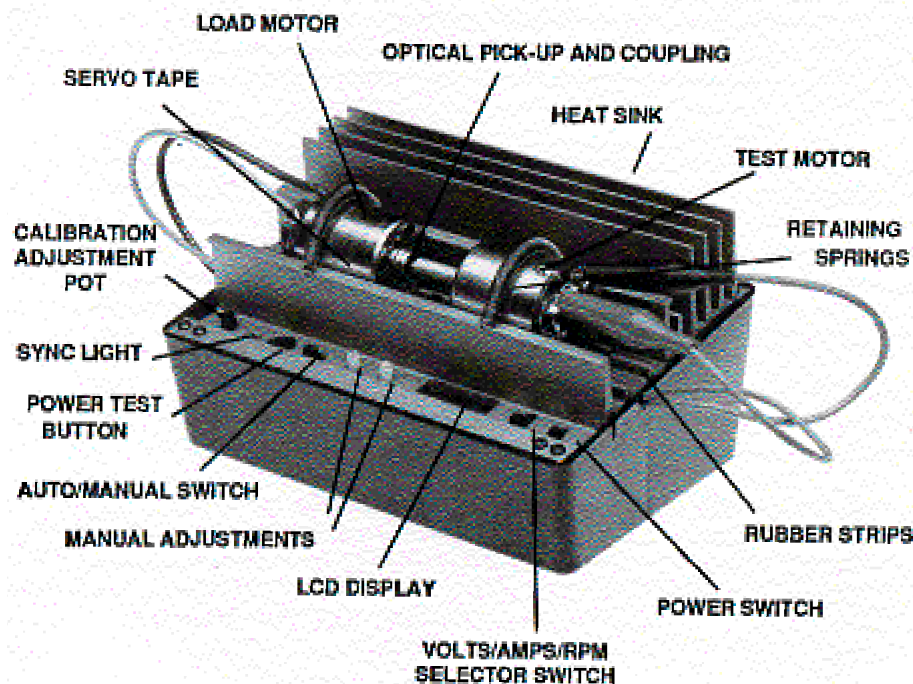


TEAM TEKIN®

DYN 900 DIGITAL PRO DYNO



USER'S GUIDE

WARRANTY

TEKIN ELECTRONICS, INC. guarantees this unit to be free from factory defects in materials and workmanship for a period of 120 days from the date of purchase (verified by sales receipt). This warranty does not cover: suitability for specific applications, components worn by use, application of improper voltage, tampering, misuse, shipping damage, or Acts of God. Our warranty liability shall be limited to repairing unit to our original specifications, and in no case shall our liability exceed the original cost of the product. Additionally, these items void the warranty:

1. Wires or connections which are exposed and not insulated properly.
2. Connecting power backwards.
3. Allowing water or moisture into the DYNO.
4. Incorrect wiring.
5. Damage resulting from tampering.
6. Normal wear and fatigue
7. Damage from motor spray or solvent

By using this DYNO the user accepts all resulting liability.

TEKIN® ELECTRONICS, INC.

For service return the unit to the address below. Mark "Repair" on the outside of box. For Warranty work a sales slip must be enclosed. No estimate is provided, but will never exceed 50% of current list price.

940 Calle Negocio • San Clemente, California 92673-6201 U.S.A.
(714) 498-9518 • FAX (714) 498-6339

Rev 2.0

down further - and the display is now reading power output of the motor. The CALIBRATION pot is a 10 turn unit. When the pot gets to the end it will start to click. If the display reads overage ("1") then turn the pot down to reduce the reading.

5.3) The SYNC light comes on if everything is working properly and the power reading is valid. If it does not come on it is likely that you have a problem with the slave motor.

NOTE: Patenting rights retained by TEKIN for TEKIN's technique of determining and displaying power rating of motor.

HOW TO RATE A MOTOR (Three measurements required)

6.1) To obtain a POWER RATING, set the AUTOMANUAL switch to auto position and press POWER TEST button. (You may want to take several power readings before the number stabilizes. This is especially true if the test motor is old or worn). Upon releasing the test button, the display should return to 100.0. If not, reset the CALIBRATION ADJUSTMENT pot and take another reading - usually, the third reading is the best. The TEKIN DYNO readings are always right, as long as the SYNC light comes on. NOTE SYNC light may flicker slightly, this is acceptable. Any variations are caused by changes in the TEST motor.

6.2) After measuring POWER, set the AUTOMANUAL switch to manual and check RPM's with the VOLTS pot turned clockwise to 5 (RPM's in thousands). Set the AMPSLOAD pot to 0, counter-clockwise.

6.3) Shut the test motor off, remove it from the DYNO, then turn power back on and measure AMPS. This is the AMP DRAW reading.

6.4) You now have a rated motor.

6.5) Record these numbers on stickers provided with DYNO.

MANUAL TEST MODE

In the manual mode the TEST motor voltage can be adjusted from about 0-5 VOLTS. The RPM may be monitored. The LOAD pot may be adjusted to apply up to about 20 AMP constant continuous LOAD on the TEST motor. The manual mode is used primarily for breaking in motors, seating brushes, ect. It is also used to check the RPM after using the AUTO TEST mode. Specific Applications are left to the users imagination.

UNDERSTANDING THE READINGS

POWER = TORQUE X RPM'S

When two motors are geared for the same axle RPM'S (see below), then the POWER READING is simply the TORQUE READING (which is the acceleration ability of the car). Motors with higher power ratings will accelerate the car faster.

They will also hold their speed better on oval tracks.

RPM'S

RPM reading is used as a basis for selecting the gear ratio of the motor (and has nothing to do with power output of the motor). Two motors that have the same power output might have different RPM's and require different gear ratios. Once a good set-up is found for any given track, all motors should be geared to produce the same rear axle RPM's on the car. As an example, if one motor turns 20,000 RPM and has a 4-to-1 gear ratio (rear axle turns 5,000 RPM) then another motor which produces 25,000 RPM (or 25% more), would be considered equivalently geared with a 5-to-1 (or 25% greater) gear ratio. This would produce the same rear axle speed of 5,000 RPM.

AMPS

AMP DRAW reading is the no-load power draw at 5 volts. This is a measure of the motor's efficiency as no-load amp draw is power consumed within the motor and not delivered to the output shaft. Of two motors which have the same power rating, the one with the lowest amp draw will be the most powerful and efficient.

TIMING

Maximum efficiency is obtained with the timing set to neutral. To find neutral timing, set the timing to the point of lowest no-load current draw on the test motor and then advance the timing until the RPM's just begin to increase slightly (by listening). The motor will obtain maximum power output and longest running time at this point; however, the power curve may not be suitable for maximum overall efficiency and drivability in the actual car. Often 1/16" of advance medium for On Road and 1/8" advance for Off Road will smooth out the power. Advancing timing more than this is not recommended with the latest motors, gear up instead.

TUNING TIPS

The power rating on the TEKIN DYNO is easy to use and quick, foolproof (does not require interpretation).

Range of typical power readings:

Stock Motors	(27 Turn):	62-72
Modified	(11-13 Turn):	Up to 80+
	(14-16 Turn):	84-89
	(17-22 Turn):	76-85

FOR THOSE MATHEMATICALLY INCLINED

These simplified equations will give an idea of the motor's characteristics. An elaborate analysis of DC motor theory is beyond the scope of this user guide. The power rating obtained with the TEKIN DYNO is however a fool proof indication of motor performance.

The Peak Efficiency can be determined with the following equation:

$$100 \bullet \frac{\text{AMP Draw}}{\sqrt{\text{AMP Draw} \bullet \frac{1000}{100\text{-Power Rating}}}}$$

Where amps = the no-load amp draw of the test motor @ 5 Volts and the power is the reading obtained in the Auto-Test mode. The efficiency is measured at 5 Volts.

The current (AMPS) at which peak efficiency occurs may be found as follows:

$$\sqrt{\text{AMP Draw} \bullet \frac{1000}{100\text{-Power Rating}}}$$

Power and Torque are calculated as follows:

$$\frac{100}{(100 - \text{Power Rating})} \times 12 = \text{Peak power output in watts}$$

Peak horsepower is calculated as follows:

$$\frac{\text{Peak power output in watts}}{746} = \text{Peak horsepower output @ 5 volts}$$

$$\text{Torque in inch/ounces} = \frac{105600 \times \text{Peak HP output @ 5 volts}}{\text{[RPM@40]}}$$

This is at maximum power output. Stall torque is twice this value.

THEORY OF OPERATION

The TEKN DYNO applies a fixed, known quantity of power into the motor. The power loss of the motor is then accurately measured. The power output of the motor is the power input minus power loss. Dividing power output by RPM out gives torque out. All TEKN DYNO's give the same reading.

PRACTICAL MOTOR MEASUREMENTS

When testing motors, always find motors with low amp-draw as they will be the most efficient. Of two motors with the same power output rating, the one with the lowest current draw will be the most efficient.

When taking power ratings, an erratic reading indicates a worn test motor.

After taking several power readings, the power rating will go down as the test motor heats up. This is normal.

RACE TUNING

Generally, the motor with the highest power output and the lowest current draw will be the most efficient and desirable. If the power output is too high for traction, then turn the torque control on speed control down, which will produce the highest overall system efficiency.

Once a particular combination is found that works well on a track, you can experiment with gearing and power ratings and will get predictable results.

TROUBLE SHOOTING

The TEKN DYNO 900 is protected against all normal shorts, overloads, and reverse voltages. If the unit is used continuously and gets too hot, it will shut off. In this case, the 12 Volt power must be disconnected and the unit allowed to cool. Use a fan on the heatsink if necessary.

If the RPM sensor disk is allowed to rub against the RPM sensor (The black plated piece bolted to the heatsink), the sensor can be damaged, but can be replaced with part # DRP 002. There is only one screw holding the sensor in place. The sensor plugs in to a 4 pin socket. When replacing it be sure to note the direction of the little arrows on the top of the sensor unit. The arrows point toward the TEST motor.

1). Some power supplies may not work properly. 2). Try a 12 Volt battery or a different power supply. 3). Try going back and rereading the instructions and follow them exactly. 4). The power supply must put out 25 AMPS continuous or the unit may not work properly. Sometimes two 12 AMP supply units can be connected in parallel (+ to + and - to -) and will work. 5). The TEKN DYNO may go off the the scale and not work properly in the AUTO TEST mode, if the TEST motor draws more than 8 AMPS when connected to the slave motor. Check this by going to manual mode and setting volts to max (5) and load to minimum (low) and checking current draw. If it is over 8 AMPS try reducing the timing on the TEST motor. 6). Do not allow the motor brushes or wires or slants to short out against the metal heatsink. If the slave motor is worn, or the commutator is bad or worn, or the brush is dirty, the DYNO light may not always come on when it is suppose to. In this case the slave motor must be rebuilt. If the TEST motor draws unusually high AMPS when coupled to the SLAVE (with load turned down), the SLAVE motor has a shorted winding.

Opening the unit is not recommended, but if it is opened the motor wires must be routed so that they are not pinched between the internal brace on the case and the back of the circuit board when the case is re-closed. If using a 12 VOLT battery be sure it holds a charge or readings will drop.

REPLACEMENT PARTS

Motor Sockets:	DRP 001
RPM Disk and Pick-up:	DRP 002
Slave Motor:	DRP 003
(Pre built & Tested)	
Motor Brackets:	DRP 006

DYNO ASSEMBLY INSTRUCTIONS

- 1.1) Wash off supplied rubber strips and cement them with super glue or contact adhesive to the ridges on the bottom of the motor-mounting channel.
- 1.2) Press the black RPM pick-up disc onto the metal motor coupling and place the set screws into the coupling.
- 1.3) Assemble the motor brackets as per instructions.

BUILDING THE SLAVE (LOAD) MOTOR

2.1) Most any wind can be used in the slave motor without affecting performance. But, if testing stock motors, a stock slave motor is required for sufficient load. A stock armature (27 turn) with ball bearings is recommended (although bearings are optional). A plain stock motor may be used for the slave motor, but the timing must be changed to neutral timing (no advance). This is because the slave motor spins in the opposite direction from normal. We recommend placing a stock armature into a modified can with uncut brushes and medium or soft brush springs, (do not use hard). Set timing to 0° (no advance). Do not use any barrel or can type capacitors on the slave motor. A TEKIN slave motor is available all pre built. Part # DRP003.

2.2) Setscrew motor coupling to slave motor. Place slave motor in position with RPM pick-up in the middle of the sensor. Slave motor **MUST BE** held in place with motor brackets so that it **WILL NOT MOVE!!!** (See figure) . . . be sure to position the motor with motor wire solder tabs pointing up. Place servo tape between motor and side walls of DYNO to prevent movement. Make sure there are no brush wires or shunts shorting to the metal heatsink. You may need to place some tape on the heatsink to prevent shorts from occurring.

OPERATION

(WARNING - MOVING PARTS - KEEP HAIR, JEWELRY, AND LOOSE CLOTHING AWAY. NEVER LEAVE ALLEN WRENCH IN MOTOR COUPLER!)

3.1) Connect DYNO 900 to 12 Volt battery or 25 Amp (or more) power supply (11-15 volts is acceptable). A lead-acid automotive or marine battery may also be used. **WARNING! LEAD-ACID BATTERIES GENERATE EXPLOSIVE GASES WHEN CHARGING. DO NOT CONNECT DYNO TO BATTERY OR USE DYNO WHILE CHARGING BATTERY! POWER READING MAY DROP WHEN USING A LEAD-ACID BATTERY IF IT IS NOT FULLY CHARGED.**

3.2) Set POWER SWITCH to OFF position and connect TEST motor to red and black alligator clips. (Make sure polarity is matched on clip connections to TEST motor so it runs in the proper direction). Make certain clips make good contact or the power reading could be low. For the best results, solder a small piece of stranded wire to the motor for clip attachment. There is no need to remove any capacitors from the TEST motor.

WARNING - DO NOT USE MOTOR SPRAY OR CLEANER ON THE DYNO - IT

WILL DAMAGE THE RPM PICKUP AND DISPLAY AND VOID THE WARRANTY!

3.3) Set AUTOMANUAL switch to Manual and the VOLTS/AMPS/RPM switch to Volts.

3.4) Set POWER SWITCH to on position.

3.5) Adjust the VOLTS pot - it should adjust from about 0-5 volts and the test motor should run accordingly.

3.6) Set POWER SWITCH to off and install the test motor in place with set screw to motor coupling. When connecting alligator clips to TEST motor make sure they are secure. A poor connection will cause a lower power rating. Use bracket to secure the test motor.

3.7) Turn AMPS/LOAD adjustment pot to 0, counterclockwise.

3.8) Turn on the DYNO - test motor should run.

3.9) Set VOLTS/AMPS/RPM switch to each position, a reading should be obtained. In RPM setting the last two digits are not displayed (Example: 13.20x = 13,200).

3.10) Adjust VOLTS pot to obtain a reading of about 5. (Set to max, fully clockwise.) Display should read 4.8 to 5.2 volts. This is normal and power readings will be correct within this range.

CHECK AMPS AND RPM'S

4.1) Connect clips to slave motor. (When clips are connected to slave motor, the test motor should not slow down. If it does, you have hooked the slave motor up backward, or you are not in manual mode, or the AMPS pot is not all the way counterclockwise.)

4.2) Slowly advance the AMPS/LOAD pot and the test motor should begin slowing down. If everything checks out at this point, proceed.

AUTO TEST MODE

NOTE: The manual controls are locked out in AUTO and do not affect the auto test readings.

5.1) With test motor in place and running, turn the AUTOMANUAL switch to auto. At this point the test motor should slow down slightly (as load is applied). The SYNC light should come on indicating everything is operating properly. The display will show a random number. The SYNC light may flicker slightly, this is normal.

5.2) Turn the CALIBRATION ADJUSTMENT pot until the display reads approximately 100.0. Then push the POWER TEST button, the test motor should slow