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## Introduction.

## By John Burke

This manual has been written as a field guide for ASR's calling to Gas stations in response to a request for a service visit on Arco G2/G3 PIC units.

The Guide DOES NOT cover installation of PIC units. The guide DOES NOT cover trouble shooting of Allied pump/POS controllers nor does it cover trouble shooting of SAM modules. These are fully documented in manuals from Tokheim, Allied and/or Schlumberger respectively. The guide does however contain references to re-starting all of these units and diagnostic means of assessing which part of the system is at fault in order to avoid swapping out good parts. Instructions for warm and cold starting these units, which are referenced during the guide, can be found fully detailed in appendix 1.

The guide IS NOT intended to replace any TOKHEIM / Schlumberger training or troubleshooting material but rather is to be used as an adjunct to it.

The guide WILL give the technician a fast assessment as to the true cause of the PIC failure, and enable any repair to be identified quickly, and minimize the number of parts swapped out in error as a part of the existing diagnostic process.

The guide has incorporated materials used at the help desk at BP ARCO to describe various codes and breakdown conditions, and so this should lead to a faster understanding of the problem and the diagnostics already used to try and assess the situation.

Each section is broken down by major category such as printer, bill acceptor, etc. A diagnostic routine is given for each section, and a run down on probable descriptions given for the call out is given in each section. Most photographs in this guide were taken using a G2 PIC system. The G3 differs in a few areas notably the outlet power and power supply layout, as well as the cash acceptor layout. This guide will be updated in this respect at issue 2, in the meantime refer to the Tokheim PIC reference manual.

The descriptions given in the sections use the same format as the PIC guide used on the BP ARCO Help Desk, which should make things easier. Each description of a problem is also complete with a routine that the station SHOULD have gone through in order to try to eliminate the problem – there are however no guarantees that that has been done.

It is strongly recommended that these fault code diagnostic procedures be gone through before changing out hardware to avoid returning parts with subsequent "no fault found" at the service centers.

Diagrams and photographs are at the back of the manual and can be found in appendix 1. Each diagram or photograph contains a section for your own notes, and may in some cases have some pre-printed notes. The diagrams are at the back so that they may be easily referred by many sections of the manual. It is recommended that you use a couple of large paper clips with this manual, so that you can keep a place in the diagrams and the text at the same time whilst working on the PIC units.

There is a section included on diagnostic testing in section 1 that should be used as a quick guide to fault location if the faulty component is not immediately obvious, and the PIC is able to be actually powered up.

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# General trouble shooting safety, and isolation requirements

## PIC Safely UL approval and hazardous environments

PIC units are located in UL class 1, Division 2 environments (Any location within 20 feet radius of a gas pump). For this reason the conventions applicable to this UL classification MUST be observed when working on PIC units, whether for routine maintenance, upgrades or breakdown call outs.

This class of UL category places relatively few restrictions on the PIC design. The main one is that "ALL wiring MUST be terminated at least 18 inches from ground level" This is because gas vapor is heavier that air, and there is a possibility of a vapor build up – make sure that this ruling is complied with.

The PIC has been designed, so that the cabinet containing the PIC power supply and the main board as well as the outlet power input and all of the wiring terminations are a MINIMUM of 18 inches from the ground. For all additions to PIC units, future modifications etc. please ensure that this 18 inch rule is met.

### Electrical isolation.

### Safety Notice.

In order to work on the PIC system, it is sometimes necessary to measure outlet power, or uncover areas of the PIC unit so that outlet power is exposed. In this case it is necessary to remove covers and safeguards which would normally prevent electrical shock or hazards to personnel or the public.

When working on PIC units with the guards removed, it is essential that both your own safety, the safety of station personnel, and public safety be first and foremost.

For recommendations on safety, please see the manufacturer manual for the PIC unit.

The main power isolation for the PIC unit is shown in diagram 1. This switch contains the main fuse for the PIC unit. When the switch is off, outlet power is still on the main inlet shown in diagram 2 as well as the power distribution boards and the wiring connecting the filtering system diagram 3.

When the text calls for "recycle the PIC unit" in this document or other texts, it refers to switching this main input switch to the off position, waiting a minimum of 4 seconds, and then switching back to the on position.

#### Static protection.

Many of the PIC unit components are static sensitive. It is essential when working on these units that static precautions be taken.

A static wrist cord connected to the PIC chassis is adequate. Note also that the new generations of printer systems being fitted to the PIC units are particularly prone to static when having parts changed, particularly the print heads

#### Safety.

The areas shown in diagrams 1, 2, and 3 can have outlet power applied to them even though the switch on the PIC is set to the OFF position. To completely disconnect the PIC unit from outlet power, it is necessary to disconnect it from the breaker, which will be found inside the station labeled as "PIC unit"

In addition, the Mars EX 3000 cash acceptor system has its own power supply, and so the leads shown in diagram 4 are also connected to outlet power.

Safety is paramount. Please observe safety rules when working on unguarded live equipment, and be sure to safeguard the safety of others.

#### Equipment re-sets and software data transfers.

In this manual, there are contained sections which deal with major components in the gas supply and accounting system such as the POS MSI system, the Allied pump controller, the VSAT system, Paypoint network, and the SAM module. These are referred in order to establish where the problem is in the station, and / or which part of the PIC unit is broken.

Some of the diagnostics and resets of these systems cause data to be lost from the system Notably tallies in the bill acceptors, and in-process transactions at the pumps. It is essential that if warm or hard re-sets of various systems are needed, or commands sent to various units from POS 2, that the requests are referred to station personnel, so that they can be sure that cash tallies are taken, and transactions are complete before systems are re-set.

## Diagnostics testing guide and PIC self test and error messages.

### Single and Double sided PIC units.

PIC units have only one power supply and main board. For a double sided PIC unit, look for the small UL label at the bottom right of the PIC unit about 3 inches from ground level, 2 inches from the right hand side. This is the PIC unit side A and contains the power supply and the main processor card.

### **PIC Diagnostics tests**

Can't process PIN

Paper out

These tests can only be used if the PIC is actually able to power up. If the PIC is not under power, use the troubleshooting guide for the power supply, and find which unit has caused the problem (if any) before continuing with this diagnostic test sequence.

### **Diagnostic self test of the PIC**

The PIC is designed to do a "Quick diagnostic" self test from the keypad without opening up the unit. This feature is built into the PIC unit so that station personnel can perform a quick test of the PIC functionality without needing keys to open it up.

This test is referred to extensively throughout this manual. The reason for this is that if a particular module has been swapped or worked on, the system test is a quick check to ensure that the particular fix was successful.

To do a self-test on the PIC unit proceed as follows:

At the keypad, type in 99 followed by the ENTER key. If the system has no problems the PIC Unit should display the message "System OK". At this point test the printer by entering 89 enter at the keypad – the printer should produce a test receipt if working correctly.

Any other message should be investigated. The error messages for the system are as follows:

Error message	Manual section dealing with it
Printer failure	Printer
Cash acceptor error	Cash acceptor
Cant process ATM cards	Card reader
Network unavailable	Non specific trouble shooting

Debit module

Printer

Page 10

Cassette removed
Door open
Bill Jammed
Cassette full
Bill paused

Bill acceptor Check doors/door switch functionality Bill Acceptor Bill acceptor Bill acceptor

#### To enter diagnostic mode (Testing individual component functions).

Power the PIC OFF from the main input switch (Diagram 1)

Look at the Thumbwheel settings on the PIC unit and write them down (Diagram 5)

Set the Thumbwheel switches for ANY number between 37 and 99 (this range automatically puts the PIC into diagnostic mode on boot up, the number is immaterial so long as it is within this range.)

Power the PIC unit back up by turning the switch to the ON position (Diagram 1)

#### Keypad test

Press each key on the keypad EXCEPT the receipt key, which is used, in a later test

Diagram 25A shows a keypad layout for the G2/G3 PIC. Diagram 25B shows the message that each key will bring up in the PIC display when the key is pressed.

If any of the keys fail to give a response the cause is probably a defective keypad (providing of course that at least SOME of the keys are working) and the security module will have to be changed in order to correct this.

After testing every key and getting the appropriate response, press the Receipt key, the display should now read "Start printing Key Code: 59". At this point the printer will print a test receipt (If the printer is not working at this point proceed to the printer section of this manual).

Next, press the Receipt key once more, the display will now read "Stop Printing Key Code: 59".

#### **Card Reader test**

While still in diagnostic mode as described above, insert a card into the reader and remove it. If both tracks 1 and 2 on the card have been read successfully the PIC main display will show the message "Test Mode T1:OK T2:OK"

If this test should not work either the card reader is not working or communications with the rest of the system are down. If this is the case refer to the card reader section of this manual

#### **Cash acceptor test**

While still in diagnostic mode as described above, insert a bill or a blank sheet of paper 2.5 inches by 5 inches in place of a bill. The display will either read "Test Mode \$0 inserted" if a blank piece of paper was used for the test, or will read "Test Mode \$X.00 inserted" where X is the value of the bill put into the cash acceptor.

If this test should not work either the cash acceptor is not working or communications with the rest of the system are down. If this is the case refer to the cash acceptor section of this manual.

#### **Exiting diagnostic mode**

Turn off power to the PIC at the main power switch (Diagram 1)

Re-set the Thumbwheel switch settings to their correct value as noted at the beginning of this section on diagnostics.

Switch the power back on to the PIC unit.

# PIC thermal printers and printer driver cards.

The printer and printer driver have historically had many failure problems. The original printers and driver boards fitted to PIC units are of Axiohm manufacture. These units are at the time of writing being re-fitted by Fujitsu mechanisms. Tokheim Corporation also supplies a unit, which is manufactured by Seiko.

### **Axiohm Printers**

This section deals specifically with the historic Axiohm model, and upgrades to this manual will include the new units as soon as further data is available for them.

### Axiohm printer basic tests

On a unit with a suspected printer failure, before any tests are carried out as detailed in the sections below. First, look at the printer mechanism (diagram 8)

There have been many printers fail due to the controller card failing, and driving the paper advance motor continuously. This causes the motor to overheat, eventually melting the plastic of the motor housing resulting eventually in a short out or a stalled motor condition.

Examine the printer mechanism closely in the area of the motor assembly (Diagram 8). If there are any signs that the plastic has melted, remove both the printer assembly and the controller card. Replace BOTH items, and return the burned out units IN ONE SHIPPING BOX.

Providing that there are in fact no signs of burning or melting in the motor area of the plastic, continue with the rest of this section on printer trouble shooting.

Next look at the DIP switch settings on the printer. These should be as shown in diagram 7. If these are not in the correct position, power down the PIC, change the switch settings and then power the PIC back up. (Diagram 1)

## Printer connection to the PIC.

The printer cable from the unit to the PIC main board consists of a 3-wire system. The data from the main board is transmitted over the cable that runs to pin 1 and 3 (Blue and green wires) of the plug (Diagram 9).

The third connection for the printer is the signal for end of paper for the printer. This is the connection on pin 10 and is held at logic 0 for normal operation going high to 5V for a paper out signal.

The following checks and tests must be been carried out prior to changing out the unit.

Check that the printer has paper, and that the paper path is correct (Diagram 6). Ensure particularly that the paper is running underneath the paper out detector micro switch.

Check that all connections to the printer are secure, and that there are no loose cables. The cable connections to the printer are shown in diagram 10.

Using a multi-meter, check the voltages at the printer unit, these should be as shown in diagram 11. If these voltages are NOT present, disconnect this plug from the controller board assembly (diagram 22). Test the voltages on the disconnected plug. If they are now correct there is a problem with the controller/printer combination causing the problem. If at this time the voltages are still not present go to the power supply section of this manual.

#### Axiohm printer communication tests

The above tests confirm that the printer has power being sent to it, and that the settings are correct. In order to check whether there is a print message being sent to it, connect a multi meter across pins 3 and 2 of the printer connection (diagram 9). With no communication taking place this voltage should be reading a little over 8 volts.

At the keyboard, enter 99 (Enter) followed by 89(Enter). This puts the PIC into a mode where it will print a test receipt if the unit is working correctly. At this point the meter reading will drop to around 0 volts for 3 or 4 seconds as the PIC unit communicates with the printer, after this time it will return to just over 8 volts if the output from the PIC is working normally.

If the test above shows that the printer is being communicated with, then the fault probably lies in either the printer or the printer controller card.

# PIC Error messages relating to Printer/Printer Driver card and common printer related reports.

#### "Printer Failure"

PIC unit has a bad printer, printer I/F board, or simply the paper is mis-fed.

#### "Paper Out"

If paper is truly out, it will display "Paper Out" at the POS as well. Install a new paper roll into the PIC unit ensuring that the paper runs underneath the paper out detector switch (diagram 6), Also ensure that the paper is fed into the printer the correct way up, since thermal paper generally only is treated on one side. If it is installed upside down, there will be no print. To advance the paper use the small red button located on the

printer support bracket close to the Thumbwheel selector switch (Diagram 27), this button when pressed will advance the paper.

### "Cash Receipt Unavailable"

This message is displayed at the PIC's when a customer has authorized a pump using cash and returns to the PIC unit trying to get a receipt but doesn't pump full amount.

### Printing blank receipts

Run "99" diagnostics by typing <99> from the "Select Pump #" prompt and then pressing <Enter>. After the PIC has done its system check, test the printer where applicable to verify the blank receipt. This is done by typing <89> when the system goes back to the "Select Pump #" prompt and pressing <Enter>. If it is blank, the paper was probably installed backwards (thermal printing is one sided). Reverse paper .

If paper is installed correctly (diagram 6), other probable causes are that the contrast is out of adjustment and may be readjusted (see diagram 10 and adjust P1 to check), or the DIPswitch settings on the printer are set incorrectly (diagram 7).

### Not printing a receipt for customer (no paper coming out)

Verify that the customer has not paid for his fuel purchase inside or that the customer has not left change on the pump. A receipt will not print in either of these cases. A receipt will only be issued if the customer pumps the full amount that they paid cash for, or if they paid using a debit card at the PIC's. Otherwise the customer is prompted to see cashier for a receipt. Also verify that the customer indicated the pump number when trying to get a receipt.

### If the receipt is printed backwards:

Setting #6 on the solder side of the printer driver controller board must have pins 1 and 2 jumpered. If they are jumped and issue is still present, replace printer driver board.

#### Before running any tests, check the following switch and link settings:

Ensure the Printer switches are set as follows (See diagram 7)

S4, S5, and S6 should be off. S1, S2, S3, S7, and S8 should be on.

# Mars Cash Acceptor

The Mars Cash Acceptor, has it's own power supply. This unit is the only one in the PIC that does not rely on the internal PIC power supply, although the communications board for the cash acceptor assemblies DOES rely on the internal PIC PSU

If the cash acceptor is identified as a possible source of PIC problems proceed as follows.

Examine the outside of the bill acceptor slot, checking for signs of user damage, and / or remains of jammed bills. If the cash acceptor is showing signs of severe user damage remove it from the unit and return it for re-calibration, marked as "user damaged". If there are remains of bill jams in the unit, remove them if possible from the outside. (Diagram 13)

If the above is not possible, remove the cash cassette from the cash acceptor mechanism (Diagram 12)

Check the cash acceptor mechanism for jammed bills. Also check the cash cassette for jammed bills. If these are found, remove carefully from the mechanism.

Inspect the cash acceptor mechanism and ensure that the bill pusher plate is in the home position and not jammed in the out position (Diagram 12).

Look at the controller board on the right hand side of the cash mechanism (In some styles of PIC unit, this may be difficult and necessitate the use of a flash-light and / or mirror.) The position of the DIPswitch settings for this unit should always be set as shown in diagram 39

Ensure that the cash cassette mechanism is correctly seated onto the rear of the cash acceptor mechanism. Also ensure that the TAB or tongue on the cash acceptor mechanism slides easily into the slot on the cash cassette when the units are joined together. (Diagrams 37 and 38)

# PIC Error messages relating to Cash acceptor/Interface cards and common cash acceptor related reports.

## "Bill Jammed, Please See Attendant", "Remove Bill" or "Cassette Full"

The "cassette full" message at times may be misleading. Instead of cassettes being full, it might be a bill jam, which is most often the case. Cassettes within the PIC, ARCO cassettes can hold up to 1,200 bills. To see the amount of bills and how much is presently in the cassettes, just press <PIC STATUS> and then <F2> at POS #2 (main register).

Check whether there is a bill jammed in the acceptor mechanism (Diagram 12) if so clear jammed bill in the bill acceptor. Note: If you can see the bill in question (Diagram 13), power down the cash acceptor (Diagram 14) and it will be spit back out

#### "Cassette Removed"

It could be a bill jam. This is because if a bill has jammed the bill pushed mechanism in any position but the home position, the PIC software will think that the cassette is not present the next time the PIC power is cycled.

Since the PIC power will almost certainly have been cycled in order to try to clear the problem by station personnel on instructions from the help desk, this message generally indicates a bill jam rather than the cassette being physically removed from the unit.

Investigations are being carried out into modifications, which will prevent this problem occurring in the future.

Three other main causes are the door switch, the cassette not installed properly, or simply a bad cassette.

**IMPORTANT:** When a PIC displays "Cassette Removed"; at the "<PIC Status> <F2>" screen at POS #2, the bill count and the dollar amount for that PIC unit in question will zero out.

### "Bill Paused"

Check and clear the cash cassettes/bill acceptors. If a bill is jammed, remove the bill (Note: Refer to "Flashing Lights Table" Diagram 15.)

### "Cash Acceptor Link Down"

Check if the PIC unit in question is configured to accept cash in the DPT configuration and cash cassette is installed within the PIC unit.

Have site insert cash into the PIC unit after the site personnel have chosen a pump #. If the message "INSERT CARD" is displayed or bills are not getting accepted, try cycling power to the PIC unit in question.

Check the connections by powering down the PIC and metering through on pairs of wires using jumpers to loop back if necessary until all lines are tested to truly trouble shoot the root of the problem.

If at this time, issue is not resolved, replacing the bill acceptor might only be the course of action possible. It could be a bad bill acceptor but most of the time it is simply a bad door switch. (Note: Refer to "Flashing Lights Table". Diagram 15)

#### "Total \$XX, Cash Limit Exceeded"

This message is displayed at the PIC's when a customer has put an amount into the PIC that exceeds the set limit. (It is normally set to \$50.00; with some exceptions.)

#### "Total \$XX at Bill Limit, Press Enter"

This message is displayed at the PIC's when a customer has put a bill count into the PIC, which exceeds the set limit; normally set to 50 bills per transaction.

#### When the display says INSERT CARD only

First do a diagnostics at the PIC's. This can be done by typing "99" and pressing <ENTER>. Also make sure that the printer is working (type "99" <ENTER> followed by "89" <ENTER>.

If the printer works, verify that the bill acceptor is enabled in the IPT configuration. If the problem has not been resolved, it could be a bad I/F board, alarm sensor cable, bill acceptor or cassette not installed or installed incorrectly. (See appropriate sections of this manual)

Note: If POS #2 displays "CA door Open" or "Cassette removed/full", PIC's will display "Insert Card" only, after customer has selected pump.

These two conditions will not allow the PIC's to accept cash. If the printer is down, PIC's will not accept cash. (Note: Refer to "Flashing Lights Table" diagram 15)

#### When the PIC unit is Double Reading

Check the DIP switch settings on the cash acceptor in question, they should be as shown in diagram 39.

If these are OK, clean bill acceptor path from film and dirt. If this shows no improvement you may have to change out bill acceptor(s) in question. Another probable cause is that some components on the Allied Box are failing.

#### Bill Acceptor will not pull in bill; motor does not start

At the PIC unit, type in "99" and press <ENTER> to see if the PIC displays any error messages. If not, make sure that a cassette is present and installed correctly (Diagrams 37 and 38)

Note: If system detects a cassette remove/cassette full or a cassette was truly not installed, the bill acceptor's motor will not run and it will only say "Insert card" at the PIC unit in question after the customer has selected pump.

Next make sure that the PIC is configured correctly in the IPT configuration to accept cash in the Back Office (BKO). Even though the setting is set to "YES", you may have to set it to "NO", exit and accept all change and go to MSI poll. After BKO has polled for about one minute go back into the IPT configuration and set the previous settings that you changed to "NO" back to "YES". Exit, accept all changes, and go to MSI poll.

You might now have to do a pump config. at POS #2 (main register) by pressing  $\langle F2 \rangle$  and then  $\langle 4 \rangle$  and when prompted for a password type "GASCHG".

If the problem is still present, confirm that the power is connected to the cash acceptor (Diagram 14). Check all DIPswitch settings are set properly on the bill acceptor (Diagram 39).

If motor still doesn't start, look to see if the root of the problem is truly the cash acceptor, I/F board, main board or the printer (if printer doesn't work, bill acceptor will not take cash) and replace problem causing component(s). (Note: Refer to "Flashing Lights Table" Diagram 15.)

### **Excessive Bill Jams:**

This may simply be due to the conditions of the bills getting accepted. The manufacturer has said the highest probability of getting a bill jam is when the first bill is put into a PIC after the Armor Service Provider (Carrier) has replaced the PIC with an empty cassette.

Check the tab that the cassette locks into is level with respect to the top of the stacker housing. If it is bent up or down, bend it back until it is level (Diagram 38). Make sure that the cassette is installed correctly (Diagram 37) and that the knob is turned fully in the installed position and not before or beyond the installed position.

If excessive bill jam is still present, replacing the bill acceptor and/or cassette might be the possible solution. (Note: Most of the time it is a cassette issue.)

### **Rejects All or Too Many Bills:**

The bills could be the problem instead of the cash acceptor. The manufacturer of the bill acceptor claims a 95% read rate. Bill acceptors at the PIC units should already be configured to take bills 4 different ways. (See DIPswitch settings Diagram 39)

(Note: Bill acceptor might be configured for 1 or 2-way read only.)

Verify if the bill acceptors are in high security mode, by verifying the DIPswitch settings above, and then try inserting bills four different ways.

If the problem is still present or if the terminal is rejecting apparently good bills, it may be a bad bill acceptor in which one or more of its components failing, a bad main board, or the bill acceptor is simply out of calibration Note – Cash customers have to select a pump # before the PIC units asks them to insert card or bill. (This is one of the most common call regarding "not accepting cash")

<u>Settings</u> (Note: Bill acceptors should be configured through the coupon.) \$1, 5, 10, 20 = Standard \$2, 50, 100 = Off Bill Way Accept = 4

(See Diagram 39 DIP switch settings)

### Bill Acceptor Doesn't Give Credit for Bills Accepted:

The probable cause could be simply a bad bill acceptor, bill acceptor communications card, or something wrong with some components in the Allied Box.

# Ensure the Bill Acceptor switches are set as follow (See diagram 39)

On SW1, all DIPswitches should be all off. On SW2, all dip-switches should be all off.

**Note:** Bill acceptor should be configured through the coupon.

#### Communications check for the bill acceptor.

Because the bill acceptor works via an RS232 interface card it can be tricky to ascertain whether the unit is actually faulty or whether it is some other component in the system that has gone down if the bill acceptor is not working at all.

One way is to use the alternate channels on the interface card, in other words swap out the B and A side connections temporarily on the interface card, if the second side of the PIC is already established to be working. If this starts the cash acceptor in question working, then the problem lies with the main board the interface board or the associated wiring. If the unit still does not work then the cash acceptor is most likely faulty. (Diagrams 35,26,23)

# **Debit Module**

### See also appendix 1 for SAM and Allied information.

The PIC debit module contains the display, the keyboard, and the encryption module for debit card transactions. Because of the debit card encryption module, the unit has no way of entry of ASR service to any of these modules, since to open the module loses the PIN information contained within it, and then the module has to be returned to the factory to have the PIN re-injected.

# PIC Error messages relating to Debit module and common debit module related reports.

### PIC display (LCD) is Faded or has broken lines:

Change the debit module.

### Boxes in the display:

Try cycling power to the PIC units. Check that the thumb wheel setting for PIC addressing is correct (Diagram 5). Check for shorts or opens in PIC communication wiring as well.

With the PIC powered down, meter across the red/black wires on the debit module(with the cable harness disconnected ) The reading should be between 11 to 12 ohms. (diagram 16)

### The PIC screen is blank:

Check that the PIC has power, check that the power supply is reading at the correct level on all 4-voltage rails (Diagram 17). If the fuse is blown, the bill acceptor or the printer driver board generally causes it.

Verify is that the thumb-wheels switches (sides A & B) (Diagram 5) are set properly and that they don't share the same address/wrong address.

If it is a double side PIC and if only one side is down, most likely it is a bad debit module.

**Note:** Especially on G3 PIC models the communication and power cords get pinched and/or cut when cash cassettes/bill acceptors are put back into place and vault doors are closed on normal Armored Service Provider (Carrier) service runs. This might result in a blown fuse due to a short and must be changed out. Check this power and

communication cable for any cuts and for any detection that this cable is getting pinched and address the problem.

Since both the display and the keyboard are high abuse items damage to the debit modules is not uncommon. It is important though to ensure that the debit module is the cause of the reported problem, since returns of debit modules with subsequent "no fault found" on return to the factory is high and the units are very expensive (See Diagram 16).

There are actually only two connections to a debit module. There is a 6-pin connector, which carries communications from the module and supplies it with power. The other connector is a 2-pin connector, which is connected to the electronic beeper for the PIC unit.

Check out the power connections to the unit. If present continue, if not check the power supply section of the manual.

Other probable problems are the DIPswitches in the SAM are set incorrectly, these DIPswitches in the SAM set the communication speed, and if set incorrectly will not enable the debit module to display (See also appendix 1). The DIPswitch settings for the SAM are:

### SAM DIPswitch 3

<b>S1</b>	ON
S2	OFF
<b>S3</b>	ON
<b>S4</b>	ON
S5	OFF
<b>S6</b>	ON
<b>S7</b>	OFF
<b>S8</b>	OFF

This will set the SAM unit to 9600-baud rate.

The power supply connections should be checked on pins 1 and 2 of the debit module (See Diagram 16 for faultfinding tips).

### Invalid Pin

Send a DLL by pressing <F2> and then <8> at POS #2 (main register). When prompted for password, type in "GASCHG". If this didn't resolve the problem, it could be a bad SSM, SAM or debit module.

If ALL PIC's are displaying this error, but debit works inside the store, site has the wrong encryption key in the SAM.

Change SSM to appropriate encryption key (0 or 132 key). It could also be that the SSM's battery is weak. Check SSM to see if the unit reads at least 2.8 VDC. If it does not, change SSM. Once the SSM is replaced, a DLL must be done.

Note: Check SSM. If it says "0" encryption then it is ARCO's and if it is "132" it is PayPoint encryption.

# Card reader.

Ensure that the card reader is showing no signs of external damage. Take a card and make sure that it is possible to push a card into the reader all of the way, and that there are no mechanical obstructions to the card being pushed into the reader (Diagram 28).

If there are any mechanical obstructions – remove them if possible – if not possible change the card reader.

Card readers are high use items, are open to abuse, and sometimes get dirty. Always first try cleaning the card reader before delving too far into diagnostics routines, the card reader may simply be dirty. Other probable problems could be magnetic strips on the back of the card are worn out, the manufacturer cut the cards incorrectly; causing the magnetic strip in the back of the card to be out of line when being read, etc.

If cards are being rejected on a regular basis and the card reader has been diagnostically tested and cleaned, it may be necessary to swap out the card reader for a Panasonic unit. It has been found that the Panasonic part in this application is more forgiving of slight variations in card design and tolerancing (Diagram 30)

This should be done if it is identified that the card reader is at fault, and the problem is recurring at that particular card reader.

Providing the card reader contains no mechanical obstructions, check the power supply connections to the card reader. If these are not present, go to the power supply section of this manual.

If the rest of the PIC system is working, it is possible to test the module by running the card reader diagnostics test as detailed in the diagnostics section of this manual.

Finally, when time comes to replace the module if necessary, do a quick "double check". The card reader only has one connection (diagram 29). It is an easy matter to hang a new card reader onto this connection to check that in fact the existing unit is faulty. This will avoid units being returned with no fault found.

# PIC Error messages relating to Card reader/Interface cards and common card reader related reports.

### "Remove Card"

If no card is actually stuck in the card reader, send a pump configuration by pressing  $\langle F2 \rangle$  & then  $\langle 4 \rangle$  and typing "GASCHG". Sending a pump configuration is done by using POS #2 (main register).

### "Can't Process ATM Cards"

First verify if network is up. Next check to see if the debit is working at the POS. If so, the problem is not with PayPoint. Next see if this error message is displayed at all the PIC's. If it is only displayed on one of the PIC's, then the problem could reside in the debit module, which might need to be replaced.

If all the PIC units display this error message, send a DLL to the PIC's by pressing  $\langle F2 \rangle$  and then  $\langle 8 \rangle$  at POS #2. When prompted for a password, type "GASCHG".

Next verify that all switches at the SAM are set properly (See appendix 1). A warm start or cold start (if necessary) of the SAM (Appendix 1) may be required, if all PIC's are displaying this error. IMPORTANT: Warm and cold starting SAM will take PIC's units off line, so make sure all outstanding or pending transactions on PIC's are completed.

If this action does not cure the problem, it is a bad SSM or SAM and needs to be changed.

#### "Can't Process PIN"

Warm start the SAM (Appendix 1) and send a DLL to the PIC's by pressing  $\langle F2 \rangle$  and then  $\langle 8 \rangle$  at POS #2 (main register) if all PIC's are displaying error. When prompted for a password, type in "GASCHG".

If issue still goes unresolved, next check with PayPoint for communication status. The problem could reside in the SSM or debit module. If only one or a few of the PIC's are displaying this message, it is a bad debit module.

#### "Card Not Approved Use Another Card"

Customer is simply using an invalid card to do a transaction.

### When the PIC displays "INSERT BILL" only

Verify that the network is available. MSI should display network down. If networks seem to be up and running, next try sending a DLL from POS #2 by pressing  $\langle F2 \rangle$  and then  $\langle 8 \rangle$ . It will ask for a password, which is "GASCHG".

Another possible problem that the PIC unit(s) in question is/are not set up to accepted debit cards.

# Main Board,

For whatever reason the PIC is not working as far as the outside world is concerned, sometimes the problem lies with something that has no external display functions.

The main board is one of these. It acts as a controller for all of the actions that takes place from the PIC unit with the outside world, It routes the cash acceptor and card reader information to the allied controller and it also sends the information received from the Allied to the PIC display.

Most of the external effects of the main board being broken are therefore dealt with in the section titled Non item specific trouble shooting, since there are many things that can be external to the PIC to appear for it not to be working.

Occasionally, like any other computer system, the PIC main board will fail. Like any other computer system though, it is expensive and we must be sure that it is actually broken. The PIC main board is talking with a lot of other devices, and it is important that the functionality of these external inputs is tested.

The main point to remember about the PIC computer main board is that it is in effect a "dumb terminal".

All that the PIC is doing is acting in pre-programmed responses to signals received from the rest of the system. The actual control for the system, along with all of the messages, communications with the POS system, the satellite up-link and talking with the debit network, actually is handled by the Allied pump controller.

Before any further tests are carried out, make sure that there is power available to the main board. The connections are shown in Diagram 24.

It is also important to ensure that the correct version of software is fitted to the PIC. There are 4 programmable devices on the PIC (Diagram 32) which may change from time to time as functionality to internal and external devices changes. The programmable devices must be removed using an appropriate PLCC device extractor (Diagram 33)

So, before a main board is exchanged, it is essential to ensure that the unit is "Dead" in it's own right, and not being affected by something else connected to the system.

This is relatively easy to arrange. The PIC unit is connected to the rest of the network via a RS 485 working through a twisted pair input. (Diagram 18 main PIC input, Diagram 34 if you disconnect it from the main board entry point))

If the rest of the system downstream appears to be working correctly, but the PIC is not, disconnect this input connection, and recycle the PIC – the message should cycle through and read "PLEASE PAY CASHIER". Also the flash code on the bill acceptor should be flashing code 2.

If this is the case, then the PIC main board is at least functioning, and further investigation into the root cause of the problem should be carried out including swap-out diagnostics to try to narrow down the cause (Diagrams 35,26,23)

If the PIC unit has restricted functionality for example, it has a working printer, but no display, IT IS ESSENTIAL that the non-working parts of the system are checked BEFORE the main board is swapped out.

Since the main board is used for inputs from both sides of a PIC unit, it often is the case on double sided units that cables can be swapped from A to B side connections either on the Main board or on the communications interface board (Diagram 35). This should only be done to help identify faulty hardware, and the connections should be put back once the faulty hardware has been identified and replaced

# **Power Supply.**

The PIC unit is fitted with a supply that develops four separate supplies from the main input. The supply is a switched mode supply, and as such is very tolerant of input voltage variations within it's working specification. When the supply detects the start of a "power out" it disconnects the outputs, and will not reconnect them for about 0.5 seconds of the power coming back to an acceptable level. It does this in order that the PIC unit can fully power down before the power is re-applied, and this should ensure that the system reboots in an acceptable manner, and does not "hang up" as it might do if the power just dipped briefly.

The power supply has been modified for use in Tokheim produced PIC units, since the standard model of the power supply has inductors fitted to each output channel, the modified version has had these removed and replaced by fuses.

## **Power Supply Tests**

Firstly, ensure that the input to the supply is connected across outlet voltage of 115 volts. This can be easily established by metering across the input to the power supply as shown in diagram 17.

If there is no supply to the input terminals, meter across the output of the filter unit as shown in diagram 19. If this is not showing outlet power, but the input is, change the filter. If this is showing outlet power, meter across the switch with the switch in the ON position. If outlet power is not present on both sides (Diagram 20) either the switch is faulty or more likely the fuse is blown.

If the fuse has blown, change the fuse in the fused switch unit. NOTE IF THIS FUSE HAS BLOWN, SOMETHING CAUSED IT!! So before replacing the fuse disconnect the output from the power supply as shown in diagram 21 and 22.

When the new fuse is fitted, power up the PIC, and check once more on the output terminals of the power supply as shown in Diagram 17. The readings should be +5, +24 +12 and -12 as shown in the diagram.

The major items driven by the supply are the printer (heaviest draw), the main board for the computer, and the communications interface card for the cash acceptors. Please note that the Mars series cash acceptors used currently in the PIC units are fitted with their own individual power supply.

# **Communications board Interface board**

A number of the items in the PIC use TTL logic to communicate with the PIC. The main board on the PIC is designed to use RS232, as it's primary interface. The interface board uses UARTS to convert from and to TTL from the RS232 ports of the PIC unit. Roughly speaking it is a translator.

Like most boards it can go wrong although the outside effect of this particular board not working is for something else to appear not to be working.

Firstly, check the voltage supply rails to connector J6, if voltage is not present go to the power supply section of this manual.

Note this board used 0v, +5v, +12V and -12V.

This board is relatively easy to trouble shoot since it has two channels for every function since it is designed for a two sided PIC unit. If one side of the PIC is working try swapping the connections on the interface card as shown in diagrams 35,23,26.

## Non item specific trouble shooting

This section contains messages that are not specific to any individual PIC unit component, but rather are an indication that either another part of the POS/Allied/SAM system is down or that the individual parts of the system are not communicating correctly with each other.

#### "Please Use Another Terminal" or "Please Pay Cashier"

For RS2000 sites, this message indicates that the terminal has problems with both the cash acceptor and the debit function.

This is a message that will appear when there is a problem with communication between the SAM and the PIC's.

First, press the **<CANCEL>** key at the PIC unit in question to see if the display returns to normal. If not, press any key on the PIC keypad and wait for a 30-second duration. If 3 long beeps are heard during that 30-second time frame, this will indicate the PIC's are not communicating with SAM. Check site for any loose communications connections.

If there is one beep, the SAM to PIC communications are OK. Once SAM and PIC communication is confirmed, verify that SAM to Allied Box communication is available as well. To do so, go to the Allied Box and press "C".

The message that should be displayed is "CH12 Link-Up". If issue is still unresolved, warm start the SAM (see appendix 1) and send a pump configuration to the PIC's by pressing  $\langle F2 \rangle$  and then  $\langle 4 \rangle$  at POS #2 (main register).

A password will be required, type "GASCHG" when prompted. To bring up the debit, send a DLL by pressing  $\langle F2 \rangle$  and  $\langle 8 \rangle$  at POS #2 as well. When prompted once again for a password, type in "GASCHG".

Finally run "99" diagnostics at the PIC's. This is done by typing <**99**> at the "Select Pump #" prompt and pressing <**Enter**>. (**Note:** These steps may have to be repeated). Hopefully the PIC unit will display "System Okay" at this point.

Other probable causes are that the thumb-wheel switches at the PIC's not set up correctly (see diagram 5), also the SAM DIPswitches may be set incorrectly (see appendix 1). The problem could also be a bad SAM, SSM, or main board

**Note:** Make sure the Back Office (BKO) is set up for PIC usage and ask to see if the SAM has the new code enhancement. This is the latest software to be installed in the SAM (version 4501.04.30. or later version). If not, this might be the root of the problem.

### "Out Of Service"

If there are no problems with the main register, warm start the SAM (see appendix 1). It will take a while for the SAM and PIC units to reestablish communication. Once it says "CH12-Link UP" at the Allied Box, go to the PIC units and press any key on the PIC keypad and wait 30 seconds. If the PIC signals with 3 beeps within the 30-second waiting period, there still exists a communication problem and the problem could reside in the SAM or Allied units

Check the integrity of all wiring between units by looping out wire pairs and metering through to check line integrity. If there are no beeps within the 30-second waiting period, the communication is good.

If the problem still exists, the Allied box is the probably causing the problem. This can be verified by pressing the  $\langle C \rangle$  key in the Allied keypad. If any message but "CH12-LINK UP" appears on the display, the problem is probably the Allied Box.

### "CIP Down - Pay Cashier"

This indicates a communication failure between the SAM and the PIC's. First try warm starting the SAM (see appendix 1), and then send down a pump configuration at POS #2 (main register) by pressing  $\langle F2 \rangle \&$  then  $\langle 4 \rangle$ .

A password will be requested, type "GASCHG". If that doesn't clear, try sending a DLL by pressing  $\langle F2 \rangle$  and then  $\langle 8 \rangle$  and then typing in "GASCHG" when you are prompted for a password.

Finally, try cycling power at the PIC breakers. When this is done it may be necessary to send the pump configuration and DLL once more. If this doesn't clear the message, check station for wiring integrity between the SAM, the PICs, and the ALLIED.

### "CA Door" is displayed (POS) when PIC's say "System Okay"

Verify that the PIC door in question is closed. Drop down to DOS on POS #2 (main register). Note: Doing this procedure will bring the PIC units down. This is done by pressing  $\langle F2 \rangle$  then answering  $\langle Y \rangle$  to the next two prompts. The password is "GASCHG". This will take the system to DOS. Then at the DOS prompt, type START and press enter. This will return caller to MSI.

If this fails, check the integrity of all switches and associated wiring, if necessary replace switches/wiring if found to be faulty, otherwise, adjust door switches.

#### If PIC units works slowly or hangs up the other side

First try sending a pump configuration by pressing  $\langle F2 \rangle$  and then  $\langle 4 \rangle$  at POS #2 (main register). When prompted for a password, type in "GASCHG". Next try warm starting the SAM (see appendix 1). If that doesn't work, try cold starting the Allied Box.

IMPORTANT: When warm starting the SAM and cold starting the Allied Box make sure there are no pending or ongoing PIC transactions.

#### Debit Down Outside Only - Inside OK

Most likely there was a failure in the SAM, SSM or in the Allied Box. The SAM should be warm started if possible (see appendix 1). When this has been done, at POS #2 (main register), send a pump configuration by pressing  $\langle F2 \rangle \& \langle 4 \rangle$  and a DLL by pressing  $\langle F2 \rangle \& \langle 4 \rangle$  and a DLL by pressing  $\langle F2 \rangle \& \langle F2 \rangle \& \rangle$  then  $\langle 8 \rangle$  to the PIC's (repeat, if necessary). In both cases the system will prompt for a password. Type "GASCHG". All this is done at POS #2 (main register).

**Note:** If only one of the PIC's has a problem of a debit being down it is probably a bad debit module. But if all the PIC's are experiencing this problem, it is most likely a bad SSM.

#### "Network Unavailable" (Debit down inside & outside)

Call PayPoint Help Desk @ (213) 486-2600 and ask them perform a "stop and restart" if the problem is not VSAT. Verify that the system is up.

It could be a communication problem in which there simply could be a loose connection. Check connections.

When network is down and the customer tries to do a debit transaction at the PIC, the PIC will prompt "Card Not Approved. . .Use Another Card".

Note: If POS #2 is down, PIC's will be down as well.

#### "Door Open"

The magnetic door switch may need adjusting (See diagram 31). Try adjusting, if this doesn't cure the problem jumper the door switch to verify the root of the problem. If the problem is the wiring replace as appropriate. If not, the switch may be a problem

#### **Cassette is Broken**

Check cassette mechanism for damage. If necessary, straighten out tab at top of cassette so that the mechanism locks correctly onto the cash acceptor mechanism (Diagrams 37 and 38).

If this is possible lock the cash cassette to the cash acceptor mechanism, and test out the combination.

If the cash cassette is unreliable, damaged or in unusable condition, replace the cash cassette.

### The PIC Units are in Test Mode:

The thumb-wheel switches are set to numbers between 37 and 99. Set the thumb-wheel switches to the correct value. This will depend on the individual station configuration. (See diagram 5)

# Appendix 1

# **Peripheral Hardware Information for PIC Installations**

### Sending a Pump Configuration to PIC's

Go to register #2 (main register) and press  $\langle F2 \rangle$  and then  $\langle 4 \rangle$ . The system will ask for the password, which is "GASCHG" (no spaces). The system will go through a pump configuration.

### Sending a Down Line Load (DLL) to the PIC's

Ask the manager or site personnel to go to register #2 (main register) and press  $\langle F2 \rangle$  and then  $\langle 8 \rangle$ . The system will ask for the password, which is "GASCHG" (no spaces). The system will send the download debit configuration to the PIC's.

### Warm Starting the SAM

This is a commonly performed "fix" to establish communication between the main SAM and the PIC's.

IMPORTANT: First make sure that no customers are trying to do any transactions at the PIC units or if there are still PIC transactions pending. If so, wait until all customers are done.

Locate the SAM box mounted on the wall in the back room. It will be the smaller of the two boxes (talking about the Allied Box and the SAM box) on the wall and should be labeled "SCHLUMBERGER ACCESS MODULE". Find the only cable (usually gray in color) that has NO computer connector and follow it to its source which is usually an Uninterruptible Power Supply (UPS) or a wall outlet. Disconnect the power plug from the outlet for approximately 30 seconds. At this point, if any key is pressed on the PIC keypad, it will just hang there.

Reconnect plug and send a pump configuration to the PIC's at POS #2 (main register) by pressing <F2> and then <4>. A password is required - it is "GASCHG". This should resolve the hang-up and PIC units will be left on "Select Pump #"prompt. Do a diagnostic test at the PIC units by typing "99" and then pressing <Enter>. It should say "System Okay".

### Cold Starting the SAM

On the SAM unit check the following DIPswitch settings :

S1, S2, S3, S4, S6, S7, and S8 should be off and S5 should be the ONLY switch that is on.

Next reset the DIPswitch settings; leaving all the DIPswitch settings alone except for S5 and S6. Turn **S6 on** and **S5 to off** position. Then, disconnect the cord from the power source (the only cable connected to the SAM that has no computer connector) for approximately 10 seconds. This power source is either from a wall outlet or an Uninterruptible Power Supply (UPS).

Next, reconnect the power supply and restore the DIPswitch to its default setting as stated up above I.E.

# S1, S2, S3, S4, S6, S7, and S8 should be off and S5 should be the ONLY switch that is on.

To complete this action, send a pump configuration at POS #2. This can be done by pressing  $\langle F2 \rangle$  and then  $\langle 4 \rangle$  and typing "GASCHG" when prompted for password.

Next send a DLL by pressing  $\langle F2 \rangle$  and then  $\langle 8 \rangle$  and typing "GASCHG" when prompted for password (still at POS #2).

### Warm Starting the Allied Box

IMPORTANT: This procedure will shut down all pumps and PIC's. Make sure that all customers are off all the pumps and all the PIC's.

All outstanding/pending gas transactions for the pumps and PIC's must be completed. Once that is done, find the power cord for the Blue Allied Box. When all pumps are idle and no one is using the PIC's, toggle the on/off button above the power cable on the right side of the Allied Box cabinet, off and then on.

If there is no on/off switch, disconnect the power cable from the Allied Box and leave disconnected for 10 seconds. Reconnect the power cable and wait for the system to go through a reset sequence. Check the PIC's for messages.

### **Cold Starting the Allied Box**

IMPORTANT: This procedure will shut down all the pumps and PIC units. Make sure that there are no ongoing or pending gas transactions.

Note: Site will be able to make in store transaction (i.e. beverages, snacks, etc.) but ABSOLUTELY no gas sales.

First hold middle push button down (it is a small push button switch). While holding that button, press <0> and then let go of that middle button. Let go of <0> after you hear a beep. Press <1> at the next three prompts.

Send a "Pump Configuration" at register POS#2. This can be done by pressing  $\langle F2 \rangle$  and then  $\langle 4 \rangle$  and typing "GASCHG" when prompted for password

Finally press <C>. On the Allied Box's LCD it should say "CH12-Link Up".

#### Make sure the DPT Configuration is correct

See "DPT Default Configurations Setting and Procedures".

#### Ensure the SAM SW1 Switches are set as follows (normal running setting)

S1, S2, S3, S4, S6, S7, and S8 should be off. S5 should be on.

# Ensure the SAM SW3 switches are set for 9600 baud as follows (Communication SAM/POS).

S1, S3, S4, and S6 should be on S2, S5, S7 and S8 should be off.

#### **Toggling PIC Units on & off**

Make sure there is no ongoing or pending gas transactions which are authorized through the PIC's.

(IMPORTANT: This will bring all PIC units "Out of Service".) At POS#2 press <F2> and then <M>. When prompted for password, type "GASCHG".

#### Note: This option was taken out with MSI version 72.

# How to check for the SAM's software version (Can only be done for versions 4.29 or greater):

Copy pam\_ptd.exe, c1\_sam1.msg and c1\_sam2.msg into a folder (directory) suitably named (like SAMVER) or something unique.

Connect a SAM download cable to either com1 or com2 of the PC and COM Port 2 of SAM.

Change folder (directories) to the directory with the pam\_ptd.exe and the c1\_sam\*.msg files.

Execute pam\_ptd.exe

Double click on pam\_ptd.exe or type pam\_ptd at the DOS prompt

Either using Alt S or clicking on Settings at the top left of the program screen, bring up the Com Port Setting menu.

Select either Com1 or Com2.

In the "Setting for Port 1 (2)" window, set the Baud rate to 9600, Parity to Odd, Data bits to 8, and Stop bits to 1.
Click OK (or Alt O) to save settings.

Either using Alt F or clicking on File at the top left of the program screen, bring up the File menu.

Either click on Playback File or Ctrl Page Up to bring up the Playback File selection menu.

Select either c1\_sam1.msg or c1\_sam2.msg depending on whether you connected the SAM download cable to port 1 or port 2 of your PC; Sma1 (port 1) sma2 (port2). Selection can be made by double clicking on the name or scrolling to high light the name and pressing Alt O.

Run the program by pressing PageUp on the PC. Data will appear on the screen.

Note: The ASR's should know what the codes means when they appear on the PC screen. If you need to know what the code means, the PIC Level III individual has a copy of the codes and their meanings. Get a copy from him/her.

#### How to download the latest software version in the SAM

Power down the SAM and open the cover. Set the DEBUG switch (SW3 switch position 8) to ON. Set the COLD START switch (SW1 switch position 6) to ON. Set the WATCHDOG TIMER switch (SW1 switch position 5) to OFF. Disconnect any cables connected to the SAM's ports #1 and #2. Reconnect the SAM's power cable.

#### **Observe the following:**

The bank of small SAM LED's flashing slowly. The larger SAM port #1 and port #2 LED's are off.

7. Install the SAM download cable from the serial port of the PC (com1 or com2) to either port #1 or port #2 of the SAM.

#### Enter the appropriate selected command from your PC ...

LOAD 1 [ENTER] (Load program from the PC to SAM using PC port COM1:) LOAD 2 [ENTER] (Load program from the PC to SAM using PC port COM2:)

The system LED's will begin to sequence on and off in a binary counting fashion as the Flash memory is cleared. Then the System LED's will flash on and off sequentially during program download.

! Caution !

Do not disconnect the SAM power or interrupt the download process in any way until instructed to do so.

Follow PC instructions to complete file downloads.

After the "File Transfer Complete" message, wait for the System LED's to return to a slow flashing sequence. Set SW3 position 8 to OFF.

Power down the PC and the SAM; reassemble and reconfigure the system for normal operation.

Set the COLD START switch (SW1 switch position 6) to OFF.

Set the WATCHDOG TIMER switch (SW1 switch position 5) to ON.

Reconnect the power cable to the SAM.

This manual has been produced by John Burke of Infinity + 2

If you have comments and suggestions on its improvement, please e-mail your comments to:

John@infinityplus2.com

John Burke, Corona, California, November 26 2000.

# **APPENDIX 2**

# **PIC Troubleshooting Guide**

Photographs And Diagrams





The main switch for the PIC is located in the section immediately under the outer door. The switch can be found on the left hand side of this housing which contains the Main processor board, the power supply unit, filtering and conditioning systems for outlet power, as well as the interface card for the cash acceptor mechanisms.

Please note that the switch contains a fuse. This is the main fuse for the PIC unit.









Even though the PIC is switched off at the main switch in Diagram 1, parts of the PIC STILL have outlet power applied to them. It is essential that all safety precautions be taken to protect both yourself, as well as station personnel and members of the public while PIC units and associated equipment are being worked on with protective covers removed.





Even though the PIC is switched off at the main switch in Diagram 1, parts of the PIC STILL have outlet power applied to them. It is essential that all safety precautions be taken to protect both yourself, as well as station personnel and members of the public while PIC units and associated equipment are being worked on with protective covers removed.





Unless these thumb wheel settings are correct, there is no chance that the PIC unit will work correctly. These Thumbwheel settings tell the computer systems connected to the PIC where they are, and what messages need to be sent to them in response to information being sent from them.

In this manual, it is sometimes necessary to alter the value of these Thumbwheel switches in order to put the PIC unit into various diagnostics tests. It is essential that they be put back to their original settings before the PIC unit will communicate correctly with the rest of the system.

The switch is mounted on the printer bracket just to the right of the paper feed button.





Thermal paper only works one way up! No print, if the paper is feeding and nothing prints, it may be due to upside down paper.

Ensure that the paper is running underneath the paper out detector also.

If the printer is out of paper, the PIC unit should NOT accept cash transactions so when the PIC display reads "Insert card only" it can be due to the paper being out, or fitted incorrectly.









Picture shows the side housing of the Axiohm printer.

This area is a major cause of failure. The chips on the stepper motor driver effectively go out of control, and keep the motor driving. This in turn heats up the motor which eventually melts itself into the plastic of the side housing. Any sign of melted plastic in this area, is a good indication that the unit needs replacing. Generally, it will be found that in this case the controller card needs to be changed as well. In practice when this occurs, the controller card has actually failed, and in doing so takes out the Axiohm printer mechanism in the process.

These printers and controllers are being replaced by Seiko units in new installations from Tokheim, and field retrofitted units from Seetek using Fujitsu mechanisms and controllers will be replacing the current high maintenance Axiohm mechanism during the first and second quarter of 2001.









Confused?? Yes it has two sets of numbering for some connections. We have shown them in separate colors for clarity.

Connected to
Data I/O to/ from main board
Stepper motor control
Power supply connector
Print head connector
Interboard connector
Thermal sensor(option)
Paper cutter control
Paper/paper out sensor
Paper feed/self test
Configuration settings see diagram 7
Print contrast adjustment pot.





When the PIC has a blown fuse problem, disconnect this connector before powering up with a new fuse. Very often it is the printer causing a problem due to component/motor burnout that caused the fuse to blow in the first place. This connector isolates ALL power to the printer and its controller card





It is possible, if the pusher plate is jammed for any reason other than in the fully retracted position for the cash acceptor to send to the PIC unit an erroneous "cassette removed" message. This is because of a logic conflict within the cash acceptor. If there is a "cassette removed" message on the PIC and the cassette is clearly correctly mounted and locked on to the cash acceptor, the most likely cause is a bill jam within the pusher plate area.





Examine the bill acceptor slot for signs of trapped bills, and if possible remove them. If you can see the bill in the slot, power down the cash acceptor, and it will try at least to spit the bill back out.





The power for the cash acceptors is supplied as 115 volt outlet power, since they have their own power supply unit. If you want to take power off of the cash acceptors independently of the rest of the PIC system, it can be done by unplugging this plug/socket pair.

This connection may not be immediately visible. It is generally tucked down into the slot through which the cable runs to get to the cash acceptor. Gently tugging on this cable will generally find this connection.



What the bli	nkir	ng/flashing lights mean on the bill a	acceptors:
# of Flashes		Meaning	2 LED's here
0	=	No power to unit, unit in flash download mode or unit in calibration mode.	A
1	=	Not used	
2	=	Disabled by interface	No. of Concession, Name
3	=	Configuration coupon ready mode	
4	=	Bill jam	
5	=	LRC removed.	
6	=	Tamper detected	
7	=	End of stacker switch blocked.	
8	=	Bill held in unit (no credit given).	
9	=	Needs cleaning	
10	=	Needs cleaning.	

## Flash codes for bill acceptors.

The bill acceptors will send a sequence of flash signals to the LED's on the front bezel to make the operator/Technician aware of the status of the unit. For the codes listed in the table above here is a list of corrective actions for each of the flash codes listed

Action
Enable Interface
Continue with configuration
Remove bills
Install cassette or troubleshoot cash acceptor
Unit will re-set after 15 minutes
Remove blockage
Remove bill
Clean bill acceptor
Clean bill acceptor



The reading should read 11 - 12 ohms across these two pins.

Since the debit module only has one connection that matters for troubleshooting, the fastest way to see whether it is working is to plug another debit module temporarily into the 6 PIN connector and re-boot the PIC unit. If the temporary debit module does not work either, look elsewhere in the system, and re-connect the original debit module.

Only make this a temporary connection DO NOT swap out the module mechanically for this quick test, this can be done if the new module fixes the problem.





The power supply for the PIC unit has 4 output voltages, 5v, +12v, -12v and +24v.

If the unit has failed one or more of these may be missing, or more commonly the unit simply will not work. A common fault with these units when faulty is that they go noisy and "buzz"

Before changing out a power supply, it is important to check whether anything is loading up the supply and stopping it working. This is easily established, since all of the components of the system, the main board, printer, interface card etc. have places where the power is connected. Try disconnecting these one at a time to see if the power rails will come back up to try and establish whether the power supply unit is truly the cause of the problem.

The most common cause of power problems are actually due to trapped cables, and printer units gone bad.

Wire Color	Voltage
Black	0V
Red	+5V
Orange	+24V
Yellow	-12V
Blue	+12V
Notes:	





Please ensure that the PIC is actually fed by a twisted pair cable. If the cables are not twisted together, the PIC will be badly affected by spurious noise pick up on the communications lines which may cause erroneous error messages and malfunctioning of the PIC unit.





Filters are easy to troubleshoot. If there is outlet power on the input and nothing on the output, the filter is defective (relatively rare).

Under no circumstances should these filters be bypassed, as system performance could be compromised as a result.





The main switch for the PIC is located in the section immediately under the outer door. The switch can be found on the left hand side of this housing which contains the Main processor board, the power supply unit, filtering and conditioning systems for outlet power, as well as the interface card for the cash acceptor mechanisms.

Please note that the switch contains a fuse. This is the main fuse for the PIC unit.





If the power supply fires up when the rest of the system is disconnected, try RECONNECTING the system a piece at a time until the source of the problem is fount. The main cause of blown fuses in PIC units are trapped wires, and melted down printers.





Main power in-feed for the Axiohm printer system, for voltages see diagram 11 **Notes:** 





Connector	Connected to
J3	Printer side A
J5	Power distribution
J7	Card reader side A
J8	Remove jumper when replacing
J9	Printer side B
J11	J9 interface board PIC side A
J15	Card reader side B
J17	J11 interface board PIC side B
J18	RS-485 comms entry (Brn. pin 1 Purp. pin 2)
J22	J2 interface board (RS232 bill acceptor A)
J23	J1 interface board (RS232 bill acceptor B)
J25	Siren
J26	Thumbwheel switches side A
J27	Thumbwheel switches side B
Notes:	





J5 on the main board carries all of the voltages developed within the PIC unit.

This is a very useful place to check for all of the voltages on the PIC when checking the output of the power supply unit.





**Note**: These are the responses that come up in the main PIC display unit in response to each button press.

They have been shown here overlaid on the keypad for clarity. If any of the keys fail to give a response the cause is probably a defective keypad (providing of course that at least SOME of the keys are working) and the security module will have to be changed in order to correct this.

After testing every key and getting the appropriate response, press the Receipt key, the display should now read "Start printing Key Code: 59". At this point the printer will print a test receipt (If the printer is not working at this point proceed to the printer section of this manual).

Next, press the Receipt key once more, the display will now read "Stop Printing Key Code: 59".

If you have finished with diagnostics at this point power down the PIC, re-set the Thumbwheel switches and power the PIC back up to continue. If you have more diagnostics to carry out return to the diagnostics section of this manual.





Connector	Connected to
J1	J23 Main Board (RS232 bill acceptor B)
J2	J22 Main board (RS232 bill acceptor A)
J3	Bill acceptor B TTL level logic
J4	Bill acceptor A TTL level logic
J5	Door switch side B
J6	Power distribution connector
J7	Door switch side A
J8	Debit module side A
J9	J11 main board (side A)
J10	Debit module B
J11	J17 main board (side B)
Notes:	













The other end of this connector plugs straight in to the main board (Diagram 23). If the cable is thought to be a problem, it is a simple matter to meter through it by disconnecting both ends. This is true of a lot of the cables within the PIC unit. **Notes:** 





If cards are being rejected on a regular basis and the card reader has been diagnostically tested and cleaned, it may be necessary to swap out the card reader for a Panasonic unit. It has been found that the Panasonic part in this application is more forgiving of slight variations in card design and tolerancing.





Alarm or door open messages on the PIC units are usually either due to the door actually being open (infrequent). Or the door switches being broken/out of alignment or a cable harness problem (common).

In order to trouble shoot the problem, try adjusting the switches as shown in Diagram above. If this does not cure the problem, try linking out the other end of the cable to see if the message goes away. If it does, then the wiring or the switch unit will generally require replacement if adjustment has already been tried.








These EPROM's control the functionality of the PIC main board.

Ensure that if you are replacing an Axiohm printer with the Tokheim Seiko printer upgrade that the new EPROM's are fitted at the same time. If the unit is being changed for a Seetek Fujitsu printer, that printer upgrade will work with either EPROM so changing the EPROM is not essential unless required as a part of the upgrade works instruction.





This is the main input point for the PIC with the rest of the world. When metering this connection through to make sure of it's integrity it is essential that it is traced through to this point, since it is here that it needs to be to be able to connect with the PIC computer.





As an example of testing out main board functionality and connected hardware, it is possible to "SWAP" out connections to evaluate whether the main board has a problem or whether the device concerned has a problem. This is also true of the Interface card which is very easy to "swap"

As an example, here we show J22 and J23 which are the inputs for the cash acceptors for side A and B respectively. If the PIC has a cash acceptor which works (say side A) and one which does not (side B) and the same is true after these two cables have been swapped, then the problem CANNOT be with the main board, but must either be with other hardware such as the interface board or the cash acceptor itself.

J2 interface board (	RS232 bill acceptor A)	)
	J2 interface board (	J2 interface board (RS232 bill acceptor A)

J23 J1 interface board (RS232 bill acceptor B)

Check out the dual ports that can be swapped over for diagnostics on a PIC by looking at diagrams 23 (main board) and 26 (interface board) - don't forget to swap them back when you are finished.

NOTES:





As you can see from the above photograph, PIC units can be full of surprises, this particular one is factory fitted!!. When you go to an installation, be diligent.

Check out the PIC unit for loose connections, obvious signs of user damage, and disconnected earth terminations before trying to trouble shoot the installation, this could save you valuable time on this or a future occasion.





A common cause of problems with the cash cassette is that it is not properly fitted to the cash acceptor mechanism. The bar which runs underneath the cash cassette MUST locate into the two slots built into the cash acceptor mechanism. If this is not the case the cash cassette cannot properly lock onto the mechanism, and an error message will be displayed.





A common cause of problems with the cash cassette is that it is not properly fitted to the cash acceptor mechanism. The tongue on the cash acceptor mechanism inserts into a slot in the cash cassette. This is the mechanism that locks the cash cassette to the cash acceptor.

Sometimes the tongue on the cash cassette becomes bent up or down due to mishandling when trying to seat the cassettes onto the cash acceptor mechanism. If this is the case it is sometimes possible to straighten out the tongue and get the system working. It is important to check the result carefully though by feeding bills or coupons into the cash acceptor, since this is the reference locking point of the cassette to the acceptor at the top of the mechanism.





## Directive: <u>Always</u> *coupon* configure the cash acceptors when needed.

# Note: It should already be configured appropriately when coming out of the refurbishment/repair house.

If you don't have a coupon to configure the cash acceptor, the DIP switch settings should be set in the photograph above, with the exception of the toggle switch 2 in SW1. That should be set to OFF. For configuring the bill acceptor using a coupon, see either the Tokheim manual or the Mars 3000 cash acceptor manual.

Bank 1	Switch	Bank 2	Switch
ON	1	ON	1
OFF	2	ON	2
ON	3	OFF	3
ON	4	OFF	4
ON	5	OFF	5
OFF	6	OFF	6
OFF	7	OFF	7
OFF	8	OFF	8

In coupon mode set all switches OFF on bank 1and switch 8 on bank 2 to ON