MagneTek

# VCD 723
# Product Guide

## Revision History

The following table shows all pages that have been revised since the first issue of this manual.

| Revision Date | Affected Pages |
|---|---|
| 9/15/93 | Initial |

## Related Documents List

The following publications provide additional information on the VCD 723 drives. Each is available from MagneTek. Please use the form provided at the back of this manual to place your order.

- Maintenance Guide TM 6723-10
- PCDU Guide TM 6723-20
- MicroTrac® LAN Network Guide TM 6723-30

Additional copies of this manual can also be ordered by specifying the VCD 723 Product Guide (TM 6723).

## Warranty

Standard products manufactured by MagneTek are warranted to be free from defects in workmanship and material for a period of one year from date of shipment and any products which are defective in workmanship or material will be repaired or replaced, at MagneTek's option, at no charge to the Buyer. Final determination as to whether a product is actually defective rests with MagneTek. The obligation of MagneTek hereunder shall be limited solely to repair or replace, at MagneTek's discretion, products that fall within the foregoing limitations, and shall be conditioned upon receipt by MagneTek or written notice of any alleged defects or deficiency promptly after discovery and within the warranty period, and in the case of components or units purchased by MagneTek, the obligations of MagneTek shall not exceed the settlement that MagneTek is able to obtain from the supplier thereof. No products shall be returned to MagneTek without its prior consent. Products which MagneTek consents to have returned shall be shipped prepaid f.o.b. MagneTek's factory. MagneTek cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective. The life of the products of MagneTek depends, to a large extent, upon the usage thereof, and MAGNETEK MAKES NO WARRANTY AS TO FITNESS OF ITS PRODUCTS FOR THE SPECIFIC APPLICATIONS BY THE BUYER NOR AS TO PERIOD OF SERVICE UNLESS MAGNETEK SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT.

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## Limitation Of Liability

IN NO EVENT SHALL MAGNETEK BE LIABLE FOR LOSS OF PROFIT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES WHETHER ARISING OUT OF WARRANTY, BREACH OF CONTRACT OR TORT.

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## How To Use This Manual

MagneTek has made this product guide an easy to use reference. To help you use this manual, we have provided the following guides:

- The top of each page has an identification of the section. For example, notice that at the top of this page **Introduction 1** appears. This identifies the page as part of Section 1, Introduction. There are four sections in this manual: Introduction, Installation and Start-Up, Operation and Troubleshooting/ Maintenance.

- Each section is organized into one or more major subject headings. These are the main topics covered in that section. You will recognize major subject headings by their distinctive appearances. The next line illustrates an example:

  This is an example of a major subject heading from Section 3.

## Controls and Indicators

Each major subject heading may have one or more minor topics that are covered. The next line illustrates an example:

This is a minor topic covered under “Controls and Indicators.”

### *Status LEDs*

Each minor topic may have one or more descriptive headings. These identify items covered within the minor topic. The next line illustrates an example:

This is a descriptive heading covered under “Status LEDs.”

**Ready**

At the bottom of each page is the name of the first major subject heading covered on that page. The page number and revision date are also included. For example, at the bottom of this page, the information indicates that “How to Use This Manual” is the first major subject heading. It was last revised September 15, 1993.

Using the information on the top of the page to find the section, the bottom of the page to find the major subject heading and the left margin to find the minor topics and descriptive headings, you can easily page through the manual to find the information you need.

A table of contents is also included. The Table of Contents can be used to locate section and major topics. A glossary is provided to define terms which may be unfamiliar.

## Safety Statements

In addition to notes, the following types of precautionary statements appear in this manual.

**IMPORTANT**

A statement of conditions which should be observed during drive setup or operation to ensure dependable service.

**CAUTION**

A statement of conditions which must be observed to prevent undesired equipment faults or degraded drive system performance.

**WARNING**

**A statement of conditions which MUST BE OBSERVED to prevent personal injury or serious equipment damage.**

## How To Contact MagneTek

For additional information, contact any MagneTek Representative, Authorized Distributor, or our Technical Support Staff at:

MagneTek
16555 West Ryerson Road
New Berlin, WI 53151

(800) 541-0939 (414) 782-0200
FAX: (414) 782-1283

## Drive Description

The MicroTrac name is used to describe MagneTek's family of digital system drives and the compatible products used to create systems. This manual describes the MicroTrac compatible VCD 723 AC motor drive.

### *Performance*

The VCD 723 is a high performance, sine-coded, Pulse Width Modulated (PWM) AC motor drive which generates an adjustable three phase output for complete speed or torque control of a compatible AC induction motor. The VCD 723 can maintain a 150% current overload for 60 seconds with automatic stall prevention and voltage boost to prevent nuisance tripping during load or line side transient conditions. The VCD 723 will not induce any voltage line notching distortion to the utility line and maintains a displacement power factor of approximately 0.98 throughout its speed range.

### *Flexibility*

The VCD 723 drive is totally software configurable to the application through a high level graphical language, called Programmable Application Control (PAC). PAC provides complete flexibility without having to make hardware adjustments. Interface to other equipment is provided with local Input/Output (I/O) or a high speed Local Area Network (LAN). Use of the LAN means that a single coaxial cable eliminates multiple conductor cables and provides high noise immunity. Extensive diagnostic and setup capability are provided through two control/display units. The Local Control/Display Unit (LCDU) is mounted flush with the drive cover and consists of a Liquid Crystal Display (LCD) with two lines of sixteen alphanumeric characters, five pushbuttons, and five status Light Emitting Diodes (LED's). The LCDU can be used for all setup functions and many diagnostics. The Portable Control/Display Unit (PCDU) is an optional hand-held device that can be plugged into any MicroTrac compatible drive and used for all the same functions as the LCDU plus some advanced diagnostics. The PCDU has two lines of sixteen alphanumeric characters and a thirty-key keypad.

### *Accuracy*

The distributed control architecture of the MicroTrac system means that each drive performs its own regulation calculations synchronized to a common high accuracy crystal master. Thus, even minute crystal drift will not affect multiple drive tracking. This allows a MicroTrac system to maintain the drift between sections to 0.00% at steady state. The fully digital nature of the regulation means that an individual drive can maintain a 0.00% average difference between set and actual speed from no-load to full-load when using digital tachometer speed feedback. Digital setup and performance assure exact process line and finished product duplication shift to shift and month to month. Speeds, tensions, ratios, draws, limits, ranges, alarms, and other control parameters can be set as percentages or exact numerical values via keypad or thumbwheel switches with up to six digits of resolution. Parameters are entered and displayed in plain and understandable English. The drive can be completely set up prior to actual running and changes can be made during operation. Keypad entry of changed parameters, protected memory, and factory default values allow the operator to modify data with minimum risk to the process.

## Useability

The VCD 723 drive is composed of several major components. The base component is the MagneTek VCD 703 drive, with special software. To this is added the MicroTrac circuit card, which provides graphical PAC programming environment, LAN communications and extra local I/O. The other components are the Local and Portable Control/Display Units, which allow user friendly interface for drive setup and provides extensive diagnostic capabilities. In addition, optional circuit cards can be added for expanded local I/O capabilities and added functionality.

## Versatility

The VCD 723 can be set up to operate in one of two major modes based on the level of regulation enabled. The first mode allows the drive to run as if it were a VCD 703 drive, but the input for the constants come from the PAC environment instead of from the Digital Operator. In addition to utilizing the speed control logic of the VCD 703 drive to control the motor, this mode adds the extra I/O capabilities that are present on the MicroTrac circuit card. This also allows for all of the advantages and flexibility of utilizing the PAC programming language. In this mode, the inputs and outputs on the VCD 723 behave in the same way that they would have had this been a VCD 703 drive, however, the An, Bn, Cn, Dn, On, Sn, and Un constants are entered via the PAC environment.

The second major operating mode of the VCD 723 has the VCD 703 drive operate as a slave to the MicroTrac circuit card. In this mode, the PAC programmer has complete freedom in how the motor should be controlled, including which inputs/outputs should perform a specific function.

## Characteristics

The VCD 723 is mounted in a NEMA 1 wall mount enclosure, with other power/control components required for VCD/VCM interconnection.

When properly installed, operated and maintained, the VCD 723 can provide years of troublefree service. It is important that the person who operates, inspects, or maintains this equipment thoroughly read and understand this manual before proceeding.

# Ratings and Specifications

*Control Specifications*

Table 1. **Motor Control Specifications**

| SECTION A. 208/230V | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Drive** | | | | | | | | | | | |
| **General Use** | **Model VCD 723-** | **A003** | **A005** | **A7P5** | **A010** | **A015** | **A020** | **A030** | | **A050** | |
| | **Capacity HP** | 3 | 5 | 7.5 | 10 | 15 | 20 | 30 | | 50 | |
| | **Input Current A** (Motor HP) | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| | | 11 | 18 | 26 | 35 | 53 | 70 | 97 | 106 | 140 | 211 |
| | **Continuous Rated Current A** | 9.6 | 16 | 24 | 32 | 48 | 64 | 96 | | 160 | |
| **Circuit Breaker (MCCB) Rating A** | | 20 | 30 | 50 | 60 | 100 | 100 | 150 | | 300 | |
| **Low Noise Operation** *(1)* | **Model VCD 723-** | **A003** | **A005** | **A7P5** | **A010** | **A015** | **A020** | **A030** | | N/A | |
| | **Capacity HP** | 3 | 5 | 7.5 | 10 | 15 | 20 | 30 | | | |
| | **Continuous Rated Current A** | 7.68 | 12.8 | 19.2 | 25.6 | 38.4 | 51.2 | 76.8 | | | |
| **Rated Output Voltage** | | 180V | | | | | | | | | |
| **Overload Current Rating** | | 150% for one minute *(2)* | | | | | | | | | |
| **Input Power** | **Voltage/Frequency** | 3-Phase 208V, 50Hz 208/230V, 60Hz | | | | | | | | | |
| | **Allowable Fluctuation V** | ± 10% | | | | | | | | | |
| | **F** | ± 5% | | | | | | | | | |
| **Motor (VCM)** | | | | | | | | | | | |
| **Capacity HP (KW)** | | **3** (2.2) | **5** (3.7) | **7.5** (5.5) | **10** (7.5) | **15** (11) | **20** (15) | **25** (18.5) | **30** (22) | **40** (30) | **50** (37) |
| **Model VMA___** | | 003 | 005 | 7P5 | 010 | 015 | 020 | 025 | 030 | 040 | 050 |
| **Rated Speed rpm** | | 1750 rpm (4-pole, 60Hz) | | | | | | | | | |
| **Rated Voltage** | | 3-phase 190 VAC | | | | | | | | | |
| **Rated Current A** | | 9.6 | 16.0 | 22.8 | 29.4 | 44.0 | 57.0 | 69.0 | 82.0 | 120 | 148 |
| **Rated Torque lb-ft** | | 9 | 15 | 22.5 | 30 | 45 | 60 | 75 | 90 | 120 | 150 |
| **$WK^2$ $lb\text{-}ft^2$** | | 0.183 | 0.264 | 0.543 | 0.680 | 1.253 | 1.617 | 3.260 | 4.050 | 5.96 | 7.5 |
| **Frame No.** | | 182T | 184T | 213T | 215T | 254T | 256T | 284T | 286T | 324T | 326T |

See notes on page 8.

Table 1. **Motor Control Specifications - Continued**

| SECTION B1. 380/415/460V; 3-60 HP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Drive** | | | | | | | | | | | | | |
| **General Use** | **Model VCD 723-** | **B001** | **B003** | **B005** | **B010** | | **B015** | **B020** | **B030** | | **B040** | **B060** | |
| | **Capacity HP** | 1 | 3 | 5 | 10 | | 15 | 20 | 30 | | 40 | 60 | |
| | **Input Current A** / **Motor HP** | 1 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 |
| | | 2.82 | 5 | 9 | 14 | 18 | 26 | 35 | 42 | 53 | 70 | 97 | 106 |
| | **Continuous Rated Current A** | 2.56 | 4.8 | 8 | 16 | | 24 | 32 | 48 | | 64 | 96 | |
| **Circuit Breaker (MCCB) Rating A** | | 5 | 10 | 20 | 30 | | 50 | 60 | 100 | | 100 | 150 | |
| **Low Noise Operation** *(1)* | **Model VCD 723-** | **B001** | **B003** | **B005** | **B010** | | **B015** | **B020** | **B030** | | **B040** | **B060** | |
| | **Capacity HP** | 1 | 3 | 5 | 10 | | 15 | 20 | 30 | | 40 | 60 | |
| | **Continuous Rated Current A** | 2.05 | 3.84 | 6.4 | 12.8 | | 19.2 | 25.6 | 38.4 | | 51.2 | 76.8 | |
| **Rated Output Voltage** | | 360V | | | | | | | | | | | |
| **Overload Current Rating** | | 150% for one minute *(2)* | | | | | | | | | | | |
| **Input Power** | **Voltage/Frequency** | 3-Phase 380/415/460V, 50/60Hz | | | | | | | | | | | |
| | **Allowable Fluctuation V** | ± 10% | | | | | | | | | | | |
| | **F** | ± 5% | | | | | | | | | | | |

| **Motor (VCM)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Capacity** | **HP (KW)** | 1 (0.7) | 3 (2.2) | 5 (3.7) | 7.5 (5.5) | 10 (7.5) | 15 (11) | 20 (15) | 25 (18.5) | 30 (22) | 40 (30) | 50 (37) | 60 (45) |
| **Model** | **VMB___** | 001 | 003 | 005 | 7P5 | 010 | 015 | 020 | 025 | 030 | 040 | 050 | 060 |
| **Rated Speed** | **rpm** | 1750 rpm (4-pole, 60Hz) | | | | | | | | | | | |
| **Rated Voltage** | | 3-phase 380 VAC | | | | | | | | | | | |
| **Rated Current** | **A** | 1.63 | 4.8 | 8 | 11.4 | 14.7 | 22 | 28.5 | 34.5 | 41 | 60 | 74 | 82 |
| **Rated Torque** | **lb-ft** | 3 | 9 | 15 | 22.5 | 30 | 45 | 60 | 75 | 90 | 120 | 150 | 180 |
| **$WK^2$** | **$lb\text{-}ft^2$** | 0.074 | 0.183 | 0.264 | 0.543 | 0.680 | 1.253 | 1.617 | 3.260 | 4.050 | 5.960 | 7.500 | 9.340 |
| **Frame No.** | | 143T | 182T | 184T | 213T | 215T | 254T | 256T | 284T | 286T | 324T | 326T | 364T |

See notes on page 8.

Table 1. **Motor Control Specifications - Continued**

| SECTION B2. 380/415/460V; 75-400 HP | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Drive** | | | | | | | | |
| **General Use** | **Model VCD 723-** | **B075** | **B100** | **B150** | **B200** | **B250** | **B300** | **B400** |
| | **Capacity HP** | 75 | 100 | 150 | 200 | 250 | 300 | 400 |
| | **Input Current A** (Motor HP) | 75 | 100 | 150 | 200 | 250 | 300 | 400 |
| | | 141 | 211 | 246 | 330 | 374 | 496 | 663 |
| | **Continuous Rated Current A** | 128 | 165 | 224 | 300 | 340 | 450 | 600 |
| **Circuit Breaker (MCCB) Rating A** | | 225 | 300 | 400 | 600 | 600 | 800 | 1000 |
| **Rated Output Voltage** | | 360V | | | | | | |
| **Overload Current Rating** | | 150% for one minute (2) | | | | | | |
| **Input Power** | **Voltage/Frequency** | 3-Phase 380/415/460V, 50/60Hz | | | | | | |
| | **Allowable Fluctuation V** | ± 10% | | | | | | |
| | **F** | ± 5% | | | | | | |
| **Motor (VCM)** | | | | | | | | |
| **Capacity HP (KW)** | | **75** (55) | **100** (75) | **150** (110) | **200** (160) | **250** (185) | **300** (220) | **400** (300) |
| **Model VMB___** | | 075 | 100 | 150 | 200 | 250 | 300 | 400 |
| **Rated Speed rpm** | | 1750 rpm (4-pole, 60Hz) | | | | | | |
| **Rated Voltage** | | 3-phase 380 VAC | | | | | | |
| **Rated Current A** | | 103 | 142 | 206 | 272 | 338 | 398 | 525 |
| **Rated Torque lb-ft** | | 225 | 300 | 450 | 600 | 750 | 900 | 1200 |
| **$WK^2$ $lb\text{-}ft^2$** | | 11.77 | 17.6 | 37.0 | 69.58 | 74.22 | 88.14 | 97.42 |
| **Frame No.** | | 365T | 404T | 444T | 445T | 447T | 449T | 449T |

See notes on page 8.

Table 1. **Motor Control Specifications - Continued**

| | | | |
|---|---|---|---|
| **SECTION C. All VCD 723's** | | | |
| Control Characteristics | Control Method | | Digital flux vector, Sine-coded PWM |
| | Speed Control | Range | 1:1000 operation possible even at stall |
| | | Precision | Digital ref.: ± 0.01% (–10 to +40°C, +14 to +140°F)<br>Analog ref.: ± 0.1% (25 ± 10°C, 77 ± 50°F) |
| | Speed Reference Setting Resolution | | Digital Operator reference: 0.01 Hz (12 bits)<br>Analog reference: 0.06 Hz/60Hz (10 bits) |
| | Auto Speed Reference Signal | | 0 to +10 VDC (20k Ω), or 4 to 20 mA (250 Ω) |
| | Accel / Decel Time | | 0 to 3000 sec (resolution: 0.1 sec.)<br>(Accel / Decel times set independently) |
| | Torque Limit | | Setting range: 0 to 300%. Forward/Reverse set independently |
| | Selectable Functions | | Multi-step speed operation (9 steps max.), S-curve accel/decel, zero speed control, servo lock, arbitrary torque detection, etc. |
| Protective Functions | Inverter | | Overcurrent, overvoltage, cooling fin overheat, undervoltage, cooling fan failure, grounding, etc. |
| | Motor | | Overload, overheat, overspeed |
| | System | | Excessive speed deviation, open-phase detection, continuous operation during momentary power loss (immediate stop at end of programmed ride-thru time, 2 sec. max.) *(See Note 3)* |
| Environmental Conditions | Ambient Temperature | | –10 to +45°C (+14 to +113°F) |
| | Storage Temperature *(See Note 4)* | | –20 to +60°C (–4 to +140°F) |
| | Humidity | | 90% RH (no condensation) |
| | Vibration | | 1 G at less than 20 Hz, up to 0.2 G at 20 to 50 Hz. |
| **SECTION D. All VCM's** | | | |
| Rated speed | | | 1750 rpm (4 poles) |
| Pulse Generator | | | 1024 ppr (standard) Higher rates are available. |
| Thermistor | | | Standard |
| Load Connection | | | Direct coupling or belt drive |
| Insulation Type | | | Class F |
| Ambient Temperature | | | –20 to +40°C (–4 to +104°F) |
| Location | | | Indoor |

NOTES:

*(1)* Low noise operation can be selected by setting of Sn-09 : 0XXX = General Use (low carrier frequency – 2.08 kHz); 1XXX = Low Noise Operation (high carrier frequency - 12.5 kHz). Rated current is 80% of General Use rated current.

*(2)* 100% reference current is Continuous Rated Current for Low Noise Operation or General Use.

*(3)* For a drive rated 230V 5HP or less, or 460V 3HP or less, standard max. ride-thru time is 1 sec (1000 msec). The max. ride-thru time can be extended to 2 sec (2000 msec) by adding an optional external mounting capacitor unit.

*(4)* Temperature during shipping. Storing in this temperature for a long period may deteriorate main circuit capacitor.

## *Terminal Functions and Control Signal Specifications*

There are various types of I/O available in the VCD 723. The terminal I/O specifications are listed in Table 2. The digital feedback tachometer connector specifications are listed in Table 3. A diagram of these connections can be found in Figure 4.

Table 2. **Terminal I/O Specifications**

| TERMINAL | FUNCTION | DESCRIPTION |
|---|---|---|
| 1,2,4,5,6,7,8 | Logic inputs | The input is off (logic 0) when the input is open, and on (logic 1) when the input is connected to Logic Input Common (0V). If input is from a relay contact, the contact rating must be: 30 VDC min<br>100 mA min<br>If input is from an open collector, the rating must be:<br>35 VDC min<br>100 mA min |
| 3 | Logic inputs | This is always used for external fault generation. This input cannot be reassigned. The SN12 constant can be used to set this input to Normally Open or Normally Closed. If Normally Open is selected, a fault is indicated when the contact closes and if Normally Closed is selected an open contact indicates the fault. |
| 9,10 | Logic output, normally open relay contact | Normally open relay contact.<br>Contact capacity: 250 VAC at 1A or below.<br>30 VDC at 1A or below. |
| 11 | Logic input common | Common (0V) for use in wiring Logic Inputs. |
| 12 | Shield tie point | Shield sheath tie point which is connected to Chassis Common. |
| 13 | Analog input | Non-isolated 0 to 10 VDC analog input. Input has 20K ohms of impedance. Resolution is 10 bits. |
| 14 | Analog input | Non-isolated 4 to 20 mA analog input. Input has 250 ohms of impedance. Resolution is 10 bits. |
| 15 | Analog input power supply | Control power supply for analog input: +15 VDC at 20 mA max. |
| 16 | Analog input | Non-isolated 0 to 10 VDC analog input. Input has 20K ohms of impedance. Resolution is 10 bits. |
| 17 | Analog input common | Common (0V) for use in wiring analog inputs. |
| 18,19,20 | Logic output, form C relay contact | 18 is Normally Open, 19 is Normally Closed, and 20 is Common. Contact Capacity: 250 VAC at 1A or below.<br>30 VDC at 1A or below. |
| 21,22 | Analog output | Non-isolated 0 to 11 VDC analog output. Maximum sourcing current is 2 mA. 21 is positive with respect to 22. Resolution is 8 bits. |
| 23,24 | Current monitor analog output | Non-isolated analog output. Approximately 5 VDC at rated output current. |
| 25,26 | Logic outputs, open collector | Photocoupler isolated output. Capacity of +48 VDC max at 50 mA max. |
| 27 | Open collector output common | Common (0V) for use in wiring multi-function open collector outputs. |

Table 2. **Terminal I/O Specifications - Continued**

| TERMINAL | FUNCTION | DESCRIPTION |
|---|---|---|
| 28,29 | Logic outputs, open collector | Photocoupler isolated output. Capacity of +48 VDC max at 50 mA max. |
| 30 | Motor thermistor input | Motor temperature feedback. |
| 31 | Motor thermistor input common | Common (0V) for use in wiring motor thermistor input. |
| 32 | Shield tie point | Shield sheath tie point which is connected to Chassis Common. |
| 51 | +10VREF output | Reference voltage output for use with MicroTrac card analog inputs. 10 mA max capacity. |
| 52 | -10VREF output | Reference voltage output for use with MicroTrac card analog inputs. 10 mA max capacity. |
| 53 | I/O common | Common (0V) for use with MicroTrac card I/O. |
| 54 | Shield tie point | Shield sheath tie point which is connected to Chassis Common. |
| 55,56 | Analog outputs | Non-isolated -10 to +10 VDC analog outputs. Maximum sourcing current is 2 mA. Resolution is 12 bits. |
| 57 | I/O common | Common (0V) for use with MicroTrac card I/O. |
| 58 | Shield tie point | Shield sheath tie point which is connected to Chassis Common. |
| 59,60,61,62 | Analog input | Non-isolated differential analog input. Input has over 100K ohms of impedance. Resolution is 12 bits. Input voltage range is -600 to +600 mV when terminals 60 (+) and 61 (-) are used. Input voltage range is -10 to +10 VDC when terminals 59 (+) and 62 (-) are used. |
| 63 | I/O common | Common (0V) for use with MicroTrac card I/O. |
| 64 | Shield tie point | Shield sheath tie point which is connected to Chassis Common. |
| 65,66,67,68 | Analog input | Non-isolated differential analog input. Input has over 100K ohms of impedance. Resolution is 12 bits. Input voltage range is -600 to +600 mV when terminals 66 (+) and 67 (-) are used. Input voltage range is -10 to +10 VDC when terminals 65 (+) and 68 (-) are used. |
| 69 | I/O common | Common (0V) for use with MicroTrac card I/O. |
| 70 | Shield tie point | Shield sheath tie point which is connected to Chassis Common. |
| 71,72,73,74 | Digital Tachometer inputs | The quadrature encoder A (terminal 71), /A (terminal 72), B (terminal 73), and /B (terminal 74) signals are connected here. There is 100 ohms of impedance between each pair of encoder input signals. Input differential voltage of 5 VDC max. The maximum input frequency is 300KHz. |
| Connector CA1 | Digital Tachometer Connector | Isolated +12 VDC power supply to quadrature encoder and quadrature encoder signal inputs. |

Table 3. **Digital Feedback Tachometer Connector CA1 Terminal Specifications**

| TERMINAL | FUNCTION | DESCRIPTION |
|---|---|---|
| 1 | Isolated power supply | Isolated power supply for digital tachometer: +12 VDC at 200 mA max. |
| 2 | Isolated power supply common | Common (0V) for digital tachometer isolated power supply. |
| 3,4,5,6 | Digital Tachometer inputs | The quadrature encoder A (terminal 3), /A (terminal 4), B (terminal 5), and /B (terminal 6) signals are connected here. There is 560 ohms of impedance between each signal pair, pair A and /A and pair B and /B. Input differential voltage of 5 VDC max. The maximum input frequency is 300KHz. |
| 7 | Shield tie point | Shield sheath tie point which is connected to Chassis Common. |

## *Option Cards*

There are various option cards available to provide additional capability. The option cards are each described in detail in a separate User Reference Sheet. A summary of available option cards is contained in Table 4.

Table 4. **Summary of Option Cards**

| OPTION CARD | FUNCTION |
|---|---|
| Analog Monitor, AO-8 | Has two analog output channels with 8 bit resolution. Each output voltage is from 0 to +10 VDC and is non-isolated. |
| Analog Monitor, AO-12 | Has two analog output channels with 12 bit resolution. Each output voltage is from 0 to +10 VDC and is non-isolated. |
| Digital Output, DO-8 | Has six photocoupler output channels with a single common. Also has two independent relay contact output channels. |
| Torque Control, TRQ-A | Closes the torque control loop for higher accuracy torque control. |

## System Considerations

When operating in a system application, the VCD 723 can be used with other MagneTek devices with which it will communicate by means of the MicroTrac Local Area Network (LAN). Refer to Figure 1 for a typical MicroTrac System.

Each of the following remote devices (board or assembly) is described in detail in a separate User Reference Sheet.

- **Remote Display Controller LAN Node PCB (RDC) –** This board provides a means for the MicroTrac system to have system operating parameters displayed at locations remote from the MicroTrac drive. The RDC communicates with the drive through the LAN. A single RDC can support up to 31 Remote Display Units (RDUs). By means of a Portable Display/Control Unit (PCDU), the RDC allows the selected display for each RDU to be changed at anytime.

- **Remote Display Unit (RDU) –** Designed for mounting in a panel cutout, the RDU provides a two-line LED display (16 character alphanumeric, and 5-1/2 digit numeric). Consisting of a terminal, the information on its display is transmitted by a Remote Display Controller LAN Node PCB.

- **Remote Keyboard Assembly –** Designed for mounting on a panel with or near a Remote Display Unit, the Remote Keyboard allows initiation of RDU display changes without the need for a Portable Display/Control Unit.

- **Remote I/O [Input/Output] Controller LAN Node PCB (RIO) –** This board provides a means for the MicroTrac system to have inputs or outputs at locations remote from the drive. The RIO communicates with the drive through the LAN. A single RIO can support up to 6 Remote I/O boards, using any combination of the following:

    1. **Remote Logic I/O PCB (LOGI/O) –** This board provides remote logic signal input/output capability for the MicroTrac system. It is connected to a Remote I/O Controller LAN Node PCB for communication with the drive.

    2. **Remote Analog I/O PCB (ANI/O) –** This board provides remote analog signal input/output capability for the MicroTrac system. It is connected to a Remote I/O Controller LAN Node PCB for communication with the drive.

    3. **Remote Thumbwheel Switch I/O PCB (TWIO) –** This board provides remote thumbwheel switch input/output capability for the MicroTrac system. It can support up to 9 Thumbwheel Switch Assemblies. This board is connected to a Remote I/O Controller LAN Node PCB for communication with the drive.

- **Remote Programmable Logic Controller (PLC) Interface –** Available for a variety of PLCs. These devices allow bi-directional communication via the MicroTrac LAN between drives and the PLC. Both logic and numeric data can be transferred.

- **Remote Power Supply –** The Remote Power Supply produces control level voltages for use by a Remote LAN Node PCB or a Remote Display Unit.

- **Remote Serial Communication Controller LAN Node PCB (RSC) –** This board provides a means for the MicroTrac system to have input from or output to other equipment that uses RS-232 serial communication. The RSC communicates with the drive through the LAN.

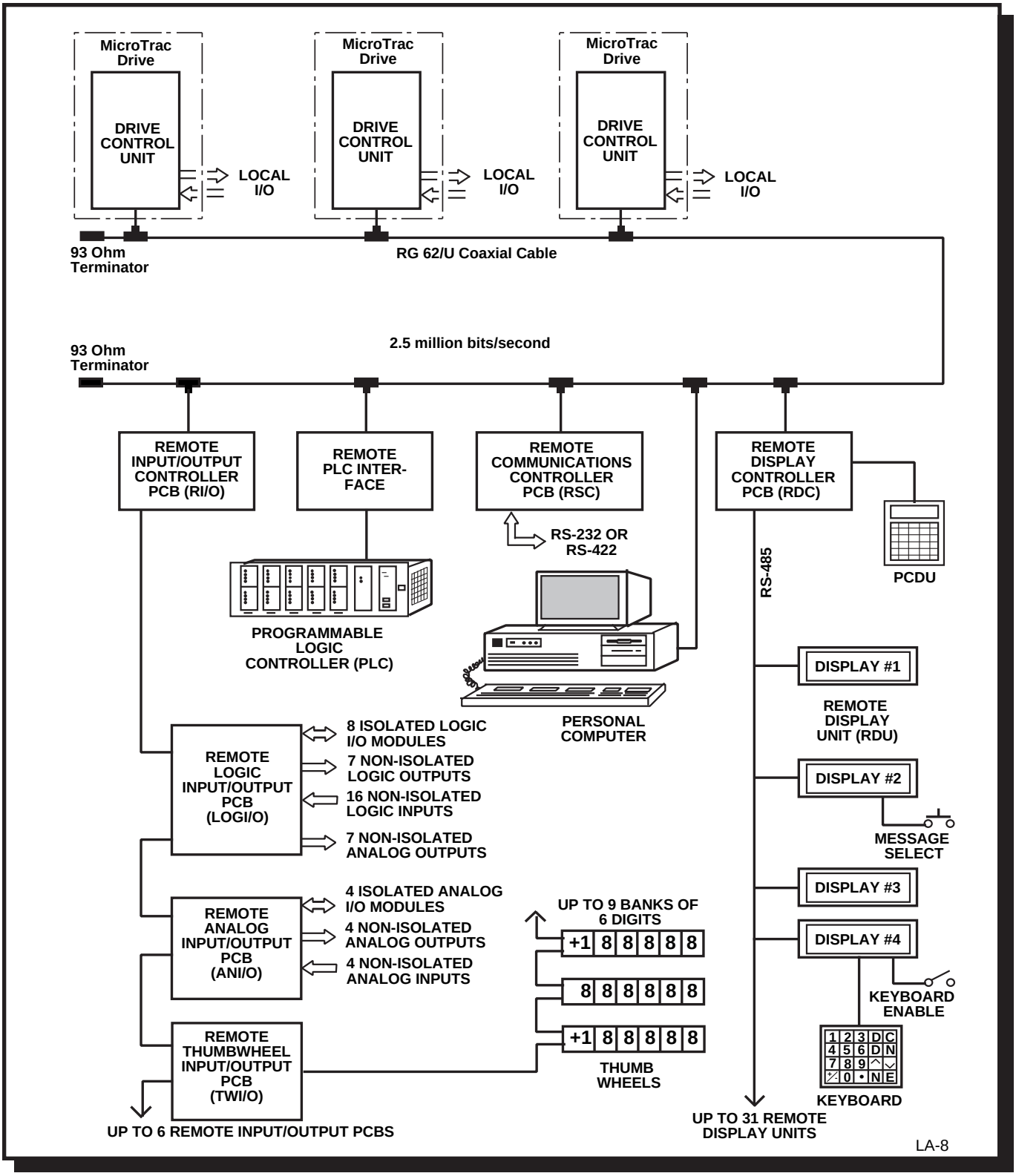



*Figure 1.* ***Typical MicroTrac System Diagram***

## Pre-installation Considerations

Location of the VCD 723 is important to achieve proper performance and normal operating life. The unit should be installed in an area where it will be protected from the following:

- Direct sunlight, rain or extreme (condensing) moisture.
- Corrosive gases or liquids.
- Vibration, airborne dust or metallic particles.

### *Receipt of Shipment*

All equipment is tested against defect at the factory. Any damages or shortages evident when the equipment is received must be reported immediately to the commercial carrier who transported the equipment. Assistance, if required, is available from your MagneTek representative. Always refer to the order number, equipment description, and serial number when contacting MagneTek.

### *Unpacking*

Remove the protective shipping material from around the equipment. Remove all packing material. Inspect for loose wiring. Make sure all contact wedges and other shipping devices have been removed.

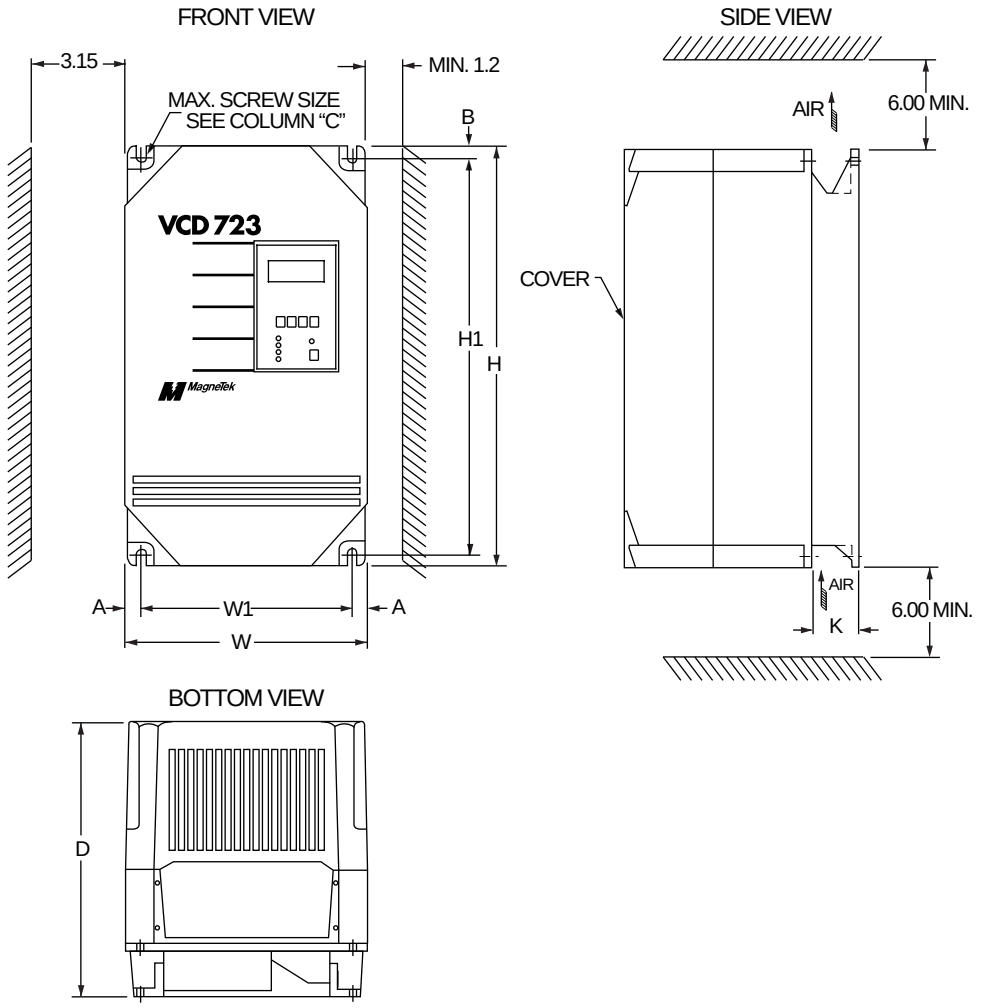
### *Repacking*

For long periods of storage, equipment should be covered to prevent corrosion, and should be placed in a clean, dry, location. If possible, equipment should be stored in its original crating. Periodic inspection should be made to ensure that the equipment is dry and that no condensation has accumulated. The equipment warranty does not cover damage due to improper storage. Assistance, if required, is available from your MagneTek representative.

## Physical Installation

For effective cooling as well as proper maintenance, the VCD 723 must be installed vertically. Use the holes provided on the back of the drive for installation. There MUST be a MINIMUM 6 inch clearance above and below the VCD 723 enclosure. A MINIMUM 3 inch clearance is required on the left side of the VCD 723 enclosure. See Figure 2 for physical dimensions.

## VCD 723 Standard Protected Chassis

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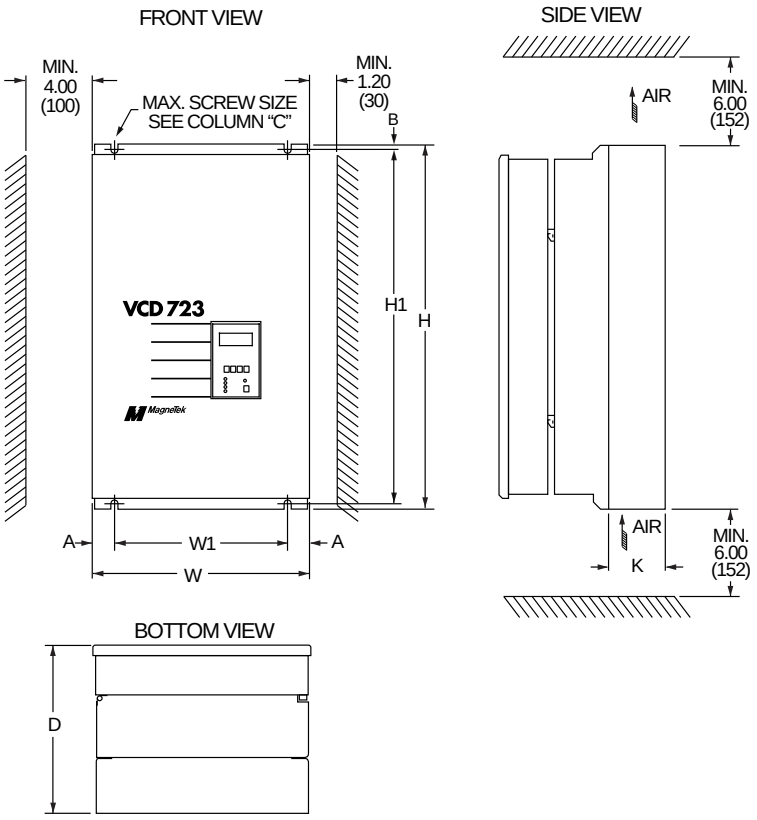
| INPUT | HP (kW) | ENCLOSURE DIMENSIONS IN INCHES (mm) | | | | | | | MTG HOLE DIMENSIONS IN INCHES (mm) | | WEIGHT LBS. (KG) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H | W | D | A | B | C | K | H1 | W1 | |
| 208 / 230V | 3 (2.2) 5 (3.7) | 11.97 (304) | 8.05 (204) | 8.86 (225) | .48 (12) | .39 (10) | 1/4-20 (M6) | 1.57 (40) | 11.22 (285) | 7.09 (180) | 21 (10) |
| | 7.5 (5.5) 10 (7.5) | 13.94 (354) | 8.05 (204) | 10.04 (255) | .48 (12) | .39 (10) | 1/4-20 (M6) | 1.57 (40) | 13.19 (335) | 7.09 (180) | 27 (12) |
| 380 / 415 / 460V | 3 (2.2) | 13.94 (354) | 8.05 (204) | 8.66 (220) | .48 (12) | .39 (10) | 1/4-20 (M6) | 1.57 (40) | 13.19 (335) | 7.09 (180) | 27 (12) |
| | 5 (3.7) 10 (7.5) | 13.94 (354) | 8.05 (204) | 10.04 (255) | .48 (12) | .39 (10) | 1/4-20 (M6) | 1.57 (40) | 13.19 (335) | 7.09 (180) | 27 (12) |

Note: Consult Factory for Shipping Weights.

*Figure 2.* ***VCD 723 Dimensions (Sheet 1 of 3)***

## VCD 723 Standard Protected Chassis

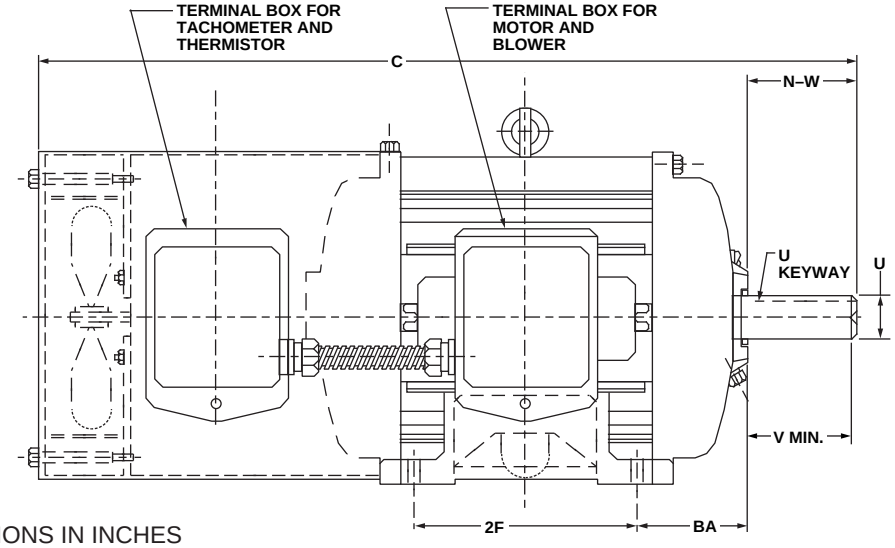



| INPUT | HP (kW) | ENCLOSURE DIMENSIONS IN INCHES (mm) | | | | | | | MTG HOLE DIMENSIONS IN INCHES (mm) | | WEIGHT LBS. (KG) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | H | W | D | A | B | C | K | H1 | W1 | |
| 208 / 230V | 15 (11) | 19.69 (500) | 9.84 (250) | 10.04 (255) | .96 (25) | .30 (7.5) | 1/4 (M6) | 4.11 (104) | 19.09 (485) | 7.87 (200) | 52 (24) |
| | 20 (15) | 21.65 (550) | 12.80 (325) | 9.65 (245) | .96 (25) | .30 (7.5) | 1/4 (M6) | 3.37 (86) | 21.06 (535) | 10.83 (275) | 76 (35) |
| | 30 (22) | | | 10.04 (255) | | | | | | | |
| | 40 (30) | 31.50 (800) | 18.70 (475) | 11.02 (280) | 1.97 (50) | .39 (10) | 7/16 (M10) | 4.30 (109) | 30.71 (780) | 14.76 (375) | 105 (48) |
| | 50 (37) | | | | | | | | | | |
| 380 / 415 / 460V | 15 (11) | 19.69 (500) | 9.84 (250) | 10.04 (255) | .96 (25) | .30 (7.5) | 1/4 (M6) | 2.58 (66) | 19.09 (485) | 7.87 (200) | 54 (25) |
| | 20 (15) | | | | | | | | | | |
| | 30 (22) | 21.65 (550) | 12.80 (325) | 10.04 (255) | 1.19 (30) | .30 (7.5) | 1/4 (M6) | 3.37 (86) | 21.06 (535) | 10.43 (265) | 76 (35) |
| | 40 (30) | 28.54 (725) | 13.78 (350) | 11.02 (280) | 1.97 (50) | .30 (7.5) | 3/8 (M8) | 4.14 (105) | 27.76 (705) | 9.84 (250) | 105 (48) |
| | 50 (37) | | | | | | | | | | |
| | 60 (45) | | | | | | | | | | |
| | 75 (55) | 36.42 (925) | 22.64 (575) | 11.02 (280) | 1.97 (50) | .49 (12.5) | 7/16 (M10) | 4.30 (109) | 35.43 (900) | 18.70 (475) | 199 (90) |
| | 100 (75) | | | | | | | | | | |
| | 150 (110) | | | 12.99 (330) | | | | | | | 234 (106) |
| | 200 (160) | 53.54 (1360) | 23.62 (600) | 17.72 (450) | 1.97 (50) | .69 (17.5) | 1/2 (M12) | 5.90 (150) | 52.16 (1325) | 21.65 (550) | 379 (172) |
| | 300 (220) | 57.09 (1450) | 37.40 (950) | 17.12 (435) | 3.94 (100) | .98 (25) | 1/2 (M12) | 4.05 (103) | 55.12 (1400) | 29.53 (750) | 797 (362) |
| | 400 (300) | 63.00 (1600) | 37.80 (960) | 17.72 (450) | 4.13 (105) | .98 (25) | 1/2 (M12) | 4.05 (103) | 61.02 (1550) | 29.53 (750) | 905 (411) |

Note: Consult Factory for Shipping Weights.

*Figure 2.* ***VCD 723 Dimensions (Sheet 2 of 3)***

## VCM Motor - Foot Mount

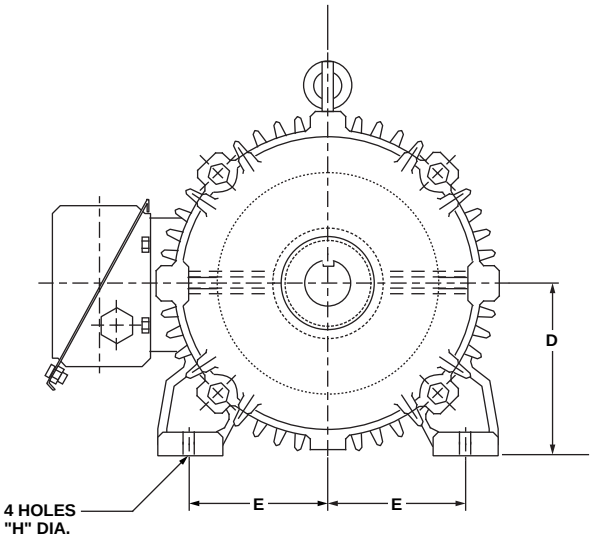



ALL DIMENSIONS IN INCHES

| HP | FRAME | BA | C | D * | E | 2F | H |
|---|---|---|---|---|---|---|---|
| 3 | 182T | 2.75 | 20.50 | 4.50 | 3.75 | 4.50 | .406 |
| 5 | 184T | 2.75 | 21.50 | 4.50 | 3.75 | 5.50 | .406 |
| 7.5 | 213T | 3.50 | 24.26 | 5.25 | 4.25 | 5.50 | .406 |
| 10 | 215T | 3.50 | 25.76 | 5.25 | 4.25 | 7.00 | .406 |
| 15 | 254T | 4.25 | 29.25 | 6.25 | 5.00 | 8.25 | .531 |
| 20 | 256T | 4.25 | 31.00 | 6.25 | 5.00 | 10.00 | .531 |
| 25 | 284T | 4.75 | 32.50 | 7.00 | 5.50 | 9.50 | .531 |
| 30 | 286T | 4.75 | 34.00 | 7.00 | 5.50 | 11.00 | .531 |
| 40 | 324T | 5.25 | 34.63 | 8.00 | 6.25 | 10.50 | .656 |
| 50 | 326T | 5.25 | 36.13 | 8.00 | 6.25 | 12.00 | .656 |
| 60 | 364T | 5.88 | 41.94 | 9.00 | 7.00 | 11.25 | .657 |
| 75 | 365T | 5.88 | 42.94 | 9.00 | 7.00 | 12.25 | .657 |
| 100 | 405T | 6.63 | 45.62 | 10.00 | 8.00 | 13.75 | .828 |
| 150 | 444T | 7.50 | 48.25 | 11.00 | 9.00 | 14.50 | .828 |
| 200 | 445T | 7.50 | 50.25 | 11.00 | 9.00 | 16.50 | .828 |
| 300 | 447T | 7.50 | 54.00 | 11.00 | 9.00 | 20.00 | .828 |
| 400 | 449T | 7.50 | 67.75 | 11.00 | 9.00 | 22.00 | .828 |

*** DIMENSION TOLERANCES**

| DIM. D | TOL. | DIM. U | TOL. |
|---|---|---|---|
| UP TO 8.00 | + .00 – .03 | UP TO 1.5000 | + .0000 – .0005 |
| OVER 8.00 | + .00 – .06 | OVER 1.5000 | + .000 – .001 |

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| FRAME | U * | V | N-W | U Keyway |
|---|---|---|---|---|
| 180 | 1.1250 | 2.50 | 2.75 | .250 x .125 |
| 210 | 1.3750 | 3.12 | 3.38 | .312 x .156 |
| 250 | 1.625 | 3.75 | 4.00 | .375 x .188 |
| 280 | 1.875 | 4.38 | 4.62 | .500 x .250 |
| 320 | 2.125 | 5.00 | 5.25 | .500 x .250 |
| 360 | 2.375 | 5.75 | 5.88 | .625 x .312 |
| 400 | 2.875 | 7.00 | 7.25 | .750 x .375 |
| 440 | 3.375 | 8.25 | 8.50 | .875 x .438 |

*Figure 2.* ***VCD 723 Dimensions (Sheet 3 of 3)***

## Electrical Connection

All basic connections are shown in Figure 3 and the drive's external connection locations are shown in Figure 4. Most of the control I/O are shown in a general fashion for an example of proper wiring. Because of the flexibility of the VCD 723, many of the control functions (i.e., RUN, Speed Reference, etc.) are not permanently assigned to a specific I/O point. The function that many of the I/O points serve is dependent upon the designer. See schematic and interconnection diagrams for specific connections.

It is very important that voltage isolation be maintained with all the I/O points which are not already isolated. For example, the analog outputs are not isolated. Therefore, if an analog output is driving a meter movement, then the movement must be in reference to the VCD 723 I/O common and not to any other common (i.e., earth common). On the other hand, if the analog output is connected to a non-isolated analog input of some test equipment, then analog isolation is necessary. The analog isolation must be performed with components not supplied with the VCD 723.

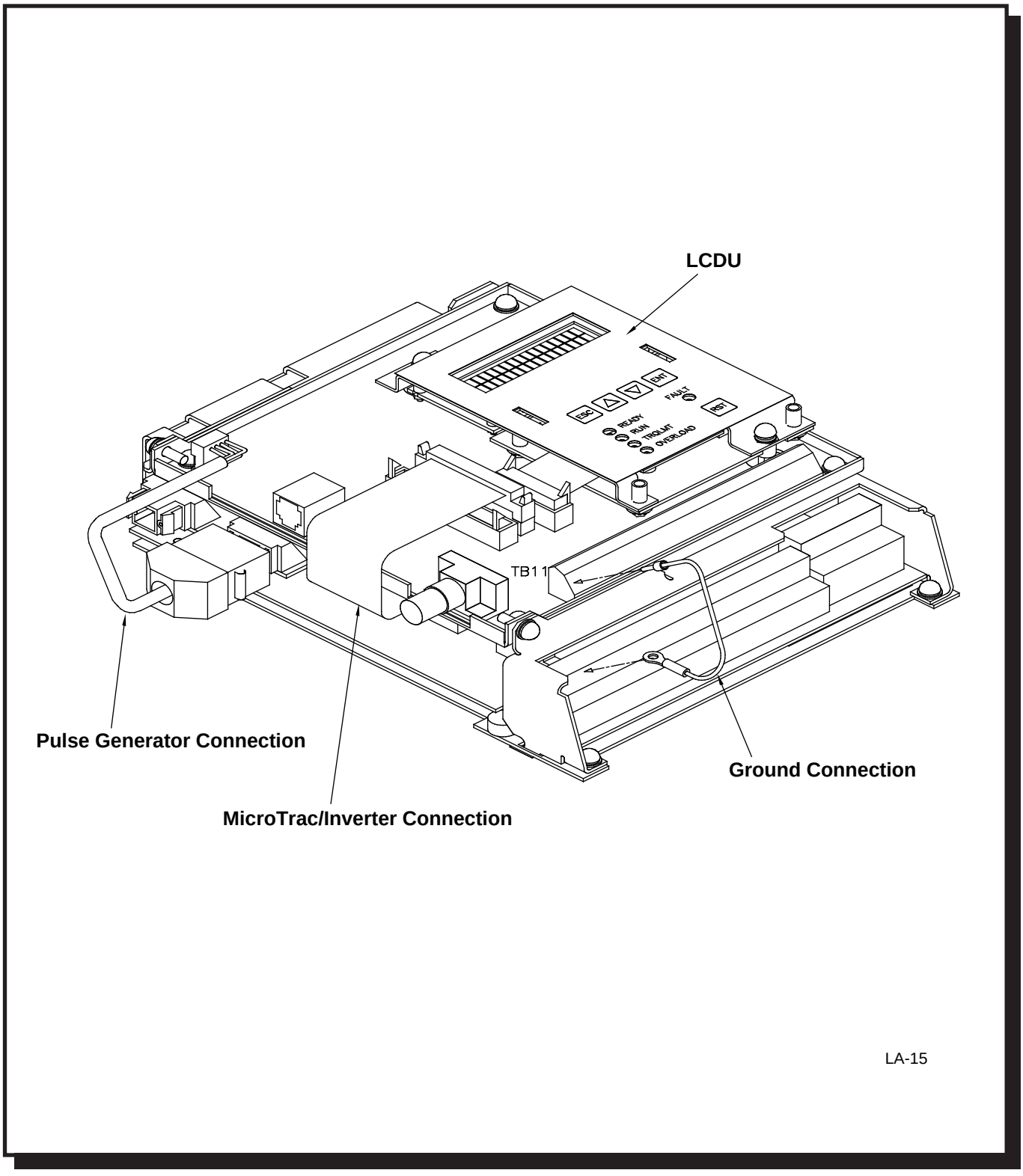
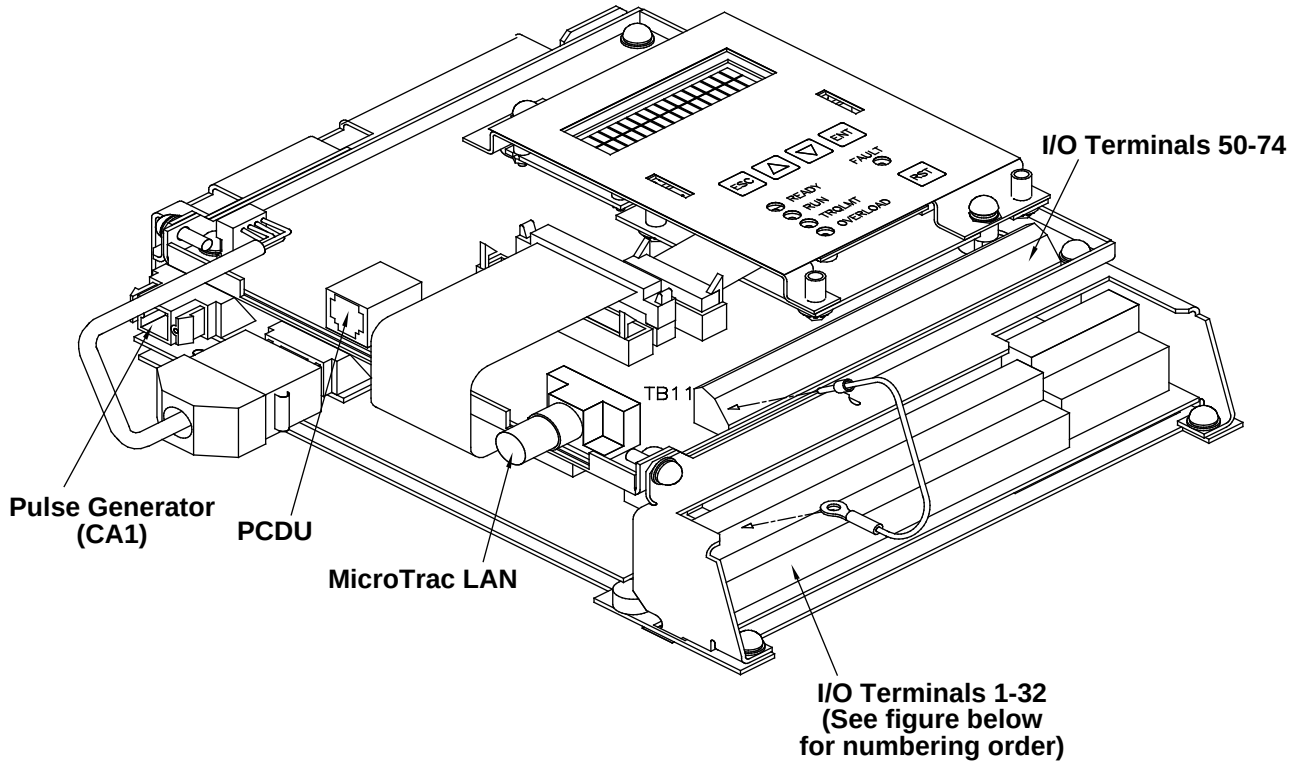



*Figure 3.* ***VCD 723 Basic Interconnection Diagram***




The connection of control circuit terminals (1) to (32) do not follow the terminal numbering order. See the following figure for correct wiring (printed on the PC board).

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 25 | 26 | 27 | 28 | 29 | 30 | 18 | 19 | 20 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 21 | 22 | 23 | 24 | 31 | 32 | 9 | 10 |

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*Figure 4.* ***VCD 723 External Connections Diagram***

## *Wire Sizes and Connections*

Ensure that wire size and disconnect devices conform to the installation contractor's drawings and to all applicable codes. Refer to Tables 5 and 6 for proper wire sizes and interconnecting information.

**CAUTION**

- Use only factory supplied installation instructions to install dynamic braking resistors. Failure to do so may cause equipment damage or personnel injury**.**
- Use 600 volt vinyl-sheathed wire or equivalent. Wire size should be determined considering ampacity and codes.
- **Never** connect AC main power to output terminals T1(U), T2(V), and T3(W).
- NEVER allow wire leads to contact the VCD 723 enclosure. Short-circuit may result.
- NEVER connect power factor correction capacitors or noise filter to VCD 723 output.
- Size of control wire must be suitable for Class I circuits.
- Use only closed loop (ring lug) connectors sized for the selected wire gauge. The connectors are to be installed using the correct crimp tool recommended by the connector manufacturer.

Observe the following precautions when making wiring connections:

- Separate the leads used for control I/O (i.e., the signals on terminals 1 through 32, terminals 51 through 76, connector CA1, etc.) from those used for the power signals (i.e., L1(R), L2(S), L3(T), T1(U), T2(V), T3(W)). Do not run these two groups in the same conduit or wire trough.
- Provide shielded and twisted leads as indicated on the schematic and interconnection diagrams. Connect shield sheath AT THE VCD 723 END ONLY. The far end should be dressed neatly and left unconnected. Twisted shielded pair wire should be used for long runs.
- Lead length should NOT EXCEED 164 feet (50 meters).
- The contact output control leads from terminals 9, 10, 18, 19, and 20 must be separated from the other control leads.
- If the drive is being used in a LAN, use a BNC "T" connector to connect the LAN coaxial cable to the drive.

Table 5. **Closed Loop Connectors and Wire SIzes for Terminal Screws**

| WIRE SIZE AWG | WIRE SIZE $mm^2$ | TERMINAL SCREW SIZE | CLOSED LOOP CONNECTOR |
|---|---|---|---|
| 20 | 0.5 | M3.5 | 1.25 - 3.5 |
| 18 | 0.75 | | |
| 16 | 1.25 | M4 | 1.25 - 4 |
| 14 | 2 | M4 | 2 - 4 |
| | | M5 | 2 - 5 |
| 12 | 3.5 | M4 | 3.5 - 4 |
| | | M5 | 3.5 - 5 |
| 10 | 5.5 | M4 | 5.5 - 4 |
| | | M5 | 5.5 - 5 |
| 8 | 8 | M5 | 8 - 5 |
| | | M6 | 8 - 6 |
| 6 | 14 | M6 | 14 - 6 |
| 4 | 22 | M8 | 22 - 8 |
| 1 | 38 | M8 | 38 - 8 |
| 1 | 38 | M10 | 38 - 10 |
| 2/0 | 60 | | 60 - 10 |
| 3/0 | 80 | | 80 - 10 |
| 4/0 | 100 | | 100 - 10 |
| 4/0 | 100 | M12 | 100 - 10 |
| MCM300 | 150 | | 150 - 12 |
| MCM400 | 200 | | 200 - 12 |

Table 6. **Wire Sizing for Main Circuit**

| DRIVE MODEL VCD 723- | TERMINAL SYMBOL | TERMINAL SCREW SIZE | WIRE SIZE AWG | WIRE SIZE $MM^2$ |
|---|---|---|---|---|
| **SECTION A. 208/230 V** | | | | |
| A003, A005 | L1(R), L2(S), L3(T), N, B1/P, B2, T1(U), T2(V), T3(W) | M4 | 12 - 10 | 3.5 - 5.5 |
| | G(E) | M4 | 14 - 10 | 2 - 5.5 |
| A7P5, A010 | L1(R), L2(S), L3(T), N, B1/P, B2, T1(U), T2(V), T3(W) | M5 | 10 - 8 | 5.5 - 8 |
| | G(E) | M5 | 14 - 10 | 2 - 5.5 |
| A015 | L1(R), L2(S), L3(T), P1, P3, T1(U), T2(V), T3(W), N | M6 | 8 - 6 | 8 - 14 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$(s) | M4 | 20 - 14 | 0.5 - 2 |
| A020 | L1(R), L2(S), L3(T), P1, P3, T1(U), T2(V), T3(W), N | M8 | 8 - 4 | 8 - 22 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |

Table 6. **Wire Sizing for Main Circuit - Continued**

| DRIVE MODEL VCD 723- | TERMINAL SYMBOL | TERMINAL SCREW SIZE | WIRE SIZE | |
|---|---|---|---|---|
| | | | AWG | $MM^2$ |
| **SECTION A. 208/230 V (Continued)** | | | | |
| A025, A030 | L1(R), L2(S), L3(T), P1, P3, T1(U), T2(V), T3(W), N | M8 | 4 - 2 | 22 - 38 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$(s) | M4 | 20 - 14 | 0.5 - 2 |
| A040, A050 | L1(R), L2(S), L3(T), P1, P3, T1(U), T2(V), T3(W), N | M10 | 1 - 4/0 | 38 - 100 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$(s) | M4 | 20 - 14 | 0.5 - 2 |
| **SECTION B. 380/415/460V** | | | | |
| B001, B003 | L1(R), L2(S), L3(T), N, B1/P, B2, T1(U), T2(V), T3(W) | M4 | 12 - 10 | 3.5 - 5.5 |
| | G(E) | M4 | 14 - 10 | 2 - 5.5 |
| B005, B010 | L1(R), L2(S), L3(T), N, B1/P, B2, T1(U), T2(V), T3(W) | M4 | 12 - 10 | 3.5 - 5.5 |
| | G(E) | M5 | 14 - 10 | 2 - 5.5 |
| B015, B020 | L1(R), L2(S), L3(T), N, B1/P, B2, T1(U), T2(V), T3(W), P3 | M5 | 10 - 8 | 5.5 - 8 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$200(s200), $l_2$400(s400), x, y | M4 | 20 - 14 | 0.5 - 2 |
| B030 | L1(R), L2(S), L3(T), N, P1, P3, T1(U), T2(V), T3(W) | M6 | 8 - 6 | 8 - 14 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$200(s200), $l_2$400(s400), x, y | M4 | 20 - 14 | 0.5 - 2 |
| B040, B060 | L1(R), L2(S), L3(T), N, P1, P3, T1(U), T2(V), T3(W) | M8 | 4 - 3 | 22 - 38 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$200(s200), $l_2$400(s400), x, y | M4 | 20 - 14 | 0.5 - 2 |
| B075, B100, B150 | L1(R), L2(S), L3(T), N, P1, P3, T1(U), T2(V), T3(W) | M10 | 1 - 4/0 | 38 - 100 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$200(s200), $l_2$400(s400), x, y | M4 | 20 - 14 | 0.5 - 2 |
| B200, B250 | L1(R), L2(S), L3(T), N, P1, P3, T1(U), T2(V), T3(W) | M12 | 4/0 - MCM400 | 100 - 200 |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$200(s200), $l_2$400(s400), x, y | M4 | 20 - 14 | 0.5 - 2 |
| B300, B400 | L1(R), L2(S), L3(T), N, P1, P3, T1(U), T2(V), T3(W) | M12 | MCM650 x 2P | 325 x 2P |
| | G(E) | M8 | 14 - 10 | 2 - 5.5 |
| | $l_1$(r), $l_2$200(s200), $l_2$400(s400), x, y | M4 | 20 - 14 | 0.5 - 2 |

## *Grounding*

The VCD 723 must be solidly grounded using the main circuit ground terminal G (E).

- Ground wire resistance should be 100 ohms or less.
- NEVER ground the VCD 723 in common with welding machines, motors, or other large current electrical equipment. Run the ground lead in a separate conduit from leads for large current electrical equipment.
- Use ground lead size listed in table 6, and make the length as short as possible.
- Where several VCD 723 drives are used side by side, all should be grounded directly, or daisy chained to earth ground (see Figure 5). DO NOT FORM A LOOP WITH THE GROUND LEADS.

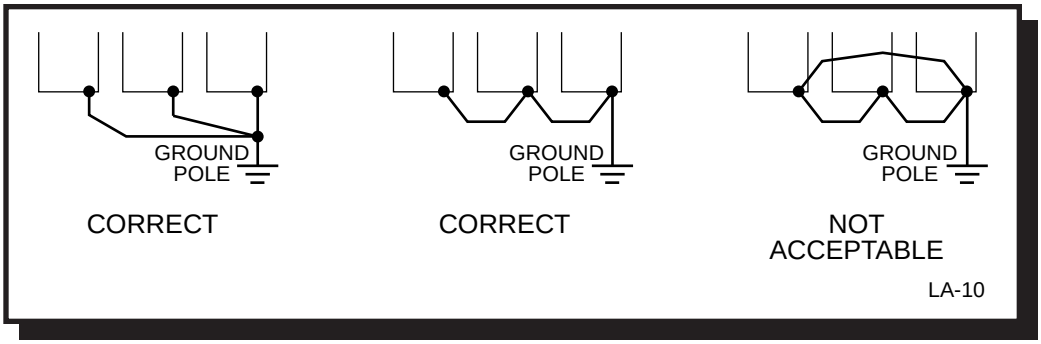



*Figure 5.* ***Proper Grounding of Three VCD 723 Drives***

## Pre-Power Check

**CAUTION**

To prevent damage to the drive, the following checks must be performed before applying input power.

❏ Make sure wires are properly connected.

❏ Verify ground connections to the drive.

❏ Disconnect motor from its load. To ensure safety, prior to test operation, disconnect the coupling or belt which connects the motor with the machine so that motor operation is isolated. If an operation must be performed while the motor is directly connected to the machine, use great care to avoid any possible hazardous condition.

❏ For 460V, 15HP and above verify that the power voltage select connector in the VCD 723 is positioned correctly for the input power line voltage (see Figure 6). Voltage is preset to 460V at the factory. Reposition if required.

❏ Check that all mechanical connections inside VCD 723 are tight.

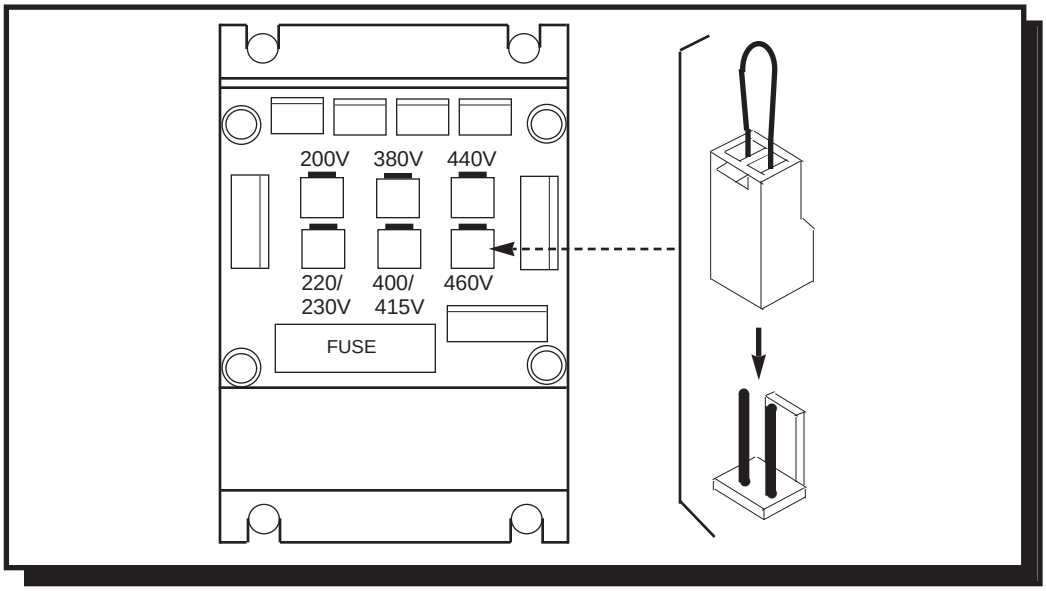



*Figure 6.* ***Voltage Selection in 460V VCD 723, 15HP and Above***

- ❏ Remove any excess packing material.
- ❏ Check that all shipping devices and relay wedges have been removed. Manually operate all contactors and relays to ensure that they move freely.
- ❏ Verify that all electrical connections are secure.
- ❏ Verify that all transformers are connected for proper voltage, according to the drive system schematic diagram.
- ❏ Verify that the PG-X tachometer card is installed.
- ❏ Verify the EPROM inserted in the VCD 703 control board is labeled according to the drawings supplied.
- ❏ Verify that all connections are made per the schematic.
- ❏ Verify that the three phase power connections are secure.

**CAUTION**

Verify that incoming power IS NOT connected to the drive's output terminals. (Terminals T1, T2, and T3). Improper connection will cause severe damage to the drive when energized.

## Drive Start-up

❑ Verify the motor, blower, thermistor, and PG (Digital Tachometer) wiring for proper voltage and phase sequence. If the motor is a MagneTek Vector Control Motor (VCM), then see the appendix for proper wiring. If the motor is not a MagneTek VCM, then see the manufacturer supplied drawings.

❑ Apply three phase input power to the drive.

❑ Verify that the "CHARGE" lamp inside the drive is lit.

❑ The first message that will be displayed on the Local Control Display Unit is the following:

| **Verifying the CRC-16. Wait . . .** |
|---|

This is an indication that the CPU is verifying the program loaded in its memory is valid. The check takes approximately 5 seconds. After the check, one of a number of messages will be displayed.

❑ When the program and non-volatile memory is valid, the following message will be displayed on the Local Control Display Unit:

| **Powered Up and Ready** |
|---|

In addition, the Ready LED will be lit.

❑ The following is a list of abnormal display conditions that may occur, and the actions necessary to correct the situation:

- If there is an invalid program in memory, then the following message will be displayed on the Local Control Display Unit:

| **Select BAUD rate 19200 UP,DWN,ENT** |
|---|

If this occurs, a new program must be uploaded into memory. See Section 3 for the proper program upload procedure.

- Check that no faults are indicated on the drive's display. A fault is indicated by the Fault LED being lit and a fault message appearing on the Local Control Display Unit. See Section 3 for more detailed information regarding fault reporting and clearing.

- As part of the program's start-up procedure, the validity of the nonvolatile parameters are checked. If the values are invalid, the following message is displayed on the Local Control display Unit:

  **BAD NVRAM CRC**
  **ENT FOR DEFAULTS**

  If this occurs, press the ENT key. The factory programmed default values will then be loaded into non-volatile memory.

❑ The parameter values should be checked for proper settings. The settings will be shown on the Function list supplied with the order documentation. Refer to Section 3 to find the operating procedure necessary to view and change parameter values. These parameter values include the following:

- Speed Reference Setting Constants (i.e., Main Speed Reference, Jog Speed Reference).
- Application Constants (i.e., Accel Time, Decel Time, Forward Side Torque Limit).
- Control Constants (i.e., Speed Reference Input Limit, Pulse Generator Pulses Per Motor Revolution, Motor Overload Detection starting Current).
- Motor Constants (i.e., Base Speed, Number of Motor Poles, Motor Rated Current, Rated Slip Frequency).
- Order Constants (i.e., Select Control with or without Pulse Generator Feedback, Select Control with or without motor thermistor).
- System Constants (i.e., MagneTek Vector Control Motor Selection, Input/Output Function Assignments, Control Behavior Selections, Carrier Frequency Selection).
- Any other values that may be job specific (i.e., Empty Roll Diameter for winder applications, Follower Pulse Generator Pulses Per Revolution).

❑ Check the Pulse Generator's (PG) rotation.

- Select the parameter to view the PG Feedback (function number 604).
- Manually rotate the shaft counter clockwise, as viewed from the shaft end. Verify that the displayed PG feedback is positive.

  If the display does not change from "0", check the PG cable connections. If the problem persists, check for pulses at test points "PA" and "PB" on the right-hand side of the PG-X card, with an oscilloscope.

  If the PG feedback shows a negative sign ("-"), reverse the polarity by reversing the wiring between the A and B channels. This is accomplished by switching the wire labeled A+ with wire labeled B+, then switching wire labeled A- with wire labeled B-.

- Manually rotate the shaft clockwise, as viewed from the shaft end. Verify that the displayed PG feedback is negative ("-").

❑ Check the motor rotation.

- Check that the drive is in the forward rotation mode.
- Start the motor at a slow speed by using the JOG input if one is present. Check that the motor accelerates smoothly and that the speed feedback is the same as the speed reference.
- If the motor does not accelerate smoothly or oscillates, check or perform the following:

❶ Reverse any two motor leads.

**IMPORTANT**

If leads are reversed, re-identify and record the fact that the leads were reversed.

❷ If the speed feedback does not read the same as the speed reference, verify that the pulse generator's Pulse Per Revolution constant (function number 46) is set to the proper value for your pulse generator.

❸ Again start the motor at a slow speed by using the JOG input if one is present. If instability is still present, check for a noise related problem:

Program the drive for open loop mode by disabling the Pulse Generator input.

Start the motor at low speed again by using the JOG input if one is present. If instability disappears, the problem is noise related.

Program the drive for closed loop mode by enabling the Pulse Generator input.

❹ To verify that noise is the source of the problem, perform the following:

Change the drive constant, which changes the carrier frequency, from 2.08 KHz to 12.5 KHz.

- Using the LCDU change the appropriate constants.
- Using the LCDU save the changes to NVRAM.

- Power the drive down long enough for the charge light to go out.
- Power up the drive.

Run the drive at low speed by using the JOG input if one is present. If instability increases, the problem is noise related.

Return the carrier frequency to its original setting.

❺ If it has been determined that noise is the source of the problem, check for grounding problems:

Motor must be grounded.

Drive must be grounded.

Check shield connections.

Power leads from the line and to the motor should be isolated from the pulse generator signals.

External power supply connections for tachometer common should be isolated from the earth ground.

External signals, if used, should be isolated from earth ground.

❻ If noise is not the problem (instability is not related to carrier frequency), contact MagneTek Service about adjusting regulator constants.

❑ Perform a motor test run. The test run should be in both the forward and reverse direction.

❑ Connect the motor coupling, or belt, to the load.

*Parameter Verification*

❑ Verify once again that the VCD 723 parameter values are set to their proper values. Refer to section 3 to find the operating procedure necessary to view and change parameter values.

❑ Record any parameter values that were changed from their factory default values.

❑ Operate the drive using external control signal inputs shown on the system schematic and verify proper operation.

## Controls and Indicators

Accessible through the front cover of the VCD 723 are local controls and indicators. Figure 7 shows the Local Control Display Unit.

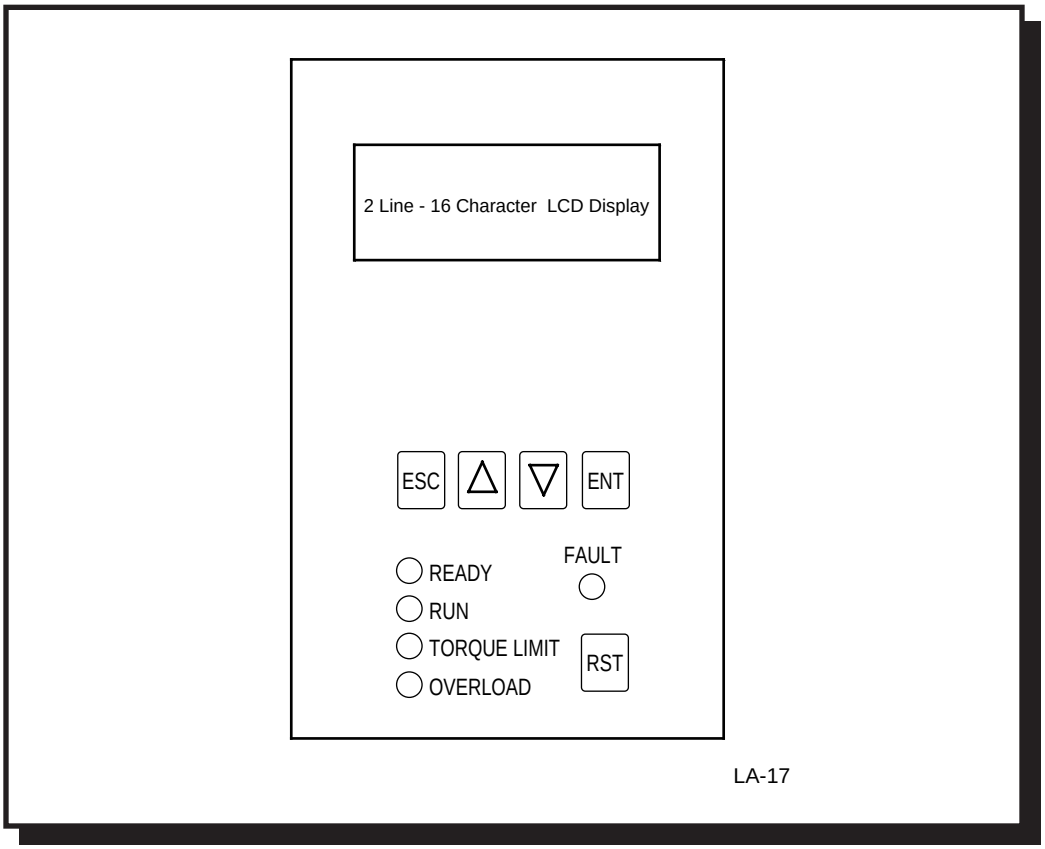



*Figure 7.* ***Local Control Display Unit (LCDU)***

At the top of the LCDU is a liquid crystal display. Two lines of sixteen alphanumeric characters can be displayed. This allows for English language legends and units while entering or viewing data.

### *Status LEDs*

There are five light emitting diodes on the LCDU. These are used as a quick indication of the drive's status.

**Ready** Indicates that the drive is ready to operate.

**Run** Drive is controlling motor speed.

**Torque Limit** Drive is demanding more torque than is available.

**Overload** Motor current is in the overload region.

**Fault** Indicates that a drive fault exists. The Fault/Error Code List (see Table 8 located in the Troubleshooting/Maintenance section) defines what conditions the drive will recognize as faults.

**IMPORTANT**

Clearing a Fault from the Fault List is NOT THE SAME as resetting the fault. Some faults are transient in nature and require no further action after clearing the fault from the Fault List. Others require additional action to allow the drive to continue to run. See the Fault/Error Code List for further details.

All status lights are under the control of the application specific software. The PAC program for this drive must be consulted to determine the actual meaning for each light.

### *Local Control Display Unit (LCDU)*

There are five keypad keys on the LCDU. These allow for the entry and viewing of data. They can also be used for operating the drive.

**ESC** Allows you to "back out" of an operation. For example, if a mistake is made while entering numerical data, the ESC key can be pressed before the data is entered, allowing the operator to start over.

**Up Arrow** Scrolls to the next higher number. The number may be a specific function number or the modification of the value of a parameter.

**Down Arrow** Scrolls to the next lower number. The number may be a specific function number or the modification of the value of a parameter.

**ENT** Completes an operation. It may be pressed to enter a modified parameter's value, or to go "deeper into" a function.

**RST** Used to clear the fault list. There are other methods that can be used to clear the fault list, but this key provides a shortcut. Any time this key is pressed, the fault list will be cleared. Depending on the nature of the fault and the PAC program loaded, this button can also clear the fault condition as well as the record of the fault.

An optional Portable Control Display Unit (PCDU) can be plugged into a telephone style jack at the side of the VCD 723 drive (reference figure 4). If your drive is equipped with this option, refer to the PCDU guide provided with the unit for operating procedures.

## Start-up Operation

❑ After applying power, the first message displayed on the Local Control Display Unit is the following:

| **Verifying the CRC-16. Wait...** |
|---|

This is an indication that the CPU is verifying the program loaded in memory is valid. The check takes approximately 5 seconds. After the check, one of a number of messages will be displayed.

❑ When the program and non-volatile memory are valid, the following message will be displayed on the Local Control Display Unit:

| **Powered Up and Ready** |
|---|

In addition, the Ready LED will be lit.

❑ The following is a list of abnormal display conditions that may occur, and the actions necessary to correct the situation:

- If there is an invalid program in memory, then the following message will be displayed on the Local Control Display Unit:

| **Select BAUD rate 19200 UP,DWN,ENT** |
|---|

If this occurs, a new program must be uploaded into memory. The program upload procedure is explained later in this section.

- A fault condition may have occurred, in which case a fault message will be displayed. An example of a fault message would be as follows:

| **Divide by Zero F103 Blk:00170** |
|---|

A fault message is always displayed in this fashion. The top line of the LCDU display contains a description of the fault. The bottom line of the LCDU display contains the Fault assigned number and other information that will help determine the cause of the fault. In the example given above, the extra information shows which PAC block was being executed. If the block number is 0000 the fault occurred in the kernel code. When the fault is related to the MicroTrac LAN, instead of the PAC block number, a Local Area Network Node number will appear (i.e., Node:002), which will identify the device on the MicroTrac LAN with which the fault is associated.

When a fault message is displayed, the source of the fault should be corrected. After the fault source is corrected, the fault may be cleared by pressing the RST key on the LCDU.

- As part of the program's startup procedure, it checks the validity of the parameters that are stored in non-volatile memory. If the values are invalid, then the following message is displayed on the Local Control Display Unit:

**BAD NVRAM CRC**
**ENT FOR DEFAULTS**

If this occurs, press the ENT key. The factory programmed default values will then be loaded into non-volatile memory.

## General Operation

After the drive has powered up and the display is showing "Powered Up and Ready", or a fault number, the LCDU can be used to enter new values for parameters, monitor drive functions, and perform certain drive diagnostics. Every operation that the LCDU performs is called a "function". Each function is assigned a unique number. Function numbers and descriptions are listed in Table 7.

Table 7. **Function Number Assignments**

| Function Number | Description |
|---|---|
| 000 | Fault Display/Clear |
| 1 to 599 | PAC Dependent Parameter Values |
| 600-799 | PAC Dependent Monitor Only Values |
| 800 | Error Display |
| 801 | Modify Fault and Error Declarations |
| 802-899 | Reserved for Advanced Fault and Error Control |
| 900-979 | Reserved for Diagnostics and Tests |
| 980 (P) | PAC Block Trace Monitor |
| 981-991 | Reserved for Diagnostics and Tests |
| 992 (L) | Upload/Download of Program or Parameters |
| 993 (P) | Reset All Non-Volatile RAM |
| 994 | Save/Restore Non-Volatile RAM Parameters |
| 995 | Load Defaults |
| 996-998 | Reserved for Diagnostics and Tests |
| 999 | Hex Monitor |

(P) These functions are only available through use of the optional Portable Control Display Unit (PCDU).
(L) These functions are only available through use of the Local Control Display Unit (LCDU).

## Parameter Functions

The functions numbered 1 through 599 are reserved for settable parameters. The function numbers for these settable parameters depend on the PAC program, although some function numbers may be standardized. Examples of settable parameters are Accel Times, Regulator Gains, and Rated Speed.

The following steps explain how to modify a given parameter value via the LCDU display:

❑ Press the Up or Down Arrow keys to select the desired function number. The display shows a description of the function on the top line, and the present value, units, and function number on the bottom line.

```
TACH COUNTS
1024. PPR P068
```

❑ Press the ENT key to allow the currently displayed parameter to be modified. After the ENT key is pressed, a prompt will be given to indicate that the modify mode is active.

```
TACH COUNTS
1024. PPR EDIT
```

❑ Press the Up or Down keys to change the value of the parameter. The least significant digit of the parameter will be changed by 1 for every keypress. Holding the key down will result in an auto repeat of the keypress. If a minimum or maximum limit is exceeded for the parameter value, then the message “vLIMv” or “^LIM^” will be displayed, respectively.

❑ At this point, the ENT key or the ESC key may be pressed.

Press the ENT key to accept the currently entered value for the displayed parameter. If the value is within the minimum and maximum limits for the parameter, it is accepted and the modify prompt disappears. If the value has exceeded a limit when the ENT key is pressed, the limit is accepted and the modify prompt disappears.

A modified parameter is retained only as long as power is applied. Function #994 is used to save the new value in nonvolatile memory.

Press the ESC key to exit the modify mode without changing the parameter value. The modify prompt will disappear and the original value will return.

## Monitor Functions

Functions numbered 600 through 799 are reserved for parameters that may be viewed, but not modified. The function numbers for these displayable parameters depend on the PAC program, although some function numbers may be standardized. Examples of displayable parameters are Speed Feedback, Actual Motor RPM, and Inverter Output Current.

The following steps explain how to display a given parameter via the LCDU display:

❑ Press the Up or Down Arrow keys to select the desired function number. The display shows a description of the function on the top line, and the present value, units, and function number on the bottom line.

```
SPEED
0.000 PU  M600
```

## Error Handling/ Reporting

The drive has two methods for reporting errors and faults. Each condition may utilize one, both, or neither of the reporting methods.

1. The most conventional method is called fault reporting. Each occurrence of a fault is recorded in an area of memory called the Fault List. At the moment a fault condition occurs, the red FAULT light will light and a unique fault number will appear on the LCDU. The Fault List stores the 16 oldest faults and stops recording faults as soon as the list is filled. This list is erased when the drive is powered down or reset. Whether or not the drive stops or continues to run is dependent on the way the particular fault is implemented within the PAC diagram. Most standard faults are set so that the drive will stop if a fault occurs.

2. The second method is called error reporting. Each occurrence of an error is recorded in an area of memory called the Error List. Error reporting differs from fault reporting in several respects. First, at the moment an error condition occurs, the red FAULT light will NOT light and a unique error number will NOT appear on the LCDU. Second, the Error List stores the 16 most recent errors and always overwrites the oldest error when the list is filled. Third, the Error List is stored in Non-Volatile Memory and is retained when the drive is powered down or reset. Lastly, the drive operation is NOT affected when an error condition occurs.

## *Fault Reporting (F0)*

Function number "0" is used to display and clear the Fault List. The following steps explain how to display and clear faults via the LCDU display:

❏ Press the Up or Down Arrow keys to select the desired function number, 0. The display shows a description of the function on the top line, and the action that may be performed on the bottom line.

```
DISPLAY FAULTS
(press ENT) F000
```

❏ Press the ENT key. If there are no faults in the list, then a no fault message will be displayed.

```
No Faults
(press ESC)
```

If there are faults in the list, then a top of fault list message will be displayed.

```
TOP OF FLT LIST
RST clears all
```

❏ Press the Down Arrow key to view the faults in the list. For example:

```
MATH UNDERFLOW
F102   Blk:00702
```

The top line describes the fault, and the bottom line displays the fault code along with the PAC block that was executing when the fault occurred. A PAC block number of "00000" indicates that the fault was declared by the Kernel software and not by the execution of a PAC block.

The oldest fault is on the top of the list. Therefore, pressing the Down Arrow key displays a newer fault, and pressing the Up Arrow key displays an older fault. The end of the list is reached when the Down Arrow key is pressed enough times and the end of fault list is displayed.

```
END OF FLT LIST
Press INC
```

❏ Press the ESC key to return to the function entry mode.

```
DISPLAY FAULTS
(press ENT) F000
```

❏ Press the RST key at any time to clear all of the faults currently stored in the fault list. The FAULT light will be turned off and the list will be cleared.

## *Error Reporting (F800)*

Function number 800 is used to display the Error List. The following steps explain how to display errors via the LCDU display:

❑ Press the Up or Down Arrow keys to select the desired function number, 800. The display shows a description of the function on the top line, and the action that may be performed on the bottom line.

```
VIEW ERROR LIST
(press ENT) F800
```

❑ Press the ENT key. If there are no errors in the list, then a no error message will be displayed.

```
No ERRORS yet
(press ESC)
```

If there are errors in the list, then the first error in the list will be displayed.

❑ Press the Down Arrow key to view the errors in the list. For example:

```
MATH UNDERFLOW
05:35:12 *B00702
```

The top line describes the error, and the bottom line displays the elapsed time since the error occurred along with the PAC block that was being executed.

The elapsed time is a measurement of how long the drive has been powered up since the error occurred. There are two formats in which the elapsed time will be displayed; HH:MM:SS (for hours, minutes, and seconds) if the error occurred within 24 hours, and DDD-HH:MM (for days, hours, and minutes) if the error occurred more than 24 hours ago.

The "*" character before the B on the bottom line marks a fixed entry in the error list. Only that one error list entry will display the "*" character. There is no start to the error list since it may be overwritten at any time. The "*" character is used to show when one complete loop of the error list has been viewed.

A PAC block number of “00000” indicates that the error was declared by the Kernel software and not by the execution of a PAC block.

The newest error is on the top of the list. Pressing the Up Arrow key displays a newer error, and pressing the Down Arrow key displays an older error. When the end (or start) of the list is reached, pressing the corresponding Down (or Up) Arrow key will loop to the start (or end) of the list.

❏ Press the ESC key to return to the function entry mode.

```
VIEW ERROR LIST
(press ENT) F800
```

### *Fault and Error Report Setup (F801)*

Function number 801 is used to indicate which conditions should be reported as a fault, an error, or both. The list of possible conditions is referred to as the disposition list. The following steps explain how to display and modify the disposition list via the LCDU display:

❏ Press the Up or Down Arrow keys to select the desired function number, 801. The display shows a description of the function on the top line, and the action that may be performed on the bottom line.

```
MODIFY DISP LIST
(press ENT) F801
```

❏ Press the ENT key. The last accessed condition will be displayed. For example:

```
DIVIDE BY ZERO
#017 Error Fault
```

The top line contains a description of the condition. The bottom line contains the condition number and how the condition should be reported when it occurs.

❏ Press the Up or Down Arrow keys until the condition that is to be modified is displayed. For example:

```
MATH OVERFLOW
#101 Error Fault
```

- ❑ Press the ENT key to modify how the condition is to be reported. A modify prompt will appear to indicate that keypresses will now affect how this condition is reported.

- ❑ Press the Up or Down Arrow keys to cycle through all of the combinations of disposition. The combinations of disposition are that the condition not be reported (neither Error nor Fault appear), be reported only as an Error (only Error appears), be reported only as a Fault (only Fault appears), or report the condition as both an Error and a Fault (both Error and Fault appear).

- ❑ At this point, the ENT key or the ESC key may be pressed.

  Press the ENT key to accept the currently entered disposition combination for the displayed condition. The modify prompt will disappear.

  Press the ESC key to exit the modify mode without changing the disposition for the displayed condition. The modify prompt will disappear and the original disposition combination will return.

- ❑ Press the ESC key after all modifications are made to return to the function entry mode.

**MODIFY DISP LIST**
**(press ENT) F801**

## Non-Volatile RAM-Access (T994)

Every parameter the drive uses has three areas in memory associated with it. First, there is an active memory area (RAM) where the value is stored and used by the run-time software. Second, there is a read-only memory area (ROM) where the factory-set default value is permanently stored. Last, there is an area in non-volatile memory (NVRAM) where the value is saved and remembered for the next power up or reset. This multi-level approach makes it possible to return to the last set of "stable" parameters in tuning of the active drive parameters.

Function number 994 is used to transfer parameter values between the non-volatile memory area and the active memory area. The following steps explain how to copy data to or from the non-volatile memory area:

- ❑ Press the Up or Down Arrow keys to select the desired function number, 994. The display shows a description of the function on the top line, and the action that may be performed on the bottom line.

**NVRAM ACCESS**
**(press ENT) T994**

❑ Press the ENT key. A message will appear that will state the actions that may be performed.

```
UP:Rest  DN:Save
NV->RAM  RAM->NV
```

❑ At this point, the ESC key, the Up Arrow key, or the Down Arrow key may be pressed.

Press the ESC key to return to the function entry mode without performing any value transfers.

```
NVRAM ACCESS
(press ENT) T994
```

Press the Up Arrow key to restore the parameter values in the active memory area (RAM) from the values in the last saved memory area (NVRAM). A message will appear showing that the restore is taking place. This will be followed by a message explaining that the restoration is complete. Press the ESC key to return to the function entry mode.

```
Restoring data
```

```
Restore is done,
press ESC key.
```

Press the Down Arrow key to save the parameter values in the active memory area (RAM) to the last saved memory area (NVRAM). A message will appear explaining that the save is complete. Press the ESC key to return to the function entry mode.

```
Save completed,
press ESC key.
```

## Load Defaults Function (T995)

Every parameter in the drive has a factory-set default value that is loaded when the drive is powered up for the first time. These default values may not be optimal values for a specific application; however, they will allow the drive to function properly. It is possible to reload these default parameter values. For instance, when the drive is operating erratically and is suspected that one or more parameters were improperly set.

Function number 995 is used to transfer the factory-set default values to the parameter values in the active memory area. The following steps explain how to load default values to the active memory area:

❑ Press the Up or Down Arrow keys to select the desired function number, 995. The display shows a description of the function on the top line, and the action that may be performed on the bottom line.

**LOAD DEFAULTS**
**(press ENT) T995**

❑ Press the ENT key. A message will appear that will state the actions that may be performed.

**IF SURE (enter)**
**ELSE (ESC) T995**

❑ At this point, the ESC key or the ENT key may be pressed.

Press the ESC key to return to the function entry mode without performing any value transfers.

**LOAD DEFAULTS**
**(press ENT) T995**

Press the ENT key to load the factory-set default values into the active parameter values. A message will appear explaining that the loading of the default values is complete. Press the ESC key to return to the function entry mode.

**Defaults loaded,**
**press ESC key.**

## Upload/ Download of Program or Parameters (T992)

The VCD 723 has the ability to pass program and parameter information between the drive's memory and a computer with a serial port. The direction of data flow is defined as Upload (from the computer to the drive) or Download (from the drive to the computer). Figure 8 shows the electrical connections required to connect the serial port of the VCD 723 to the serial port (COM1) of an IBM PC™ compatible computer. The PC utilized must have a serial port and disk drive.

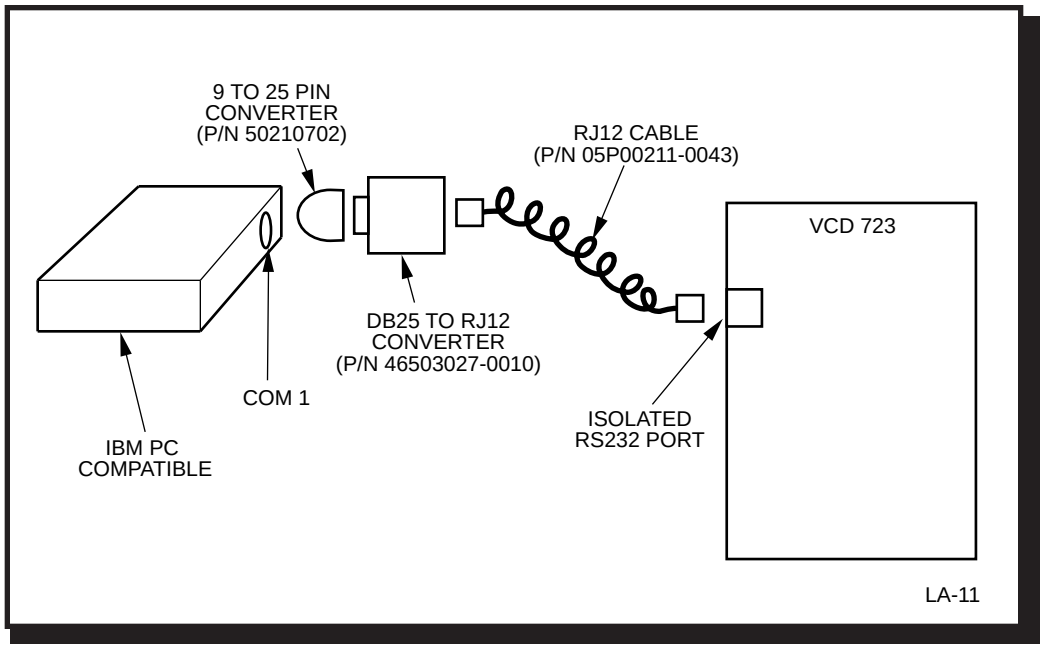



*Figure 8.* ***VCD 723 to IBM PC Compatible Computer Interconnect Diagram***

In addition to the electrical connections, a serial communications program must be utilized by the computer to access data through the serial port. A serial communications program which supports the Y Modem Batch file transfer protocol, such as ProComm™ or Qmodem™ must be installed on the PC. The Y Modem Batch file transfer protocol is the protocol that must be used when communicating with the VCD 723. In uploading and downloading of files, the drive behaves like a bulletin board service to the PC. A file upload means that a file is sent from the PC to the drive. A file download means that a file is sent from the drive to the PC.

There are two file types associated with upload and download. One is the PAC program file (i.e., the file with the .PRG extension). The other is the parameter file (i.e., the file with the .PAR extension). The PAC program file is the file that contains the executable instructions that determines the application characteristics of the drive. The parameter file is a file of all the parameter settings of a drive at the time the .PAR file was captured (from a previous parameter download).

**Program upload** is defined as the process of a computer sending the VCD 723 drive a new PAC program (i.e., the .PRG file) through the drive's serial port . This process may be required when upon application of power the drive finds that the PAC program loaded into memory is invalid. This process may also be used when it is desired to change the PAC program from what was previously loaded. Some of the steps shown below are skipped when the PAC program in memory is found to be invalid upon application of power.

**Program download** is defined as the process of the VCD 723 drive sending a computer its PAC program (i.e., the .PRG file) through the drive's serial port. This process can be used for memory backup.

**Parameter upload** is defined as the process of a computer sending the VCD 723 drive all of its settable parameters (i.e., the .PAR file). This process can be used to set up the drive with a set of tuned constants.

**Parameter download** is defined as the process of the VCD 723 drive sending a computer all of its settable parameter values (i.e., the .PAR file). This process can be used for memory backup. A parameter download is the only data transfer process that can occur while the drive is in RUN mode.

The VCD 723 can not be in RUN mode while an upload or a program download is occurring. Furthermore, the PAC program stops executing while the upload or program download is happening.

Function number 992 is used to upload and download PAC programs and parameters. The following steps explain how to perform an upload or download:

- ❏ Press the Up or Down Arrow keys to select the desired function number, 992. The display shows a description of the function on the top line, and the action that may be performed on the bottom line.

| **UPLOAD/DOWNLOAD**<br>**(press ENT) T992** |
|---|

- ❏ Press the ENT key. A message will appear that will state the actions that may be performed.

| **DRIVE —> PC**<br>**UP, DOWN, or ENT** |
|---|

- ❏ At this point, the ESC key, the Up Arrow key, or the Down Arrow key may be pressed.

Press the ESC key to return to the function entry mode without performing any data transfers.

```
UPLOAD/DOWNLOAD
(press ENT) T992
```

Press the Up Arrow key to select an upload operation.

```
DRIVE <— PC
UP, DOWN, or ENT
```

Press the Down Arrow key to select a download operation.

```
DRIVE —> PC
UP, DOWN, or ENT
```

❑ Press the ENT key to accept the Upload or Download selection. A message will appear that will state the actions that may be performed.

```
PARAMETER xfer
UP, DOWN, or ENT
```

❑ At this point, the ESC key, the Up Arrow key, or the Down Arrow key may be pressed.

Press the ESC key to return to the function entry mode without performing any data transfers.

```
UPLOAD/DOWNLOAD
(press ENT) T992
```

Press the Up Arrow key to select transfer of the program.

```
PROGRAM xfer
UP, DOWN, or ENT
```

Press the Down Arrow key to select transfer of the parameters.

```
PARAMETER xfer
UP, DOWN, or ENT
```

❑ Press the ENT key to accept the given selection. A message will appear that will state the actions that may be performed.

| **Select BAUD rate**<br>**19200 UP,DWN,ENT** |
|---|

❑ Press the Up or Down Arrow keys to select the desired baud rate. Pressing the Up arrow will increase the baud rate and pressing the Down arrow key will decrease the baud rate (19,200 is the maximum baud rate).

❑ Press the ENT key to accept the displayed baud rate. The VCD 723 will begin the selected file transfer.

**CAUTION**

When the program transfer begins it must be completed because the existing program is erased.

❑ Initiate a Y Modem Batch file transfer from the PC (i.e., for ProComm users press the <PgUp> key for an upload or press the <PgDn> key for a download, and select the YMODEM Batch mode).

❑ Depending on the direction and type of file transfer, one of several sequences will occur.

For a Program Upload:

- A message will appear explaining that permanent storage memory is being erased.

| **Erasing the**<br>**FLASH ROMs** |
|---|

- A message will appear explaining that the VCD 723 is attempting to start the program transfer.

| **Start UPLOAD**<br>**of Program** |
|---|

- At this time, the VCD 723 is waiting to communicate with the PC. When the transfer begins, a message will appear showing how much of the transfer has already taken place. For a baud rate of 19200, the transfer will take approximately five minutes. The completion percent number counts up as more data is transferred.

| **Completion:**<br>**23%** |
|---|

In addition, the lights on the LCDU will appear to bubble up showing that the transfer is taking place.

- When the transfer is complete, non-volatile memory needs to be initialized. A message will appear explaining what to do.

| **BAD NVRAM CRC**<br>**ENT FOR DEFAULTS** |
|---|

- Press the ENT key. This will load the programmed default values into the active parameter area and into the non-volatile memory area and begin execution of the PAC program.

| **Powered Up**<br>**and Ready** |
|---|

❑ For a Program Download:

- A message appears explaining that the VCD 723 is attempting to start the program transfer.

| **Start DOWNLOAD**<br>**of Program** |
|---|

- At this time, the VCD 723 is waiting to communicate with the PC. When the transfer begins, a message will appear showing how much of the transfer has already taken place. For a baud rate of 19200, the transfer will take approximately ten minutes. The completion percent number counts up as more data is transferred.

| **Completion:**<br>**23%** |
|---|

In addition, the lights on the LCDU will appear to bubble up showing that the transfer is taking place.

Downloads generally take longer than uploads because the download transfers all memory locations while an upload only transmits the active portion of memory.

- When the transfer is complete, the function entry mode will return.

| UPLOAD/DOWNLOAD<br>(press ENT) T992 |
|---|

❑ For a Parameter Upload:

- A message appears explaining that the VCD 723 is attempting to start the parameter transfer.

| Start UPLOAD<br>of Parameters |
|---|

- At this time, the VCD 723 is waiting to communicate with the PC. When the transfer begins, a message will appear showing how much of the transfer has already taken place. For a baud rate of 19200, the transfer will take approximately 30 seconds. The completion percent number counts up as more data is transferred.

| Completion:<br>23% |
|---|

In addition, the lights on the LCDU will appear to bubble up showing that the transfer is taking place.

- When the transfer is complete, the function entry mode will return.

| UPLOAD/DOWNLOAD<br>(press ENT) T992 |
|---|

❑ For a Parameter Download:

- A message appears explaining that the VCD 723 is attempting to start the parameter transfer.

| Start DOWNLOAD of Parameters |
|---|

- At this time, the VCD 723 is waiting to communicate with the PC. When the transfer begins, a message will appear showing how much of the transfer has already taken place. For a baud rate of 19200, the transfer will take approximately 30 seconds. The completion percent number counts up as more data is transferred.

| Completion: 23% |
|---|

In addition, the lights on the LCDU will appear to bubble up showing that the transfer is taking place.

- When the transfer is complete, the function entry mode will return.

| UPLOAD/DOWNLOAD (press ENT) T992 |
|---|

## Hex Monitor (T999)

Function number 999 is used to directly view memory values. A memory map is required, and as such, it is reserved for use by MagneTek personnel.

| DCU HEX MONITOR (press ENT) T999 |
|---|

## Fault and Error Conditions

An error or fault condition is an indication of abnormal behavior. Table 8 lists all of the standard type errors and faults that might arise, and suggestions on what actions need to be performed to correct the problem. In addition to the errors and faults listed, the PAC program may contain more application specific errors and faults; refer to the order documentation for a list of these errors and faults. Use the procedures in Section 3 to view the errors and faults that may be present. Once action has been performed to remove the cause of the fault, use the procedures listed in section 3 to clear the faults.

Table 8. **Standard Error and Fault Descriptions**

| ERROR/FAULT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| 17, DIVIDE BY ZERO | A division by the number zero has occurred. | Check the PAC diagram for any denominators that may be zero. The fault display will show which PAC block was executing at the time of the fault. |
| 21, WATCHDOG TRIP<br>22, RSRVD INTERRUPT<br>30, MEMORY ACCESS<br>31, SEVERE CODE FLT<br>32, CODE FAULT<br>33, HARDWARE FAULT | A problem with either hardware or software has occurred on the MicroTrac circuit card. | Refer to troubleshooting chart 13. |
| 96, WEB BREAK | The continuous web has broken. | |
| 97, OVERSPEED | Command value is too high. | Verify all speed parameter settings (i.e. pulses per revolution, motor rated speed, etc.). Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |
| 98, TACH LOSS | ❶ Broken tach wires.<br>❷ Loose connector.<br>❸ Tach failure - belt loss? | Verify wiring to the tachometer. |
| 99, REVERSE TACH | Tach connected backwards. | Reverse tachometer A signals with tachometer B signals. For example, switch wire labeled A+ with wire labeled B+, then switch wire labeled A- with wire labeled B-. |
| 100, NOT-A-NUMBER<br>101, MATH OVERFLOW<br>102, MATH UNDERFLOW<br>103, F.P. DIVIDE BY ZERO<br>104, SIGN ERROR | A mathematical error has occurred. | Check the PAC diagram for the possible cause. The fault display will show which PAC block was executing at the time of the fault. |

Table 8. **Standard Error and Fault Descriptions - Continued**

| ERROR/FAULT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| 113, MISSING PCU | The MicroTrac is running but not communicating with the processor on the Power Conversion Unit circuit card. | Refer to troubleshooting chart 13. |
| 121, DP RAM ERROR | The cable between the MicroTrac card and the inverter is bad. The Dual Port RAM on the MicroTrac card is bad. | Replace the cable between the MicroTrac card and the drive. Replace MicroTrac circuit card. |
| 260, ITERATION T/O | Upload/Download protocol detected, too many retries. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |
| 261, OUT OF SEQUENCE | Upload/Download protocol block sequence is not contiguous. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |
| 262, BYTE TIMEOUT | Upload/Download protocol more than one second has elapsed between block byte transmission or reception. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |
| 263, WRONG FILE TYPE | Upload/Download protocol unrecognized file extension. | Use one of the proper file extensions when using Upload or Download (i.e., .PAC or .PRG). |
| 264, NULL BLK EXPECTD | Upload/Download protocol partial null block was sent. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |
| 265, USER CANCELLED | Upload/Download protocol user abort. | The Y Modem transfer was cancelled by the user. This occurs when the ESC key is pressed on the LCDU or when the user cancels it through use of the communications software executing on the PC. |
| 266, UNEXPECTD NL BLK | Upload/Download protocol, a null block was not expected. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |
| 267, WRONG S-REC TYPE | Upload/Download protocol only S2 and S8 records are OK. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |
| 268, BAD S-REC CHECK | Upload/Download protocol S record did not verify. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |
| 269, BAD, S-REC ENDREC | Upload/Download protocol END record did not verify. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |

Table 8. **Standard Error and Fault Descriptions - Continued**

| ERROR/FAULT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| 270, FILE TOO LARGE | Upload/Download protocol filesize is greater than one gigabyte. | None of the files used will ever be this size, so check the validity of the file under question. |
| 271, WRONG FILENAME | Upload/Download protocol given parameter .PAR filename does not match the PAC program .PRG filename. | Check for the proper filenames. |
| 272, NO MEMORY HERE | Upload/Download protocol memory check did not pass after an S-record write. | ❶ Verify S-record writes to available memory.<br>❷ The FLASH ROM IC's may need to be replaced.<br>❸ The MicroTrac card may need to be replaced. |
| 274, MOTOR RUNNING | Upload/Download was attempted while the Motor is in the RUN mode. | Stop the motor before attempting an Upload or a Download. |
| 275, NOT PARAM FILE | Upload/Download parameter .PAR file had an invalid (no sync) S0 record. | ❶ Check serial port cable wiring and connections.<br>❷ Check software executing on PC. |
| 276, FLASH PRG 00 ERR | Can't program a byte in the FLASH ROM to all logic 0. | ❶ The FLASH ROM IC's may need to be replaced.<br>❷ The MicroTrac card may need to be replaced. |
| 277, FLASH PRG FF ERR | Can't program a byte in the FLASH ROM to all logic 1. | ❶ The FLASH ROM IC's may need to be replaced.<br>❷ The MicroTrac card may need to be replaced. |
| 278, FLASH VERIFY ERR | A byte in the FLASH ROM did not program correctly. | ❶ The FLASH ROM IC's may need to be replaced.<br>❷ The MicroTrac card may need to be replaced. |
| 700, I MAIN P U VLT | Drive declared a main power under voltage. This occurs two seconds after detection of low voltage. | Check incoming power. |
| 701, I CTRL P U VLT | Drive declared the control circuit power to be under the acceptable voltage level during operation. | Control power supply may be bad. |
| 702, MC CONTACTOR OFF | Drive declared that the main circuit magnetic contactor does not operate correctly. | Check connections to main circuit contactor. |

Table 8. **Standard Error and Fault Descriptions - Continued**

| ERROR/FAULT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| 703, BRAKE TRANSISTOR | Drive declared that the braking transistor is malfunctioning. | Replace braking transistor or gate drive board. |
| 704, BRAKE RESIST HOT | Drive declared that the brake resistor unit overheated. | Wait for resistor to cool. Check application requirements for braking capacity. |
| 706, THERMISTOR OPEN | Drive declared that the connection to the motor thermistor is disconnected. | Verify proper wiring to the thermistor. If properly wired, then use the spare thermistor. |
| 707, TRANSMIT ERROR | Drive declared that the transmission between the VCD 723 and the remote operator was not established within 5 seconds after the power supply was turned on. | Verify that the correct version of EPROM's are installed in the VCD 723. This error indicates that the inverter portion of the drive is programmed as a VCD 703. |
| 712, EXT FLT T INPUT | Drive declared that a transmission error occurred 2 seconds after transmission was established between the VCD 723 and the remote operator. | Verify that the correct version of EPROM's are installed in the VCD 723. This error indicates that the inverter portion of the drive is programmed as a VCD 703. |
| 720, OPEN INV TACH | Drive detected that its pulse generator input is open. | Verify wiring to PG-X circuit card CA-1 connector. |
| 721, INV OVERSPEED | Drive declared an overspeed. | Verify all speed parameter settings (i.e. pulses per revolution, motor rated speed). Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |
| 722, INV SPEED ERROR | Drive detected a probable speed error. | |
| 741, BASE BLOCK CKT | Drive detected a control circuit failure. | Replace the inverter control circuit card. |
| 742, SHADOW RAM FLT | Drive detected that its NVRAM is bad. | Replace the inverter control circuit card. |
| 743, NVRAM CHKSUM ERR | Drive detected that the constants in its non-volatile memory are not valid. | Confirm that all parameters are within allowable ranges. If they are, then replace the inverter control circuit card. |
| 744, INV MCU Q/D FLT | Drive detected that its CPU A/D converter has failed. | Replace the inverter control circuit card. |

Table 8. **Standard Error and Fault Descriptions - Continued**

| ERROR/FAULT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| 745, OPTION CARD CONN | Drive detected that its optional card connector has failed. | Replace the inverter control circuit card or the connecting cable. |
| 751, DSP P CKT FLT | Drive detected that its Digital Signal Processor (DSP) peripheral circuitry has failed. | Replace the inverter control circuit card. |
| 752, OPTION A/D FLT | Drive declared that the A/D converter on its High Accuracy Torque Control option card has failed. | Replace the inverter control circuit card. |
| 753, MISSING DCU | Drive has not received a software handshake from the MicroTrac circuit card. | ❶ Cycle power off and on.<br>❷ Replace the cable between the MicroTrac card and the drive.<br>❸ Replace MicroTrac circuit card. |
| 754, INV MODEL ERROR | Drive declared that the model number is wrong. | Replace the inverter control circuit card. |
| 760, DPRAM CHECKSUM | Drive declared that the checksum validating the constants in the Dual Port RAM (between the MicroTrac card and the inverter) is incorrect. | Verify all of the constant settings. Replace the MicroTrac circuit card. Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |
| 761, DPRAM CONST. ERR | Drive declared that a constant in the Dual Port RAM (between the MicroTrac card and the inverter) is out of range. | Verify all of the lettered constant settings. Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |

Table 8. **Standard Error and Fault Descriptions - Continued**

| ERROR/FAULT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| 762, KVA SETTING ERR | Drive declared that the KVA setting is out of range. | Verify the KVA setting constant SN01. Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |
| 763, SETTING ERROR | Drive declared that a constant in the Dual Port RAM (between the MicroTrac card and the inverter) is out of range. | Verify all of the lettered constant settings. Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |
| 764, SN15-18 SET ERR | Drive declared that one or more of the constants SN15, SN16, SN17, SN18, are invalid. | ❶ Verify the settings of the constants SN15, SN16, SN17, SN18.<br>❷ Verify data relationship (SN15, SN16, SN17, SN18).<br>Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |
| 765, TRQ SELECT ERR | Drive declared the Torque control mode selection is in error. | Verify the settings of the constants that affect the Torque control. Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |

Table 8. **Standard Error and Fault Descriptions - Continued**

| ERROR/FAULT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| 766, INV NV RAM ERR | Drive has declared an error in writing to its non-volatile RAM. | Replace the inverter control circuit card. Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |
| 767, OUT OF RANGE | Drive declared a value is out of range. | Verify all of the lettered constant settings. Whenever changing parameter settings the following procedure must be followed:<br>❶ Correct the setting.<br>❷ Use function 994 to transfer the data from RAM to NVRAM.<br>❸ Turn power off.<br>❹ When the charge light is off, then turn power on. |
| 768, OVERCURRENT | Drive has detected that the output current exceeds 200% of the transistor rated current. | Refer to troubleshooting chart 7. |
| 769, BUS OVERVOLTAGE | Drive has detected that the DC bus voltage is high. The detection level is approximately 400V for a 230V rated unit; 800V for a 460V rated unit. | Refer to troubleshooting chart 5. |
| 770, INV. OVERLOAD | Drive detected that the Drive overload protection has tripped. | Refer to troubleshooting chart 8. |
| 771, INVERTER HOT | Drive detected that the fin temperature has exceeded 90 degrees C (194 degrees F) +/-5 degrees. | Refer to troubleshooting chart 10. |
| 772, BLOWN FUSE | DC Bus fuse has cleared. | Check for a short circuit in the output. |
| 773, OPEN LOAD PHASE | Drive detected an opening in the wiring from the inverter to the motor. | Check for problems in the drive to motor wiring. |
| 774, INV HARDWARE FLT | Drive detected a fault in its control circuit hardware. | Replace the inverter control circuit card. |
| 775, MOTOR OVERLOAD | Drive detected that the motor overload protection has tripped. | Refer to troubleshooting chart 8. |

Table 8. **Standard Error and Fault Descriptions - Continued**

| ERROR/FAULT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| 776, MOTOR HOT | Drive detected that the motor overheat temperature has been exceeded. | ❶ Verify constant CN14 and CN15 settings.<br>❷ Refer to troubleshooting chart 10. |
| 777, TRANSIENT P LOSS | Drive detected low voltage, but momentary power loss ride-thru is enabled, and momentary power loss ride-thru time (constant CN19) has not been exceeded yet. | Verify incoming power. |
| 778, SPEED DEVIATION | Drive detected excessive speed deviation. | Verify speed related constants. |
| 779, INVERTER FAN | Drive detected that its cooling fan has failed. | ❶ Look for cooling fan obstructions.<br>❷ Replace cooling fan. |
| 800, LAN HARDWARE ERR | The Local Area Network (LAN) hardware is not operting properly. | Check BNC ”T” Connector.<br>Check 95Ω termination resistors.<br>Replace the MicroTrac circuit card. |
| 801, MAX. LAN RETRIES | A directed LAN message was not received by the given network node number after trying several times. | Verify that the given node number is connected to the same coaxial cable (the MicroTrac LAN) as the VCD 723, and that it is operational. |
| 802, ILLEGAL MSG TYPE | A directed LAN message was received by the VCD 723 from the given node, nd the message content is not one of the supported message data types. | ❶ Verify that the given node number is operating properly.<br>❷ Verify that the LAN is operating properly. |
| 803, BROADCAST MISSED | A broadcast message from the given node was not received by the VCD 723 within the allotted time, and one was expected. | Verify that the given node number is connected to the same coaxial cable (the MicroTrac LAN) as the VCD 723, and that it is operational. |
| 804, DIRECTED MISSED | A directed message from the given node was not received by the VCD 723 within the allotted time, and one was expected. | Verify that the given node number is connected to the same coaxial cable (the MicroTrac LAN) as the VCD 723, and that it is operational. |
| 805, LAN - NO TX ROOM | Not enough memory is allocated in the MicroTrac memory to store all of the LAN messages that need to be transmitted. | Contact MagneTek. The software on the MicroTrac circuit card needs to be changed. |
| 806, LAN - NO RX ROOM | Not enough memory is allocated in the MicroTrac memory to store and process all of the LAN messages that have been received. | Contact MagneTek. The software on the MicroTrac circuit card needs to be changed. |

## Troubleshooting Flowcharts

If the VCD 723 malfunctions, locate the cause and take corrective action by following the flowcharts in this section.

### A. TROUBLESHOOTING MOTOR SYMPTOMS



### B. TROUBLESHOOTING FOR FAULT CONDITIONS



**WARNING**

Oscilloscope chassis may be at voltages potentially hazardous to life if not properly grounded. If oscilloscope is used to measure high voltage waveforms, use only a dual channel oscilloscope in the differential mode with X100 probes. Always connect oscilloscope chassis to earth ground.

**WARNING**

Voltages dangerous to life exist when equipment is open and energized. Do not work alone.

**CAUTION**

To prevent equipment damage always remove incoming three-phase power before test equipment is connected or removed. Never disconnect or connect the wiring while the power is applied.

## Chart 1. Motor Does Not Rotate

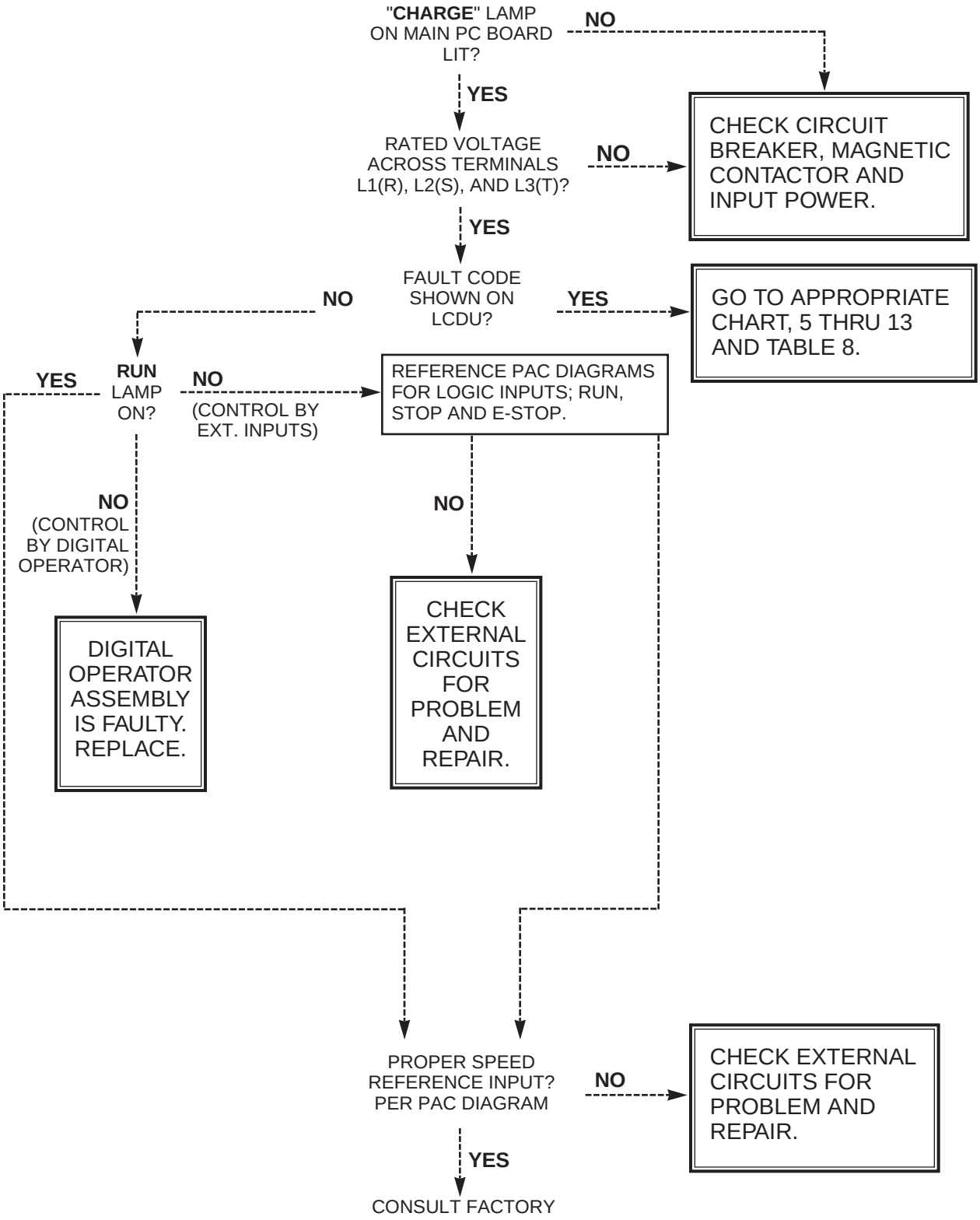


Chart 2. **Motor Stalls During Operation**

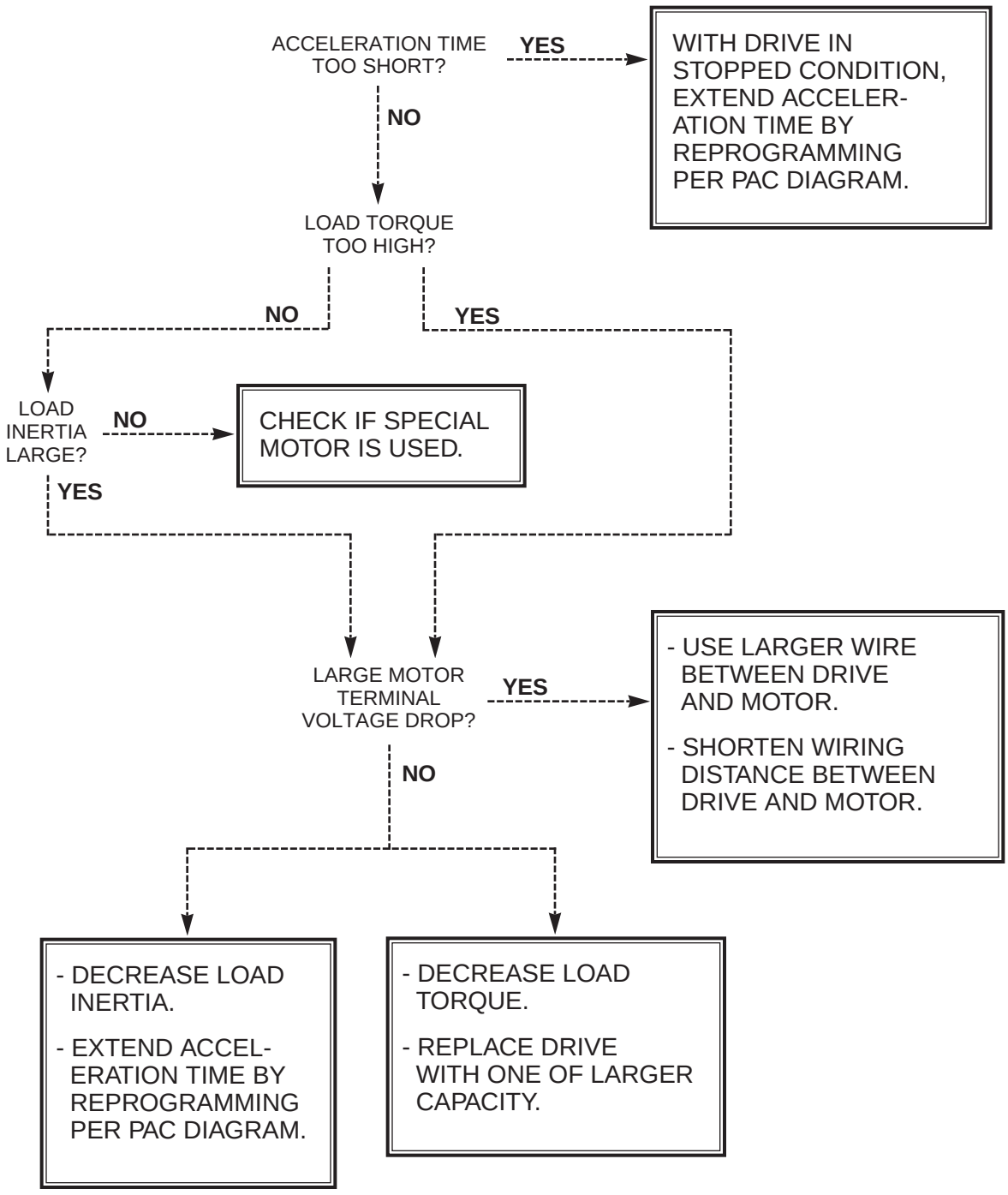


Chart 3. **Motor Does Not Rotate At Set Speed**

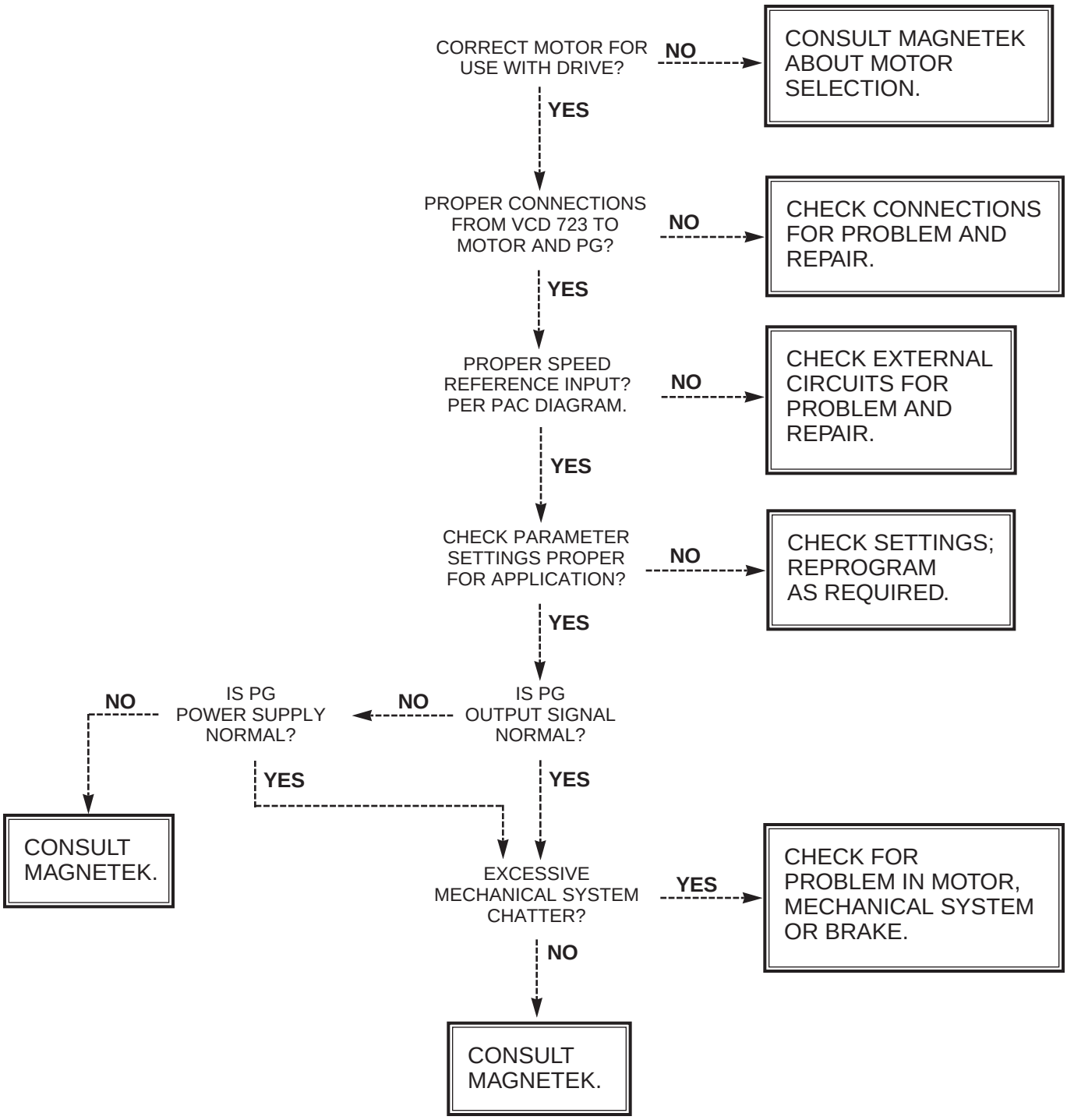


Chart 4. **Motor Hunting**

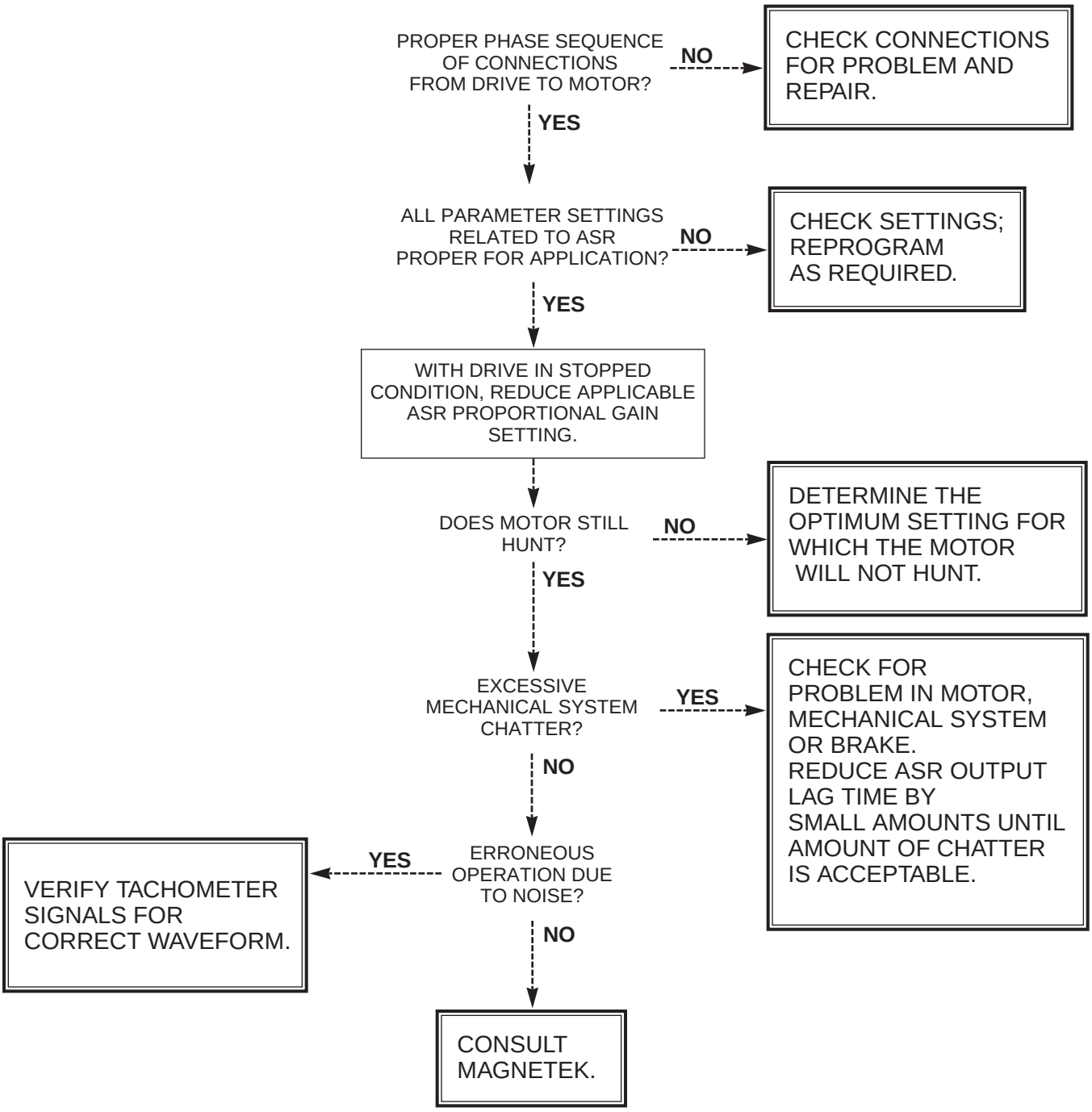


Chart 5. **Overvoltage (*ou*) Fault Indication**

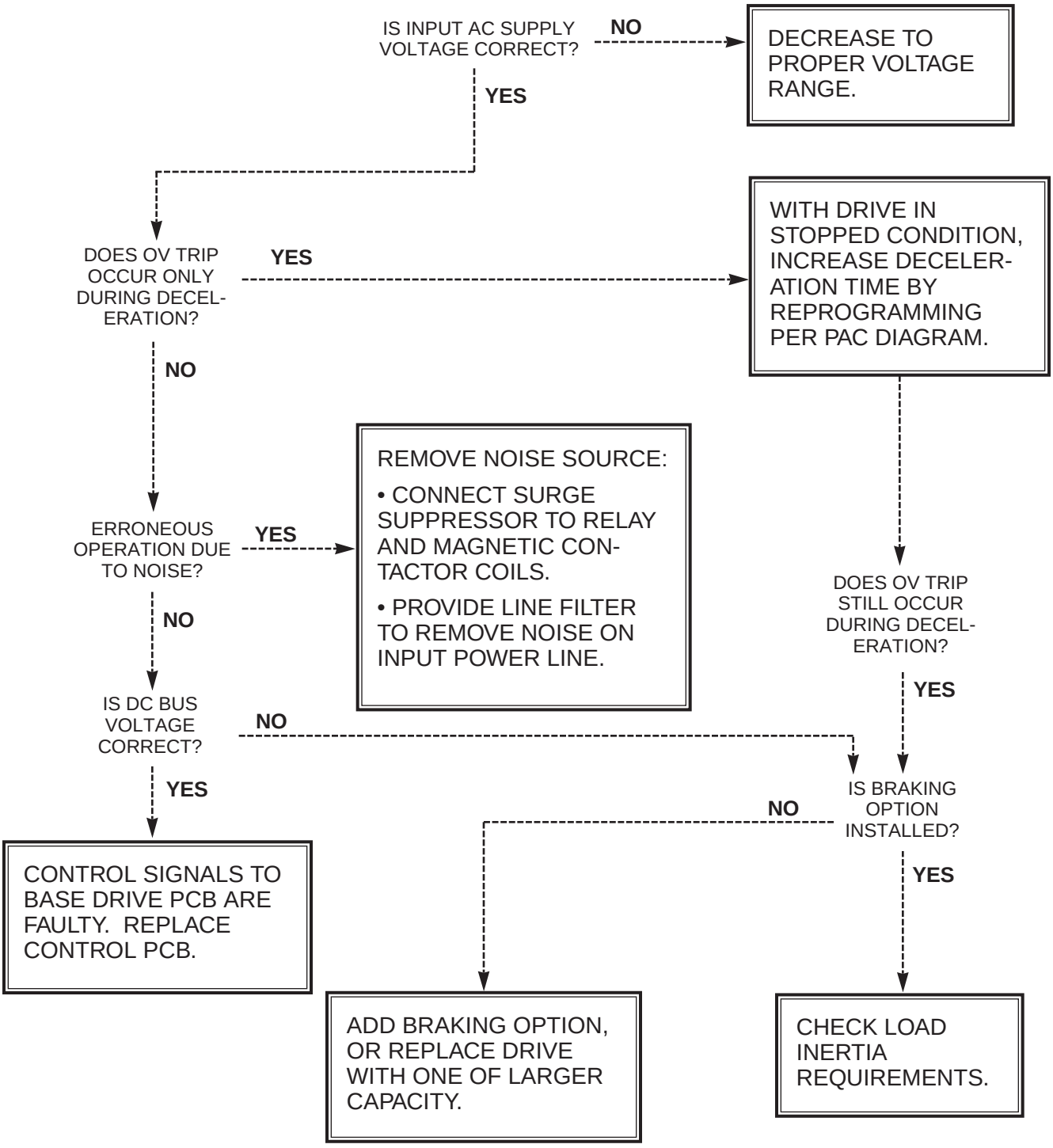
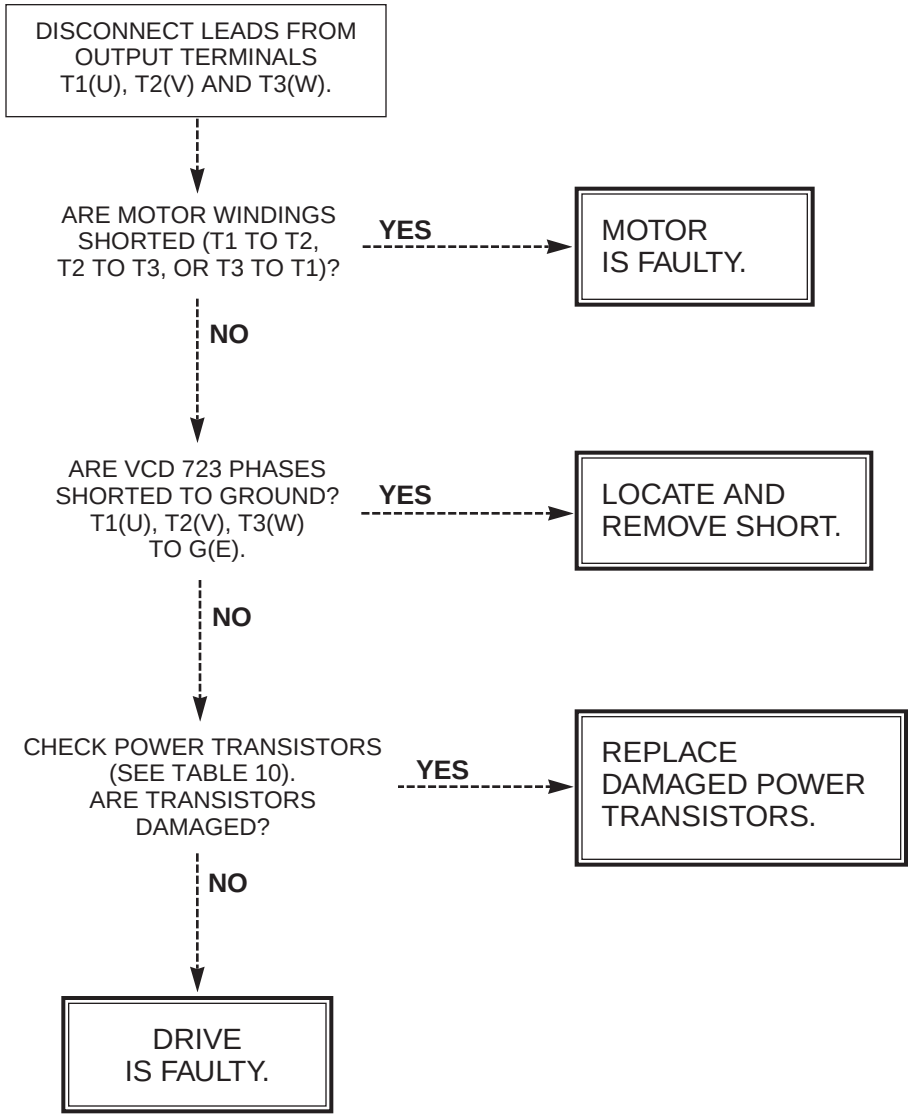


Chart 6. **Blown Fuse (*FU*) Fault Indication**




**WARNING**

**DO NOT REPLACE DC BUS FUSE WITHOUT**

**FIRST CHECKING OUTPUT TRANSISTORS.**

Chart 7. **Overcurrent (*oC*) Fault Indication**

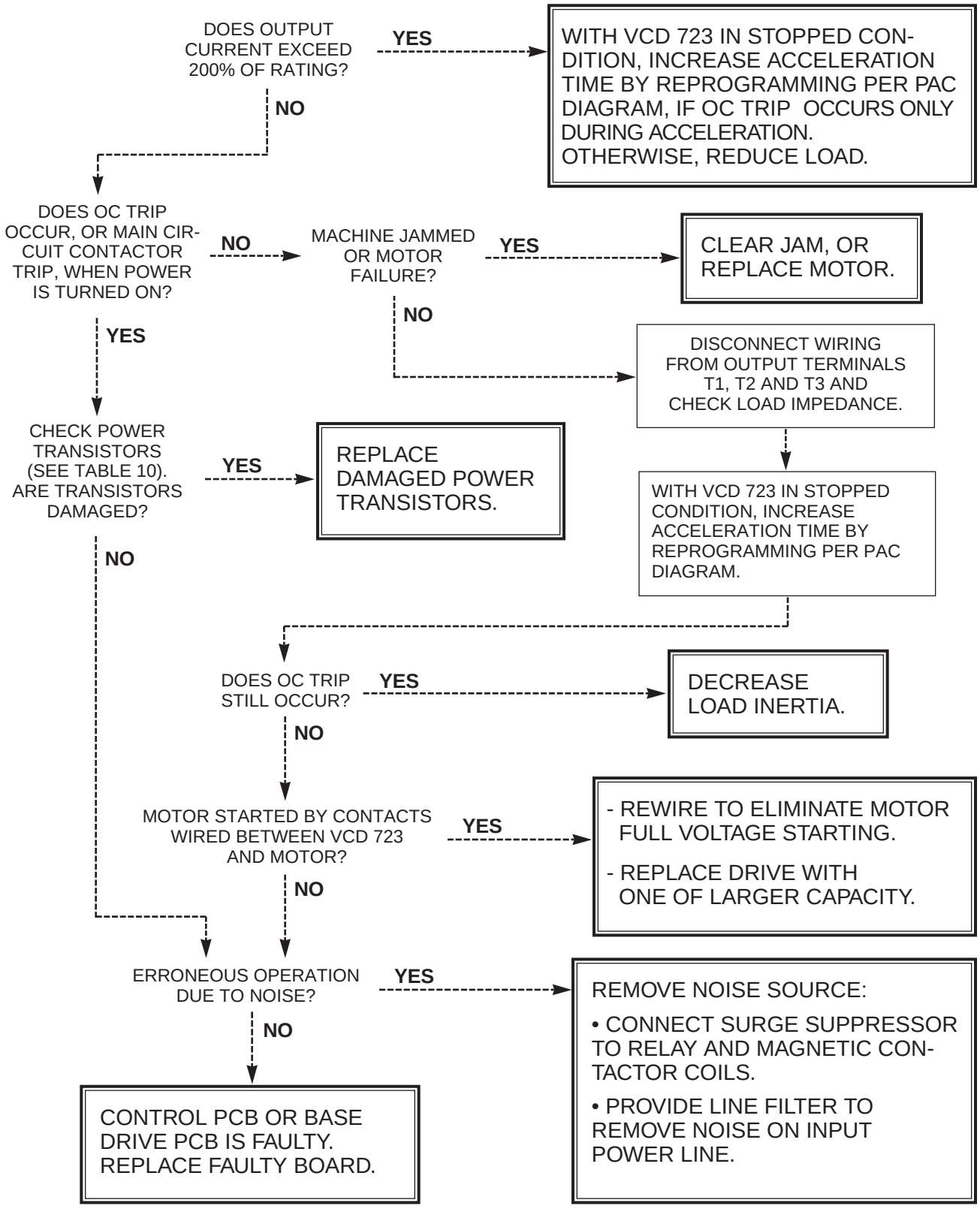


Chart 8. **Overload (*oL*) Fault Indication**

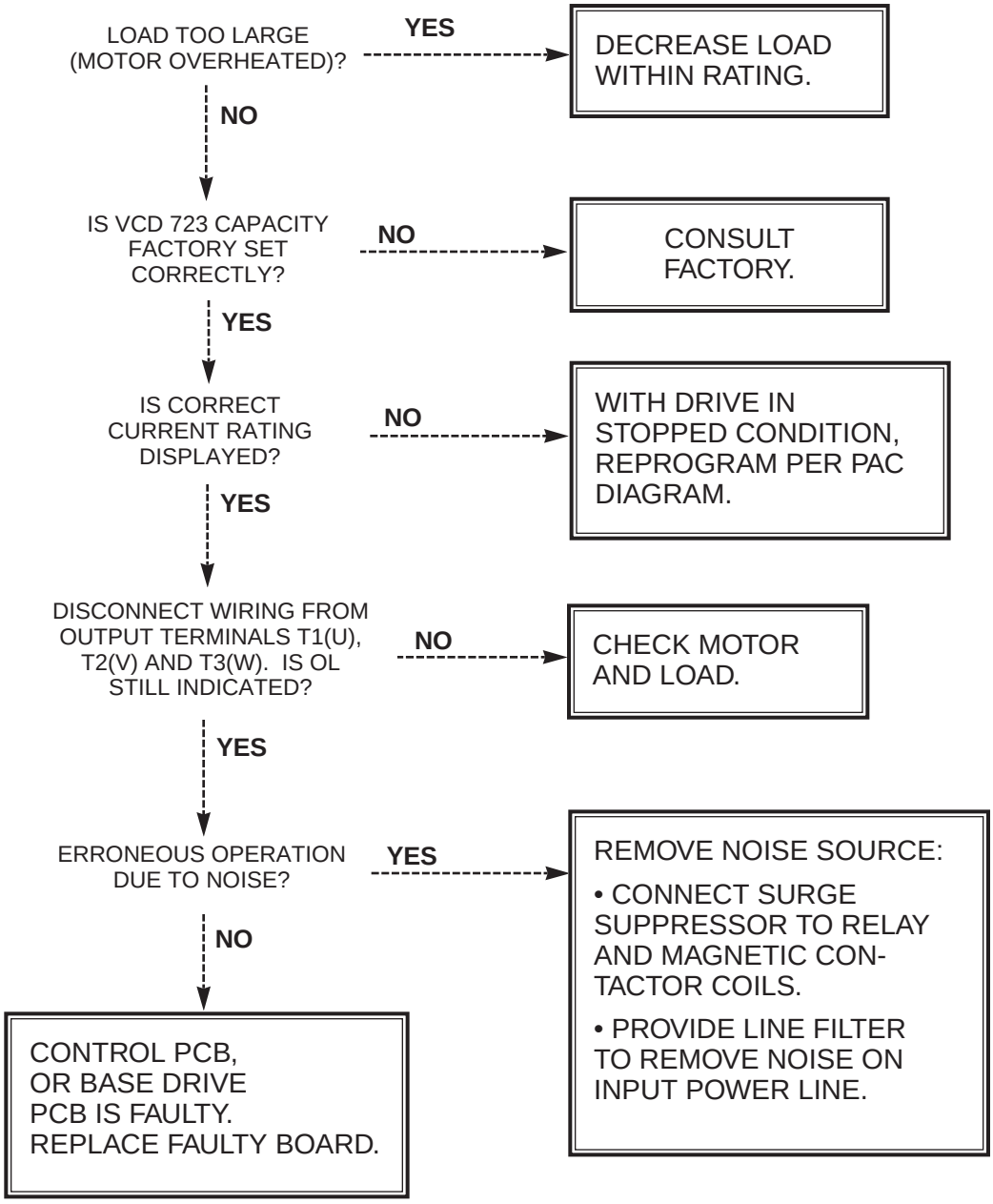


Chart 9. **Underload (*uU*) Fault Indication**

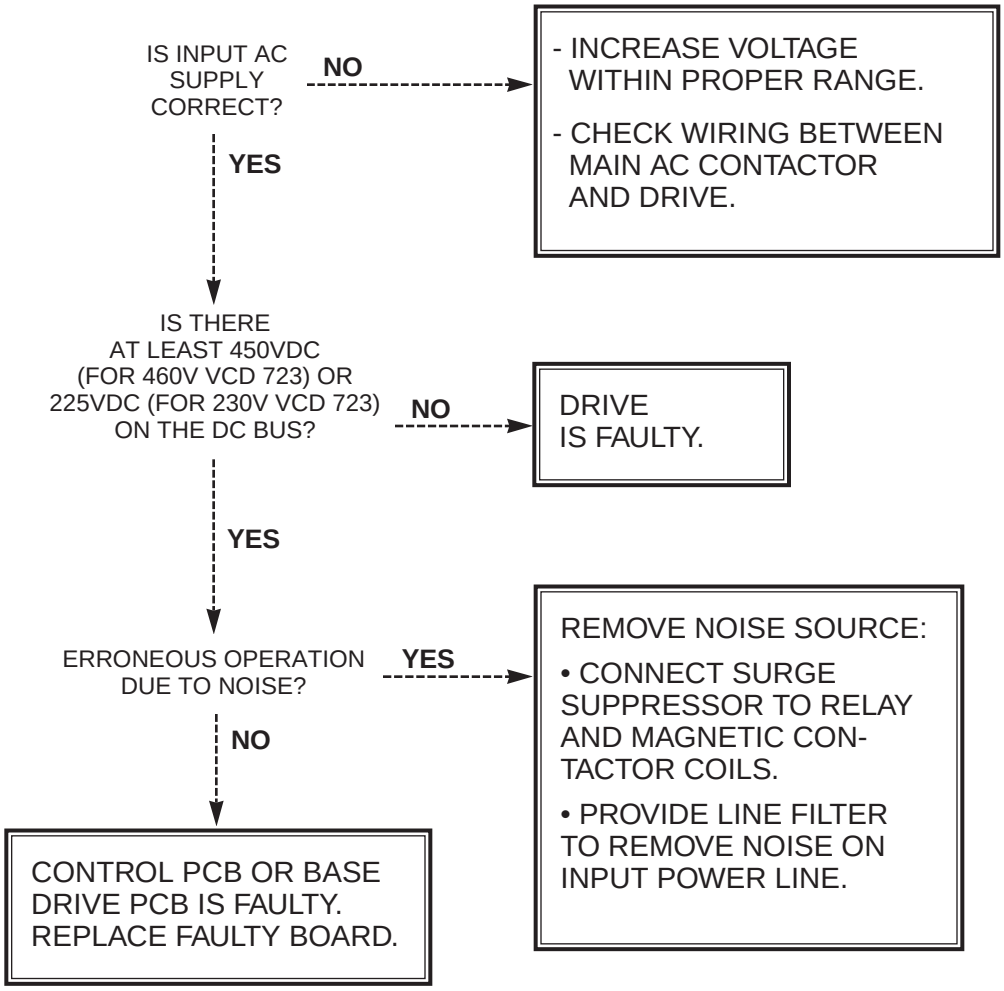


Chart 10. **Inverter Overheated (*oH*) Fault Indication**

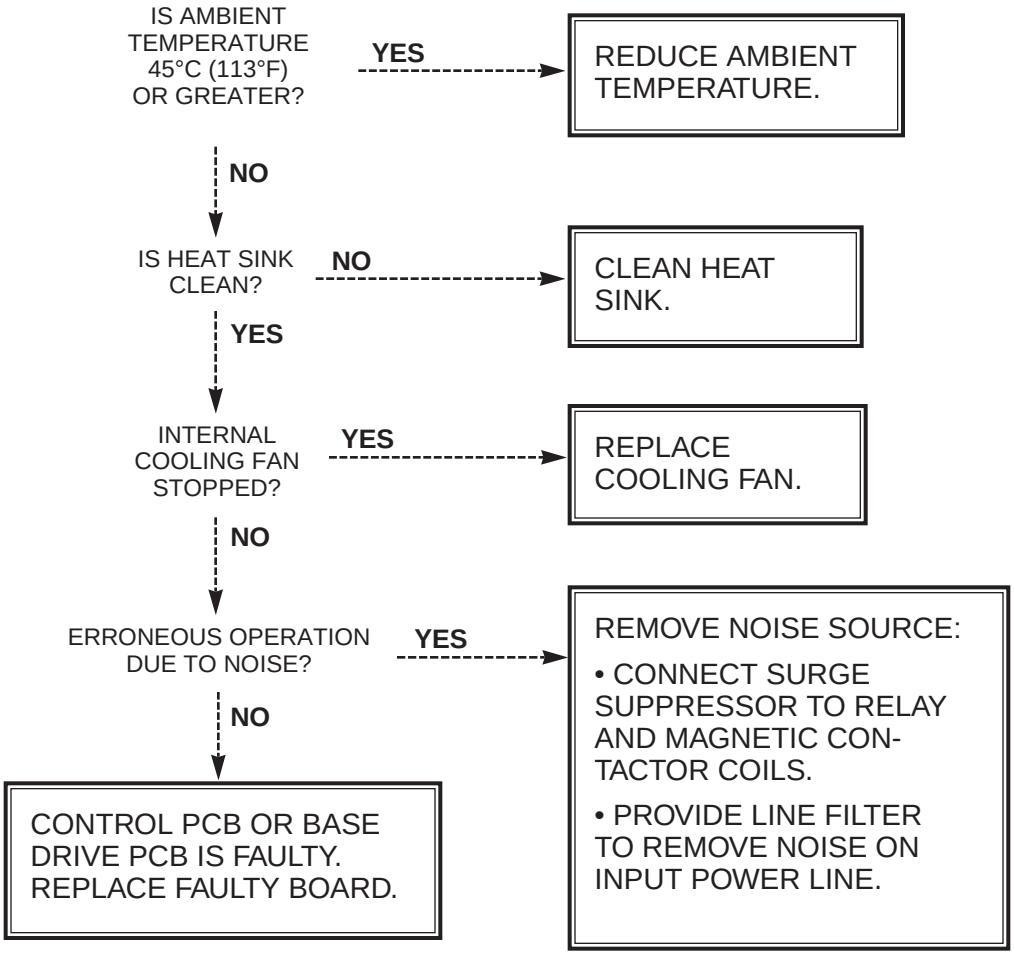


Chart 11. **Control Function Error (*CPF*_ _ ) Fault Indication**

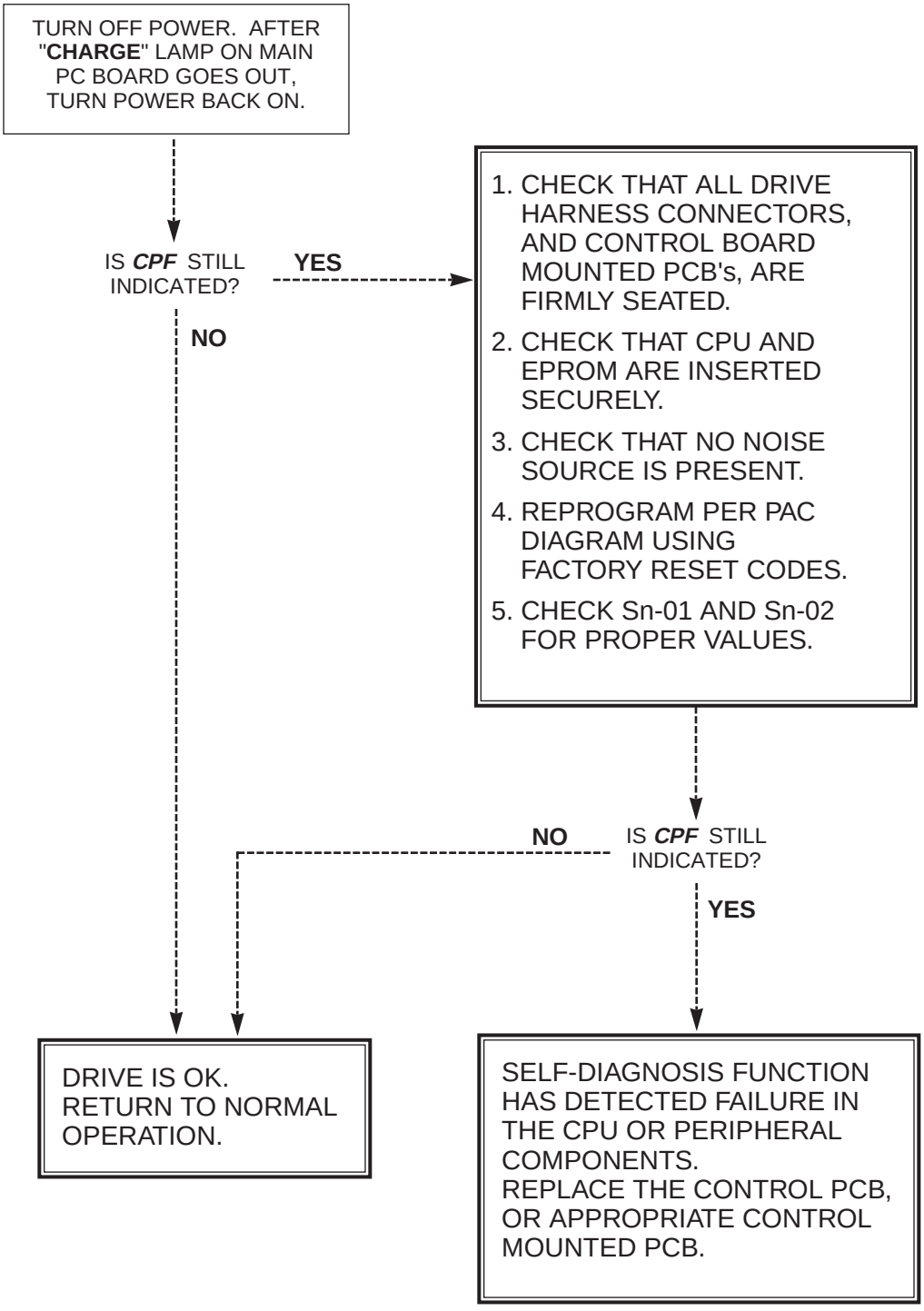


Chart 12. **External Fault (*EF_* ) Indication**

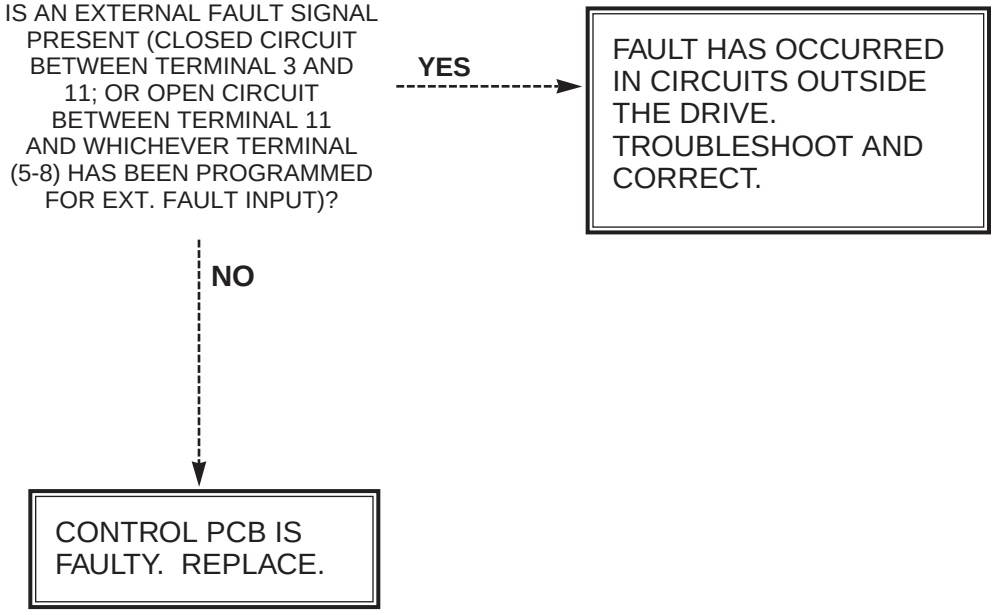


Chart 13. **Power Supply Verification**

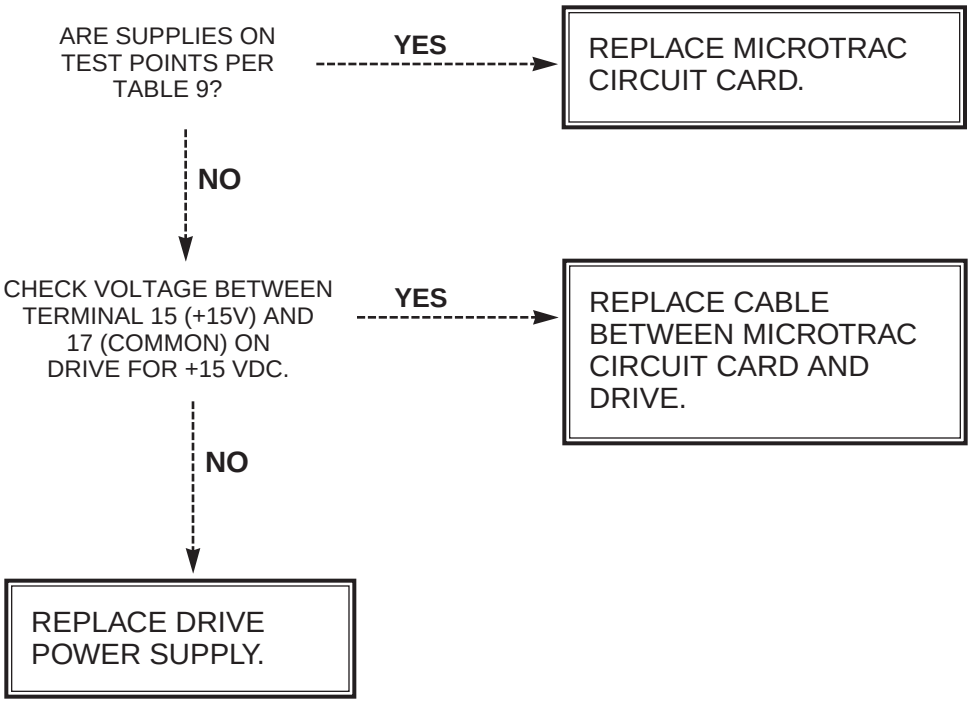



Table 9. **AC MicroTrac Circuit Card Test Points**

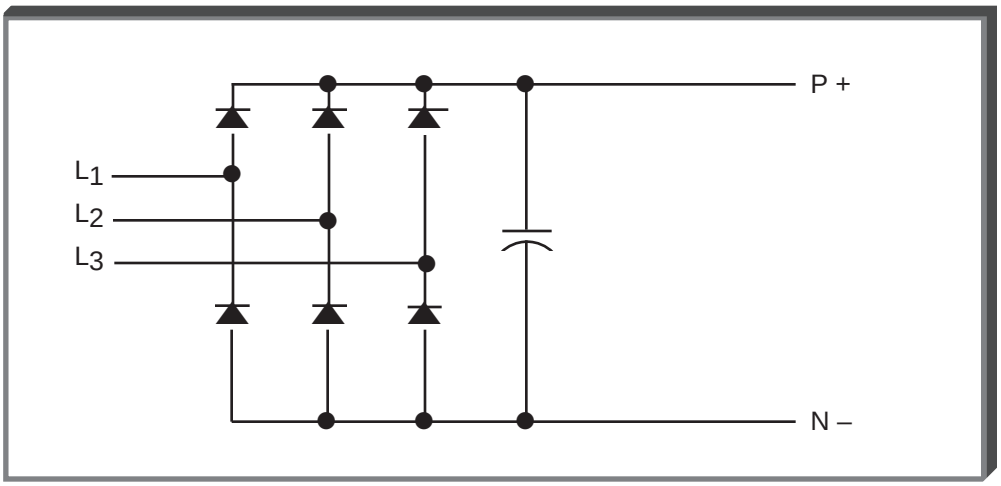
| | |
|---|---|
| TP1 - TP13 | For use by MagneTek Engineering |
| TP14 | Analog Input 0 (+/-10 VDC) |
| TP15 | Analog Input 1 (+/-10 VDC) |
| TP16 | Analog Output 0 (+/-10 VDC) |
| TP17 | Analog Output 1 (+/-10 VDC) |
| TP18 | +10VREF |
| TP19 | -10VREF |
| TP20 | -15 VDC Supply |
| TP21 | +5 VDC Supply |
| TP22 | +15 VDC Supply |
| TP23 | +24 VDC Supply |
| TP24 | Power Supply Common |
| TP25 | Power Supply Common |

## Diode and Transistor Module Resistance Test

Measure the resistance across the module terminals with a volt-ohm meter. Set the meter at the X1 range. The measured resistance should be within the values listed in Table 10.

### *Diode Module*

RESISTANCE TEST FOR 3Ø CONVERTER MODULES (BRIDGE RECT)




VOM RESISTANCE SCALE R x 1
+ IS THE POSITIVE POLARITY LEAD*
- IS THE NEGATIVE POLARITY LEAD

*THE VOM RED LEAD IS NOT NECESSARILY THE POSITIVE POTENTIAL IN THE RESISTANCE MODE. FOR THESE TESTS THE + LEAD REFERS TO THE POSITIVE POTENTIAL. MAKE SURE YOU KNOW WHICH POLARITY YOU HAVE ON YOUR VOM.

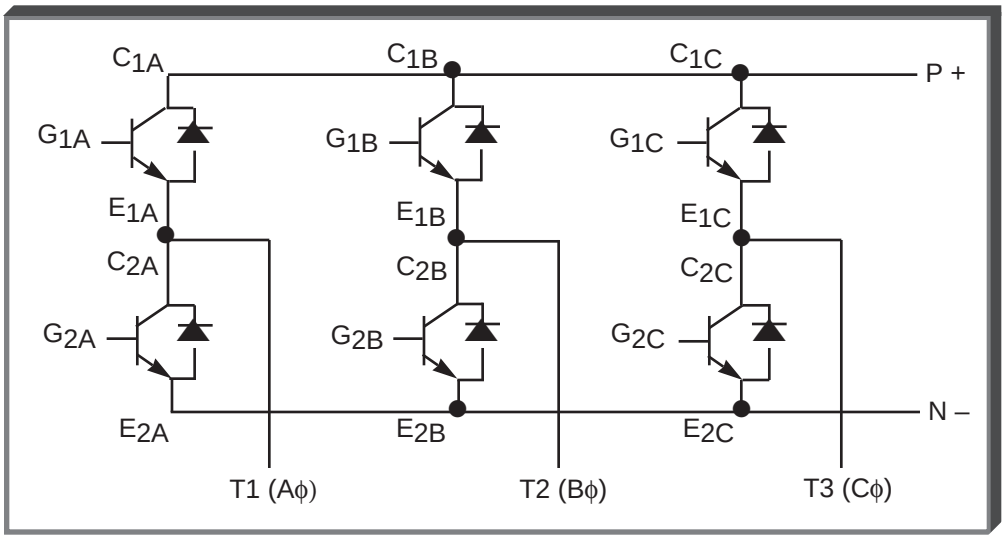
Table 10. **Diode Module Resistances**

| + ON | – ON | NORMAL READING (OHMS) | ABNORMAL READING (OHMS) | + ON | – ON | NORMAL READING (OHMS) | ABNORMAL READING (OHMS) |
|---|---|---|---|---|---|---|---|
| L1 | P | 10 to 50 | 0 or INFINITE | L1 | N | INFINITE | LESS THAN 1M |
| L2 | P | | | L2 | N | | |
| L3 | P | | | L3 | N | | |
| N | L1 | | | P | L1 | | |
| N | L2 | | | P | L2 | | |
| N | L3 | | | P | L3 | | |
| | | | | P | N | MAGNITUDE OF CAP CHARGE TO INFINITE | 0 or INFINITE |

*Transistor Module*

Measure the resistance across the module terminals with a volt-ohm meter. Set the meter to the X1 range. The measured resistance should be within the values listed in Table 11.

RESISTANCE TEST FOR 3Ø TRANSISTOR MODULES




VOM RESISTANCE SCALE R x 1
+ IS THE POSITIVE POLARITY LEAD*
- IS THE NEGATIVE POLARITY LEAD

*THE VOM RED LEAD IS NOT NECESSARILY THE POSITIVE POTENTIAL IN THE RESISTANCE MODE. FOR THESE TESTS THE + LEAD REFERS TO THE POSITIVE POTENTIAL. MAKE SURE YOU KNOW WHICH POLARITY YOU HAVE ON YOUR VOM.
**OR 0.3 TO 0.7 ON DIGITAL METER SET TO DIODE DROP SCALE.

Table 11. **Transistor Module Resistances**

| + ON | – ON | NORMAL READING (OHMS) | ABNORMAL READING (OHMS) | + ON | – ON | NORMAL READING (OHMS) | ABNORMAL READING (OHMS) |
|---|---|---|---|---|---|---|---|
| P+ | T1 | | | G1A | T1 | | |
| P+ | T2 | | | G1B | T2 | | LESS |
| P+ | T3 | | | G1C | T3 | INFINITE | |
| T1 | N- | INFINITE | 0 | G2A | N- | | THAN |
| T2 | N- | | | G2B | N- | | |
| T3 | N- | | | G2C | N- | | 1M |
| T1 | P+ | | | T1 | G1A | | |
| T2 | P+ | | | T2 | G1B | | LESS |
| T3 | P+ | 5** to 50 | 0 or INFINITE | T3 | G1C | INFINITE | |
| N- | T1 | | | N- | G2A | | THAN |
| N- | T2 | | | N- | G2B | | |
| N- | T3 | | | N- | G2C | | 1M |

## Spare Parts List

Table 12. **Spare Parts List - 230 Volt Drives**

| Description | Qty/Drive | Part Number |
|---|---|---|
| Transistor Module | | |
| 3HP | 1 | 50207804 |
| 5HP | 1 | 50207805 |
| 7.5HP | 3 | 50207806 |
| 10HP | 3 | 50207807 |
| 15HP | 3 | 50207808 |
| 20HP | 3 | 50207809 |
| 30HP | 6 | 50207810 |
| Diode Module | | |
| 3HP and 5HP | 1 | 50207822 |
| 7.5HP | 1 | 50207823 |
| 10HP | 1 | 50207824 |
| 15HP | 1 | 50173962 |
| 20HP and30HP | 3 | 50184816 |
| Control Board | | |
| 3HP thru 30HP | 1 | 50207937 |
| 50HP | 1 | 50207918 |
| Gate Driver Board | | |
| 3HP | 1 | 50207943 |
| 5HP | 1 | 50207944 |
| 7.5HP | 1 | 50207945 |
| 10HP | 1 | 50207946 |
| 15HP and 20HP | 1 | 50207947 |
| 30HP | 1 | 50207948 |
| Power Supply Board | | |
| 3HP thru 10HP | 1 | 50207964 |
| Cooling Fan | | |
| 3HP thru 7.5HP | 1 | 50207966 |
| 10HP thru 30HP | 1 | 50207919 |
| 50HP | 2 | 50207919 |
| Fuse, DC Bus | | |
| 3HP | 1 | 50184828 |
| 5HP | 1 | 50184829 |
| 7.5HP and 10HP | 1 | 50184830 |
| 15HP | 1 | 50184831 |
| Fuse | | |
| 20HP | 1 | 50207974 |
| Fuse, DC Bus | | |
| 30HP | 1 | 50184859 |
| 50HP | 1 | 50184890 |
| AC MicroTrac Board | | |
| 3HP thru 50HP | 1 | 46S03034-0010 |
| AC MicroTrac Local Display | | |
| 3HP thru 50HP | 1 | 46S03035-0010 |

Table 13. **Spare Parts List - 460 Volt Drives**

| Description | Qty/Drive | Part Number |
|---|---|---|
| Transistor Module | | |
| 3HP | 1 | 50207812 |
| 5HP | 3 | 50207813 |
| 10HP | 3 | 50207814 |
| 15HP | 3 | 50207815 |
| 20HP | 3 | 50207816 |
| 30HP | 3 | 50207817 |
| 40HP and 60HP | 6 | 50207818 |
| 75HP and 100HP | 6 | 50207907 |
| 150HP | 12 | 50207908 |
| 200HP | 12 | 50207909 |
| Diode Module | | |
| 3HP | 1 | 50207825 |
| 5HP and 10HP | 1 | 50207826 |
| 15HP | 1 | 50184817 |
| 20HP | 1 | 50207827 |
| 30HP | 1 | 50184818 |
| 40HP and 60HP | 3 | 50207828 |
| 75HP and 100HP | 6 | 50207914 |
| 150HP | 9 | 50207914 |
| Main Diode Circuit | | |
| 200HP | 6 | 50207915 |
| Control Board | | |
| 3HP thru 40HP | 1 | 50207937 |
| 60HP thru 200HP | 1 | 50207918 |
| Gate Driver Board | | |
| 3HP | 1 | 50207952 |
| 5HP | 1 | 50207953 |
| 10HP | 1 | 50207954 |
| 15HP and 20HP | 1 | 50207955 |
| 30HP | 1 | 50207956 |
| 40HP | 1 | 50207957 |
| 60HP | 1 | 50207958 |
| 75HP | 1 | 50207960 |
| 100HP | 1 | 50207961 |
| 150HP | 1 | 50207962 |
| 200HP | 1 | 50207963 |
| Power Supply Board | | |
| 3HP thru 10HP | 1 | 50207965 |
| Control Board | | |
| 300HP and 400HP | 1 | 50207918 |

Table 13. **Spare Parts List - 460 Volt Drives - Continued**

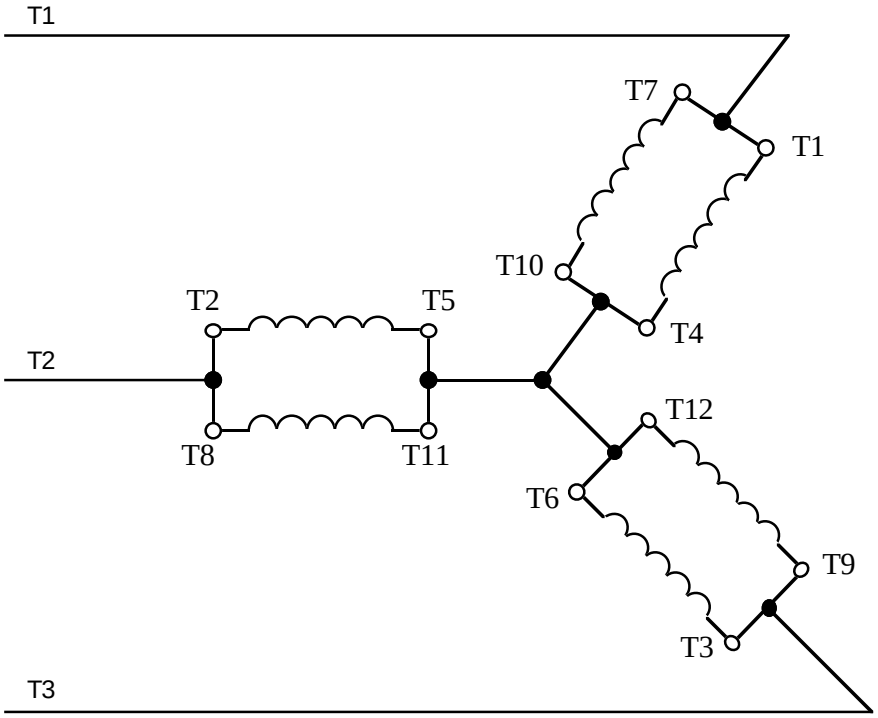
| Description | Qty/Drive | Part Number |
|---|---|---|
| Main Drive Board | | |
| 300HP | 1 | 50207917 |
| 400HP | 1 | 50207916 |
| Sub Drive Board | | |
| 300HP | 3 | 50207925 |
| 400HP | 3 | 50207926 |
| Main Diode Circuit | | |
| 300HP | 6 | 50207915 |
| 400HP | 9 | 50207915 |
| Cooling Fan | | |
| 3HP thru 10HP | 1 | 50207966 |
| 15HP and 20HP | 1 | 50207967 |
| 30HP | 1 | 50207919 |
| 40HP thru 200HP | 2 | 50207919 |
| Fan Unit | | |
| 300HP and 400HP | 3 | 50207929 |
| Fuse, DC Bus | | |
| 3HP | 1 | 50207850 |
| 5HP and 10HP | 1 | 50207851 |
| Fuse | | |
| 15HP and 20HP | 1 | 50207968 |
| 30HP and 40HP | 1 | 50207969 |
| 60HP | 1 | 50207970 |
| 75HP | 1 | 50207971 |
| 100HP | 1 | 50207972 |
| 150HP | 1 | 50173998 |
| 200HP | 1 | 50207973 |
| AC MicroTrac Board | | |
| 3HP thru 400HP | 1 | 46S03034-0010 |
| AC MicroTrac Local Display | | |
| 3HP thru 400HP | 1 | 46S03035-0010 |

## VCM Motor/PG Connection

The vector control motor (VCM) windings must be connected to the VCD 723 as shown in the following table and illustration.

Table 14. **Connection of VCM**

| CONNECTION | T1 | T2 | T3 | CONNECT ALL TOGETHER |
|---|---|---|---|---|
| Parallel Star | T1 & T7 | T2 & T8 | T3 & T9 | T4 - T5 - T6 - T10 - T11 - T12 |




The VCM contains two thermistors. Connect only one thermistor (VCM leads M1 & M11) to the VCD 723. The other thermistor (leads M2 & M22) is a spare.

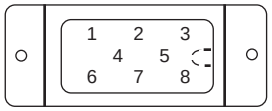
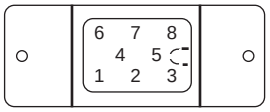
Pulse Generator connections are shown in the following tables.

Table 15. **TB1 - PG Connection**

| FUNCTION | TB1 TERMINAL | EPC MODEL 755A *(1)* | BEI MODEL E25 |
|---|---|---|---|
| +12V (200mA) | 1 | White | Red |
| 0V | 2 | Black | Black |
| A+ | 3 | Red | Yellow |
| A– | 4 | Green | Wht/Yel |
| B+ | 5 | Brown | Blue |
| B– | 6 | Yellow | Wht/Blue |
| SHIELD | 7 | Shield | Green |

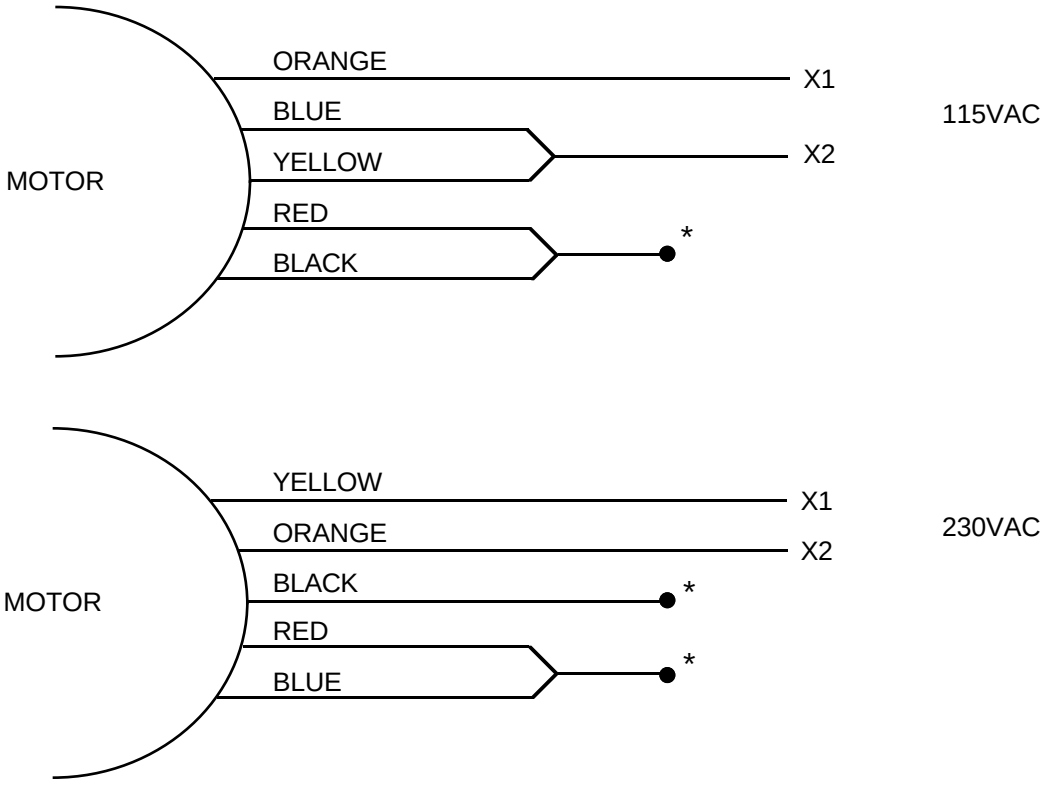
*(1)* For PG, EPC Model 755A (provided as standard), Orange and Blue wires are not used.

Table 16. **Connectors on PG Card**

| CONNECTOR NO. | FUNCTION | TERMINAL ARRANGEMENT *(2)* | WIRE SIZE |
|---|---|---|---|
| CA1 | For Pulse Generator |  | 18 GA (0.75 $mm^2$) |
| CA2 | For Pulse Monitor |  | 18 GA (0.75 $mm^2$) |

*(2)* Top view (from pin connections).

For VCM frame sizes 180 & 210, the blower motor should be connected as shown in the following illustration.




* Tied off (if shown paired) and insulated.

# Motor Parameters

## *Parameter Calculation*

This procedure must be performed if the motor to be used with the VCD 723 Drive is NOT a MagneTek VCM induction AC vector motor. This calculation is to be used for SPEED CONTROL MODE ONLY with tachometer feedback (PG). When the application requires torque control, motor parameters should be set and adjusted by using the tuning procedure.

## Required Motor Data For Calculation

This information is usually located on the motor nameplate, except for the no-load current. If the motor manufacturer is unable to supply this information, use 30% for the dn-07 data value.

| | |
|---|---|
| Motor Output (HP) : | HP |
| Motor Voltage (V) : | $V_m$ |
| Motor Rated Speed (RPM): | $N_R$ |
| Motor Base Speed (RPM): | $N_S$ |
| No. of Poles: | pp |
| Full Load Amps (FLA): | $I_{FLA}$ |
| No-Load Amps (NLA): | $I_{NLA}$ |

## Calculation Method

dn-XX Calculation:

(1) dn-01 Base Speed

dn-01 = See Table A

(2) dn-02 Top Speed

(a) For constant torque applications

dn-02 = dn-01

(b) For constant HP applications

dn-02 = Top Speed (dn-02 ≤ 2 • dn-01)

(3) dn-03 No. of Poles

dn-03 = pp (See Table A)

(4) dn-04 No-Load Voltage: $V_{NL}$

dn-04 = $V_{NL}$ (See Table B)

(5) dn-05 Torque producing current: IT

$$\text{dn-05} = \sqrt{(I_{FLA})^2 - (I_{NLA})^2}$$

(6) dn-06 Slip Frequency: SF

$$dn\text{-}06 = \left(\frac{V_M}{V_{NL}}\right)^2 \left[\frac{N_S - N_R}{N_S}\right] x\ 60$$

(7) dn-07 Magnetizing Current: IM

$$dn\text{-}07 = \frac{I_{NLA}}{dn\text{-}05}\ x\ 100\%$$

(IM = 30% if no-load current not available)

(8) dn-08 thru dn-18 = Factory default values acceptable

(9) Cn-09 (PG Constant) = PPR of Tachometer (Pulses Per Revolutions)

Table A. Base Speed

| fl | Poles | dn-01 |
|---|---|---|
| 60 | 4 | 1750 RPM |
| 50 | 4 | 1450 RPM |
| 60 | 6 | 1150 RPM |
| 60 | 8 | 850 RPM |

Table B. No-Load Voltage (V)

| Vm | $V_{NL}$ |
|---|---|
| 230V | 210V |
| 460V | 420V |

(10) Optional Adjustments

On-02: 0110
└—— Disable thermistor and rotor heat model

On-03: 1010
└—— Disable overvoltage protection when Dynamic Braking Option is installed.

## *Sample Calculation*

**Motor Data**

| | |
|---|---|
| Motor Output: | HP = 15 |
| Motor Voltage: | $V_M$ = 230V |
| Motor Rated Speed: | $N_R$ = 1763 RPM |
| Motor Base Speed: | $N_S$ = 1800 RPM |
| No. of Poles: | pp = 4 |
| Full Load Amps: | $I_{FLA}$ = 39.4 A |
| No-Load Amps: | $I_{NLA}$ = 12.0 A |

**Calculate dn-XX's**

dn-01 ($N_R$) = 1750
dn-02 ($N_S$) = 1750
dn-03 (pp) = 4
dn-04 ($V_{NL}$) = 210

dn-05 = 38

$$dn\text{-}05 = \sqrt{(I_{FLA})^2 - (I_{NLA})^2}$$

$$dn\text{-}05 = \sqrt{(39.4)^2 - (12)^2}$$

$$dn\text{-}05 = 37.5 \approx 38$$

dn-06 = 1.5

$$dn\text{-}06 = \left(\frac{V_M}{V_{NL}}\right)^2 \left[\frac{N_S - N_R}{N_S} \times 60\right]$$

$$dn\text{-}06 = \left(\frac{230}{210}\right)^2 \left[\frac{1800 - 1763}{1800} \times 60\right]$$

$$dn\text{-}06 = 1.48 \approx 1.5$$

dn-07 = 31.6

$$dn\text{-}07 = \frac{I_{NLA}}{dn\text{-}05} \times 100\%$$

$$dn\text{-}07 = \frac{12}{38} \times 100\%$$

$$dn\text{-}07 = 31.6\%$$

## Node, Channel and Subchannel Assignments

Every device in a MicroTrac system is identified with a Node number, a Channel number, and a Subchannel number, regardless of whether the device uses the Local Area Network or not. These identifiers have different significance for each device and some devices may not need all three fields to provide a unique identification. This appendix lists each device type relating to the VCD 723, and describes the significance of each field for that device.

### *VCD 723 Constants*

**CN-09 Settings**
CN-09 sets the digital tach pulses per revolution. This is normally set for either 1024 or 2500 PPR depending upon the type of tach used on the motor.

**DN-01 thru DN-18 Settings**
DN-01 thru DN-18 set the motor constants per the following tables:

| CONSTANT | DESCRIPTION | INITIAL VALUE | UNITS |
|---|---|---|---|
| Dn-01 | MOTOR BASE SPEED | 1750 | RPM |
| Dn-02 | MOTOR MAXIMUM SPEED | 1750 | RPM |
| Dn-03 | NUMBER OF MOTOR POLES | 4 | ~ |
| Dn-04 | MOTOR NO LOAD VOLTAGE | PER TABLE | VAC |
| Dn-05 | MOTOR RATED PRIMARY CURRENT | PER TABLE | AAC |
| Dn-06 | RATED SLIP FREQUENCY | PER TABLE | HZ |
| Dn-07 | EXCITATION CURRENT REFERENCE | PER TABLE | % |
| Dn-08 | PRIMARY RESISTANCE, USED WITH OPT TRQ BOARD | PER TABLE | % |
| Dn-09 | LEAKAGE COEFFICIENT, USED WITH OPT TRQ BOARD | PER TABLE | % |
| Dn-10 | MOTOR IRON LOSS | PER TABLE | % |
| Dn-11 | MOTOR MACHINERY LOSS | PER TABLE | % |
| Dn-12 | SECONDARY CIRCUIT TIME CONSTANT | PER TABLE | MSEC |
| Dn-13 | LEAKAGE SAT COEF, USED WITH OPT TRQ BOARD | 1.20 | ~ |
| Dn-14 | ROTOR HEAT GAIN | 0.00 | ~ |
| Dn-15 | ROTOR HEAT TIME CONSTANT | 30 | MIN |
| Dn-16 | IRON CORE SATURATION COMP COEFFICIENT 1 | 0.5 | ~ |
| Dn-17 | IRON CORE SATURATION COMP COEFFICIENT 2 | 0.75 | ~ |
| Dn-18 | MOTOR OVERHEAT TEMPERATURE | 155 | °C |

## DN-01 Thru DN-18 Motor Setting Constants

| RTD MTR VAC | VCM MODEL NO. | HP | Dn-04 | Dn-05 | Dn-06 | Dn-07 | Dn-08 | Dn-09 | Dn-10 | Dn-11 | Dn-12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | VMA003 | 3 | 175 | 8.03 | 1.57 | 51.6 | 5.1 | 8.77 | 6.7 | 0.4 | 138 |
| | VMA005 | 5 | 175 | 13.34 | 1.37 | 56.1 | 4.0 | 8.39 | 6.6 | 0.3 | 140 |
| | VMA7P5 | 7.5 | 175 | 19.94 | 1.83 | 37.4 | 3.3 | 8.05 | 3.4 | 0.6 | 143 |
| | VMA010 | 10 | 175 | 26.24 | 1.67 | 33.5 | 2.7 | 6.62 | 3.2 | 0.7 | 171 |
| | VMA015 | 15 | 175 | 39.07 | 1.33 | 28.4 | 3.3 | 5.84 | 1.4 | 1.0 | 212 |
| 190 | VMA020 | 20 | 175 | 52.11 | 1.17 | 24.7 | 2.9 | 5.86 | 1.4 | 0.8 | 268 |
| | VMA025 | 25 | 180 | 63.32 | 1.03 | 29.1 | 2.1 | 5.84 | 1.5 | 1.0 | 264 |
| | VMA030 | 30 | 180 | 75.61 | 1.13 | 27.2 | 1.9 | 5.32 | 1.3 | 0.8 | 255 |
| | VMA040 | 40 | 175 | 108.0 | 0.67 | 34.6 | 1.5 | 9.68 | 1.3 | 1.0 | 154 |
| | VMA050 | 50 | 175 | 133.7 | 0.67 | 30.9 | 1.4 | 8.63 | 1.2 | 0.8 | 165 |
| | VMA003 | 3 | 210 | 6.80 | 1.37 | 61.0 | 4.7 | 9.86 | 7.4 | 0.4 | 116 |
| | VMA005 | 5 | 215 | 11.00 | 1.23 | 71.2 | 3.6 | 9.86 | 7.6 | 0.3 | 118 |
| | VMA7P5 | 7.5 | 215 | 16.26 | 1.67 | 44.2 | 3.0 | 8.21 | 3.9 | 0.6 | 135 |
| | VMA010 | 10 | 215 | 21.45 | 1.20 | 39.8 | 2.4 | 7.05 | 3.7 | 0.7 | 162 |
| | VMA015 | 15 | 215 | 31.92 | 1.20 | 34.1 | 2.9 | 6.23 | 1.6 | 1.0 | 176 |
| 230 | VMA020 | 20 | 215 | 42.55 | 1.07 | 29.3 | 2.5 | 6.20 | 1.5 | 0.8 | 247 |
| | VMA025 | 25 | 215 | 53.16 | 0.93 | 33.1 | 1.9 | 6.21 | 1.6 | 1.0 | 240 |
| | VMA030 | 30 | 215 | 63.54 | 1.00 | 30.5 | 1.8 | 5.73 | 1.4 | 0.8 | 263 |
| | VMA040 | 40 | 215 | 85.36 | 0.60 | 28.1 | 1.3 | 6.52 | 1.6 | 1.0 | 230 |
| | VMA050 | 50 | 215 | 109.04 | 0.60 | 36.7 | 1.2 | 8.90 | 1.4 | 0.8 | 163 |
| | VMB003 | 3 | 350 | 4.02 | 1.57 | 51.6 | 5.1 | 8.77 | 6.7 | 0.4 | 139 |
| | VMB005 | 5 | 355 | 6.58 | 1.37 | 57.7 | 3.9 | 8.39 | 6.7 | 0.3 | 140 |
| | VMB7P5 | 7.5 | 350 | 9.97 | 1.83 | 37.4 | 3.3 | 8.05 | 3.4 | 0.6 | 143 |
| | VMB010 | 10 | 355 | 12.94 | 1.67 | 34.5 | 2.7 | 6.62 | 3.3 | 0.7 | 171 |
| | VMB015 | 15 | 350 | 19.54 | 1.33 | 28.4 | 3.3 | 5.84 | 1.4 | 1.0 | 212 |
| | VMB020 | 20 | 355 | 25.69 | 1.17 | 25.4 | 2.8 | 5.86 | 1.4 | 0.8 | 268 |
| | VMB025 | 25 | 360 | 31.66 | 1.03 | 29.1 | 2.1 | 5.84 | 1.5 | 1.0 | 264 |
| | VMB030 | 30 | 360 | 37.80 | 1.13 | 27.2 | 1.9 | 5.32 | 1.3 | 0.8 | 255 |
| 380 | VMB040 | 40 | 355 | 53.23 | 0.67 | 35.6 | 1.4 | 9.68 | 1.3 | 1.0 | 154 |
| | VMB050 | 50 | 355 | 65.90 | 0.67 | 31.8 | 1.3 | 8.63 | 1.3 | 0.8 | 165 |
| | VMB060 | 60 | 360 | 75.16 | 0.80 | 26.0 | 1.3 | 4.70 | 1.2 | 1.2 | 309 |
| | VMB075 | 75 | Consult MagneTek | | | | | | | | |
| | VMB100 | 100 | | | | | | | | | |
| | VMB150 | 150 | | | | | | | | | |
| | VMB200 | 200 | | | | | | | | | |
| | VMB300 | 300 | | | | | | | | | |
| | VMB400 | 400 | | | | | | | | | |
| | VMB003 | 3 | 425 | 3.34 | 1.37 | 62.5 | 4.6 | 9.86 | 7.6 | 0.4 | 116 |
| | VMB005 | 5 | 430 | 5.50 | 1.23 | 71.2 | 3.6 | 9.86 | 7.6 | 0.3 | 118 |
| | VMB7P5 | 7.5 | 425 | 8.25 | 1.67 | 43.1 | 3.0 | 8.49 | 3.8 | 0.6 | 135 |
| | VMB010 | 10 | 430 | 10.72 | 1.20 | 40.0 | 2.4 | 7.05 | 3.7 | 0.7 | 162 |
| | VMB015 | 15 | 425 | 16.15 | 1.20 | 33.3 | 3.0 | 6.23 | 1.6 | 1.0 | 176 |
| | VMB020 | 20 | 430 | 21.28 | 1.07 | 29.3 | 2.5 | 6.20 | 1.5 | 0.8 | 247 |
| | VMB025 | 25 | 435 | 26.29 | 0.93 | 33.9 | 1.9 | 6.21 | 1.7 | 1.0 | 240 |
| | VMB030 | 30 | 435 | 31.41 | 1.00 | 31.2 | 1.7 | 5.73 | 1.5 | 0.8 | 263 |
| 460 | VMB040 | 40 | 435 | 42.19 | 0.60 | 28.8 | 1.2 | 6.52 | 1.6 | 1.0 | 230 |
| | VMB050 | 50 | 435 | 53.89 | 0.60 | 37.6 | 1.2 | 8.86 | 1.4 | 0.8 | 163 |
| | VMB060 | 60 | 440 | 61.60 | 0.73 | 30.2 | 1.2 | 4.88 | 1.3 | 1.2 | 271 |
| | VMB075 | 75 | Consult MagneTek | | | | | | | | |
| | VMB100 | 100 | | | | | | | | | |
| | VMB150 | 150 | | | | | | | | | |
| | VMB200 | 200 | | | | | | | | | |
| | VMB300 | 300 | | | | | | | | | |
| | VMB400 | 400 | | | | | | | | | |

**ON-01 Setting**
ON-01 is factory set for 0000 and should not be changed. This enables the inverter fault circuit which detects tach connection.

**ON-02 Setting**
ON-02 is factory set for 0010. This determines whether the inverter utilizes the motor thermistor or not:

0000 = Control with thermistor
0010 = Control without thermistor

**SN-01 Settings**
SN-01 sets the capacity of the VCD 723 per the following table. SN-01 can be set either by using a numo block to write the decimal value to [260-101-0] or by using the geth block to write the hex value to [723-101-~]. If SN-09 is set for low noise operation, the values shown for continuous current must be reduced by 20%. SN-01automatically determines the setting of CN-19.

| RATED INPUT VAC | VCD MODEL NO. | HP | Sn-01 HEX | Sn-01 DEC | CONTINUOUS RATED CURRENT | POWER LOSS RIDE THRU TIME (CN-19) |
|---|---|---|---|---|---|---|
| 230 | VCD 723-A003 | 3 | 03 | 03 | 9.6 | 1.00 |
| | VCD 723-A005 | 5 | 04 | 04 | 16 | 2.00 |
| | VCD 723-A7P5 | 7.5 | 05 | 05 | 24 | 2.00 |
| | VCD 723-A010 | 10 | 06 | 06 | 32 | 2.00 |
| | VCD 723-A015 | 15 | 07 | 07 | 48 | 2.00 |
| | VCD 723-A020 | 20 | 08 | 08 | 64 | 2.00 |
| | VCD 723-A030 | 30 | 0A | 10 | 96 | 2.00 |
| | VCD 723-A050 | 50 | 0C | 12 | 160 | 2.00 |
| 460 | VCD 723-B003 | 3 | 23 | 35 | 4.8 | 1.00 |
| | VCD 723-B005 | 5 | 24 | 36 | 8 | 2.00 |
| | VCD 723-B010 | 10 | 26 | 38 | 16 | 2.00 |
| | VCD 723-B015 | 15 | 27 | 39 | 24 | 2.00 |
| | VCD 723-B020 | 20 | 28 | 40 | 32 | 2.00 |
| | VCD 723-B030 | 30 | 2A | 42 | 48 | 2.00 |
| | VCD 723-B040 | 40 | 2B | 43 | 64 | 2.00 |
| | VCD 723-B060 | 60 | 2D | 45 | 76.8 | 2.00 |
| | VCD 723-B075 | 75 | 2E | 46 | 128 | 2.00 |
| | VCD 723-B100 | 100 | 2F | 47 | 165 | 2.00 |
| | VCD 723-B150 | 150 | 31 | 49 | 224 | 2.00 |
| | VCD 723-B200 | 200 | 33 | 51 | 300 | 2.00 |
| | VCD 723-B300 | 300 | 35 | 53 | 450 | 2.00 |
| | VCD 723-B400 | 400 | 36 | 54 | 600 | 2.00 |

**SN-02 Setting**
SN-02 is factory set for "FFF" hex (4095 DEC) and should not be changed. This determines that the DN-XX constants are used to define the motor rather than the VCD 723 factory preset values.

**SN-09 Settings**
SN-09 is set to match the input voltage and the inverter carrier frequency as follows:

| SN-09 | 230/460 VAC | 200/400 VAC | LOW CARRIER FREQUENCY | HIGH CARRIER FREQUENCY |
|---|---|---|---|---|
| 0000 | X | | X | |
| 0001 | | X | X | |
| 1000 | X | | | X |
| 1001 | | X | | X |

If set for high carrier frequency (low noise operation), the continuous current rating of the VCD 723 is reduced by 20%. The VCD 723 overload curve is automatically changed.

**SN-12 Settings**
SN-12 determines the reaction of the drive to the status of the contact connected to terminal 3 of the VCD 723. Terminal 3 is always the external fault input and normally would be used as an E-stop input. In the following table, "N.O." means the contact closes on a fault:

| SN-12 | N.O. CONTACT | N.C. CONTACT |
|---|---|---|
| 0100 | X | |
| 0101 | | X |

**SN-15, 16, 17 & 18 Settings**
SN-15 thru SN-18 are set to15 decimal (of hex). This determines that the logic input terminals 5 thru 8 are read by the DCU only. In other words, they have no direct effect on the inverter.

**SN-20, 21, 22, 23 & 24 Settings**
SN-20 thru SN-24 are set to 15 decimal (of hex). This configures the normally open relay contact (terminals 9 & 10) and the four open collector outputs (terminals 25, 26, 28 & 29) for control by the DCU.

**SN-30 Settings**
SN-30 is set for 0100 and should not be changed. This configures the VCD 723 for the torque control mode rather than the speed control mode.

## Node 260 (Dual Port Ram) Assignments

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION |
|---|---|---|---|
| 0 | ~ | NUMO | TORQUE REFERENCE. RANGE IS 0 TO +/- 1.0 |
| 1 | 0 | LOGO | RUN |
| 1 | 1 | LOGO | REVERSE |
| 1 | 2 | LOGO | BASEBLOCK ON |
| 1 | 3 | LOGO | NOT USED |
| 1 | 4 | LOGO | EXTERNAL ERROR (CONTROLLED BY SN-31) |
| 1 | 5 | LOGO | RESET FAULTS |
| 1 | 6 | LOGO | USE ACCEL/DECEL TIME 2 |
| 1 | 7 | LOGO | ACCEL/DECEL PROHIBITED (SPEED HOLD) |
| 2 | 0 | LOGO | APPLY INITIAL CURRENT TO MOTOR |
| 2 | 1 | LOGO | RESET INTEGRAL CHANNEL OF AUTOMATIC SPEED REGULATOR (ASR) |
| 2 | 2 | LOGO | NOT USED |
| 2 | 3 | LOGO | ACCEL/DECEL CONTROL INACTIVE (ALLOW STEP CHANGES) |
| 2 | 4 | LOGO | CONTROLS RELAY CONTACT LOGIC OUTPUT (TERM 9&10) |
| 2 | 5 | LOGO | CONTROLS OPEN COLLECTOR LOGIC OUTPUT (TERM 25) |
| 2 | 6 | LOGO | CONTROLS OPEN COLLECTOR LOGIC OUTPUT (TERM 26) |
| 2 | 7 | LOGO | CONTROLS OPEN COLLECTOR LOGIC OUTPUT (TERM 28) |
| 3 | ~ | NUMO | SPEED REFERENCE TO ASR (RANGE IS 0 TO +/- 1.0922) |
| 4 | ~ | NUMO | TORQUE COMPENSATION TO BE ADDED TO THE OUTPUT OF THE ASR |
| 5 | ~ | NUMO | EXTERNAL MAGNETIC FLUX REFERENCE |
| 6 | ~ | NUMO | ASR PROPORTIONAL GAIN. USED ONLY IF BIT 1 OF SN-30 IS SET TO 1 |
| 7 | ~ | NUMO | REGENERATIVE TORQUE LIMIT. ACCEPTABLE RANGE IS 0 TO 3.0 |
| 8 | 0 | LOGO | SELECTS MICROTRAC TO CONTROL ANALOG OUTPUT (TERM 21 & 22) |
| 8 | 1 | LOGO | SELECTS MICROTRAC TO CONTROL AO-08 OPTIONAL CH-1 OUTPUT |
| 8 | 2 | LOGO | SELECTS MICROTRAC TO CONTROL AO-08 OPTIONAL CH-2 OUTPUT |
| 8 | 3 | LOGO | SELECTS MICROTRAC TO CONTROL AO-12 OPTIONAL CH-1 OUTPUT |
| 8 | 4 | LOGO | SELECTS MICROTRAC TO CONTROL AO-12 OPTIONAL CH-2 OUTPUT |
| 8 | 5 | LOGO | SELECTS MICROTRAC TO CONTROL DO-08 OPTIONAL DIGITAL OUTPUTS |
| 8 | 6 | LOGO | NOT USED |
| 8 | 7 | LOGO | NOT USED |
| 9 | 0 | LOGO | NOT USED |
| 9 | 1 | LOGO | NOT USED |
| 9 | 2 | LOGO | NOT USED |
| 9 | 3 | LOGO | NOT USED |
| 9 | 4 | LOGO | NOT USED |
| 9 | 5 | LOGO | NOT USED |
| 9 | 6 | LOGO | NOT USED |
| 9 | 7 | LOGO | CONTROLS OPEN COLLECTOR LOGIC OUTPUT (TERM 29) |
| 10 | ~ | NUMO | CONTROLS ANALOG OUTPUT (TERM 21&22). 1 = +11.0 VDC, -1 = -11.0 VDC |

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION |
|---|---|---|---|
| 11 | 0 | LOGO | CONTROLS DO-08 LOGIC OUTPUT BIT 0 |
| 11 | 1 | LOGO | CONTROLS DO-08 LOGIC OUTPUT BIT 1 |
| 11 | 2 | LOGO | CONTROLS DO-08 LOGIC OUTPUT BIT 2 |
| 11 | 3 | LOGO | CONTROLS DO-08 LOGIC OUTPUT BIT 3 |
| 11 | 4 | LOGO | CONTROLS DO-08 LOGIC OUTPUT BIT 4 |
| 11 | 5 | LOGO | CONTROLS DO-08 LOGIC OUTPUT BIT 5 |
| 11 | 6 | LOGO | CONTROLS DO-08 LOGIC OUTPUT BIT 6 |
| 11 | 7 | LOGO | CONTROLS DO-08 LOGIC OUTPUT BIT 7 |
| 12 | ~ | NUMO | CONTROLS AO-08 ANALOG OUTPUT CH 1. +1 = +11 VDC |
| 13 | ~ | NUMO | CONTROLS AO-08 ANALOG OUTPUT CH 2. +1 = +11 VDC |
| 14 | ~ | NUMO | CONTROLS AO-12 ANALOG OUTPUT CH 1. +1 = +11 VDC, -1 = -11 VDC |
| 15 | ~ | NUMO | CONTROLS AO-12 ANALOG OUTPUT CH 2. +1 = +11 VDC, -1 = -11 VDC |
| 50 | 0 | LOGI | DRIVE RUNNING |
| 50 | 1 | LOGI | AT ZERO SPEED |
| 50 | 2 | LOGI | REVERSE OPERATION |
| 50 | 3 | LOGI | FAULT RESET HAS BEEN INPUTTED |
| 50 | 4 | LOGI | SPEED COINCIDENCE AS SET BY Cn-02 AND Cn-03 DETECTED |
| 50 | 5 | LOGI | INVERTER READY |
| 50 | 6 | LOGI | A MINOR FAULT HAS OCCURRED |
| 50 | 7 | LOGI | A MAJOR FAULT HAS OCCURRED |
| 51 | 0 | LOGI | SPEED REF FROM DCU NOT WITHIN ACCEPTABLE RANGE |
| 51 | 1 | LOGI | LAST POWER LOSS/MOMENTARY STOP NOT WITHIN RIDE THROUGH RANGE |
| 51 | 2 | LOGI | REMOTE OPERATION (INVERTER RECOGNIZES THAT MICROTRAC IS IN CONTROL) |
| 51 | 3 | LOGI | NOT USED |
| 51 | 4 | LOGI | NOT USED |
| 51 | 5 | LOGI | NOT USED |
| 51 | 6 | LOGI | NOT USED |
| 51 | 7 | LOGI | NOT USED |
| 52 | 0 | LOGI | OVERCURRENT (OR GROUNDING) DETECTED ALARM |
| 52 | 1 | LOGI | DC BUS OVERVOLTAGE TRIP ALARM |
| 52 | 2 | LOGI | INVERTER OVERLOADED ALARM |
| 52 | 3 | LOGI | INVERTER OR BRAKING RESISTOR OVERHEATED OR BRAKING TRANSISTOR FAULT |
| 52 | 4 | LOGI | OVERSPEED FAULT DETECTED ALARM |
| 52 | 5 | LOGI | BLOWN FUSE ALARM |
| 52 | 6 | LOGI | LOAD OPEN PHASE ALARM |
| 52 | 7 | LOGI | EXTERNAL ERROR ALARM |

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION |
|---|---|---|---|
| 53 | 0 | LOGI | HARDWARE ERROR DETECTED (RAM CHECK OR BASEBLOCK CHECK) ALARM |
| 53 | 1 | LOGI | MOTOR OVERLOAD ALARM |
| 53 | 2 | LOGI | MOTOR OVERTEMPERATURE ALARM |
| 53 | 3 | LOGI | IN MOMENTARY STOP (MOMENTARY STOP IS A POWER LOSS OF LESS THAN 2 SEC) ALARM |
| 53 | 4 | LOGI | POWER FAILURE DETECTED (EITHER MAIN OR CONTROL POWER OR MC CONT. OFF) ALARM |
| 53 | 5 | LOGI | OVERSPEED DEVIATION (INCLUDING STARTING STALL) ALARM |
| 53 | 6 | LOGI | TACH OR THERMISTOR CABLE DISCONNECTED ALARM |
| 53 | 7 | LOGI | COOLING FAN FAULT ALARM |
| 54 | ~ | NUMI | SPEED REFERENCE (RANGE IS 0 TO +/- 1.0922) |
| 55 | ~ | NUMI | PRIMARY FREQUENCY REFERENCE (RANGE IS 0 TO +/- 1.0922) |
| 56 | ~ | NUMI | SPEED FEEDBACK (RANGE IS 0 TO +/- 1.0922). FILTERING SET BY Sn-34. |
| 57 | ~ | NUMI | TORQUE REFERENCE (RANGE IS 0 TO +/- 1.0) |
| 58 | ~ | NUMI | OUTPUT CURRENT (RANGE IS 0 TO +3.276) |
| 59 | ~ | NUMI | OUTPUT VOLTAGE REFERENCE (RANGE IS 0 TO +3.276) |
| 60 | ~ | NUMI | ANALOG INPUT (PIN 13 OR 14). +10 VDC OR 20 MA = 1 |
| 61 | ~ | NUMI | ANALOG INPUT (PIN 16). +10 VDC = 1 |
| 62 | 0 | LOGI | INVERTER MAIN BOARD TERMINAL 1 |
| 62 | 1 | LOGI | INVERTER MAIN BOARD TERMINAL 2 |
| 62 | 2 | LOGI | INVERTER MAIN BOARD TERMINAL 3 (DEDICATED TO THE FUNCTION OF EXTERNAL FAULT). Sn-12 DETERMINES WHETHER INPUT IS NORMALLY OPEN OR CLOSED. |
| 62 | 3 | LOGI | INVERTER MAIN BOARD TERMINAL 4 |
| 62 | 4 | LOGI | INVERTER MAIN BOARD TERMINAL 5 |
| 62 | 5 | LOGI | INVERTER MAIN BOARD TERMINAL 6 |
| 62 | 6 | LOGI | INVERTER MAIN BOARD TERMINAL 7 |
| 62 | 7 | LOGI | INVERTER MAIN BOARD TERMINAL 8 |
| 63 | ~ | NUMI | KVA CONSTANT (CONFIRMATION OF SN-01 SETTING) |
| 64 | 0 | LOGI | INVERTER OPTIONAL CARD A CONNECTED (SPEED FEEDBACK OPTION) |
| 64 | 1 | LOGI | INVERTER OPTIONAL CARD B CONNECTED (EXCLUSIVE USE OPTION) |
| 64 | 2 | LOGI | INVERTER OPTIONAL CARD C CONNECTED (REFERENCE, TRANSMISSION OPTIONS) |
| 64 | 3 | LOGI | INVERTER OPTIONAL CARD D CONNECTED (MONITOR OPTION) |
| 64 | 4 | LOGI | PERSONAL COMPUTER CONNECTED |
| 64 | 5 | LOGI | 1=575 VOLT SYSTEM. 0=230/460 VOLT SYSTEM |
| 64 | 6 | LOGI | 1=460 VOLT SYSTEM. 0=230 VOLT SYSTEM |
| 64 | 7 | LOGI | 1=BI-POLAR TRANSISTOR DEVICES. 0=IGBT DEVICES |
| 65 | ~ | NUMI | OPTION A MODEL CODE |

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION |
|---|---|---|---|
| 66 | ~ | NUMI | OPTION B MODEL CODE |
| 67 | ~ | NUMI | OPTION C MODEL CODE |
| 68 | ~ | NUMI | OPTION D MODEL CODE |
| 69 | ~ | NUMI | DC BUS VOLTAGE (FOR A 460 VAC SYSTEM, 1 PU = 800 VOLTS) |
| 70 | ~ | NUMI | MOMENTARY LOWERING VOLTAGE DEPTH VALUE |
| 71 | 0 | LOGI | MAIN POWER UNDERVOLTAGE FAULT |
| 71 | 1 | LOGI | CONTROL POWER UNDERVOLTAGE FAULT |
| 71 | 2 | LOGI | MC CONTACTOR OFF |
| 71 | 3 | LOGI | BRAKING TRANSISTOR FAULT |
| 71 | 4 | LOGI | BRAKING RESISTOR OVERHEAT FAULT |
| 71 | 5 | LOGI | NOT USED |
| 71 | 6 | LOGI | THERMISTOR OPEN FAULT |
| 71 | 7 | LOGI | CP-213 TRANSMISSION ERROR FAULT |
| 72 | 0 | LOGI | NOT USED |
| 72 | 1 | LOGI | NOT USED |
| 72 | 2 | LOGI | EXTERNAL FAULT (TRANSMISSION INPUT) |
| 72 | 3 | LOGI | EXTERNAL FAULT (TERMINAL #3) |
| 72 | 4 | LOGI | EXTERNAL FAULT (TERMINAL #5) |
| 72 | 5 | LOGI | EXTERNAL FAULT (TERMINAL #6) |
| 72 | 6 | LOGI | EXTERNAL FAULT (TERMINAL #7) |
| 72 | 7 | LOGI | EXTERNAL FAULT (TERMINAL #8) |
| 73 | 0 | LOGI | PULSE GENERATOR LEADS OPEN FAULT |
| 73 | 1 | LOGI | OVERSPEED FAULT |
| 73 | 2 | LOGI | ESTIMATED SPEED ERROR FAULT |
| 73 | 3 | LOGI | NOT USED |
| 73 | 4 | LOGI | NOT USED |
| 73 | 5 | LOGI | NOT USED |
| 73 | 6 | LOGI | NOT USED |
| 73 | 7 | LOGI | NOT USED |
| 75 | 0 | LOGI | NOT USED |
| 75 | 1 | LOGI | BASE BLOCK CIRCUIT FAULT |
| 75 | 2 | LOGI | NVRAM OR SRAM FAULT |
| 75 | 3 | LOGI | NVRAM BCC ERROR FAULT |
| 75 | 4 | LOGI | MCU A/D CONVERTER FAULT |
| 75 | 5 | LOGI | FAULTY CONNECTION OF OPTION CONNECTOR |
| 75 | 6 | LOGI | NOT USED |
| 75 | 7 | LOGI | NOT USED |
| 76 | 0 | LOGI | NOT USED |
| 76 | 1 | LOGI | DSP PERIPHERAL FAULT |

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION |
|---|---|---|---|
| 76 | 2 | LOGI | OPTION CARD A/D CONVERTER FAULT |
| 76 | 3 | LOGI | TRANSMISSION OPTIONAL CARD FAULT |
| 76 | 4 | LOGI | INVERTER MODEL CODE ERROR |
| 76 | 5 | LOGI | MCU MUTUAL DIAGNOSIS FAULT |
| 76 | 6 | LOGI | TORQUE CONTROL CARD A/D ERROR |
| 76 | 7 | LOGI | NOT USED |
| 78 | 0 | LOGI | UNDERVOLTAGE DETECTION ALARM |
| 78 | 1 | LOGI | OVERVOLTAGE DURING STOPPING ALARM |
| 78 | 2 | LOGI | MOTOR OVERLOAD ALARM |
| 78 | 3 | LOGI | INVERTER OVERLOAD ALARM |
| 78 | 4 | LOGI | NOT USED |
| 78 | 5 | LOGI | COOLING FAN FAULT ALARM |
| 78 | 6 | LOGI | INVERTER OVERHEAT PREDICTION ALARM |
| 78 | 7 | LOGI | LOAD CIRCUIT FAULT ALARM |
| 79 | 0 | LOGI | NOT USED |
| 79 | 1 | LOGI | OPERATION SEQUENCE INPUT ALARM (2-WIRE) |
| 79 | 2 | LOGI | EXTERNAL FAULT (TRANSMISSION OPTION) |
| 79 | 3 | LOGI | EXTERNAL FAULT (TERMINAL 3) |
| 79 | 4 | LOGI | EXTERNAL FAULT (TERMINAL 5) |
| 79 | 5 | LOGI | EXTERNAL FAULT (TERMINAL 6) |
| 79 | 6 | LOGI | EXTERNAL FAULT (TERMINAL 7) |
| 79 | 7 | LOGI | EXTERNAL FAULT (TERMINAL 8) |
| 80 | 0 | LOGI | BUS TRANSMISSION FAULT (CP-213) |
| 80 | 1 | LOGI | NOT USED |
| 80 | 2 | LOGI | NOT USED |
| 80 | 3 | LOGI | EXCESSIVE SPEED DEVIATION |
| 80 | 4 | LOGI | NOT USED |
| 80 | 5 | LOGI | NOT USED |
| 80 | 6 | LOGI | NOT USED |
| 80 | 7 | LOGI | NOT USED |
| 81 | ~ | NUMI | INVERTER ROM NUMBER |
| 82 | ~ | NUMI | OPTIONAL ROM NUMBER |
| 83 | ~ | NUMI | TORQUE FEEDBACK |
| 84 | ~ | NUMI | SPEED DETECTION COUNTER VALUE |
| 85 | ~ | NUMI | TRACE SAMPLING TIME |

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION | INITIAL VALUE |
|---|---|---|---|---|
| 101 | ~ | NUMO | Sn-01 KVA SELECT | |
| 102 | ~ | NUMO | Sn-02 (SELECTS PRE PROGRAMMED PATTERNS OF Cn CONSTANTS) | |
| 103 | 00-03 | LOGO | BITS 0-3 SET Sn-03 | 0000 |
| 103 | 04-07 | LOGO | BITS 4-7 SET Sn-04 | 0011 |
| 105 | 00-03 | LOGO | BITS 0-3 SET Sn-05 | 0001 |
| 105 | 04-07 | LOGO | BITS 4-7 SET Sn-06 | 0000 |
| 107 | 00-03 | LOGO | BITS 0-3 SET Sn-07 | 0000 |
| 107 | 04-07 | LOGO | BITS 4-7 SET Sn-08 | 0000 |
| 109 | 00-03 | LOGO | BITS 0-3 SET Sn-09 | 0000 |
| 109 | 04-07 | LOGO | BITS 4-7 SET Sn-10 | 0111 |
| 111 | 00-03 | LOGO | BITS 0-3 SET Sn-11 | 0000 |
| 111 | 04-07 | LOGO | BITS 4-7 SET Sn-12 | 0100 |
| 113 | 00-03 | LOGO | BITS 0-3 SET Sn-13 | 0101 |
| 113 | 04-07 | LOGO | BITS 4-7 SET Sn-14 | 1101 |
| 115 | ~ | NUMO | Sn-15 (SELECTS FUNCTION TO BE PERFORMED BY INPUT NO. 5) | 03 |
| 116 | ~ | NUMO | Sn-16 (SELECTS FUNCTION TO BE PERFORMED BY INPUT NO. 6) | 04 |
| 117 | ~ | NUMO | Sn-17 (SELECTS FUNCTION TO BE PERFORMED BY INPUT NO. 7) | 06 |
| 118 | ~ | NUMO | Sn-18 (SELECTS FUNCTION TO BE PERFORMED BY INPUT NO. 8) | 08 |
| 119 | ~ | NUMO | Sn-19 (SELECTS FUNCTION FOR ANALOG INPUT TERMINAL 16) | 00 |
| 120 | ~ | NUMO | Sn-20 (SELECTS FUNCTION FOR OUTPUT NO. 1) | 00 |
| 121 | ~ | NUMO | Sn-21 (SELECTS FUNCTION FOR OUTPUT NO. 2) | 01 |
| 122 | ~ | NUMO | Sn-22 (SELECTS FUNCTION FOR OUTPUT NO. 3) | 02 |
| 123 | ~ | NUMO | Sn-23 (SELECTS FUNCTION FOR OUTPUT NO. 4) | 06 |
| 124 | ~ | NUMO | Sn-24 (SELECTS FUNCTION FOR OUTPUT NO. 5) | 0D |
| 127 | 00-03 | LOGO | BITS 0-3 SET Sn-27 | 0000 |
| 127 | 04-07 | LOGO | BITS 4-7 SET Sn-28 | 0000 |
| 130 | 00-03 | LOGO | BITS 0-3 SET Sn-30 | 0000 |
| 130 | 04-07 | LOGO | BITS 4-7 SET Sn-31 | 0100 |
| 132 | 00-03 | LOGO | BITS 0-3 SET Sn-32 | 0001 |
| 132 | 04-07 | LOGO | BITS 4-7 SET Sn-33 WHICH IS NOT USED WITH MICROTRAC | 0000 |
| 134 | 00-03 | LOGO | BITS 0-3 SET Sn-34 | 0001 |
| 134 | 04-07 | LOGO | BITS 4-7 SET Sn-35 WHICH IS NOT USED WITH MICROTRAC | 0000 |

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION | INITIAL VALUE | UNITS |
|---|---|---|---|---|---|
| 201 | ~ | NUMO | Cn-01 (ZERO SPEED LEVEL) | 2.00 | % |
| 202 | ~ | NUMO | Cn-02 (SPEED COINCIDENCE LEVEL) | 100 | % |
| 203 | ~ | NUMO | Cn-03 (SPEED COINCIDENCE DEADBAND) | 2.00 | % |
| 204 | ~ | NUMO | Cn-04 (SPEED DEVIATION) | 10.00 | % |
| 205 | ~ | NUMO | Cn-05 (SPEED REFERENCE INPUT LIMIT) | 109.00 | % |
| 206 | ~ | NUMO | Cn-06 (MINIMUM SPEED LIMIT) | 2.00 | % |
| 207 | ~ | NUMO | Cn-07 (ASR FILTER #1) | 4 | MSEC |
| 208 | ~ | NUMO | Cn-08 (EXCITATION TIMER?) | 0.0 | SEC |
| 209 | ~ | NUMO | Cn-09 (PULSE GENERATOR CONSTANT) | 600 | PPR |
| 210 | ~ | NUMO | Cn-10 (SPEED LIMIT BIAS) | 20.00 ◆ | % |
| 211 | ~ | NUMO | Cn-11 (EMERGENCY TORQUE COMPENSATION?) | 0.0 | % |
| 212 | ~ | NUMO | Cn-12 (NOT USED) | | |
| 213 | ~ | NUMO | Cn-13 (FEEDER RESISTANCE, i.e. LINE IMPEDANCE) | 0.0 | % |
| 214 | ~ | NUMO | Cn-14 (MOTOR OVERLOAD DETECTION STARTING CURRENT) | 110 | % |
| 215 | ~ | NUMO | Cn-15 (MOTOR OVERLOAD OPERATION TIME) | 60 | SEC |
| 216 | ~ | NUMO | Cn-16 (OVERSPEED DETECTION LEVEL) | 120 | % |
| 217 | ~ | NUMO | Cn-17 (PUV DETECTION LEVEL) | 210/430 | VAC |
| 218 | ~ | NUMO | Cn-18 (DISCONNECTED TACH CABLE DETECTION TIME) | 1.00 | SEC |
| 219 | ~ | NUMO | Cn-19 (MOMENTARY POWER LOSS RIDE THROUGH TIME) | 1.00 ■ | SEC |
| 220 | ~ | NUMO | Cn-20 (NUMBER OF AUTO RESTART ATTEMPTS) | 0 | ~ |
| 221 | ~ | NUMO | Cn-21 (STOP TIMER) | 0.0 | SEC |
| 222 | ~ | NUMO | Cn-22 (ASR PROPORTIONAL GAIN 2) | 20 | ~ |
| 223 | ~ | NUMO | Cn-23 (ASR PROPORTIONAL GAIN SELECTION LEVEL) | 0.00 | % |
| 224 | ~ | NUMO | Cn-24 (ZERO SERVO GAIN) | 5 | ~ |
| 225 | ~ | NUMO | Cn-25 (ZERO SERVO COMPLETION WIDTH) | 10 | PULSE |
| 226 | ~ | NUMO | Cn-26 (S-CURVE TIME 2) | 0.0 | SEC |
| 227 | ~ | NUMO | Cn-27 (TORQUE REFERENCE FILTER) | 0 | MSEC |
| 228 | ~ | NUMO | Cn-28 (MOTOR TEMP RISE DETECTION LEVEL) | 80 | °C |
| 229 | ~ | NUMO | Cn-29 (MOTOR TEMPERATURE?) | 0 | ~ |
| 233 | ~ | NUMO | Cn-33 (TORQUE DETECTION LEVEL 1) | 100 | % |
| 234 | ~ | NUMO | Cn-34 (TORQUE DETECTION LEVEL 2) | 100 | % |

◆ -Initial value dependent on setting of Sn-02. Value shown is for Sn-02 setting of 0F hex.

■ -Initial value dependent on setting of Sn-01.

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION | INITIAL VALUE | UNITS |
|---|---|---|---|---|---|
| 301 | 00-03 | LOGO | BITS 0-3 SET On-01 | 0000 | |
| 301 | 04-07 | LOGO | BITS 4-7 SET On-02 | 0000 | |
| 303 | 00-03 | LOGO | BITS 0-3 SET On-03 | 1010 | |
| 303 | 04-07 | LOGO | BITS 4-7 SET On-04 | 0000 | |
| 305 | ~ | NUMO | On-05 (INVERTER LOW FREQUENCY OL GAIN) | ■ | |
| 306 | ~ | NUMO | On-06 (INVERTER LOW FREQUENCY OL FREQUENCY) | ■ | |
| 307 | ~ | NUMO | On-07 (REGEN TORQUE LIMIT AT LOW FREQUENCY) | 50.00 | % |
| 308 | ~ | NUMO | On-08 (CURRENT AMPLIFIER CHARACTERISTIC NO. 1) | 020 | ~ |
| 309 | ~ | NUMO | On-09 (ASR OUTPUT FILTER NO. 2) | 0 | MSEC |
| 310 | ~ | NUMO | On-10 (CEMF COMPENSATION) | 1.000 | NONE |
| 311 | ~ | NUMO | On-11 (A-phi-R TIME CONSTANT, USED WITH TRQ OPTION PCB) | ◆ | MSEC |
| 312 | ~ | NUMO | On-12 (AFR GAIN) | 1.00 | NONE |
| 313 | ~ | NUMO | On-13 (AFR TIME CONSTANT) | 120 | MSEC |
| 314 | ~ | NUMO | On-14 (FLUX FDBK GAIN, USED WITH TRQ OPTION BOARD) | 1.000 | NONE |
| 315 | ~ | NUMO | On-15 (CURRENT FDBK GAIN, USED WITH TRQ OPTION PCB) | 1.000 | NONE |
| 316 | ~ | NUMO | On-16 (NVRAM SOFT NUMBER) | | NONE |
| 317 | ~ | NUMO | On-17 (DSP A/D CONVERTER U PHASE GAIN) | | NONE |
| 318 | ~ | NUMO | On-18 (DSP A/D CONVERTER U PHASE OFFSET) | | NONE |
| 319 | ~ | NUMO | On-19 (DSP A/D CONVERTER W PHASE GAIN) | | NONE |
| 320 | ~ | NUMO | On-20 (DSP A/D CONVERTER W PHASE OFFSET) | | NONE |
| 321 | ~ | NUMO | On-21 (ON DELAY COMPENSATED GAIN) | 1.00 | NONE |
| 322 | ~ | NUMO | On-22 (A/D OFFSET ADJUST) | 0.000 | VLTS |
| | | | | | |
| | | | | | |
| 401 | ~ | NUMO | An-01 (SPEED REFERENCE 1, MAIN SPEED REFERENCE) | 0.00 | % |
| 402 | ~ | NUMO | An-02 (SPEED REFERENCE 2, MULTI-STEP SPEED) | 0.00 | % |
| 403 | ~ | NUMO | An-03 (SPEED REFERENCE 3, MULTI-STEP SPEED) | 0.00 | % |
| 404 | ~ | NUMO | An-04 (SPEED REFERENCE 4, MULTI-STEP SPEED) | 0.00 | % |
| 405 | ~ | NUMO | An-05 (SPEED REFERENCE 5, MULTI-STEP SPEED) | 0.00 | % |
| 406 | ~ | NUMO | An-06 (SPEED REFERENCE 6, MULTI-STEP SPEED) | 0.00 | % |
| 407 | ~ | NUMO | An-07 (SPEED REFERENCE 7, MULTI-STEP SPEED) | 0.00 | % |
| 408 | ~ | NUMO | An-08 (SPEED REFERENCE 8, MULTI-STEP SPEED) | 0.00 | % |
| 409 | ~ | NUMO | An-09 (JOGGING SPEED REFERENCE) | 10.00 | % |

◆ -Initial value dependent on setting of Sn-02. Value shown is for Sn-02 setting of 0F hex.

■ -Initial value dependent on setting of Sn-01.

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION | INITIAL VALUE | UNITS |
|---|---|---|---|---|---|
| 501 | ~ | NUMO | Bn-01 (ACCELERATION TIME 1) | 10.0 | SEC |
| 502 | ~ | NUMO | Bn-02 (DECELERATION TIME 1) | 10.0 | SEC |
| 503 | ~ | NUMO | Bn-03 (ACCELERATION TIME 2) | 10.0 | SEC |
| 504 | ~ | NUMO | Bn-04 (DECELERATION TIME 2) | 10.0 | SEC |
| 505 | ~ | NUMO | Bn-05 (ASR PROPORTIONAL GAIN) | 20 | ~ |
| 506 | ~ | NUMO | Bn-06 (ASR INTEGRAL TIME) | 1000 | MSEC |
| 507 | ~ | NUMO | Bn-07 (FORWARD TORQUE LIMIT) | 150.00 | % |
| 508 | ~ | NUMO | Bn-08 (REVERSE TORQUE LIMIT) | 150.00 | % |
| 509 | ~ | NUMO | Bn-09 (REGENERATIVE TORQUE LIMIT) | 150.00 | % |
| 510 | ~ | NUMO | Bn-10 (RATED SPEED ADJUSTMENT) | 1.0000 | ~ |
| 511 | ~ | NUMO | Bn-11 (TRACE SAMPLING TIME) | 0.060 | SEC |
| 512 | ~ | NUMO | Bn-12 (EMERGENCY STOP TIME) | 10.0 | SEC |
| 513 | ~ | NUMO | Bn-13 (MONITOR NUMBER AFTER TURNING ON PWR SUPPLY) | 1 | ~ |
| 514 | ~ | NUMO | Bn-14 (PULSE GENERATOR DIVISION RATIO) | 1 | ~ |
| 515 | ~ | NUMO | Bn-15 (SPEED 0 ADJUSTMENT) | 0.00 | % |
| 516 | ~ | NUMO | Bn-16 (VOLTAGE ADJUSTMENT) | 1.000 | ~ |
| 517 | ~ | NUMO | Bn-17 (MULTI FUNCTION MOTOR OUTPUT SELECT) | 23 | ~ |
| 518 | ~ | NUMO | Bn-18 (MULTI FUNCTION MOTOR OUTPUT GAIN) | 100 | % |
| 519 | ~ | NUMO | Bn-19 (S CURVE TIME) | 0 | SEC |
| 522 | ~ | NUMO | Bn-22 (AO OPTIONAL CH1 OUTPUT SELECT) | 22 | ~ |
| 523 | ~ | NUMO | Bn-23 (AO OPTIONAL CH1 OUTPUT GAIN) | 100.0 | ~ |
| 524 | ~ | NUMO | Bn-24 (AO OPTIONAL CH2 OUTPUT SELECT) | 23 | ~ |
| 525 | ~ | NUMO | Bn-25 (AO OPTIONAL CH2 OUTPUT GAIN) | 100.0 | ~ |

## Node 260 (Dual Port Ram) Assignments - Continued

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION | INITIAL VALUE | UNITS |
|---|---|---|---|---|---|
| 601 | ~ | NUMO | Dn-01 (MOTOR BASE SPEED) | 1750 | RPM |
| 602 | ~ | NUMO | Dn-02 (MOTOR MAXIMUM SPEED) | 1750 | RPM |
| 603 | ~ | NUMO | Dn-03 (NUMBER OF MOTOR POLES) | 4 | ~ |
| 604 | ~ | NUMO | Dn-04 (MOTOR NO LOAD VOLTAGE) | 170/340 | VAC |
| 605 | ~ | NUMO | Dn-05 (MOTOR RATED PRIMARY CURRENT) | | AAC |
| 606 | ~ | NUMO | Dn-06 (RATED SLIP FREQUENCY) | 1.00 | HZ |
| 607 | ~ | NUMO | Dn-07 (EXCITATION CURRENT REFERENCE) | 30.0 | % |
| 608 | ~ | NUMO | Dn-08 (PRIMARY RESISTANCE, USED WITH OPT TRQ BOARD) | 2.0 | % |
| 609 | ~ | NUMO | Dn-09 (LEAKAGE COEFFICIENT, USED WITH OPT TRQ BOARD) | 20.00 | % |
| 610 | ~ | NUMO | Dn-10 (MOTOR IRON LOSS) | 2.0 | % |
| 611 | ~ | NUMO | Dn-11 (MOTOR MACHINERY LOSS) | 0.5 | % |
| 612 | ~ | NUMO | Dn-12 (SECONDARY CIRCUIT TIME CONSTANT) | 100 | MSEC |
| 613 | ~ | NUMO | Dn-13 (LEAKAGE SAT COEF, USED WITH OPT TRQ BOARD) | 1.20 | ~ |
| 614 | ~ | NUMO | Dn-14 (ROTOR HEAT GAIN) | 0.00 | ~ |
| 615 | ~ | NUMO | Dn-15 (ROTOR HEAT TIME CONSTANT) | 30 | MIN |
| 616 | ~ | NUMO | Dn-16 (IRON CORE SATURATION COMP COEFFICIENT 1) | 0.5 | ~ |
| 617 | ~ | NUMO | Dn-17 (IRON CORE SATURATION COMP COEFFICIENT 2) | 0.75 | ~ |
| 618 | ~ | NUMO | Dn-18 (MOTOR OVERHEAT TEMPERATURE) | 120 ◆ | °C |

◆ -Initial value dependent on setting of Sn-02. Value shown is for Sn-02 setting of FFF hex.

## Node 703 (Accessible by PCDU) Assignments

| CHAN | SUB CHAN | PAC BLOCK TYPE | CONST | DESCRIPTION |
|---|---|---|---|---|
| 101 | ~ | GETH | Sn-01 | KVA SELECT |
| 102 | ~ | GETH | Sn-02 | MOTOR SELECTION (SELECTS PRE PROGRAMMED MOTOR PARAMETERS) |
| 103 | 0 | GETP | Sn-03 | DETERMINES READ/WRITE STATUS OF CONSTANTS IN THE DRIVE MODE |
| 103 | 4 | GETP | Sn-04 | SETS INVERTER CONFIGURATION |
| 105 | 0 | GETP | Sn-05 | SETS INVERTER CONFIGURATION |
| 105 | 4 | GETP | Sn-06 | SETS INVERTER CONFIGURATION |
| 107 | 0 | GETP | Sn-07 | SETS INVERTER CONFIGURATION |
| 107 | 4 | GETP | Sn-08 | SETS INVERTER CONFIGURATION |
| 109 | 0 | GETP | Sn-09 | SETS INVERTER CONFIGURATION |
| 109 | 4 | GETP | Sn-10 | SETS INVERTER CONFIGURATION |
| 111 | 0 | GETP | Sn-11 | SETS INVERTER CONFIGURATION |
| 111 | 4 | GETP | Sn-12 | SETS INVERTER CONFIGURATION |
| 113 | 0 | GETP | Sn-13 | SETS INVERTER CONFIGURATION |
| 113 | 4 | GETP | Sn-14 | SETS INVERTER CONFIGURATION |
| 115 | ~ | GETH | Sn-15 | SELECTS FUNCTION TO BE PERFORMED BY LOGIC INPUT NO. 5 |
| 116 | ~ | GETH | Sn-16 | SELECTS FUNCTION TO BE PERFORMED BY LOGIC INPUT NO. 6 |
| 117 | ~ | GETH | Sn-17 | SELECTS FUNCTION TO BE PERFORMED BY LOGIC INPUT NO. 7 |
| 118 | ~ | GETH | Sn-18 | SELECTS FUNCTION TO BE PERFORMED BY LOGIC INPUT NO. 8 |
| 119 | ~ | GETH | Sn-19 | SELECTS FUNCTION FOR ANALOG INPUT TERMINAL 16 |
| 120 | ~ | GETH | Sn-20 | SELECTS FUNCTION FOR LOGIC OUTPUT NO. 1 |
| 121 | ~ | GETH | Sn-21 | SELECTS FUNCTION FOR LOGIC OUTPUT NO. 2 |
| 122 | ~ | GETH | Sn-22 | SELECTS FUNCTION FOR LOGIC OUTPUT NO. 3 |
| 123 | ~ | GETH | Sn-23 | SELECTS FUNCTION FOR LOGIC OUTPUT NO. 4 |
| 124 | ~ | GETH | Sn-24 | SELECTS FUNCTION FOR LOGIC OUTPUT NO. 5 |
| 127 | 0 | GETP | Sn-27 | SETS INVERTER CONFIGURATION |
| 127 | 4 | GETP | Sn-28 | SETS INVERTER CONFIGURATION |
| 130 | 0 | GETP | Sn-30 | SETS INVERTER CONFIGURATION |
| 130 | 4 | GETP | Sn-31 | SETS INVERTER CONFIGURATION |
| 132 | 0 | GETP | Sn-32 | SETS INVERTER CONFIGURATION |
| 132 | 4 | GETP | Sn-33 | NOT USED WITH MICROTRAC |
| 134 | 0 | GETP | Sn-34 | SETS INVERTER CONFIGURATION |
| 134 | 4 | GETP | Sn-35 | NOT USED WITH MICROTRAC |
| | | | | |
| 301 | 0 | GETP | On-01 | SETS INVERTER CONFIGURATION |
| 301 | 1 | GETP | On-02 | SETS INVERTER CONFIGURATION |
| 303 | 0 | GETP | On-03 | SETS INVERTER CONFIGURATION |
| 303 | 1 | GETP | On-04 | SETS INVERTER CONFIGURATION |

## Node 247 (MicroTrac Card) Assignments

| CHAN | SUB CHAN | PAC BLOCK TYPE | DESCRIPTION |
|---|---|---|---|
| 0 | 0 | LOGO | LCDU READY LED |
| 0 | 1 | LOGO | LCDU RUN LED |
| 0 | 2 | LOGO | LCDU TORQUE LIMIT LED |
| 0 | 3 | LOGO | LCDU OVERLOAD LED |
| 7 | 0 | LOGO | REQUEST FAULT RESET |
| 8 | 0 | LOGI | FAULT EXISTS IN FAULT LIST |
| 8 | 4 | LOGI | LCDU FAULT RESET BUTTON PRESSED |
| 16 | ~ | NUMI | FX=0 |
| 17 | ~ | NUMI | FX=1 |
| 18 | ~ | NUMI | FP=0 |
| 19 | ~ | NUMI | FP=1 |
| 20 | 0 | LOGI | FALSE |
| 20 | 1 | LOGI | TRUE |
| 21 | 0 | LOGO | LOGIC DATA DUMP |
| 21 | ~ | NUMO | NUMERIC DATA DUMP |
| 30 | ~ | TACH | DIGITAL FEEDBACK TACH |
| 31 | ~ | TACH | DIGITAL REFERENCE TACH |
| 32 | 0 | NUMI | MAIN BOARD ANALOG INPUT |
| 32 | 1 | NUMI | MAIN BOARD ANALOG INPUT |
| 33 | 0 | NUMO | MAIN BOARD ANALOG OUTPUT |
| 33 | 1 | NUMO | MAIN BOARD ANALOG OUTPUT |
| 40 | ~ | NUMI | TRACE BUFFER 0 |
| 41 | ~ | NUMI | TRACE BUFFER 1 |

## VCD 723 Error Codes

| ERROR CODE | PCDU DISPLAY | DESCRIPTION |
|---|---|---|
| 700 | M PWR U VLT | INVERTER DECLARED MAIN POWER UNDERVOLTAGE |
| 701 | C PWR U VLT | INVERTER DECLARED CONTROL POWER UNDERVOLTAGE |
| 702 | MC CONTACT OFF | INVERTER DECLARED MC CONTACTOR OFF |
| 703 | BRAKE TRANS FLT | INVERTER DECLARED BRAKING TRANSISTOR FAULT |
| 704 | BRAKE R HOT | INVERTER DECLARED BRAKING RESISTOR OVERTEMP |
| 706 | THERMISTOR OPEN | INVERTER DECLARED THERMISTOR OPEN |
| 707 | TRANSMIT ERROR | INVERTER DECLARED TRANSMISSION ERROR |
| 712 | EXT FLT T INPUT | EXTERNAL FAULT DECLARED VIA INVERTER TRANSMISSION INPUT |
| 713 | EXT FLT TERM 3 | EXTERNAL FAULT DECLARED VIA INVERTER TERMINAL 3 |
| 714 | EXT FLT TERM 5 | EXTERNAL FAULT DECLARED VIA INVERTER TERMINAL 5 |
| 715 | EXT FLT TERM 6 | EXTERNAL FAULT DECLARED VIA INVERTER TERMINAL 6 |
| 716 | EXT FLT TERM 7 | EXTERNAL FAULT DECLARED VIA INVERTER TERMINAL 7 |
| 717 | EXT FLT TERM 8 | EXTERNAL FAULT DECLARED VIA INVERTER TERMINAL 8 |
| 720 | INV PG OPEN | INVERTER DETECTED THAT ITS PULSE GENERATOR IS OPEN |
| 721 | INV OVERSPD | INVERTER DECLARED OVERSPEED FAULT |
| 722 | INV SPD ERROR | INVERTER HAS DETECTED A PROBABLE SPEED ERROR |
| 741 | BASE BLK FLT | INVERTER HAS DETECTED A BASE BLOCK CIRCUIT FAULT |
| 742 | S RAM FLT | INVERTER HAS DETECTED A SHADOW RAM FAULT |
| 743 | NVRAM CHK ERR | INVERTER HAS DETECTED A NVRAM CHECKSUM ERROR |
| 744 | MCU A D FLT | INVERTER HAS DETECTED A MAIN MCU A/D CONVERTER FAULT |
| 745 | OP CRD CONNECT | INVERTER HAS DETECTED A POOR OPTION CARD CONNECTION |
| 751 | DSP P FLT | INVERTER HAS DETECTED A DSP PERIPHERAL CIRCUIT FAULT |
| 752 | OPT A D FLT | INVERTER HAS DECLARED AN OPTION CARD A/D FAULT |
| 753 | MISSING DCU | INVERTER HAS NOT SEEN THE DCU HANDSHAKE |
| 754 | INV MODEL ERR | INVERTER MODEL CODE NUMBER IS WRONG |
| 760 | DPRAM CHK ERR | AN ERROR IN THE DPRAM CHECKSUM HAS BEEN DETECTED |
| 761 | DPRAM CNST | INVERTER DETECTED ERROR IN SETTING ONE OF THE LETTERED CONSTANTS |
| 762 | KVA SET ERR | INVERTER DECLARED KVA SETTING ERROR |
| 763 | SET ERR | INVERTER DETECTED ERROR IN SETTING ONE OF THE LETTERED CONSTANTS |
| 764 | SN ERR | SN-15 THROUGH SN-18 SETTING ERROR |
| 765 | TQ ERR | TORQUE CONTROL MODE SELECTION ERROR |
| 766 | NVRAM ERR | INVERTER HAS AN NVRAM WRITE ERROR |
| 767 | RANGE ERROR | UPPER/LOWER LIMIT EXCEEDED IN SETTING |
| 768 | INV OVC | INVERTER OVERCURRENT |
| 769 | INV OVV | INVERTER BUS OVERVOLTAGE |

## VCD 723 Error Codes - Continued

| ERROR CODE | PCDU DISPLAY | DESCRIPTION |
|---|---|---|
| 770 | INV OVL | INVERTER OVERLOAD |
| 771 | INV OVT | INVERTER OVERTEMPERATURE |
| 772 | INV FUSE | INVERTER FUSE BLOWN |
| 773 | INV PHASE | INVERTER OPEN LOAD PHASE |
| 774 | INV HWD | GENERAL INVERTER HARDWARE FAILURE |
| 775 | INV MOVL | INVERTER SENSED MOTOR OVERLOAD |
| 776 | INV MOVT | INVERTER SENSED MOTOR OVERTEMP |
| 777 | INV PL | INVERTER MOMENTARY POWER LOSS |
| 778 | INV SPDD | OVERSPEED DEVIATION |
| 779 | INV FAN | INVERTER COOLING FAN FAULT |

## Glossary

**A/D** – Analog to Digital converter.

**Active Hub** – A central component in LAN star networks that ensures data integrity over distances of up to 2000 feet by regenerating the network signal.

**Active menu item** – The menu item for an RDU that will be used to get the source of the information to be displayed. When a menu item number is selected, the Control/Display Unit (CDU) menu item data will be used; if there is no data in the CDU menu item for the selected menu item number, then the default menu item data is used.

**Active Link** – A device that interconnects two LAN bus networks.

**ANI/O** – Remote Analog I/O [Input/Output] PCB.

**Broadcast message** – A type of LAN message which is capable of being received by all nodes on the LAN. The message contains the source of the message, but the destination is all nodes that have been enabled to receive broadcast messages.

**CDU** – Control/Display Unit. There are two CDUs supported for the MicroTrac DSD drive: the Standard CDU (see *SCDU* definition) and the Portable CDU (see *PCDU* definition).

**CDU menu item** – A menu item of an RDU that was built by using the PCDU.

**Channel** – The second level address used to further define the location of information external to the the PAC environment (the first level of addressing being the Node number - see *NODE* definition). To access information external to the PAC environment requires reference to that information by an address which includes all levels of addressing defined for that particular information. That is, to use a Channel number also requires the associated Node number such as Node 50, Channel 21. The system will support a maximum of 256 (0 through 255) Channel numbers.

**Complex PAC task** – Any of the more complicated PAC functions (as opposed to the simpler elemental functions), which consists of two (or more) interrelated PAC tasks. These interrelated tasks are referred to as segments. Each segment is a self-contained module which executes sequentially, although each segment executes separately. The interrelated segments exchange information between each other which has predefined significance. The various segments need not be programmed in a common scan (see SCAN definition).

An example of a complex task would be SPDR, the speed regulator task, which consists of two related segments. One segment executes in the fast scan, and consists of the actual function of regulating the speed by comparing the speed reference to the feedback and generating a torque command based on the

difference and the required gains of the regulator. The other segment consists of the code used to calculate the gains required for the speed regulation function in the format required by that segment. In other words, it translates from the engineering terms used to describe regulator performance (such as load inertia and desired crossover frequency) to the integral and proportional gains required by the regulator segment. Since these defining parameters are rarely changed, this segment needs to execute only rarely, thus saving processor time for other functions which do require frequent execution.

**Conditional scan** – Conditional scan tasks define sub-programs (i.e. sub-programs consisting of unique interconnections of PAC tasks) which execute only when certain logic conditions related to the conditional scan task are satisfied. When the conditional scan executes, the program defined for the conditional scan executes at the scan level at which the conditional scan task is programmed (see *SCAN* definition). The use of conditional scans allows greater utilization of the limited processor time.

**Custom fault** – A fault (or error) defined via the PAC task "FLTD". These faults have significance only to a particular PAC design. (See *Fault* or *Error* definition).

**D/A** – Digital to Analog converter.

**DCU** – Drive Control Unit. The drive control unit refers to the hardware and software used to control the drive as opposed to the hardware and software used to control the power conversion process. Specifically, it refers to the hardware and software associated with the DCU microprocessor. The DCU software includes the variable software generated as a result of the PAC program and the fixed software (see *Kernel* definition) used to control execution of the PAC program.

**Default menu** – A menu for an RDU that contains the default menu items as received through the LAN from the drives. Each drive connected to the LAN can have default menu items that are to be displayed on specific RDUs. The default menu items and the order of the menu items are determined by the PAC programmer.

**Directed message** – A type of LAN message which can be received only by one LAN Node. This type of message contains both the source and destination Node numbers.

**Elemental PAC task** – The simpler PAC language functions where everything associated with that function is contained in one sequentially executed module.

**EPROM** – Erasable Programmable Read Only Memory. An integrated circuit that is usually used to hold the instructions for a microprocessor's program.

**Error** – An abnormal condition considered less serious than a fault (see *FAULT* definition). The difference between the two is that an error is recorded in the NVRAM, but not announced on the CDUs. The declaration of a fault will cause immediate display of the fault code number on the SCDU and the lighting of the **FAULT** LED. Any abnormal condition, standard or custom (also see *STANDARD FAULT* and *CUSTOM FAULT* definitions) may be declared as an error, a fault or both. Each abnormal condition is given an initial default classification as either an error, a fault, or both an error AND a fault. A special CDU function is provided to override that initial default classification.

The declaration of an error places the error number assigned to that error at the end of the Last Error List. This error list is of fixed length (16) and allows display via the CDU of the latest errors (note this differs from the First Fault List, which displays the oldest faults). In addition to the display of the error code number, this error list also allows the display of the task number of the PAC task generating the error (if the error was not generated by a PAC task, then task number zero [0] is displayed) and a time stamp of when the error occurred.

**Fault** – An abnormal condition generally requiring corrective action. A fault is considered to be a condition more serious than an error (see ERROR definition). The difference between the two is that an error is recorded in the NVRAM, but not announced on the CDUs. The declaration of a fault will cause immediate display of the fault code number on the SCDU and the lighting of the Fault LED. If multiple faults occur, the last declared fault is the fault displayed on the CDU.

A fixed number of faults (16) are recorded in order of declaration. This Fault List may be reviewed by order of fault declaration via a special CDU function. Once the Fault List is full, declaration of additional faults will not appear on the Fault List until space on the list is made available. The same CDU function used to display the Fault List may be used to clear from the list either all the faults or individual faults. The **FAULT** LED will remain lit until all the faults have been cleared from the Fault List.

Faults can be classified into two categories: “Standard” (see *STANDARD FAULT* definition) and “Custom” (see *CUSTOM FAULT* definition).

In most cases, no action is taken when a fault is declared. In these cases, the corrective action is the responsibility of the PAC program. In some cases, however, the abnormal condition is so severe that corrective action must be taken without regard to the PAC program (see *SEVERE FAULT* definition).

All defined abnormal conditions may be categorized as a fault or not a fault via a special CDU function. Each of these conditions is given an initial default (i.e. it is either categorized as a fault or not). The special CDU function allows overriding of that initial definition.

**Fixed point number** – A number system used internally in the computer which is encoded in a specific manner. Fixed point numbers have a limited range of values which they can represent. In the case of the fixed point numbering system used for the PAC language, the maximum value which can be represented is +/- 32,767.99998 and the smallest non-zero value is +/- 0.000015.

The advantage of fixed point numbers is that some of the arithmetic operations such as addition, subtraction, and comparison execute much faster than a value represented in floating point.

**Floating point number** – A number system used internally in the computer which is encoded in a specific manner. In this case the encoding method (i.e. format) is a widely used format developed by the IEEE organization. The encoding scheme is similar to scientific notation of numbers which make use of number field and exponent. For example, 1.2 x E-2 is a scientific notation of the number 0.012 (1.2 times ten to the minus 2 power). The advantage of floating point numbers is that they can represent a very large range of values from the very small to the very large.

**HIT** – High Impedance Transceiver. A type of transceiver circuitry on a LAN Node that electrically connects to the coaxial cable. HIT Nodes may be interconnected in star or bus networks. MicroTrac DSD uses this type of transceiver.

**Kernel** – This is the fixed (i.e. non-changeable) code for the DCU microprocessor which forms the operating system of the microprocessor. As such, it controls the generation of the various scans, the order of execution of the PAC tasks, the information passed to and from the PAC tasks and the execution of other standard code not directly associated with the PAC tasks such as the control of the CDU or LAN handler.

**LAN** – Local Area Network. A high speed serial communication network which allows two-way communications between multiple devices (referred to as Nodes) all connected to the same communications cable. The specific LAN used is “ARCNET”.

**LAND** – LAN Driver transceiver. A type of transceiver circuitry on a LAN Node that electrically connects to the coaxial cable. LAND Nodes may be interconnected in a star network only.

**LAN Node** – A point in a network where service is provided, service is used, or communications channels are interconnected.

**LCD** – Liquid crystal display.

**LED** – Light emitting diode.

**Local I/O** – The class of Input and Output hardware located on the MicroTrac DSD chassis. All connections between the Main CPU Control PCB and these I/O boards are made via ribbon cables. All connections between the actual I/O devices (i.e. push buttons, thumbwheel switches, lights etc.) are made with individual wires between the I/O device and the drive.

**Local RDU** – When referring to a keyboard, the local RDU is the RDU that the keyboard is connected to.

**Locked RDU** – An RDU whose display may not be modified by a keyboard or push button connected to another RDU.

**LOGI/O** – Remote Logic I/O [Input/Output] PCB.

**Menu** – A list of items for an RDU, any one of which may be selected to be displayed on that RDU.

**Menu item** – A source definition of where the information to be displayed on an RDU, when selected, is to come from. The source definition includes the Drive Node number, the Channel number, and the Subchannel number. The decimal point location is also defined.

**Node** – Originally a term used to identify the base address of devices connected to the LAN. For MicroTrac DSD this term has been expanded to refer to the base address of anything outside the PAC program environment. Thus, the PCU and Local I/O PCBs are each assigned a Node number, even though the DCU does not communicate with those devices over the LAN. The system will support Node numbers 1 thru 258.

Node numbers assigned to devices on the LAN are unique, and refer to only one device on the LAN. Node numbers other than those on the LAN are predefined and not changeable. (Also see *LAN Node* definition.)

**NVRAM** – Non-Volatile Random Access Memory. Memory that can be written to as well as read from. In addition, this memory is protected from losing data when the power is lost. Usually this is accomplished with a battery that is good for at least 10 years.

**PAC** – Programmable Application Control. The graphically oriented task-based language used to customize the DCU (i.e. customize the drive for a specific application).

**PAC Diagram** – A drawing, resembling a schematic diagram, which shows the various PAC tasks and the unique interconnection of those PAC tasks.

**PAC task** – The smallest unit which can be programmed in the PAC language. Numerous types of PAC tasks are provided, each performing a specific, well defined function. Each type of PAC task may be used numerous times in a PAC design. Each PAC task is represented by a block on the PAC Diagram.

**PAC task number** – A unique number assigned by the PAC programmer to each PAC task on the PAC Diagram. These numbers may be assigned in any order and serve only as a means of identifying unique sources of information in the PAC program. The system will support up to 32,767 PAC tasks with the allowable task numbers being 1 to 32767.

**Passive Hub** – A central component in LAN star networks that splits the network signal. Data integrity is ensured over a distance of 100 feet for a 4-port Passive Hub.

**PCB** – Printed Circuit Board.

**PCDU** – Portable Control/Display Unit. A device which can plug into a drive or an RDC, via a cable with a modular connector (similar to a telephone cord), that has two lines of 16 character alphanumeric display and a 30 key keyboard. It allows the viewing and setting of variables.

**PCU** – Power Conversion Unit. The power conversion unit refers to the hardware and software associated with the power conversion from the AC lines to the motor. Specifically, it refers to the hardware and software associated with the PCU microprocessor as well as the power related components. The PCU is responsible only for the power conversion process, not determination of how much power should be converted (which is a function of the DCU).

**Per-unit value** – A per-unit value is a method of representing a quantity where the value 1.0 represents the "Rated" value for that quantity. Whereas the "Rated" value is generally a dimensioned value, the Per-Unit value is a dimensionless quantity.

**Power cube** – The MicroTrac DSD chassis and all components mounted on or inside it. A power cube alone cannot operate a motor; auxiliary items such as isolation transformer, input circuit breaker, control power transformer and motor loop contactor are needed to make up a complete MicroTrac DSD drive.

**Queue** – A list consisting of values where each new value is entered at the end of the list and values read from the list are taken from the beginning of the list. In other words, a first-in first-out [FIFO] buffer.

**"RAM"** – Random Access Memory. Memory that can be written to as well as read from. The data in this memory is lost when the power is lost.

**RDC** – Remote Display Controller LAN Node PCB. A board that includes the LAN Node circuitry and the software to control what is displayed on each of up to 31 RDUs. This device also communicates with the drives over the LAN.

**RDU** – Remote Display Unit. A device that has a 16 character alphanumeric display and a 5-1/2 digit plus sign numeric display. This device is controlled by an RDC.

**RDU message** – The data that is displayed on both displays of the RDU. The source of the message is defined in the RDC by a Menu Item number, Drive number, Channel number, Subchannel number, decimal position, a flag stating what type of message it is (whether the message is modifiable or not), and - if it is modifiable - the minimum and maximum allowable limits of an entered value.

**RI/O** – Remote I/O [Input/Output] Controller LAN Node PCB. A board that includes the LAN Node circuitry and the software to control outputs to and monitor inputs from Remote (Logic or Analog) I/O boards. This device also communicates with the drives over the LAN.

**Scan** – This term refers to the frequency at which a particular PAC task will execute. All PAC tasks programmed in a particular scan will execute in the same time frame. MicroTrac DSD is provided with four timed scans and one background scan. Each PAC task programmed in a timed scan will execute once in that time frame. The background scan executes each PAC task once in whatever time is left over from the timed scans and then starts over executing each task again.

**SCDU** – Standard Control/Display Unit. The 4-1/2 digit numeric display, 4 push buttons (keypad) and multi-color LED on the drive. It allows viewing and setting of variables.

**Selected menu item** – The menu item number in the RDU's menu that is being displayed.

**Severe fault** – An abnormal condition whose severity requires immediate action by the microprocessor sensing the error. An example of a severe error is an IST condition sensed by the PCU. In this case, the PCU disconnects the load; it does not wait for the PAC program to command load disconnect. (Also see *FAULT* definition.)

**Speed Command** – The desired speed setpoint prior to local PAC task modification such as linear accel/decel control, draw modification, trim modification, etc. (Also see *SPEED REFERENCE* definition.)

**Speed Reference** – The speed reference signal after all PAC task modification such as linear accel/decel control, draw modification, trim modification, etc. That is, the instantaneous value of the reference which is applied to the speed regulator. (Also see *SPEED COMMAND* definition.)

**Standard fault** – A fault (or error) which is independent of a particular PAC design. These conditions are associated with the operation of the DCU microprocessor or the PCU or the LAN handler. (See *FAULT* or *ERROR* definition.)

**Subchannel** – The PAC language defines a particular input or output by use of a Node, a Channel, and a Subchannel. The Subchannel refers to a specific input or output of a given Node and Channel.

The third level of addressing which further defines the location of information external to the PAC program environment; the first level is the Node number (see *NODE* definition) and the second level is the Channel number (see *CHANNEL* definition). To access information requires specifying all levels of addressing defined for that piece of information. For example, Node 251, Channel 4, Subchannel 0 refers to the Local Digital I/O PCB connected to connector J1 (assigned Node 251), Thumbwheel switch inputs (assigned as Channel 4 of the Digital I/O PCB), and specifically the set of thumbwheel switches designated as Bank 0 (i.e. Subchannel 0).

**Token** – A term used with the LAN to describe a special LAN message. This message is passed from one LAN Node to another. When a LAN Node receives this message (i.e. the token), it is allowed to transmit a message it has generated while waiting to receive permission to transmit. Once it has completed its transmission, it must pass the token to the next node (in numerical sequence). Nodes which do not have the token may receive messages but may not transmit a message until the token is received. If the node receiving the token does not have any messages to transmit, it simply passes the token to the next node.

**TWI/O** – Remote Thumbwheel I/O [Input/Output] PCB.

**Unlocked RDU** – An RDU whose display may be modified by a keyboard or push button connected to another RDU. This is the default RDU lock state.

Please send information concerning scheduled dates of Training Seminar(s) for the VCD 723.

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