

**DUNCAN
MECHANICAL MECHANISM
SERVICE MANUAL**

Duncan Parking Technologies

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DUNCAN MECHANICAL MECHANISM SERVICE MANUAL

FOREWARD

The staff of our Customer Service Department is always available for counsel regarding the service or maintenance of your Duncan parking Meters, and to assist you in any way possible.

INTRODUCTION

Because of improved lubrication, jeweled timer movement and the use of Oilite Busings, it is not necessary to annually clean the operating mechanism. Duncan recommends lubricating the timer pivots, jewel studs and mainspring coils every two years.

Although the meter is ruggedly constructed to withstand many times the use and abuse normally given a parking meter, careful handling of the equipment should be exercised. If repairs are necessary, do not attempt to use force on any part of the mechanism, as this may only cause unnecessary damage. Within the pages of this manual you will find appropriate instructions which will enable your Service Department to alleviate and remedy most conditions requiring service.

WORK SHOP

Suitable space, having good ventilation and lighting, should be provided in which to store spare mechanisms and timers to protect them from dust and damage. Drawers and covered containers are desirable for the storage of spare parts. Cleaning fluids should always be kept in flashproof containers. Shelves or racks can be erected for the proper storage of spare parts, standards and bases, as well as any other equipment. A well-planned workshop will enable a Service Technician to work more efficiently.

TOOLS

All of the tools normally needed to repair and maintain the parking meters are furnished with the initial shipment of meters to each installation. Pipe Straighteners, Ratchet Wrenches and other special tools are also available from our Company or through its distributors.

RECOMMENDED LUBRICANTS

Considerable damage could result if the wrong types of lubricants are used. Exhaustive research and tests have been conducted to determine the type of lubricant most ideal for use with the DUNCAN Parking meters. For the timer, we recommend ST1987.

USE ALL LUBRICANTS SPARINGLY. The lubricants recommended above may be obtained through our Parts Department and should be used in accordance with instructions of the containers. We **DO NOT RECOMMEND** the use of Dry Powdered Graphite, Ordinary Household or Machine Oils, or Hydraulic Fluids as lubricants.

All parking meters leaving our assembly line are coin tested and time checked by skilled craftsmen. Each mechanism is lubricated with long lasting lubricants, which, under normal conditions, should require a minimum of service. Duncan recommends that the timer pivot, jewel studs and mainspring coils be lubricated every two years. This can be easily performed on-site without bringing the mechanism to the repair shop.

MAINTENANCE

If a DUNCAN Parking Meter Mechanism fails to operate properly, it should be examined and only the required adjustments or replacements completed—it is necessary to clean and relubricate the mechanism, if abnormal local conditions have caused an accumulation of dust and/or contamination of the lubricants or metal parts.

CARE OF METER

Normally, the majority of service required can be accomplished on the street, without replacing mechanisms. In those instances where it is more desirable to remove the mechanism, a spare mechanism should be installed and the unit requiring service taken to your maintenance shop. **CAUTION:** When necessary to clean a mechanism, always remove the timer and clean it separately from all other parts in accordance with the instructions under “Care and Adjustment” of timer. With the exception of timers, all parts can be cleaned in an appropriate cleaning solution. For best results, parts should be mechanically agitated while in the cleaning agent, as this assists in the removal of old lubricants or dirt. Thoroughly dry parts and relubricate.

CARE OF LOCKS

All locks used in the DUNCAN Parking Meters are manufactured of the highest quality materials, which will provide the best service life. Locks, like any other mechanism, require some service in order to continue giving top performance, and we recommend the following:

1. No lubricants, such as oils, grease or graphite, suspended in any solution, should be used, since these lubricants have a tendency to pick up dust and foreign matter and, eventually, cause very difficult operation of the lock and excessive wear to both locks and keys.
2. We recommend that every six (6) months a light application of ST3012 be made. This application should be made with a small pressure bulb directly into the key-way for the ST3012.
3. When locks are found to have an excessive accumulation of foreign matter and if previous applications of "wet" lubricants have been made, we recommend that on-street lock cleaning procedure should be employed. If this procedure fails to improve the lock function, then the plug must be removed from the lock and washed in a solvent, if possible, dried under air pressure, and an application of ST3012 applied.
4. It is of the utmost importance that keys be checked regularly to avoid the use of worn keys. Specify brass or steel keys when ordering replacements.

A dirty or improperly lubricated lock will show abnormal wear and will result in key breakage. Any time a lock is replaced, **BE SURE TO INSERT THE KEY IN THE LOCK WHEN TIGHTENING THE CAM LOCK NUT OR SCREW. IF THE KEY IS NOT INSERTED, THE LOCK TUMBLERS MAY BE MUTILATED.**

ADJUSTMENT OF MECHANISM

When assembled, the DUNCAN Mechanism has but ONE simple adjustment: the adjustment of the WINDING RING and WINDING WHEEL ASSEMBLY. The Ring/Wheel Assembly must be adjusted to insure proper engagement of the Coin Carrier Winding Pawl in the Winding Ring which are the parts that activate the meter when the motorist deposits his coin and turns the handle.

Whenever a mechanism has been completely disassembled and reassembled, it should be coin tested to determine the correct adjustment of the engagement of the Winding Pawl into the Winding Ring. After adjustment, it should be determined that the "tab" on the "Time Expired" flag is "riding" properly on the Winding Wheel so as to clear the wheel and allow the flag to come up.

The Winding Ring and Winding Wheel ADJUSTMENT can be accomplished as follows:

1. If the mechanism is equipped for multiple coin operation (1¢, 5¢, 10¢ or 25¢), the adjustment should be made as follows:
 - (a) If for PENNY and/or NICKEL operation, insert penny into the nickel slot and then turn the handle until the penny rises on the nickel segment. Turn the mechanism upside down, and, raised to eye level, visually check the clearance between the Winding Pawl and the "TEETH" of the Winding Ring by turning the timer arbor counter-clockwise with the Part No. ST1008 Timer Key, observing the clearance closely as each tooth passes the Winding Pawl. The Pawl should just BARELY clear the top of the teeth. If the CLEARANCE of the Winding Pawl in relation to the Winding Ring is too great, the Pawl will not engage the teeth of the Winding Ring when the penny is in contact with the Penny Segment and, as a result, no time will be obtained for the penny.
 - (b) If the mechanism operates on NICKELS ONLY, follow the above instructions and adjust with a penny so that the Winding Pawl clears the top of the teeth.

- (c) If the mechanism operates with only DIMES and QUARTERS, insert the DIME in the appropriate slot and turn the handle until the coin rises on the coin track, but not on the segment. The Winding Pawl should barely clear the Winding Ring teeth at this point.
 - (d) If the mechanism is set for SINGLE DIME OR QUARTER operation, adjust as in (c) unless the Coin Segment is a “full track” (179°) which should be adjusted so that the driving lug projecting from the Winding Wheel which engages in the indicator Cam protrudes through the Cam and is flush with the underside of the Cam.
2. TO CORRECT CLEARANCE: To move the Ring forward, the ADJUSTMENT NUT in front of the Winding Ring should be loosened and the Adjustment Nut at the rear of the Winding Wheel should be tightened. Reverse the aforementioned procedure to move the Winding Ring back away from the Coin Carrier if it is too close. Both adjustment nuts should be tightened to maintain adjustment. Special adjustments may be necessary in the case of token or special operating mechanisms.

THE DUNCAN TIMER CARE AND ADJUSTMENT

The heart of the meter is the timer, which controls the movement of the time indicator. It is a dependable precision instrument, sturdily built by skilled craftsmen.

Normally, the timer needs little or no routine service, as a result of factory lubrication and the sealed timer cover. Duncan recommends that the timer pivots, jewel studs and mainspring coils be lubricated every two years. This does not require removal of the timer from the mechanism assembly and may be performed easily on site with a screwdriver and oiler. Simply remove the timer cover and place a drop of oil on each end of each shaft at the point of contact to the timer plates. Place a small drop in each jewel stud and a few drops around the coils of the mainspring to allow the oil to run down between the coils. Do not wipe excess oil off of the timer plates with a cloth or other absorbent material, as this will remove the oil from the timer pivot wells. Replace the timer cover when relubrication is completed.

If, due to damage or unusual conditions, the timer fails to function properly, it may easily be serviced or completely cleaned, and the following suggestions are recommended:

Always use fresh cleaning and rinsing solutions when cleaning timers, and clean them independently from other parts. The main wheel and balance wheel assembly and the *clutch governor (installed on 4-4/5 Hr. and over timers) should be removed completely from the timer and should not be placed in cleaning solution under any circumstances. These parts may be wiped clean with a lint free cloth or cotton swab.

The balance wheel assembly should be removed and cleaned separately to preclude the possibility of damage to the hairspring or balance staff. Do not place in cleaning or rinsing solutions.

The remaining timer parts should be cleaned in an approved cleaning solution as follows:

1. Remove hairspring wedge from bracket with tweezers or pliers.
2. Carefully disengage end of hairspring from bracket with tweezers.

3. Loosen jamb nut and balance screw, using #ST1907 wrench and #ST1906 screw drier sufficiently to lift out entire Balance wheel assembly.
4. Fully wind mainspring, using #ST1008 timer key, and place mainspring retainer ring #ST1830 (#ST19083 on timers above 4 hours) around mainspring. Unwind mainspring, using timer key until ring is held firmly in place and tension is released from gear train. Remove 4 pillar nuts, separate timer plate and remove gear train. Main wheel and balance wheel assembly and mainspring should not be placed in cleaning solution; they may be wiped clean. If timer is equipped with a clutch governor (installed on 4-4/5 Hr. timers and over), this part, like the main wheel assembly, should not be cleaned or oiled.
5. Clean the remaining timer parts in approved cleaning solution and mechanically agitate, if possible, during cleaning process, with the exception of the balance wheel assembly, which should be cleaned separately to avoid damage.
6. Thoroughly dry parts with forced warm air or with the aid of an air hose.
7. Reassemble cleaned parts, main wheel assembly and, if used, clutch governor assembly, into frames and secure with pillar nuts.

CAUTION: Be careful in assembling shaft pivots in plate bearings, as carelessness could cause them to be sprung out of line causing trouble, difficult to locate.

8. Clean points of balance staff with the aid of a block of pith wood, and install balance wheel and hairspring assembly, and tighten balance screw sufficiently to hold balance wheel in place.
9. Thread end of hairspring through bracket with tweezers until bend at the end of the spring is level with top of bracket. Fasten securely in this position with hairspring wedge.

10. Adjust end-play of balance wheel assembly until there is about .003 to .005 end-shake.

CAUTION: Do not tighten balance screw to such a degree as to damage the points of the staff or crack the jewels!

11. Adjust coils of hairspring with tweezers so they do not clash one against the other when in motion.
12. Fully wind mainspring using timer key #ST 1008, and remove mainspring retainer ring.
13. The hairspring of the balance wheel assembly has been properly vibrated electronically, and set for the best required, at the factory. When reassembling, pin the hairspring into the bracket at the bend, which is the point of vibration. After repinning, check the beat for accuracy as follows:

<u>TIMER</u>	<u>BEATS per MINUTE</u>
32 Min	214 to 219.5
*1 hr	457 to 468.5
4 Hr., 12 Hr., 24 Hr. (*1 Hr Prior to 1963)	114.5 to 117
2 Hr., 6 Hr.	228.5 to 234
2-2/3 Hr., 8 Hr., 16 Hr	171.5 to 175.5
2.4 Hr., 7.2 Hr., *14.4Hr	190.5 to 195
3 Hr., 9 Hr., 18 Hr.	152 to 156
4.5 Hr.	101.5 to 104
*4.8 Hr	285.5 to 292.5
9.6 Hr., 19.2 Hr	143 to 146.5
10 Hr., 20 Hr	137 to 140.5
28.8 Hr. (*14.4 Hr Prior to 2/24/61 and *4.8 Hr. Prior to 3/16)	95 to 97.5

14. Sparingly lubricate with ST1987 timer oil all bearing plates for all wheels, as well as both ends of the balance staff, verge pins, the escape wheel teeth and mainspring coils. Never use household or ordinary machine oils, as these will gum up and will cause timer to stop. Also, lightly lubricate the leaves of the mainspring with ST1987 timer oil while in unwound position (about 2 turns).

DO NOT PUT ANY OIL ON THE HAIRSPRING, FRICTION WASHER OR
*CLUTCH GOVERNOR ASSEMBLY.

(*Clutch governor assembly—“ratchet type” may be oiled lightly on ratchet teeth)

15. The main wheel friction is factory adjusted and should not be changed.
16. Before assembling timer to clock plate, wind mainspring fully with timer key #ST1008 and then back off 1-1/4 to 1-1/2 turns. The mainspring in this position will give the maximum amount of power to permit the proper amount of wind.

For those who do not wish to clean and/or repair the timers in their own shop, they may return the timers to the factory for repair or exchange at a nominal charge. Timers returned to the factory should be carefully packed to avoid further damage and repair expenses, and instructions included in the package. A separate letter should be sent with instructions to expedite handling. Prior to shipping any material to the factory, always call the Customer Service Department to obtain an Authorized Return Number (ARN). This will ensure proper handling of your material.

Timers should be set to beat on the slow side! The beat should be carefully checked and adjusted if it varies from the figures shown. If less than the minimum beat, shorten the hairspring a trifle by removing wedge and pulling spring through bracket, then repin. If more than the maximum beat, lengthen hairspring by removing wedge and pushing end of hairspring down through bracket, then repin. Adjust coils of hairspring with tweezers so they do not clash one against the other when in motion. Impulse pin on balance wheel spoke should line up with lever by adjusting hairspring collet with tool #ST1923.

PARKING METER INSTALLATION INSTRUCTIONS

Regardless of which model DUNCAN Parking Meter is to be installed, the basic instructions are identical.

Duncan meters are custom designed for direct installation on 2" pipe standards, or on 2-1/2" pipe standards through the use of a special adapter. The Duncan meters can also be installed on Duncan Double Meter Adapters, mounted on one pipe standard for serving two or four car spaces from one pipe installation.

For installation on existing standards, the pipe should be straightened (Duncan sells a special tool for this purpose) and painted. The top of the standard should be reamed and made free of all burrs or sharp edges.

The 2" standards should be of the structural grade galvanized type, have a 2.390" maximum and 2.352" minimum outside diameter and a 2.090" maximum and 1.996" minimum inside diameter. (In some countries, slightly smaller or larger pipe is all that is available and may require special meter fastener jaws to compensate for the size difference. When in doubt, contact your Duncan Distributor or Duncan's Customer Service Department). All standards should be of uniform 48" length and should be installed so that 37" appears above ground with the vent holes facing the street.

All standards **MUST** have two 1/4" diameter ventilation holes through one wall. One drilled 3" and the other 32 1/2" from the top of the standard.

The lower end of the pipe standard should be made oblong or "out of round" to help interlock it into the concrete. If decorative Aluminum Bases are used (Duncan's P/N 4), they should be installed at the same time the concrete for the standards is poured so that the base is filled with concrete. Immediately after the concrete has set, the standards and bases should be prepared for painting and given a coat of fast-dry type aluminum paint to improve their appearance and as a preservative.

Under normal conditions, the meters can be installed on the newly installed pipe standards 24 hours after installation. The meters should be placed on the standards, facing the desired direction, and the meter fasteners securely tightened. **IMPORTANT:** Within two weeks after the installation,

all meter fasteners should be checked and retightened, if needed, as the expansion of meter will cause some meters to loosen on the standard. The Duncan method of fastening meters to the standard is the most secure in the industry and when properly installed on good quality standards, they will resist most methods of vandalism and attempts to remove the meter. In areas of EXTREME VANDALISM, more elaborate methods of installation may be required.

Detailed installation instructions are available through Duncan's local Distributor or by contacting Duncan's Customer Service Department.

MAINTENANCE PROCEDURES FOR DUNCAN MECHANICAL PARKING METERS

DAILY ON-STREET INSPECTION PROCEDURES:

1. Exchange and return to shop all mechanisms that are to be checked for the Enforcement Division. (Complaints on tickets, etc.)
2. Check meters with yellow flag showing.
3. Check for any other sign of an out-of-order meter.

SCOPE OF WORK TO BE PERFORMED

- A. The repair or adjustment in less than five minutes of any meter on site.
- B. Exchange of any mechanism and/or meter that is to be returned to shop for repair.
- C. Clearing of jammed coins.
- D. Replacement of broken domes.
- E. Replacement of broken springs.
- F. Tighten loose screws.
- G. Adjustment of time expired flag.
- H. Adjustment of violation flag.
- I. Adjustment of winding ring.
- J. Straighten bent pipe and sleeves.
- K. Tighten loose pipe.
- L. Replace missing pipe and sleeves.

IN SHOP REPAIR PROCEDURES:

1. Mechanisms with a ticket complaint to be checked for proper coin operation and time checked. Report of finding to be sent daily to enforcement division for disposition of tickets.
2. Out of order meters to be repaired, adjusted or lubricated as the case may be.

SCOPE OF WORK TO BE PERFORMED

- A. Domes replaced.
- B. Timers checked, adjusted and timed.
- C. Where necessary, worn or broken parts to be replaced in timer and mechanism.
- D. Time expired flag adjusted.
- E. Violation flag adjusted.
- F. Indicator adjusted.
- G. Balance wheel adjusted.
- H. Lubricate as needed.

ON-STREET PREVENTATIVE MAINTENANCE PROCEDURES:

1. **EVERY SIX MONTHS.**

SCOPE OF WORK TO BE PERFORMED

- A. Lubricate door lock.
- B. Lubricate mechanism lock.
- C. Lubricate locked box lock.

2. EVERY YEAR.

SCOPE OF WORK TO BE PERFORMED

- A. On-street lock cleaning for door lock.
- B. On-street lock cleaning for mechanism lock.

3. EVERY TWO YEARS.

SCOPE OF WORK TO BE PERFORMED

- A. Lubricate timer pivot on both front and back of timer.
- B. Lubricate jewel studs.
- C. Lubricate mainspring coils.

4. EVERY THREE TO FIVE YEARS.

SCOPE OF WORK TO BE PERFORMED

- A. Domes to be replaced.

IN SHOP PREVENTATIVE MAINTENANCE PROCEDURES:

1. **EVERY THREE TO FIVE YEARS.**

SCOPE OF WORK TO BE PERFORMED

- A. Timers to be disassembled, cleaned in industrial brass cleaning fluid, reassembled, lubricated and adjusted. Where necessary, worn or broken parts are to be replaced and then timers are to be time checked.

2. **EVERY FIVE TO FIFTEEN YEARS.**

SCOPE OF WORK TO BE PERFORMED

- A. Housing to be repainted.
- B. Locks are to be removed from coin door and mechanism housing. Locks are to be cleaned and lubricated, then replaced in door and housing.

DUNCAN FINE-O-METER IS EASY WAY TO COLLECT FINES

Thousands of cities have found Duncan's FINE-O-METER a most convenient device for settling "on-the-spot" traffic fines. Violation ticket envelopes containing the fine may be deposited therein without subjecting motorist to the embarrassment of a trip to the police station, city hall, etc. Eliminates also, the necessity of mailing in fine. By placing in appropriate locations on meter posts, FINE-O-METER makes paying fines easier—reduces possibility of tourist violator leaving the city without settling traffic fine.