MARSHALLTOWN
The Premier Line

OPERATOR'S MANUAL

Includes Safety, Service and Replacement Part Information

Model SP684
SURFACE SHARK™
Surface Planer

Do not discard this manual. Before operation, read and comprehend its contents. Keep it readily available for reference during operation or when performing any service related function. When ordering replacement parts, please supply the following information: model number, serial number and part number.

Marshalltown, IA
Phone 800-888-0127 / 641-753-0127
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www.**MARSHALLTOWN**.com

MARSHALLTOWN SURFACE SHARK
SURFACE PLANER WARRANTY PROGRAM

PURPOSE

It is the intention of Marshalltown Company to supply products to the marketplace that reflect the highest standards for materials, design and manufacture. Each original customer is entitled to receive coverage as described by the current limited warranty program for the product(s) purchased, regardless of where it (they) was (were) originally purchased. This program is intended to serve as a method to facilitate the proper communication procedures for the purpose of obtaining applicable coverage for a product.

WHAT THE LIMITED WARRANTY COVERS

Marshalltown Company warrants that each new and unused product and/or accessory sold by it shall be:

1) Free from defects in material and workmanship under normal use and service for a period of two (2) years from the original date of purchase.

2) To warrant the labor expenses associated with the defects in material and workmanship for a period of one (1) year from the original date of purchase.

The warranty period for materials workmanship and labor expenses shall run concurrent from the original date of purchase (invoice date). No exception to this policy will be made.

The obligation under this warranty program is limited to the current, flat labor rates allowed by it and the replacement and/or repair at its Fayetteville, Arkansas, factory site, or at an authorized dealer designated by it, of such part or parts as shall appear upon inspection to have been defective in material and/or workmanship at the time sold. The part or parts claimed to be defective must be returned to the inspection point, with reasonable transportation charges prepaid. In the event that the part or parts are determined to be covered by the terms of the warranty program, Marshalltown Company will reimburse the original purchaser for reasonable transportation charges. The amount designated, as reasonable transportation charges shall be the sole discretion of Marshalltown Company. Any part or parts replaced under the terms of the warranty program will carry the applicable new product warranty. At the time of requesting warranty service, the original purchaser must present evidence of the purchase date of the part or parts submitted for warranty inspection.

ALLOWABLE FLAT LABOR RATES

Marshalltown Company will pay shop labor repair on warranty at the Marshalltown Company Shop Labor Rate in existence on the date of the warranty claim. A Marshalltown Company Labor Chart will determine the time allowed to complete a repair and will govern the shop labor hours that will be allowed.

Marshalltown's warranty policy will not cover the following; taxes, shop supplies, environment surcharges, air freight, travel time, loss of rental revenue, or any other charges whatsoever or any liabilities for direct, incidental, or consequential damage or delay.

Please fill out your Marshalltown Company warranty card and place it in the mail within 24 hours of delivery.

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NOTICE TO OPERATORS

IF YOU CAN NOT READ OR DO NOT FULLY UNDERSTAND THE CONTENTS OF THIS MANUAL, PLEASE CONTACT THE FACTORY FOR PROPER ASSISTANCE BEFORE ATTEMPTING TO OPERATE THIS PRODUCT.

SI TU NO PUEDES LE'ER O NO COMPRENDES EL CONTENIDO DE ESTE MANUAL FAVOR DE PONERSE EN CONTACTO CON LA. FABRICA PARA ASSISTENCIA- A PROPIA ANTES DE INTENTAR PARA OPERAR ESTE PRODUCTO.

SOLLTEN SIE DIESE GEBRAUCHSANWEISUNG NICHT LESEN KOENNEN ODER ES NICHT VOLLKOMMEN VERSTEHEN, WENDEN SIE SICH BITTE AN DEN HERSTELLER FUER RICHTIGE HILFE EHE SIE VERSUCHEN DIESES PRODUKT ZU OPERIEREN.

SI VOUS NE LISEZ OU NE COMPRENDRE ENTIEREMENT LES MATIERES DE CE MANUEL, S'IL VOUS PLAIT, CONTACTEZ L'USINE POUR L'ASSISTANCE APPROPRIEE AVANT D'UTILISER LE PRODUIT.

⚠ DANGER

⚠ WARNING

⚠ CAUTION

These safety alert symbols identify important safety messages in this manual. When you see these symbols, be alert to the possibility of personal injury and carefully read the message that follows.

Do not allow anyone to operate the Surface Planer without first reading this Operator's Manual and becoming familiar with its operation. The manufacturer of this Surface Planer has gone to great extremes to provide the owner(s) and/or operator(s) with the finest equipment available for its intended job function of material removal and/or preparation of work surfaces. Yet, the possibility exists that the Surface Planer can be utilized in and/or subjected to job applications not perceived and/or anticipated by the manufacturer. Such misuse and/or misapplication of the Surface Planer can lead to the possibility of serious damage, injury or even death. It is the responsibility of the owner(s) and/or operator(s) to determine that the Surface Planer is being utilized and/or operated within the scope of its intended job function. It is the responsibility of the owner(s) and/or operator(s) to establish, monitor and constantly upgrade all safety programs and/or practices utilized in and for the operation of the Surface Planer. The purpose of such programs is to provide for owner(s') and/or operator(s') safety. Operators must be instructed to recognize and avoid unsafe conditions associated with their work (29 CFR 1926.21 (b)(2)) and/or applicable updated revisions. It is the responsibility of the owner(s) and/or operator(s) to determine that no modifications and/or alterations have been made to the Surface Planer. Modifications and/or alterations can lead to the possibility of serious damage, injury or even death. It is the responsibility of the owner(s) and/or operator(s) to make this Operator's Manual available for consultation during all phases of operation. Refer to OSHA 2207 and/or applicable updated revisions which contains all OSHA job safety and health rules and regulations (1926 and 1910) covering construction.

⚠ CAUTION

The concept of portable, low horsepower type surface planing equipment has been successfully utilized for many years as a practical solution to many types of surface preparation job requirements. The basic concept is proven and well accepted within the associated marketplaces as an alternative method to manual labor and other types of machines and methods. Use of a Surface Planer requires strenuous work activity. This type of work activity can be considered to be greater in magnitude than that experienced with the use of many other types of both light construction and lawn and garden related equipment. This type of work activity should only be attempted by operators of adequate physical size and stature, mental awareness and physical strength and condition. Each operator is required to supply a reaction type force that counteracts/balances and/or resists the forces generated during the surface planing process. The body parts most noticeably affected during the planing process are the arms, hands, wrists, shoulders, lower back and legs. The planing process can also produce excessive stress/strain directly to the back muscles, spinal vertebrae and many other body parts. Back related pain can be a side effect of the planing process. An operator with a chronic back related problem or a history of back and/or other medically related problems should not attempt to utilize the Surface Planer. Use of the Surface Planer may only aggravate this and any other medically related problem. The forces generated and/or encountered correspond to the natural laws of physics and are inherent to the planing process. They can not be changed or totally eliminated with portable hand held and operated, surface planing equipment of this design. Proper operating positions and techniques, as outlined in this manual, can be successfully utilized to minimize the effects of the reaction forces upon the human body. Because of the diverse type of prevailing job applications, job site conditions, operator experience levels and operator physical characteristics, no warranty, guarantee, representation and/or liability is made by the manufacturer as to the absolute correctness or sufficiency of any operational procedure, operational position and/or technique. There is no absolute guarantee that an operator of any given experience level, physical size and/or physical condition will be immune to the possibility of and/or probable physical side effects of the normal surface planing process. The normal planing process includes the flails striking a wide variety of surface materials and compositions and the resulting reaction forces created. Each potential operator of the Surface Planer must be made aware of and assume the operational and physical liability described and/or associated with the planing process when utilizing the Surface Planer. Each potential operator not willing to assume the operational and physical liability described and/or associated with the planing process should not operate the Surface Planer. Proper levels of operator experience, skill and common sense are essential for maximizing the safe and efficient operation of the Surface Planer.

Record the Surface Planer and engine/electric motor serial numbers in the spaces provided below.

_____ **Model Number**

_____ **Serial Number**

_____ **Engine Serial Number**

_____ **Date of Purchase**

Specifications and design are subject to change without notice or obligation. All specifications are general in nature and are not intended for specific application purposes. Marshalltown Company reserves the right to make changes in design, engineering or specifications and to add improvements or discontinue

manufacture at any time without notice or obligation. Marshalltown Company and its agents accept no responsibility for variations which may be evident in actual products, specifications, pictures and descriptions contained in this publication.

OPERATOR INSTRUCTIONAL DATA SHEET

The following undersigned operators of the Surface Planer described and/or pertaining to this Operator's Manual have received formal safety and operational information/instruction from the undersigned owner(s)/ instructor(s) in accordance to OSHA 29 CFR 1926.21 (b)(2) and/or applicable updated revisions pertaining to, but not necessarily limited to the:

1) READING, COMPREHENSION AND ACKNOWLEDGEMENT OF THE MATERIAL COMPRISING THE ENTIRE CONTENTS OF THE APPLICABLE OPERATOR'S MANUAL AND SAFETY AND OPERATIONAL INFORMATION VIDEO FOR THE SURFACE PLANER.

2) FORMALIZED OPERATOR'S SAFETY PROGRAM TO BE DEVISED BY THE OWNER OF THE SURFACE PLANER IN CONJUNCTION WITH THE CONTENTS OF THE APPLICABLE OPERATOR'S MANUAL FOR THE SURFACE PLANER.

3) OSHA RULES AND REGULATIONS RESEARCHED FOR AND/OR BY THE OWNER OF THE SURFACE PLANER AND DEEMED APPLICABLE TO THE SAFE AND PROPER USE AND/OR OPERATION OF THE THE SURFACE PLANER FOR ANY SPECIFIC JOB APPLICATION.

4) LOCAL LAWS, REGULATIONS AND CUSTOMS RESEARCHED FOR AND/OR BY THE OWNER OF THE SURFACE PLANER AND DEEMED APPLICABLE TO THE SAFE AND PROPER USE AND/OR OPERATION OF THE SURFACE PLANER FOR ANY SPECIFIC JOB APPLICATION.

5) FORMALIZED MAINTENANCE PROGRAM FOR THE SURFACE PLANER TO BE DEVISED BY THE OWNER OF THE SURFACE PLANER IN ACCORDANCE WITH, BUT NOT NECESSARILY LIMITED TO, THE SPECIFICATIONS, GUIDELINES AND OPERATIONAL INFORMATION CONTAINED IN THE APPLICABLE OPERATOR'S MANUAL.

6) COMPREHENSIVE OPERATIONAL INSTRUCTIONS FOR THE CORRECT AND PROPER USE OF THE SURFACE PLANER AS PER THE CONTENTS OF THE APPLICABLE OPERATOR'S MANUAL.

_____ Operator _____ Owner/Instructor _____Date

_____ Operator _____ Owner/Instructor _____Date

_____ Operator _____ Owner/Instructor _____Date

_____ Operator _____ Owner/Instructor _____Date

_____ Operator _____ Owner/Instructor _____Date

_____ Operator _____ Owner/Instructor _____Date

SAFETY PRECAUTIONS

⚠ DANGER

THE FOLLOWING SAFETY PRECAUTIONS PROVIDE SOME COMMON SENSE GUIDES TO PROMOTE SAFETY AND EFFICIENCY WITH THE SURFACE PLANER. NO WARRANTY, GUARANTEE OR REPRESENTATION IS MADE BY THE MANUFACTURER AS TO THE ABSOLUTE CORRECTNESS OR SUFFICIENCY OF ANY INFORMATION OR STATEMENT. THESE SAFETY PRECAUTIONS ARE INTENDED TO DEAL PRINCIPALLY WITH COMMON PRACTICES AND CONDITIONS ENCOUNTERED IN THE USE OF THE SURFACE PLANER AND ARE NOT INTENDED TO BE ALL INCLUSIVE. PROPER LEVELS OF OPERATOR EXPERIENCE, SKILL AND COMMON SENSE ARE ESSENTIAL FOR SAFE AND EFFICIENT OPERATION.

⚠ DANGER

THE ENGINE EXHAUST ALONG WITH THE DUSTS/BYPRODUCTS FROM THE COVERING REMOVAL PROCESS ASSOCIATED WITH THE OPERATION OF THE SURFACE PLANER CAN CONTAIN CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM. THIS STATEMENT IS MADE IN COMPLIANCE TO CALIFORNIA PROPOSITION 65.

⚠ DANGER

INCORRECT USE OF THE SURFACE PLANER CAN RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR EVEN DEATH. TO REDUCE THIS POSSIBILITY, GIVE COMPLETE AND UNDIVIDED ATTENTION TO THE JOB AT HAND AND FOLLOW THESE SAFETY PRECAUTIONS:

PREPARATION

1) The Surface Planer is a specialized type of powered equipment, designed for a specific job function and requires adequate and thorough instruction BEFORE it is operated. The size, power, complexity and operating characteristics of this type of powered equipment would dictate that each operator must receive adequate, professional instruction regarding the proper operation of the Surface Planer before being allowed to utilize it. BEFORE attempting to utilize the Surface Planer, read this Operator's Manual to familiarize each operator with its correct operating procedures. Avoid the urge not to take the necessary time to read this Operator's Manual before operating the Surface Planer. DO NOT OPERATE THE SURFACE PLANER UNTIL EACH OPERATOR COMPLETELY COMPREHENDS THE CONTENTS OF THIS MANUAL, APPLICABLE SUPPLEMENTAL INFORMATION AND THE INFORMATION SUPPLIED BY THE ENGINE MANUFACTURER.

2) Develop a comprehensive program for the safe operation of the Surface Planer by its owner(s) and/or operator(s). Such a program will include, but is not limited to: instructional requirements for operation, applicable OSHA requirements, local laws and regulations, job site safety and a Surface Planer maintenance program. Constantly examine and upgrade this program to guarantee owner(s) and/or operator(s) safety. Each operator must be fully instructed regarding the specifics of this safety program.

3) Determine that the Surface Planer is in its original, factory configuration and has not been modified in any manner. Many modifications can result in potentially dangerous configurations that can lead to property damage and/or personal injury. If there are any questions about possible modifications made to the Surface Planer, contact the Customer Service Department for specific information BEFORE utilization. There is no charge for this service. Do not operate the Surface Planer without the use of the original equipment V-belt guard. Use of the planer without an approved belt guard can lead to property damage and/or personal injury.

4) Minors should never be allowed to operate the Surface Planer. Bystanders, especially children and animals, should not be allowed in the area where the Surface Planer is in use. The covering removal process can result in flying particles being emitted at high velocity and striking the operator and/or onlookers. This can lead to the possibility of

property damage and/or personal injury. Keep all body parts, loose clothing, foreign objects and onlookers clear while equipment is in operation.

5) Operators must be in adequate physical condition, mental health and not under the influence of any substance (drugs, alcohol, etc.) which might impair vision, dexterity or judgment. Working with the Surface Planer is strenuous. If you have any condition that might be aggravated by strenuous work, check with your doctor BEFORE operating the Surface Planer. Guard against the possibility of back related injuries. Always lift the Surface Planer with leg muscles and not with the back. Use of the Surface Planer requires that the operator be of the proper height, weight and strength to maximize operational efficiency and minimize the possibility of personal injury.

6) Prolonged use of the Surface Planer (or other, similar machines) exposes the operator to vibrations which may produce Whitefinger Disease (Raynaud's Phenomenon). This phenomenon reduces the hand's ability to feel and regulate temperature, produces numbness and burning sensations and may cause nerve and circulation damage and tissue necrosis. Antivibration systems do not guarantee that you will not sustain Whitefinger Disease. Therefore, continuous and regular users should closely monitor the condition of their hands and fingers. After each period of use, exercise to restore normal blood circulation. If any of the symptoms appear, seek medical advice immediately.

7) Clothing must be sturdy and snug fitting, but allow complete freedom of movement. Never wear loose fitting jackets, scarves, neckties, jewelry, flared or cuffed pants or anything that could become caught on controls or moving parts. Wear long pants to protect your legs. Protect your hands with heavy duty, nonslip gloves to improve your grip. Good footing is most important when operating the Surface Planer. Wear sturdy boots with nonslip soles. Steel-toed safety shoes are highly recommended. Never wear tennis shoes or other, similar type shoes which afford little or no protection. Wear an approved safety hard hat to protect the operator'(s') head(s) where there is a danger of head injuries.

8) Noise, generated by the engine of the Surface Planer and/or the actual planing process itself, can damage your hearing. A gasoline engine powered Surface Planer operates with a noise emission greater than 70 dBA. Hearing protection is required while operating or when near operating equipment. Continuous and regular operators should have their hearing checked regularly.

9) Flying debris, generated by the planing process, can cause eye injury. Eye protection is required while operating or when near operating equipment

10) Visually inspect the Surface Planer, components, tools and accessories for damaged or worn parts. BEFORE each use:

a) Disconnect the engine spark plug wire.

b) Clean and remove all accumulated foreign matter from the wheels and determine that each rotates freely.

c) Clean and remove all accumulated foreign matter from inside the main frame area.

d) Inspect the V-belt drive for proper tension, wear and general condition. Replace each component as necessary.

e) Inspect the flail drum and flails/spacer washers for for excessive wear and structural integrity. Replace each component as necessary. The flail drum and flails rotate at high speed during the planing process and are subject to high wear rates.

f) Determine that operator controls work freely, all safety devices are operative and information decals are readable.

g) Check to see that the Surface Planer and all related accessories are in good, mechanical condition BEFORE utilization.

h) Re-connect the spark plug wire.

11) Contact appropriate representatives to determine if/where electrical cables, gas lines and other hazardous items are buried under the work surface BEFORE utilization. The Surface Planer and related accessories are not insulated. Contact with buried electrical cables, gas lines and other hazardous items can result in electrocution and/or an explosion.

12) Know how the controls operate. Know how to stop the engine quickly in an emergency. Always start the engine with the flail drum raised to its maximum height from the work surface to minimize the possibility of unexpected contact with the work surface. Unexpected contact with the work surface can cause loss of machine control, and the possibility of property damage and/or personal injury.

13) When operating the Surface Planer with an electrically powered vacuum system on a surface containing water or other electrically conducting

liquid, special precautions must be taken to minimize the possibility of operator electrocution. One such precaution is to wire and operate the electric motor from a 20 Ampere, 115 Volt AC power source in conjunction with a ground fault circuit interrupter (GFCI). A GFCI is a safety device that disconnects power from a circuit to a load when a potentially dangerous condition occurs. The GFCI opens the circuit when the fault current flow from a power line to a ground exceeds the safe limit for humans. The GFCI protects against harmful electrical shock to a person caused by contact with a defective electrical product. A GFCI differs from a fuse or circuit breaker. A fuse or circuit breaker opens the circuit when the total current flow in the power line exceeds the safe limit of the power line. They are designed to protect against fire caused by overheating. Use of a GFCI gives on the job protection from electrical shock hazards caused by ground faults in commercial, industrial and residential applications. They are simple and easy to use: plug a portable GFCI into any suitable, grounded receptacle and plug the Surface Planer into the GFCI for automatic protection against ground faults. For specific information, consult current National Electrical Code publications and OSHA publications 210-22D (or current revision) for construction sites and 555-3 (or current revision) for use around any area containing water.

14) Never exceed the recommended capacities of the Surface Planer. Refer to the Specifications section of this manual for more detailed information.

OPERATION

1) Give complete and undivided attention to the job at hand. Do not chew gum, smoke and/or use smokeless tobacco while utilizing the Surface Planer. Do not attempt to eat and/or drink while utilizing the Surface Planer. Determine that eyeglasses and/or hearing aid devices are properly secured.Use of the Surface Planer is strenuous and causes fatigue. Help prevent the cause of an accident. Plan to take work breaks as required to help maintain proper mental and physical alertness.

2) This Surface Planer is not sealed or insulated. Do not operate this machine in an explosive atmosphere or near combustible materials. Refer to current OSHA and National Electric Code® rules and regulations.

3) Gasoline is an extremely flammable fuel. Use extreme caution when handling gasoline or mixing fuel. Always utilize UL®, CSA® or CE approved containers for the storage and transportation of fuel. Do not smoke or bring fire or flame near the fuel. Always shut off the engine and allow it to cool before refueling. Never remove the fuel tank filler cap while the engine is running. Never operate an engine without a fuel tank filler cap. Select bare ground for fueling and move at least 10 feet from the fueling spot before starting the engine. Wipe off any spilled fuel before starting the engine and check for leakage. If a fuel or oil leak is found, do not start or run the engine until the leak is fixed and the spillage has been wiped away. Take care not to get fuel or oil on your clothing. If this happens, change your clothing immediately. Before operating the Surface Planer, refer to the Specifications section of this manual for more detailed information regarding fuel and lubrication requirements.

4) The Surface Planer is designed for use by one operator. Use of the Surface Planer by more than one operator can lead to confusion and loss of control, resulting in property damage and/or personal injury. If it is felt that more than one person is required to operate the Surface Planer, STOP and contact the Customer Service Department for specific operational and service/maintenance information. There is no charge for this service.

5) Do not operate the Surface Planer with onlookers close by. Caution all onlookers to stand clear. The planing process can result in flying particles being emitted at high velocity and striking the operator and/or onlookers This can lead to the possibility of property damage and/or personal injury. Keep all body parts, loose clothing and foreign objects clear of the rotating drum and flails.

6) Never start the engine or electric motor without first raising the flail drum to its maximum height from the work surface to minimize the possibility of unexpected contact with the work surface. Unexpected contact with the work surface can cause the loss of machine control and the possibility of property damage and/or personal injury.

7) **Start and operate the Surface Planer only in a well ventilated area. Carbon Monoxide fumes given off by an engine operating from standard fuels are poisonous. Breathing these fumes can result in property damage and/or personal injury.**
Operate the Surface Planer only when/where visibility and light are adequate for the job at hand. Work carefully. Always hold the operator handle firmly with both hands. Wrap your fingers around the handle, keeping it cradled between your thumbs and fingers. Always make sure the operator handle is in good condition and free of moisture, pitch, oil or grease. Wear gloves to improve your grip. Never leave the Surface Planer running unattended.

8) Special care must be exercised on slippery conditions and on difficult, uneven surfaces. Watch for cracks, high spots and other, surface irregularities. Keep proper footing and balance at all times. The normal use of this machine is on level surfaces. Other terrains can be dangerous and should be avoided. Only properly trained operators should attempt these techniques.

9) Never start the engine with the Surface Planer on cracked, uneven or irregular surfaces. Never start the engine with the flails and/or flail drum in contact with the work surface. Such occurrences can lead to the loss of machine control and the possibility of property damage and/or personal injury.

10) Contact with a hot, engine muffler can cause property damage and/or personal injury. Remain clear of a hot, engine muffler. Do not over speed the engine by altering the governor setting or by disconnecting the engine governor. Serious damage to the engine and/or personal injury can result.

11) Clean and remove all accumulated foreign matter from inside the main frame after each use. This practice will maximize bearing and V-belt service life.

12) Because this Surface Planer is classified as a low cost, hand held, low horsepower, portable type machine, it is limited in the number of practical and/or suitable job applications. A particular job site, actual surface conditions, job specifications and operator skill/common sense may dictate that a different type of machine (with characteristics of higher purchase cost, being mounted to a carrier vehicle, with greater horsepower and less mobility), method and/or process be utilized to properly complete the job with the degree of efficiency and safety required. Contact the Customer Service Department for specific information regarding suitable job applications, job site surface conditions and operator experience/skill/common sense recommendations for this Surface Planer BEFORE utilization. There is no charge for this service.

MAINTENANCE, REPAIR AND STORAGE

1) Use only genuine, approved replacement parts and accessories for maintenance and repair. Use of parts and accessories manufactured by others can result in property damage and/or personal injury.

2) Follow the Service instructions as outlined in the appropriate section of this manual.

3) Always stop the engine and disconnect the spark plug wire BEFORE checking or working on the Surface Planer.

4) Always properly maintain the Surface Planer. Frequently check all fasteners and individual parts. Built in safety features are effective only if they are maintained in good working condition. Replace any questionable part or assembly with a genuine, factory approved, replacement part. Do not forsake proper maintenance for the price of a few replacement parts. Proper maintenance does not cost... it actually pays dividends. Do not attempt any maintenance repair work not described in this manual. Have such work performed at your dealer's service facility.

5) A worn or damaged engine muffler is a fire hazard and may cause loss of hearing. Check to see that the muffler is in good condition. If the muffler is equipped with a spark arresting device, determine that it is in proper working condition at regular service intervals. Replace the spark arresting device with an approved replacement if there is any question of its integrity. It is the responsibility of the owner(s) and/or operator(s) to provide for and properly maintain a USDA approved, spark arresting muffler in an operating area specified by law. Check with appropriate governing agencies for more specific information. The Surface Planer must not be operated if the muffler is faulty or has been removed. Contact with a hot engine muffler can cause property damage and/or personal injury.

6) Do not operate the planer without the use of a factory approved V-belt guard that is maintained in proper structural condition. Frequently inspect the belt guard for signs of wear, cracks and other signs of fatigue. If there is any question regarding the structural integrity and/or condition of the belt guard, properly dispose and replace with a genuine, factory approved, replacement part only.

7) Maintain all safety and operation decals in proper condition. If any decal becomes damaged and/or unreadable, replace with genuine, factory approved, replacement parts only.

8) The Surface Planer utilizes self locking hexagon head nuts to minimize the effects of vibration. Replace all self locking hardware with genuine, factory approved, replacement parts only.

9) Consult the material supplied by the engine or electric motor manufacturer for specific information relative to proper operational, lubrication and storage requirements.

ASSEMBLY

The SP684 SURFACE SHARK Surface Planer is shipped from the factory secured on a specially designed wooden pallet and protected from external damage by a corrugated carton or wood crate. If shipped with a corrugated carton, the Surface Planer can be secured to the pallet by wood laths nailed to the pallet body. Remove the carton or crate immediately upon receipt using suitable tools to remove the nails.

⚠ DANGER

WEAR SAFETY GLASSES AND OTHER APPROPRIATE SAFETY APPAREL WHEN CUTTING THE STEEL BANDING AND/OR REMOVING THE CORRUGATED/WOOD SHIPPING CRATE.

REMOVING THE SURFACE PLANER FROM THE PALLET

Application: SP684 Surface Planer

Tools Required:

1 each, pliers
1 each, claw hammer or hammer and an appropriate pry bar
2 each, 1/2 inch wrenches

The Surface Planer is secured to the pallet with steel banding. Using the pliers, cut and remove the banding. The Surface Planer is secured to the pallet with a tie-down clamp. Using the 1/2 inch wrenches, remove the tie-down clamp. The Surface Planer can then be removed from the pallet.

Visually inspect the shipment for freight damage and/or missing parts. If shipping damage is evident, contact the delivering carrier immediately to arrange for an inspection of the damage by their claims representative. Federal law requires that a claim be filed within a specific time period. If missing parts are detected, notify your dealer who will assist you in obtaining them.

The Surface Planer is shipped from the factory completely assembled. If ordered with the Surface Planer, the flail drum and flail kit are normally installed on the flail drum driveshaft. Additional flail drums and flail kits or replacement parts are normally shipped separately.

Check all fasteners for security. Consult a fastener torque chart for the proper torque value if any fastener is found to require retorquing.

FILLING THE ENGINE CRANKCASE WITH OIL

Application: SP684 Surface Planer

Note: The Surface Planer is test run at the factory and is subject to a number of operational tests before shipment. This requires the engine crankcase to be filled with oil to the proper level. No further addition of oil is required prior to placing a new unit in service. In normal operational service, to fill the engine crankcase with oil after first draining the crankcase, proceed as follows:

Tools Required:

1 each, small, clean funnel

1)The SP684 Surface Planer is available equipped with a number of industrial quality, gasoline and diesel engines. Consult the material supplied by the engine manufacturer for the engine that has been ordered with your Surface Planer. Carefully review this material to become familiar with specific operating characteristic, recommendations and service requirements.

2) Determine the location(s) of both the oil filler and oil drain plug(s).

3) Wipe oil, dust and accumulated dirt from the filler plug area.

4) Using the funnel, fill the engine crankcase with a high grade motor oil. Consult the material supplied by the engine manufacturer for proper amount, weight and service classification.

5) Replace the oil filler plug and tighten. Wipe off any excess oil spilled on the engine crankcase and Surface Planer.

6) Do not operate the engine unless proper oil level is maintained as per the material supplied by the engine manufacturer.

FILLING THE ENGINE FUEL TANK

Application: SP684 SURFACE SHARK.

Tools Required:

1 each, small, clean funnel

⚠ CAUTION

Never mix oil with gasoline. Four cycle engines are not designed to be operated with oil mixed with the gasoline.

1) Determine the location of the fuel tank filler cap.

2) Carefully clean the filler cap and surrounding area to insure that no dirt or debris falls into the fuel tank. Remove the filler cap.

3) Fill the fuel tank with fresh, clean, unleaded automotive gasoline. Leaded “regular” grade gasoline is an a acceptable substitute. DO NOT USE GASOLINE CONTAINING METHANOL (WOOD ALCOHOL) Gasoline containing a maximum of 10 percent ethanol or grain alcohol (sometimes referred to as Gasohol) may be used but requires special care when the engine is stored for extended periods.

4) Use of a properly blended gasoline for operation during the intended season will result in easier engine starting. Do not use gasoline left over from the previous season of operation.

5) Do not overfill the tank or spill any fuel. If the fuel tank incorporates a screen mesh to prevent debris from falling into the tank, do not remove to increase the fill rate. Replace the filler cap. Wipe away any excess spilled fuel.

⚠ DANGER

DO NOT SMOKE NEAR THE FUEL TANK. DO NOT FILL THE FUEL TANK WITH THE ENGINE RUNNING OR IF IT IS HOT. ANY FUELS ARE EXTREMELY FLAMMABLE. ALLOW AMPLE TIME BETWEEN EACH REFUELING FOR THE ENGINE TO COOL. AN IGNITION SOURCE IN CLOSE PROXIMITY TO THE FUEL TANK CAN BE THE SOURCE OF AN EXPLOSION, RESULTING IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.CONSULT THE MATERIAL SUPPLIED BY THE ENGINE MANUFACTURER FOR INFORMATION RELATIVE TO PROPER FUELING PROCEDURES.

OPERATION

CALIFORNIA PROPOSITION 65 DISCLAIMER

Application: SP684 SURFACE SHARK

⚠ DANGER

THE ENGINE EXHAUST AND BY/PRODUCTS FROM THE OPERATIONAL PROCESS OF THIS PRODUCT CONTAIN CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS, OR OTHER REPRODUCTIVE HARM.

SPARK ARRESTOR DISCLAIMER

Application: SP684 SURFACE SHARK

DO NOT OPERATE THE SURFACE PLANER ON ANY FOREST COVERED, BRUSH COVERED, OR GRASS COVERED, UNIMPROVED AREAS UNLESS AN APPROVED SPARK ARRESTOR IS INSTALLED ON THE MUFFLER. THE SPARK ARRESTOR MUST BE MAINTAINED IN PROPER WORKING ORDER BY THE OWNER AND/OR OPERATOR. IN THE STATE OF CALIFORNIA, THE ABOVE IS REQUIRED BY LAW. OTHER STATES MAY HAVE SIMILAR LAWS. FEDERAL LAWS WILL APPLY ON FEDERAL LANDS. LAWS WILL VARY WITH USE IN SPECIFIC COUNTRIES.

THEORY OF OPERATION

Application: SP684 SURFACE SHARK

The SP684 Surface Planers operate on the principle of various flail configurations being operated at high rotational speeds to make direct contact with a work surface. A series of flails are spaced and aligned on shafts that span a specified width and rotate on a drum that can be raised or lowered at the discretion of the operator. The specific flail configuration and impact rate directly affect the rate of material removal from the work surface, the resulting surface profile and texture.

The planing process is directly controlled by these conditions:

1) The use of a suitable mechanism (flail) of sufficient strength and hardness to impact the work surface and remove material while delivering an acceptable service life.

2) Sufficient static weight supporting the flails which allow them to effectively penetrate the work surface and remove material.

3) Adequate horsepower capable of propelling the rotating flails against the work surface to deliver acceptable productivity rates.

Since no two materials are exactly alike, no two work surface materials can be penetrated and removed by the exact same method. The nature of the planing process, along with operator experience, skill and common sense, would suggest that efficient and productive material removal is a matter of trial and error. Combinations of flail type, condition, configuration, spacing along the width of the flail drum and feed rate are direct factors that will determine the overall success of the job application.

FLAIL DESIGN AND APPLICATION

While individual flail design and configuration may vary, basic operational characteristics are identical: impact a work surface material and remove a percentage of the material. This common operational characteristic has led to the development of two basic flail configurations:

1) High carbon, heat treated, alloy steel designed for direct contact and removal of the surface material. The high carbon content of the flail material also helps to improve service life

2) High carbon, heat treated, alloy steel with tungsten carbide inserts brazed into the flail body. The tungsten carbide inserts are intended to directly contact the work surface and remove material. The inserts effectively resist wear and usually deliver a substantially longer service life than the plain, heat treated steel types. The flail body is designed to serve as a matrix or support for the tungsten carbide inserts, hence the requirement for heat treatment. The heat treatment process also aids the flail body in resisting wear.

Several Factors Directly Affect the Selection of a Flail Design for a Specific Job Application:

1) The type and amount of material to be removed from the work surface. Materials of higher yield and tensile strengths along with the actual volume of material to be removed will generally be the first factors under consideration.

2) Purchase costs versus service life. The original purchase cost of plain, heat treated steel flails must be compared against the substantially higher costs of tungsten carbide insert flails. In turn, these costs must be compared to anticipated service life. All flails, whether of high speed steel or tungsten carbide insert design, will eventually wear to the point of requiring replacement. The amount of unproductive time spent to replace worn flails on a job can be substantially greater than the actual replacement cost of many flails. It then becomes a balance between purchase cost, productivity, service life and labor cost.

3) Surface finish and texture. The finest grained surface finish available from the planing process is comparable to a “swept or broomed” like finish. FIGURE 1. If a smooth, flat finish is desired, the planing process must be followed with a grinding or polishing type process. Many job requirements may call for large amounts of material to be removed, but followed with additional specifications requiring a finer surface finish or texture. Many times these jobs dictate the use of an aggressive flail configuration because of productivity and cost considerations. Less aggressive flail configurations can then be utilized for the final finishing sequence. Generally speaking, the more aggressive the flail configuration, the more coarse the resulting finish and texture.

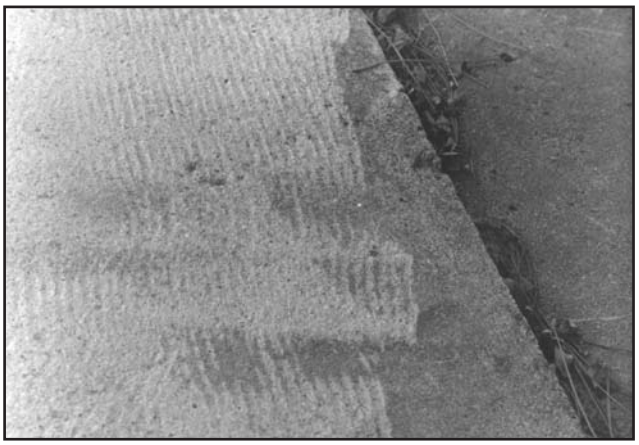


FIGURE 1

Many flail configurations are available to meet a wide variety of job application and surface material specifications. To give additional perspective to each configuration a rating system of 1 to 10 (10 being highest) has been devised.

Beam Flail

The beam type flail is manufactured from high carbon, alloy steel that is thoroughly hardened for additional service life. FIGURE 2. It is highly effective for scabbling or scarifying and delivers medium to coarse surface finish texture. Designed for medium to high speed material removal of the work surface.

FIGURE 2

Suggested applications:

1) Medium duty asphalt and concrete milling

2) Descaling steel decks

3) Removing thick material build-ups of greases, paints, oils, vegetable powders and resins from non-wood type floors

4) Dried, fully cured, carpet and tile adhesive removal

5) Painted traffic line removal

COST 1
PRODUCTIVITY 5
SERVICE LIFE 2

The beam flail should be replaced when the outside diameter is worn to approximately 1-5/16 inch or the inside diameter elongates to approximately 3/4 inch.

Pentagonal Flail

The pentagonal flail is manufactured from high carbon, alloy steel that is thoroughly hardened for additional service life. FIGURE 3. Each section of the five sided design features a small, tungsten carbide insert that is first placed in a small hole and then held in position with copper brazing. It is highly effective for scabbling or scarifying and delivers medium to coarse surface finish texture. Designed for high speed material removal of the work surface.

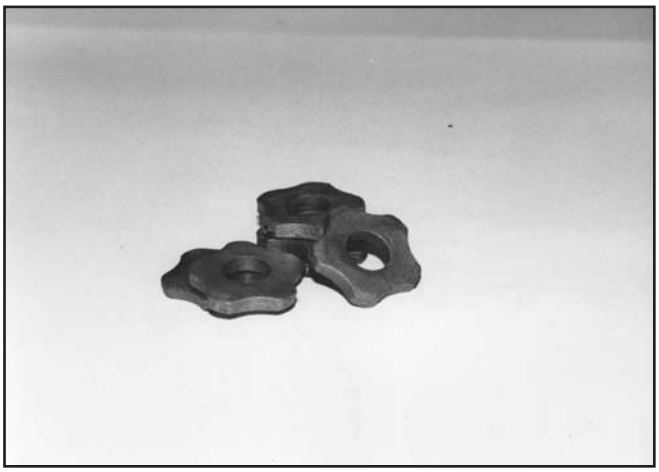


FIGURE 3

Suggested applications:

1) Heavy duty asphalt and concrete milling

2) Milling concrete joints

3) Asphalt and concrete grooving

The pentagonal flail is designed for more aggressive and rapid removal of a surface in comparison to the beam flail. The addition of the tungsten carbide inserts contributes to its long service life and higher production rates. The tungsten carbide is also the main reason for the cost differential between it and the other flails. The design configuration yields a rather coarse surface finish and texture. For many job applications, this finish and texture will be satisfactory. Some applications may require an additional smoothing process. For example: removing high spots or other irregularities from sidewalks. The initial process would utilize pentagonal flails for productivity and service life reasons. If the resulting surface finish is too coarse to meet specifications, it can be smoothed with the use of the beam flails.

COST 10
PRODUCTIVITY 8
SERVICE LIFE 10

The pentagonal flail should be replaced when two successive tungsten carbide inserts break off or the inside diameter elongates to approximately 3/4 inch. In service, the flail body will wear much faster than the tungsten carbide inserts. The copper brazing used to weld the inserts into the body can fail and an insert break off. The flail can still be used in service. It will just wear a little faster and more uneven in that particular area. As a general rule, a pentagonal flail can be utilized until there has been body wear that will no longer support the tungsten carbide inserts.

Milling Flail

The milling flail is manufactured from high carbon, alloy steel that is heat treated for additional service life. FIGURE 4. Each section of the five sided design features a rectangular, tungsten carbide insert that is held in position with copper brazing. The milling flail is primarily designed for "climb" milling applications. This requires that the Surface Planer be pulled toward the operator when being utilized. Removal rates are dependent upon both surface and substrate material composition.

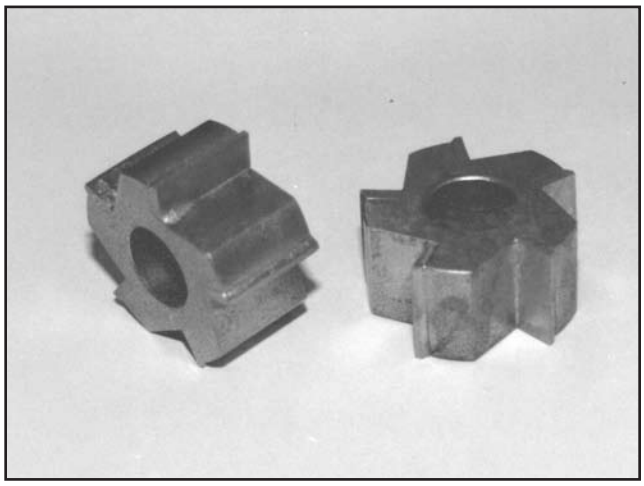


FIGURE 4

Suggested applications:

Removing synthetic coatings, thermoplastic and cold plastic marking and lines from concrete and asphaltic surfaces.

COST 10
PRODUCTIVITY 7
SERVICE LIFE 7

Milling flails are designed to remove a variety of traffic line materials from concrete and asphaltic type surfaces. With proper techniques, minimal amounts of parent work surface material will also be removed during the planing process. Milling flails are expensive. To realize maximum service life, milling flails should not be utilized for the direct removal of concrete and asphaltic work surface materials. Such use will drastically reduce their service life and substantially increase project costs.

SPACER WASHERS

Application: SP684 SURFACE SHARK

Spacer washers are stamped from high carbon, alloy steel that is heat treated for additional service life. FIGURE 5.

FIGURE 5

The function of spacer washers:

1) Reduce the number of flails required to be mounted on the flail drum, thus reducing purchase and operational costs.

2) Arrange the flails in a sequence or pattern that minimizes "blind" or "open" spots created by the additional support plates of the two section flail drum. Always insert at least one spacer washer between two (2) consecutive flails. The exception to this rule is a configuration where its design does not require the use of spacer washers. A flail drum set up with only pentagonal flails and no spacer washers will not penetrate the work surface at satisfactory rates. Typical configurations minimize the hammering or impact action of the flails. However, this can also be useful when removing traffic lines.

3) Allow the flails to be arranged on the one section flail drum in configurations of specific widths for many job applications. An example would be the use of pentagonal flails to groove a concrete floor. The spacer washers are used to position the pentagonal flails at the desired width. FIGURE 6.

Variances in material thickness and manufacturing processes can affect the final thickness of both flails and spacer washers. Because of this occurrence, trial and error is important for assembling flails and spacer washers on a flail drum. By mixing and matching flails and spacer washers of specific thicknesses, the required number of components can be assembled on a flail drum in a minimum amount of time.

⚠ DANGER

USE ONLY FACTORY SUPPLIED SPACER WASHERS ON THE FLAIL DRUM. OTHER WASHER TYPES AND/OR CONFIGURATIONS CAN PRODUCE ABNORMAL WEAR AND ELONGATION, RESULTING IN COMPLETE SEPARATION FROM THE FLAIL DRUM. SPACER WASHER SEPARATION CAN RESULT IN PROPERTY LOSS AND/OR PERSONAL INJURY.

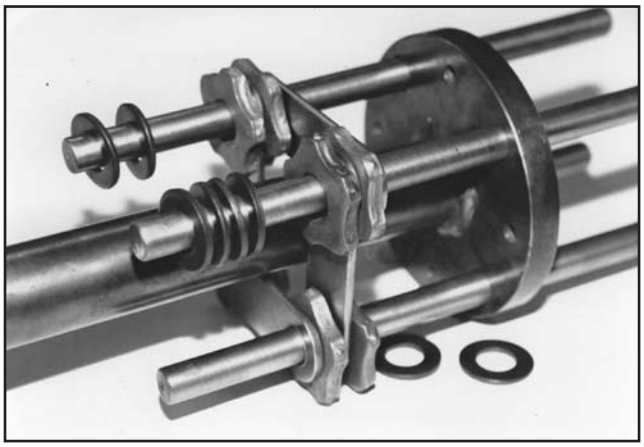


FIGURE 6

FLAIL DRUM RODS

Application: SP684 SURFACE SHARK

Flail drum rods are manufactured from 1/2 inch diameter alloy steel. They are heat treated in a two step process that yields a surface hardness that resists wear and extends service life.

Drum rod service life is difficult to predict because of the large number of flail configurations and work surface materials. Normal wear should be uniform about the rod circumference. FIGURE 7.

FIGURE 7

Problems Encountered by Uneven Component Wear:

1) Inadequate free play exists between the flails/spacer washers and the support plates of the flail drum. If the flails and spacer washers do not have complete freedom of movement, they will not be capable of properly rotating about the flail drum rod. The result is rod wear confined to two locations that are usually 180 degrees apart. FIGURE 8. Variances in flail and spacer washer thicknesses affects free play when assembled on the drum. Because free play is also created during the planing process due to actual flail and spacer washer wear, a certain amount of “tightness” can sometimes be tolerated without affecting the service life of the drum rods or flails. The specific amount of “tightness” can usually be determined through trial and error. If the flails and spacer washers appear too tight on the drum, remove an appropriate flail or washer and reassemble the drum. If a short, operational test indicates normal component wear patterns, the apparent problem has been solved. A general rule for consideration: it is better to have the flails and spacer washers a “little too loose” on the drum than a “little too tight”.

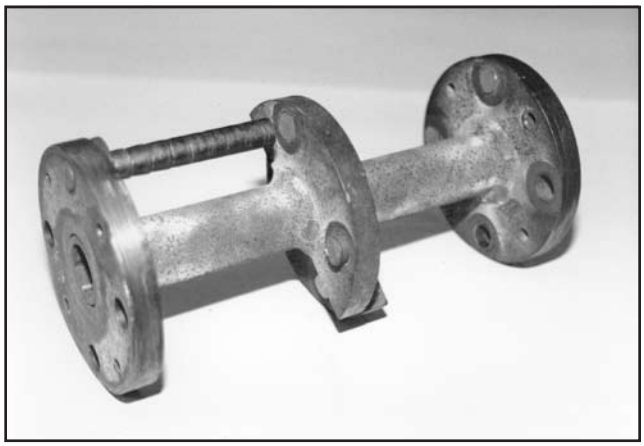


FIGURE 8

2) Mixing both worn and new flails on the drum. Proper flail action against the work surface material requires that the flails be of the same, approximate dimensions. Flails with various inside and outside dimensions will not impact the work surface material with the same intensity and deliver the same results. Flail rod wear is directly proportional to the amount of force it must supply against each, individual flail. When a rod can no longer supply adequate force against the flails, it will break, allowing the flails to be hurdled against the inside of the Surface Planer frame. The more aggressive flails require greater forces to keep them contained on the rod. These forces, in turn, create faster and/or uneven rod wear rates.

Because flail drum rods are a critical component of the actual planing process, it is important that each rod be inspected on a regular basis to determine proper structural integrity.

⚠ DANGER

INSPECT EACH FLAIL DRUM ROD ON A REGULAR INTERVAL TO DETERMINE PROPER STRUCTURAL INTEGRITY. USAGE RATES AND OTHER OPERATING PARAMETERS WILL DETERMINE PROPER INTERVAL RATES. IF THERE IS ANY QUESTION REGARDING THE VISUAL STRUCTURAL INTEGRITY OF A DRUM ROD, PROPERLY DISCARD AND REPLACE IT WITH AN APPROVED, FACTORY REPLACEMENT PART ONLY.

⚠ DANGER

THE MINIMUM ALLOWABLE DRUM ROD DIAMETER IS 3/8 INCH AS MEASURED ALONG ANY PART OF ITS CIRCUMFERENCE AND/OR LENGTH. ANY DRUM ROD NOT MEETING THIS MINIMUM DIMENSION STANDARD SHOULD BE PROPERLY DISCARDED AND REPLACED WITH AN APPROVED, FACTORY REPLACEMENT PART ONLY.

⚠ DANGER

UNDER NO CIRCUMSTANCE IS WELDING AND/OR ANY OTHER TYPE OF METAL BUILD-UP PROCESS ALLOWED TO BE PERFORMED ON A WORN DRUM ROD. TYPICAL MAINTENANCE TECHNIQUES CAN ALTER THE ORIGINAL HEAT TREATMENT PROCESS AND COMPROMISE THE STRUCTURAL INTEGRITY, RESULTING IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

On occasion, it may be necessary to remove severely worn drum rods from the flail drum by the use of a band saw or similar device. FIGURE 9. Proper preventative maintenance and operational procedures will minimize these occurrences.

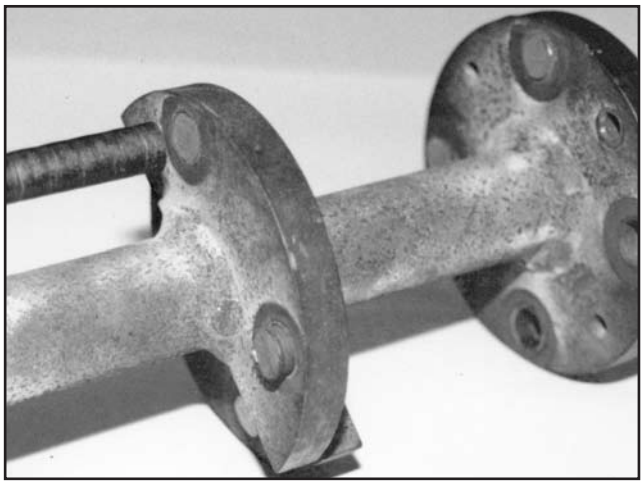


FIGURE 9

⚠ CAUTION

Utilize proper personal protection devices and exercise caution when attempting this procedure. Secure/stabilize the drum on a solid surface to prevent accidental rotation.

FLAIL DRUM DESIGN AND APPLICATION

Application: SP684 SURFACE SHARK

Flail drums are manufactured from alloy steel and heat treated to extend the service life. Drums are classified by the number of sections between the side plates.

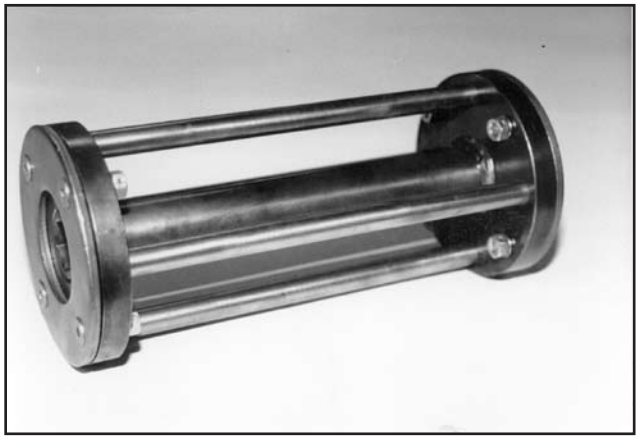


FIGURE 10

The one section flail drum incorporates the four flail rods supported only by the end plates. FIGURE 10. To provide additional stability and structural rigidity for the drum rods, four support straps are included as a standard accessory. These support straps can be installed about the flails in lieu of the standard spacer washers. FIGURE 11. Additional support straps can also be assembled as required to provide for additional rigidity for the drum rods.

FIGURE 11

⚠ CAUTION

Never operate the one section drum without the use of a proper quantity of support straps to provide for additional stability and structural integrity. Property damage and/or personal injury can result.

The added flexibility of the one section flail drum can be especially useful on many, specialized job applications. These job applications are usually limited to grooving, or light scabbling and scarifying applications. Example: grooving concrete floors to minimize the chance of animals and humans from falling and sustaining injuries. This end result can be readily accomplished by the correct spacing of flails, spacer washers and support straps on a one section drum. FIGURE 12.

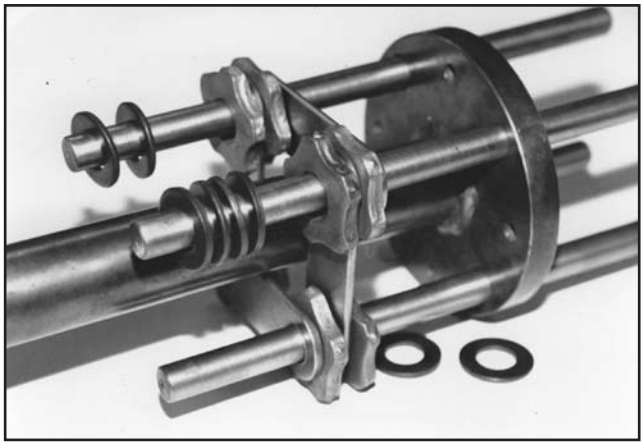


FIGURE 12

The most widely used drum is of the two section design. FIGURE 13. It incorporates two half sectioned side plates that are positioned on the center shaft to facilitate optimum flail spacing. The half side plate sections also provide additional stability and structural rigidity for the drum rods. The two section drum can accommodate the use of all flail designs while meeting the most demanding job applications.

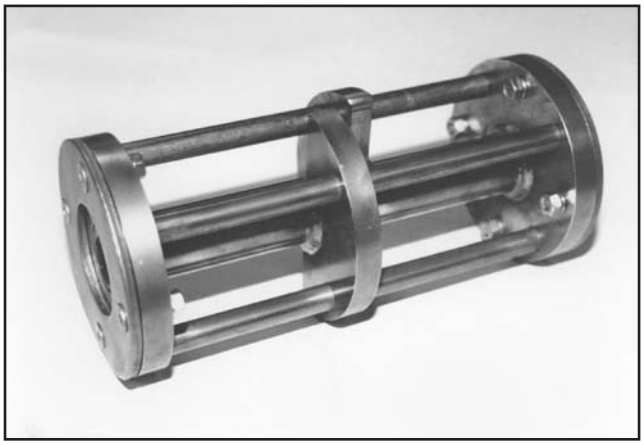


FIGURE 13

General Notes Regarding Flail Drums:

1) Flail drum rods are held in position by end caps and related fasteners. The end caps are heat treated to extend their service life.

2) The countersunk Allen head capscrews are retained to the flail drum by both self locking, hexagon head nuts and lock washers. The lock washers provide additional redundancy while eliminating open, exposed threads that can become worn or damaged from field use. A countersunk Allen head capscrew was chosen over a conventional hexagon head capscrew to eliminate anticipated wear. Component wear would substantially increase the difficulty of disassembling drum components in the field. Before removing these capscrews, clean the internal hexagon with an appropriate tool to help facilitate their removal.

3) Flail rods are not intended to rotate in the drum assembly while the Surface Planer is in operation. Severe operation can cause the drum plates to wear and elongate. Drum rods are also subject to wear and elongation. If the total amount of wear is not severe, various types of high strength, anaerobic adhesives can be utilized to secure the rods to the drum. Severe component wear is always an immediate reason to reject either the rods and/or drum and replace with factory approved, replacement parts.

4) Regularly inspect the drum for excessive wear and signs of fatigue. Random vibration caused by the planing process is difficult, if not impossible, to fully predict. Component service life is impossible to predict. Work surface materials, operator techniques and general maintenance are also contributing factors that will limit the service life of the drum and/or components. If there is any question regarding the structural integrity of a drum or any component, properly discard and replace with factory approved, replacement parts.

5) It is advisable to always have a minimum of one spare, loaded drum available to increase job site productivity and reduce down time. Replacing worn flails is a job that can require from only a few, short minutes to even hours for extremely worn and damaged components. Replacing a drum on the driveshaft can usually be accomplished in a matter of a few minutes. It is a common practice to replace worn flails during normal, unproductive time and keep a number of loaded, replacement drums on the job site to speed production rates.

INSTALLING FLAILS ON THE TWO SECTION DRUM

All flails are assembled on the two section drum in sequence patterns with the spacer washers. Spacer washers provide for an overlapping effect of the flails that produces consistent material removal from the work surface.

Normal Installation Procedure (fine finish) for all 1/8 Inch Nominal Thickness Flails:

1) Install a flail next to the outside side plate of the narrow section. Next, install a spacer washer. Follow with a flail and continue the sequence until the section is full. FIGURE 14.

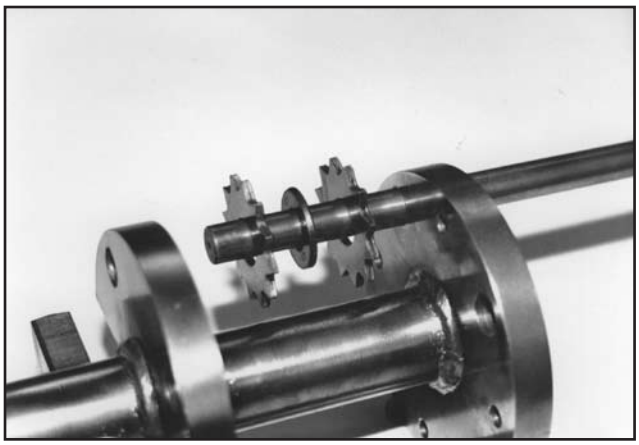


FIGURE 14

2) Install a spacer washer next to the outside side plate of the wide section. Next, install a flail. Follow with a spacer washer and continue the sequence until the section is full. FIGURE 15.

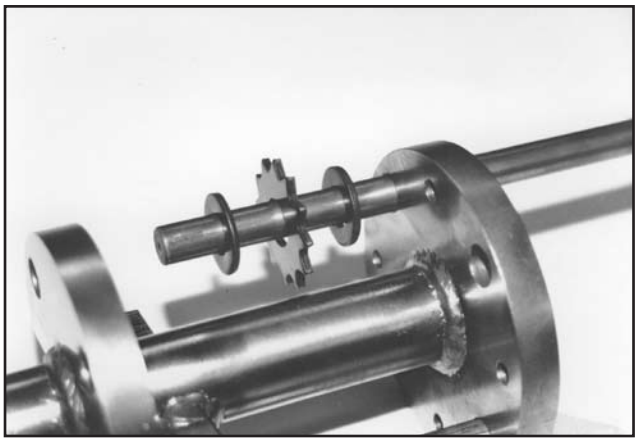


FIGURE 15

Normal Installation Procedure (fine finish) for Pentagonal Flails:

1) Install a spacer washer next to the outside side plate of the narrow section. Next, install a flail. Follow with a spacer washer and continue the sequence until the section is full. FIGURE 16.

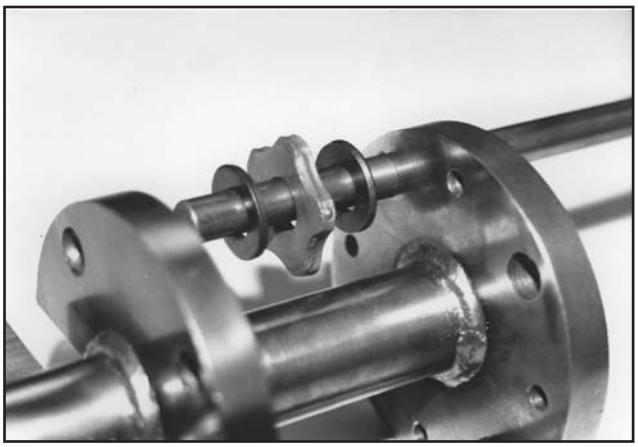


FIGURE 16

2) Install a flail next to the outside side plate of the wide section. Next, install a spacer washer. Follow with a flail and continue the sequence until the section is full. FIGURE 17.

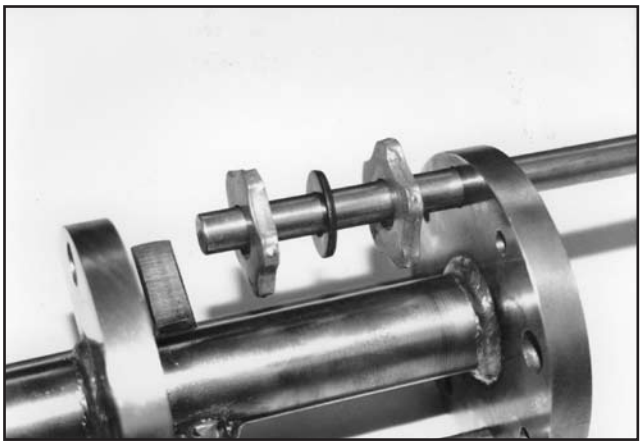


FIGURE 17

Normal Installation Procedure for Milling Flails:

1) Install three spacer washers next to the outside side plate of the narrow section. Next, install a flail. Follow with two spacer washers and continue the sequence until the section is full. The tungsten carbide inserts must be installed to form a continuous planing surface. FIGURE 18.

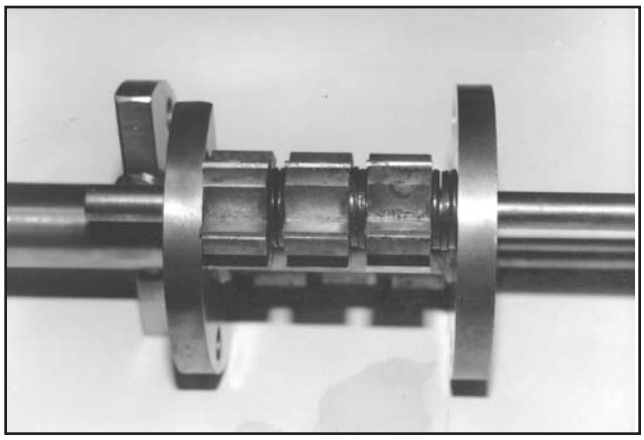


FIGURE 18

2) Install a flail next to the outside side plate of the wide section. Next, install two spacer washers. Follow with a flail and two spacer washers. Install another milling flail followed by three spacer washers. Finally, install the remaining flail and one spacer washer. The tungsten carbide inserts must be installed to form the same, continuous planing surface as in Step 1. FIGURE 19.

3) Milling flails can also be installed on the drum without the use of spacer washers.

General Notes Regarding the Installation of Flails:

1) Because of variance in material thicknesses and manufacturing tolerances, the specified number of spacer washers may not always fit within the narrow and wide sections. If this occurs, grinding a spacer washer to reduce its thickness is an option.

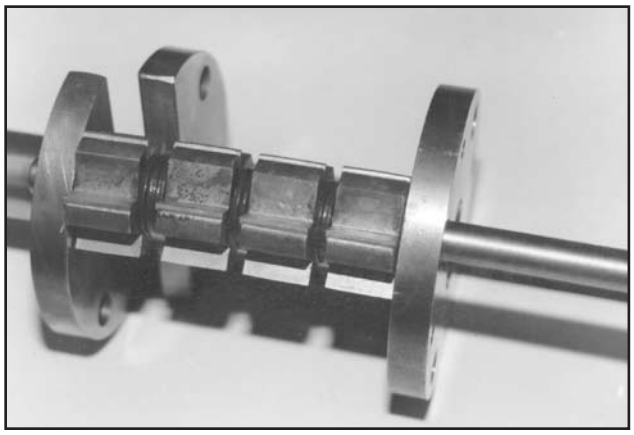


FIGURE 19

Exercise caution when grinding a spacer washer to reduce its thickness. Wear safety eye wear and other, appropriate safety apparel to minimize the potential for personal injury.

2) Flails require sufficient free play to allow them to properly impact the work surface material. If the flails fit too tight on the drum, inconsistent material removal and accelerated flail wear will result. The formation of rust between the flail and spacer washer surfaces will affect proper free play. Excessive free play can also accelerate the wear of flails and rods. As a general rule, flails should be free to rotate by hand after being installed on the drum. If this is not possible, the flails should be disassembled and additional free play provided by reducing the thickness of a spacer washer.

3) All flails are bi-directional in design with the exception of the milling flail. That is, there is no forward or reverse orientation on the drum. Fail service life can sometimes be extended by reversing their orientation on the driveshaft. The effect is similar to rotating tires on an automobile.

4) As the name implies, the tungsten carbide inserts of the milling flail cut the work surface material with an action very similar to that of a machine tool cutting steel. The brittleness of the tungsten carbide insert requires that it be fully supported to minimize breakage. This requires a substantial flail body to provide the necessary support. The resulting configuration makes the milling flail one directional in design. This limitation requires the operator to install a loaded drum on the driveshaft with the tungsten carbide inserts facing the direction of rotation. FIGURE 20. If the tungsten carbide inserts face opposite to the direction of rotation, improper milling action and accelerated flail wear will occur.

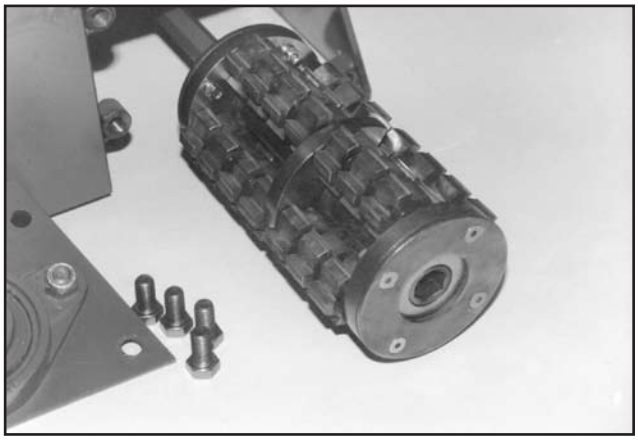


FIGURE 20

⚠ CAUTION

Before installing the drum on the driveshaft, make a close, visual inspection of the entire assembly. Determine that all flails and spacer washers are properly secured on the rods and that no loose flail or spacer washer has slipped its position during assembly. Flails and spacer washers can fall off the rods during assembly and become dislodged and unnoticed. When the loaded drum begins rotating at high speeds, these components can fly off the drum causing property damage and/or personal injury.

INSTALLING A LOADED DRUM ON THE DRIVESHAFT

Application: SP684 SURFACE SHARK

Tools required:

1 each, 3/4 inch wrench or equivalent
1 each, torque wrench, 85 ft lbs (115 Nm) capacity with 3/4 inch socket

1) If the Surface Planer is powered by an engine, disconnect the spark plug wire. If powered by an electric motor, properly disconnect the extension cord or Surface Planer from the power source.

2) Rotate the height adjustment lever located on the operator handle counterclockwise to raise the Surface Planer to its maximum height position above the work surface.

3) Using the wrench, remove the four (4) 1/2 inch diameter x 1 inch long capscrews and flat washers securing the drum access plate to the main frame.

4) Remove the drum access plate from the driveshaft.

5) Clean and remove any excessive material build-up from the threaded bosses and surrounding areas.

6) Install the loaded flail drum on the driveshaft. If utilizing the milling flails or other flail configurations that are unidirectional, determine that the flails are facing the direction of rotation. FIGURE 21.

7) Install the drum access plate on the driveshaft. The left, vertical side of the access plate should align tight against the main frame.

8) Install the four 1/2 inch diameter x 1 inch long capscrews and washers. Capscrews should install with a minimal amount of resistance and related, alignment problems. Torque the capscrews to 85 ft lbs (115 N.m). No lockwashers or similar devices are required.

9) If the Surface Planer is powered by an engine, reconnect the engine spark plug wire. If powered by an electric motor and the machine is to be used immediately, reconnect the extension cord or Surface Planer to the power source. Determine that the ON/OFF switch located on the operator handle is in the OFF position.

⚠ DANGER

UNEXPECTED MACHINE START UP CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

10) Removing a loaded drum from the driveshaft is accomplished by reversing the above steps.

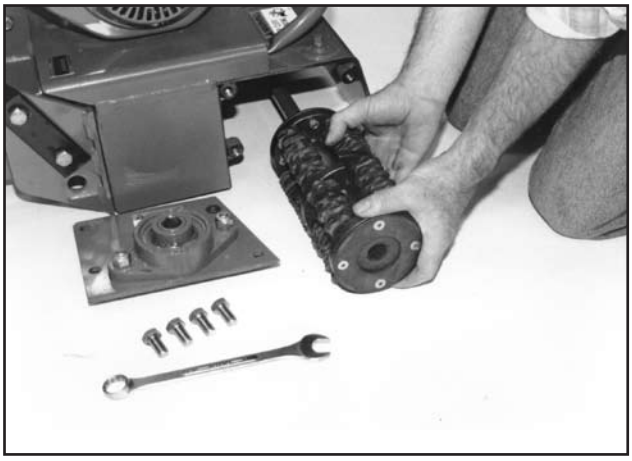


FIGURE 21

TRANSPORTING THE SURFACE PLANER

Application: SP684 SURFACE SHARK

The Surface Planer has an operational weight that prohibits one person from loading and/or unloading it alone by conventional, physical efforts.

⚠ DANGER

DO NOT ATTEMPT TO LIFT THE SURFACE PLANER UP INTO A TRANSPORTATION VEHICLE WITH THE USE OF ONE PERSON ALONE. DO NOT ATTEMPT TO LOWER THE SURFACE PLANER FROM A TRANSPORTATION VEHICLE WITH THE USE OF ONE PERSON ALONE. LIFT AND/OR LOWER THE SURFACE PLANER ONLY BY THE USE OF A POWER TAILGATE UNIT, A SUITABLE HOIST UNIT OF PROPER CAPACITY AND/OR CONFIGURATION OR BY THE USE OF A PROPER QUANTITY OF PERSONNEL IN PROPER PHYSICAL CONDITION.

1) A lifting bail device can be used to facilitate lifting by a mechanical device incorporating a chain and suitable attachment device. The location of the lifting bail may not always locate the exact position of the center of gravity for the Surface Planer. A lifting handle is provided on the front of the main frame. This handle can be utilized by personnel whenever lifting/lowering the Surface Planer.

⚠ DANGER

EXERCISE EXTREME CAUTION WHEN UTILIZING A MECHANICAL DEVICE FOR LIFTING THE SURFACE PLANER. UTILIZE THE MECHANICAL DEVICE IN ACCORDANCE TO BOTH ITS STATED STATIC AND DYNAMIC LOADING ENVELOPES. DO NOT UTILIZE THE MECHANICAL DEVICE UNTIL THIS INFORMATION IS PROPERLY KNOWN AND UNDERSTOOD BY ALL APPLICABLE PERSONNEL. FAILURE TO PROPERLY UTILIZE THE MECHANICAL DEVICE CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

2) When transporting the Surface Planer on a motor vehicle, the fuel tank breather vent (if so equipped) must be completely closed to eliminate the accidental seepage of fuel and resulting potential fire and environmental hazards. In order to minimize the possibility of damage to the Surface Planer, always transport in its normal, upright position. All equipment must be secured in/on vehicles with suitable strapping or tie-downs. Personnel should not be transported in the same compartment as equipment and fuel supplies. Consult applicable OSHA, AGA, CGA, etc. regulations for the proper transportation of gasoline and other, flammable gases.

STARTING THE SURFACE PLANER ON THE JOB SITE

Application: SP684 SURFACE SHARK

1) Position the Surface Planer on a flat and level surface of firm foundation.

2) Rotate the height adjustment lever counterclockwise to raise the Surface Planer to its maximum position above the work surface. This will insure proper clearance between the loaded drum and the work surface.

3) Pull the Quik-Pitch lever back to its stop. This will help raise the Surface Planer to its maximum position above the work surface. This will help insure proper clearance between the loaded drum and the work surface. FIGURE 22.

FIGURE 22

⚠ DANGER

DO NOT ATTEMPT TO START THE ENGINE WITHOUT FIRST DETERMINING THAT THE LOADED DRUM IS NOT IN CONTACT WITH THE WORK SURFACE. IF THE ROTATING FLAILS COME IN CONTACT WITH THE WORK SURFACE BEFORE THE OPERATOR HAS ASSUMED FULL CONTROL, THE ACTION HAS THE POTENTIAL TO PULL THE SURFACE PLANER AWAY. A RUNAWAY SURFACE PLANER CAN CAUSE PROPERTY DAMAGE AND/OR PERSONAL INJURY.

4) Refer to the material supplied by the engine manufacturer for the correct starting, operation and stopping procedures.

5) The SP684 gasoline powered Surface Planer is not equipped with a centrifugal clutch assembly. The gasoline engine is directly coupled to the driveshaft by a V-belt reduction.

⚠ DANGER

AS SOON AS THE ENGINE STARTS, THE OPERATOR MUST BE IN A POSITION TO ASSUME DIRECT AND FULL CONTROL OF THE SURFACE PLANER. FAILURE TO ASSUME DIRECT AND FULL CONTROL CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

6) Allow the engine to properly “warm up” and operate without the requirement for choking. Check for excessive machine noise and/or vibration.

⚠ DANGER

DO NOT OPERATE A GASOLINE ENGINE IN CLOSED SPACES WITHOUT PROPER VENTILATION. GASOLINE ENGINES PRODUCE CARBON MONOXIDE FUMES. BREATHING CARBON MONOXIDE FUMES CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY. EXCESSIVE LEVELS OF CARBON MONOXIDE CAN CAUSE DEATH.

7) Stop the engine in accordance with the instructions as described in the material supplied by the engine manufacturer.

If the Surface Planer and/or an individual component/ accessory does not appear to be functioning properly, STOP and do not further operate the Surface Planer until the proper corrective action has been completed. If there are any questions regarding the proper operation of the Surface Planer, contact the Customer Service Department BEFORE further utilization. There is no charge for this service.

OPERATING THE SURFACE PLANER ON THE JOB SITE

Application: SP684 SURFACE SHARK

⚠ DANGER

THE PLANING PROCESS PRODUCES EXCESSIVE NOISE, VIBRATION AND FLYING DEBRIS. ALL OPERATORS AND WORK PERSONNEL IN THE VICINITY OF THE SURFACE PLANER MUST WEAR APPROPRIATE SAFETY EYE WEAR AND HEARING PROTECTION DEVICES. OTHER SAFETY APPAREL AND/OR PROCEDURES, DEEMED NECESSARY BY SUPERVISORY PERSONNEL MUST ALSO BE WORN AND/OR PRACTICED BY ALL APPROPRIATE PERSONNEL.

⚠ DANGER

EXERCISE EXTREME CAUTION WHEN OPERATING THE SURFACE PLANER IN THE VICINITY OF DECK INSERTS, PIPES, COLUMNS, OPENINGS, LARGE CRACKS, UTILITY OUTLETS OR ANY OBJECT PROTRUDING FROM THE SURFACE. CONTACT WITH SUCH OBJECTS CAN LEAD TO LOSS OF MACHINE CONTROL, RESULTING IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

⚠ DANGER

DO NOT OPERATE A GASOLINE ENGINE IN CLOSED SPACES WITHOUT PROPER VENTILATION. GASOLINE ENGINES PRODUCE CARBON MONOXIDE FUMES. BREATHING CARBON MONOXIDE FUMES CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY. EXCESSIVE LEVELS OF CARBON MONOXIDE CAN CAUSE DEATH.

1) Push the Quik-Pitch lever forward to its stop. This action will allow the height adjustment lever system to travel over center and lock itself into position. A worn Quik-Pitch system will not allow the lever to travel over center and properly lock. FIGURE 23.

2) Flail cutting depth is controlled by the height adjustment lever . Rotate the lever counterclockwise to raise the flail drum off the work surface. Rotate the lever clockwise to lower the flail drum to the work surface. The height adjustment lever can be locked in position by dropping the connecting capscrew head through one of the two holes provided. Each complete turn will raise or lower the flail drum approximately 1/16 inch (1.6 mm). Using the height adjustment lever, lower the flail drum into the work surface to the desired depth.

3) Proper operator position will enhance operational safety and overall productivity. FIGURE 24. Operate the engine at maximum, governed speed. Consult the material supplied by the engine manufacturer and the Specifications section for specific information.

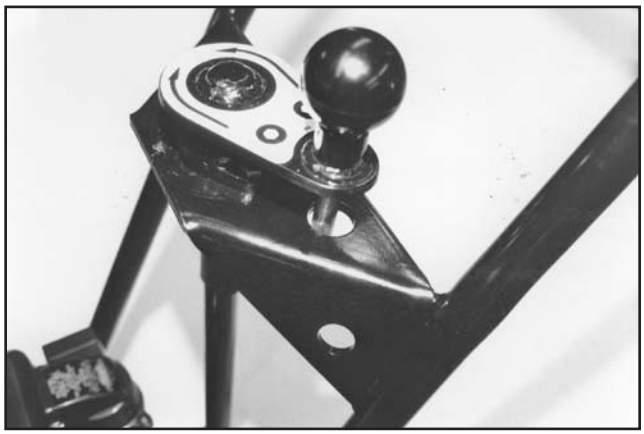


FIGURE 23

4) The wide variety of potential work surface materials along with the corresponding variety of job site environments, makes it impossible to develop a standardized operating procedure for the Surface Planer. Use of the Surface Planer will require constant trial and error testing until satisfactory results are achieved. Experience gained over time and common sense will help to minimize the amount of necessary testing. Many factors will directly affect the operating parameters and/or techniques utilized for a specialized job application. Some of these factors include:

FIGURE 24

a) Work surface material yield and tensile value. As a general rule, these values will determine the cutting depth achieved in one pass. Materials with high yield and tensile values will characteristically resist/limit flail penetration. For such materials, the accepted procedure is to make a number of shallow passes over the work surface rather than attempt to make a single, deep pass. The net effect is to actually increase productivity: more material removed in less time. Other added benefits to this technique are decreased vibration, less operator fatigue and increased flail service life.

b) Higher material removal rates can sometimes be achieved by making a series of shallow passes 90 degrees to each other to form a waffle like pattern. This technique is especially useful when planing misaligned sidewalks and joints.

c) Job specifications may require a wide variety of work surface finishes and textures. The smoothest surface texture available from the Surface Planer is very similar to a “broom” type finish. If a smoother finish and texture is required to meet specifications, a grinding finish must be specified. This process utilizes a different process and can not be achieved with the Surface Planer.

5) The Surface Planer features a “down feed” type design for the flail drum. The flail drum rotates forward and towards the front of the machine before the flails impact the work surface and remove material. The rotational direction of the drum produces a “self-propelled” effect that assists the operator when pushing the machine forward. Conversely, when the operator pulls the machine back towards himself, he must exert an additional force to overcome the “self-propelling” force.

⚠ DANGER

ALWAYS MAINTAIN PROPER CONTROL OF THE SURFACE PLANER. IF AN OPERATOR LOOSES CONTROL OF THE MACHINE, A "RUNAWAY" SURFACE PLANER CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY. BECAUSE OF THE UNIQUE OPERATING CHARACTERISTICS OF THE SURFACE PLANER, THERE IS NO PROVISION FOR THE ELECTRIC MOTOR/ENGINE TO AUTOMATICALLY STOP IF THE OPERATOR FAILS TO MAINTAIN PROPER CONTROL.

⚠ DANGER

WHEN OPERATING THE SURFACE PLANER ON ABOVE GROUND LEVELS, EXERCISE EXTREME CAUTION TO PREVENT LOSS OF CONTROL THAT COULD ALLOW THE MACHINE AND/OR OPERATOR TO FALL DOWN TO LOWER LEVELS. SUCH AN OCCURRENCE CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

6) Beam and pentagonal flail are bi-directional in design and can be operated in both forward and reverse directions. Milling flails are one directional in design. This limitation requires the operator to install a loaded drum on the driveshaft with the tungsten carbide inserts facing the direction of rotation. FIGURE 25. Remove work surface material only by pulling the Surface Planer towards the operator after the drum has been lowered to the desired cutting depth. Never push the Surface Planer forward when the milling flails are in contact with the work surface material.

This technique will allow the following to occur:

a) The milling flail "hammers" rather then "cuts" the material, producing ineffective results and substantial lower productivity.

b) Flail body material is subject to accelerated wear, especially in the area supporting the tungsten carbide insert. As this area wears, the insert becomes chipped and can "break off" from the flail body, thus significantly reducing its efficiency and useful service life.

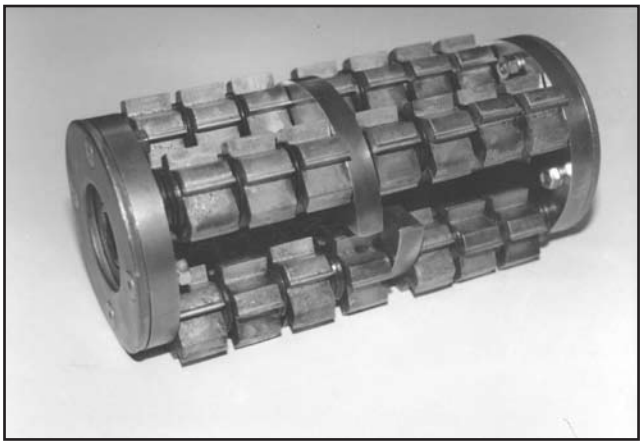


FIGURE 25

7) The maximum cutting depth on a slab surface is 5/8 inch. It is not recommended that the Surface Planer be utilized to achieve depths greater than this value. In most operating configurations, the normal planing depth per single pass will vary between 1/16 to 1/8 inch deep depending upon the work surface material type and flail type and/or configuration. This planing depth range will usually maximize productivity rates and component service life.

8) For normal job applications, operate the engine at a maximum, governed speed of 3450 RPM. Consult the material supplied by the engine manufacturer and the Specifications section for specific information.

9) The planing process on many work surface materials can produce sparks, dust and other foreign particle contamination.

⚠ DANGER

SPARKS PRODUCED BY THE ACTIONS OF THE FLAILS IMPACTING AGAINST THE WORK SURFACE (FOR EXAMPLE: STRIKING ANCHOR BOLTS) DURING THE PLANING PROCESS MAY COME IN CONTACT WITH MATERIALS THAT CAN RESULT IN A FIRE AND/OR EXPLOSION. THIS OCCURRENCE CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

⚠ DANGER

THE CREATION OF DUST AND OTHER FOREIGN PARTICLE CONTAMINATION FROM THE OPERATIONAL PROCESS CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

FOR SUCH OPERATING CONDITIONS, ALWAYS WEAR A NIOSH/MSHA APPROVED DUST/MIST RESPIRATOR. CONSULT APPLICABLE OSHA REGULATIONS FOR SPECIFIC INFORMATION.

Dust and other particle contamination can be controlled by the following methods:

a) The Surface Planer is equipped with a 3 inch outside diameter vacuum tube adapter located at the front of the machine. An industrial type vacuum cleaner can be attached to the Surface Planer to remove/control dust and other particle contamination from the work surface. A plastic cover is provided for the 3 inch diameter adapter. Insert a vacuum hose over the tube. A hose clamp is sometimes required to properly secure the vacuum hose to the tube. FIGURE 26.

⚠ DANGER

ALWAYS UTILIZE A VACUUM SYSTEM DESIGNED TO OPERATE WITHIN THE SPECIFIC JOB SITE REQUIREMENT. DUST MATERIAL CAN MEET CLASS II OR CLASS III SPECIFICATIONS OF THE NATIONAL ELECTRICAL CODE® FOR HAZARDOUS LOCATION CLASSIFICATIONS. CONSIDERATION MUST ALSO BE GIVEN TO THE CREATION OF HAZARDOUS TYPE MATERIALS REQUIRING SPECIFIC DISPOSAL PROCEDURES. DETERMINE THAT THE VACUUM SYSTEM IS PROPERLY DESIGNED TO OPERATE WITHIN THESE ATMOSPHERES. CONSULT CURRENT NATIONAL ELECTRIC CODE®, OSHA AND ENVIRONMENTAL PROTECTION AGENCY REGULATIONS FOR SPECIFIC INFORMATION.

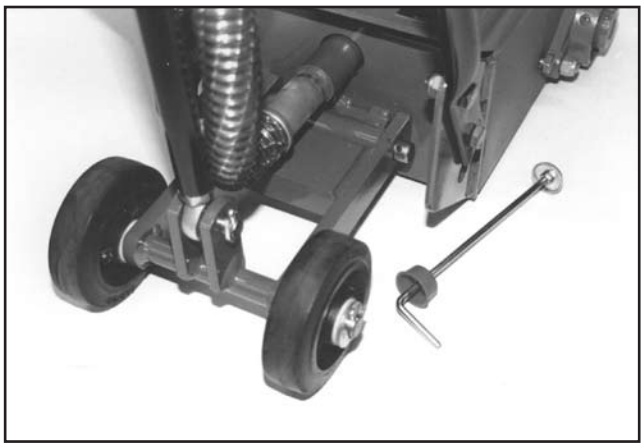


FIGURE 26

b) The Surface Planer is equipped with a 1/4 inch NPT water mist dust control fitting on the main frame. This fitting is provided to allow the installation of a valve and standard garden hose. Water can be regulated by the valve to minimize dust problems when a vacuum is not available or its use not desired. As a general rule, a small volume of water is required. It is not necessary to flood the work surface material. An added benefit is that the water can reduce the amount of heat generated by the planing process and significantly add to flail and bearing service life. FIGURE 27.

⚠ DANGER

WATER USED IN THIS PROCEDURE CAN ACT AS A CONDUCTOR OF ELECTRICITY. USE OF ALL ELECTRICALLY POWERED EQUIPMENT BEING OPERATED ON AND/OR AROUND THE VICINITY OF THE WET WORK SURFACE INCREASES THE POTENTIAL FOR ELECTROCUTION. CONSULT CURRENT NATIONAL ELECTRICAL CODES AND OSHA REGULATIONS FOR SPECIFIC INFORMATION.

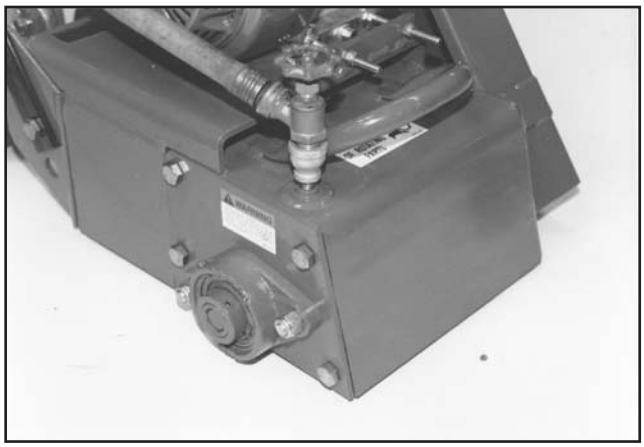


FIGURE 27

When utilizing water to control dust and other particle contamination, thoroughly clean the interior surfaces of the Surface Planer to remove any material build-up. Failure to properly clean the interior surfaces can result in dried material build-up affecting operation and/or bearing service life.

c) Many oil based materials such as asphalt can quickly accumulate on components and severely restrict the ability of the flails to remove material from the work surface. Kerosene and other types of oil based solvents can be utilized to remove the accumulated material(s).

⚠ DANGER

EXERCISE EXTREME CAUTION WHEN UTILIZING ANY SOLVENT TO REMOVE ACCUMULATED MATERIALS FROM THE SURFACES OF THE MACHINE AND RELATED COMPONENTS. MANY SOLVENTS ARE FLAMMABLE. DO NOT SMOKE OR INTRODUCE FLAME IN THE WORK AREA. PROVIDE ADEQUATE VENTILATION AND WEAR APPROPRIATE SAFETY APPAREL.

⚠ DANGER

PROPERLY DISPOSE OF ALL ACCUMULATED MATERIALS PER OSHA AND ENVIRONMENTAL PROTECTION AGENCY CODES AND REGULATIONS. MANY ACCUMULATED MATERIALS CAN BE CLASSIFIED AS HAZARDOUS AND REQUIRE PROPER DISPOSAL PROCEDURES. CONTACT THE APPLICABLE GOVERNMENT AND/OR PRIVATE AGENCIES FOR SPECIFIC INFORMATION.

10) On job applications where the planing process creates a considerable amount of loose material, it can become almost impossible to determine proper cutting depths and the extent of work already accomplished. The problem is more compounded if a vacuum system is not used. Loose material should be removed by sweeping or other appropriate processes and the Surface Planer again used until conditions warrant removing the accumulated material.

11) Another side benefit of progressive housekeeping is increased V-belt life. The belt guard incorporates a bumper that is designed to push excess material away from the bottom sheave and minimize the amount of loose material that is picked up by the V-belt. Loose surface material can be extremely abrasive. A V-belt operating in these materials is subject to accelerated wear and premature failure.

12) To raise the loaded drum from the work surface, pull the Quik-Pitch lever back to its stop. This will allow the operator to reposition or maneuver the Surface Planer about the jobsite. Pushing the Quik-Pitch lever forward to its stop will lower the loaded drum to the same depth level.

STOPPING THE SURFACE PLANER

Application: SP684 SURFACE SHARK

1) Push the Quik-Pitch lever forward to its stop.

2) Rotate the height adjustment lever located on the operator handle counterclockwise to raise the Surface Planer to its maximum height above the work surface.

3) Stop the engine in accordance with the instructions as described in the material supplied by the engine manufacturer.

SERVICE

PREVENTATIVE MAINTENANCE CHECK LIST

Application: SP684 SURFACE SHARK

The normal operation of the Surface Planer produces extreme dirt and dust, along with high levels of random vibration. Before operating the Surface Planer, the following service list should be accomplished. This list is for reference only and is not intended to be all

inclusive. Other subject areas can be added at the discretion of the owner(s) and/or operator(s):

1) Check all fasteners for proper torque values. If a fastener requires retorquing, consult a torque chart for proper value. Properly discard and replace any worn fastener with a factory approved, replacement part.

2) Check the V-belt for wear. Adjust or replace as necessary. Check pulleys for wear and proper alignment. Many loose materials created as a result of the operating processes can be extremely abrasive.

3) Keep the Surface Planer clean. Wash the unit after each use. Keep loose material from accumulating around engine cooling fins. Determine that the interior sections of the frame are free of material build-ups. Such build-ups can restrict the operating process and present a potential safety hazard. Clean and remove any material build-up from the Surface Planer after each use.

4) Engine service life can be extended with proper air cleaner maintenance. Consult the material supplied by the engine manufacturer for specific information.

5) Check for proper engine oil level. Always use clean, high quality engine oil. Change oil as required. Consult the material supplied by the engine manufacturer for specific information.

⚠ DANGER

DO NOT PERFORM PREVENTATIVE MAINTENANCE CHECKS WITH THE ENGINE OR ELECTRIC MOTOR RUNNING. STOP THE POWER SOURCE AND DISCONNECT THE SPARK PLUG OR EXTENSION CORD BEFORE PERFORMING ANY MAINTENANCE TO THE SURFACE PLANER. RECONNECT THE SPARK PLUG BEFORE RESTARTING THE ENGINE. IF ELECTRIC MOTOR EQUIPPED, TURN THE ON/OFF SWITCH TO THE OFF POSITION BEFORE RECONNECTING THE EXTENSION CORD. IMPROPER PROCEDURES CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

CHECKING V-BELT TENSION AND ALIGNMENT

Application: SP684 SURFACE SHARK

Proper V-belt tension and alignment are essential for smooth transmission of horsepower and extended service life. Improper tension and alignment will accelerate V-belt wear and contribute to decreased productivity. The V-belt is tensioned at the factory with the maximum recommended tension force. Check the belt tension at least two times during the first day of operation, as there will normally be a rapid decrease in belt tension until the belt has run in. Check the belt tension every eight hours of operation thereafter and maintain tension within the recommended range. The correct operating tension for a V-belt drive is the lowest tension at which the belt will not slip under peak load conditions.

Tools Required:

1 each, 9/16 inch wrench
1 each, 16 inch minimum length straightedge
1 each, 10 lbs minimum capacity, tension scale or belt tension tool

1) If the Surface Planer is powered by an engine, disconnect the spark plug wire. If powered by an electric motor, disconnect the extension cord or Surface Planer from the power source.

2) Position the Surface Planer on a suitable work bench with the V-belt approximately at waist level.

3) Using the 9/16 inch wrench, remove the belt guard from the main frame. Clean the inside of the belt guard with an appropriate solvent. Check for signs of wear and damage.

⚠ CAUTION

Observe all applicable safety precautions for the solvent.

4) Check belt tension using the spring scale or belt tension tool midway between the engine and driveshaft pulleys. Belt deflection should measure approximately 3/16 inch at 3-7/8 to 5-1/2 lbs force. FIGURE 28. If tension is within specifications, proceed to Step 5. If tension is not within specifications, refer to **INSTALLING A REPLACEMENT V-BELT OR PULLEY** for specific information.

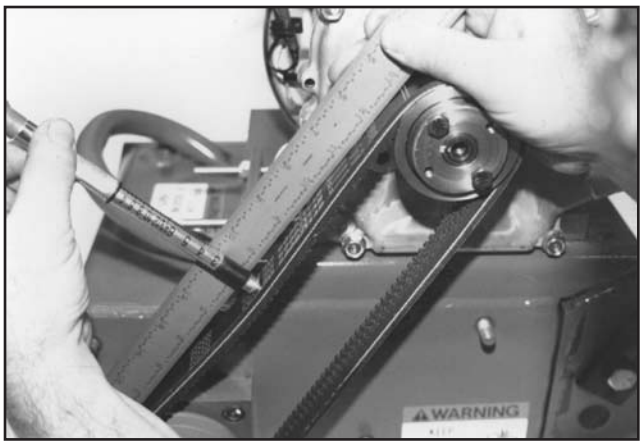


FIGURE 28


FIGURE 29

5) Belt alignment is checked with the straightedge. Place the straightedge squarely against the driveshaft pulley. Properly aligned pulleys should also place the straightedge squarely against the engine pulley, FIGURE 29. Remove the straightedge and rotate the engine pulley 120 degrees. Recheck alignment with the straightedge. Repeat the process until the engine pulley is rotated a full 360 degrees. Maximum allowable misalignment is +- 1/32 inch. If pulley alignment is not within specifications, refer to **INSTALLING A REPLACEMENT V-BELT OR PULLEY** for specific information.

6) Install the belt guard to the main frame. Install the flat washers and self-locking hexagon nuts. Torque the nuts to 35 ft lbs (47 N.m). Determine that all safety related decals affixed to the belt guard are fully readable. If any decal is not fully readable, replace with a factory approved, replacement part only.

7) If the Surface Planer is powered by an engine, reconnect the engine spark plug wire. If powered by an electric motor and the machine is to be used immediately, reconnect the extension cord or Surface Planer to the power source. Determine that the ON/OFF switch located on the operator handle is in the OFF position.

⚠ DANGER

UNEXPECTED MACHINE START UP CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

INSTALLING A REPLACEMENT V-BELT OR PULLEY

Application: SP684 SURFACE SHARK

Tools Required:

1 each, 7/16 inch wrench
2 each, 1/2 inch wrenches
1 each, 9/16 inch wrench
1 each, 16 inch minimum length straightedge
1 each, 10 lbs minimum capacity, tension scale or belt tension tool
1 each, torque wrench, 35 ft lbs (47 Nm.) capacity with 7/16 inch and 9/16 inch sockets

Parts Required:

1 each, Part# M3VX335 V-belt (if required)
1 each, Part# MSP8-0221 bushing (if required)
1 each, Part# MSP8-0280 bushing (if required)
1 each, Part# MSP8-0360 bushing (if required)
1 each, Part# MSP8-0270 sheave (if required)
1 each, Part# MSP8-0201 sheave (if required)
1 each, Part# MSP8-0211 key (if required)

1) If the Surface Planer is powered by an engine, disconnect the spark plug wire. If powered by an electric motor, disconnect the extension cord or Surface Planer from the power source.

2) Position the Surface Planer on a suitable work surface with the V-belt approximately at waist level.

3) Using the 9/16 inch wrench, remove the belt guard from the main frame. Clean the inside of the belt guard with an appropriate solvent. Check for signs of wear and damage.

⚠ CAUTION

Observe all applicable safety precautions for the solvent.

3) Using a 1/2 inch wrench, remove the self locking nuts on the engine/electric motor take-up cap screws. Rotate the take-up capscrews until the hexagon head contacts the threaded mounting plate.

4) Using the 1/2 inch wrenches, loosen the engine/electric motor attachment cap screws, and slide the engine/electric motor toward the front of the main frame. FIGURE 30.

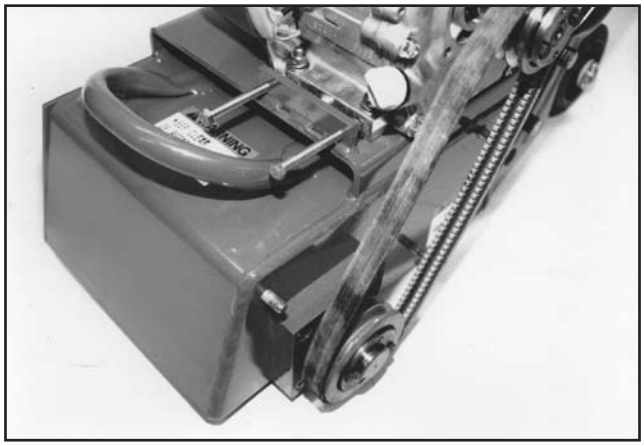


FIGURE 30

5) Remove the worn belt and install the replacement V-belt, Part# M3VX335.

a) Do not install a replacement belt if the pulleys have worn grooves. Such pulleys should be replaced to insure proper belt fit. Operating the V-belt in worn pulley grooves will accelerate V-belt wear and significantly reduce its service life.

b) A V-belt should never be forced over a pulley. More belts are broken from this cause than from actual failure in service.

c) Keep the belt as clean and free of foreign material as possible. Do not use belt dressing.

6) Reinstall the engine/electric motor take-up cap screws with the heads facing toward and in contact with the engine crankcase/electric motor thrust plate. Tighten the engine/electric motor attachment cap screws until they just begin to apply tension to the engine/electric motor. DO NOT OVER TIGHTEN. Alternately tighten the take-up cap screws until slight tension is applied to the V-belt.

7) The driveshaft pulley should be positioned within 1/16 inch if the shaft shoulder. If the distance exceeds this limit, proceed as follows:

a) Using the 7/16 inch wrench, remove the two 1/4 inch diameter cap screws from the bushing.

b) Insert the cap screws into the tapped holes in the bushing flange. Tighten progressively until the bushing disengages from the pulley.

c) Insert the 1/4 inch diameter cap screws into the tapped holes in the pulley. Tighten progressively until the bushing applies tension to the pulley. FIGURE 31.

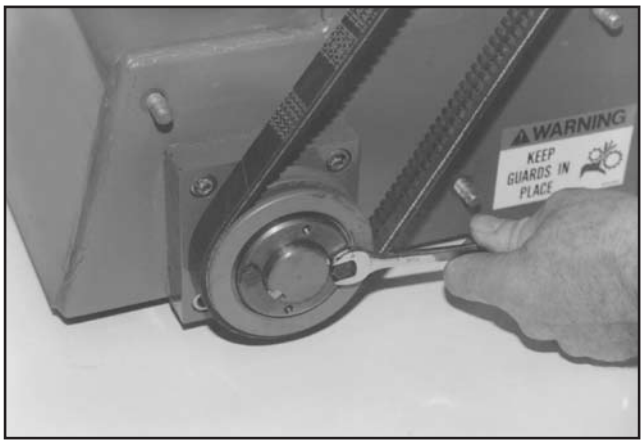


FIGURE 31

d) Tap the pulley/bushing assembly against the shaft shoulder with the soft hammer.

e) Tighten the 1/4 inch diameter cap screws progressively with a torque wrench to 95 inch pounds.

Note: this installation procedure is also used when installing replacement pulleys.

8) Belt alignment is checked with the straightedge. Place the straightedge squarely against the driveshaft pulley. Properly aligned pulleys should also place the straightedge squarely against the engine/electric motor pulley. Remove the straightedge and rotate the engine pulley 120 degrees. Recheck the alignment with the straightedge. Repeat the process until the engine/electric motor pulley has been rotated a full 360 degrees. Maximum allowable misalignment is +- 1/32 inch. FIGURE 32.

If engine crankshaft/electric motor pulley alignment needs to be adjusted, proceed as follows:

a) Using the 7/16 inch wrench, remove the two 1/4 inch diameter cap screws from the engine pulley bushing.

b) Insert the cap screws into the tapped holes in the bushing flange. Tighten progressively until the bushing disengages from the pulley.

c) Insert the 1/4 inch diameter cap screws into the tapped holes in the pulley. Tighten progressively until the bushing applies tension to the pulley.

d) Using the straightedge for reference alignment purposes, tap the engine/electric motor pulley/bushing into proper position.

e) Tighten the 1/4 inch diameter cap screws progressively with the torque wrench to 95 inch pounds. FIGURE 33.

FIGURE 32

f) Recheck alignment as outlined per the beginning of Step 8.

9) Apply increased belt tension by progressively tightening the take-up cap screws against the engine crankcase/electric motor thrust plate.

a) Recheck V-belt alignment.

b) Check belt tension with the spring scale or belt tension tool midway between the engine/electric motor and driveshaft pulleys. Belt deflection should measure approximately 3/16 inch (4.8 mm) at 3-7/8 to 5-1/2 pounds (1.8 to 2.5 kg) force. FIGURE 34.

c) If belt tension and alignment is within specifications, torque the engine/electric motor attachment cap screws to 20 ft lbs (27 Nm.)

d) Recheck V-belt tension and alignment.

10) Install the belt guard to the main frame. Install the flat washers and self-locking hexagon nuts. Torque the nuts to 35 ft lbs (47 Nm.). Determine that all safety related decals affixed to the belt guard are fully readable. If any decal is not fully readable, replace with a factory approved, replacement part only.

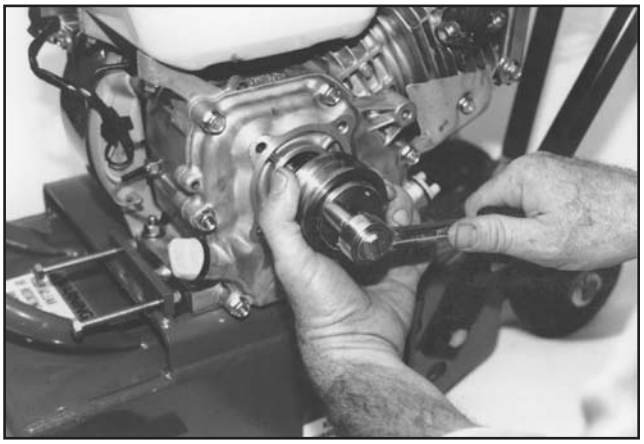


FIGURE 33

FIGURE 34

11) If the Surface Planer is powered by an engine, reconnect the engine spark plug wire. If powered by an electric motor and the machine is to be used immediately, reconnect the extension cord or Surface Planer to the power source. Determine that the ON/OFF switch located on the operator handle is in the OFF position.

⚠ DANGER

UNEXPECTED MACHINE START UP CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

INSTALLING A REPLACEMENT BEARING ON THE V-BELT SIDE

Application: SP684 SURFACE SHARK

Tools Required:

1 each, 7/16 inch wrench
1 each, 9/16 inch wrench
1 each, racket, suitable extension and 9/16 inch socket
1 each, torque wrench, 35 ft lbs (47 Nm.) capacity with 9/16 inch socket
1 each, 5/16 inch Allen wrench
1 each, pliers for large, external-type, snap rings
1 each, 1-7/8 inch diameter steel shaft of appropriate length
1 each, 2-1/16 inch outside diameter x 1-5/8 inch inside diameter x 2-1/4 inch long sleeve
1 each, shop press
Various support blocking as required.

Parts Required:

1 each, Part# M5208-2RS sealed ball bearing
1 each, container of bearing and shaft locking grade, anaerobic adhesive/sealant
1 each, Part# M5160-156 snap ring (if required)
1 each, Part# MSP8-0241 driveshaft (if required)

1) Disconnect the spark plug wire from the spark plug.

2) Position the Surface Planer on a suitable work surface with the V-belt approximately at waist level.

3) Using the racket, extension and 9/16 inch socket, remove the belt guard from the main frame. Clean the inside of the belt guard with an appropriate solvent. Check for signs of wear and damage.

⚠ CAUTION

Observe all applicable safety precautions for the solvent.

4) Remove the V-belt and driveshaft pulley. Refer to **INSTALLING A REPLACEMENT V-BELT OR PULLEY** for specific information.

5) Using the 5/16 inch Allen wrench and 9/16 inch wrench, remove the bearing block/driveshaft assembly from the main frame. For accuracy and alignment purposes, the main frame incorporates tapped holes to properly position the cap screws.

6) Position the driveshaft assembly on a suitable work surface. Use the snap ring pliers to remove the snap ring. FIGURE 35. Remove the spacer.

⚠ CAUTION

Wear safety glasses and other appropriate safety apparel when removing the snap ring or performing any work with an arbor press. Caution all onlookers about the possibility of flying debris and personal injury.

7) Position the driveshaft assembly in a suitable arbor press. Determine that the outer race of the bearing is properly supported. Press the bearing/driveshaft assembly from the bearing block. FIGURE 36. Reposition the support blocking and press the bearing from the bearing block utilizing the 1-7/8 inch diameter steel rod as a punch. FIGURE 37.

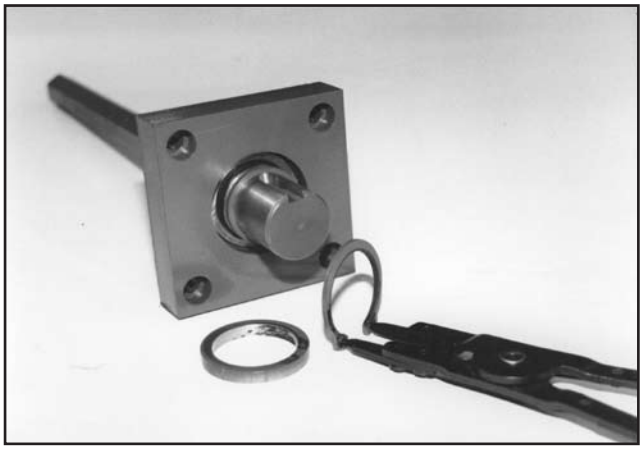


FIGURE 35

8) Clean and inspect the driveshaft and housing for wear and damage. If any damage is evident, replace the applicable component.

9) Clean the outside bore diameter of the replacement bearing. Apply a suitable amount of anaerobic

adhesive/sealant to the outside diameter of the bearing. Using the same support blocking, press the replacement bearing into the bearing housing until it seats itself against the flange. FIGURE 38.

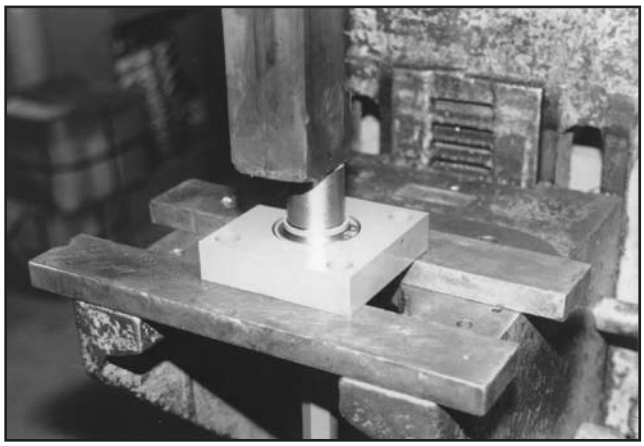


FIGURE 36

FIGURE 37

10) Position the bearing block on the arbor press with the exposed side of the bearing facing up. Support the inner race of the bearing by centering the 2-1/16 inch outside diameter sleeve. This will properly absorb the thrust against the inner race created by pressing the driveshaft into the bearing. FIGURE 39.

11) Clean the bearing journal area of the driveshaft with a suitable solvent. Apply a suitable amount of anaerobic adhesive/sealant to the bearing journal area of the driveshaft. Press the driveshaft into the bearing housing until it seats against the bearing. FIGURE 40.

12) Reinstall the snap ring on the driveshaft.

⚠ CAUTION

Wear safety glasses and other appropriate safety apparel when removing the snap ring or performing any work with an arbor press. Caution all onlookers about the possibility of flying debris and personal injury.

FIGURE 38

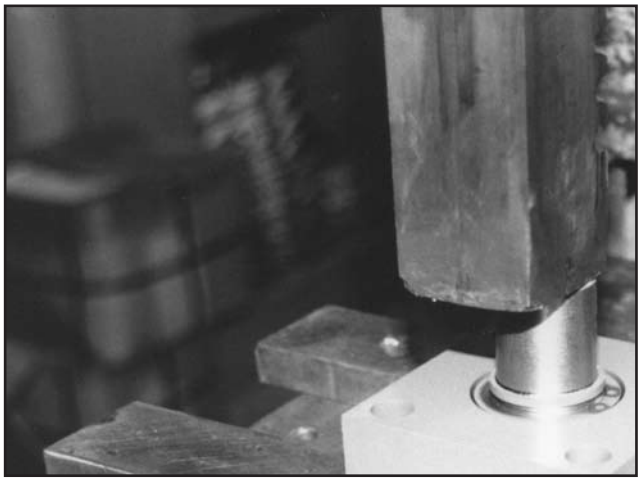


FIGURE 39

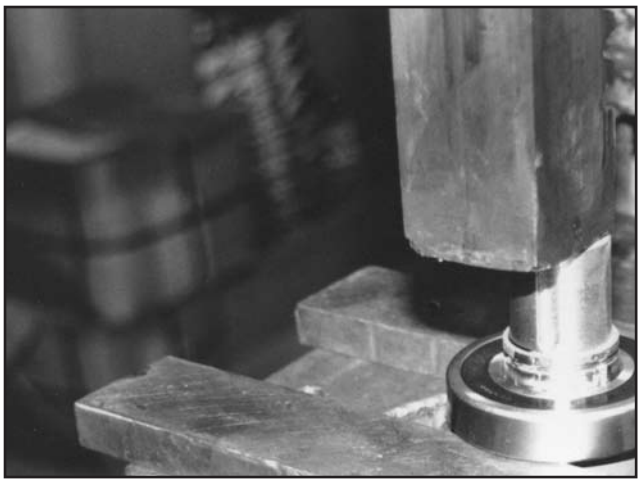


FIGURE 40

A properly installed, replacement bearing should rotate without excessive friction, drag and/or “rough spots”. If these symptoms occur after assembly, the bearing was improperly supported when pressed on the driveshaft or into the housing. The resulting thrust placed upon the bearing exceeded its static capacity. A bearing operating with these characteristics will deliver minimal service life and be prone to premature failure.

13) Reinstall the bearing block/bearing and driveshaft assembly to the main frame.

14) Follow the procedures as outlined in this manual for the proper installation of the pulleys and V-belt assemblies.

15) Reinstall the belt guard to the main frame.

16) Reconnect the spark plug wire to the spark plug.

⚠ DANGER

UNEXPECTED MACHINE START UP CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

INSTALLING A REPLACEMENT BEARING ON THE OUTBOARD SIDE

Application: SP684 SURFACE SHARK

Tools Required:

1 each, 3/4 inch wrench
1 each, 5/16 inch Allen wrench
1 each, plastic hammer
1 each, arbor press
1 each, torque wrench, 85 ft lbs (115 Nm.) capacity, with 5/16 inch, male Allen head and 9/16 inch socket
1 each, 2-1/16 inch outside diameter x 1-5/8 inch inside diameter x 2-1/4 inch long sleeve
1 each, pliers for large, external type snap rings

Parts Required:

1 each, Part# M5208-2RS bearing
1 each, Part# M5160-156 snap ring (if required)

1) Disconnect the sparkplug wire from the spark plug.

2) Position the Surface Planer on a suitable work surface with the V-belt approximately at waist height.

3) Using the 3/4 inch wrench, remove the access plate cap screws. Remove the access plate. Use the plastic hammer as necessary.

4) Using the 5/16 inch Allen wrench and 9/16 inch wrench, remove the bearing block from the access plate. For accuracy and alignment purposes, the access plate incorporates tapped holes to properly position the cap screws.

5) Position the bearing block on a suitable work surface. A common shop vise can also be utilized. Remove the snap ring that retains the bushing in the bearing bore. FIGURE 41.

6) Position the bearing block on the arbor press with the exposed side of the bearing facing down. Determine that the bearing block is properly supported. Using the arbor press and an appropriate sized thrust bushing, remove the internal hexagon bushing and bearing from the housing. FIGURE 42.

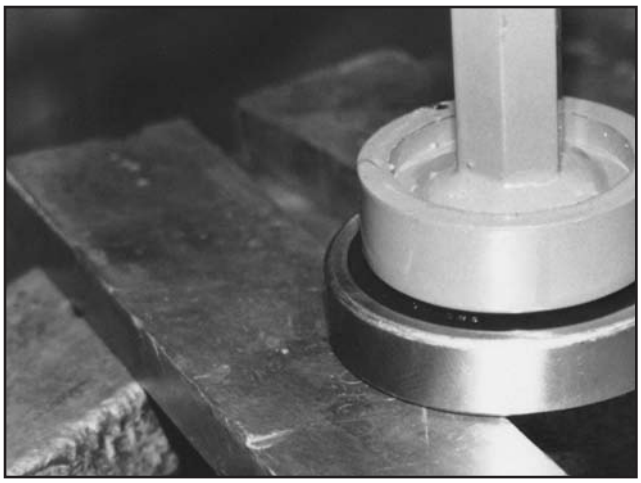


FIGURE 41

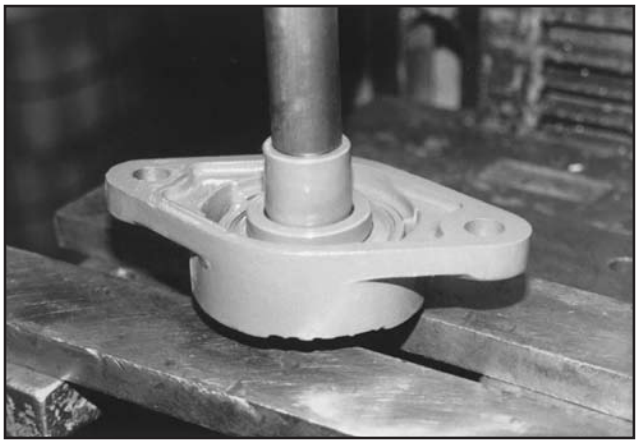


FIGURE 42

7) Position the internal hexagon bushing and bearing in the arbor press with the snap ring side of the bushing facing up. Determine that the bearing is properly supported. Using the arbor press and an appropriate sized thrust bushing, remove the internal hexagon bushing from the bearing. FIGURE 43.

8) Clean and inspect the internal hexagon bushing for damage and excessive wear. Replace the bushing if required.

9) Clean the inside bore diameter of the bearing block and inspect for damage.

10) Clean the outside diameter of the replacement bearing. Apply a suitable amount of anaerobic adhesive/ sealant to the outside diameter of the bearing. Align the replacement bearing against the bearing housing. Using the supports, press the bearing into the housing until it seats itself against the flange, FIGURE 44.

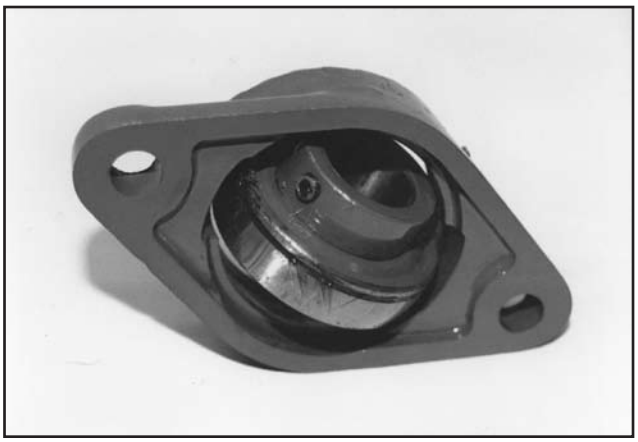


FIGURE 43

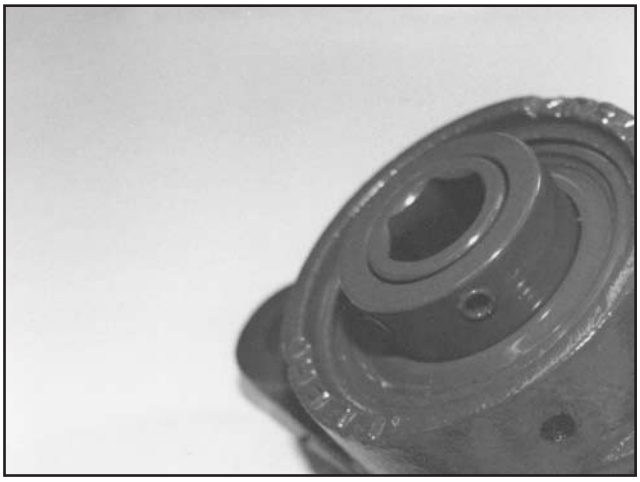


FIGURE 44

11) Position the bearing block with the exposed side of the bearing facing down. Determine that the bearing block and replacement bearing are both properly supported. Using the arbor press, align and press the internal hexagon bushing into the bearing block until it seats itself against the flange, FIGURE 45.

12) Reinstall the snap ring on the internal hexagon bushing.

⚠ CAUTION

Wear safety glasses and other appropriate apparel when removing/installing the snap ring or performing any work with an arbor press. Caution all onlookers about the possibility of flying debris and personal injury.

FIGURE 45

13) Mount the bearing block to the access plate. Tighten the 3/8 inch self locking hexagon nuts with the torque wrench to 35 ft lbs (47 Nm.).

14) Install the access plate to the main frame by aligning the dowel pins and installing the cap screws and washers. Tighten with the 3/4 inch wrench.

A properly installed replacement bearing should rotate without excessive friction, drag and/or “rough spots”. If these symptoms occur after assembly, the bearing was improperly supported when pressed into the bearing block. The resulting thrust placed upon the bearing exceeded its static capacity. A bearing operating with these characteristics will deliver minimal service life and be prone to premature failure.

15) If the Surface Planer is powered by an engine, reconnect the engine spark plug wire. If powered by an electric motor and the machine is to be used immediately, reconnect the extension cord or Surface Planer to the power source. Determine that the ON/OFF switch located on the operator handle is in the OFF position.

⚠ DANGER

UNEXPECTED MACHINE START UP CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

LUBRICATION REQUIREMENTS

Application: SP684 SURFACE SHARK

Parts Required:

1 each, container of dry film lubricant

1) Lubricate the caster wheel bearings with a dry film lubricant only. Dry film lubricants dry immediately upon contact. Use sparingly. Excess lubricant will attract the fine grained, powered materials described and directly affect bearing service life.

Do not lubricate the caster wheels with any type of grease material. Grease will attract foreign material accumulations that can accelerate bearing wear.

2) The flail drum driveshaft is supported by extra capacity, double row ball bearings. Both bearings are of a sealed design and should not require additional lubrication during their normal service life. The grease type and amount utilized for the bearings are intended to provide proper lubrication for the respective loads and operational speeds. Replacement bearings should contain approximately 30 percent fill capacity. Excessive amounts of grease in the bearing cavity can actually increase friction and resulting heat increases can also dramatically shorten bearing service life.

3) The hand crank bearing is sealed and should not require additional lubrication during its normal service life.

4) Do not apply belt dressing materials to the V-belt for the purpose of minimizing slippage. These products typically attract foreign material accumulations that can accelerate component wear. Excessive V-belt slippage can be eliminated with proper V-belt tension and alignment.

5) Loosen the rubber boot to expose the hand crank screw threads. Lubricate the threads with dry film lubricant on a regular, scheduled basis. Clean and remove all material accumulations around the

threaded area before applying the lubricant. Do not lubricate the threads with any type of grease material. Grease will attract foreign material accumulations that can accelerate component wear. Place the rubber boot in its original location and tighten the retaining clamp.

Do not operate the Surface Planer without the protective rubber boot in its intended location. Operation without the rubber boot or a boot in an improper position will accelerate component wear by allowing materials to accumulate in the screw thread area of the crank handle.

ALIGNING THE CASTER WHEELS

Application: SP684 SURFACE SHARK

Tools Required:

1 each, 16 inch minimum length straightedge
2 each, 3/4 inch wrenches
1 each, torque wrench, 85 ft lbs (115 Nm.) capacity with 3/4 inch socket
1 each, 6 inch scale

Proper front and rear caster wheel alignment is essential to produce an even cutting action by the flails. With use, caster bearings and axles will eventually wear. Excessive caster bearing and axle wear can contribute to an uneven cutting action. In addition, a sharp blow delivered to the Surface Planer (eg; being dropped to the surface from off a truck) can also affect the caster wheel alignment.

⚠ CAUTION

Caster wheels are aligned during assembly with the use of a specially designed alignment jig. However, satisfactory results can also be achieved in the field by following steps:

1) Position the Surface Planer on a suitable work surface. If the Surface Planer is powered by an engine and the engine is not to be removed, fuel and oil must be first drained from the fuel tank and crankcase. If powered by an electric motor, disconnect the extension cord or Surface Planer from the power source. The normal position for aligning the caster wheels is with the main frame perpendicular to the work surface. Support the unit with proper blocking.

2) Shim washers of .015 inch (.381 mm) thickness are sometimes utilized when fastening the front axle assembly to the main frame. Install washers as required. FIGURE 46. The fasteners that attach the front axle assembly should be tightened until slight tension is applied. Always position the 1/2 inch flat washers against the slots provided in the axle assembly.

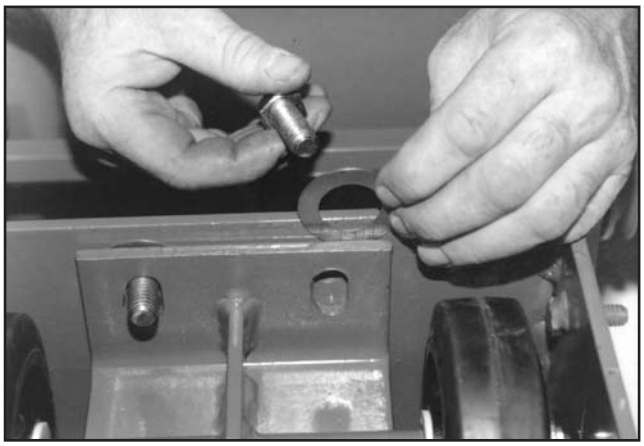


FIGURE 46

3) Position the front casters so that their faces extend approximately 7/16 inch (11.1 mm) beyond the bottom surface of the main frame. Caster wheels have a slight curvature on their faces. The measurement should be taken at the high point of the curvature, FIGURE 47.

4) Push the rear casters towards the main frame until the upper limit stop is encountered. FIGURE 48.

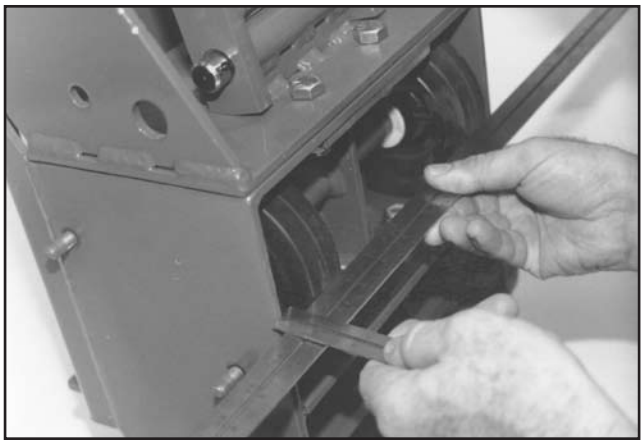


FIGURE 47

5) Place the straightedge between the front and rear casters on the high point of the face curvature. Adjust the front casters so that the gap between the straight-edge and the bottom of the main frame is identical. This gap figure is approximately 1/8 to 1/4 inch (3.17 to

6.35 mm). It is important that the straightedge be positioned on both sets of casters in the same relative position on the caster faces. FIGURE 49.

6) Tighten the fasteners with the torque wrench to 85 ft lbs (115 Nm.). The addition of clamps will minimize any movement or location change while tightening the fasteners.

FIGURE 48

7) Repeat Step 5 to determine that alignment did not change while tightening the fasteners. If alignment did change, repeat Steps 2 thru 6 until satisfactory results have been achieved.

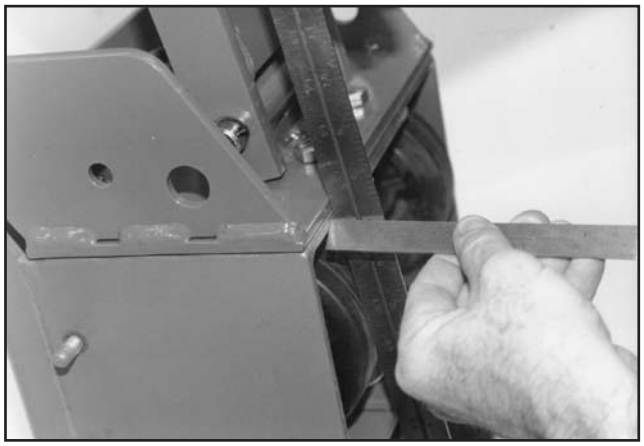


FIGURE 49

CHECKING DRIVESHAFT RUN OUT

Application: SP684 SURFACE SHARK

Tools Required:

1 each, 3/4 inch wrench
1 each, dial indicator and magnetic base

Parts Required:

1 each, Part# MNSP8-0241 driveshaft (if required)

Proper driveshaft run out limits are essential to produce an even cutting action by the flails. Driveshaft run out limits are measured with the use of a dial indicator for accuracy.

1) Position the Surface Planer on a suitable work surface. If the engine is not to be removed, fuel and oil must be drained from the fuel tank and crankcase. The normal position for checking driveshaft run out is with the main frame perpendicular to the work surface. Support the unit with proper blocking.

2) Using the 3/4 inch wrench, remove the cap screws that retain the access door to the main frame.

3) Clean and remove any excessive material build-up from the threaded bosses and surrounding area. Material build-up can affect the driveshaft run out.

4) Remove the flail drum and replace the access door. Tighten the cap screws with the wrench until the access door is secured.

5) Install the dial indicator with the magnetic base attached to the main frame. Driveshaft run out can be measured by the dial indicator at two locations:

a) Position the dial indicator to measure run out on the driveshaft flange. Maximum run out (as measured by the dial indicator gauge) is + - .010 inches (.254 mm). A worn flange surface may not allow an accurate measurement to be taken. FIGURE 50.

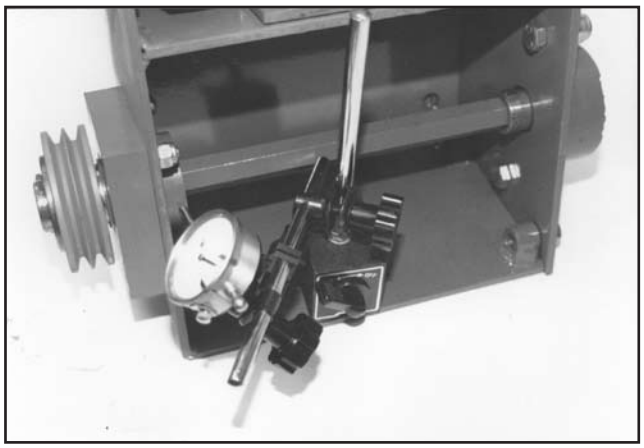


FIGURE 50

b) Position the dial indicator to measure run out on the internal hexagon bushing of the outboard bearing. Maximum run out (as measured by the dial indicator gauge) is + - .015 inches (.381 mm). FIGURE 51.

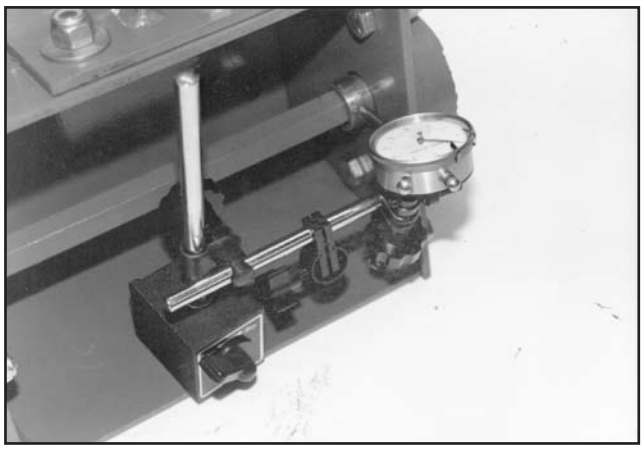


FIGURE 51

6) Run out measurements that exceed these limits may suggest that the driveshaft is bent. A bent driveshaft will accelerate bearing wear and failure while contributing to uneven flail cutting action. Under certain circumstances, a bent driveshaft can be removed and straightened in an arbor press. See the SERVICE section for specific information pertaining to replacing the driveshaft. If the straightened driveshaft still exceeds the established run out limits after re-assembly, it must be replaced with a factory approved, replacement part.

ENGINE SERVICE

Application: SP684 SURFACE SHARK

Consult the material supplied by the engine manufacturer for specific service and maintenance information regarding:

1) muffler
2) spark plug
3) air filter system
4) carburetor adjustment
5) ignition system
6) short and long term storage
7) maximum governed engine speed
8) emission standards

Keep this information stored with the Operator Manual for the Surface Planer so it will always be available for use when the engine requires service or maintenance. A properly maintained engine will add considerably to the service life and overall productivity of the Surface Planer.

Because the planing process produces high levels of random vibration, it is essential that the maximum governed engine speed be checked at regular, established intervals. Excessive engine speed can produce vibration induced forces that can dramatically affect component service life. Stress related cracking and resulting failure to mufflers, blower shrouds, belt guards and other components can result from excessive engine speed.

TROUBLESHOOTING

ENGINE

Application: SP684 SURFACE SHARK

ENGINE FAILS TO START

Ignition switch in OFF or cut off position. Place switch in the ON position or move throttle control lever to the ignition operational position.

Incorrect carburetor/fuel injection system adjustment. See Service section.

Air filter blocked. See SERVICE section.

Ignition wire to spark plug loose or disconnected. Re-connect.

Fuel supply exhausted. Refill the fuel tank.

ENGINE LOSES POWER

Incorrect carburetor/fuel injection adjustment. See Service section.

Water in fuel supply. Drain and replace fuel.

Excessive carbon accumulation in combustion chamber. See Service section.

Fuel tank breather vent closed (if so equipped). Open vent.

Air filter blocked. See Service section.

ENGINE COMPONENT FAILURE

Cracks develop in the muffler pipe or crankcase area. Excessive engine speed. Reset maximum engine governed no load speed to 3450 RPM. See Specifications section.

OPERATIONAL PROBLEMS

Application: All Models

UNEVEN FLAIL WEAR

Excessive cutting depth for the feed/travel rate. Raise the flail drum and make multiple, shallow passes instead. Reduce the feed/travel rate. See **OPERATING THE SURFACE PLANER ON THE JOB SITE.**

Improper flail and spacer washer setup. See **FLAIL DESIGN AND APPLICATION.**

Accumulation of foreign material. Clean and/or replace the flails and spacer washers as necessary.

Flails and/or spacer washers are too tight on the drum. Remove and/or replace flails and spacer washers. See **FLAIL DRUM RODS.**

EXCESSIVE JUMPING ON THE WORK SURFACE

Excessive cutting depth for the feed/travel rate. Raise the flail drum and make multiple, shallow passes instead. Reduce the feed/travel rate. See **OPERATING THE SURFACE PLANER ON THE JOB SITE.**

Engine/Flail RPM too low. Reset engine speed. See **OPERATING THE SURFACE PLANER ON THE JOB SITE.**

ACCELERATED V-BELT WEAR

Misaligned and/or improperly tensioned pulleys. Readjust pulleys and V-belt. See Service section.

Worn pulleys. Replace pulleys as required. See **INSTALLING A REPLACEMENT V-BELT OR PULLEY.**

Improper V-Belt. Replace with a Goodyear 3VX335 V-belt or equivalent. See **INSTALLING A REPLACEMENT V-BELT OR PULLEY.**

Bent driveshaft. See **CHECKING DRIVESHAFT RUN OUT.**

V-belt rubbing on the work surface. Inspect the belt guard bumper for wear. Repair or replace the guard as necessary. Readjust cutting height. Remove excess loose material from the work surface. See **OPERATING THE SURFACE PLANER ON THE JOB SITE.**

ACCELERATED BEARING WEAR AND/OR FAILURE

Misaligned and/or improperly tensioned pulleys. Readjust pulleys and V-belt. See Service section.

Bent driveshaft. See **CHECKING DRIVESHAFT RUN OUT.**

Improper lubrication. See **LUBRICATION REQUIREMENTS.**

UNEVEN CUTTING ACTION

Excessive material build-up on the wheel face surfaces. Remove the material.

Excessive caster wheel bearing wear. Replace the caster.

Excessive front or rear axle wear. Replace the appropriate axle assembly. See **ALIGNING THE FRONT AND REAR CASTER WHEELS.**

Front and rear caster wheels are not properly aligned. See **ALIGNING THE FRONT AND REAR CASTER WHEELS.**

Flails and/or spacer washers are too tight on the drum. Remove and/or replace flails and spacer washers. See **FLAIL DRUM RODS.**

Mixing new and worn flails. Remove and replace with flails of the same, approximate diameter. See **FLAIL DRUM RODS.**

STORAGE

Application: SP684 SURFACE SHARK

Proper procedure for long term storage of the Surface Planer will protect it against the effects of corrosion and damage. If the Surface Planer is not to be operated for a period of 30 days or more, proceed to store as follows:

1) Clean all accumulated foreign material from the Surface Planer utilizing an appropriate solvent.

⚠ CAUTION

Observe all applicable safety precautions for the solvent.

2) Follow the procedure as outlined in the material supplied by the engine manufacturer describing long term storage for the engine.

3) Check all visible parts for wear, breakage or damage. Order any part required to make the necessary repair. This will avoid a needless delay when operating the Surface Planer at next use.

4) Apply a dry film lubricant to all exposed metal components to prevent the formation of rust.

5) Store the Surface Planer inside. If the Surface Planer must be stored outside, protect it with a suitable covering.

SPECIFICATIONS

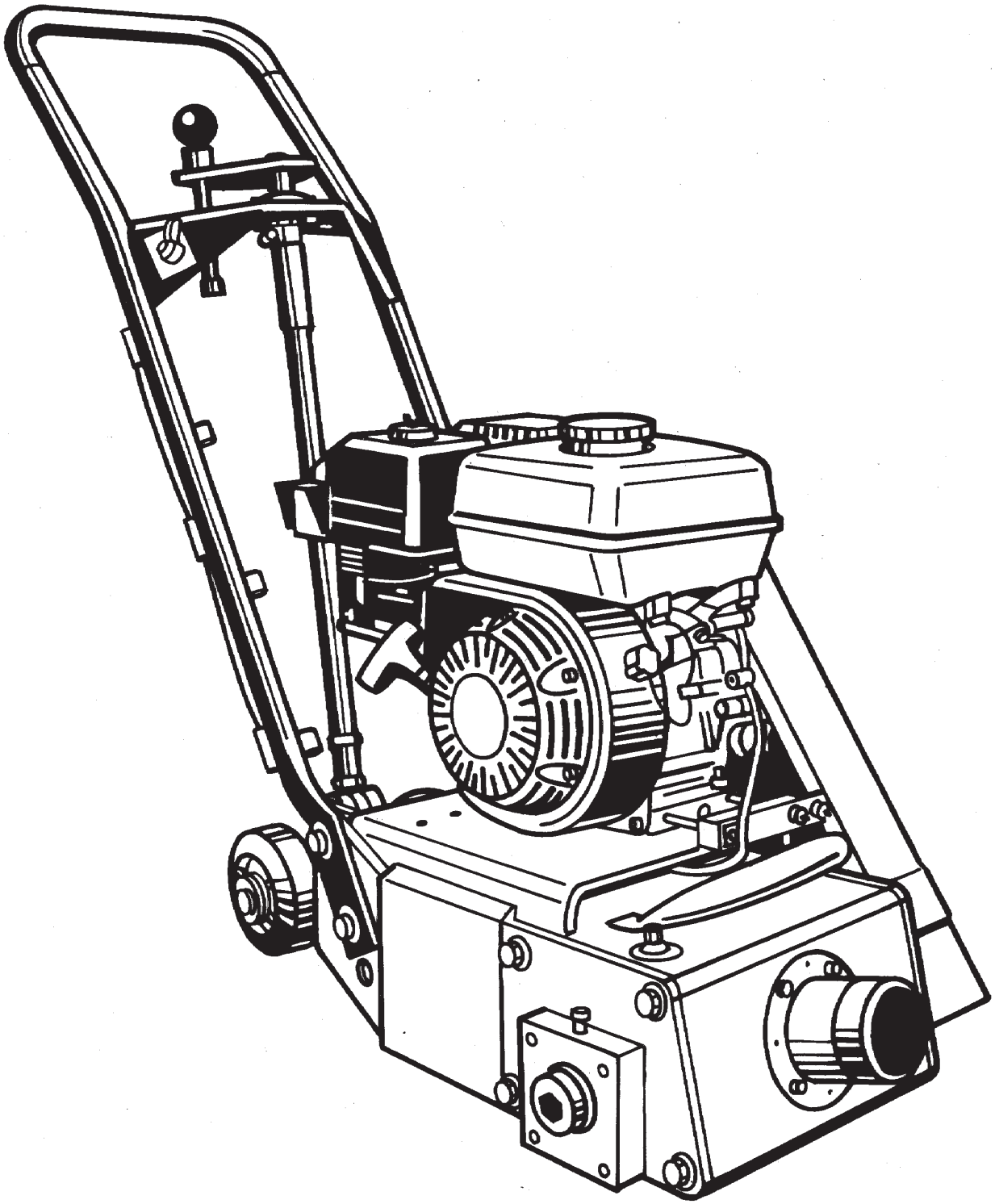
FRAME

STRUCTURE	Unitized, welded steel plate
DRIVE REDUCTION SYSTEM	VX335 Belt/Pulley
DRIVESHAFT SIZE AND CONFIGURATION	13/16 inch (21 mm) hexagon
MAXIMUM CUTTING DEPTH	5/8 inch (16 mm)
MAXIMUM CUTTING WIDTH	8 inches (203 mm)
MAXIMUM MACHINE LENGTH	43-1/4 inches (1099 mm)
MAXIMUM OPERATOR HANDLE HEIGHT	38-3/8 inches (975 mm)
OVERALL MACHINE WIDTH	16-1/8 inches (410 mm)
CUTTING PROXIMITY TO	3-1/4 inches (83 mm) without edger attachment
LATERAL BORDER VACUUM CLEANER CONNECTION	1-1/2 or 3 inch (38 or 76 mm) outside diameter.

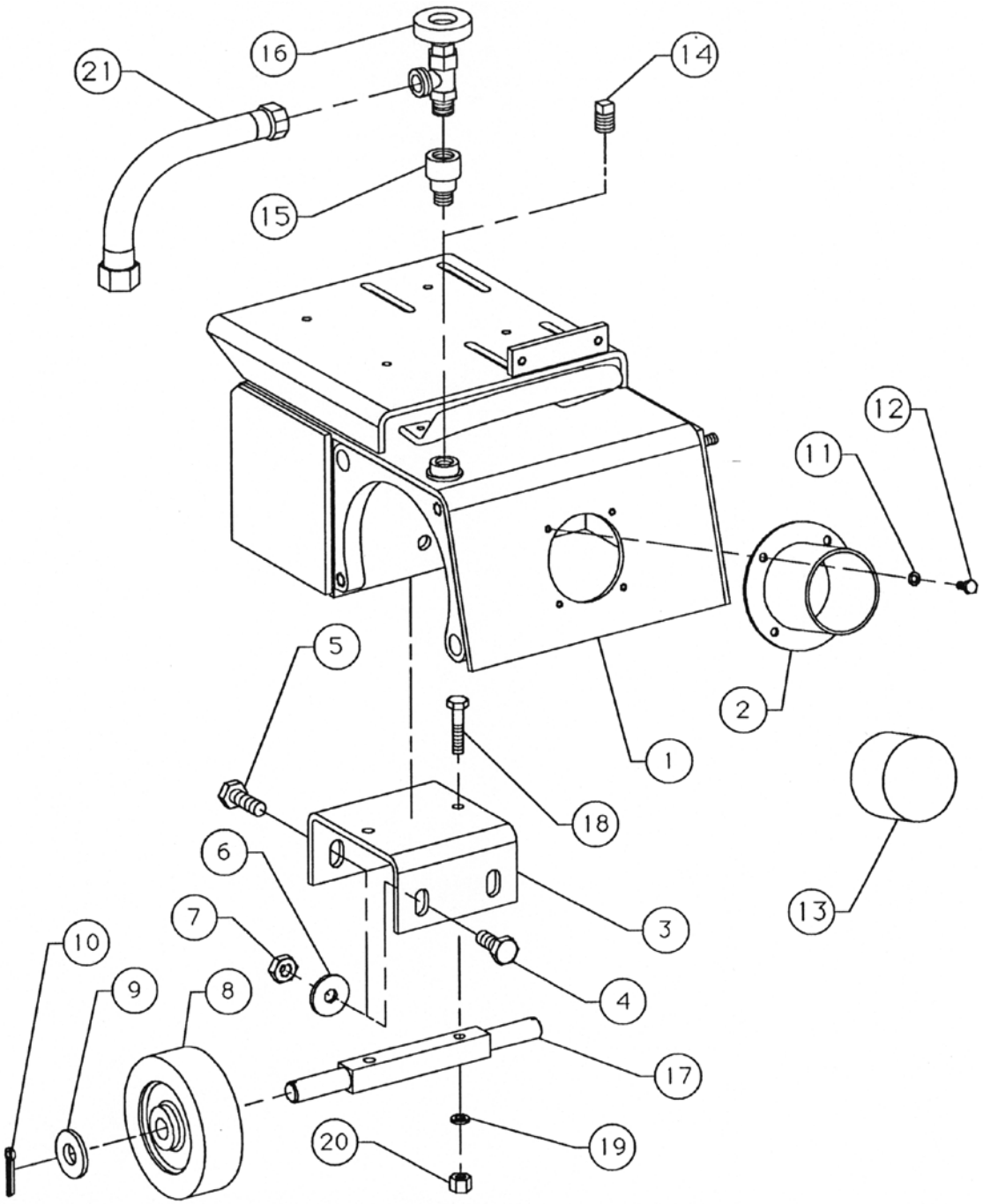
GENERAL

BASIC WEIGHT	160 lbs (73 kg), less drum and flails.
MAXIMUM GOVERNED ENGINE SPEED FOR 5 HP CATEGORY, 4 CYCLE, GASOLINE ENGINES	3450 RPM

Replacement Parts Diagrams
SP684 SURFACE SHARK Surface Planer



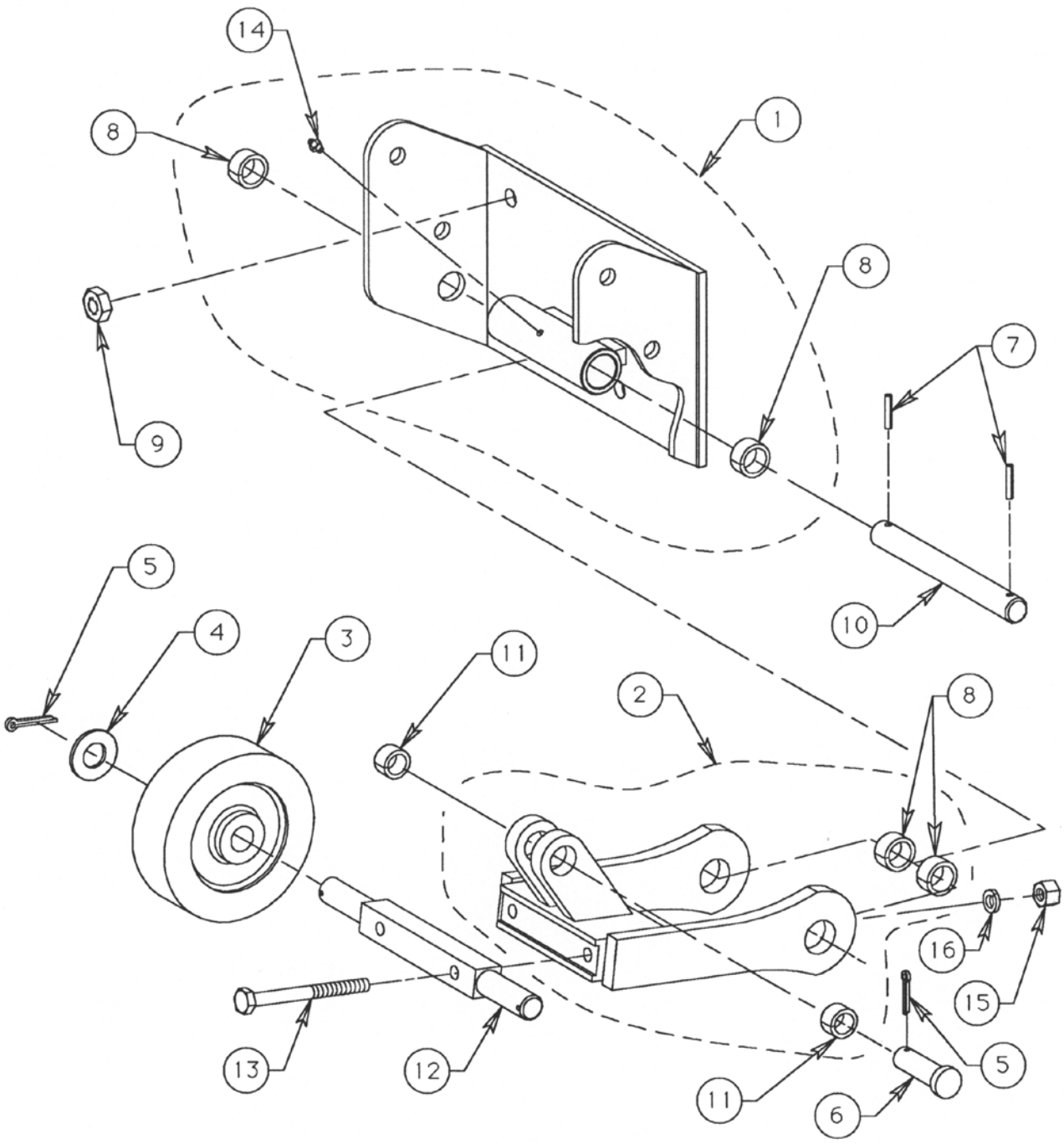
Main Frame Assembly
SP684 SURFACE SHARK Surface Planer



Main Frame Assembly
SP684 SURFACE SHARK Surface Planer

Reference Number	PART NUMBER	DESCRIPTION	QTY
1	MSP8-0051	Frame, Main	1
2	MSG24-0360	Tube, Vacuum	1
3	MSP8-0061	Axle Mount	1
4	M15081000	Screw, Cap, 1/2-13 UNC x 1-1/4", Plated, Grade 5	2
5	M15081200	Screw, Cap, 1/2-13 UNC x 1-1/2", Plated, Grade 5	2
6	M17080000	Washer, Flat, 1/2", Plated	4
7	M53080000	Nut, Hexagon, 1/2-13 UNC, Self-Locking, Plated	4
8	MSP8-0070	Wheel, Caster	2
9	M17120000	Washer, Flat, 3/4", Plated	2
10	M22021200	Pin, Cotter, 5/32" x 1-1/2", Plated	2
11	M16040000	Washer, Lock, 1/4", Plated	4
12	M15040600	Screw, Cap, 1/4-20 UNC x 3/4", Plated, Grade 5	4
13	MSP8-0350	Cap, Dust Cover	1
14	M26040000	Plug, Pipe, 1/4 NPTF, Square	1
15	MSP8-0040	Fitting, Reducing (Not Used With Item 14)	1
16	MSP8-0030	Valve (Not Used With Item 14)	1
17	MSP8-0370	Axle	1
18	M15061400	Screw, Cap, 3/8-16 UNC x 1-3/4", Plated, Grade 5	2
19	M16060000	Washer, Lock, 3/8", Plated	2
20	M18060000	Nut, Hexagon, 3/8-16 UNC, Plated	2
21	MCS8-0900	Hose, Jumper	1

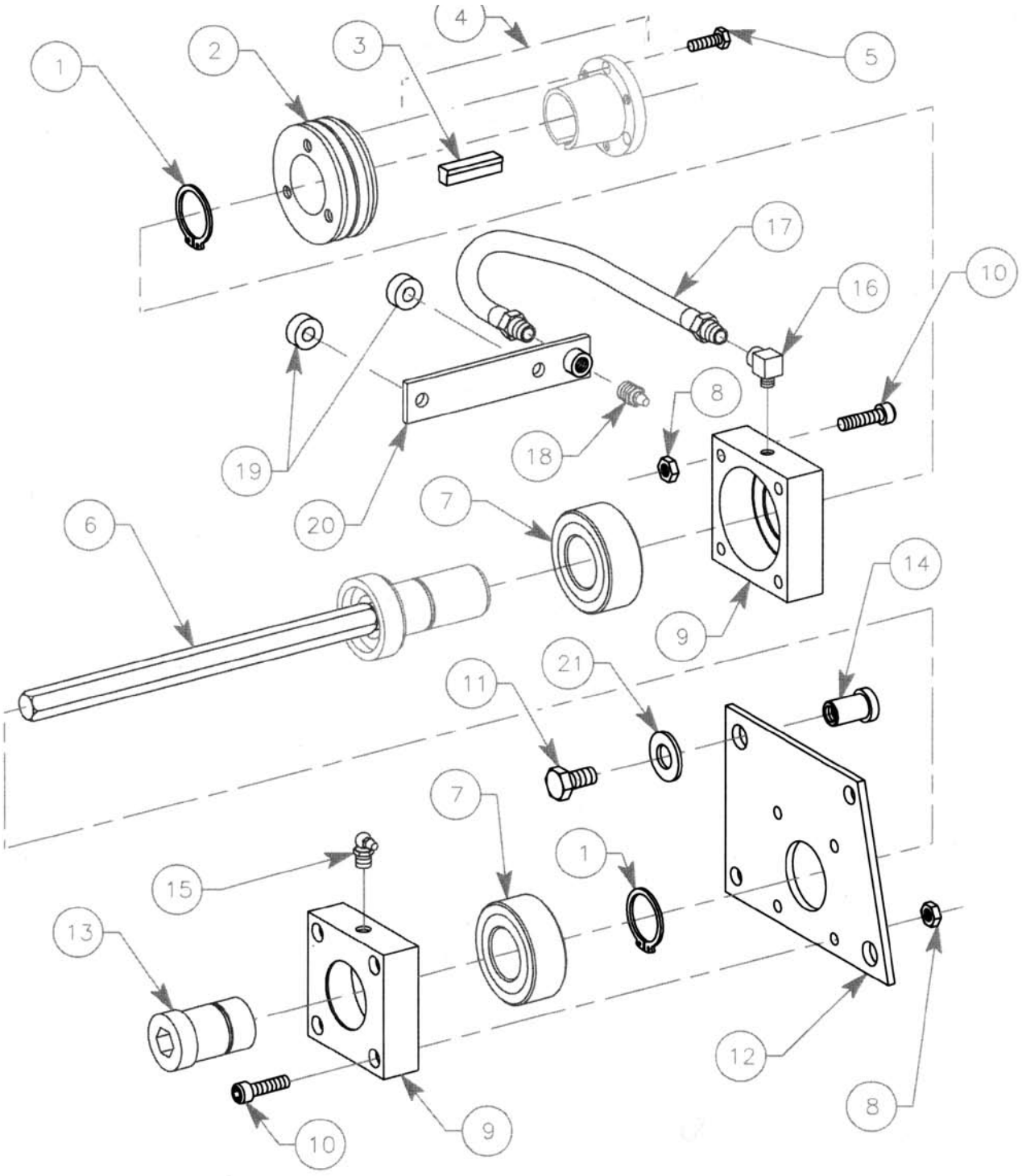
Rear Frame Assembly
SP684 SURFACE SHARK Surface Planer



Rear Frame Assembly
SP684 SURFACE SHARK Surface Planer

Reference Number	PART NUMBER	DESCRIPTION	QTY
1	MSP8-0091	Assembly, Rear Frame Mount (Includes P/N SP8-0450 and 550-0590	1
2	MSP8-0112	Assembly, Rear Axle Mount (Includes P/N SP8-0450 and SP8-0460)	1
3	MSP8-0070	Wheel, Caster	2
4	M17120000	Washer, Flat, 3/4", Plated	2
5	M22021200	Pin, Cotter, 5/32" x 1-1/2", Plated	3
6	M23101600	Pin, Clevis, 5/8" x 2", Plated	1
7	M20030800	Pin, Roll, 3/16" x 1", Plated	2
8	MSP8-0450	Bushing, Connex®	4
9	M53080000	Nut, Hexagon, 1/2-13 UNC, Self-Locking, Plated	2
10	MSP8-0100	Shaft, Hinge, Plated	1
11	MSP8-0460	Bushing, Connex®	2
12	MSP8-0370	Axle	1
13	M15063200	Screw, Cap, 3/8-16 UNC x 4", Plated, Grade 5	2
14	M550-0590	Fitting, Grease	1
15	M18060000	Nut, Hexagon, 3/8-16 UNC, Plated	2
16	M16060000	Washer, Lock, 3/8", Plated	2

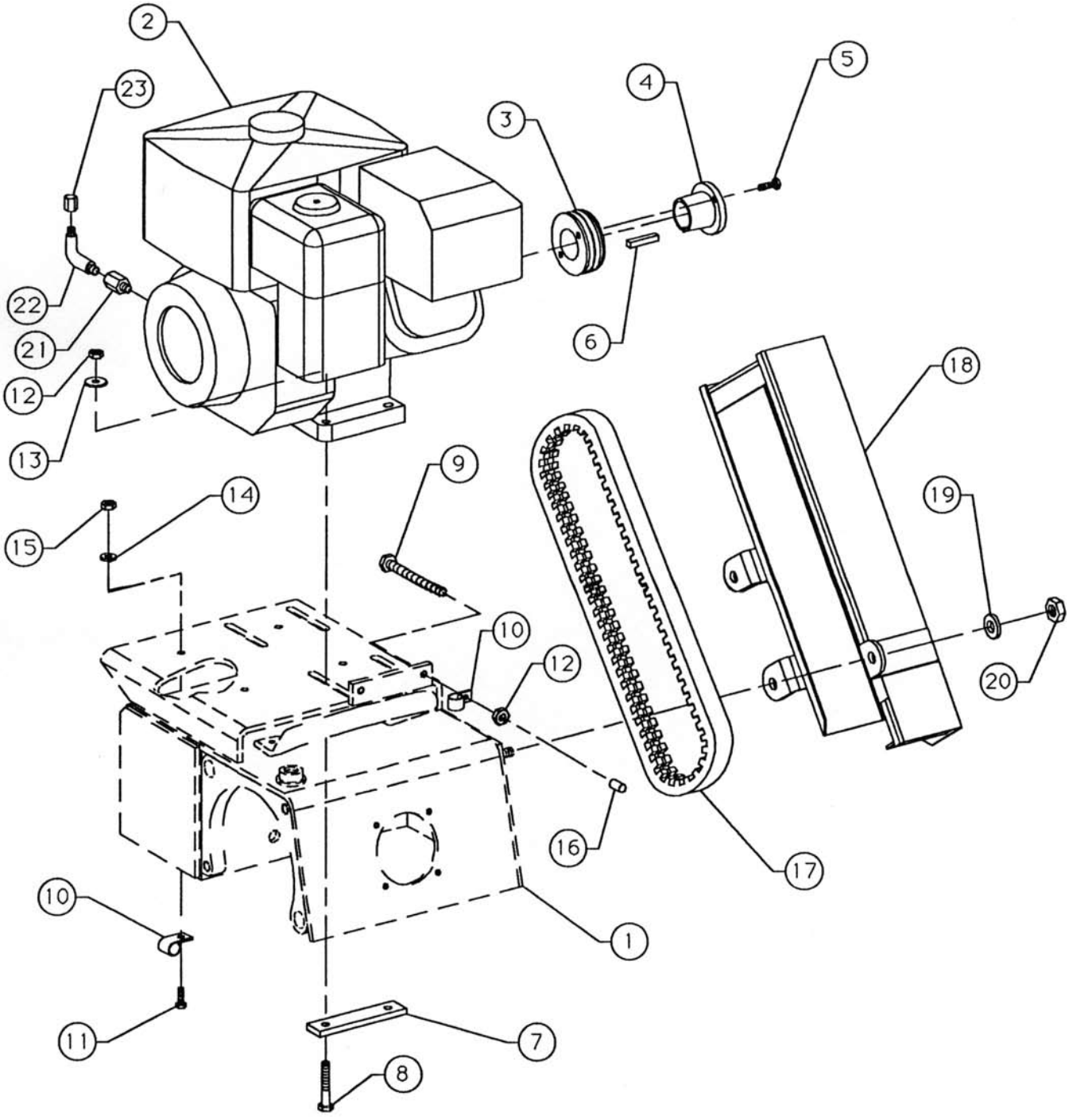
Driveshaft Assembly
SP684 SURFACE SHARK Surface Planer



Driveshaft Assembly
SP684 SURFACE SHARK Surface Planer

Reference Number	PART NUMBER	DESCRIPTION	QTY
1	MSP8-0290	Ring, Retaining, External	2
2	MSP8-0201	Sheave, Driveshaft	1
3	MSP8-0211	Key, Special	1
4	MSP8-0221	Sheave, Center Hub (Includes P/N SP8-0211)	1
5	M15050800	Screw, Cap, 5/16-18 UNC x 1", Plated, Grade 5	3
6	MSP8-0241	Driveshaft	1
7	MSP8-0421	Bearing, Sealed	2
8	M52060000	Nut, Hex, Self-Locking, 3/8-16 UNC, Plated	8
9	MSP8-0231	Block, Bearing Mounting	2
10	M60061200	Screw, Cap, Socket, 3/8-16 UNC x 1-1/2", Plated	8
11	M15080800	Screw, Cap, 1/2-13 UNC x 3/4", Plated, Grade 5	4
12	MSP8-0251	Plate, Main Frame Side	1
13	MSP8-0330	Insert, Hex	1
14	MSP8-0340	Bushing, Dowel	2
15	MSP8-0560	Fitting, Grease, 90° x 1/8" NPT	1
16	MSP8-0570	90° Street Elbow, 1/8" NPT x 1/8" NPT	1
17	MSP8-0600	Hose, Grease	1
18	MSP8-0590	Fitting, Grease, Straight, 1/8" NPT	1
19	MGP8-0090	Spacer	2
20	MSP8-0440	Hose Mount	1
21	MSP8-4000	Washer, Hardened	4

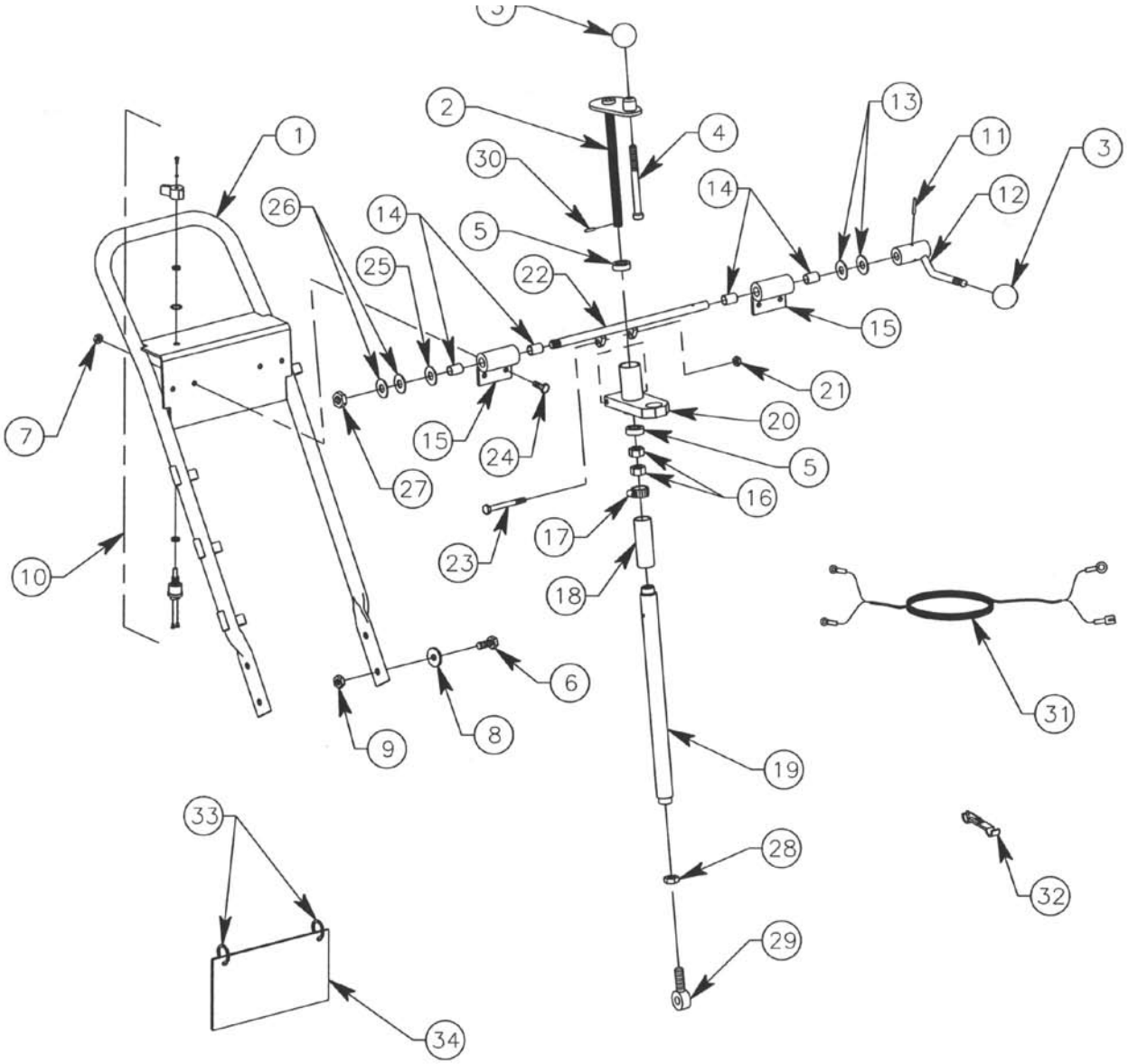
Gasoline Engine Assembly
SP684 SURFACE SHARK Surface Planer



Gasoline Engine Assembly
SP684 SURFACE SHARK Surface Planer

Reference Number	PART NUMBER	DESCRIPTION	QTY
1	MSP8-0051	Frame, Main	Ref
2	MGX160K1QXC9	Engine, Honda, (5.5 HP)	1
3	MSP8-0270	Sheave, Engine	1
4	MSP8-0280	Bushing, Center Hub	1
5	M15040600	Screw, Cap, 1/4-20 UNC x 3/4", Grade 5	2
6	MSP8-0290	Key, Standard, 3/16" x 3/16" x 1-1/2"	1
7	MSP8-0010	Bracket, Engine Mount	2
8	M15051600	Screw, Cap, 5/16-18 UNC x 2", Plated, Grade 5	4
9	MSP8-0020	Screw, Cap, Full Thread, Engine Take-up, Plated	2
10	MCOV-0411	Clamp, Plated	2
11	M15040600	Screw, Cap, 1/4-20 UNC x 3/4", Plated, Grade 5	1
12	M17040000	Washer, Flat, 1/4", Plated	4
13	M53050000	Nut, Hexagon, 5/16-18 UNC, Self-Locking, Plated	6
14	M16040000	Washer, Lock, 1/4", Plated	1
15	M18040000	Nut, Hexagon, 1/4-20 UNC, Plated	1
16	MSP8-0380	Cap, Plastic	2
17	M3VX335	V-Belt	1
18	MSP8-0300	Shroud, V-Belt Safety	1
19	M17060000	Washer, Flat, 3/8", Plated	3
20	M53060000	Nut, Hexagon, 3/8-16 UNC, Self-Locking, Plated	3
21	MSP8-0400	Adapter	1
22	MSP8-0390	Hose, Oil Drain	1
23	M660-0490	Cap, Female, 1/4" NPT	1

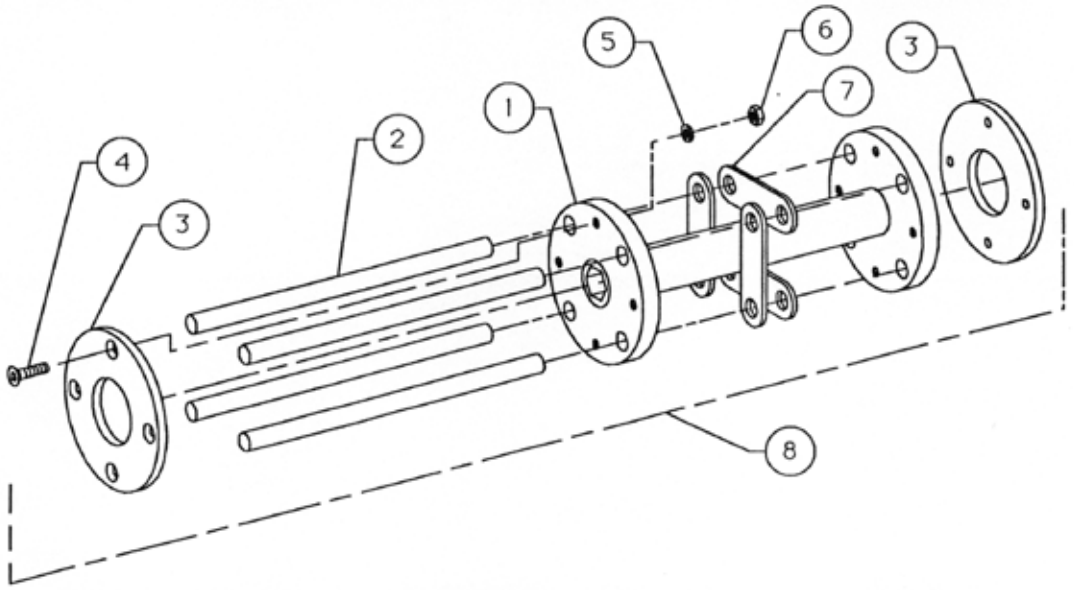
Operator Handle Assembly
SP684 SURFACE SHARK Surface Planer



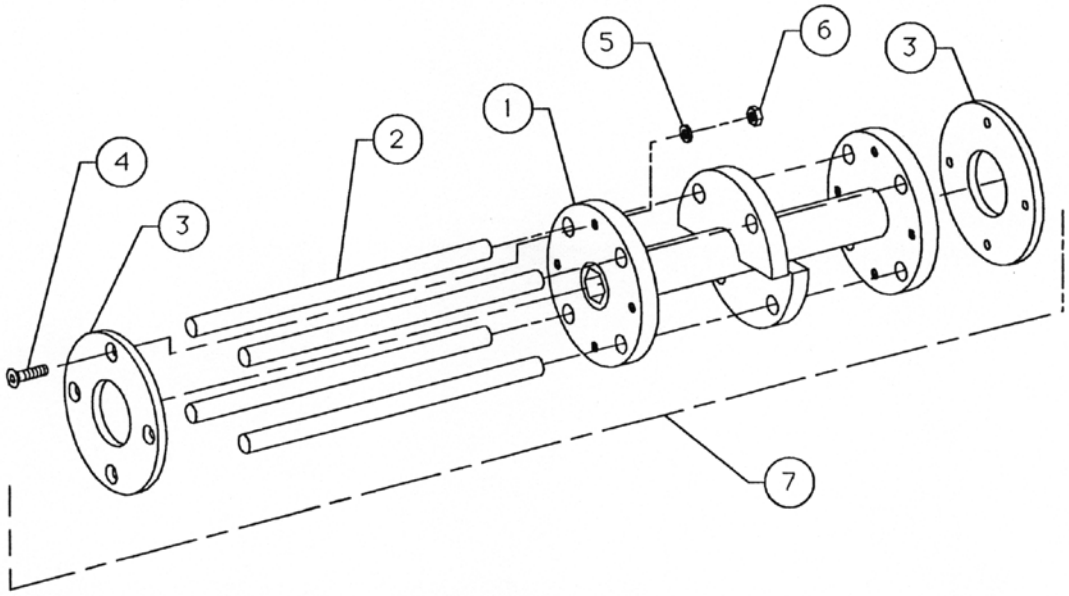
Operator Handle Assembly
SP684 SURFACE SHARK Surface Planer

Reference Number	PART NUMBER	DESCRIPTION	QTY
1	MSP8-0142	Handle, Operator	1
2	MSP8-0131	Screw, Crank	1
3	MSP8-0160	Knob, Handle	2
4	MSP8-0410	Screw, Socket Head, Special	1
5	M99502H	Bearing	2
6	M15081000	Screw, Cap, 1/2-13 UNC x 1-1/4", Plated, Grade 5	4
7	M53060000	Nut, Hexagon, Nylock®, 3/8-16 UNC, Plated	4
8	M17080000	Washer, Flat, 1/2", Plated	4
9	M53080000	Nut, Hex, 1/2-13 UNC, Self-Locking, Plated	4
10	MCS8-0350	Switch, Shut-Off	1
11	M20031200	Pin, Roll, 3/16" x 1-1/2"	1
12	MCS8-0240	Lever	1
13	M200682	Washer, Plastic	2
14	MCS8-0420	Bearing, Oilite®	4
15	MCS8-0190	Hinge, W/Bearings (Includes 2 Of Part Number CS8-0420)	2
16	M18100000 LH	Nut, Hexagon, 5/8-11 UNC, LH, Plated	2
17	M56200000	Clamp, Hose, 1-1/4", Plated	1
18	MSP8-0160	Boot, Sleeve	1
19	MSP8-0171	Barrel, Adjusting	1
20	MCS8-0210	Tube, Bearing	1
21	M18060000	Nut, Hexagon, 3/8-16 UNC, Plated	1
22	MCS8-0200	Shaft, Over Center	1
23	M81063000	Screw, Cap, 3/8-16 UNC x 3-3/4", Stainless	1
24	M15060800	Screw, Cap, 3/8-16 UNC x 1", Plated, Grade 5	4
25	MSG24-4000	Washer, Flat, 5/8", Special, Plated	1
26	M84100000	Washer, Bellville	2
27	M19100001	Nut, Hexagon, 5/8-18 UNF, Self-Locking, Plated, Grade 5	1
28	M40100011	Nut, Hex, Jam, 5/8-18 UNF, Left Hand Thread, Plated	1
29	MSP8-0180	Rod, End	1
30	M20030600	Pin, Roll, 3/16" x 3/4"	1
31	MSP684H-0370	Wire Loom, Shut-Off	1
32	M22x18 T-TAP	T-Tap, 22-18 Gauge Wire	1
33	MKIC-172	Ring, Kick-Out	2
34	MSP684-5040	Sign, Planer Quik-tips	1

One Section Drum Assembly
SP684 SURFACE SHARK Surface Planers



Two Section Drum Assembly
SP684 SURFACE SHARK Surface Planer



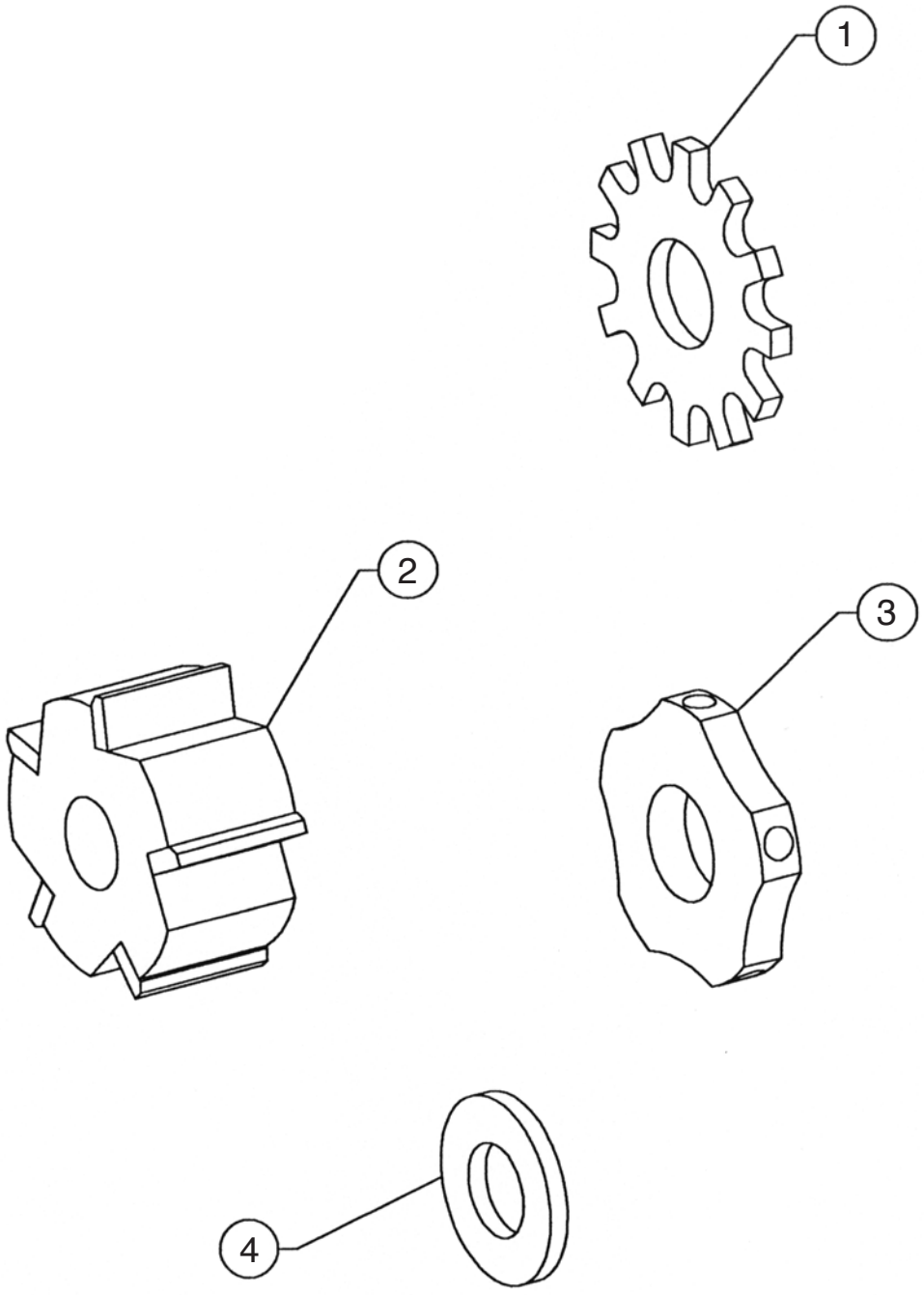
One Section Drum Assembly
SP684 SURFACE SHARK Surface Planer

Reference Number	PART NUMBER	DESCRIPTION	QTY
1	MSP8-2000-010	Drum, Flail, One Section	1
2	MSP8-2000-040	Rod, Flail Drum	4
3	MSP8-2000-050	Cap, End, Flail Drum	2
4	M27040800	Screw, C/S, Allen Head, 1/4-20 UNC x 1", Plated	8
5	M16040000	Washer, Lock, 1/4", Plated	8
6	M52040000	Nut, Hex, 1/4-20 UNC, Self-Locking, Plated	8
7	MSP8-2000-030	Strap, Support	8
8	MSP8-2000-A	Flail Drum, 1 Section, Complete, Less Flails Includes 4 Support Straps	1

Two Section Drum Assembly
SP684 SURFACE SHARK Surface Planer

Reference Number	PART NUMBER	DESCRIPTION	QTY
1	MSP8-2100-010	Drum, Flail, Two Section	1
2	MSP8-2000-040	Rod, Flail Drum	4
3	MSP8-2000-050	Cap, End, Flail Drum	2
4	M27040800	Screw, C/S, Allen Head, 1/4-20 UNC x 1", Plated	8
5	M16040000	Washer, Lock, 1/4", Plated	8
6	M52040000	Nut, Hex, 1/4-20 UNC, Self-Locking, Plated	8
7	MSP8-2100-A	Flail Drum, 2 Section, Complete, Less Flails	1

Flails And Spacer Washers
SP684 SURFACE SHARK Surface Planer



Flails And Spacer Washers
SP684 SURFACE SHARK Surface Planer

Reference Number	PART NUMBER	DESCRIPTION	QTY
1	MSP8-3100	Flail, Beam, Heat Treated Alloy Steel	As Needed
2	MSP8-3300	Flail, Milling, Heat Treated Alloy Steel	As Needed
3		With Tungsten Carbide Inserts	
	MSP8-3200	Flail, Pentagonal, Heat Treated Alloy Steel	As Needed
4		With Tungsten Carbide Inserts	
	MSP8-4000	Washer, Spacing, Heat Treated Alloy Steel	As Needed

NOTES

NOTES

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