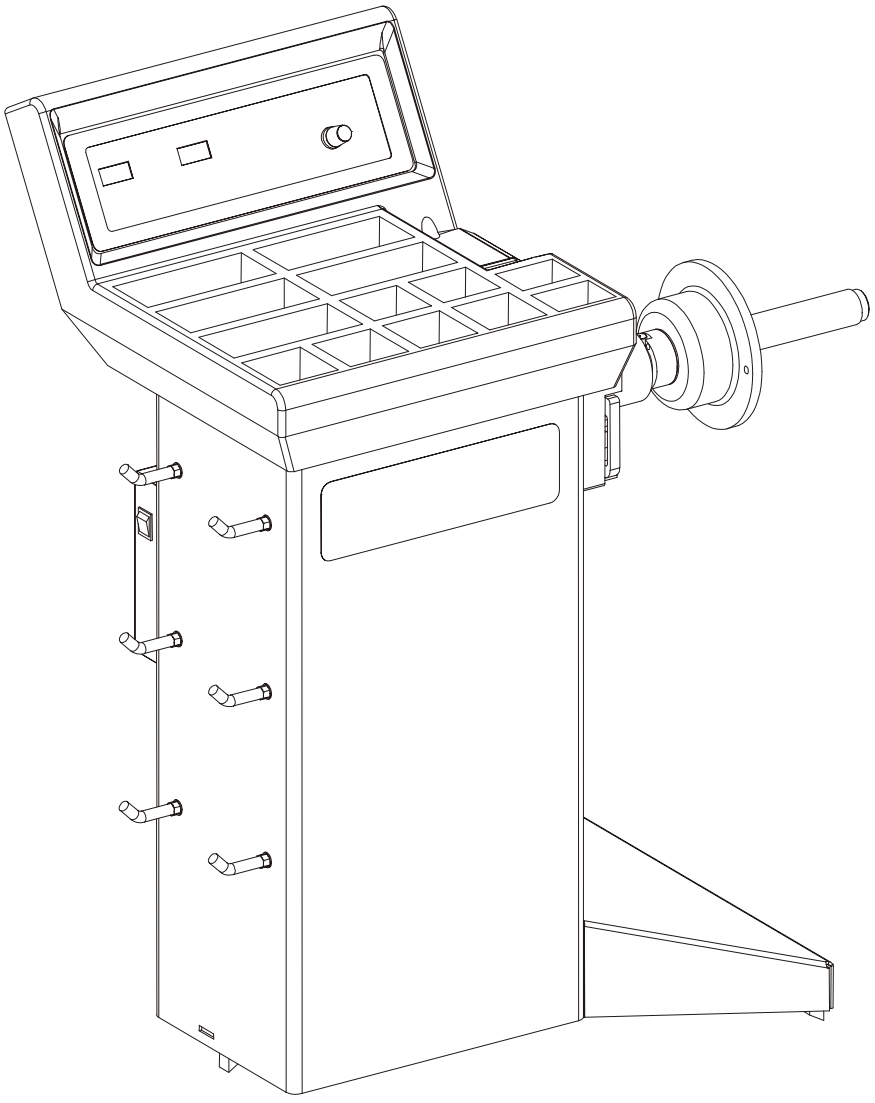
Service Manual

DSP 7700 Wheel Balancer



HUNTER Engineering Company

Contents

1 .Introduction

Purpose

This manual will assist service personnel in troubleshooting and repairing the DSP 7700 Wheel Balancer.

Operation

When service is requested, it is important to verify that the unit is being used properly. Always check for proper AC line voltage. *For proper line voltages, refer to "CPU/Display Board Test Pad Voltages," page 6-1.*

Read and become familiar with the contents of this manual before servicing the DSP 7700 wheel balancer. It is also essential to have read and understood the operation manual. *Refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T.* Hands-on operation experience is recommended; try all the features, balance a wheel, etc. Understanding the operation of the balancer will make servicing easier and safer.

Hazard Definitions

Watch for these symbols:

⚠ **CAUTION:**	Hazards or unsafe practices, which could result in minor personal injury, or product or property damage.

⚠ **WARNING:**	**Hazards or unsafe practices, which could result in severe personal injury or death.**

⚠ **DANGER:**	**Immediate hazards, which will result in severe personal injury or death.**

These symbols identify situations that could be detrimental to your safety and/or cause equipment damage.

Because components in this manual are referred to by Hunter part numbers, *refer to parts drawing 12-13, for parts identification.*

⚠ **WARNING:**	**To prevent the possibility of electrical shock injury or damage to the equipment, POWER MUST BE DISCONNECTED BY PULLING THE PLUG FROM THE AC POWER SUPPLY.**

⚠ **WARNING:**	**Make sure that a 115V, 15 amp electrical supply circuit and the appropriate receptacle are installed with the proper grounding. Plugging the 115V balancer into a 230V electrical supply circuit will damage the equipment.**

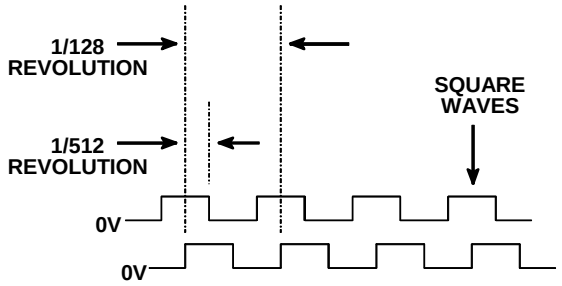
Related Publications

Additional information can be found in:

Form 4244T	Operation Instructions DSP 7700 Wheel Balancer
Form 4280T	Installation Instructions for DSP 7700 Wheel Balancer
Form 3667T	Installation Instructions for Bolt-Down Kit
Form 12-13	DSP 7700 Parts Drawing

Purpose Of Components

The spindle encoder board, 45-863-1, operates with the movement of the slotted spindle encoder disk, 17-63-2, providing two square waves and a home pulse to the CPU/Display board, 45-867-1. The two square waves occur in “quadrature” or 90 degrees out of phase with each other. *Refer to illustration.*



The CPU/Display board senses the order and frequency of the edges to determine the direction and speed of the shaft. Each passing of a slot in the disk through a detector causes a high (+5V) and low (0V) edge on each channel. There are 128 slots in the disk, so the position of the shaft is determined to 128 x 2 edges x 2 channels, or 512 positions. There are three, red LED’s on the board for visual checking of the two channels and the home pulse.

There are two force transducers, 109-87-3. A ceramic element located between the two steel caps, produces voltage change when the force upon the caps is changed. The transducers receive force vibrations (due to the rotating imbalance) through the welded steel structure. Also on each transducer is a temperature sensor. The change in temperature (since calibration) is calculated at every spin. The signals are then compensated for any temperature-dependent system effects. The force transducer signals are sent through the cables (these cables are a permanent part of the transducers) to the CPU/Display board.

The knob board, 45-675-1, has a rotary encoder for manual entry of wheel dimensions. The rotary encoder produces the same kind of signal as the spindle encoder board, with the exception that the device uses mechanical switches (rather than optics), and there is no home pulse. The direction and speed of the knob is noted by the CPU/Display board for update of the dialed-in wheel settings.

The keypad overlay provides “key pressed” signals to the CPU/Display board by connecting pins 1 through 9 to pin 10 (ground) of J2 on the CPU/Display board. *Refer to Appendix, “Wiring Diagrams and Schematics.”*

The CPU/Display board, 45-867-1, performs the following operations:

Drives the display and beeper.
Scans the knob and keypad for change via J1 and J2.
Receives unregulated power and monitors/controls the DC drive via J3.
Tracks the spindle movement via J5.

Reads the imbalance signals from the left and right force transducers via J8 and J7.

The manual input knob is scanned for change by the DSP (digital signal processor) chip 800 times-per-second. The turning rate is noted and the digits are updated by larger increments for faster rates. This is why a large range of values can be quickly dialed across before slowly tuning-in an exact value as the knob is slowed down.

The nine keys are scanned and the display is updated 200 times-per-second. One LED display update requires 96 shifts of data “bits” (one for each LED). These 96 shifts occur every 1/200 of a second, while the DSP is scanning and responding to the knob and switches.

When a spin starts, the DSP chip checks for locked rotor, excessive time to forward rotation, excessive time to minimum speed, etc. The DSP chip also makes sure that the following conditions are met during the spin:

Spindle encoder signals are functioning perfectly.

Both force pickup temperature sensors are functioning properly.

The knob and keypad are ignored during the spin. Once the wheel is at minimum speed to take data, eight revolutions (of the wheel) worth of force transducer data are fed to the DSP chip. The DSP chip extracts the rotating imbalances from the noise in the signal, due to the motor and floor vibrations, determines, and displays the correction weight angles and positions based on the dialed-in wheel data. It then initiates the wheel braking sequence. Once the wheel stops, the knob and keypad functions are restored.

2 . Initial Installation

Placement

The balancer should be placed in a dry area, which is not subjected to water spray. Clearance for the operator at the front of the balancer should be at least 3 feet. The electrical power cord should be positioned so that it cannot be walked on, driven over, or tripped over.

Floor Requirements

The balancer should be placed on a **solid** concrete floor. Any floor condition, which might allow the balancer to move during a spin, is unacceptable.

PROBLEM	CORRECTIVE ACTION
Very fine finished concrete.	Rough up the floor area at the three point supports or bolt the unit down to the floor.
Painted concrete.	Remove floor paint at the three point supports or bolt the unit down to the floor. Do not grind the paint off with the three point supports by simply jerking the balancer about . . . this will leave flakes of paint under the supports (making matters worse).
Floor is angled.	Bolt the unit down. (The fact that the balancer is installed tilted will not affect it's performance.)
Floor is not clean.	Clean the floor.

If the balancer cannot be moved easily by pulling on the spindle with one's index finger, the floor condition is acceptable. Also be sure that the three point supports are on flat surfaces and not on "bumps" or "pits" in the concrete floor.

NOTE:	This floor condition requirement is **not** unique to the DSP 7700. All balancers must remain stationary during the measurement spin. Balancer movement may be undetectable, but the force transducers of a balancer cannot sense the true rotating imbalance forces, if the entire balancer is moving due to those same forces (even if only by tiny fractions of an inch).

If the location selected is a cement floor that is hollow underneath, place the balancer over a supporting beam or close to a supporting wall.

With the proper floor requirements, the DSP 7700 will perform well, with or without being bolted to the floor. If desired, three of the hold-down hooks used during shipment can be placed in the slots next to the feet to bolt the unit to the floor. *Refer to "Installation Instructions for Bolt-Down Kit," Form 3667T.*

Installation Procedure

Unpack the balancer and check for shipping damage.

Verify proper grounding of the unit by taking an ohm reading between the frame and the ground pin of the power cord.

Remove the motor panel assembly and check the belt tension. Adjust to 50 lbs. ± 5 lbs., if necessary. *Refer to "Motor, Belt, and Pulley," page 3-7.*

Be certain that the balancer is turned off ("**O**" is depressed on the ON/OFF switch, located on the motor panel assembly).

Plug the balancer into the proper electrical service.

Turn the unit on by depressing the "**I**" side of the ON/OFF switch.

Check for proper operation of the balancer controls:

Press the START key. Verify that the shaft is turning **clockwise** when viewing it from the end of the shaft.

Verify that the unit completes a balance cycle and the shaft brakes to a stop.

If the shaft turns the wrong way, unplug the unit, unplug the motor wires from the power board, and swap positions.

Check if each of the remaining keys function, causing a short beep. The NEXT and ENTER keys can be checked by performing the "Set-Up" procedure.

Check if the knob causes changes to the corresponding display wheel dimension indicators.

Calibrate the balancer per the operation manual. *Refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T.*

Perform the "Calibration Check" procedure. *Refer to "Quick Calibration Check Procedure," page 5-9.*

If desired, perform the "Set-Up" procedure, programming the balancer settings to the customer's needs. *Refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T.*

Check the spindle threads and lubricate them, if necessary. Clean the spindle threads by running the edge of a rag between the threads, while turning the spindle by hand. Lubricate the spindle shaft and wing nut threads. A lubricant containing Teflon®, which evaporates leaving a long lasting film of lubricant, such as SuperLube® by Permatex is recommended.

Initial installation procedure is complete.

3 .Removal, Installation, and Adjustment of Components

Purpose

The intent of this section is to provide helpful information during servicing that may not be obvious from part drawings.

> ⚠ **WARNING:** **To prevent the possibility of electrical shock injury or damage to the equipment, POWER MUST BE DISCONNECTED BY PULLING THE PLUG FROM THE AC POWER SUPPLY.**

To prevent damage to static sensitive components, a grounded static wrist strap must be used when servicing circuit boards or cables. Any board shipped in an anti-static bag should remain in the bag until it is necessary to install it in the balancer. Use the same bags when returning defective boards to Hunter so that anti-static damage during shipment is not mistaken for a problem with the balancer.

> ⚠ **CAUTION:** Wait 30 seconds after turning off the balancer before unplugging any of the cables. There are capacitors on the DC drive board, which hold a charge although power is turned off. There are resistors across these capacitors to bleed-off the charge, however, it takes about 30 seconds for this to happen after the power is turned off.

Weight Tray, 69-933-1

Remove the four screws that hold the weight tray down and the five Keps nuts that attach the display to the weight tray.

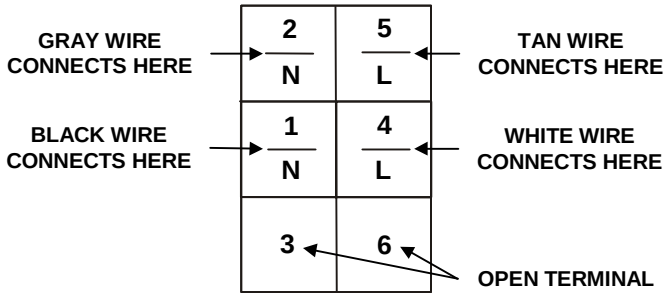
> ⚠ **CAUTION:** Removal of the radius arm will result in the loss of the manual and optional auto dataset calibration and will break the factory Loctite seal.

ON/OFF Switch, 18-270-2

NOTE:	When replacing the ON/OFF switch, making wiring harness connections will be easier from the outside of the balancer with the wires pulled through the mounting hole.

To remove the ON/OFF switch, reach inside the cabinet and push out on the switch, while depressing one of the molded plastic tabs on the switch. This will disengage the switch from the mounting hole. Pull out a portion of the wiring harness through the mounting hole and disconnect the old switch.

Connect the new switch to the wiring harness. On the new switch, there are two sets of terminals separated by a plastic rib. Plug the black wire (from L1 on the DC drive board) and white wire (from L2 on the DC drive board) into one set of terminals, and plug the tan and gray wires (from power source) into the other. *Refer to illustration below for connections.*



Install the new switch in the mounting hole so the "**I**" (ON) side is up and "**O**" (OFF) is down.

DC Drive Board, 45-861-1

Service to the DC drive board consists of checking and replacing fuses at F1, F2, and F3, and adjusting potentiometers R31, R42, and R49. Fuses at F1 and F2 are 250 volt, MDA-10 amp fuses. F3 uses a 250 volt, GMC-3 amp fuse.

R31 is Motor Speed Control. *Refer to "Motor, Belt, and Pulley," page 3-7.*

R42 is Torque Limit and is always rotated fully clockwise (maximum).

R49 is "I-R Compensation." It is set such that the motor comes up to speed, but does not overshoot the intended rpm. R49 may be adjusted from 1/3 clockwise to 2/3 clockwise with no materially adverse effects.

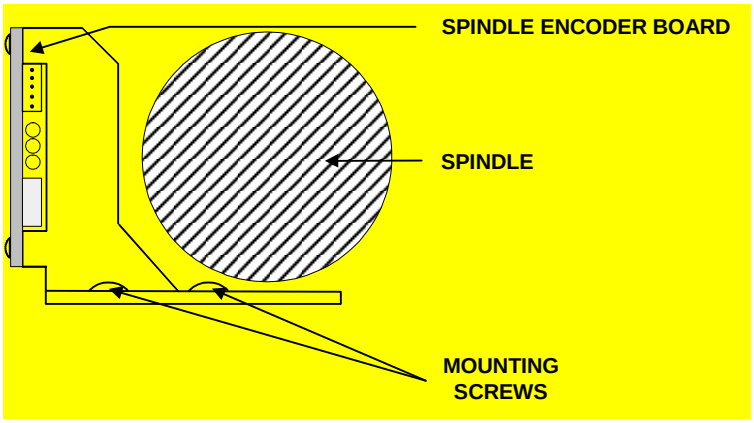
NOTE:	There is little chance this potentiometer will need to be adjusted.

Spindle Encoder Board and Bracket Assembly, 45-863-1

When plugging-in and unplugging the connector to the encoder board bracket assembly, support the board by hand to avoid deflecting the bracket. This could make the optical switches on the board press against the brass encoder disk and possibly bend the encoder disk.

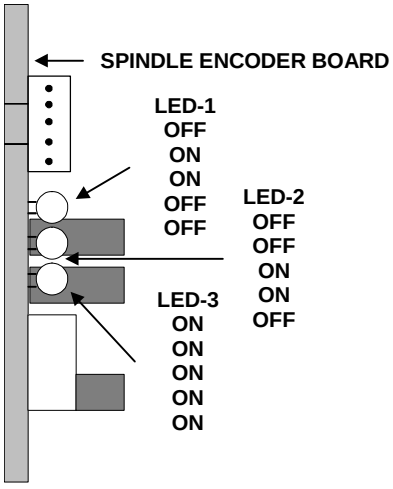
It is important that the cable be secured properly to prevent contact with the pulley and belt.

Do not remove the two screws holding the board to the mounting bracket, as they are pre-adjusted at the factory. To install the assembly, slide the three optical switches on the PC board over the brass spindle encoder disk, 17-63-2, inside the pulley section of the spindle.



Turn the spindle by hand, looking, and listening for any contact between components. Bend the bracket, if necessary, to ensure that the board does not rub on the spindle and that the encoder disk does not rub on the optical switches.

Turn the balancer on and check for proper optical switch operation by observing the three LED's on the PC board while turning the spindle **clockwise** as viewed from the end of the spindle. The LED's should flash as shown in the illustration below.



LED-3 (home pulse) is always ON, except for a short duration, OFF once per revolution of the spindle.

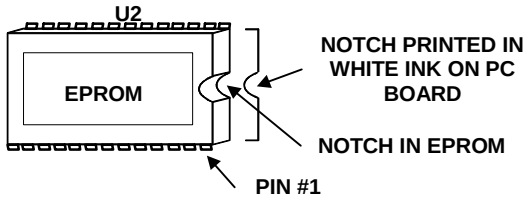
If the LED's do not operate correctly, remove the bracket assembly, but leave the cable plugged-in. While holding the encoder assembly by the bracket, turn on the balancer and block each optical switch with a business card. The LED corresponding to each switch should turn ON when blocked.

If the board functions, but the installed assembly does not produce the proper LED sequence, the position of the assembly must be adjusted. If LED-3 sequences with LED-1 and LED-2, the board is too close to the spindle centerline. Loosen the two mounting screws of the bracket and adjust the assembly until LED-3 turns off once per revolution of the shaft. If LED-3 never turns off, the board is located too far from the spindle centerline. If the board must be moved closer to the spindle centerline, loosen the two mounting screws of the bracket and adjust the assembly.

The DSP 7700 has automatic encoder signal checking at every spin. *Refer to "Display Error Codes," page 5-6.*

"EPROM"

Remove and discard the old EPROM (Erasable Programmable Read Only Memory) from U2 position on the CPU/Display board, 45-867-1. Install the new EPROM with the notched end facing in the same direction as indicated by the notch printed in white ink on the PC board. *Refer to illustration.*



Verify the program version is correct by pressing and holding the ENTER key while turning the machine on.

The software version number (such as 1.0.0) appears on the outer weight amount indicators. The displayed software version number should agree with the label on the EPROM.

Calibrate the unit per the Operation Manual. *Refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T.*

Perform the Set-Up Procedure (select the display programmables) per the Operation Manual. *Refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T.* If error codes appear, *refer to "Display Error Codes," page 5-6.*

Cables

If replacing a cable, which is routed through the weight tray, be sure to re-route the new cable through the same hole in the same manner.

The spindle encoder cable should be installed with end marked "This end to DSP BD J5" at J5 of the CPU/Display board. This ensures that the cable shield connection originates at the CPU/Display board and not the encoder board.

Force Transducer

Clean the mounting surfaces so that the ball sockets and ceramic ball are completely free of any dirt or debris. Install the new transducer, making sure that the flat surface area (if present) of the ball is not contacting the ball seat as illustrated below:

YES **NO** **NO**

Tighten the setscrew 1/4 turn after finger tightening.

Move the transducer in small arcs to allow the ball and transducer to become seated. Position the assembly so that the long edge of the board is parallel with the floor (excessive angle will cause the board to contact the weight tray, upsetting the imbalance vibration readings).

Tighten the setscrew another 1/4 turn.

Tighten the locknut to prevent the adjustment from changing.

Plug the cable connector into J8 of the DSP board for a left transducer, or into J7 for a right transducer.

Manual Dataset Arm

Calibrate the arm to a reading of 295 per the Operation Manual. *Refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T.*

The sliding Dataset arm must be installed parallel with the main shaft to operate properly. Rotate the arm to the down position to verify that the reading is still within one digit of the 295 calibration reading.

Optional Auto Dataset Arm

Remove weight tray, 69-933-1, from housing assembly.

Unplug Dataset cable from J11 on CPU/Display board. Remove cable tie securing cable to housing.

Remove the two screws, 75-312-2, that attach the optional Auto Dataset arm assembly, 103-89-1, to the housing assembly.

Install the Auto Dataset system using the same screws previously removed.

If Auto Dataset potentiometers are faulty, the Auto Dataset Potentiometer Assembly should be replaced as a unit. *Refer to "Inner Auto Dataset Potentiometer Assembly Replacement," page 3-6.*

Cable routing and mechanical adjustments:

It is important that the cable be looped and secured properly to prevent binding and scraping of the cable jacket when the arm is pulled in and out.

Work the arm back and forth, checking that the loop moves freely. The loop should not rub against the welded balance structure, but it can rub against the outer wrapper of the unit.

Route the cable up through the weight tray. Plug the connector into J11 "Inner Dataset" of the CPU/Display board.

The rim diameter potentiometer is the one located at the left end of the Dataset arm shaft.

The rim distance potentiometer is the one that rides on the plastic rack as the arm is moved in and out.
Potentiometer guide, 104-117-2, slides along the formed metal guide rail. Pull the arm from full in to the full out position, making sure that the potentiometer guide does not bind anywhere along its travel.

To calibrate the Auto Dataset arm, *refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T*

Place a wheel on the balancer and take a rim lip measurement. Verify that the diameter acquired agrees with the wheel to within 0.1 inch (3 mm) and with the scale reading to within 1 mark (1 mm) of the tape scale.

Inner Auto Dataset Potentiometer Assembly Replacement, 93-52-1

Remove weight tray.

Unplug Dataset cable from J11 on CPU/Display board. Remove cable tie securing cable to housing.

Hold the spring that wraps the dataset arm shaft back, and loosen the two setscrews securing the potentiometer assembly to the dataset arm shaft.

Slide the old potentiometer assembly off the shaft and slide the new assembly onto the shaft. Verify that the potentiometer guide slides along the guide rail.

Perform "Inner Auto Dataset Centering Adjustments," page 3-6, then tighten the two setscrews securing the potentiometer assembly to the dataset arm shaft.

To calibrate the Auto Dataset arm, *refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T*

Place a wheel on the balancer and take a rim lip measurement. Verify that the diameter acquired agrees with the wheel to within 0.1 inch (3 mm) and with the scale reading to within 1 mark (1 mm) of the tape scale.

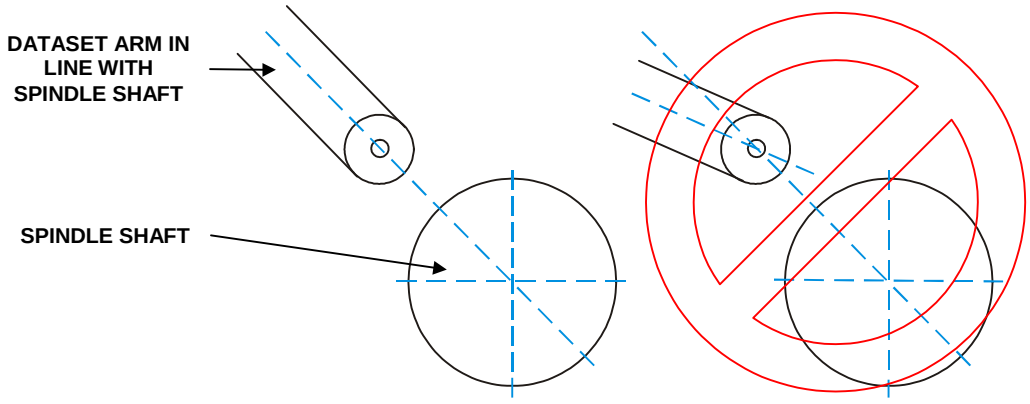
Inner Auto Dataset "Centering" Adjustments

To "Center" the diameter potentiometer (adjust potentiometer shaft for mid-rotation when the radius arm is at half travel):

Put the balancer in diagnostic mode and advance to display variable 27 (diameter potentiometer reading). This will give a real-time reading of the diameter potentiometer value, followed by an "H" (which indicates hexadecimal format).

Before installing the potentiometer assembly onto the Dataset shaft, rotate the upper potentiometer shaft until the display shows between 00 00H and 00 09H.

Rotate the Dataset arm until it is pointing directly away from the spindle.



While the arm is in this position, insert the potentiometer into the end of the dataset shaft. Rotate the arm, making sure that the display shows 00 00H when the arm is pointing away from the spindle.

It is also possible to use the potentiometer test pad voltages on the DSP board to “center” the potentiometers. Display reading 00 00H corresponds to zero volts at the potentiometer test pad. “POT 1” test pad is the diameter (TP10) potentiometer, “POT 2” is the distance (TP9) potentiometer.

To “Center” the distance potentiometer (adjust potentiometer shaft for mid-rotation when the Dataset arm is pulled halfway out):

Put the balancer in diagnostic mode and advance to display variable 26. This will give a real-time reading of the distance potentiometer value, followed by an “H” (which indicates hexadecimal format).

Pull the arm out to scale at 230.

With the scale at 230, lift the distance potentiometer off the rack just enough to rotate the gear. Rotate the gear to obtain display reading between 00 00H and 00 09H.

Set the potentiometer and gear back onto the rack. Pull the arm in and out, making sure that the display shows 00 00H at approximately mid rack travel.

Motor, Belt, and Pulley

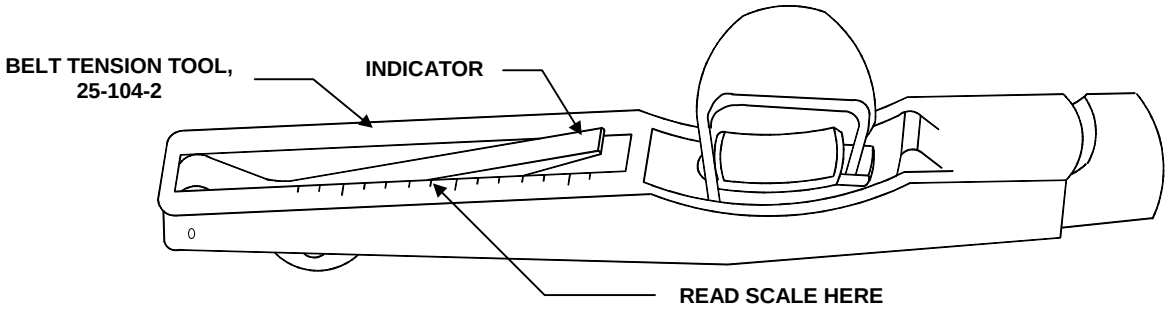
Check and Adjust Belt Tension

Disconnect AC power cord from the power supply.

Remove the two screws securing the motor panel assembly to the base assembly.

Check belt tension as follows:

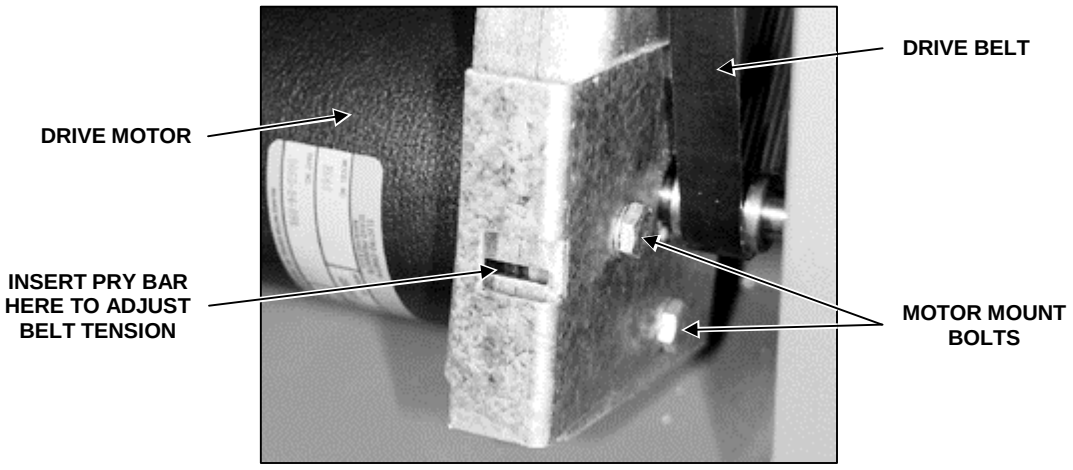
1. Position the end of the indicator flush with the scale of the belt tension tool.



2. Place the index finger inside the rubber finger strap of the belt tension tool.
3. Position the belt tension tool on the section of belt between the motor and the spindle.
4. Push down on the belt tension tool until the tool clicks.
5. Read belt tension where the top edge of the arm crosses the scale. *Refer to the above illustration.*
6. Belt tension should be set to 50 ft-lb., ± 5 ft-lb.

If necessary, adjust belt tension as follows:

1. Loosen four motor mount bolts.



2. Using a small pry bar, move the motor to obtain the correct tension on the belt. To decrease belt tension, move the motor upward. To increase belt tension, move the motor downward.
3. Hold the motor in place and tighten four motor mount bolts.
4. Verify proper belt tension and readjust, if necessary.
5. Secure the motor panel assembly to the base assembly using two screws previously removed.

Connect AC power cord to the power supply.

Verify the motor's rpm as follows:

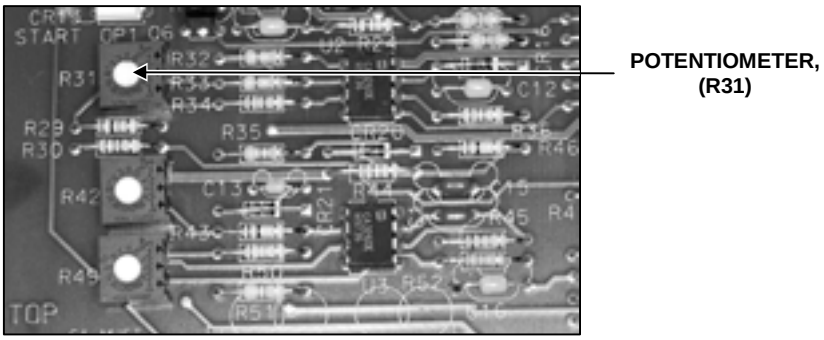
1. Press and hold the "Next" and "Enter" keys while turning the unit on.
2. Press the "Start" key.
3. The rpm of the motor will display on the console. It should be 150 rpm ± 2 rpm.

If necessary, adjust the motor speed as follows:

1. Remove two screws securing the motor panel assembly to the base assembly.

> ⚠ **CAUTION:** Do not touch any components of the circuit board, other than the potentiometer, while the balancer is plugged into the electrical supply.

2. Locate the potentiometer (R31) and adjust using a small slotted screwdriver. Turning the potentiometer **clockwise** will increase the motor speed. Turning it **counterclockwise** will decrease the motor speed.



3. Verify motor speed. Readjust as necessary.
4. Reinstall two screws previously removed to secure the motor panel assembly to the base assembly.
5. Turn off the unit to cancel “rpm display” mode.

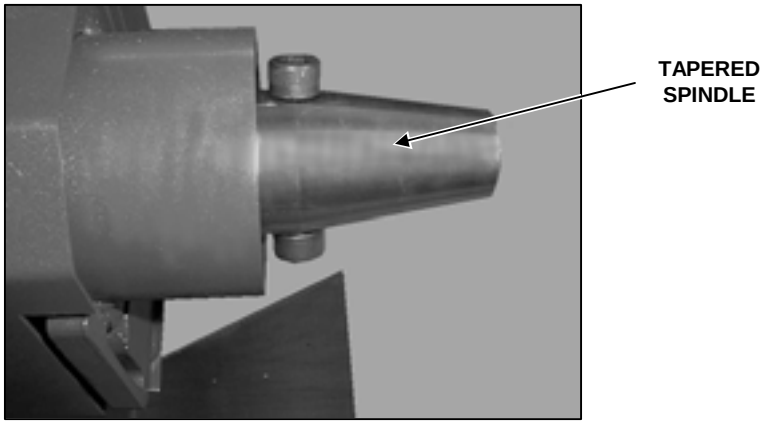
The electrical connections to the motor consist of one ground to be connected to tab 5 (also labeled motor 2) and a power wire to tab 3 (also labeled motor 1) of the DC drive board, 45-861-1. A ground wire is connected to the “N” terminal of the DC drive board and a welded stud on the chassis of the balancer.

If replacing the pulley, torque the two pulley setscrews to 70 in-lbs., while the motor is out of the unit. This torque is not achievable with a simple hex wrench (use a torque wrench with a hex bit).

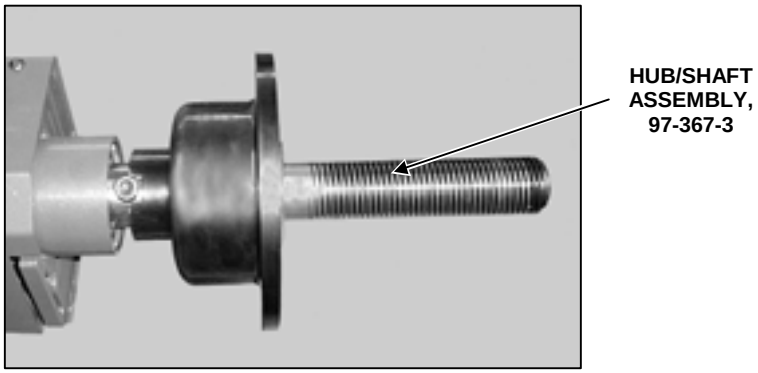
Set the belt tension to 50 lbs. ±5 lbs. *Refer to “Check and Adjust Belt Tension,” page 3-7.* Turn the spindle a few times and then recheck the belt tension.

Spindle and Threaded Shaft Assembly

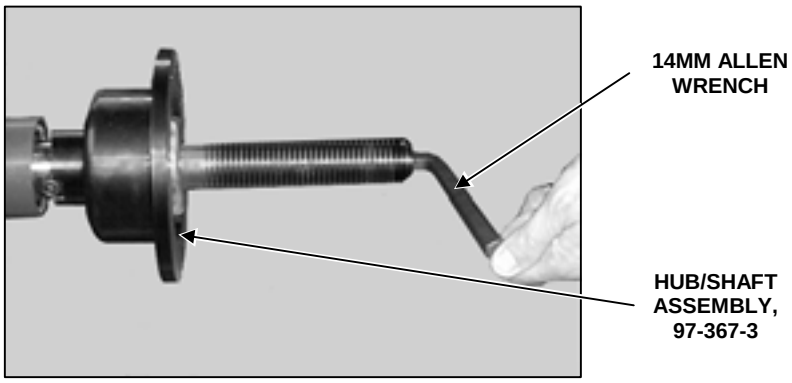
Clean the taper of the spindle with a clean cloth and verify that it is free of dirt and debris. Apply a light coat of oil to prevent rust.



Position the hub/shaft assembly, 97-367-3, on the tapered surface.



Gently shake the hub/shaft assembly to seat the assembly on the tapered surface. Tighten the bolt located inside the hub/shaft assembly to approximately 50 ft-lbs. using the 14mm Allen wrench provided.



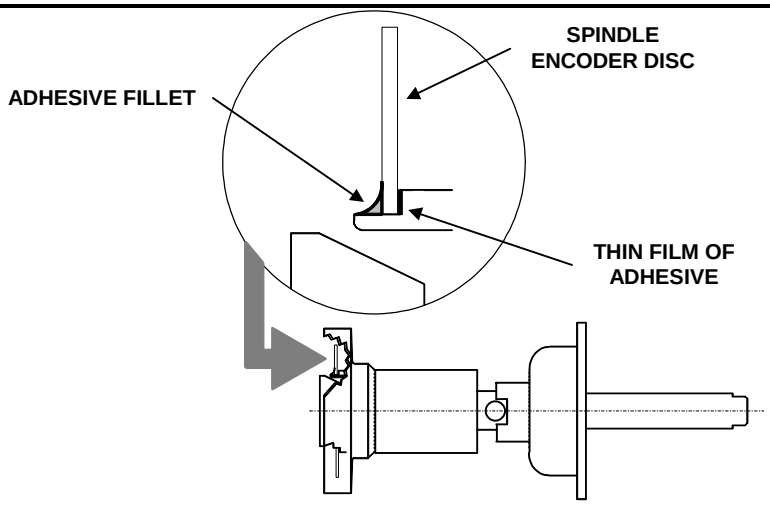
The threaded shaft loosens **counterclockwise** (as viewed from the end of the shaft) and tightens **clockwise**.

Spindle Encoder (Slotted Aperture) Disk (Part of Kit 20-976-1)

Remove the spindle encoder bracket assembly, remove the spindle assembly, pull off the old encoder disk, and scrape off any old adhesive from the spindle. Clean the spindle contact area and the new encoder disk with lacquer thinner. **DO NOT** use parts cleaner or anything that leaves a residue.

Use either Hunter adhesive, 162-69-2, or "Loctite-426" and spread a thin coat on the spindle contact area. Place the disk in position and press it firmly over the adhesive all the way around. The orientation of the home pulse slot does not matter. Add more adhesive to the outside of the disk and spindle lip to form a fillet as shown in the following illustration.

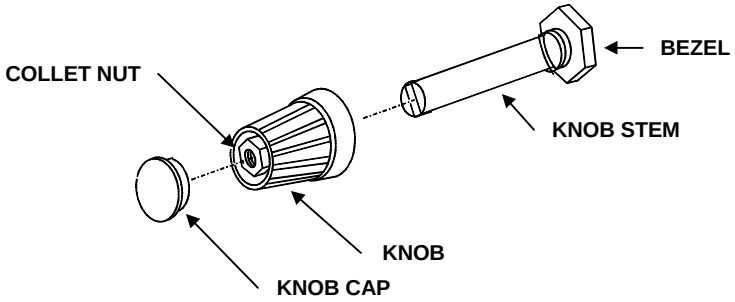
NOTE:	Be careful to not get adhesive into the encoder disk slots.



Re-install the spindle and spindle encoder board.

Manual Input Knob, 34-86-2

Pry off the gray plastic knob cap, 34-87-2, from the knob. Loosen the brass collet nut to allow the knob to slide off the knob stem.



When installing the new knob, the knob will bind against the display if it is held against the display while tightening the collet nut. Hold the knob slightly away from the display (the thickness of a piece of paper is about right) while tightening the brass collet nut. The knob should be installed as close to the display as possible without binding.

Knob Board, 45-675-1

Unplug the knob board cable connector from J1 of the DSP board.

Remove the gray plastic cap, brass nut, and washer to remove the knob from the knob shaft.

Remove the lock nut to remove the knob board from the assembly.

4 . Diagnostics Mode

Enabling the Diagnostics Mode

Press and hold the two ⇕ keys while turning the balancer on. It is important to remember that once the balancer is turned on in diagnostic mode, it remains in the diagnostic mode until turned off. All balancer operations work identically while in diagnostic mode, with three exceptions:

Screen Viewable Diagnostic Values

If a balancer problem cannot be corrected by normal service measures, it is possible to show diagnostic values on the display screen. These values are used internally by the DSP chip for use elsewhere in this manual or for analyzing at a Hunter Service Center. Before calling the service center with these values, have the balancer serial number and software version number available, to prevent the need for a second telephone call. To access the software version number, press and hold the ENTER key while turning the balancer on. The software version number will appear on the display.

The DSP 7700 uses the Hexadecimal system to show diagnostic values instead of the decimal system. The Hexadecimal system is based on units of sixteen rather than units of ten that the decimal system uses:

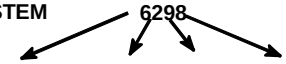
DECIMAL SYSTEM:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17...

HEX SYSTEM:

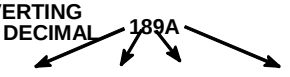
1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, 10, 11...

EX: DECIMAL SYSTEM 6298



(6 X 1000) + (2 X 100) + (9 X 10) + (8 X 1) = 6298

EXAMPLE: CONVERTING HEX SYSTEM TO DECIMAL 189A



(1 X 4096) + (8 X 256) + (6 X 16) + (10 X 1) = 6298

IF RESULT IS GREATER THAN 32,767, THE HEX NUMBER IS NEGATIVE. SUBTRACT 65,536 FROM THE TOTAL TO GET THE DECIMAL NEGATIVE NUMBER.

Hexadecimal-to-decimal calculators are available, identifiable by the letters “A, B, C, D, E, F” appearing across one of the rows of keys.

Press the NEXT key while the “Standard” LED is lit to see the first diagnostics value (1 should appear, alternating with a five character value across the weight amount indicators). If the NEXT key does not respond this way, both outer keys were not held down firm enough during power-up, (the balancer responded to only one of the keys, initiating normal balancer operation).

NOTE:	The diameter knob can be used to dial to the desired display variable, once the NEXT key is pressed to show the first variable.

Each press of the NEXT key will present a five character value across the weight amount indicators. The corresponding index will alternate with that number.

Each character of a displayed value can be the numbers 0 through 9 or the letters A, b, C, d, E, or F. The last character is always “H” which stands for “hex” format characters.

The following is an example of the characters as they appear on the display screen:

For example, DSP 7700 software version 1.0.0, has twenty-nine diagnostics variables which might show on the screen as shown in the table below:

DIAMETER DIGITS	WEIGHT DIGITS	HEX VALUE	DECIMAL VALUE
1 	01 1bH	O11b	283
2 	02 00H	0200	512
3 	0E AFH	0EAF	3,759
.			
.			
.			
. 	00 01H	0001	1
. 	00 00H	0000	0
. 	FF FFH	FFFF	-1

After the last diagnostics value has been presented, pressing the NEXT key will return the unit to the normal weight displays. Be sure to turn the balancer off and then back on when finished with the diagnostics mode.

Calibrating In Diagnostics Mode

Diagnostic calibration will be saved even if the calibration fails (“CAL Err” is displayed on the screen). This might allow the balancer to function until a faulty transducer can be replaced. A transducer that has a weak output may be failing the regular calibration. For example, try calibrating while in diagnostics and then perform the quick cal check.

In diagnostic calibration, all the limits are tighter, especially for the temperature sensors on each transducer. “CAL Err” is acceptable to appear on a balancer that always shows “CAL rdy” if calibrating while not in diagnostics mode.

Setup Procedure in Diagnostics Mode

When the balancer is in diagnostic mode, the “Setup” procedure presents some setup programmables not available in the non-diagnostic mode “Setup” selections.

Selection	Purpose	Settings	Factory Settings
Rnd	Round Increment	0.01, 0.05, 0.25 oz	0.25 oz
Bli	Blind Amount	0, 0.15, 0.29, 0.58 oz	0.29 oz
Lan	Language	DSP (English U.S.)	DSP
		05 (English Export)	
		09 (German)	
		18 (Spanish LA)	
		19 (Spanish Spain)	

5 .Troubleshooting

Pre-Troubleshooting Checklist

When service is requested, it is important to verify that the balancer is being used properly.

Verify that the “blind” is set to a value **larger** than the “round.” *Refer to “Setup Procedure in Diagnostics Mode,” page 4-3.*

Verify that the calibration weight studs are not loose or bent.

Was the “enter TDC” step 2 of the calibration procedure performed correctly?

Is the wheel shifting position during the spin without the operator realizing it? The wing nut may not be tight enough. A two handed “rocking” motion of the wheel is recommended.

Is the wheel shifting its position during the spin because of dry spindle and wing nut threads? When the threads are not well lubricated, a large portion of the effort to turn the wing nut goes into overcoming the thread friction, instead of pushing the wheel against the balancer hub faceplate. It may **feel** tight, but it is not pushing the wheel against the hub to nearly the same degree as if the threads were lubricated.

Is the wheel shifting position during the spin because of excessive oil or debris on the hub faceplate or wheel? Make sure these surfaces are clean and dry.

NOTE:	The customer should **not** coat the hub surface with oil to keep it from rusting.

Is the wheel (especially a large wheel) centered properly? Check for proper centering by holding the Dataset arm tip near, but not touching the rim lip while turning the wheel. Look for up and down movement of the rim with respect to the stationary Dataset arm tip. Large wheels are more difficult to center due to the extra weight having to travel up the cone.

Make sure the cones are not dry and that the wheel is “rolling” as the wing nut is tightened. This lets the pilot hole roll, instead of slide, while it travels up the wheel cone.

Try lifting the wheel as the wing nut is being tightened.

On very heavy wheels, try wheel coning from the outside of the wheel. This forces the cone into the pilot hole by the full wing nut force instead of just the spring pressure.

Is the wheel bent? Check by holding the Dataset arm tip close-to, but not touching the rim lip while turning the wheel. Look for left and right movement of the rim with respect to the stationary Dataset arm tip. If the wheel is bent, the dialed-in Dataset reference setting on the display is only correct for one spot (where the wheel was measured). A weight placed at any other angular location will be in error and result in residual imbalance amounts.

Check for debris accumulating inside of the spindle spring mechanism.

Ask the customer if the problem re-occurs on different wheels (water or other matter inside the tire will cause trouble). Tires should always be inflated to proper specifications.

Check the floor condition. *Refer to "Initial Installation," page 2-1.*

Check for physical damage to wheel cones, cup, and wing nut.

Auto Dataset Troubleshooting

Test pins on the power board are provided to access the wiper voltages with a meter. A distance potentiometer wiper voltage can read from almost -5 to almost +5 volts if the potentiometer is not installed in the Dataset arm. For the distance potentiometer (TP9), mechanical limiting of the arm is set to allow only a percentage of the possible 10 turns of the potentiometer to occur. The distance wiper voltages on a correctly assembled Dataset arm should not exceed ±1.9 volts. The diameter potentiometer (TP10) is a single-turn potentiometer and should read up to ±1.95 volts, with about 40 degrees rotation of "dead area" where the voltage will not change. The dead area will not be accessible in an installed dataset arm because the spindle will inhibit the arm movement. The best situation is to have a potentiometer "centered" for the arm travel. This means that the inner Auto Dataset diameter wiper voltage should be zero when the arm is at mid angular travel. The distance wiper voltages should be zero when the inner and outer arms are at mid linear travel. A potentiometer can be "off center" by quite a bit without impairing Dataset arm performance because this is compensated for at calibration.

NOTE:	Test pads TP9 and TP10 are coated, therefore it will be necessary to "poke" through the coating with the meter probe.

Inner Auto Dataset

Potentiometer 1, TP10 (diameter), should go from negative to positive voltage as the arm is pivoted from touching the top of the threaded shaft to touching the bottom of the threaded shaft. Ideally, the voltage should be zero with the arm pointing directly away from the spindle (mid angular travel). This is not required, but if the voltage clips (sticks at a maximum or minimum value) within the endpoints of the arm travel, "center" the potentiometer. *Refer to "Inner Auto Dataset "Centering" Adjustments," page 3-6.*

Potentiometer 2, TP9 (inner Auto Dataset distance), should go from negative to positive voltages as the arm is pulled from the rest position to fully extended. Ideally, the voltage should be zero with the arm at the half-travel point. This is not required, but if the voltage clips (sticks at a maximum or minimum value) within the endpoints of the arm travel, "center" the potentiometer. *Refer to "Inner Auto Dataset "Centering" Adjustments," page 3-6.*

The balancer spindle travel from steps 1 and 2 is used in the calibration, so the spindle encoder board must be plugged-in to obtain a successful Dataset calibration. Spindle angle travel between cal steps 1 and 2 is used to determine to high accuracy the distance between the spindle centerline and Dataset arm shaft centerline. This makes the diameter reading accurate to 0.1 inch, yet does not require a fixed vertical or horizontal mounting distance of the arm relative to the spindle. The arm **does** need to be parallel with the spindle, however. To check for parallel, touch the arm tip to the back of a cone with the arm in the up position, and then in the down position.

If the scale readings vary by 3mm or more, report this to the Service Center. The arm can be repositioned by filing a slot in the leftmost mounting hole on the front of the balancer, allowing the rear of he Dataset arm to be moved up or down.

Binding Dataset Shaft

Lubricate main shaft with grease or “white lube” to eliminate shaft binding during arm rotation.

If the inner arm refuses to trigger by distance potentiometer movement or inputs incorrect distances:

Put the balancer in diagnostic mode and advance to display variable 30. *Refer to “Diagnostics Mode,” page 4-1.* Write down the value in variable 30. This is the potentiometer value recorded from the last arm calibration, at which the trigger should occur due to the distance potentiometer.

Change to display variable 26 (real time inner distance potentiometer reading) and observe if reading 30 occurs when the arm is pulled slightly to the right of the home (storage) position. If so, the problem is somewhere else.

If the inner arm refuses to trigger by diameter potentiometer movement or inputs incorrect distances:

Put the balancer in diagnostic mode and advance to display variable 31. *Refer to “Diagnostics Mode,” page 4-1.* Write down the value in variable 31. This is the potentiometer value recorded from the last arm calibration, at which the trigger should occur due to the diameter potentiometer.

Change to display variable 27 (real time inner diameter potentiometer reading) and observe if reading 31 occurs when the arm is rotated slightly upward from the home (storage) position. If so, the problem is somewhere else.

Troubleshooting Chart

SYMPTOM	POSSIBLE CAUSE	REMEDY
Motor will not run, display dead, spindle encoder LED is dead.	No AC power. Fuse F1/F2 open on power board.	Check customers AC power line service. Replace fuse.
Motor starts, but will not cycle, spindle encoder LED's sequence correctly.	Defective spindle encoder cable. Defective CPU/Display board.	Replace cable, 38-627-1. Replace CPU/Display board, 45-867-1.
Motor starts, but will not cycle, spindle encoder LED's do not sequence correctly.	Defective or out of adjustment spindle encoder assembly.	Replace or adjust assembly.
Everything appears dead, except for spindle encoder LED's.	Balancer software is not running due to intermittent EPROM connection. Defective CPU/Display board.	Try re-inserting EPROM, then try a known good EPROM. Replace CPU/Display board, 45-867-1.
Motor runs and cycles, but the display is dead.	Defective CPU/Display board.	Replace CPU/Display board, 45-867-1.
Wheel starts, but freewheels instead of braking to a stop.	Intermittent cable connections. Defective DC drive board.	Replace cable, 38-860-1. Replace DC drive board, 45-861-1.
Wheel and/or wing nut come loose during the spin.	Threads on spindle shaft and wing nut are not lubricated and/or dirty. Too much of the turning force on the wing nut is being used to overcome the thread friction, instead of pushing the wheel against the hub faceplate. Wheel and/or balancer hub faceplate not clean and dry. Wingnut is not tight enough.	Clean the spindle by running the edge of a rag between the threads, while turning the spindle by hand. Lube the spindle shaft and wing nut threads using Teflon® containing evaporating lubricant i.e. SuperLube® by Permatex. Clean with non-residue solvent such as lacquer thinner. Tighten wingnut.
Spindle starts by itself.	START switch is sticking near the closed position. Try a known, good keypad/overlay assembly and observe if the problem persists. Fuses loose in fuse clips of power board. CPU/Display board has conductive debris near the start sensing circuits (near U9, 13, and 14.) CPU/Display board "start" sensing circuits are defective. Intermittent shorts to "start" sensing lines in DC power cable.	Replace the keypad/overlay assembly, 51-1579-1. Remove fuses and tighten clips (compress together). Blow off debris. Replace CPU/Display board, 45-867-1. Replace cable, 38-627-1.

Troubleshooting Chart (continued)

SYMPTOM	POSSIBLE CAUSE	REMEDY
Weight positions or amount indicators are incorrect, or non-repeatability from spin to spin.	Incorrect calibration of top-dead-center (step 2 of Cal Procedure).	Re-calibrate balancer.
	Loose or defective force transducer.	Clean, adjust, or replace transducer.
	Defective CPU/Display board.	Replace CPU/Display board, 45-867-1.
	Dirt in spindle encoder disk.	Clean and check the encoder board operation.
Wheel can be balanced, but is then out by more than 0.30 ounces if remounted on the balancer.	Shaft has runout.	Check shaft for runout: Shaft runout should be <0 .0015” Plate runout should be <0 .002”
	Cone is worn or dry, preventing proper wheel centering.	Inspect cone for excessive wear or lack of lubrication film.
	Wheel is not centering properly due to excessive weight, even if the wheel is turned while tightening the wing nut.	Use the outside wheel cone mounting method for larger wheels.
Weights and angles repeat from spin to spin, but cannot balance the wheel (chasing weights).	Wheel is bent or has run out.	Replace wheel.
	Wheel is not centering properly due to excessive weight, even if the wheel is turned while tightening the wing nut.	Use the outside wheel cone mounting method for larger wheels.
	Cone is worn or dry, preventing proper wheel centering.	Inspect wheel cone for excessive wear or lack of lubricating oil.
	Angle location at calibration was not accurate.	Re-calibrate the balancer.
	Calibration weight stud is loose or bent.	Replace the calibration weight.
	Setup “blind” is set to 0.00 ounce and/or “rounding” is set to 0.01 ounce (used for “weight trimming” precision balancing).	Change “blind” to 0.29 oz and rounding to 0.25 oz. *Refer to page 4-3 for “Setup Procedure in Diagnostics Mode.”*
	Setup “blind” is smaller than the “rounding.” Example: 0.25 ounce round; 0.15 ounce blind.	Only use one of the following combinations: rnd 0.05 — blind 0.15, 0.29, 0.58 — usage weights in 0.05 ounce increments. rnd 0.25 — blind 0.29, 0.58 — usage weights in 0.25 ounce increments.

Troubleshooting Chart (continued)

SYMPTOM	POSSIBLE CAUSE	REMEDY
Keypad or knob functions happen by themselves.	CPU/Display board has conductive debris near the knob and switch detect circuits (near U7, U8, CR43, and J2).	Blow off debris.
	CPU/Display board knob and switch detect circuits are defective.	Replace CPU/Display board, 45-867-1.
	Defective knob encoder.	Replace knob board, 45-675-1.
The keypad is too sensitive or responds to a number of key presses that were not actually executed.	Defective keypad/overlay assembly.	Replace the keypad/overlay assembly, 51-1579-1.
Keypad not responding.	Defective keypad/overlay assembly.	Replace the keypad/overlay assembly, 51-1579-1.
	Defective CPU/Display board.	Replace CPU/Display board, 45-867-1.

Display Error Codes

SYMPTOM	POSSIBLE CAUSE	REMEDY
“Err -1-” blinks on the display, “no rotation signal detected.”	Spindle encoder assembly or cable is defective.	Replace assembly, 45-863-1, or cable, 38-627-1.
	Defective CPU/Display board.	Replace CPU/Display board, 45-867-1.
	Spindle really is not turning. Drive or motor problem.	Verify that balancer is plugged into power supply.
	CPU/Display board has conductive debris near the encoder sense circuits (near U8, RN2, and J5).	Blow off debris.
	Defective DC drive board.	Replace DC drive board, 45-861-1.
“Err -2-” blinks on the display, “excessive time elapsed to achieve minimum measuring speed.”	Wheel is too heavy.	Give the wheel a helping push before pressing the START switch. Advise Hunter of wheel and tire type for evaluation.
	Wheel was turning the wrong way when the START switch was pressed, taking extra time for the motor to reverse it’s rotation.	Do not allow larger wheels to turn in the wrong direction before pressing the START switch.
	No home pulse detected.	Check spindle encoder board, cable, and CPU/Display board.
	Incoming power voltage sagging when spinning large tire.	Improve the incoming power service or convert the balancer to a different power service. Advise Hunter if this occurs.
“Err -3-” blinks on the display, “forward rotation not detected.”	Motor leads reversed.	Reverse motor leads.

Display Error Codes (continued)

"Err -4-" blinks on the display, "excessive time to decelerate."	Intermittent DC drive cable connections. Defective DC drive board.	Replace cable, 38-627-1. Replace DC drive board, 45-861-1.
"Err -5-" blinks on the display, "unexpected reverse rotation."	Not applicable to a DSP 7700.	Advise Hunter of wheel and tire type if this occurs.
"Err -6-" blinks on the display, "no home pulse detected."	Spindle encoder board bracket assembly adjusted too close to shaft centerline. Dirt in encoder ring home pulse slot. Bad encoder board. Home pulse wire (pin 4) of encoder cable is shorted to ground (pin 5). Spindle encoder ring scraped against detectors on encoder board, damaging the home pulse detector.	Loosen encoder bracket mounting screws and move the assembly away from the shaft centerline. Clean encoder ring. Replace encoder board, 45-863-1. Replace cable, 38-627-1. Replace encoder board and check spindle for end play problems.
"Err -7-" blinks on the display "home pulse erratic."	Spindle encoder board bracket assembly adjusted too close to shaft centerline. Dirt in encoder ring home pulse slot. Bad encoder board.	Loosen encoder bracket mounting screws and move the assembly away from the shaft centerline. Clean encoder ring. Replace encoder board.
"Err -8-" blinks on the display "multiple home pulses detected."	Spindle encoder board bracket assembly adjusted too far from shaft centerline. Bad encoder board. Home pulse wire (pin 4) is open or intermittent.	Loosen encoder bracket mounting screws and move the assembly closer to the shaft centerline. Replace encoder board, 45-863-1. Replace encoder cable, 38-627-1.
"Err -9-" blinks on the display "spindle encoder erratic."	Spindle encoder board bracket assembly adjusted. Bad encoder board. Pins 1 and/or 3 of encoder cable are intermittent shorts or opens. Spindle encoder ring scraped against detectors on encoder board, damaging the phase A and/or phase B detector.	Try repositioning encoder assembly. Replace encoder board, 45-863-1. Replace encoder cable, 38-627-1. Replace encoder board and check spindle for end play problems.
"Err -10-" blinks on the display, "left transducer temperature out of range."	Transducer is unplugged (if you unplug it as a test, turn power off to allow temperature "reading" to discharge from a capacitor on the CPU/Display board).	Plug in transducer.

Display Error Codes (continued)

SYMPTOM	POSSIBLE CAUSE	REMEDY
"Err -11-" Blinks on the display, "right transducer temperature out of range."	Temperature sensor in transducer is bad.	Replace transducer, 109-87-3.
	Bad U10 on CPU/Display board.	Replace CPU/Display board, 45-867-1.
	Bad transducer cable connections.	Replace transducer, 109-87-3.
"Err -12-" blinks on the display, "problem reading calibration data."	Problem with CPU/Display board permanent memory.	Replace CPU/Display board. If unable to replace board, calibrate balancer and leave power on.
"Err - 13-" blinks on the display, "problem writing calibration data."	Problem with CPU/Display board permanent memory.	Replace CPU/Display board. If unable to replace board, leave power on.
"Err - 14-" blinks on the display, "problem writing calibration data."	Problem with auto dataset. (Optional equipment)	Replace CPU/Display board. If unable to replace board, leave power on.
"Err - 15-" blinks on the display, "problem writing calibration data."	Problem with auto dataset. (Optional equipment)	Replace CPU/Display board. If unable to replace board, leave power on.
"Err -16-" blinks on the display, "problem reading setup data."	Problem with CPU/Display board permanent memory.	Replace CPU/Display board. If unable to replace board, perform "Setup" and leave power on.
"Err -17-" blinks on the display, "problem writing setup data."	Problem with CPU/Display board permanent memory.	Replace CPU/Display board. If unable to replace board, leave power on.
"Err -20-" blinks on the display, "problem reading from multiple areas of data storage."	Problem with CPU/Display board permanent memory.	Replace CPU/Display board. If unable to replace board, calibrate balancer, perform "Setup," calibrate Auto Dataset arm, and leave power on.

NOTE: Errors 12 through 20 may appear at power up after installing new software. This is normal. Perform "Calibration" and "Setup." Turn balancer OFF, then ON. Error message should be gone.

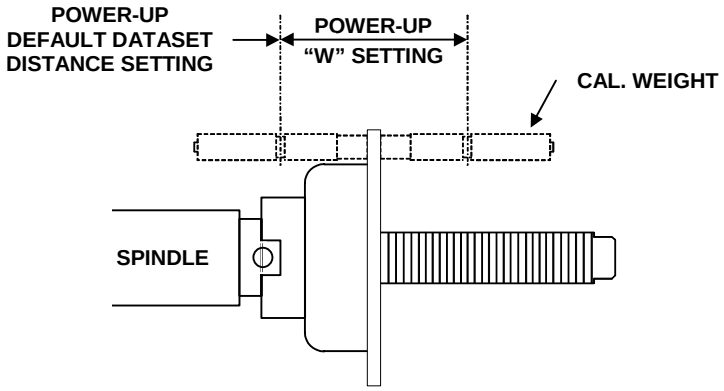
Display Error Codes (continued)

SYMPTOM	POSSIBLE CAUSE	REMEDY
"CAL Err" appears on the display after the last calibration spin.	Calibration weight was not placed at the proper position for each calibration spin.	Re-calibrate the balancer per the Operation Manual. *Refer to "Operation Instructions DSP 7700 Wheel Balancer," Form 4244T.*
	Left or right channel imbalance signal was out of correct range because of a bad transducer or CPU/Display board.	Try new transducers first, then try a new CPU/Display board.
	Transducer has grown weaker with time, failing the calibration weight sequence test in software.	Calibrate the balancer while in diagnostics mode. This forces the balancer to accept calibration, which in most cases will let the user continue to use the balancer. Before turning the unit off, record and send diagnostic display variables 1-13 to Service Center for evaluation.

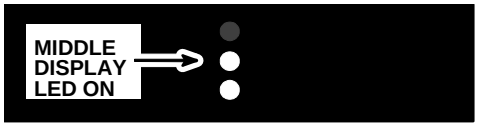
Quick Calibration Check Procedure

Turn the balancer off and then on again.

The purpose of doing this is to obtain the default knob settings (where the inner and outer weight placement planes coincide with the center of gravity of the left and right installed calibration weight positions) as illustrated below.

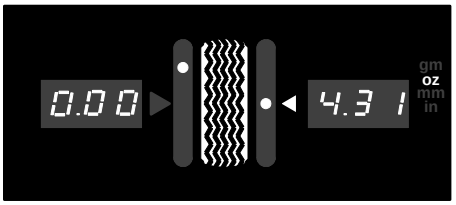


Disable Blind and Rounding by pressing the right key once to light the middle LED above the key as illustrated below.



Install the calibration weight on the right side of the hub faceplate (using either hole).

Since the center of the installed calibration weight coincides with the dialed in settings for the outer plane, all of the imbalance amount caused by the calibration weight should appear on the outer plane imbalance amount indicator as shown below. The reading should be within 0.05 oz of 4.31 oz.

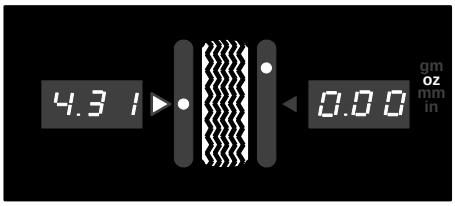


To verify the weight angle, turn the spindle shaft until the Green Arrow and the Center LED on the outer plane imbalance amount indicator are both on (as if to position a wheel for correction weight placement at Top Dead Center).

The calibration weight should be at Bottom Dead Center.

Move the calibration weight to the left side of the hub faceplate.

Since the center of the installed calibration weight coincides with the dialed in settings for the inner plane, all of the imbalance caused by the calibration weight should appear on the inner plane imbalance amount indicator as shown below. The reading should be within 0.05 oz of 4.31 oz.



To verify the weight angle, turn the shaft until the Green Arrow and the Center LED on the inner plane imbalance amount indicator are both on (as if to position a wheel for correction weight placement at Top Dead Center).

The calibration weight should be at Bottom Dead Center.

The "*Quick Calibration Check Procedure*" is complete.

The "*Quick Calibration Check Procedure*" can be performed at any time, but the 0.05 tolerance on the weight amounts can only be expected on a balancer that has just been calibrated. If the calibration check readings are off by more than 0.10, re-calibrate the unit and perform the "Quick Calibration Check Procedure" again. Report any chronic calibration check problems to the Hunter Engineering Service Center.

NOTE:	Both calibration and the quick calibration check should be performed at the same conditions as when the balancer is in use. If the ambient temperature has changed dramatically, (heat or air conditioning turned off overnight), wait until the room has returned to working conditions before using the feature.

Troubleshooting Transducers

Variable	Description	Limits	
		Decimal	**Hex**
3	Left transducer magnitude due to cal weight position 2.	94 -> 1,649	005EH -> 0671H
7	Right transducer magnitude due to cal weight position 2.	398 -> 6,971	018EH -> 1b3bH
14	Left transducer range value.		
15	Left transducer magnitude due to spin.		
16	Engineering use.		
17	Left transducer temperature reading due to spin.	0 -> 2752	0H -> 0AC0H
18	Right transducer range value.		
19	Right transducer magnitude due to spin.		
20	Engineering use.		
21	Right transducer temperature reading due to spin.	0 -> 2752	0H -> 0AC0H

Turn balancer off, then back on while pressing the outer two keys to enable diagnostics mode, let warm up for five minutes, and calibrate while in the diagnostic mode.

Leave cal weight installed and spin again. Remember that "cal err" may appear since all limits are tighter, but this is not a problem because the calibration is saved in the diagnostic mode (pass or fail).

Check limits of variables 3 and 7 as shown above. This must be done **after** calibration to be of diagnostic value.

Check repeatability of transducers:

Check that variables 14 (L) and 18 (R) are 000F. If not, replace the corresponding transducer.

Select variable 15 (L) or 19 (R) and spin four times. The number should not fluctuate more than twenty counts.

Test the temperature probes:

Select variable 17 (L) or 21 (R) and spin four times. The number should be within limits shown above and should not fluctuate more than twenty counts.

Spin repeatedly (the temperature is only read during a spin) while blowing warm air on the transducer, the number should decrease.

Remove the heat source and continue spinning, the number should gradually return to the original reading.

Troubleshooting Drifting Transducers

Calibrate (not in diagnostics mode). If “CAL Err” appears, *refer to “Troubleshooting Transducers,” page 5-10.*

Turn balancer off, then back on while pressing the outer two keys to enable diagnostics mode.

Press NEXT key to view variables 3 and 7. Record the variables.

Turn the balancer off to cancel diagnostic mode.

Balancer may be used until drift symptoms reappear.

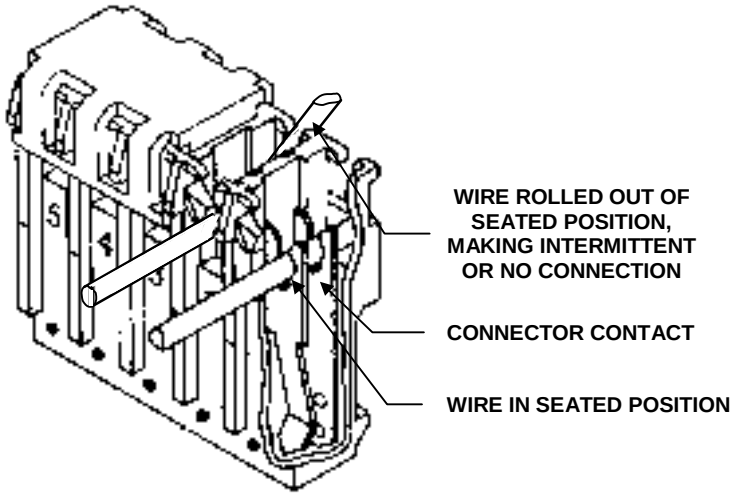
After drift symptoms reappear, repeat steps and compare new variables for 3 and 7 to previously recorded variables. It is important that the ambient temperature be close to that at the time of the beginning of the test. If not, normal temperature effects on the force crystals will be mistaken for drift.

The numbers should not be different by more than 1%. Replace corresponding transducer if required.

NOTE:	Newly installed transducers may “settle in” for a week after being compressed. Calibration may be required daily for the first week.

Motor Drive Board LED Data

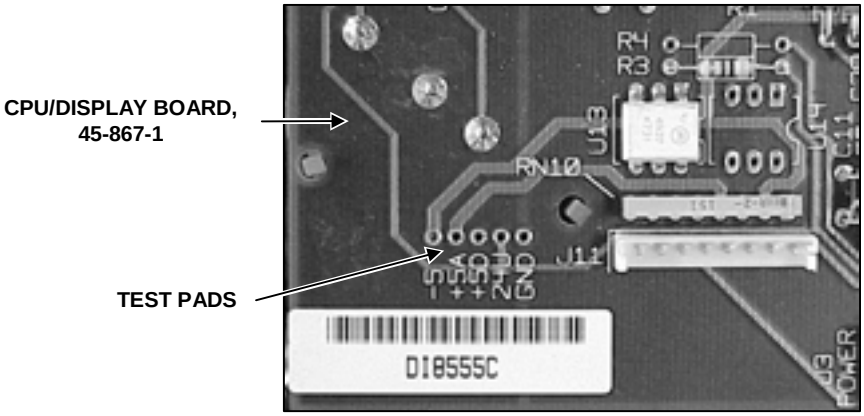
COLOR	FUNCTION	NUMBER	DESCRIPTION
Green	Start	CR13	START signal is on (from CPU). If the motor does not rotate, and the BRAKE FAULT LED is lit, check the BRAKE FAULT information below. Check the motor and its wiring. If the FIRE LED is not lit, check fuse F3 on the drive board. If F3 is okay, replace the drive board.
Amber	Fire	CR14	FIRE Indicates the SCR fire signal is being produced. This checks the majority of the run circuitry. If the GREEN LED is ON, and the FIRE LED is ***not*** ON, there is a board fault.
Red	Stop	CR15	STOP signal is on (from CPU). Braking is being applied. This is never on when the GREEN and/or AMBER LEDs are on, unless there is a fault, which is most likely to be the cable has pulled partly out of its connector, or the CPU is faulty.
Orange	Brake Fault	CR22	This LED is ON during normal braking, but is always OFF after rotation stops. If the ORANGE LED stays lit, there is a fault in the brake circuit, usually caused by a bad cable, as above. Usually this has harmed a component in the drive, and requires replacement of the drive board. This replacement MUST be preceded by repair/replacement of the cable, or the new board will be harmed. **NOTE: Verify that the wires are properly seated into the IDC connector. Due to the stiffness of the wire, repeated exercising of the cable/connector may cause the wire to roll up and out from between the arms of the connector contact. If this occurs, it may give the same symptoms as a bad cable.**



6 .Appendix

CPU/Display Board Test Pad Voltages:

When checking the power supply output voltages, use the test pads located on the CPU/Display Board.



LABEL	NAME	VOLTAGE TO GND.
GND.	Ground	0V
24U	+ 12V Unregulated *	+ 14V to + 15.5V
+ 5D	+ 5 Digital	+ 5V
+ 5A	+ 5 Analog	+ 5V
- 5	- 5 Analog	- 5V
A OUT	Analog Out	Not Used
* “24U” is 24 Unregulated on 8500 version of DSP/Display board.		

Wiring Schematics and Diagrams

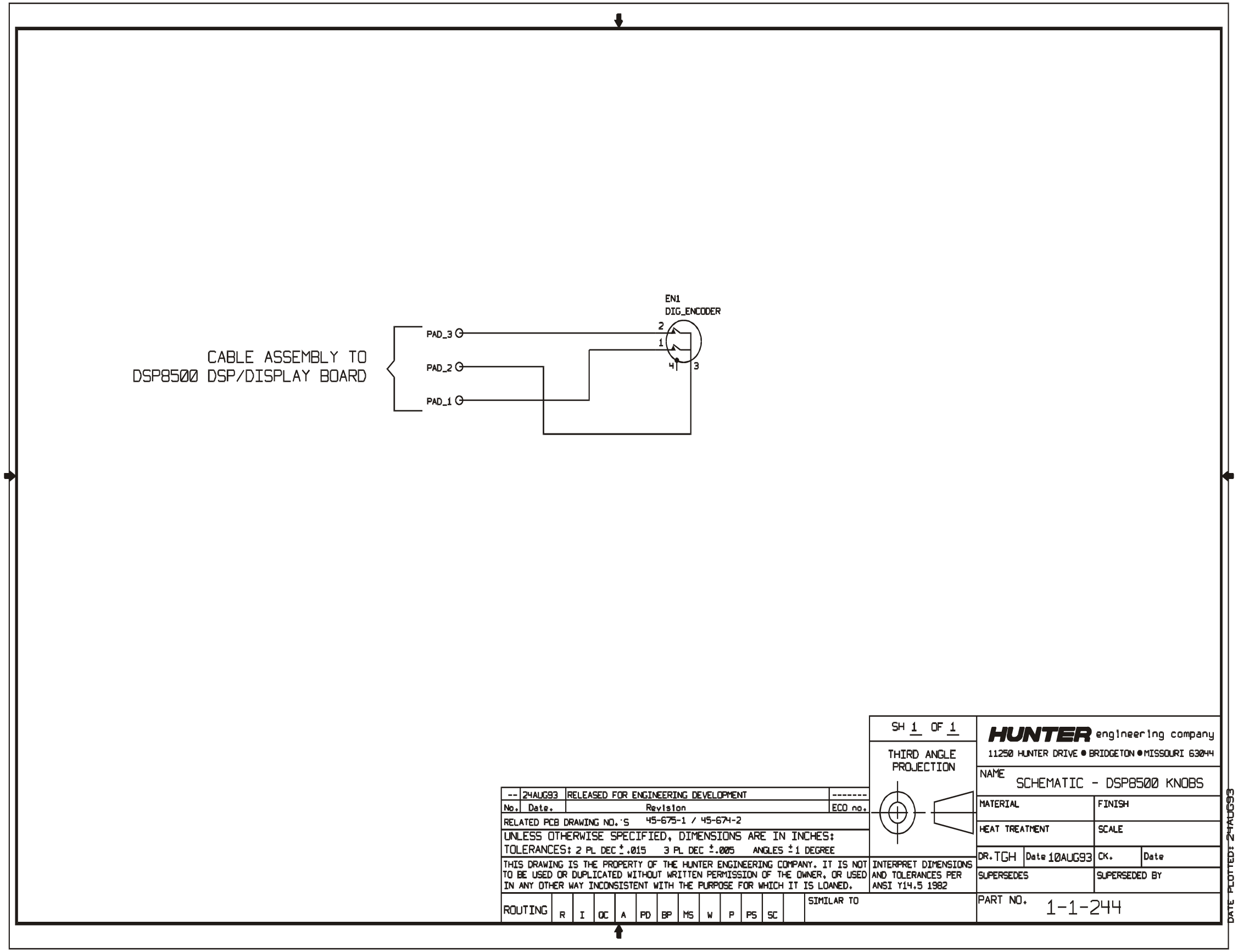
Knob Board, 45-675-1

Encoder Board, 45-863-1

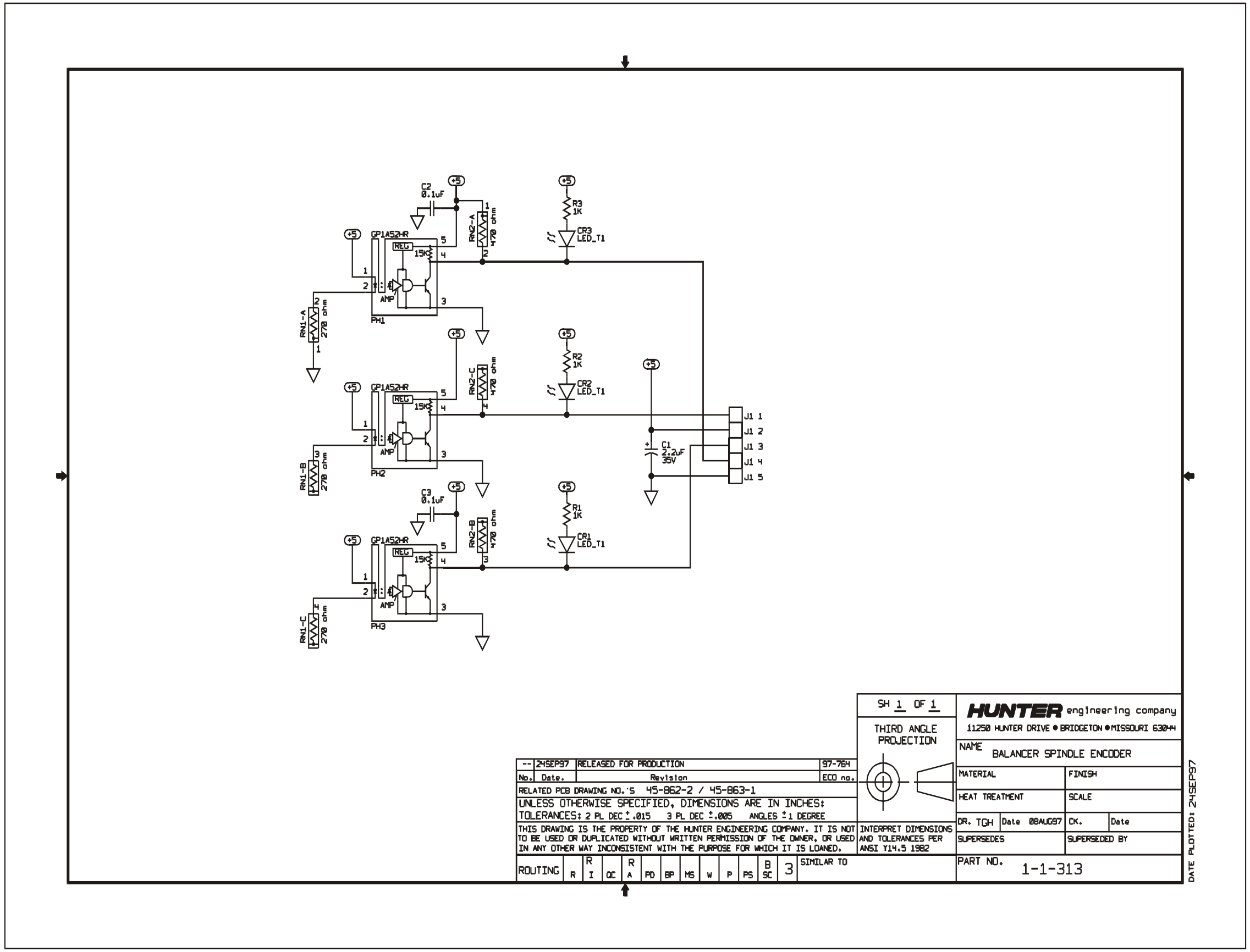
CPU/Display Board, 45-867-1

DC Drive Board, 45-861-1

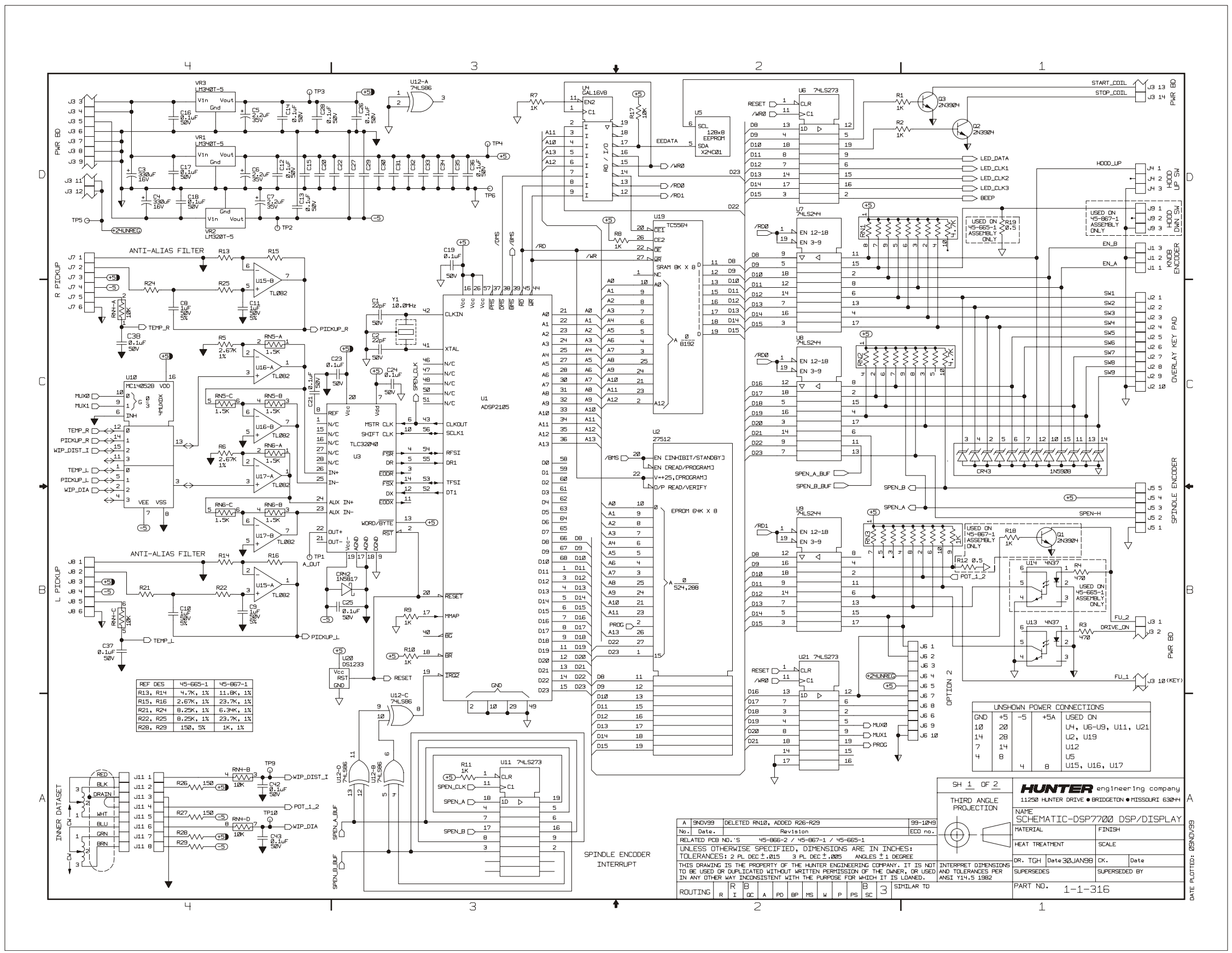
Knob Board, 45-675-1



Encoder Board, 45-863-1



CPU/Display Board, 45-867-1



REF DES	45-665-1	45-867-1
R13, R14	4.7K, 1%	11.8K, 1%
R15, R16	2.67K, 1%	23.7K, 1%
R21, R24	8.25K, 1%	6.34K, 1%
R22, R25	8.25K, 1%	23.7K, 1%
R28, R29	150, 5%	1K, 1%

UNSHOWN POWER CONNECTIONS

GND	+5	-5	+5A	USED ON
10	20			U4, U6-U9, U11, U21
14	28			U2, U19
7	14			U12
4	8			U5
		4	8	U15, U16, U17

A	9NOV99	DELETED RN10, ADDED R26-R29	99-1049
No.	Date.	Revision	ECO no.

RELATED PCB NO.'S 45-866-2 / 45-867-1 / 45-665-1

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES:
TOLERANCES: 2 PL DEC ±.015 3 PL DEC ±.005 ANGLES ±1 DEGREE

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INTERPRET DIMENSIONS AND TOLERANCES PER ANSI Y14.5 1982

ROUTING R | R I | B DC | A | PD | BP | MS | W | P | PS | B SC | 3

SIMILAR TO

SH 1 OF 2

THIRD ANGLE PROJECTION

HUNTER engineering company
11250 HUNTER DRIVE • BRIDGETON • MISSOURI 63044

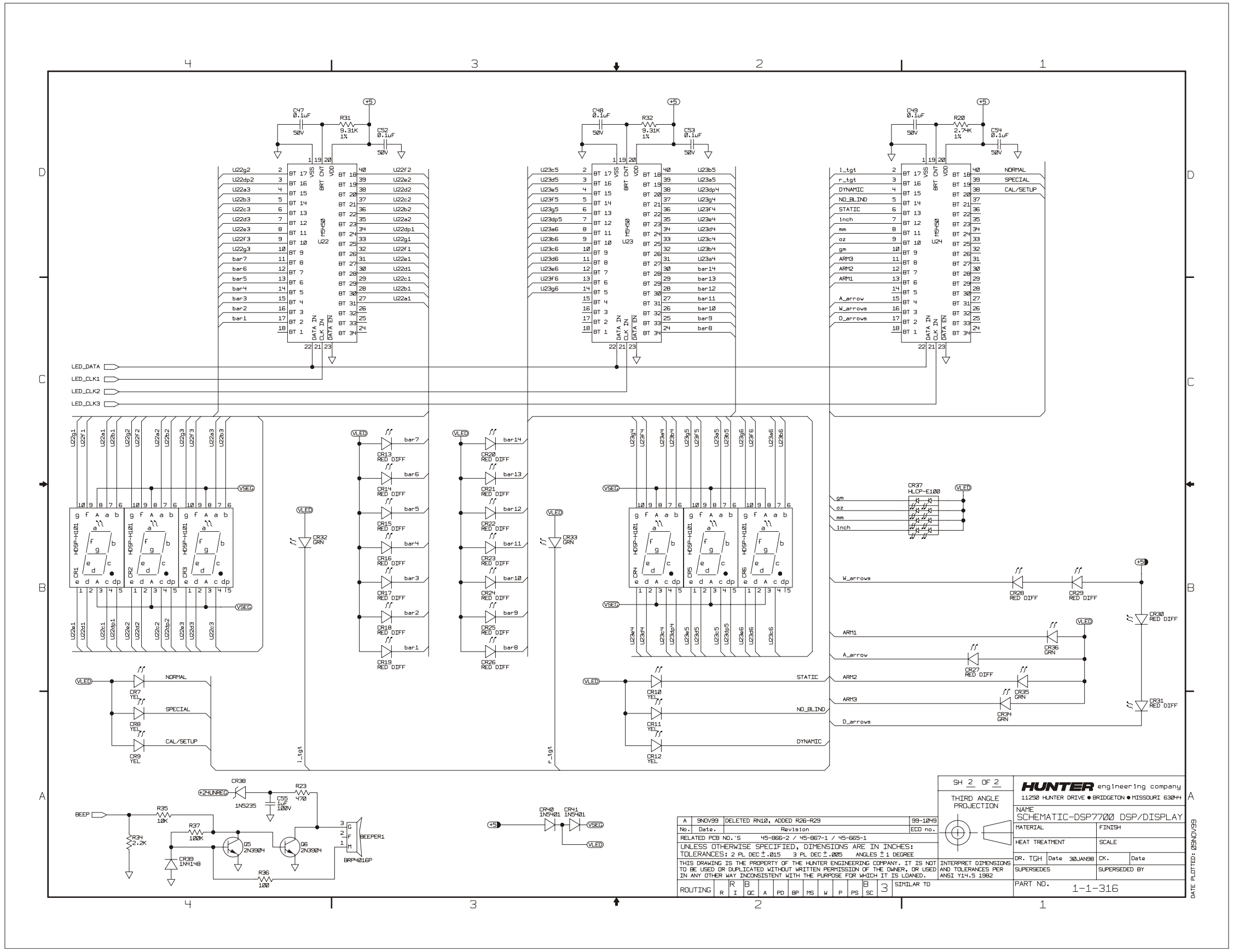
NAME SCHEMATIC-DSP7700 DSP/DISPLAY

MATERIAL	FINISH
HEAT TREATMENT	SCALE
DR. TGH Date 30JAN98	CK. Date
SUPERSEDES	SUPERSEDED BY

PART NO. 1-1-316

DATE PLOTTED: 09NOV99

CPU/Display Board, 45-867-1



DC Drive Board, 45-861-1