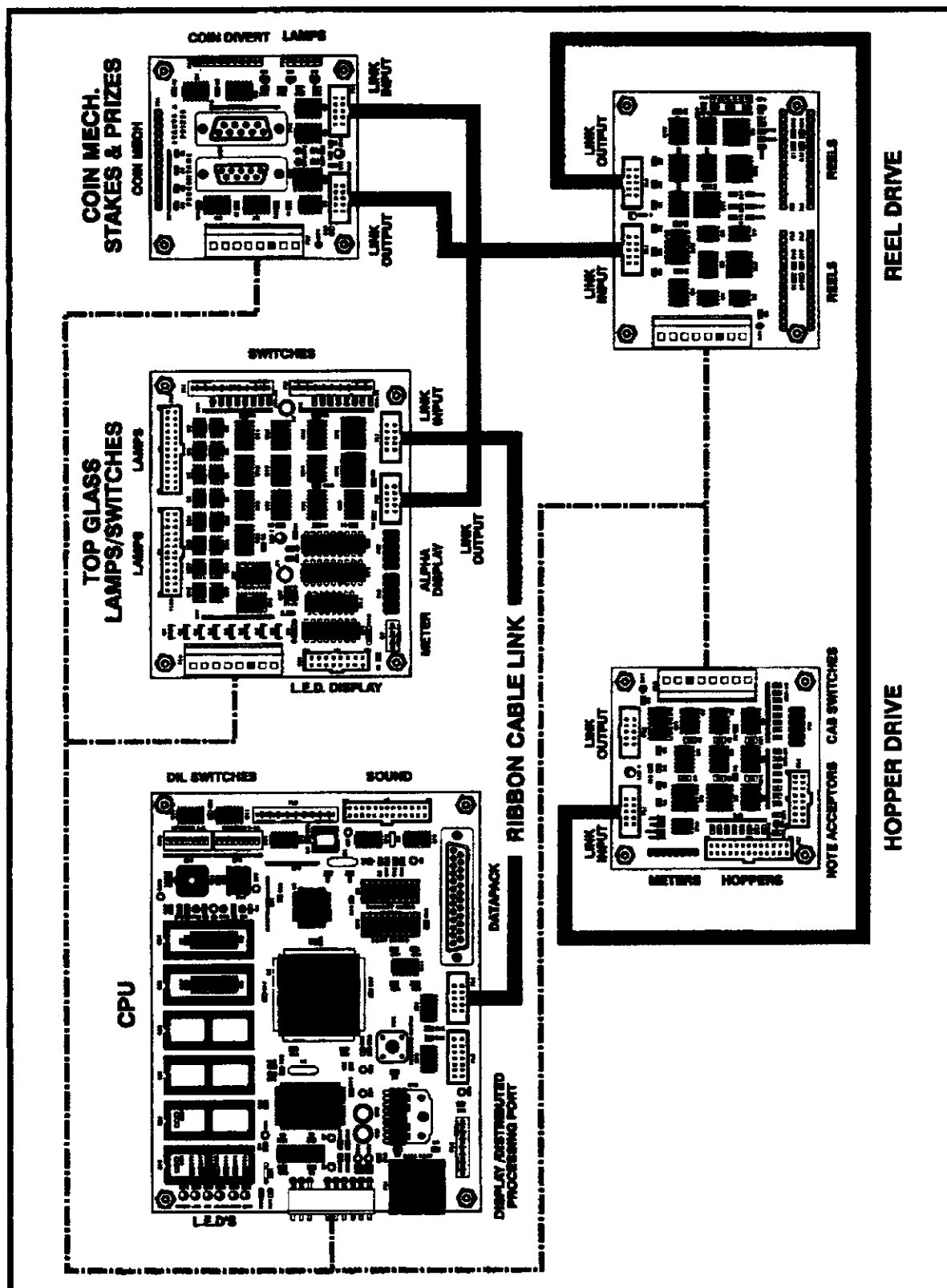
**Epoch System Layout**

**Epoch Main Microprocessor Schematic Diagram**
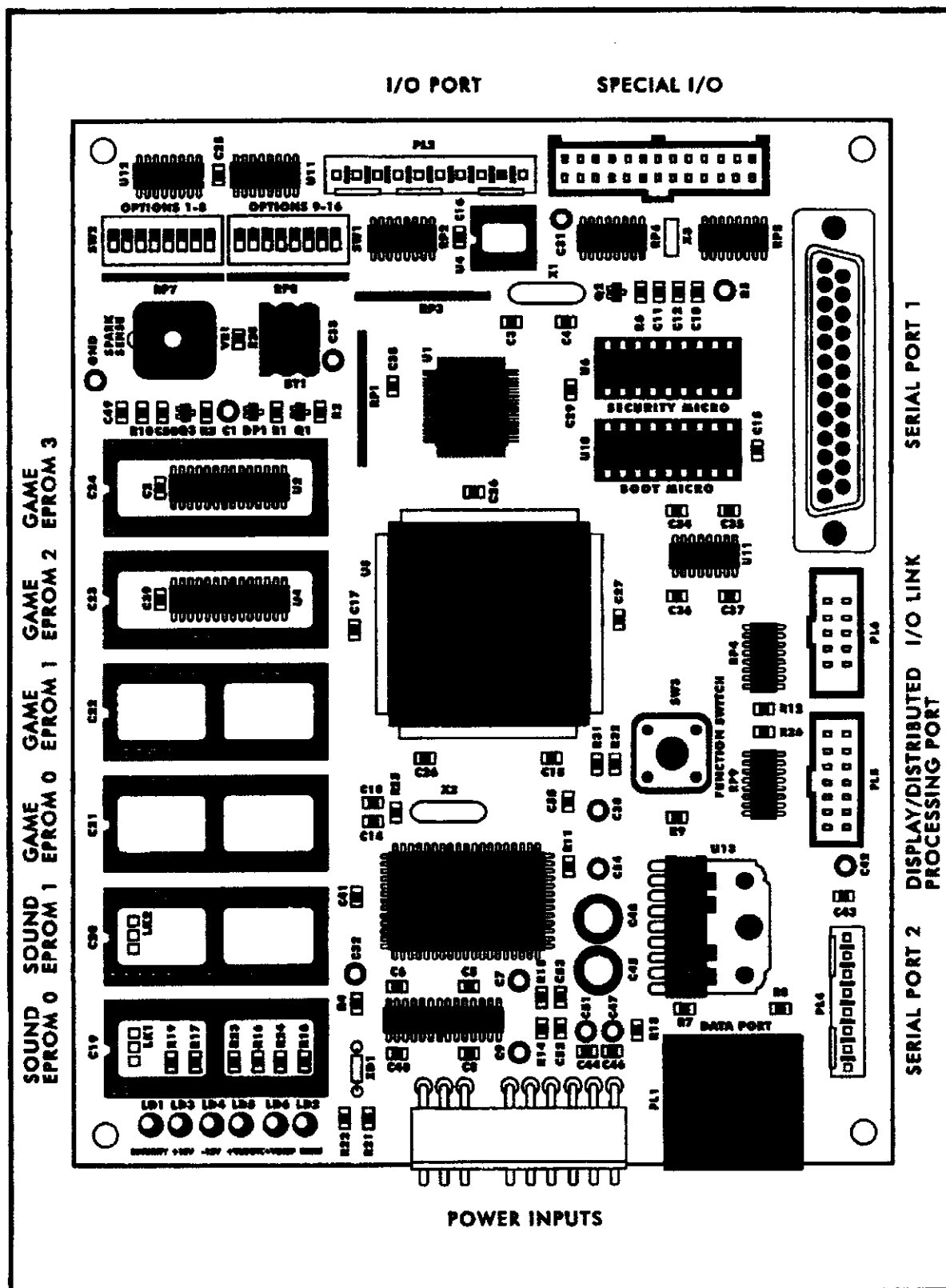
**Epoch Main Microprocessor Unit**
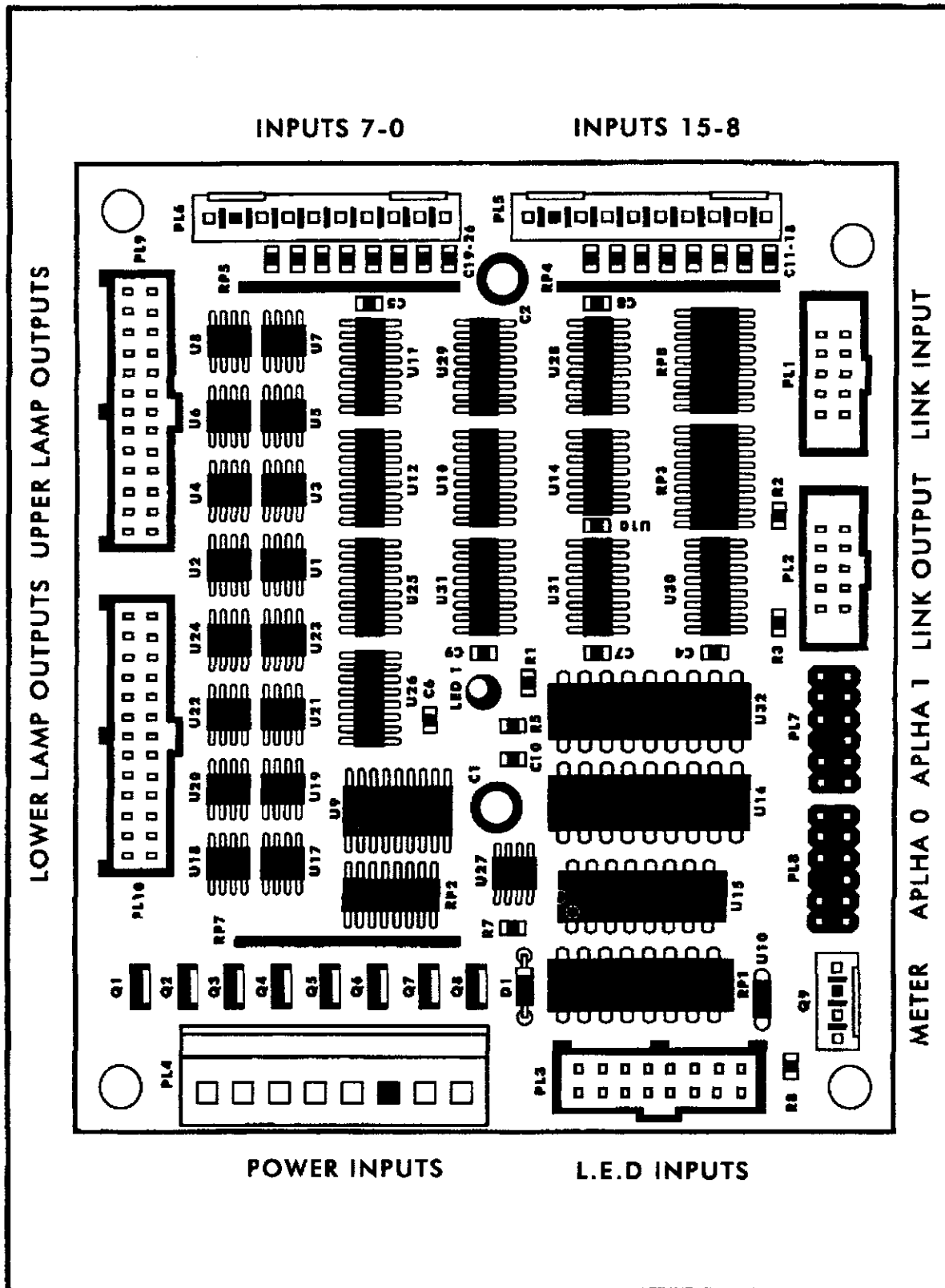
Epoch Lamp Display & Switch Board

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COIN ACCEPTOR
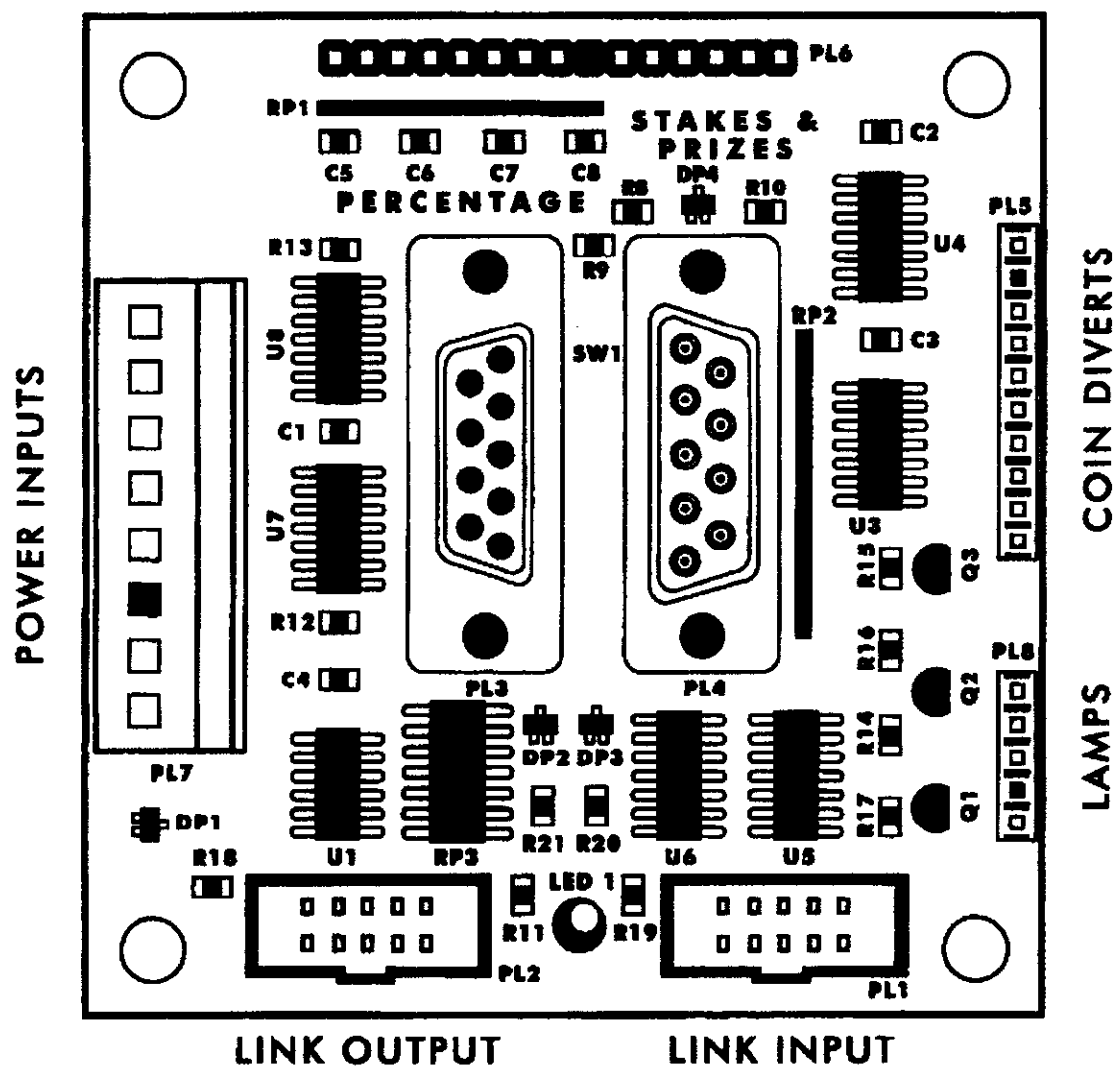


Epoch Coin Mech Stakes & Prizes Board
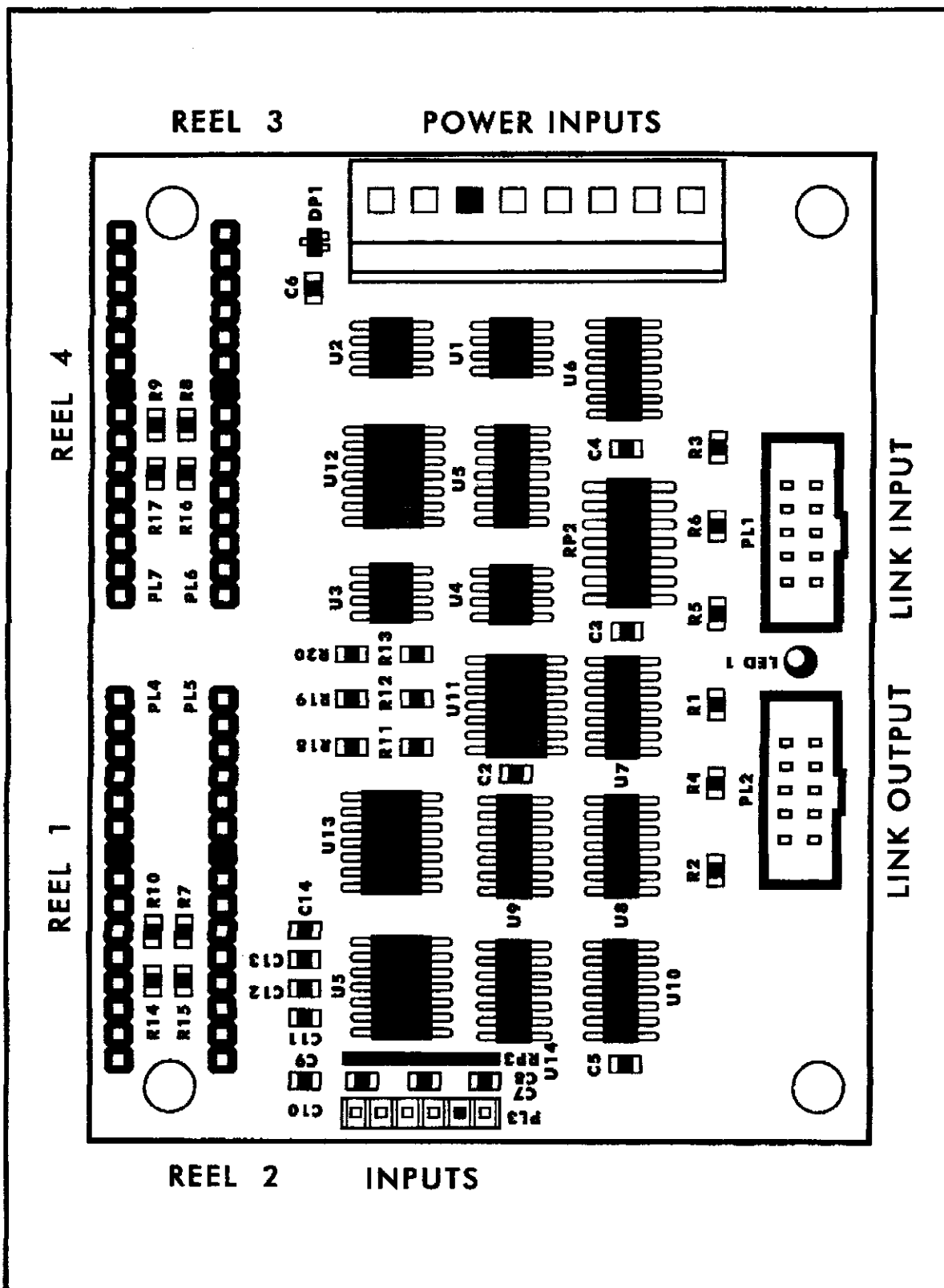
**Epoch Reel Driver Board**
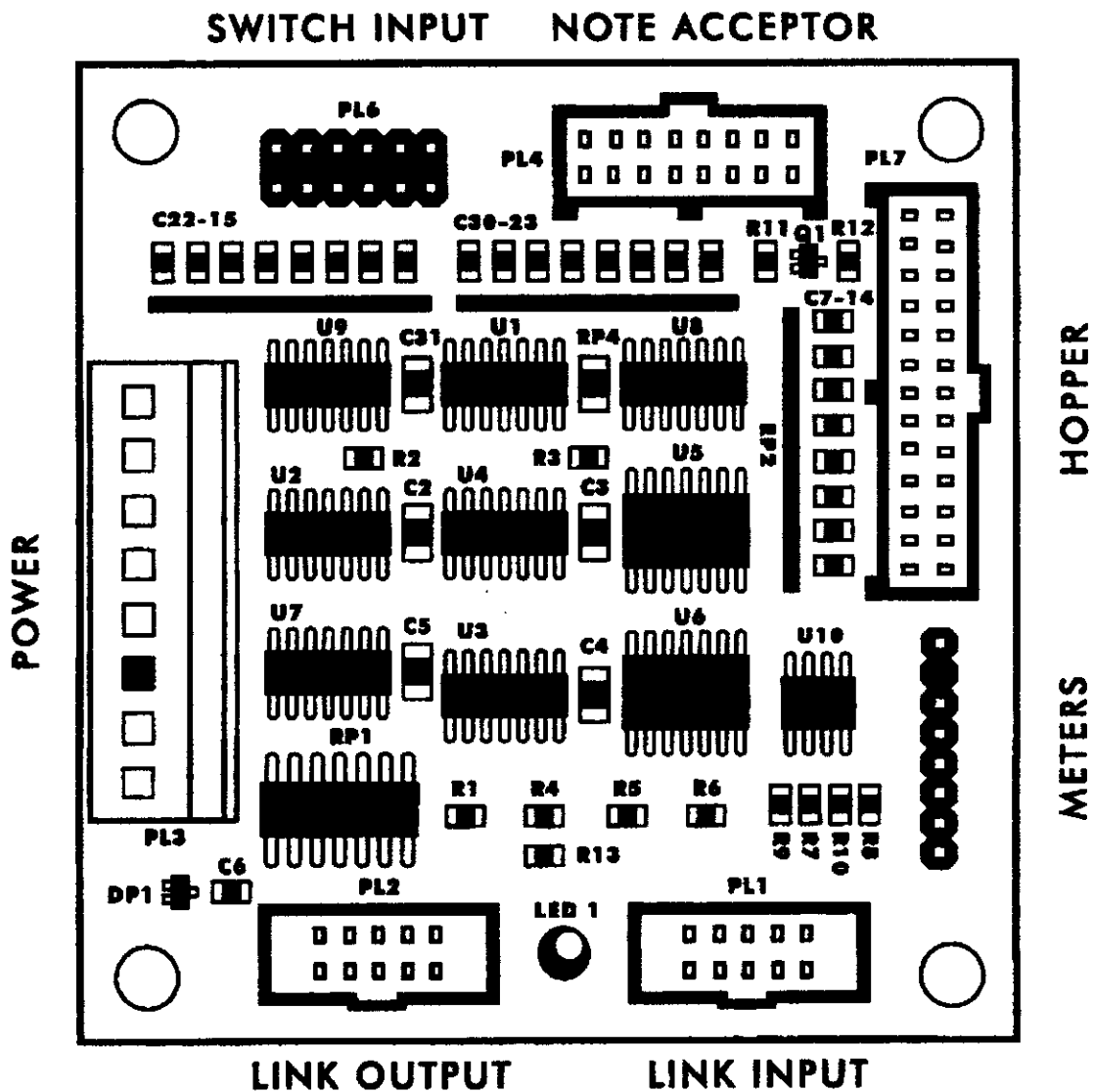
MAYGAY

SWITCH INPUT    NOTE ACCEPTOR

POWER

HOPPER

METERS

LINK OUTPUT    LINK INPUT

**Epoch Hopper Driver Board**

**Epoch Power Supply**

MAYGAY.
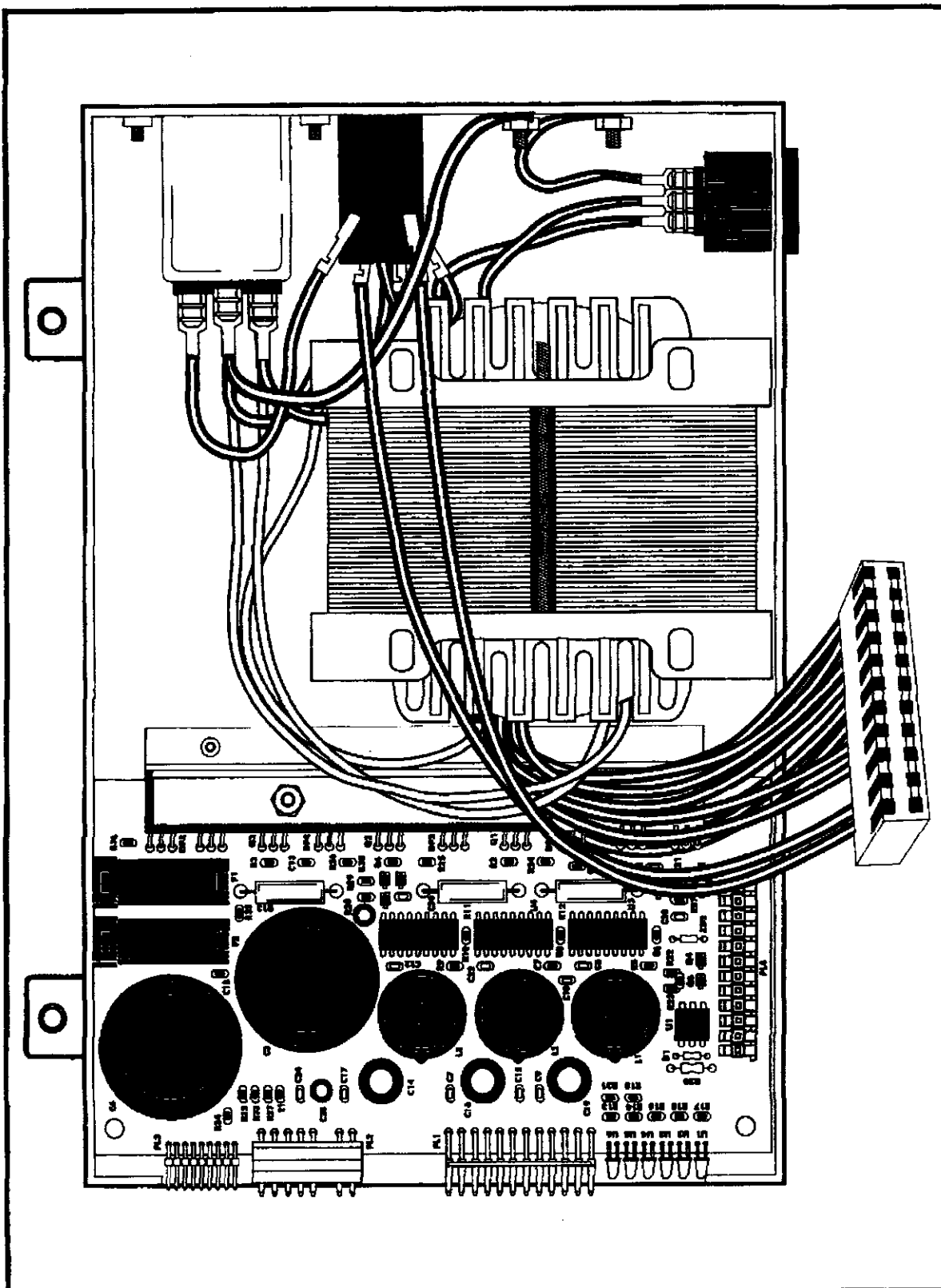
## 3.4 Coin Mechanism

### 3.4.1 Mars Electronics Cashflow Coin Mechanism

A Mars Electronics Cashflow Coin Mechanism Unit is fitted in the machine for coin entry, validation and routing.

The Mars Cashflow Coin Mechanism Unit includes an ME100 top entry electronic coin validator, together with a 4 way separator and Dual Coin Entry. The unit also offers a high security level and an alarm feature which is integrated into the machine security system.

The 4 way separator is aligned with the hopper unit of a payout unit. Coin routing is controlled by a routing plug, which is fitted to the separator, wherein coins are routed to the exits configured by the plug. Any nominated coins are routed to the default cash box route.

The Dual Coin Entry (DCE) allows entry of coins and tokens from separate slots. At present, the token slot has a blanking plate mounted behind it to ensure tokens cannot be inserted. A front bezel is also included within the unit.

The coin mechanism is driven by a 12V DC supply, via the machines coin mech board. A doubled ended loom is fitted between the validator, and coin mech board. When the loom is connected, signals from the machine to the validator are routed via the DCE.

### 3.4.2 Coin Controls C435A Top Entry Validator

#### GENERAL OVERVIEW

The coin controls C435A sixteen coin electronic validator incorporates 4 way coin sorting and is used within this cabinet in front entry option mode.

The C435A has been incorporated in preference to other devices due primarily to it's token teach and run option (though is industry standard compatible in both form and fit as other mechanisms) which is both a simple, reliable and secure method of programming non-standard tokens.

#### PROGRAMMING

With the machine powered up and the validator parallel connector in place; carry out the following steps:-

* set the rotary switch situated on the bottom right of the validator to position 'F'
* press the program button situated directly beneath the rotary switch
* using a minimum of 20 coins of the selected token type feed these through the entry bezel turn the rotary switch to position 'C' and finally press the program button

NOTE: The Teach and Run phase can be abandoned whilst the validator is in teach phase (position 'F') by either pressing the program button or disconnecting the power source.
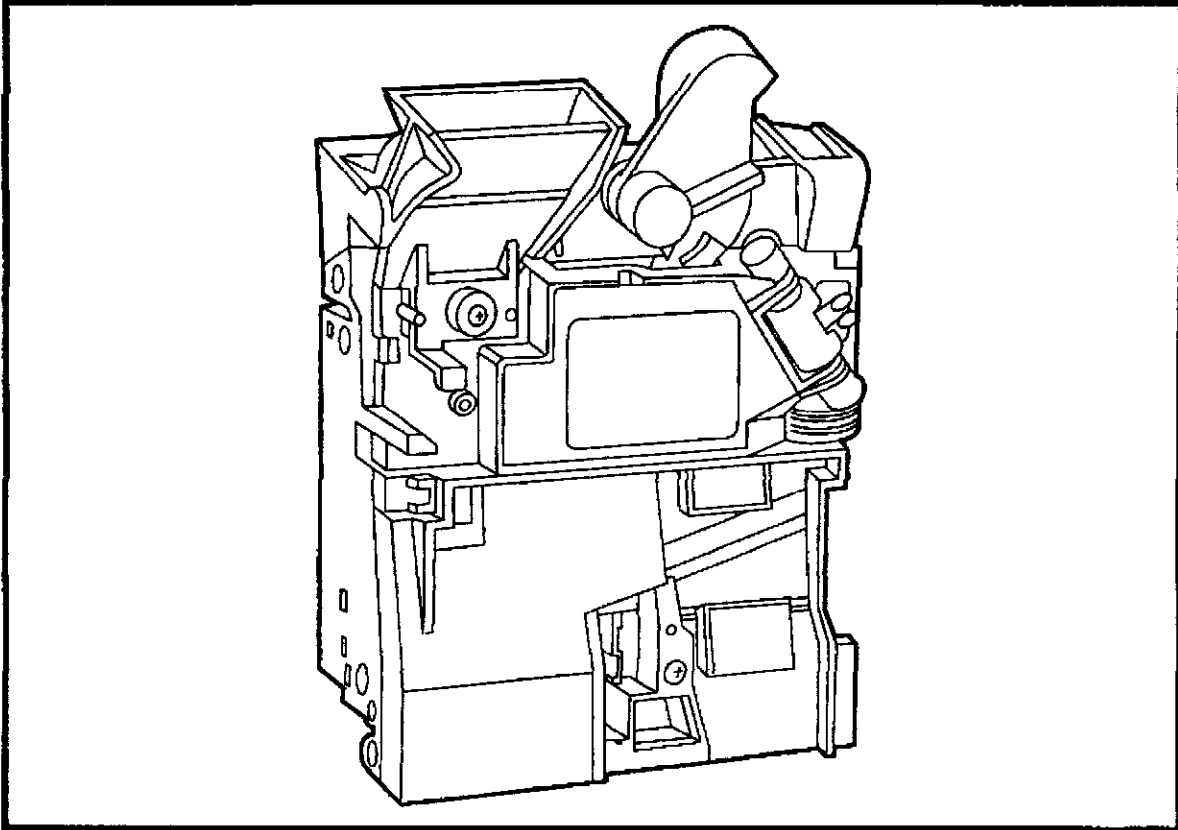
**Mars Electronics Cashflow Coin Mechanism**
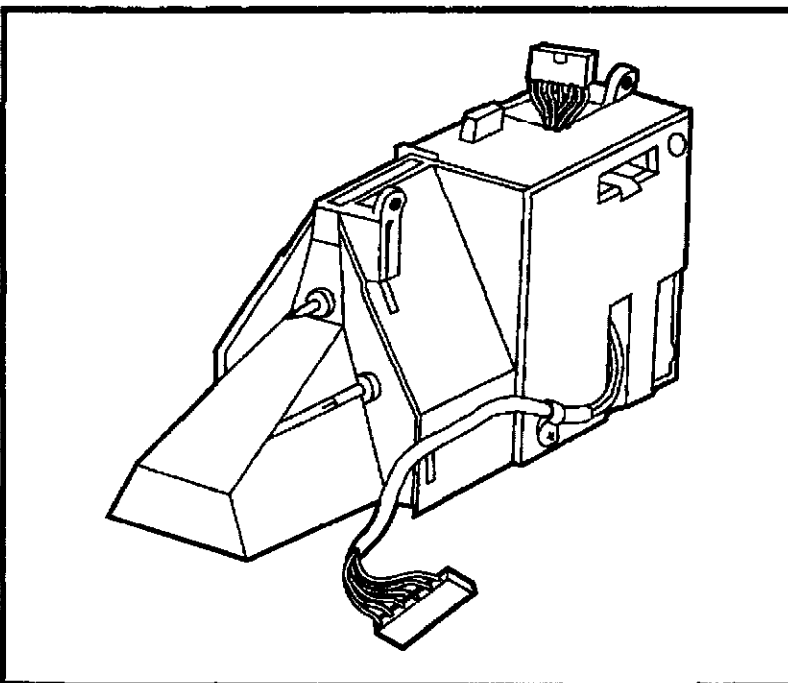


**Mars Electronics Cashflow Coin Separator**

**Coin Routing Plug**

PIN 1

PIN 21  PIN 22  WIRE LINKS



£1 HOPPER — C

£1 CASHBOX — D

20p HOPPER (IF FITTED) — B

A — ALL OTHER COINS
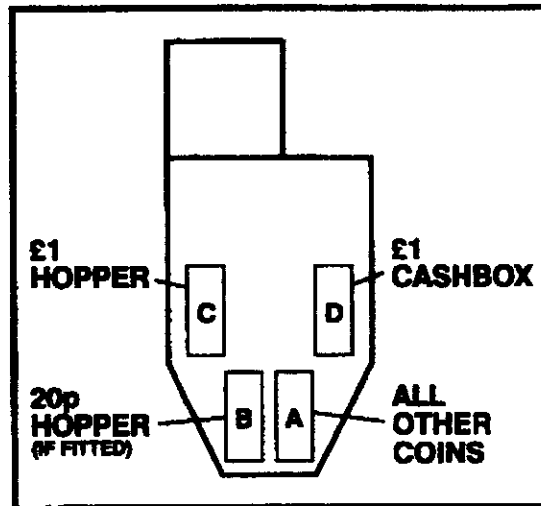
**Maygay Coin Routing**
**(Viewed from below)**



COIN ENTRY

ROUTING PLUG CONNECTOR

MACHINE INTERFACE CONNECTOR

ROUTE INHIBIT CONNECTOR

GREEN DIAGNOSTIC LED

SEPARATOR CONNECTOR

ROTARY DATA SWITCH

4 WAY DIL TEACH SWITCHES

**Mars Cashflow Coin Mechanism Unit**

PIN 1

PIN 21    PIN 22    WIRE LINKS
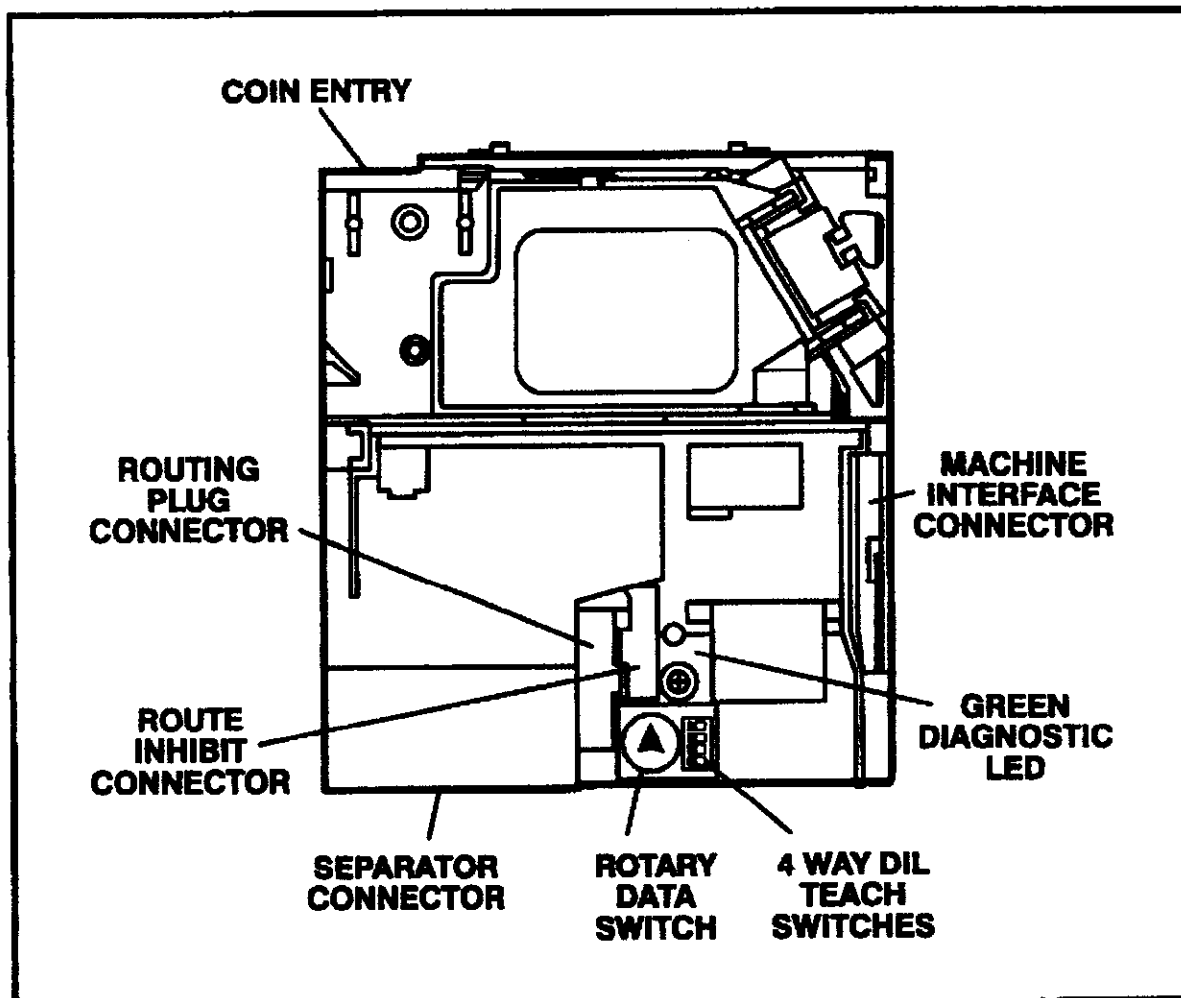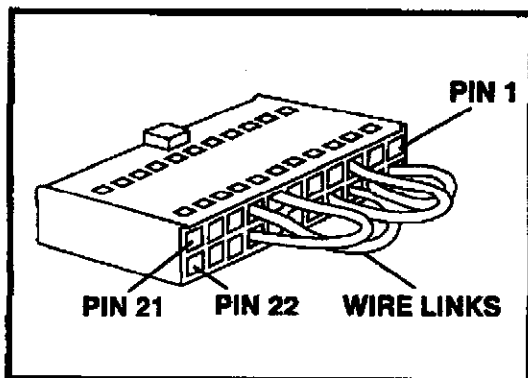
**Coin Routing Plug**

**Mounting Channel**

**Channel Clip**
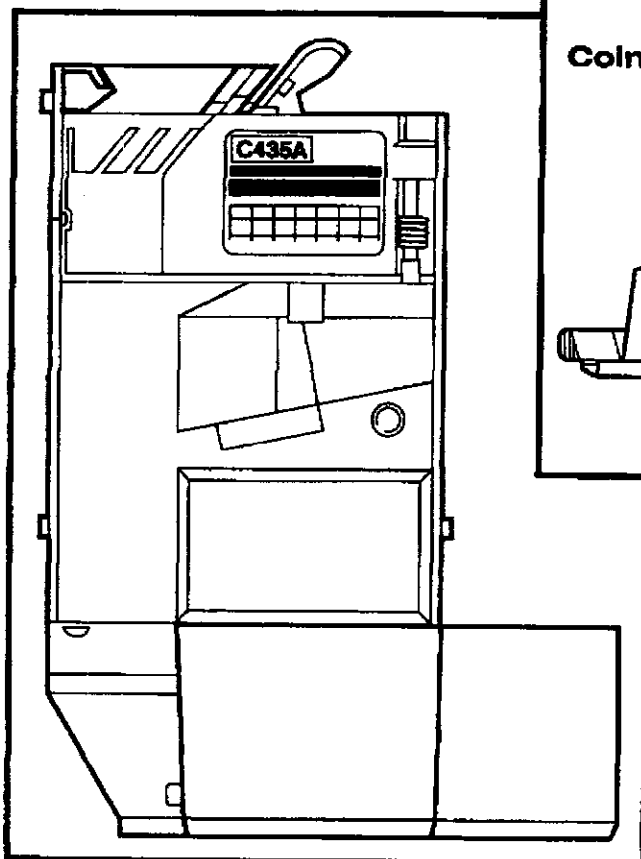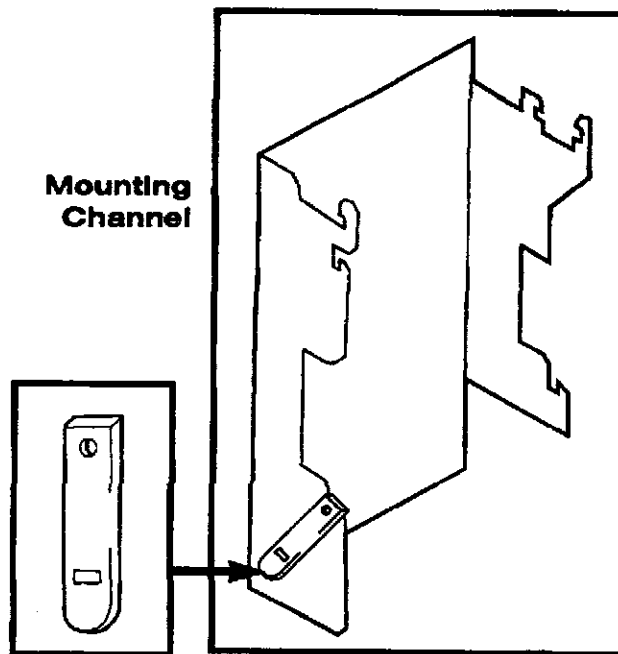
C435A

**Coin Entry Bezel** →

**Dual Coin Entry Chute**
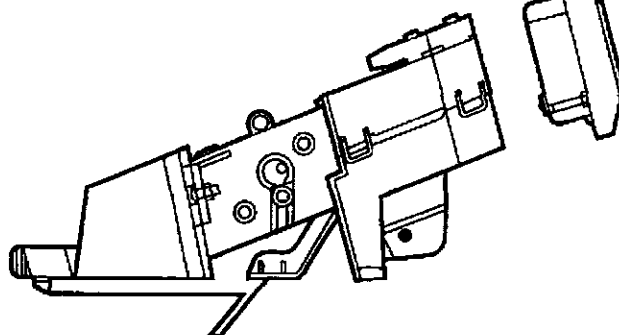
**Coin Controls C435A
Top Entry Validator**
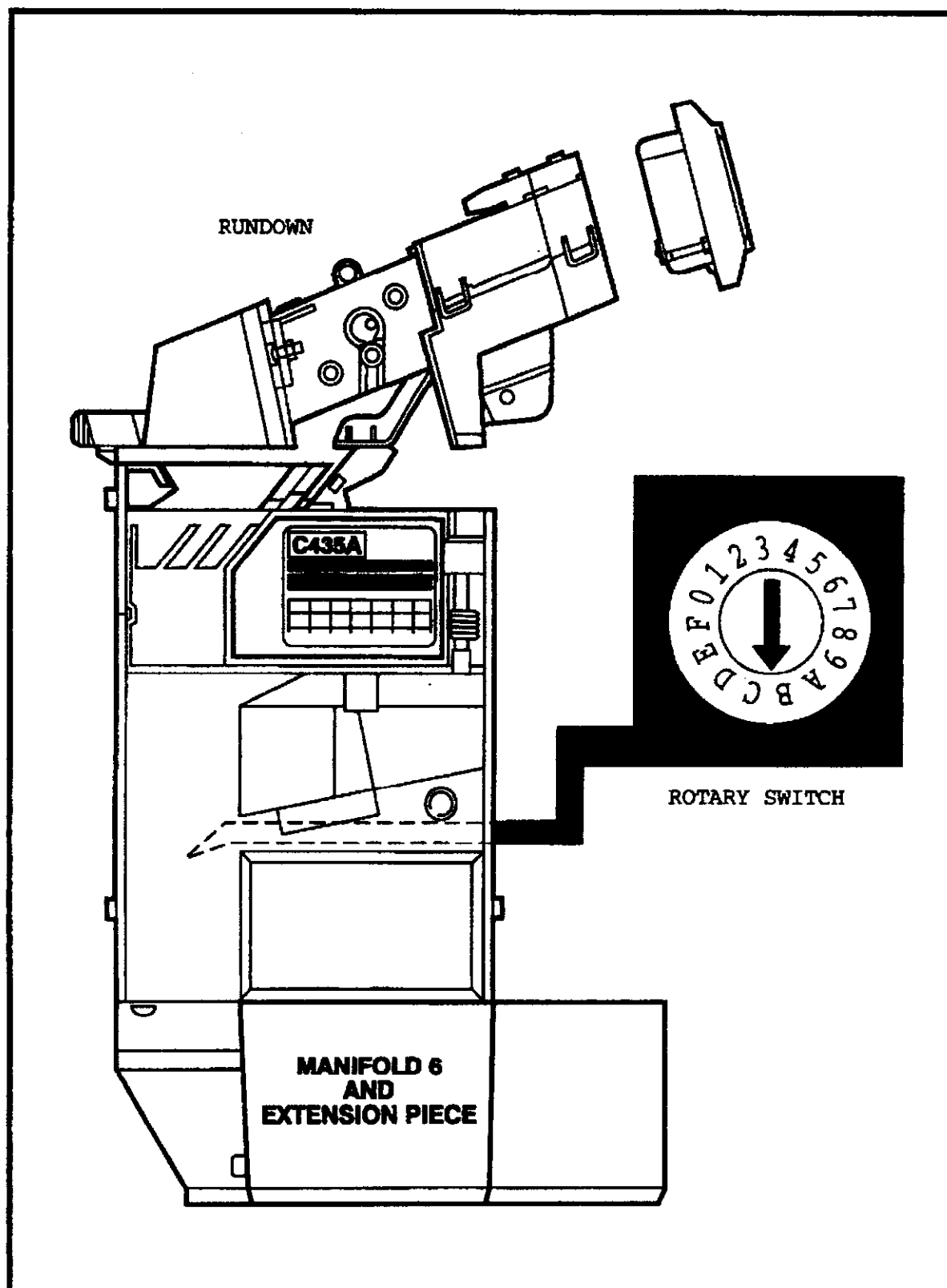
RUNDOWN

C435A

ROTARY SWITCH

MANIFOLD 6
AND
EXTENSION PIECE

**Coin Controls C435A Top Entry Validator**

Token Group 1

Token Group 7

No Tokens

Teach Mode

Program Inhibits

Token Group 11

Teach token Selection

Program Options
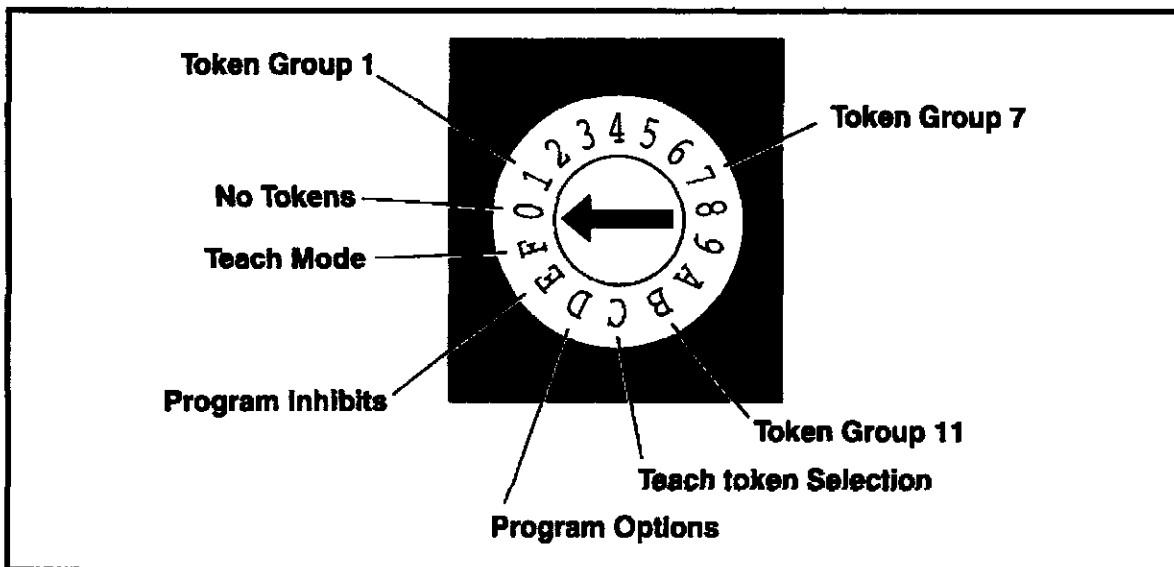
IMPORTANT: NEVER LEAVE
THE ROTARY SWITCH IN POSITION D, E, OR F.

**C435A Rotary Switch**

Coin Windows

Bank 1                                    Bank 2

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16)

Rotary Switch

Token Windows                                    Teach Window

(0) (1) (2) (3) (4) (5) (6) (7) (8) (9) (A) (B) (C)

STANDARD OPERATING MODES

| | | |
|---|---|---|
| CCL mode/DCE connected: | Coin slot: | 15 coin windows |
| | Token slot: | 1 token window (12 Groups) |
| CCL mode/DCE Not connected: | Coin slot: | 16 coin windows |
| | Token slot: | No tokens accepted |
| Industry mode/DCE connected: | Coin slot: | 15 coin windows + 1 token |
| | Token slot: | No tokens accepted |

**C435A Coin/Token Windows**

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**3.5 Pay Out Unit**

Coin Controls    Float capacity

1x £1 Hopper    £125.00

£250.00 with note acceptor

### 3.5.1 Coin Controls Compact Hopper Unit

The Coin Controls Compact Hopper incorporated into this product handles coins in diameter range 15 to 28mm and within a thickness range of 1.20 to 3.20mm. The hopper is controlled by the +24V supply which drives the motor which in turn powers the hopper components. The pay out speed, whilst varying on both the coin size and volumes resident within the hopper at any given time, is approximately 10 coins per second.

The hopper is fitted with a low level sensor to indicate coin starvation and fill levels. The total capacity of the unit is in the region of 700 coins. Correct payout from the hopper has been ensured by the incorporation of optical sensing and payout verification by an infra-red signal which will alert against coin jams.

The hopper is mounted within a new coin handling system, with electrical connection to the unit being made via a 4 pin 'wall polarised' plug situated below the unit. Coins are routed through the top end of the hopper (bowl) then exit through the rear of the hopper which directly goes to the paybowl.

The two cash boxes are identified as follows:

1x £1 coins   –   Capacity 3,000 coins

1x mixed coins   –   Capacity 5,000 coins
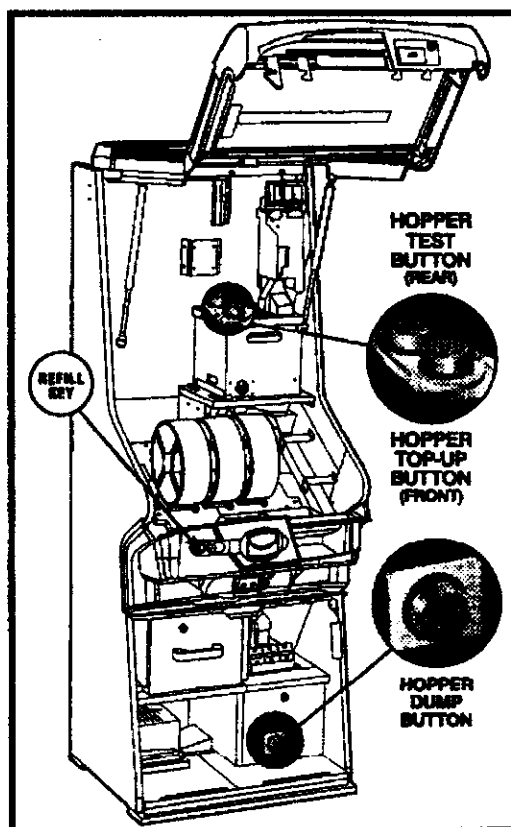
# HOPPER DUMP PROCEDURE

With the lower moulded door removed and the front door open, turn the refill key.
The alphanumeric will display the refill procedure V1.0 refill coins.

Press the hopper dump button behind
the inner cash door, labelled **"DUMP FLOAT"**.

Press the hopper top-up button (green) button found on the top
of the hopper assembly to dump the hopper float.
The coins are counted on the display and the message
reads **"DUMP PND FLOAT"**.

A label can be found with
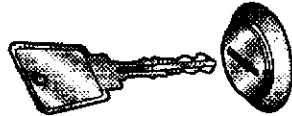button positions on the side
of the hopper assembly.

If the amount dumped is less than the standard float a "Short by £XX" message is
displayed. (This would be the amount to add to the float to top it
up to the standard
amount).
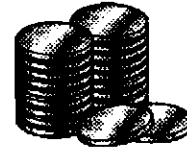
If the amount in the hopper is more than the standard amount, the hopper will count
out the standard amount and then stop. The display will prompt "Dump Surplus".
Press the start button again to dump and count any excess coins. Place surplus
amount into cash box.

# HOPPER REFILL PROCEDURE

To return to a previously dumped float
that is less than the standard amount
open the front door and manually return
all coins to the hopper. Close all doors.
DO NOT press "Hopper Topped Up button".
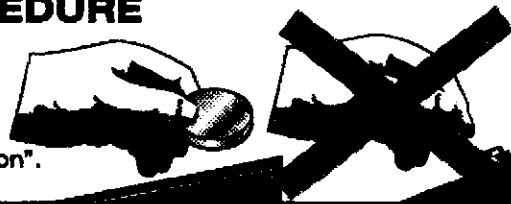
**OR**  To return to a standard float to the hopper open the top front door, turn the
refill key and manual return all coins into the hopper and press the "Hopper
Top-Up button" (Green). Close all doors and remove the
refill key.

The Hopper can also be refilled through the coin mech manually as an alternative method.
If a second hopper is present repeat the procedure exactly as for the first hopper.
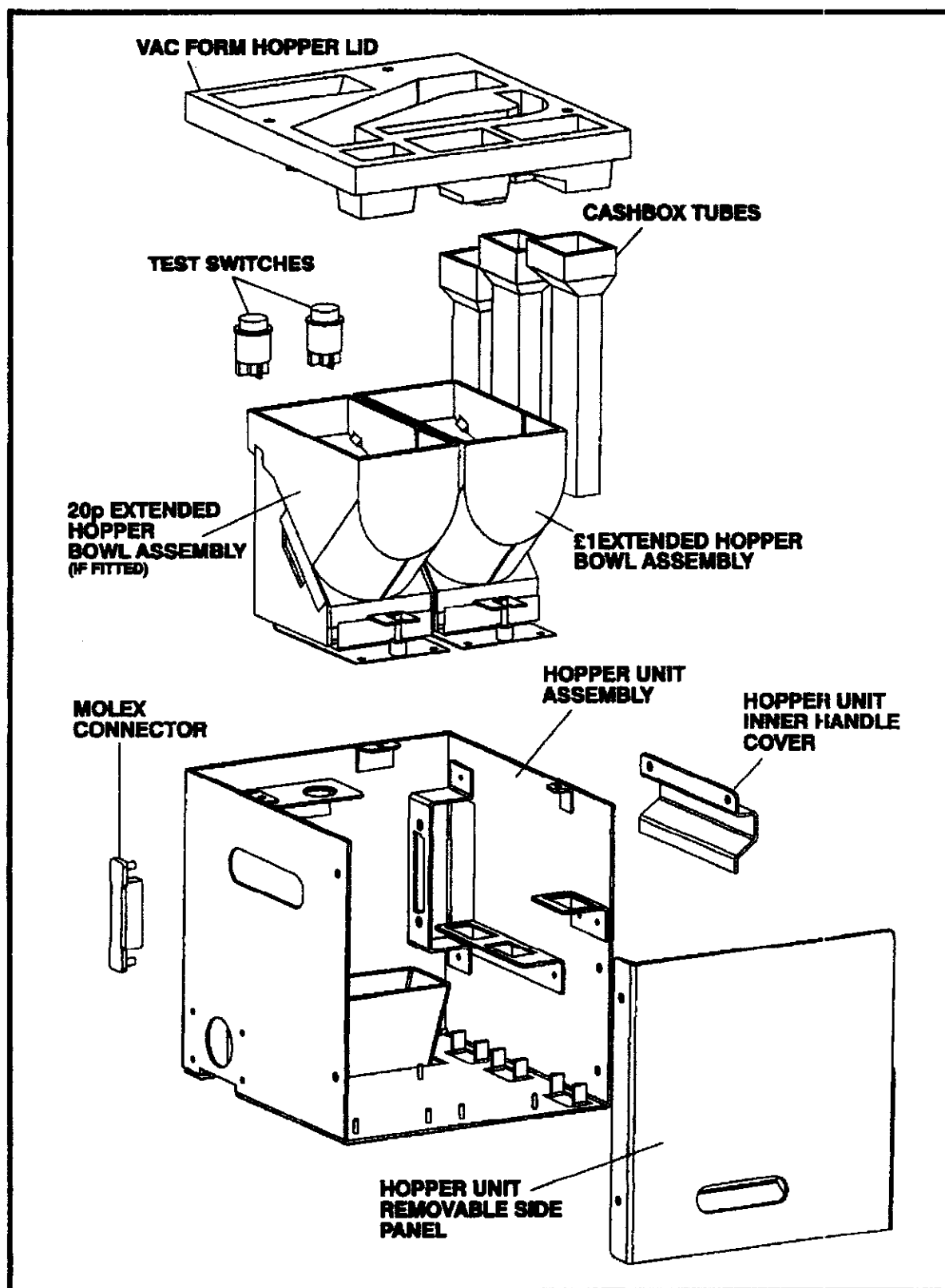
VAC FORM HOPPER LID

CASHBOX TUBES

TEST SWITCHES

20p EXTENDED
HOPPER
BOWL ASSEMBLY
(IF FITTED)

£1 EXTENDED HOPPER
BOWL ASSEMBLY

HOPPER UNIT
ASSEMBLY

HOPPER UNIT
INNER HANDLE
COVER

MOLEX
CONNECTOR

HOPPER UNIT
REMOVABLE SIDE
PANEL

**Coin Controls Compact Hopper**

Spring and ejector location

1. Bowl
2. Base
3. Motor assembly
4. Gear box cover
5. PCB assembly
6. Disc bed assembly
   (state coinage)
7. Gear cluster
   (Non serviceable item,
   illustrated for reference only)
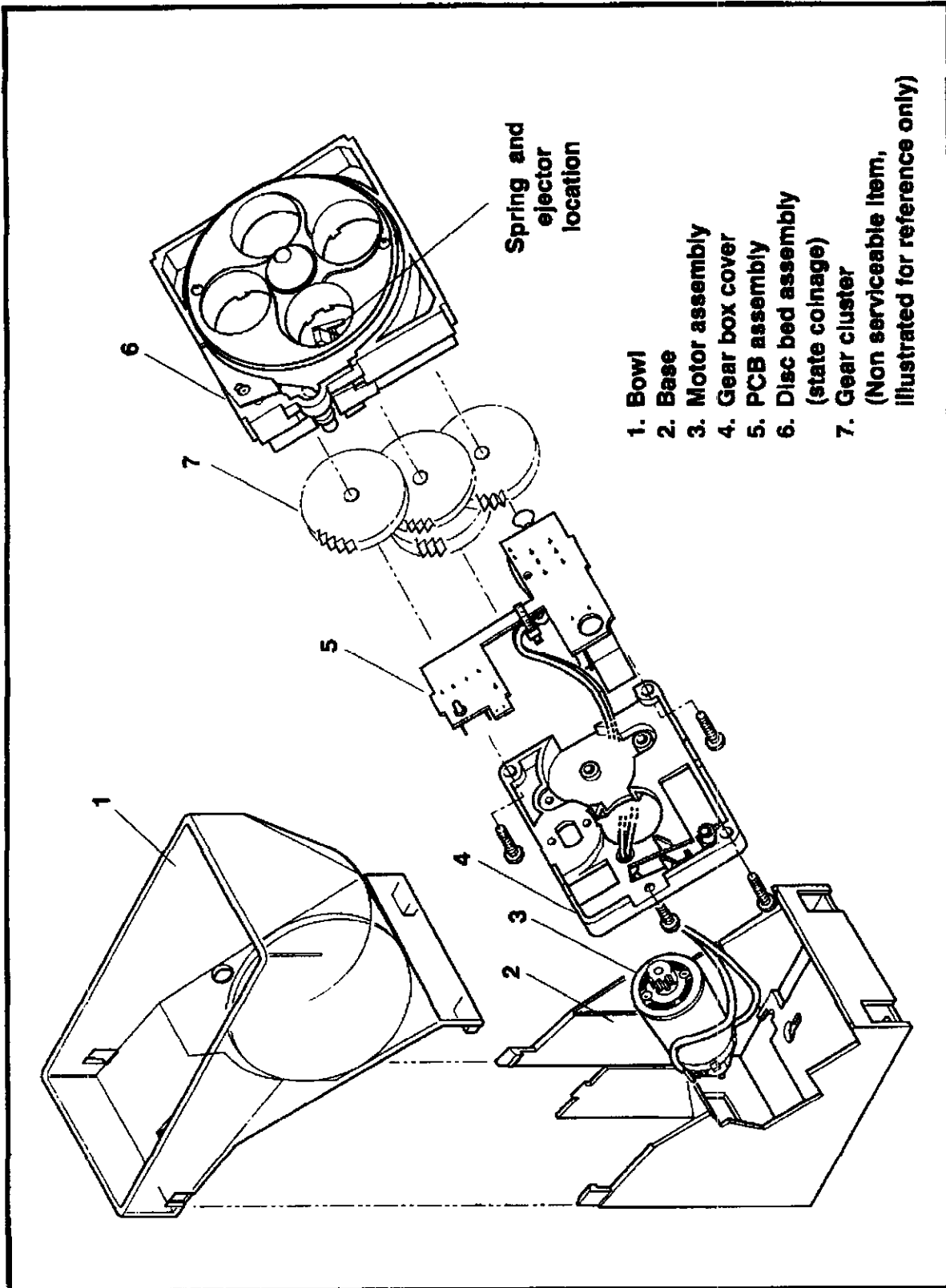
Coin Controls Compact Hopper components

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## 3.6 Reels

The machine can house a range of Starpoint RM NMB reel mechanisms. These can either be 17RM, the new FM3 or the latest addition to the range which is the 20RM reel mechanism. The 17RM and the 20RM are similar in electrical specifications. Both are independently driven by it's own bi-directional 48 step, 12v, NMB motor, housed in a lightweight one-piece moulded plastic frame, which also accommodates an adjustable lamp array fitted with Starpoint ID lamp holder. Each lamp holder in its separate divider holds a 10mm wedge based lamp. The lamp array of each of the first three reels is mounted at approximately 45° from the vertical, the array of the fourth reel being mounted at approximately 90° from the vertical. The lamp array on the 17RM is pivotal around 180° by unscrewing a pivoting screw. The lamp array on the 20RM can be set at any angle.

The 17RM and 20RM reel mechanisms contain a clear plastic reel drum over which is mounted a reel strip. A plastic opto tab is mounted on the rim of the drum for position sensing of the reel strip using an opto sensor. The opto tab is set at position 1 of the reel strip.

The 17RM reel is mounted to an angled panel by a fixed plastic foot and a quick release foot. The 20RM is fitted using the simple push-on/lift-off mounting shown left which provides its electrical connection in one simple action.
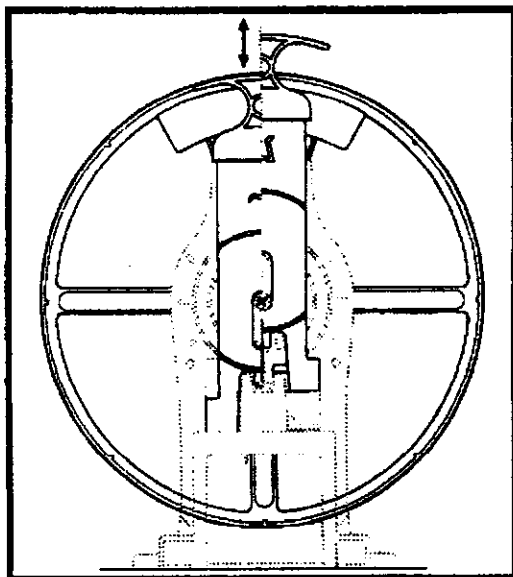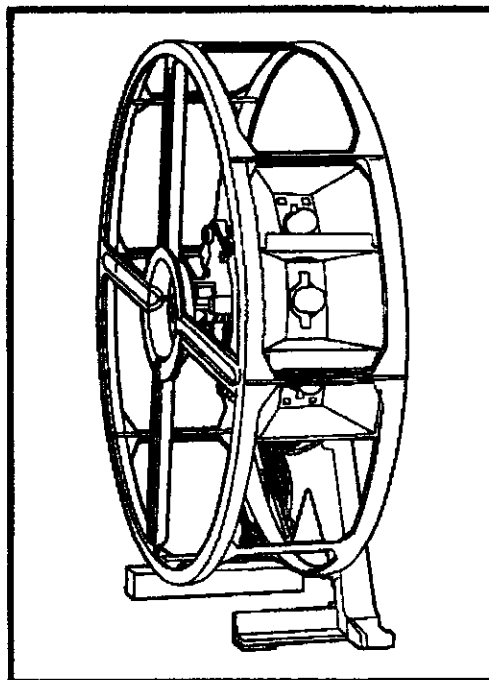
The FM3 reel mechanism is designed specifically as a feature unit although, if required the unit can be used on the lower glass mounted shelf. The unit is fixed to the display glass by a number of screws so that the minimum of space is taken up.

The FM3 reel is driven by it's own bi-directional 48 step, 12v, NMB motor, similar to one which drives the 17RM reel mechanism. The unit also accommodates a lamp holder which houses 4 Starpoint lamp arrays in which holds a 10mm wedge based lamp. The plastic Reel drum can hold reel bands with either 12, 16, 20, 24 and 25 symbols.
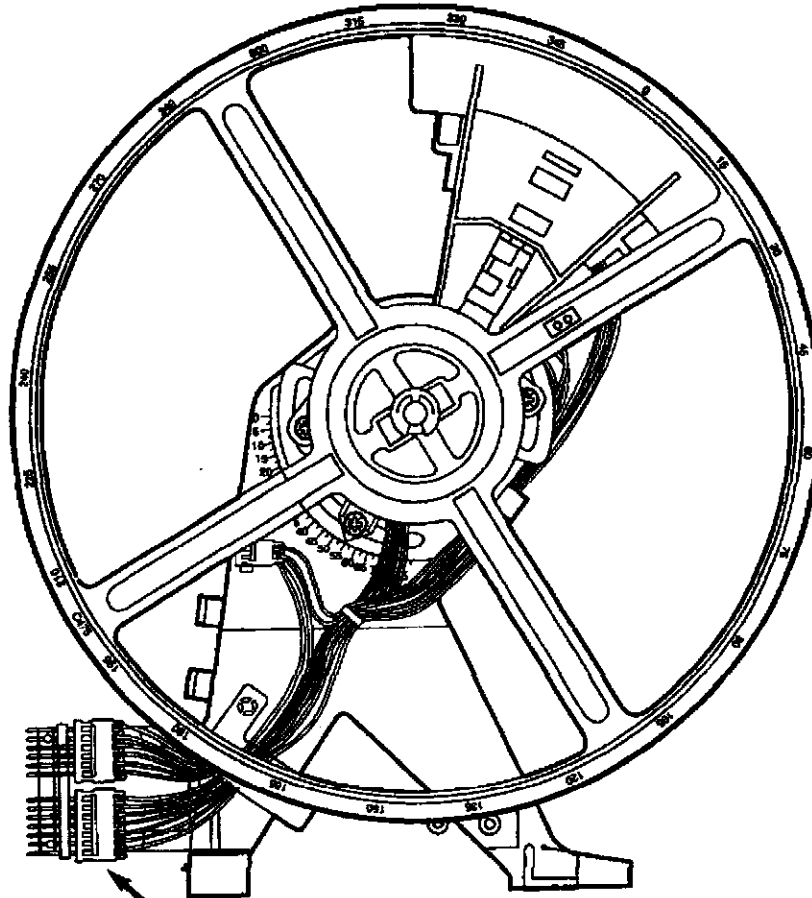
**Starpoint 17 RM Pin Sequence**
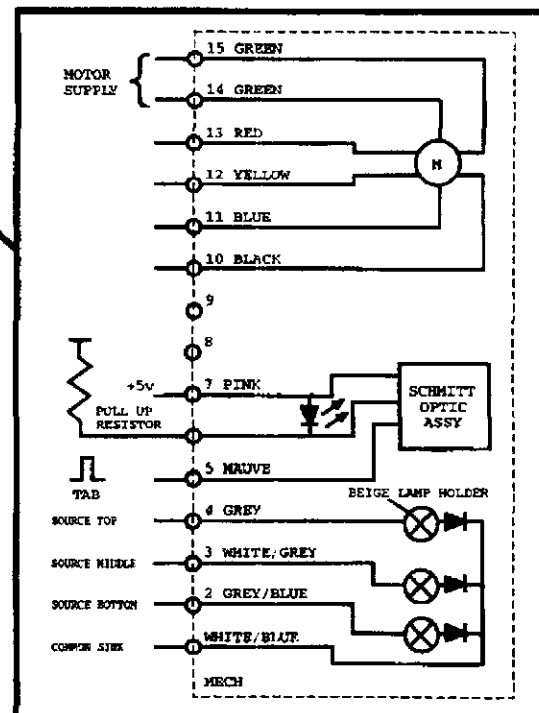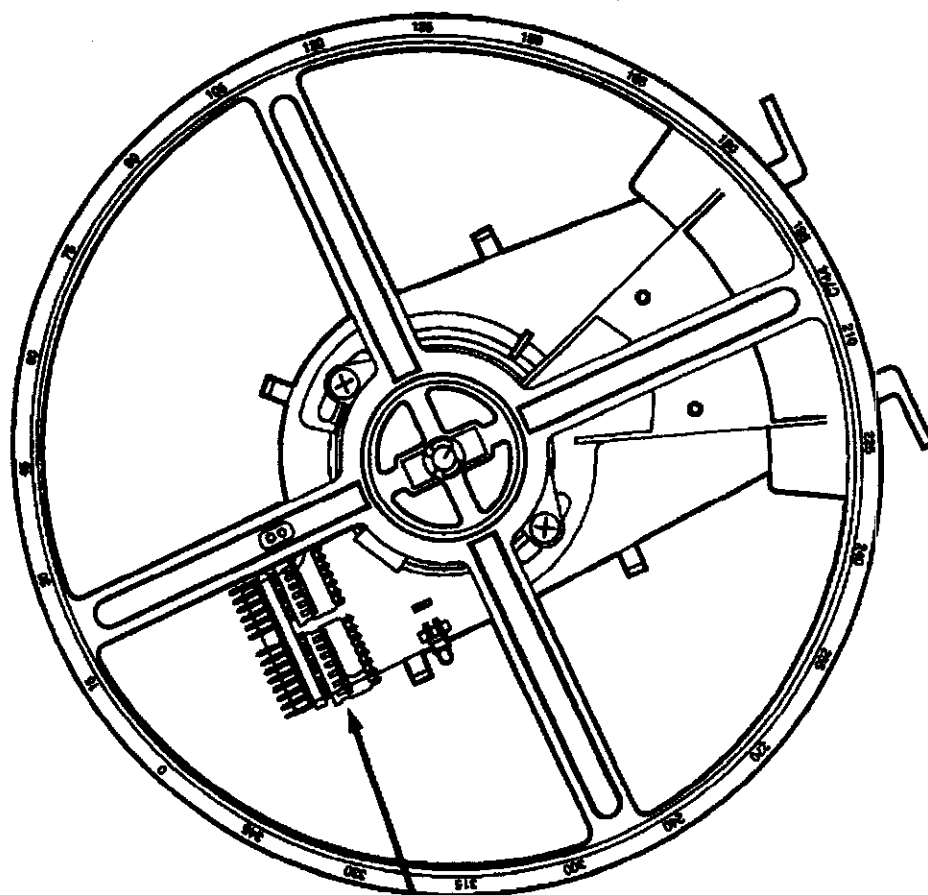
**Starpoint FM3 Pin Sequence**



| | Pin | Colour | |
|---|---|---|---|
| MOTOR SUPPLY | 15 | GREEN | |
| | 14 | GREEN | M |
| | 13 | RED | |
| | 12 | YELLOW | |
| | 11 | BLUE | |
| | 10 | BLACK | |
| | 9 | | |
| | 8 | | |
| +5v PULL UP RESISTOR | 7 | PINK | SCHMITT OPTIC ASSY |
| | 6 | | |
| TAB | 5 | MAUVE | |
| SOURCE TOP | 4 | GREY | BEIGE LAMP HOLDER |
| SOURCE MIDDLE | 3 | WHITE/GREY | |
| SOURCE BOTTOM | 2 | GREY/BLUE | |
| COMMON SINK | | WHITE/BLUE | |
| | | NECK | |
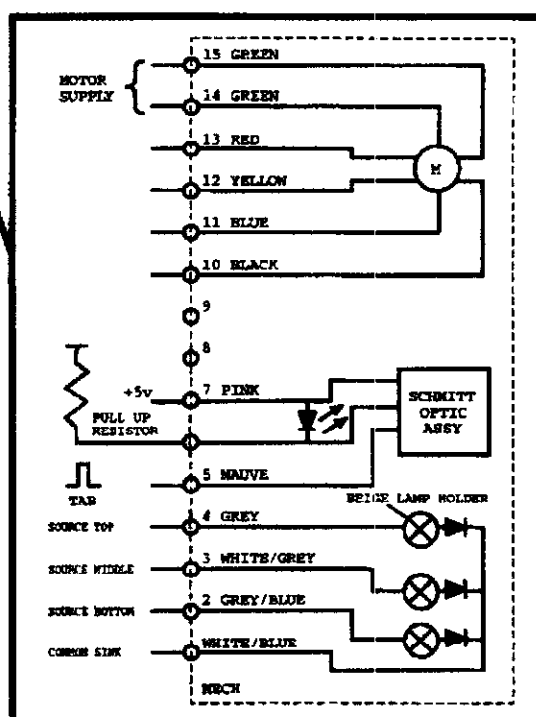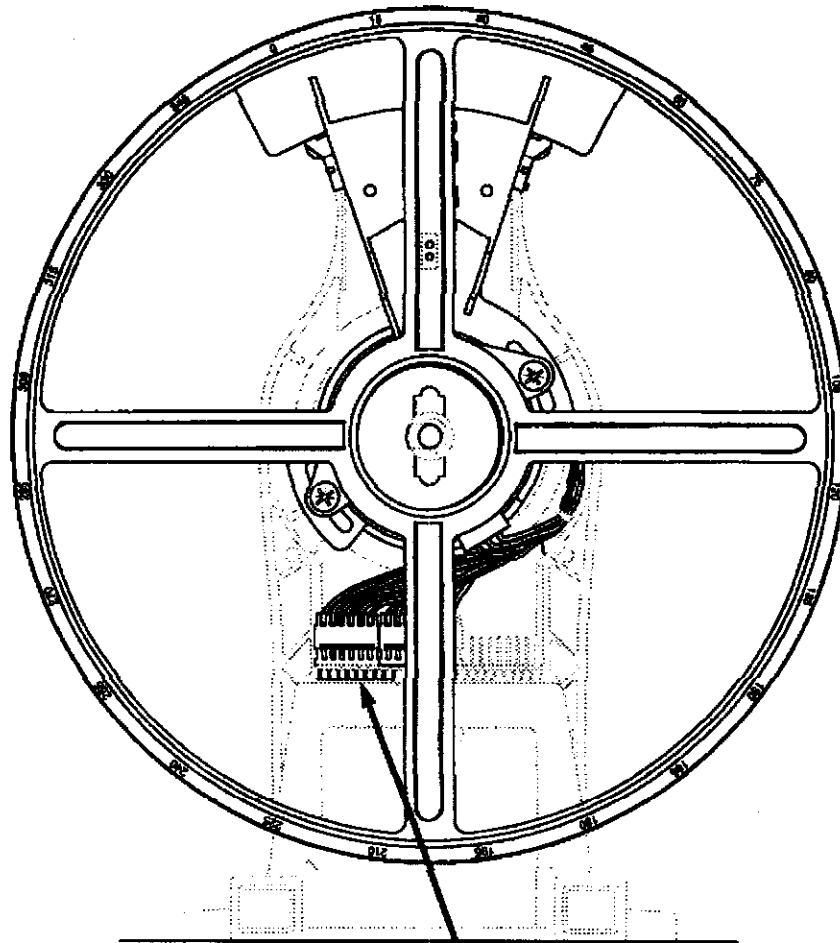
**Starpoint 20RM Pin Sequence**
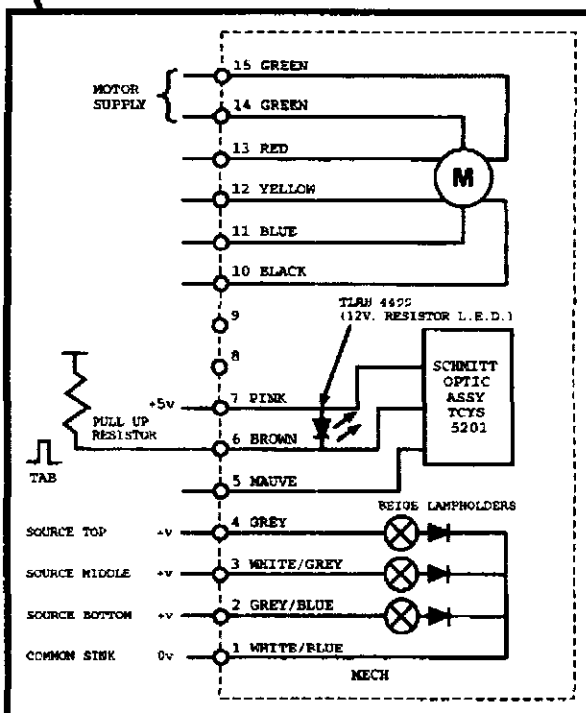
## 3.7 Note Acceptors

The elegance machine can accommodate two kinds of note acceptor.

The Smiley Bank Note Acceptor (NV4) will accept up to four different denominations



of notes, inserted in any orientation with most currencies, and will cope with different designs of banknote having the same value such as are found in the United Kingdom or Spain.
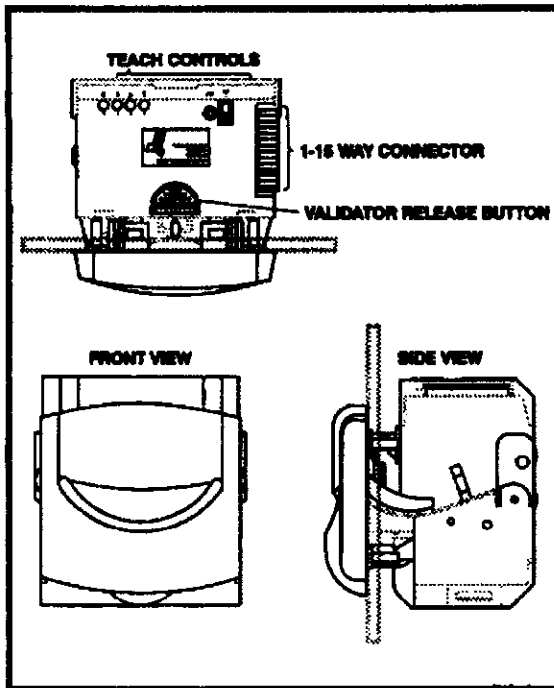
The operation is that when a note is presented to the unit the front optical sensor activates the motor and electronics. As the note is drawn through the unit it is measured and examined with a range of wavelengths of light along its length. The lens assembly enables the unit to examine the whole of the width of the note on both top and bottom faces, whilst at the same time making the validation process insensitive to marks commonly found on many banknotes in circulation.

The acceptor is designed for easy installation in most machines. The "smiling mouth" feature allows insertion of notes with one hand and simplifies the note handling mechanism.

The NV4 can also be re-configured to offer up to 16 different denominations so that multi currency validation may be done.

**IMPORTANT: THIS FEATURE IS ONLY AVAILABLE USING THE RS232 SERIAL INTERFACE.**

The NV4 comes from the factory containing at least one currency data set in so that it is ready for immediate installation. The desired currency can be altered using the PC currency download software. The unit can also be programmed using the built in teach facility which requires no additional equipment.

The NV4 has a built-in calibration system, with the exception of the two front sensors. To re-calibrate an NV4 the unit must be fitted to its front bezel and the power switch off.

The NV4 has three security level options. Each level is determines the severity of note testing which can be set independently for each of the four channels. The higher the level of security the more closely the note is examined. The security levels can be checked and altered whenever the Validator is switched from a selected channel in Teach Mode to Run Mode. When the switch is slid from teach to run one of the four LED's will light, indicating the current security level for the channel that has been taught.

# CHAPTER 3 TECHNICAL DESCRIPTION

The indications for each level are shown as follows:

**LED 1** Security level one (lowest security).

**LED 2** Security level two (recommended for most applications).

**LED 3** Security level three (highest security).

**LED 4** Inhibit. No notes will be accepted on this channel.

The diversified note acceptor recognises up to 7 denominations of any currency with a width no wider than 81mm.

It uses a rail system to set the note path when on entry. It also features 12 sensors and an array of optical, IR,

Magnetic and thread detection for currency recognition. Currency upgrades, re-calibration and diagnosis can be achieved by installation to a PC or a held device called Programming /Diagnostic Terminal (PDT).
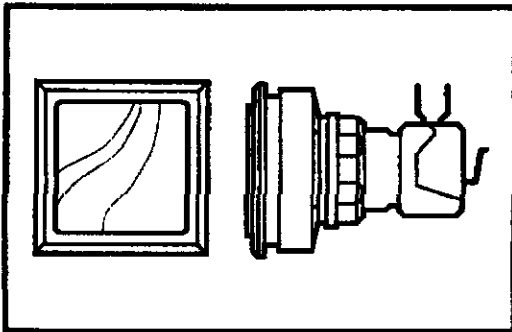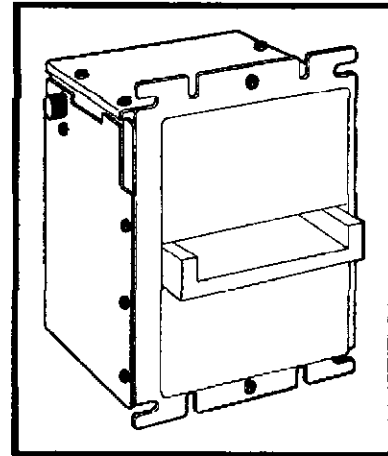
## 3.8 Buttons

The elegance machine includes a play panel within the holes of which are commonly mounted Starpoint Square Angled (Flat Flushed type) Printed Legend buttons. Each button includes a 10mm wedge lamp holder to house a 12v wedge based lamp. Switching of the lamps is controlled by the top glass lamp board.

## 3.9 Lamps

The machine includes two lamp arrays, one of which is mounted behind the reel glass, the other being mounted behind the feature display glass.

Each 10mm wedge based lamp, rated at 12v, 1.2W, is received within the socket of a 10mm ID lamp holder which includes connections for a sink line and source line.
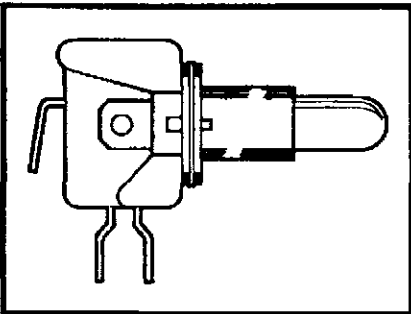
Each lamp is multiplexed to form part of an array of 32 sink x 8 source lines. Switching of the lamps is controlled by the top glass lamp board wherein each sink and source line for a respective array is driven by a separate transistor. A listing of the lamps, the connection to the MPU and the associated driver is provided in the Game Manual.

**IMPORTANT: 12V, 1.2W LAMPS ONLY ARE TO BE FITTED, OTHERWISE DAMAGE MAY OCCUR TO THE MPU.**

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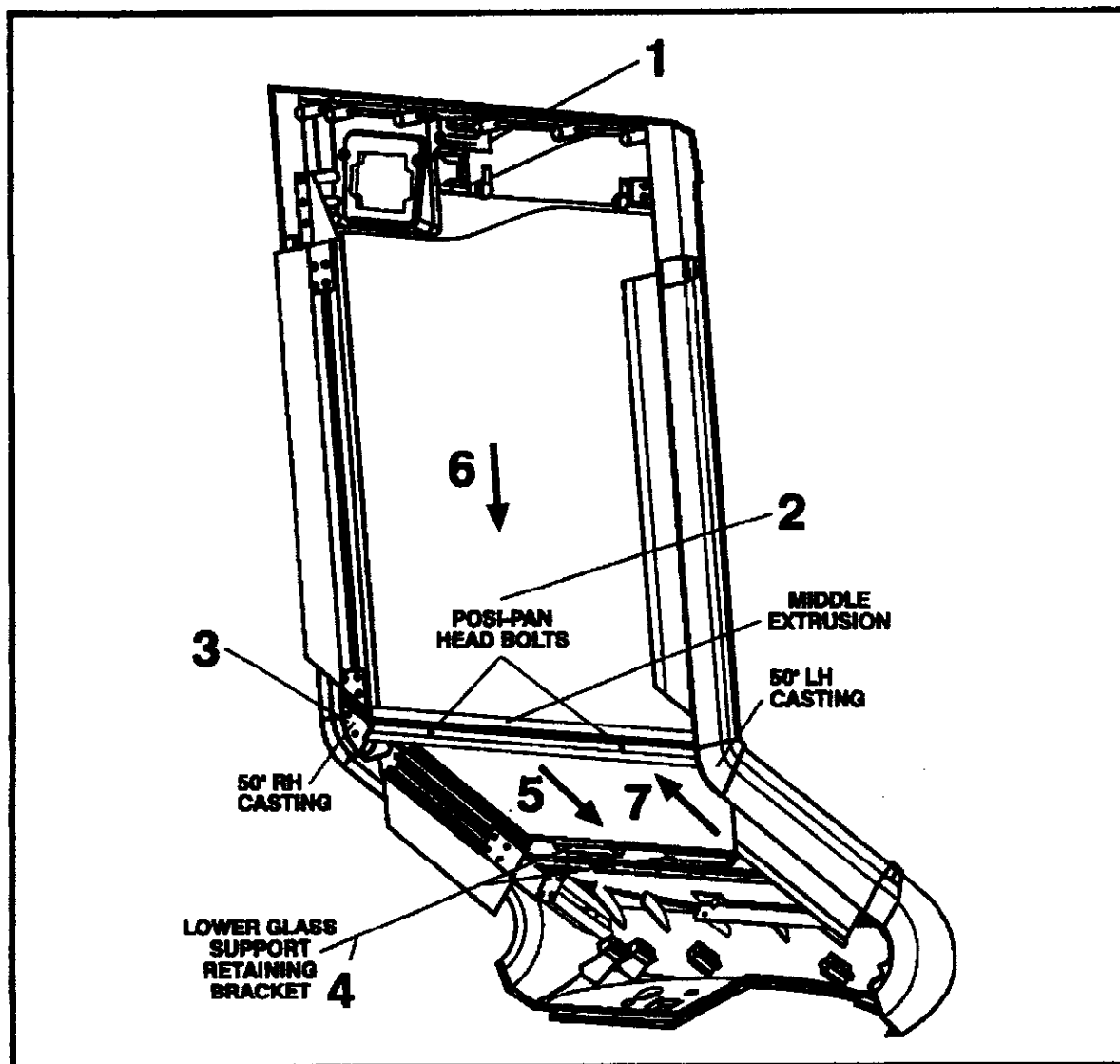
**4.1 Front Door Glass/Lamp Board Removal**

(1)    Disconnect lamp harness, switch looms, meter and alpha harness from the PCB assembly.

(2)    Remove the 2 posi-pan screws from middle glass extrusion assembly.

(3)    Remove 2 posi-pan screws from the right hand and left hand castings which hold middle glass extrusion.

(4)    Remove 4 screws holding stiffening plate and lower glass retaining bracket.

(5)    Slide bottom glass down to enable top glass to slide from frame.

(6)    Remove top glass.

(7)    The bottom glass can now be removed.

## 4.2 Coin Mechanism

### 4.2.1 Removing the Coin Mechanism Unit
Both the Mars Electronics Cashflow simply slots into the retaining bracket.

**WARNING: BEFORE REMOVING THE COIN MECHANISM UNIT, SWITCH OFF THE POWER TO THE MACHINE.**

Disconnect the coin mech loom.
Pull back the channel clip.
Lift the module up to release the pins from the channel cut outs and pivot the top end out.
Gently lift the module from the channel.

### 4.2.2 Refitting the Coin Mechanism Unit
Pull back the channel clip.
Locate the mechanism mounting lugs into the channel cut outs, pivoting the bottom end in first.
Release the channel clip.
Reconnect the coin mech loom.

### 4.2.3 Functional Testing
Upon refitting the Coin Mechanism Unit, a number of functional tests should be performed to ensure correct working.

**Reject Button Function**
Press the reject button on the outside of the machine and check that the reject flap opens. Release the button and check that the flap closes again.

**Coin Acceptance**
Switch on the mains power and insert a series of valid coins into the correct slots.
All coins should be accepted, and no blockages should be present.

**DCE Inhibit Function**
Insert coins into the token slot. Check that all coins are rejected.

**Coin/Token Routing**
Check the routing plug wiring for wrong or missing connections by ensuring the coins/tokens are routed to their correct destinations.

## 4.3 Power Supply Unit

WARNING: BEFORE REMOVING THE POWER SUPPLY UNIT,
SWITCH OFF THE POWER TO THE MACHINE. PSU CONTAINS
PARTS CARRYING MAINS VOLTAGE. DO NOT DISASSEMBLE
NON USER SERVICEABLE PARTS.

### 4.3.1 Removal of Power Supply Unit

Disconnect the IEC mains connector from the Power Supply Unit at the back of the machine.

Disconnect the Power Supply Loom connectors.

Pull the spring bolt located at the side of the metal tray on which the Power Supply unit rests.

Slide the Power Supply away from the machine.

### 4.3.2 Refitting the Power Supply Unit

Relocate the Power Supply in the machine ensuring the IEC inlet socket is adjacent to the aperture at the back of the machine.

Slide the bolt located at the side of the metal tray on which the Power Supply unit rests, slide into position PSU and release spring bolt.

Reconnect the Power Supply loom connectors.

Reconnect the IEC mains plug connector to the Power Supply Unit at the back of the machine.

### 4.4 Reels

The reels fitted to this machine have either a quick release foot and a fixed foot, both of which are mounted on the removable reel bracket or latching system.

WARNING: BEFORE REMOVING THE REEL MECHANISM UNIT,
SWITCH OFF THE POWER TO THE MACHINE.

### 4.4.1 Removing a Reel

Disconnect the reel mech loom.

Lift the lever of the Quick Release Foot or latch and gently slide the reel out.

### 4.4.2 Refitting a Reel

Slide the foot of the reel module into the fixed foot on the reel mounting bracket, so that the reel band is facing forwards.

Click the reel module into position.

Reconnect the loom.

## 4.5    Hopper Unit

**WARNING: BEFORE REMOVING THE HOPPER UNIT,
SWITCH OFF THE POWER TO THE MACHINE.**

### 4.5.1  Removing the Hopper Unit

The hopper unit of this machine is housed within a metal case for easy removal and security purposes.

Unscrew the thumb screw on the base of the hopper assembly.

Gently slide the hopper unit away from the machine.

### 4.5.2  Reconnecting the Hopper Unit

Slide the hopper unit into the machine so that the drawer connector on the hopper assembly fully engages into its mating half.

Tighten the thumbscrew.

## 4.6    Buttons

**WARNING: BEFORE REMOVING ANY OF THE BUTTON UNITS,
SWITCH OFF THE POWER TO THE MACHINE.**

### 4.6.1  Button Removal

Hold the switch of a button tightly from inside the machine.

Pull the switch backwards. The lamp should remain in place in the switch, and the bezel of the button will remain in place in the player panel.

### 4.6.2  Refitting the Button

Locate the switch in the correct button bezel.

Push the switch into the button bezel until a 'click' is heard.

Test the button by checking the switch connection when the button is pressed.

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WARNING: NEVER USE A CLEANER CONTAINING
SOLVENTS, ABRASIVE MATERIALS OR SCRAPERS
DO NOT APPLY WATER OR CLEANSERS DIRECTLY TO
A MECHANISM. ALWAYS APPLY TO A CLOTH OR BRUSH FIRST.
NEVER GET WATER ON EXPOSED ELECTRICAL CIRCUITS.
REMOVE DUST WITH A DRY, SOFT BRISTLED BRUSH.
THE MACHINE MUST NOT BE CLEANED WITH A WATER JET. DOING
SO WILL DAMAGE THE INTERNAL CIRCUITRY OF THE CABINET.
ALWAYS ENSURE POWER HAS BEEN REMOVED BEFORE ANY
MAINTENANCE OPERATIONS ARE PERFORMED.

## 5.1 Routine Maintenance

The maintenance of this machine should always be carried out by a suitably qualified Service personnel. It is recommended that simple routine maintenance is carried out periodically to prevent machine breakdown where possible.

The machine should be stripped down and the following parts cleaned using a foaming cleanser and soft cloth:-

> Reels
> Reel Glass/Feature Display Glass
> Button Assemblies

Ensure the payslide tubes are seated correctly in their solenoids.

Change lamps, where necessary. Ensure the lamps are of the correct 12v 1.2W rating.

## 5.2 Coin Mechanism

Routine maintenance of the coin mechanism unit is limited to cleaning the validator coin pathways once every 100,000 coin entries, or every three months, whichever occurs first.

Remove the validator from the machine, clean the visible parts with a damp cloth or cotton bud. Where the build up of dirt is difficult to remove, use a soft bristled brush or a mild foaming cleanser, such as Ambersil.

Open the reject flap and check that the coin entry cup and coin entry runways are clean and free from obstructions.

Check the entry liner is not dislodged or worn. Refit or replace as necessary.

Remove the reject cover and check that the runways are clean and free from obstructions.

Check for free travel of the accept gate plunger.

### Clearing Jams

The most likely cause of a coin jam is excessive dirt build up on the pathways of the mechanism.

Check the electrical connections are intact.

Check for dirt build up.

Check the condition of the stainless steel coin entry liner. Ensure the liner is in the correct position.

Check for coins trapped within the separator.

Check the coin chutes/cash box route.

Check the fitting of the front plate/channel.

Check the modules are correctly installed in the channel.

### 5.3    Hopper unit

**WARNING: COIN DUST MAY ACCUMULATE IN THE HOPPER DURING USE. INHALATION OF THE DUST SHOULD BE AVOIDED DURING MAINTENANCE OPERATION.**

All accessible parts of the coin route should be cleaned at intervals of every 100,000 or 3 months. A mild detergent on a damp cloth should be used when cleaning. No spray solvents should be applied to the hopper. Special attention must be paid to the opto sensor at the coin exit, where excess dirt build up on the optical surfaces can cause unreliable coin counting.

### Clearing Jams

The most likely cause of a coin jam is damaged or bent coins. Do not return damaged coins to the bowl.

Remove all coins from the bowl.

Remove the motor assembly from the base by gently pulling outwards the securing clips on the back of the base. Tilt the bowl forward until it is clear, then slide the bowl forward until the locating lugs, at the front are clear from the slots on the base.

Clear the coin jam by either:

Rotating the disc manually first anti clockwise then clockwise to free the coin or push the coin back inside using the edge of a similar coin.

Remove any debris from the disc bed assembly.

Clean the exit window opto with a clean dry cloth.

Re-assemble by firstly lowering the motor assembly into the base, ensuring the coin exit is in the desired position. Locate the lugs on the front of the bowl into the slots at the front of the base. Gently press down on the top of the bowl until the securing clips, on the base click into the slots in the bowl.

Refill and test the hopper.

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## 5.4    Earth Bonding and Insulation Test

WARNING: ALL EARTH CONNECTIONS MUST BE OBSERVED WHEN
REPLACING COMPONENTS WITHIN THE MACHINE.

The machine is subject to an Earth Bonding and Insulation Test, the results of which
are recorded on an adhesive label and secured externally to the back of the
machine.

It is recommended that the machine is tested periodically, such as every six
months, to prevent deterioration in the Earth Bonding and Insulation.

### THE TEST MUST BE CARRIED OUT BY A SUITABLY QUALIFIED AND AUTHORISED PERSON.

### 6.1 Anti Fraud Software

IMPORTANT: THIS MACHINE IS FITTED WITH ANTI FRAUD SOFTWARE UPON DETECTION OF SPARKING, THE MACHINE WILL CLEAR ANY OUTSTANDING CREDITS AND BANK AMOUNTS.

**Note: If the machine is switched off frequently, credits and bank amounts may be erased.**

The anti fraud software facility is optional and is disabled by switching the MPU DIL switch 1 of Bank 1 to the ON position.

### 6.2 LED's

The MPU board includes six LED's which are numbered L1-L6 and are known as Status LED's. They are listed in order on the board as follows:-

| | |
|---|---|
| LD1 | Status |
| LD3 | +12v |
| LD4 | - 12v |
| LD5 | +5v |
| LD6 | Dot matrix display power |
| LD2 | Reset |

On power up, LD3, 4 and 5 illuminate firstly to show that voltages are present, along with the LD1 which flashes to show that the board has booted up. When LD2 illuminates this shows that the software is running. LD6 is not required for operation of the MPU board in this machine.

The Status LED's are an indication of error and should all be switched ON under normal operating conditions until an error condition occurs. There is a voltage error if LED's 3, 4 and 5 are not illuminated. LD2 indicates software is not running and LD1 indicates that the board has not booted up properly.

The power supply unit has also a set of Status LED's. It has a total of six LED's, all of which indicate the voltage supplies. They are positioned just showing on the outside of the unit showing out of the cabinet for clear observation. They are listed in order on the board as follows:-

| | |
|---|---|
| LD1 | +36v |
| LD2 | switched +24v |
| LD3 | + 12v |
| LD4 | +5.2v |
| LD5 | sync pulse |
| LD6 | -12v |

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## 6.3 ERROR CODES

| ERROR CODE | DESCRIPTION OF ERROR | ERROR MESSAGE |
| --- | --- | --- |
| 0.1 | NON PAYOUT 5p CASH | PAY 5p ALM |
| 0.1 | NON PAYOUT 10p CASH | PAY 10p ALM |
| 0.1 | NON PAYOUT 20p CASH | PAY 20p ALM |
| 0.1 | NON PAYOUT 50p CASH | PAY 50p ALM |
| 0.1 | NON PAYOUT 100p CASH | PAY 100p ALM |
| 0.1 | NON PAYOUT 10T TOKEN | PAY 10T ALM |
| 0.1 | NON PAYOUT 20T TOKEN | PAY 20T ALM |
| 0.1 | NON PAYOUT 50T TOKEN | PAY 50T ALM |
| 0.1 | NON PAYOUT 100T TOKEN | PAY 100T ALM |

**Code 1: Coin Handling**

| | | |
| --- | --- | --- |
| 1.0 | GENERAL COIN MECH ERROR | COIN MECH ERR |
| 1.1 | 100p COIN MECH FAULT | 100p IN ERR |
| 1.2 | 50p COIN MECH FAULT | 50p IN ERR |
| 1.3 | 20p COIN MECH FAULT | 20p IN ERR |
| 1.4 | 10p COIN MECH FAULT | 10p IN ERR |
| 1.5 | 20 TOKEN COIN MECH FAULT | 20T IN ERR |
| 1.6 | NOTE ACCEPTOR ERRORS | NOTE ERR |
| 1.7 | PAYOUT ERROR | PAYOUT ERR |
| 1.9 | STRIM ALARM | STRIM ALM |

**Code 2: Reels**

| | | |
| --- | --- | --- |
| 2.0 | GENERAL REEL ERRORS | GEN REEL ERR |
| 2.1 | REEL 1 FAULT | REEL 1 ERR |
| 2.2 | REEL 2 FAULT | REEL 2 ERR |
| 2.3 | REEL 3 FAULT | REEL 3 ERR |
| 2.4 | REEL 4 FAULT | REEL 4 ERR |
| 2.5 | REEL 5 FAULT | REEL 5 ERR |
| 2.6 | REEL 6 FAULT | REEL 6 ERR |
| 2.7 | REEL 7 FAULT | REEL 7 ERR |
| 2.8 | REEL 8 FAULT | REEL 8 ERR |

**Code 3: Lamps**

| | | |
| --- | --- | --- |
| 3.0 | GENERAL LAMP FAILURE | GEN LAMP ERR |
| 3.1 | MULTIPLEXOR ALARM - ROW | MUX ROW ERR |
| 3.2 | MULTIPLEXOR ALARM - COLUMN | MUX COL ERR |

**Code 4: Miscellaneous**

| | | |
| --- | --- | --- |
| 4.0 | GENERAL OPERATIONAL MESSAGES | GEN OPER ALM |
| 4.1 | REFILL MODE ENTERED | REFILL TURNED |
| 4.2 | MEMORY CLEAR | MEM RESET ALM |
| 4.3 | BUTTON STUCK | STUCK BUT ALM |
| 4.4 | PERCENTAGE KEY FAULT | NO % KEY ERR |

| ERROR CODE | DESCRIPTION OF ERROR | ERROR MESSAGE |
|---|---|---|
| 4.5 | OPTIONS OR % CHANGED | NEW OPTS ALM |
| 4.6 | CALL ATTENDANT | CALL ATTENDANT |
| 4.7 | REFILL REQUIRED | REFILL NEEDED |
| 4.8 | ON/OFF TAMPER ALARM | ON/OFF ALM |
| 4.9 | STAKE KEY FAULT | STAKE KEY ERR |

**Code 5: Electronics**

| | | |
|---|---|---|
| 5.0 | GENERAL ELECTRONIC PROBLEMS | GEN ELEC ALM |
| 5.1 | EPROM FAILURE | EPROM ERR |
| 5.2 | PAL ERROR | PAL ERR |
| 5.3 | RAM CHECK FAIL | RAM ERR |
| 5.4 | H/W ERROR | H/W ERR |
| 5.5 | ESD/SPARKING DETECTED | SPARKING ALM |
| 5.6 | POWER SUPPLY FAIL | PSU ERR |

**Code 6: Meters**

| | | |
|---|---|---|
| 6.0 | GENERAL METER FAULT | GEN METER ERR |
| 6.1 | METER 1 (CASH IN) FAULT | MET 1 CIN ERR |
| 6.2 | METER 2 (CASH OUT) FAULT | MET 2 COUT ERR |
| 6.3 | METER 3 (TOKEN IN) FAULT | MET 3 TIN ERR |
| 6.4 | METER 4 (TOKEN OUT) FAULT | MET 4 TOUT ERR |
| 6.5 | METER 5 (REFILL) FAULT | MET 5 REF ERR |
| 6.6 | METER 6 PRIZE FAULT | MET 6 PRIZ ERR |

**Code 7: Power**

| | | |
|---|---|---|
| 7.1 | WAITING FOR DATAPORT | DATAPORT ERR |
| 7.2 | FAULT COMMS LINK | COMMS LINK ERR |

**Code 9: Software**

| | | |
|---|---|---|
| 9.2 | MANUFACTURER SOFTWARE ALARMS | SOFTWARE ALM |