# Gilbarco

# Service Manual

## Transac 12C (T-12C)

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# TRANSAC 12C CONSOLE (T-12C)

# SERVICE MANUAL

# 1.0  INTRODUCTION

**CAUTION:**

Some of the procedures in this manual will involve the removal and reconnection of components (connectors, etc.) to isolate the problem. For personal safety as well as protection of the equipment and components, always remove power from the equipment before removal or reconnection of any component. Use of an Anti-Static Wrist Band is recommended when servicing this equipment.

## 1.1  OVERVIEW

The Gilbarco T-12C Retail Fueling System is made up of a T-12C Console and any type Gilbarco Pumps or Dispensers capable of operating under Gilbarco's Two-Wire Communication System. A Dot-2 Printer usually completes the system but is not considered essential.

This manual gives instructions for initial start up of the T-12C Console and provides qualified technicians with guidelines to assist in the diagnosis and correction of technical problems associated with this equipment.

## 1.2  RELATED DOCUMENTS

In addition to this document, the following related documents as well as all documents for other equipment to be connected to this System (Dispensers, Printer, etc.) should be available for reference:

MDE1906A:       T-12C Operator's Quick Reference Guide.
MDE1907A:       T-12C Operator Manual (Operator Functions)).
MDE1905:        T-12C Manager Manual (Programming and other Manager Functions).
MDE1908A:       T-12C Installation Manual.
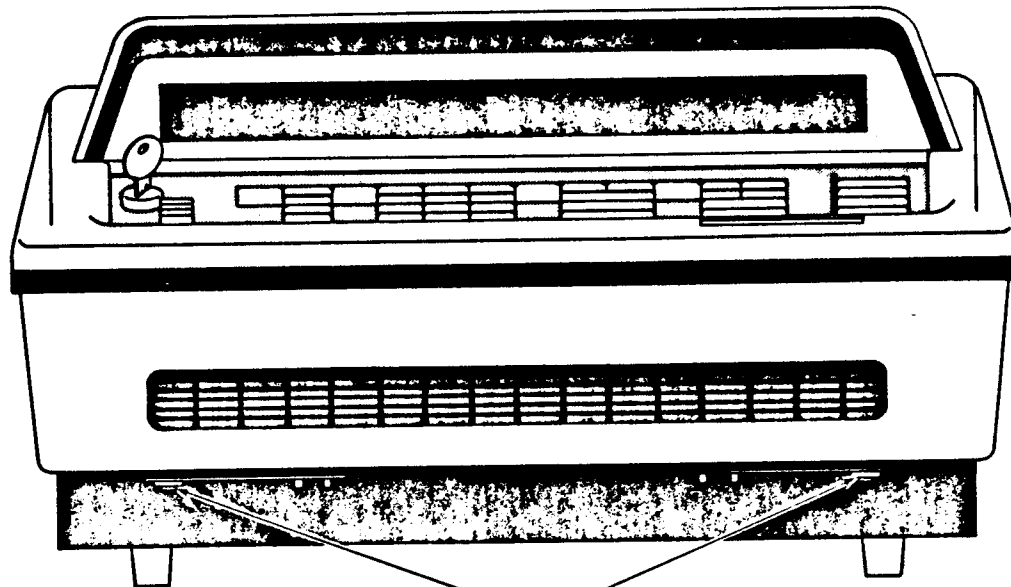
Unscrew fasteners from bottom, front cover.
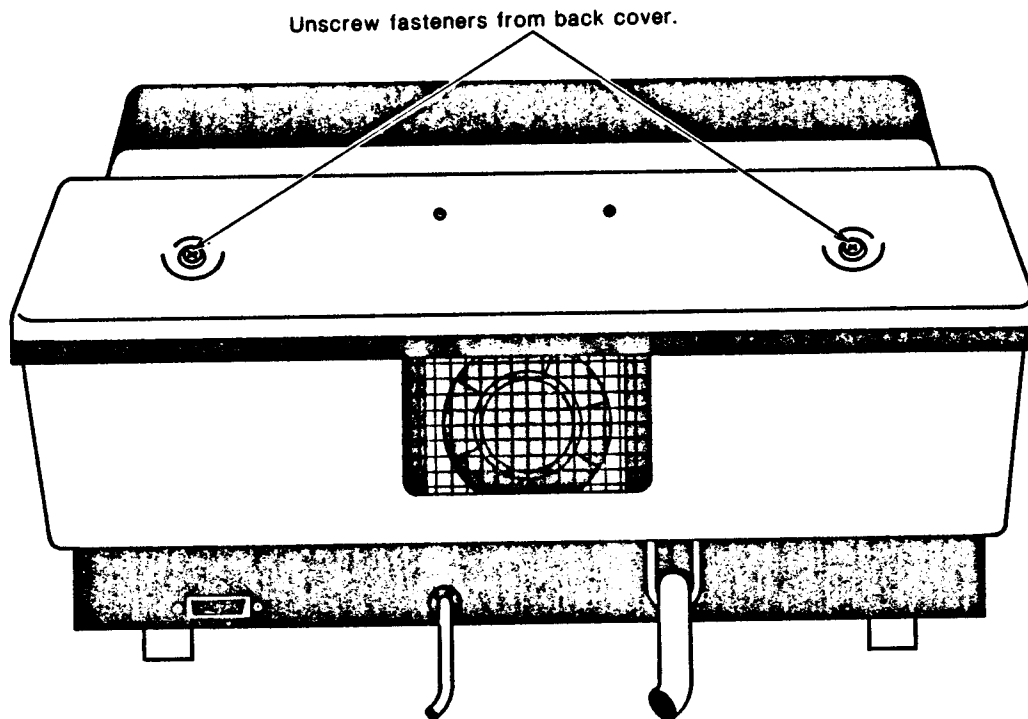
Unscrew fasteners from back cover.

**FIGURE 1:  REMOVE COVER OF T-12C**

# 2.0 INITIAL SYSTEM START UP

## 2.1 CONSOLE SET UP - (SOFTWARE VERSION 21.0)

The T-12C can be equipped with one of three logic boards:

1. Logic Board T15898 (Processor PWB Assembly T15899),
2. Interim Logic Board T16248 (Processor PWB Assembly T16249),
3. Universal Logic Board T16321 (Processor PWB Assembly, T16322).

These Logic boards support Software Version 21.0, but in different I.C. configurations (EPROMS). The T15899 and T16249 Processor PWB Assemblies each use four EPROMS: two 27128's (U19 and U20) and two 2764's (U23, and, U24). The T16322 Processor PWB Assembly uses three EPROMS: one 27256 (U18) and two 2764's (U21 and U22).

- If the Processor PWB Assembly is T15899, compare all Jumper Settings with the list on Page 5 and Figure 2 on Page 4. Reset (per instructions below) any jumpers that are not in agreement

- If Processor PWB Assembly is T16249, compare all Jumper Settings with the list on Page 7 and Figure 3 on Page 6. Reset (per instructions below) any jumpers that are not in agreement.

- If Processor PWB Assembly is T16322, compare all Jumper Settings with the lists on Pages 9 and 10 and Figure 4 on Page 8. Reset (per instructions below) any jumpers that are not in agreement.

### PROCEDURE FOR CHECKING AND RESETTING LOGIC BOARD JUMPERS

- **To remove Console Cover:** Remove the four slotted screws (two at the top rear; two at the bottom front) and lift cover off. See Figure 1, Page 2.

- The Processor PWB Assembly (which contains the Logic PWB) is mounted on a sliding tray just above the bottom front of the console. Carefully slide the PWB Assembly toward the front of the console - far enough to expose the entire Assembly.

- Locate the PWB Assembly Part Number and compare all JUMPER positions per the appropriate list and illustration below.

- Change Jumper positions (if necessary) to match the positions as indicated on the appropriate list and illustration.

- Carefully slide Processor PWB Assembly back into console, and replace cover.
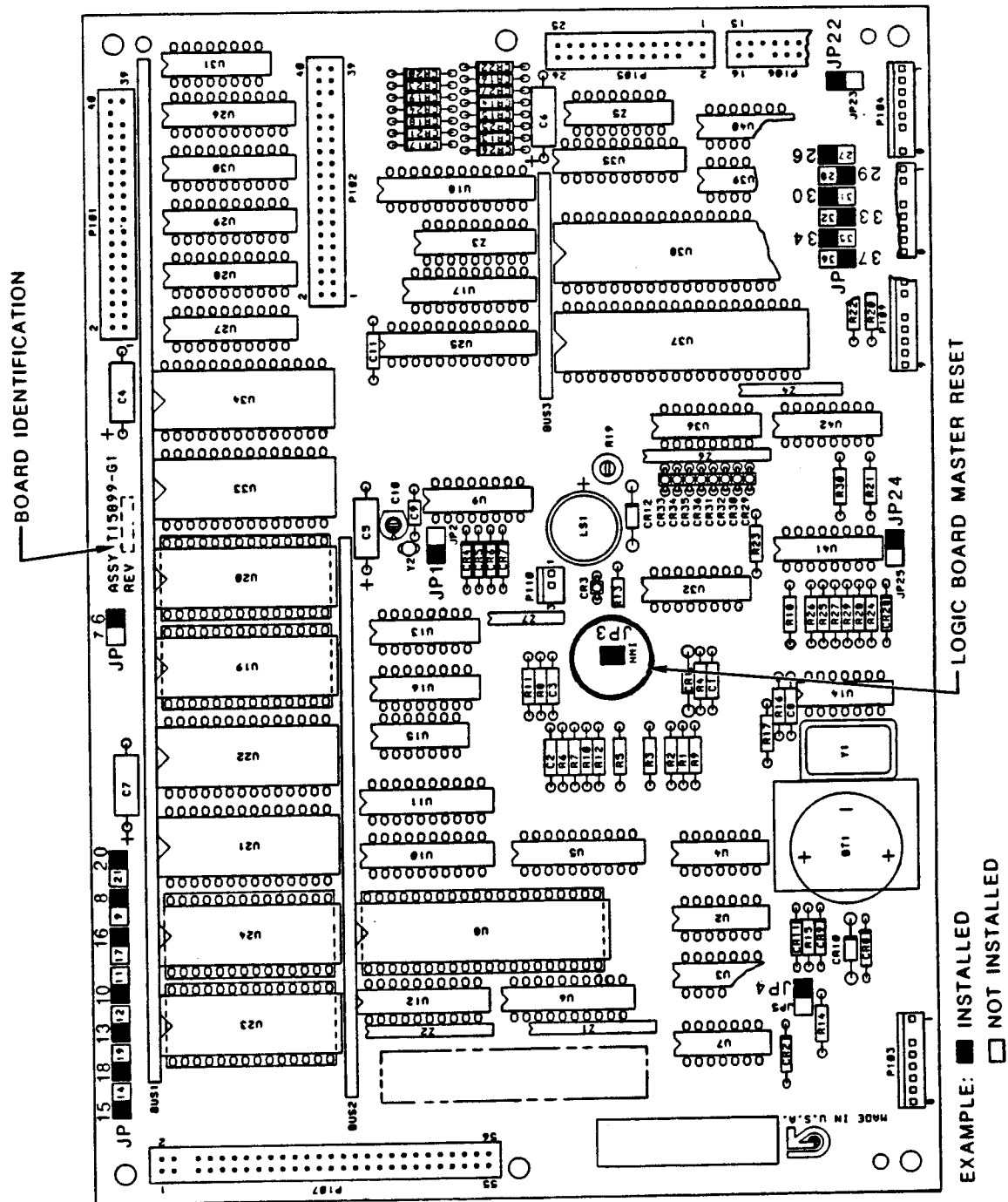
**FIGURE 2: JUMPER SETTINGS FOR PWB ASSEMBLY T15899**

INITIAL START UP - CONT.


LOGIC PWB JUMPER SETTINGS CONT.


**2.2    PROCESSOR PWB ASSEMBLY T15899**

■    **PROCESSOR PWB ASSEMBLY T15899 JUMPER SETTINGS FOR SOFTWARE VERSION 21.0 SEE FIGURE 2, PAGE 4.**

| IN | OUT | IN | OUT |
|----|-----|----|-----|
| JP1 | JP2 | | |
| JP3 | | | |
| JP4 | JP5 (REVERSE FOR STORAGE) See CAUTION below. | | |
| JP6 | JP7 | | |
| JP8 | JP9 | | |
| JP10 | JP11 | | |
| JP13 | JP12 | | |
| JP15 | JP14 | | |
| JP16 | JP17 | | |
| JP18 | JP19 | | |
| JP20 | JP21 | | |
| JP22 | JP23 | | |
| JP24 | JP25 | | |
| JP26 | JP27 | | |
| JP29 | JP28 | | |
| JP30 | JP31 | | |
| JP33 | JP32 | | |
| JP34 | JP35 | | |
| JP37 | JP36 | | |

CAUTION:  Before powering up this console, remove the jumper JP5 and insert JP4.


■    **TWO WIRE CURRENT LOOP IN T-12C:**

| IN | OUT |
|----|-----|
| JP24 | JP25 |


■    **RS422**

| IN | OUT |
|----|-----|
| JP25 | JP24 |

# LOGIC PWB JUMPER SETTINGS CONT.
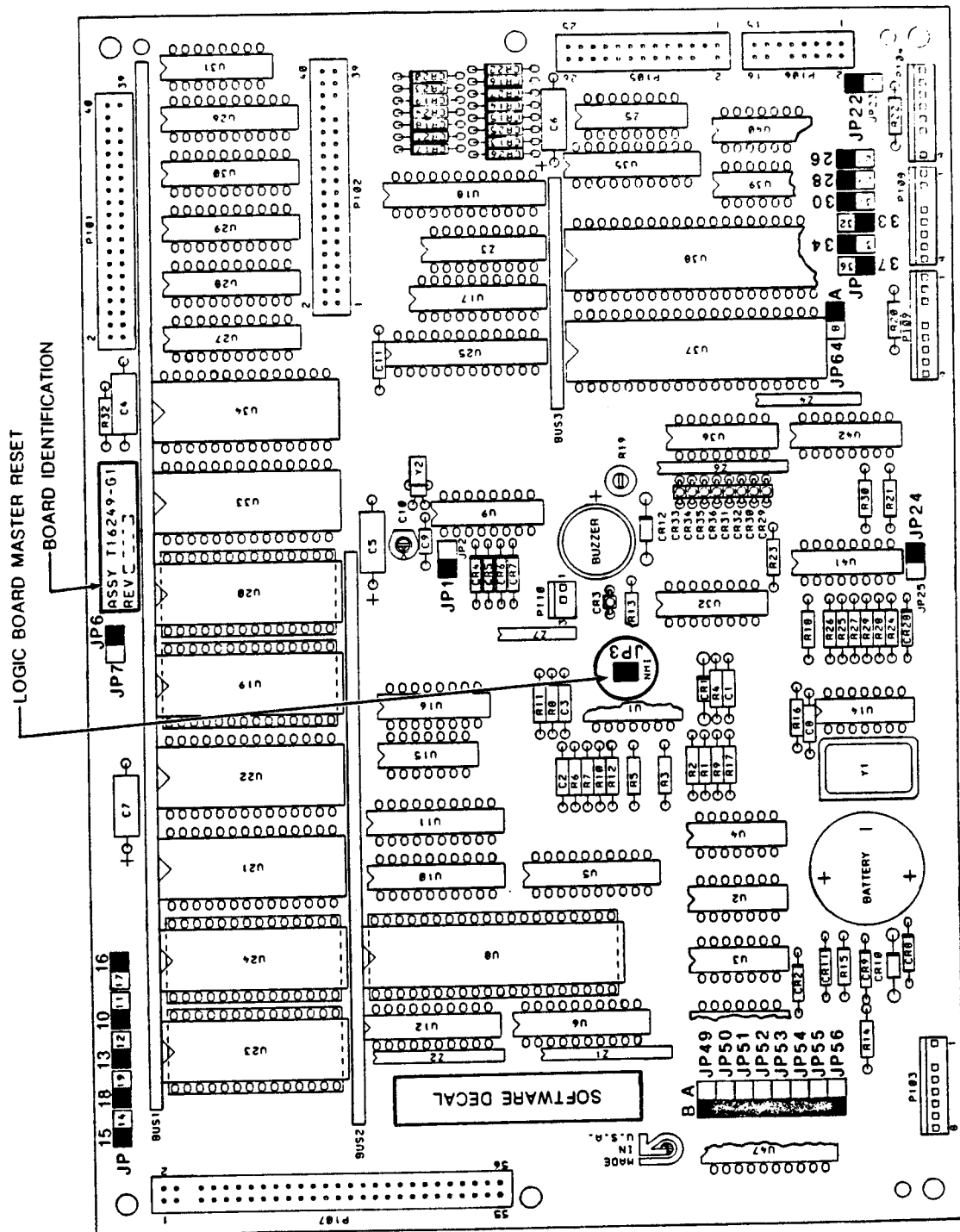


**FIGURE 3: JUMPER SETTINGS FOR PWB ASSEMBLY T16249**

## 2.3 PROCESSOR PWB ASSEMBLY T16249

- **PROCESSOR PWB ASSEMBLY T16249 JUMPER SETTINGS FOR SOFTWARE VERSION 21.0. SEE FIGURE 2, PAGE 4.**

| <u>IN</u> | <u>OUT</u> | <u>IN</u> | <u>OUT</u> |
|-----------|------------|-----------|------------|
| JP1       | JP2        | JP49B     | JP49A**    |
| JP3       |            |           |            |
| JP6       | JP7        | JP50B     | JP50A**    |
| JP10      | JP11       | JP51B     | JP51A**    |
| JP13      | JP12       | JP52B     | JP52A**    |
| JP15      | JP14       | JP53B     | JP53A**    |
| JP16      | JP17       | JP54B     | JP54A**    |
| JP18      | JP19       | JP55B     | JP55A**    |
| JP22      | JP23       | JP56B     | JP56A**    |
| JP24      | JP25       |           |            |
| JP26      | JP27       | JP64A     | JP64B      |
| JP28      | JP29       |           |            |
| JP30      | JP31       |           |            |
| JP33      | JP32       |           |            |
| JP34      | JP35       |           |            |
| JP37      | JP36       |           |            |

## 2.4 OTHER JUMPER INFORMATION - PWB ASSEMBLY T16249

- **TWO WIRE CURRENT LOOP:  JP24 IN      JP25 OUT**

- **RS422:  JP24 OUT      JP25 IN**

- **MASTER RESET   JP64A IN         JP64B OUT** *

\* Master Reset is supported by Australian software *only*.

\*\*   Jumper positions JP49 through JP56 are Australian options and are not software supported domestically. They may be either IN or OUT since they have no operational effect.
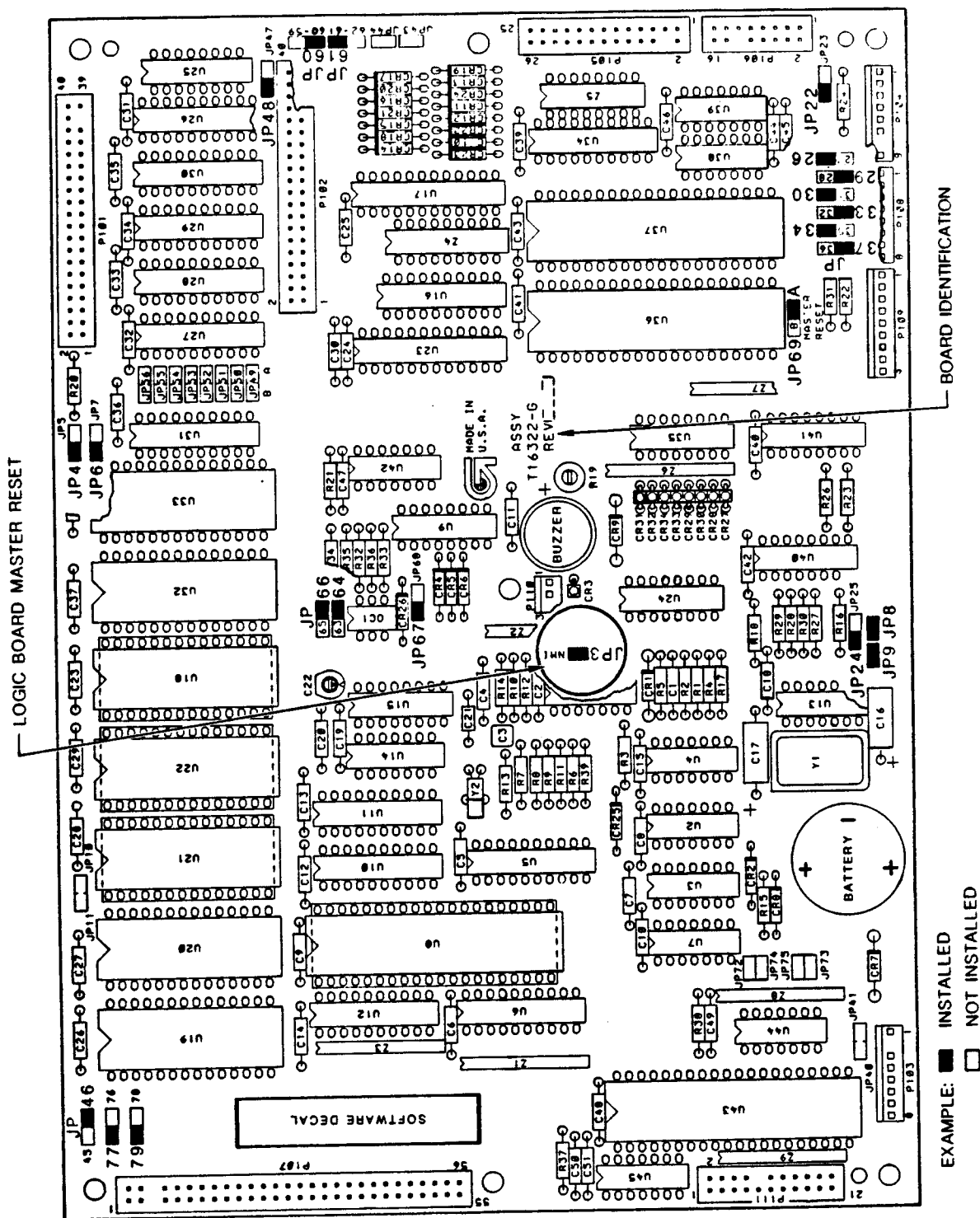
**FIGURE 4: JUMPER SETTINGS FOR PWB ASSEMBLY T16322**

INITIAL SET UP - CONT.


## 2.5   PROCESSOR PWB ASSEMBLY T16322


■   PWB   ASSEMBLY   T16322   JUMPER   SETTINGS   CONFIGURED   FOR
DOMESTIC T-12C - SOFTWARE VERSION 21.0.  SEE FIGURE 4, PAGE 8.

| IN | OUT |
|---|---|
| JP3 | |
| JP4 | JP5 |
| JP6 | JP7 |
| JP8 | |
| JP9 | |
| JP22 | JP23 |
| JP24 | JP25 |
| JP26 | JP27 |
| JP29 | JP28 |
| JP30 | JP31 |
| JP33 | JP32 |
| JP34 | JP35 |
| JP37 | JP36 |
| | JP43 |
| | JP44 |
| JP46 | JP45 |
| JP48 | JP47 |
| | JP49 |
| | JO50 |
| | JP51 |
| | JP52 |
| | JP53 |
| | JP54 |
| | JP55 |
| | JP56 |
| JP60 | JP59 |
| JP61 | JP62 |
| JP64 | JP63 |
| JP66 | JP65 |
| JP67 | JP68 |
| JP69A | JP69B |
| | JP72 |
| | JP73 |
| | JP74 |
| | JP75 |
| JP77 | JP76 |
| JP79 | JP78 |

## 2.6 OTHER JUMPER INFORMATION - PWB ASSEMBLY T16322

- **TWO-WIRE CURRENT LOOP:** JP24 IN      JP25 OUT

- **RS422:** JP25 IN      JP24 OUT

- **AUSTRALIAN SOFTWARE:**    JP49 through JP56 (May be IN or OUT - no affect)

- **MASTER RESET:**   P69A (IN)     NORMAL
                         P69B (IN)     RESET   (For Australian use only; Do not RESET)

- **SPECIAL FUNCTION JUMPERS:**

| | |
|---|---|
| JP4 | R/W RAM/ROM |
| JP5 | BANK 3 MEMORY |
| JP6 | CE2 |
| JP7 | BANK 1 MEMORY |
| JP8 | FOR ENG.TEST (SEE NOTE) |
| JP9 | FOR ENG.TEST (SEE NOTE) |
| JP40 | VB (OUT) BATTERY VOLTAGE OUT (3.6V out) |
| JP41 | BATTERY ON (SYSTEM UNDER BATTERY OPERATION) |
| JP43 | DS2 (NOT) FOR ADDITIONAL LED DIS. |
| JP44 | DS3 (NOT) FOR ADDITIONAL LED DIS. |
| JP46 | VRAM |
| JP47 | FOR GERMAN DISPLAY ONLY |
| JP48 | DS7 (NOT) |
| JP60 | SLDO |
| JP61 | FOR DOMESTIC DISPLAY ONLY |
| JP62 | FOR GERMAN DISPLAY ONLY |
| JP63 | DUAL CONSOLE REC. INPUT |
| JP64 | DUAL CONSOLE REC. INPUT |
| JP65 | DUAL CONSOLE REC. INPUT |
| JP66 | DUAL CONSOLE REC. INPUT |
| JP67 | DUAL CONSOLE REC. OUTPUT |
| JP68 | DUAL CONSOLE REC. OUTPUT |
| JP77 | +5V FOR ROM/NON VOLATILE RAM |
| JP79 | +5V FOR ROM/NON VOLATILE RAM |
| JP72 - JP75 | CARD READER SIGNAL POLARITY SELECTION |

<u>NOTE:</u>   JP8 AND 9 should be IN at all times and should never be removed except for test (*engineering only*).

## INITIAL START UP - CONT.

### 2.7 APPLYING POWER TO CONSOLE

The T-12C may now be plugged into a 120 VAC outlet. *Do not attempt Console control of the fuel dispensers until field wiring and installation of electrical service and dispensing equipment has been approved by the appropriate authorities.*

Refer to the T12C User Manual (MDE1907A) for Programming and Operating instructions..

### 2.8 APPLYING POWER TO PUMPS

■ After all site wiring is in place and tested, connect the T-12C Console to the Distribution Box using the Two-Wire Data cable at the rear of the console. (See Figure 5, below.)

PRINTER
CONNECTOR    DATA CABLE        POWER CORD
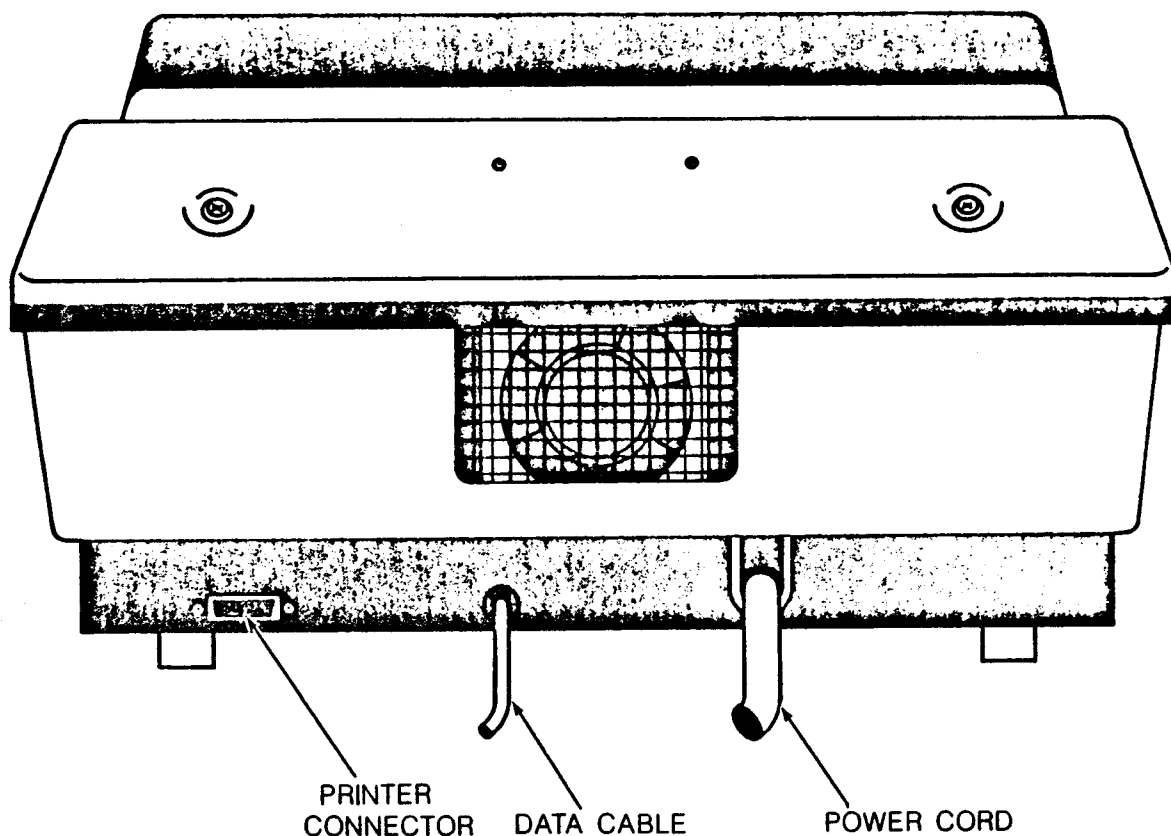
**FIGURE 5: REAR OF T-12C CONSOLE**

# INITIAL START UP - CONT

## 2.9 PUMP NUMBER AND GRADE ASSIGNMENT

■  If the T-12C Console is not powered on, plug the AC power cord into a grounded 120 VAC outlet.

■  Verify (at the pump) that a Pump Number and a Product Grade have been assigned to each hose position. The T-12C Console constantly polls the pumps and a pump can only respond via its assigned number. If Pump and Grade Numbers have not been assigned, refer to Pump or Dispenser Installation Manuals (furnished with equipment) for instructions to assign these numbers.

NOTE:    For systems with four or more grades present, it is recommended that:

  1.   Single grade pumps be set to Grade 1 and grades programmed at the console.
  2.   MDE Units be left at factory settings and Grades programmed at the console.

For systems with less than four grades it is recommended that:

  1.   True grade be set at the pump and not programmed at the console.

## 2.10 TWO-WIRE COMMUNICATION LOOP VERIFICATION

Verify in the Distribution Box that the Two-Wire Loop is functioning:

■  In the Distribution Box, turn all Two-Wire switches to "ISOLATE".

■  Check the Continuity Indicator. If the Continuity Indicator does not light, check the Troubleshooting section of this manual.

■  Turn each assigned Two Wire switch to "NORMAL", one at a time. If the Continuity Indicator light goes off, the hose position assigned to that switch should be checked for Two-Wire defect or the switch should be left in "ISOLATE" until it can be checked.

INITIAL START UP - CONT.

## 2.11  PUMP NUMBER VERIFICATION

■   Turn the T-12C Console Keylock Switch to OPERATOR.

■   Press the "ON" Button.

■   Press the PUMP SELECT for any operable pump.  The console will stop flashing and display the money data on the right with the selected pump number on the left.  If no dispensing unit responds, (console still flashes) check the pump number selection process for errors.

■   Press the PUMP SELECT Key for each hose position and verify that each pump number appears on the Pump Number display.  (Any pump number which does not appear is not communicating with the console.)  Refer to the Troubleshooting section of this manual and the service manuals for the dispensing units.

## 2.12  ASSIGNING PRODUCT GRADES AT CONSOLE - SYSTEMS WITH FOUR OR MORE GRADES

To assign a Product Grade to a hose from the T-12C Console, see MDE1907A or follow the steps given below.  All Pump Status indicators on the Console must be "OFF".

1. Turn the Keyswitch to MGR.
2. Press PROG Selector Button.
3. Press PPU key.
4. Press PUMP SELECT
5. Press the digit representing present grade.
6. Press digit representing NEW grade
7. Press AUTHORIZE.
8. Repeat steps 3, 4, 5, 6, and 7 for all hoses and Grades.

INITIAL START UP - CONT.

## 2.13   PURGING AIR FROM FUEL LINES

At this time all pumps should be operational (communicating with the console), all shear valves open (dispensers only), product in the storage tanks, and the system ready for purging of air from the fuel lines.

Air must be purged from the fuel lines by pumping at least 40 gallons of product through each hose position.  However, the fuel dispensers will not deliver product without a price setting.

If prices have not been programmed for each grade, use the T-12C Console to set an interim price of $.333 at each hose position.  This is not an operational price but one quickly programmed to allow each unit to be exercised so air can be purged from the lines.  Refer to MDE1907A or follow steps given below.  All the Status Indicators on the console must be OFF.

1.   Turn the Keylock Switch to MGR.
2.   Press PRICE SET Selector Button.
3.   Press GRADE key.
4.   Enter a price for Grade 1 of $.333 by pressing the digit 3 key three times.
5.   Press AUTHORIZE
6    Repeat steps 3, 4, and 5 for all grades.

# INITIAL START UP

## 2.14 PURGING PROCEDURE

Perform this procedure for each hose, beginning with the hose farthest from each underground tank. If difficulty is encountered, refer to the troubleshooting section of this manual.

- At the dispenser: Lift the operating handle on a hose.

- At the Console: The status light for that hose should begin to flash and a beeping sound should be heard.

- At the Console: Press Pump Select for hose with Status light flashing and

   Press "Authorize".

   Beeping stops. Status light goes from flashing to steady "ON".

- At the dispenser: After a two second lamp test (8s flashing) on the dispenser display, the pumping mechanism will activate and air can now be bled from the dispenser lines by pumping air and fuel through the hose until only fuel flows.

- At the Dispenser: Pump approximately 40 gallons through each hose to insure all air has been bled from the lines,

- Put the operating handle down and hang up the nozzle.

- At the Console: The Transac 12C console should beep once and the status light for that hose should begin a slow flash.

   Press PUMP SELECT again and press CASH to complete the transaction. (Status light should go out)

   After this procedure is performed, dispensing units should be working properly and all air should be purged from the system. Reset all TOTALS (See MDE1907A.). The initial installation is now complete.

**INITIAL START UP - CONT.**

## 2.15  SYSTEM VERIFICATION

When all dispensing units are functional, all air is purged from the system and the Console is programmed with prices and options chosen for this site:

■  Record the SHIFT, STATION, and INVENTORY totals on Chart #1, Page 18. (The SHIFT and STATION totals are now zero - the INVENTORY is now zero gallons per grade) These are the beginning totals.

■  Record all PUMP TOTALS on Chart #2, Page 19. These will be the beginning totals. Also record the PPU displayed by the pump and the grade marked on the pump.

| CONSOLE DATA | | GRADE 1 | GRADE 2 | GRADE 3 | GRADE 4 | GRADE 5 | GRADE 6 | TOTAL $(00) |
|---|---|---|---|---|---|---|---|---|
| BEGINNING TOTALS | 1 SHIFT | | | | | | | |
| | 2 STATION | | | | | | | |
| | 3 INVENTORY | | | | | | | |
| ENDING TOTALS | 4 SHIFT | | | | | | | |
| | 5 STATION | | | | | | | |
| | 6 INVENTORY | | | | | | | |
| Line 4 minus Line 1 | 7 SHIFT | | | | | | | |
| Line 5 minus Line 2 | 8 STATION | | | | | | | |
| Line 3 minus Line 6 | 9 INVENTORY | | | | | | | |

**CHART 1:  CONSOLE DATA**

| PUMP NUMBER | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PPU | | | | | | | | | | | | | |
| GRADE | | | | | | | | | | | | | |
| BEGINNING PUMP TOTALS | ELEC. | | | | | | | | | | | | |
| | MECH. | | | | | | | | | | | | |
| TRANSACTION #1 | | | | | | | | | | | | | |
| TRANSACTION #2 | | | | | | | | | | | | | |
| TRANSACTION #3 | | | | | | | | | | | | | |
| TRANSACTION #4 | | | | | | | | | | | | | |
| TRANSACTION #5 | | | | | | | | | | | | | |
| TOTAL 1-5 | | | | | | | | | | | | | |
| ENDING PUMP TOTALS | ELEC. | | | | | | | | | | | | |
| | MECH. | | | | | | | | | | | | |

**CHART 2:  PUMP DATA**

## 2.16  EXERCISING THE DISPENSING UNITS

The following step by step process must be repeated for all hoses to insure correct system operation. Begin with dispensing unit #1 and complete all steps before moving to unit #2. If any difficulty is encountered, refer to the Troubleshooting Guide in Installation and/or Service Manual for the pumps.

1.  Raise the Operating handle of dispensing unit #1. (ON)  The Status Indicator for Pump #1 on the Transac 12C console will blink (fast) and the console will beep.

2.  Authorize pump #1.  The Status Indicator for position #1 will change from blinking to steady "ON".

3.  After the dispensing unit has gone through the reset cycle (all 8s) deliver approximately $1.00 and verify that all air is purged from the system. (If not, continue this delivery until all air is purged.)

4.  Lower the Operating handle (OFF)

5.  The console will beep once and the Status Indicator for Pump #1 will blink slowly.  Press PUMP SELECT #1 then CASH to clear this payment due signal.

6.  Verify the Console readout - Money and Volume.  Record this amount under Transaction #1 for pump #1 on Chart #2.

7.  Preset pump #1 for a $.50 delivery.

8.  Raise the Operating handle on #1 and allow the pump to delivery product until IT STOPS ITSELF. (Within $.10 of $.50)

# INITIAL START UP

## SYSTEM VERIFICATION - CONT.

### EXERCISING THE DISPENSING UNITS - CONT.

9.      Lower the pump Operating handle (OFF)

10.     Clear the console payment due signal.

11      Record the amount Preset and the amount delivered under Transaction #2 for pump #1.

12.     Repeat steps 7-10 THREE more times recording the amount Preset and the amount delivered each time. (Make sure to allow the pump to STOP ITSELF each time) NOTE: If by Transaction #5 the pump will not Preset accurately, refer to Pump Installation and/or Service Manual.

13      Add the amounts delivered in the five transactions for each hose and record the total on Chart #2. The ENDING PUMP TOTALS must equal the BEGINNING PUMP TOTALS plus the total of transactions 1-5. If not, refer to Pump Installation and/or Service Instructions.

14.     Record all console SHIFT, STATION, and INVENTORY totals on Chart #1. (Under ENDING TOTALS) Add the delivery volume totals from step 13 for all pumps assigned to Grade 1. This volume amount must equal the volume amount for Grade 1 on Line 7 of Chart 1. The Grade 2 volume totals must equal the Grade 2 line 7 amount. The Grade 3 volume totals must equal the Grade 3 line 7 amount. The Grade 4 volume totals must equal the Grade 4, line 7 amount. If any of these totals do not agree, check the Grade Selector switches on all the pump logic boards. Also verify that all hose grades were programmed correctly at the Console.

15.     The money amount of all transactions on Chart #2 added together must equal the total money figure on line 7 of Chart #1. If not, recheck console programming and refer to the Troubleshooting section of this manual.

16.     Line #9 of Chart 1 must be within one unit of Line #8. This indicates that console inventory accumulation is accurate.

17.     Verify at this time that the dispensing unit mechanical volume totals have increased the same amount as the dispensing unit electronic volume totals. This insures the dispensing unit is delivering accurately.

# 3.0 SERVICE

## 3.1 FUNCTIONAL OVERVIEW

The Transac 12C system is a solid state self service system utilizing the latest in microprocessor technology. The console and dispensing units are electrically connected via a Two-Wire Communication Loop.

## TWO-WIRE COMMUNICATION LOOP

To prevent any break or discontinuity in the series loop, each dispensing unit operates under console control from two wires brought into a distribution box. Via switches in the distribution box, any dispensing unit can be ISOLATED from the loop without interrupting console control of the remaining dispensing units.

## PUMP IDENTIFICATION NUMBER

T12C System Console is in constant communication with the dispensing units and gets transaction data from each unit in the loop. Each dispensing unit has a unique address code determined by the pump I.D. number selection which has been made at the dispensing unit.

The console sends out a different code for each PUMP SELECT Key that is depressed. This code is sent to all the dispensing units in the loop but only the unit with the correct address code will respond to the console.

The physical location or the wiring position in the distribution box do not determine which unit is assigned to a particular PUMP SELECT key. Any dispensing unit may be assigned to any PUMP SELECT Key by the PUMP NUMBER SELECTOR switch.

## GRADE SELECTION

In a T-12C System, prices are set according to the Product Grade. The procedure for selecting grade names (numbers) for the various Gilbarco Fuel Dispensing units that may be used in a T-12C System are given below.

## DISPENSING UNITS H111B OR RETROPAC

If H111B or Retropac units are to be as Grades 1, 2, or 3, set the grade at the Dispensing Unit. If unit is to be used for Grades 4, 5, or 6, set to Grade 1 at the Dispensing unit and override the grade value (by programming) from Console. See Installation and Service Manuals furnished with the Dispensing Units.

SERVICE - CONT.

## FUNCTIONAL OVERVIEW - CONT.

### MULTI-PRODUCT DISPENSING (MPD) UNITS INCLUDING SALESMAKER 4: '

If MPD (including SM 4) Dispensing units are used as Grades 1, 2, or 3, set the grade at the Dispensing Unit. If one grade position only is to be used as Grades 4, 5, or 6, set that unit to Grade 1 at the Dispensing unit (if possible), and override the Grade value (by programming) from the Console. If more than one Grade position is to be used as Grades 4, 5, or 6, leave the Grade settings in factory default (1, 2, or 3) and override (by programming) from the Console.

## 3.2 GENERAL SERVICE TIPS

If problems are encountered with a T-12C System at start up where proper operation has never been verified, accuracy of the installation should first be suspected. Try to isolate the problem to either the Console or the Dispensing equipment. If isolated to the Dispensing equipment, refer to the appropriate Installation and Service Manuals pertaining to the equipment involved. If isolated to the Console, refer to MDE1908A: T-12C Console Installation Manual.

## TO DIAGNOSE A T-12C CONSOLE MALFUNCTION

Try to isolate the problem to a particular Electronic Assembly. For example, if a major portion of the system is not working, check Power Supply voltages (See Figure 5 for Voltage Test Points.) If the Power Supply voltages are incorrect, the problem is probably in one of the Power Supply Assembly components.

Next, check the fuses on the Regulator board.. Use Fusing Chart, Page 18 as a guide to locating the cause of a blown fuse. If no fuses are blown on the Regulator board, try to isolate the problem by unplugging those connectors that are used to supply the various voltages to the other components in the system.

If the problem is isolated, and the voltage is still incorrect, the problem may be solved by replacing the Regulator board. If the problem is isolated and the voltage is now correct, plug in each connector, one at a time, and note the supply voltage. When a connector is plugged in and the voltage suddenly changes, replacing the Assembly that was just plugged in will usually solve the problem.

**SERVICE - CONT.**

## 3.3 FUSING CHART

This chart is intended to guide the serviceman in locating the cause of a blown fuse and should be referred to any time a fuse needs replacement.

| FUSE | RATING | LOCATION | AFFECTED BY |
|------|--------|----------|-------------|
| F1 | 3 Amp | Rear of console housing | Any PWB or the power supply itself |
| F2 | 7.5 Amp | Power Supply Regulator Board | Processor Board or Power Supply Module |
| F3 | 5 Amp | Power Supply Regulator Board | Processor Board, Display Board, LED Board, or Power Supply Module. |
| F4 | .5 Amp | Power Supply Regulator Board | Processor Board or Power Supply Module |
| F1 | .1 Amp | Current Source Board (Piggyback on Power Supply Regulator Board) | Current Source Board, Data Cable, Distribution Box or field wiring. |

**CHART 3: FUSING CHART**

## 3.4 RECOMMENDED SPARE PARTS

In some cases, the most feasible means of determining if a particular subassembly is malfunctioning is to substitute a known good subassembly. Therefore, a technician undertaking the diagnosis and repair of this equipment should have parts on hand for replacement. The parts listed below are the recommended minimum for each service truck. If multiple sites are maintained, quantities may need to be increased, depending upon distance from depot stocking parts and other variables.

| DESCRIPTION | PART NUMBER | QUANTITY |
|---|---|---|
| Power Supply Assembly | T12695-G1S | 1 |
| Current Source | T13743-G1S | 1 |
| Display PWB | T13316-G1S | 1 |
| LED PWB Assembly | T12071-G1S | 1 |
| Processor PWB Assembly OR OR | T16322-G1S T15899-G1S T16249-G1S | 1 |
| Keyboard | R15810-02S | 1 |
| Pushbutton Switch Assembly | R15281-G1 | 1 |
| Two-Wire Cable | R17925-G1S | 1 |
| Fuse, 0.5 Amp | Q10444-01 | 5 |
| Fuse, 5.0 Amp | Q10444-02 | 5 |
| Fuse, 7.5 Amp | Q10444-03 | 5 |
| Fuse, 3.0 Amp | Q10131-19 | 5 |
| Fuse, 0.1 Amp | Q10617-01 | 5 |

NOTE: For replacement keyswitch or keyswitch assembly, use 13 digit model number code when ordering.

## USER NOTES

F1 .1A, 125V

MADE IN U.S.A.

Red P3 Blk

40VDC across

ASSY T13743-G1 REV    SER. NO.

**TWO-WIRE BOARD**

+8VDC

TP1

MADE IN U.S.A.
ASSY T13316-G    REV
SERIAL NO.

**DISPLAY BOARD**

F4 .5A, 125V

-5 VDC
GND.
+5 VDC
+12 VDC

ASSY T13730-0
SER NO.
MADE IN U.S.A.

REV

F2 7.5A, 32V          F3 5A, 32V
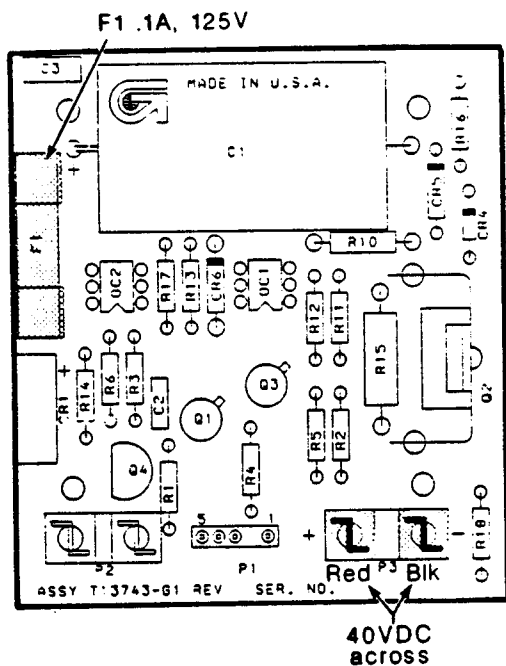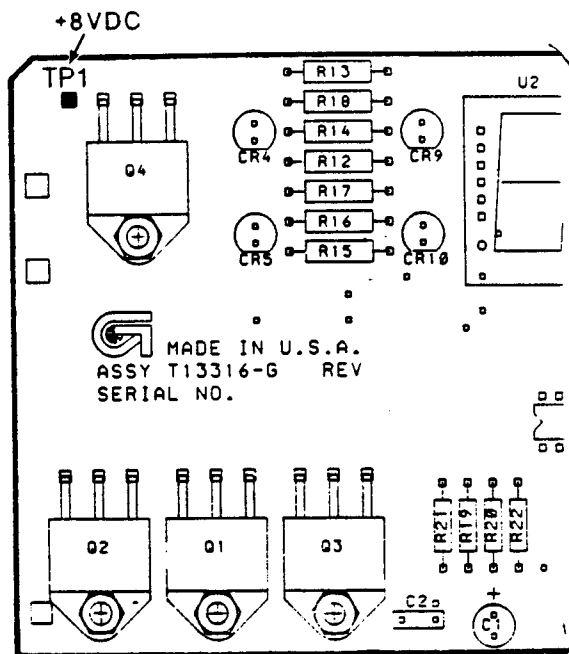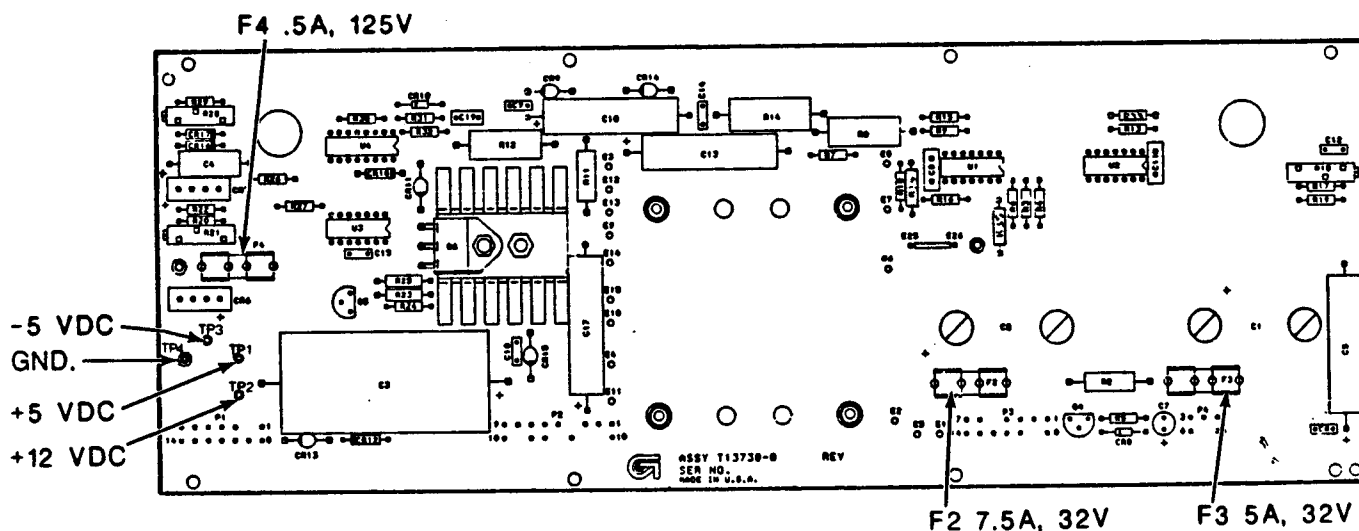
**REGULATOR BOARD**

**FIGURE 6: LOCATION OF VOLTAGE TEST POINTS AND FUSES**

# 4.0 THEORY OF OPERATION

## 4.1 T-12C ELECTRONIC COMPONENTS

The T-12C is made up of six major electronic modules. Each of these assemblies performs a separate function but all must function together correctly to allow the T12C console to control the fuel dispensers. The electronic assemblies are listed below and described in the following paragraphs.

| ELECTRONIC ASSEMBLY | PART NUMBER |
|---|---|
| POWER SUPPLY ASSEMBLY: | T12695 |
| REGULATOR BOARD ASSEMBLY | T13738 |
| PROCESSOR PWB ASSEMBLY | T15899, T16249 OR T16322 |
| TWO-WIRE PWB ASSEMBLY | T13743 |
| CONTROL PANEL ASSEMBLIES: | |
| DISPLAY PWB ASSEMBLY | T13316 |
| LED PWB ASSEMBLY | T12071 |
| PUSHBUTTON SWITCH ASSEMBLY | R15281 |

## 4.2 POWER SUPPLY ASSEMBLY

The Power Supply Module is made up of the Power Supply Chassis Assembly (T12695) and the Regulator PWB Assembly (T13738). This Module generates and regulates the DC operating voltages (required by the console and data loop) from the 120 VAC input.

The operating voltages of the T-12C are:

|  |  |
|---|---|
| +5 VDC | -5 VDC |
| +8 VDC | +12 VDC |

And a constant current source of approximately +40 VDC at 40 MA.

Each operating voltage is fused to protect the supply against damage. An AC input fuse is also provided for console protection. See Fusing Chart, Page 23, for fuse location, rating, etc. and Figure 6, Page 26, for the Voltage Test Point locations.

## THEORY OF OPERATION - CONT.

### POWER SUPPLY ASSEMBLY - CONT

**Thermal Protection Devices**: The T-12C power supply is cooled by a thermostat controlled fan assembly. To further protect the T-12C, the power supply is also equipped with a thermal (heat sensitive) device which will remove AC power from the power supply in the event the console interior temperature exceeds +235 degrees F. This condition (power removed) will automatically correct itself when the cause for overheating is eliminated.

**Power Fail Signal**: The Power Supply also generates a Power Fail signal. This signal is used to notify the console processor board when AC power is removed. The processor board will then store all the console totals memory. If the power fail timing or voltage levels are incorrect, the console could lose memory. Thus, in some cases, the Power Supply could be responsible for console memory loss.

### POWER SUPPLY ASSEMBLY COMPONENTS:

Some of the Power Supply Assembly components, along with their proper functions, are listed below.

- ■ AC Line Filter (Removes Radio Frequency interference coming in on the AC line.)

- ■ AC Line Fuse (4 amp SLO-BLO for 115 VAC operation)

- ■ B1 Fan Assembly (Used to cool the Power Supply.)

- ■ AC Power Cable Assembly (Used to plug into AC Power source.)

- ■ T1 Transformer (Used to step down the line voltage to the lower AC voltages required for various power supplies. T1 is also equipped with noise suppressor devices.)

- ■ CR1, CR2 Bridge Rectifiers (Used to convert the AC voltage from T1 to an unregulated DC voltage for the +5 VDC power supply.)

- ■ C1 and C2 Filter Capacitors (used to smooth out the raw DC voltage from the High Voltage Power Supply.)

## 4.3  PROCESSOR PWB ASSEMBLY

The Processor Board is responsible for all communication between the console and the dispensing units. The Processor board also accepts all keyboard inputs, mode switches and keyswitch inputs. All functions requiring memory, programming, human interaction, etc., are controlled by the Processor. Depending on the input, the processor will respond with any or several tasks such as those listed below:

- Send codes to the Display board for use in generating readouts and status indications

- Authorize a pump

- Total the sale, record whether cash or credit and calculate change, if required

- Update sales totals and adjust inventory

## 4.4  TWO-WIRE PWB ASSEMBLY  (CURRENT SOURCE BOARD)

The Two Wire PWB Assembly performs numerous tasks to protect the Console's electronic components while allowing the console to communicate with the fuel dispensing units. Some of these tasks are:

- Receives and transmits Two-Wire data between the console processor board and the dispensing units connected to the communication unit.

- Provides a 0.1a, 125V fuse to protect the console portion of the Two-Wire communication circuit from external power overloads or shorted data wires.

- Converts 32VAC received from the power supply transformer to a constant current of 40ma.

## 4.5  CONTROL PANEL ASSEMBLES

DISPLAY PWB ASSEMBLY: The Display Board contains all circuitry necessary to drive the seven-segment LED displays and the indicator LEDs which are on the Display board and also on the LED board. The Displays and LEDs are driven by codes sent from the Processor board.

PUSHBUTTON SWITCH ASSEMBLY: The Pushbutton Switch Assembly controls the different modes of console operation. It operates under control of the Processor board.

# USER NOTES

# 5.0  TROUBLESHOOTING GUIDE

This Troubleshooting Guide should help in resolving most problems but cannot include all possible symptoms and causes. It is essential to read all symptoms related to a problem before replacing any component.

## 5.1  POWER UP PROBLEMS

**1.  SYMPTOM:  NO DISPLAY ON CONSOLE AT POWER-UP**

      **CAUSE:**      No AC power to console.

      **CURE:**      Check AC power cord connection.

      **CAUSE:**      Circuit breaker tripped.

      **CURE:**      Reset breaker.

      **CAUSE:**      Console AC fuse blown.

      **CURE:**      Replace AC fuse (3 amp).

      **CAUSE:**      Console overheated and in Thermal Overload Condition.

      **CURE:**      Correct the condition (Clean fan, move console from sun, etc.).

**2.  SYMPTOM:  POWER SUPPLY HAS NO OUTPUT. (MEASURE AT TEST POINTS ON FIGURE 5, PAGE 25.)**

      **CAUSE:**      DC fuse(s) blown.  See Fusing Chart, Page 21.

      **CURE:**      Replace fuse with proper size as indicated on the Power Supply PC board.  If the replacement fuse blows, unplug all power supply connectors (except J2) and try again.  If the fuse blows again, replace power supply.

**TROUBLESHOOTING GUIDE - CONT.**

**POWER UP PROBLEMS - CONT.**

---

3.   **SYMPTOM: POWER SUPPLY HAS INCORRECT OUTPUTS**

    **CAUSE:**    Power Supply defective

    **CURE:**    Replace Power Supply

---

# 5.2   DISPLAY PROBLEMS

---

1.   **SYMPTOM: DISPLAY BOARD PRODUCES NO DISPLAY AT POWER UP**

    **CAUSE:**    Connector P-1 on Display board not secure

    **CURE:**    Secure P-1

    **CAUSE:**    Display board defective

    **CURE:**    Replace Display board

    **CAUSE:**    Blown fuse on Regulator board

    **CURE:**    Replace fuse

---

2.   **SYMPTOM: ONE INDIVIDUAL LED OR SEGMENT BLANK OR DIM.**

    **CAUSE:**    LED or segment of readout defective.

    **CURE:**    Replace Display or LED board.

## TROUBLESHOOTING GUIDE - CONT.

## DISPLAY PROBLEMS - CONT.

---

3.    **SYMPTOM: A GROUP OF 2 OR MORE SEGMENTS OR LEDS BLANK OR DIM**

    **CAUSE:**    Defective Display board or defective LED board.

    **CURE:**    Replace defective Display or LED board.

    **CAUSE:**    P1 or P2 connector not secure.

    **CURE:**    Secure connector (on Display board).

    **CAUSE:**    One or more wires in cable defective or loose in connector

    **CURE:**    Verify. Replace or repair as necessary.

    **CAUSE:**    Processor Board defective.

    **CURE:**    Replace processor board.

---

4.    **SYMPTOM: DISPLAY CONTINUES EMERGENCY STOP CONDITION WHEN ALL PUMP SELECT BUTTONS ARE TRIED**

    **CAUSE:**    Incorrect Operation, Keyswitch not in OPER, or ON button not pressed, etc.

    **CURE:**    Refer to programming instructions

    **CAUSE:**    Defective Communication Loop to one or more Dispensers

    **CURE:**    Isolate each Dispenser with switch at Distribution Box and return switch to NORMAL position one by one until defective loop is located.

TROUBLESHOOTING GUIDE - CONT.

# 5.3 COMMUNICATION PROBLEMS

1. **SYMPTOM:** ONE OR MORE DISPENSERS NOT COMMUNICATING WITH THE CONSOLE.

    **CAUSE:** "Isolate" switches not correctly positioned causing Data Loop to be incomplete.

    **CURE:** Flip switches (with numbers corresponding to the Dispensing units in use) from ISOLATE to NORMAL in Distribution Box.

    **CAUSE:** Pump numbers not correctly assigned at dispensing units.

    **CURE:** Verify and correct PUMP NUMBER SELECT at dispensing unit.

2. **SYMPTOM:** DISPLAY CONTINUES EMERGENCY STOP CONDITION WHEN ALL PUMP SELECT BUTTONS ARE TRIED

    **CAUSE:** Current source defective

    **CURE:** Measure between the black and red wires in the distribution box (approx 40 VDC)with the Loop Continuity Indicator OFF. Refer to Figure 5, Voltage Test points if there is not 40 VDC.

**TROUBLESHOOTING GUIDE - CONT.**

**COMMUNICATION PROBLEMS - CONT.**

---

3.    SYMPTOM: KEYSWITCH SENDING WRONG INFORMATION.

CAUSE:    Keyswitch faulty or incorrectly connected.

CURE:     Verify wiring. Replace Keyswitch Assembly if necessary.

CAUSE:    Defective Processor board.

CURE:     Replace Processor board.

---

# 5.4  MISCELLANEOUS PROBLEMS:

---

1.   PROBLEM: ONE OR TWO DISPENSING UNITS NOT RESPONDING TO THE
             CONSOLE VIA PUMP SELECT, CALL, AUTHORIZE, PRESET,
             PUMP TOTALS, DATA TRANSMISSION, ETC.

CAUSE: System problem.

CURE: Refer to Diagnostics Section immediately following this Section.

---

2.   PROBLEM: ACCUMULATION OF SHIFT TOTALS, STATION TOTALS, or
             INVENTORY INCORRECT.

CAUSE: Programming Error.

CURE: Check Programming.

CAUSE: Processor PWB defective.

CURE: Replace Processor PWB.

---

3.    ERRATIC DISPLAYS AND NO OPERATION

CAUSE:  Console Memory scrambled

CURE:  Follow steps below to clear the Console Memory.

See Section 2 if necessary for instructions for exposing Processor PWB.

- Unplug the Console and remove the upper housing.
- Slide the Processor PWB out far enough to expose JP3.
- Remove jumper from JP3.
- Power up console for about 5 seconds.
- Power down.
- Replace JP3.
- Power up.

The console memory will now be completely cleared.  If memory scrambling occurs again, replace the Console Processor PWB.

4.    PROBLEM: SECRET CODE FORGOTTEN OR INADVERTENTLY ENTERED

TO LOOK AT A SECRET CODE:

- Turn Keyswitch to "OFF".

- Press Mode Selector "ON".

- Use the Numerical Keypad to enter '919292301113041'.

- Press the appropriate Pump Select key for the Secret Code desired.  (Refer to DATA DUMP MODE for proper PS key.)

- Press AUTHORIZE.

Five characters will be displayed.  Interpret the code per the list below.

| CHARACTER DISPLAYED | CODE NUMBER |
|:---:|:---:|
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 7 | 6 |
| 8 | 7 |
| 9 | 8 |
| H | 00 |

## USER NOTES

# 6.0   DIAGNOSTIC TESTS

**TO ENTER DIAGNOSTIC MODE:**

■   Press RESET/ON.

■   Turn Keyswitch to the OFF position

■   Enter 2,2, on Keyboard and press AUTHORIZE.

The display will read "diag."

Several tests can now be performed by pressing the appropriate pump select key.  To repeat a test, press the same key after the test is complete.

1.   **TO TEST NUMERIC DISPLAYS:**

■   Press PUMP SELECT Key #1.

RESULT:   Each segment of each display will light, one by one, until all segments are on.

2.   **To TEST LEDs, DECIMAL POINTS, AND PUMP STATUS LIGHTS:**

■   Press PUMP SELECT Key #2.

RESULTS:   At the end of the test, all LEDs will be ON.

3.   **TO TEST CONSOLE BEEPER:**

■   Press PUMP SELECT #3.

RESULT:  Console BEEPER will sound.

4.   **PRINTER TEST:**

■   Press PUMP SELECT #6

RESULT:     If a Printer is connected to the Printer port, a Printer Test will be activated.

5.   MEMORY TEST:

■   Press PUMP SELECT #7.

RESULT:   The Display is blank while T-12C executes an internal memory test.  When the test is complete, "diag" reappears on the Display.

## DIAGNOSTIC MODE - CONT.

6.    AVAILABLE PUMP TEST:

■   Press PUMP SELECT #8

RESULT:   The Console will display all available pumps by lighting the appropriate
          Pump Status lights.

7.    **TO TEST KEYBOARD:**

■   Press PUMP SELECT #4

RESULT:   Console Display should read 43 which is the numeric value of PUMP
          SELECT Key #4. (See Note.)

The Console is now able to access the numeric values assigned to every Function
Button, Key, and Keyswitch position on the Console keyboard.


NOTE:   **PUMP SELECT Key #12 is pressed to <u>exit</u> the Diagnostic Mode.  Test the
         PUMP SELECT keys last to avoid inadvertently exiting the mode before
         completion of tests.**


Press the key or button (or turn the Keyswitch to the function,) and the numeric
value should appear on the Display.  The Keyboard may be tested in any order, but
following the order given below may avoid missing any steps.


| <u>CONSOLE POSITION</u> | <u>NUMERIC VALUE</u> |
|---|---|
| FUNCTION SELECT KEYS: | |
| RESET/ON | 64 |
| PROG/INVENT | 65 |
| PRICE SET/SHIFT TOTALS | 66 |
| DATA DUMP/STATION TOTALS | 67 |
| | |
| GRADE | 01 |
| LEVEL | 02 |
| PPU | 03 |
| PUMP TOTALS | 04 |

## DIAGNOSTIC MODE - CONT.

### NUMERIC KEYBOARD:

|        |    |
|--------|----|
| 1      | 11 |
| 2      | 12 |
| 3      | 13 |
| 4      | 14 |
| 5      | 15 |
| 6      | 16 |
| 7      | 17 |
| 8      | 18 |
| 9      | 19 |
| 0      | 20 |
| 00     | 21 |

| AUTHORIZE      | 30 |
|----------------|----|
| CREDIT         | 31 |
| CASH           | 32 |

| VOL/CASH DISP  | 33 |
|----------------|----|
| A/B MEM        | 34 |
| RECOMPUTE      | 35 |

| E-STOP         | 36 |
|----------------|----|
| PUMP STOP      | 37 |
| VOID           | 38 |
| CHANGE         | 39 |

### KEYSWITCH POSITIONS:

| OPER.  | 61 |
|--------|----|
| MAN.   | 62 |
| MGR.   | 63 |
| OFF    | 60 |

## DIAGNOSTIC MODE - CONT.

PUMP SELECT KEYS:

| | |
|---|---|
| PUMP SELECT 1 | 40 |
| PUMP SELECT 2 | 41 |
| PUMP SELECT 3 | 42 |
| PUMP SELECT 4 | 43 |
| PUMP SELECT 5 | 44 |
| PUMP SELECT 6 | 45 |
| PUMP SELECT 7 | 46 |
| PUMP SELECT 8 | 47 |
| PUMP SELECT 9 | 48 |
| PUMP SELECT 10 | 49 |
| PUMP SELECT 11 | 50 |
| PUMP SELECT 12 | 51 |

** 51 Displays briefly and is replaced with "diag". Turn Keyswitch to OPER. to complete the exit from Diagnostic Mode. "Diag" is replaced on Display with "000".