



OWNER'S MANUAL FOR

THE CARE AND MAINTENANCE OF THE

ASTROTURF® BRAND KNITTED NYLON TURF SURFACES

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I FOREWORD

Your AstroTurf® Knitted Nylon Turf Surface represents a significant investment of money - but it is also a key element in your sport, physical education and recreational programs. The use and maintenance recommendations contained in this manual will help you get the most value from your AstroTurf® playing surface. Following these simple practices should significantly extend product life and assure the most satisfactory surface performance.

To get the most efficient and long-term use from an AstroTurf® surface, follow these four rules:

1. Keep it clean.
2. Do not abuse it with vehicle traffic, heavy static loads, fireworks, etc.
3. Make all minor repairs promptly.
4. Call AstroTurf® for help if more complicated repair or renovation work is needed.

You will note that none of the “rules” say: “Don’t use it”. AstroTurf® surfaces are made to be used. That is why you vastly increase your service capacity with AstroTurf®. A portion of this manual answers the most often asked questions about playing and other uses. If you have further questions, contact AstroTurf® and talk to our technical or marketing people with years of experience.

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NOTE: This manual is intended for customer use. Be sure that those responsible for field maintenance are thoroughly familiar with its contents and refer to it regularly.

AstroTurf® is a registered trademark.

While the material in this manual represents AstroTurf®’s most current information regarding suggested procedures for the proper use and care of AstroTurf® surfaces, is presented in good faith and is believed to be accurate – AstroTurf, LLC., MAKES NO REPRESENTATIONS, WARRANTIES OR GUARANTEES OF ANY KIND, EXPRESS OR IMPLIED, REGARDING THE INFORMATION CONTAINED HEREIN and disclaims all liability for any loss or damage arising out of its use.

II PROTECTING ASTROTURF® KNITTED NYLON TURF SURFACES

It is good business to protect the investment in your playing surface. To do this most effectively, **KEEP IT CLEAN**. The following are the most obvious precautions:

1. Install a fence around the turf to control access.
2. Keep close adjacent areas free of litter, mud and debris.
3. Post signs prohibiting smoking and carrying food or drink onto the turf.
4. Provide trash and litter cans.
5. Observe recommended load limits for static and rolling loads, especially when the turf is wet.
6. Repair minor damage promptly.
7. Follow the AstroTurf® suggested maintenance and cleaning procedures.

AstroTurf® surfaces are designed to resist both wear and exposure to the elements. The effectiveness of their materials, design and construction is demonstrated by the long life of fields under heavy use in many climates - north and south, wet and dry, hot and humid.

Even with the quality and durability built into your AstroTurf® surface, there are things that you can do to extend the life of your installation. One is to minimize unnecessary exposure to ultraviolet rays from the sun. Proper use of a field cover during the summer months when the field is unused will eliminate the major portion of each year's ultraviolet, and will also help keep the field clean.

FIELD COVERS

Almost anything that will shade the field is acceptable. If you already possess a clean tarp, use it. If you need to purchase a cover, a number of choices are available. The most durable, but also most expensive, covers are made of light-colored coated nylon. At the other cost-extreme is black, construction grade polyethylene, available in rolls up to 40 feet wide and 200 feet long. As a compromise between these extremes of cost and durability, some stadium owners have used a product called Griffolyn™. This material is made by laminating two layers of polyethylene around a lightweight nylon scrim.

Proper use of a cover will reduce cleaning needs and extend service life of your AstroTurf® surface. However, improper use can invite undesirable moisture, dirt, and stain accumulation. Observe the following precautions if you plan to use a tarpaulin or other field cover:

1. Make sure the cover is large enough to extend beyond the playing surface, to avoid accumulation of water and debris at the edges.
2. Remove dirt and trash from field before covering.
3. Never put a cover on a wet or damp field.
4. Watch for any sign of mildew or stains when the cover is removed and if present clean the field and the cover before using again.

III CLEANING ASTROTURF® SURFACES

The most obvious cleaning needed by AstroTurf® surfaces is the removal of litter left behind by field users and spectators. Encourage good housekeeping by making sure that enough containers are provided for waste paper and trash. Try to route the field access traffic in such a way as to minimize the tracking-on of mud or dirt. Be sure that litter and loose dirt are picked up promptly before they accumulate and pack. Failure to do so can spoil the appearance of the field and affect playing quality.

Light trash and airborne dust can be removed by gasoline or electrically-powered vacuum sweepers. However, the most efficient practice for more thorough cleaning is to periodically wash the field with plenty of clean water. Using a fire hose to wash gives excellent results; the water stream flushes away loose dust and blasts out embedded soil. Regular washing will both improve the appearance of the field and prolong its life.

When washing a field with a hose, use maximum pressure and amount of flow. This agitates embedded grit and soil and washes them away. Start at the crown of the field, working first down one side and then the other or from the high side to the low side. Cleaning a typical field with a fire hose will take four or five men a full day. Allow enough time to do a thorough job.

WATER QUALITY - Some fire protection systems use raw rather than treated water. Raw or polluted water is not recommended for field washing or cooling. Untreated water in some areas contains large quantities of dissolved hard water solids. Such water may cause a noticeable film to appear on the turf after evaporation and leave a deposit behind.

CLEANING MACHINES - DRY TYPES

Experience has shown that although vacuum-type machines are satisfactory for lifting paper scraps, food debris and loose trash from an AstroTurf® surface, a combination vacuum/brush type of sweeper is the best equipment for picking up dirt, dust and fine foreign particles. Listed below are a number of factors to keep in mind when buying or operating vacuum/brush type sweepers on AstroTurf® surfaces.

BRUSH COMPOSITION - The sweeper selected should have synthetic fiber bristles such as nylon or polypropylene. The minimum bristle length should be two and one-half inches (2 1/2"); the maximum bristle diameter should be .030". *The brush should contain NO metal fibers.* Metal fibers can fall out and cause injuries to players and can also damage the AstroTurf® surface.

BRUSH SETTING - The actual brush setting will depend on the model and type of sweeper selected. The sweeper will work best, however, when the brush is set so that it just touches the top of the surface. The purpose of the brush action is to agitate the surface so that the suction can pick up the resulting dislodged dust more efficiently.

It is highly important that both the brush materials and the brush settings be correct for use on AstroTurf® surfaces. **DO NOT SET THE BRUSH SO LOW THAT IT DIGS INTO THE PILE FIBER OR BACKING FABRIC.** Too low a setting can damage the turf.

If your field is filled with blown-on or washed-in dirt, a high-pressure water hose is less likely to damage the surface than over-applied brushes from a vacuum cleaner. Vacuum cleaners are not recommended to remove packed-in dirt and mud.

Should you have questions regarding brush settings for a particular machine, contact the supplier of the equipment or AstroTurf®.

TURF LOADING - Because of the nature of the sweeping operation, vacuum-brush cleaning may require several passes over the surface to complete the job. It is recommended that any sweeper used that weighs more than three hundred (300) pounds be equipped with pneumatic tires at a maximum tire pressure of 30 psi. Do not leave cleaning equipment standing or park vehicles on wet turf for long periods.

EXHAUST FUMES - The type of fuel or power used by a sweeper is of no major importance. However, if the sweeper has an internal combustion engine, make certain that the hot engine exhaust is not discharged down toward the playing surface. Hot objects can damage an AstroTurf® field and engine exhaust may soil it. Check to make sure that the sweeper is designed in such a way that a hot muffler or exhaust pipe cannot drop onto the AstroTurf® surface.

BATTERY ACID - Check all gasoline-powered vehicles to be sure that excess battery-fill does not overflow onto the AstroTurf® surface. Strong acids can permanently stain the turf. If you elect to use an electric-powered unit, be sure that it is properly grounded.

SWEEPER MAINTENANCE -The sweeper should be maintained in accordance with the manufacturer's specifications. In the course of normal maintenance, particular care should be taken to prevent lubricating oil or grease from dripping or spilling onto the AstroTurf® surface during subsequent sweeping.

OIL SPILLS - Should oil spills occur, they should be wiped up promptly with a clean white rag moistened with a suitable spot remover such as perchlorethylene or dry-cleaning fluid. As a general rule, any commercial dry-cleaning fluid that the National Institute of Rug Cleaning has approved for nylon carpets is satisfactory. After the spot remover has been used, the area should be washed with a mild detergent followed by a generous water rinse. If you have a large oil spill, contact AstroTurf® for detailed instructions and advice.

CAUTION: Because electrically-powered vacuum cleaners may not be properly grounded, do not use them on wet or damp surfaces.

FREQUENCY OF CLEANING - The removal of loose rubbish and surface dust should be done as needed, usually about once a week on most fields. A thorough wet cleaning should be done at least once or twice a year. NOTE: *The excessive use of heavy-duty power-brushing equipment can damage both the playing surface and its underpad system.*

WASHING AND USE OF WET CLEANERS

Low-sudsing, neutral household detergents used with plenty of hot water are highly effective for removing most of the soil likely to occur on AstroTurf® surfaces, especially when the detergents are applied with mechanical wet-type carpet cleaning machines. Either the vacuum or rotary- scrubber type cleaning machines may be used, provided the manufacturer's directions for cleaning nylon carpets are followed.

Any cleaning that involves the use of soaps, wetting agents or detergents should be followed by a thorough rinsing, preferably with plenty of hot water, to remove all traces of the soap or detergent. *Do not use cleaners that contain chlorine bleaches.* For washing, follow these three steps:

1. When heavily soiled, use an industrial-type carpet scrubber and a five percent solution of low sudsing detergent in hot water. (Household detergents are recommended. Five percent equals about 6 oz. of detergent to one gallon of water.)
2. For light soiling, sponge mop with the same kind of detergent solution.
3. Following scrubbing or mopping - hose down and scrub or sponge again with a three percent solution of ammonia in hot water. (NOTE: household ammonia is three percent. Industrial aqua ammonia is 33%. Dilute nine parts water to one part industrial ammonia, or the available supply as appropriate.)

Always rinse the surface thoroughly after use of any cleanser or detergent. The use of a fire hose to flood the field can be effective for both dirt removal and rinsing.

Alternate methods of cleaning are: a steam "deep clean extraction" system or employing a deep cleaning method such as high-pressure washing or high-impact steam cleaning.

CAUTION: Be sure that any equipment or cleaners used are approved for nylon by the National Institute of Rug Cleaners.

CAUTION: On drain-through fields utilizing permeable sub bases, vacuum up spilled or excessive dirt, and other fine-grained debris, before wet cleaning.

ANNUAL CLEANING - A good, hard spring or fall rain is an excellent cleaner for an AstroTurf® surface and will provide an assist to the annual cleaning routine as described in the foregoing. However, an annual cleaning routine for heavy soiling should not be omitted.

REMOVING STAINS

GENERAL INSTRUCTIONS - The first rule in spot removal is promptness. It is always easier to clean up a fresh spill than one that has dried and hardened. Remove any solid or paste- like deposit with a spatula or table knife. Blot up excess liquids with a thick stack of paper towels or a dry absorbent such as "kitty litter" or Fullers Earth. Dry absorbents can then be swept or vacuumed up.

PROCEDURE - AstroTurf® nylon surfaces have good resistance to staining. However, it is important to realize they are only one part of a sophisticated system of various components designed for overall field performance. Some cleaning agents safe for nylon can be harmful to other components of the system. Therefore, cleaning agents are grouped into two sets, one of which can be used in liberal amounts directly on the turf surface, and the second of which should only be applied by rubbing a cloth soaked in the cleaner, in order to minimize penetration of possibly harmful agents below the turf surface. The first group of cleaners, which generally can be applied without any special precautions, are the following:

1. A warm, mild solution of granular household detergent such as Tide or All in water, or any neutral low sudsing detergent recommended for fine fabrics. Use approximately one teaspoon to one pint of water. This will handle most needs, as the list in the box below indicates.

Coffee	Tea	Grape Juice
Tomato Juice	Cocoa	Water Color
Milk	Ice Cream	Ketchup
Food Coloring	Mustard	Margarine
Merthiolate	Butter	Beer
Cola		

- 2) A three percent solution of ammonia in water, as described on an earlier page for more severe cleaning problems. *Thoroughly flush the surface so cleaned with plenty of cold water afterwards.*
- 3) Clean, dry absorbents such as paper towels or commercial "kitty litter" for applicable stains.

In the second group of cleaners, where agents must be applied sparingly and care taken to avoid penetration beneath the turf, are the following:

- 1) Mineral spirits or a grease spot-remover like perchlorethylene of the type sold by most variety stores and supermarkets. Contact our plant in Dalton, Georgia for Roman Cleaner I, available in an aerosol spray can. In general, cleaners in this

category should qualify as suitable for nylon carpets. They will be effective with stains shown in the box below.

Asphalt	Ballpoint Ink	Shoe Polish
Cooking Oil	Suntan Oil	Lipstick
Floorwax	Crayon	Rubber Cleat Marks
Motor Oil & Grease	Chewing Gum	

*Chewing gum is a common hazard and can be removed by using dry-cleaning fluid or by freezing. Aerosol packs of refrigerant are available from carpet cleaning suppliers for this purpose, or dry ice can be used.

- 2) A mixture of white distilled vinegar in an equal amount of water, to neutralize animal waste. Flush thoroughly with water after application.
- 3) A one percent solution of hydrogen peroxide in water, to treat fungus or mold spots. Flush thoroughly with water after application

CAUTION: Mineral Spirits and other petroleum-based solvents are flammable. Do not smoke or permit open flames near where these are being used. Be sure the area is well ventilated where solvent cleaners are used. For more difficult stains, it may be necessary to clean with both the detergent solution and the dry-cleaning fluid. For such stains as paint, shoe dye and model airplane glue - a commercial carpet cleaner should be consulted.

Avoid use of Clorox, any solution containing bleach, highly caustic detergent cleaners (pH above 9), highly acid cleaners (pH below 5) on any AstroTurf® surface, as they can cause damage or discoloration to its components.

IV PROPER USE OF YOUR ASTROTURF® FIELD

Below you will find a list of potential uses for AstroTurf® products. While the list is not exhaustive, it gives a good indication of the factors considered in the selection of materials and playing qualities for the specific field. It is recommended that you use this list for your field to set up guidelines for its usage. The following information will help make all these uses successful.

The following is a listing of designed uses of the AstroTurf® stadium surface installed at your facility:

- Football
- Soccer
- Marching Band
- Physical Exercises
- Physical Education Activities
- Lacrosse
- Field Hockey
- Rugby
- Pneumatic rubber-tired maintenance and service vehicles
- Pedestrian traffic and other similar uses
- Softball / Baseball (non-metal cleats)
- Military marching drills
- Ceremonial vehicular pneumatic-tired traffic

FIELD MARKING AND DECORATION

Some field owners like to use elaborate field decoration, including mid-field and end-zone designs in assorted colors. Others prefer the simpler approach of sharp, well-defined game markings with no extraneous decoration. In either instance, the materials and techniques used in applying paints will determine the life of the markings and the ease of removal when these need to be changed. In marking, *do not apply paint too heavily*. Light applications give good visibility and adequate life and are less abrasive than excessive layers of caked-up paint.

DRY MARKINGS - *Very temporary* markings can be applied by using the same chalk dust used for natural turf fields (No. 32, Field White, Charles A. Wagner Company, Philadelphia, PA). In some uses, the chalk dust is slurried with water for wet application. Chalk dust markings, however, tend to be picked up and spread by the feet of players on the field, leaving tracks in unmarked areas.

Chalk markings are easily washed away or spread by water. They may be obliterated by a hard rain shower. The only advantage for chalk markings is low cost.

PAINTS FOR ASTROTURF® SURFACES

AstroTurf®, LLC. recommends a range of paints of various permanency that may be used on the turf. Line striping equipment is also available for precision field marking.

Regardless of the type of paint used and design required, best results will be obtained when paint is applied to a clean, dry, dust-and-grease-free base. It is extremely important that old, degraded paint and dirt be washed off any area that is to be repainted if the best appearance and traffic resistance are to be obtained.

We have also developed special tools and methods for painting, paint removal and cleaning of AstroTurf® surfaces. Field owners frequently use the services of professional striping and installation companies to their advantage. If, however, you elect to perform these operations yourself, the following guidelines will assist you.

1. Temporary Paints

The recommended paints in this category are designed to be easily removable after usage in a limited number of sports games. Usually, the removal can be achieved by brushing the painted area with a solution of mild detergent and flushing thoroughly with water afterwards. Paints in this category include the following:

- (a) Top quality acrylic latex water-based exterior paints such as Sherwin Williams White Paint (AII Code A-17) and Yellow Paint (AII Code P-3). One day curing of these paints, at moderate temperature, is sufficient. Prolonged curing has no major effect on durability.
- (b) William Zinsser BIN (Bullseye) White Paint, an alcohol-based opaque lacquer, readily available in most paint stores. The product is manufactured by William Zinsser and Company, 39 Belmont Dr., Somerset, NJ 08873 (telephone 201-469-8100). These paints, in our experience, are quite readily removed, particularly if applied to damp turf. They are also useful for touching-up markings on fields in wet weather.

Both of the above paints should be diluted in the ratio of one gallon of paint with one gallon of water prior to use.

2. Standard Permanent Paints

The paints in this category are designed for use as all around utility line striping material. Properly applied, they can be expected to last for at least one season and usually more. They are of the latex type, but are more difficult to remove than the temporary paints described above. These paints are available at Sherwin Williams stores nationwide. The commercial product offering the best balance among costs, availability, and durability is determined from time to time. Presently, the recommended product is Sherwin Williams SuperPaint 8AOW507, trademark SuperWhite.

3. Special Permanent Paints

Highly durable, non-removable permanent paints may find use in some applications. Once applied and cured, these paints cannot be removed and thus it is imperative that their use be restricted to carefully chosen areas. The composition of these materials is two-part urethane, which fuses into a chemically inert material upon curing. Such paints include:

- (a) Type AWLGRIP Matterhorn White, no. 82W45, manufactured by U.S. Paint Division, Grow Group Incorporated, 831 S. 21st St., St. Louis, MO 63103 (telephone 314-621-0525). This paint is mixed with catalyst no. 82-C8-A in 1:1 ratio by volume. The

catalyzed paint should be allowed to age for 30 minutes prior to application.

- (b) Matterhorn White paint no. 27-6160, also manufactured by U.S. Paint Division, Grow Group, Incorporated. This paint is mixed with catalyst 700-C-1 in a 2:1 ratio paint to catalyst by volume. Allow catalyzed paint to age for 30 minutes prior to application.
- (c) Imron White Paint no. 817U. This paint is mixed with catalyst no. 192S in a 3:1 paint to catalyst ratio by volume. This paint is available in most auto paint stores and is also available in Europe. It is manufactured by E.I. DuPont deNemours and Company.

For each of the above paints, it is recommended that 24-48 hours be allowed for complete cure. Paint always should be applied to dry turf at moderate temperatures.

We re-emphasize that paints in this category are essentially impossible to remove, and careful thought should be given before applying them to your field.

PAINTING PROCEDURES

The following procedures apply to use of the Sherwin Williams Standard Permanent Paints, described in paragraph 2 above. Laboratory tests show that durability can be improved significantly with these paints if the following application steps are taken:

1. Apply the paint on a *dry field*. (A small amount of dampness is not harmful, but it is difficult to state practical limits for the field.)
2. Don't apply the paint to very hot or very cold turf - suggested turf temperature range is 65°F to 85°F.
3. New fields can be line-striped immediately. Loose dirt should be removed by vacuuming on previously painted fields.
4. Thickness of paint on the turf is important, excessive paint use being particularly unsatisfactory. Dilute paint by adding one quart of water to one gallon of paint and mix well. Apply at rate of 350 ft. long, 4 in. wide stripe per gallon of diluted paint.
5. Curing time is critical. Allow minimum of three days after striping before field is put into service.

FIELD STRIPING - The application procedure for applying both permanent and temporary paints, using a three-roll applicator is as follows:

1. Review the field-striping plan
2. Assemble and load the striper *off the AstroTurf® surface*.
3. Test the striper's lay-down on a length of Kraft paper or cardboard top assure uniform deposition before going on the field.
4. Anchor the guide cable by attaching it to field-striping inserts or to parked vehicles at each end of the cable.
5. Stretch the cable across the field and apply a tension of 1200 to 1800 pounds by use of a ratchet wrench ("come-along"). Cable guidance is 6" from the edge of

- the 4" wide stripe.
6. Position the line striper on the tight cable by placing its grooved wheels in position.
 7. Follow the cable across field for accurate striping.
 8. Repeat until the field is completely lined.
 9. Complete the striping by using templates for hash marks, numerals, in-bound lines, etc.

More detailed instructions for using the line striper are given in an instruction manual provided by the vendor.

GENERAL GUIDELINES FOR USING TEMPORARY PAINTS - Emblems or decorations should be limited to 200 SF for any one design whenever possible - for efficient application and removal.

Both the application and visibility-after-removal of one-game paints are deceiving if viewed from too close. The quality of the paint job as well as thoroughness of its removal should be judged from the stands as well as from close up. *Use no more paint than is absolutely necessary.*

If possible, test the application procedures before going on the field for a decorating job. Use a scrap of AstroTurf® surface nailed to asphalt or a sheet of plywood or use a corner of the field. This will allow testing of colors as well as giving a "feel" for the procedures involved.

APPLICATION TECHNIQUES FOR EMBLEMS AND DESIGNS - Equipment for Application: The use of paint-spraying equipment is recommended for applying temporary paints for field emblems. The same type of spraying equipment normally on hand in the paint shop or maintenance building will be adequate. The exact specifications for typical spray rigs are given below. Spraying equipment is recommended over the use of paint-rollers for the following four reasons:

- A more uniform paint application can be made by spraying.
- A more intricate template can be used if the paint is sprayed.
- Paint can be applied more rapidly with spray techniques.
- Paint can be removed more easily from areas that have been correctly sprayed than from areas on which the paint has been rolled.

When applying the paint, use large templates and cardboard or wood windshields to minimize paint over-spray. These recommendations should be followed whether an air-spray or an airless spray system is used.

There should be on hand and readily available an 8% solution of ammonia to clean up spills before they solidify. Directions for preparing this ammonia solution are given later in the section, which covers paint removal.

The paints should be applied lightly to the tips of the grass blades of the AstroTurf® surface. Do not attempt to paint the entire length of every blade or apply the paint down to the bottom of the grass surface. Applying the paint too heavily will harden the painted surface, make it too rough for player safety and will make the removal job difficult.

An air-spray system is recommended over an airless one because it gives closer control, especially with intricate designs. When using an air-spray gun, experience shows that a DeVilbiss spray head assembly consisting of 505E fluid tip, and E-S needle and a #53 air cap gives good results. A Grayco spray head assembly consisting of a 161-188 fluid tip, a 164-870 needle and a 161-192 air cap may be used as an alternate. Other equipment similar to the heads described can be used if your own tests show they are equivalent. Set the pot pressure at 40 to 60 psi and the atomizing air at 80 to 100 psi.

Always strain the paint prior to using it in the air gun, because of its quick drying characteristics. Use sufficiently wide templates and use air shields to control over spray. With an air-spray system you should obtain coverages of at least 150 square feet per gallon. Aim for high spread- rates whenever possible.

If working with an airless system, use a .018" orifice tip with a 12" wide fan. Experience has shown that with a 26:1 ratio airless pump; a supply pressure of approximately 40 psi should be used. Plan the work ahead and mix no more paint than needed because of its fast drying. Always strain the paint prior to use and always use an in-line filter. With an airless spray system, coverages of no less than 180 square feet per gallon should be obtained.

If emblems are left down for more than one game and need to be touched up, use a common paint roller for the purpose. Remember, however, that additional paint will make the removal job more difficult.

Always use a guide such as a template or a straight edge when applying paints to an AstroTurf® field. This also holds when doing touch-up work with a paint roller.

Do not lay out emblems whose design encourages double coverage. For example, for red letters with a white border, do not paint a solid white letter and then paint a smaller red letter on top. Instead, paint the red letter and then add a narrow white border. Double coverages are unnecessary as well as difficult to remove.

PAINT REMOVAL - The main key to efficient removal of temporary paint from AstroTurf® surfaces is initial control in the application. The use of excessive amounts of paints is wasteful, presents abrasion hazards to players and requires extra work in removal.

Either of the following two techniques should result in clean removal of temporary paints within reasonable time and without excessive manpower.

If it is necessary to remove standard permanent paints from an installation, it is recommended

that you take advantage of the equipment and expertise of paint or turf installation professional. However, the methods described below for temporary paints also will be reasonably effective with standard permanent paints, particularly Method B.

EQUIPMENT FOR PAINT REMOVAL - The two techniques utilize equipment that is normally available on site or can be rented.

The first, Method A requires the use of a street broom, a small sprayer or watering can, a water hose, a medium-sized tank or bucket for mixing, and a couple of wet vacuums.

The second Method B requires the same equipment as the first, with the addition of high-pressure hot water. This method may also be used to remove standard permanent paints, if necessary.

MATERIALS NEEDED - Both methods require use of 8% ammonia.

The solution should be prepared in advance and access to water outlets provided. The 8% ammonia solution is prepared from aqua ammonia (33% ammonia) by diluting with three parts water to one part aqua ammonia.

CAUTION: Aqua ammonia is a strong chemical. Follow the seller's instructions for handling - including eye protection, avoiding skin contact, etc. Ammonia is very corrosive to copper alloys; do not use brass nozzles or fittings. For mixing, use galvanized watering cans and sprayer tanks at all times.

PROCEDURES - The two procedures recommended may be used at the field maintenance crew's discretion:

Method A.

1. Hose down the painted area with water until the surface is saturated.
2. Using a sprayer or a watering can, apply the ammonia solution on the painted area. It is important that the ammonia solution be metered out uniformly at the rate of one gallon per 45 to 50 square feet.
3. Scrub the wetted area with a street broom until the ammonia solution turns to foam. A sweeping motion similar to sweeping a floor is sufficient. During this step, the paint will start to loosen and the pigment will begin to run. However, do not shorten the sweeping at this point.
4. Wait about 10 minutes to allow the foamed ammonia to work.
5. Apply the same amount of ammonia solution on the area a second time.
6. Thoroughly scrub the area again with a street broom. This scrubbing is not intended to be a light scrub; *scrub vigorously*.
7. Hose down the area with water and simultaneously pick up the water and dislodged paint residue with the wet vacuum. *Do not let the water and paint residue seep across the field.* If the residue and water start to spread, stop the

- hosing and let the wet vacuum catch up.
8. Repeat the process if necessary. However, if the paint was applied lightly and uniformly, it should not be necessary to repeat the process.

Method B.

Steps 1 - 4 : same as in Method A

5. Blast the paint loose with hot water from an industrial high-pressure hot water cleaner. Set the water temperature at 180 ° F. Use a nozzle that will give a 3 to 5 inch fan width; use 10 gallons of hot water per minute and a water pressure of 1000 psi. No solvent is required or desirable.
6. Simultaneously pick up the paint residue and water with the wet vacuum or immediately flood the field. Either procedure will accomplish the same ends. (NOTE: Equipment to provide the necessary pressure and water temperature is *not* the same as used for so-called "steam extraction" carpet cleaning. It is, however, similar to that used for cleaning automobile engine blocks, masonry, storage tanks and the like. Normally, this type of equipment can be rented in most metropolitan areas.)

PRECAUTIONS - These overall procedures have been recommended for field decorations not exceeding 200 Square Feet in area. It is suggested, however, that this total area be broken down into smaller portions of approximately 50 square feet, and each small area cleaned successively. This apportioning makes the removal much more manageable. If the emblem is letters, such as school initials or abbreviations, clean off one letter at a time. Unless the ammonia solution is spread uniformly, the paint removal will be streaky. The paint will not soften unless it comes in intimate contact with the ammonia.

Take care to rinse the cleaned area thoroughly with plenty of water and pick up the rinse-water rapidly with a wet vacuum. Failure to do either may result in unsightly rings or spots of paint residue. Much can be learned from trial runs, off the stadium surface. Perfect your techniques off the field.

PAINTING / REMOVAL MANPOWER REQUIREMENTS - For planning and budgeting purposes, the following approximations should be helpful. They are based on experiments on small areas in ideal circumstances as opposed to full-scale painting.

1. For applying the paint, plan approximately one man-hour per 100 square feet, depending on the intricacies of the desired emblem. This is for the painter; helpers will probably be needed to handle templates and hold air shields.
2. For removing paint, you can plan on approximately one hour per 75 square feet for a four-man crew.

LOAD LIMITS

The list of events held and the required equipment moved and erected on AstroTurf® surfaces grows longer every day. If proper steps are taken, almost any requirement can be accommodated, but certain precautions are necessary. Protection of the shock-absorbing underpad of the playing surface is especially important. Many under-pads are composite materials that contain nitrogen gas in numerous closed cells. Over extended periods of excessive compression, some of the nitrogen can diffuse through the cell walls, resulting in a marginal loss of volume. The cell walls themselves are not affected unless the overload is severe enough to cause separation or rupture.

As a general rule, AstroTurf®, LLC. recommends that no long-term static load of more than 2 psi (300 lb/ft²), nor any transient rolling load of more than 35 psi be applied to any AstroTurf® Stadium System (foam pad or elastic layer underpad). Rolling loads of up to 30 psi are acceptable on an occasional basis. (The loading of a pneumatic-tired vehicle is approximately equal to the air pressure in its tires.)

It is good practice to eliminate any unnecessary long-term static loads and to keep the necessary ones as low and brief as possible. Sheets of 3/4 inch exterior plywood, or pieces of 2x10 lumber may be used to spread major static loads and thus minimize the risk of damage to the turf system. NOTE: *Under static loads the surface should first be covered under load spreaders with polyethylene sheeting to keep it clean.* Some kinds of new plywood contain materials that will leach out and stain the turf if it is wetted; a polypropylene barrier under the plywood will prevent this happening.

DRAINAGE AND WATER REMOVAL

The 500 or greater denier nylon ribbons used in AstroTurf® stadium surfaces are selected partly because of their low water retention and rapid drainage properties. Outdoor playing fields either are sloped to permit good drainage, minimizing the need for mechanical water removal, or are of the modern Drain-Through types utilizing a permeable subbase. When it is necessary to augment the draining of a field, however, two removal techniques are suitable:

1. **Small Areas:** One of the easiest ways to move water off small areas is with rubber squeegees. These are usually available at mill supply or janitor supply houses. Some stadium owners have constructed large squeegee blades for use on a Jeep, ATV or on small lawn tractors. If a power squeegee is to be used, extreme caution should be taken to avoid gouging into the turf system and damaging it. **DO NOT USE WOOD, METAL OR OTHER RIGID SQUEEGEE BLADES.**
2. Fields utilizing the permeable subbase construction are self-draining, whether water is from rainfall or from field cleaning. On such fields, unnecessary intrusion of dirt, sand, or other fine-grained debris should be avoided by vacuuming up such spilled materials promptly.

SNOW AND ICE MANAGEMENT

Snow and ice are not harmful to AstroTurf® surfaces and can generally be left to melt and run off of their own accord. Sometimes, however, it becomes essential to clear away snow and ice to permit scheduled use of the field. When this happens, the working principle for snow is to leave it in place until as near to game time as possible. Doing so will minimize the risk of ice build-up from cold wind blowing across a damp snow-cleared surface. Ice removal is more difficult, especially if a heavy layer has built up following freezing rains (see below). Two methods are used for snow removal:

SNOW BLOWERS - If the snow is dry and powdery, it can be swept or blown from the field using a rotary brush or snow blower. *Be sure that any machinery used is set so as not to dig into the turf or gouge the surface.*

If using a blower:

- a. The first pass of the blower should be down the center of the field.
- b. Second pass should be made at the edge of either side of the first pass and the blower must be adjusted so that the snow is deposited in the truck.
- c. The blower then continues on down one side and up the other accompanied by the truck.
- d. Clean off remaining snow with a mechanical broom.

SNOW PLOWS - Snow that is wet and sticky may be more easily pushed off the field by using a snow blade with a 4 to 6 inch wide rubber tip mounted on a Jeep or light tractor. If such a blade is used, extreme care should be taken to avoid digging into the surface. The best blade setting is one that barely "kisses" the top of the surface and rolls the snow ahead of the blade. In this procedure, the snow itself will maintain contact with the surface. Wood, metal or other rigid surface blades should not be used.

- a. Adjust the blade to proper height *taking care that it will not gouge or dig into the surface.*
- b. Push snow into piles.
- c. Scoop into truck using front-end loader.
- d. Use a rotary mechanical broom to clean off the remaining snow.
- e. Severe cases of ice can be removed by using a small lawn roller to break up the ice and then proceed as above.

It is recommended that all of the equipment used as described above be moved on pneumatic tires. LUGS, STUDS AND CHAINS ARE DAMAGING AND SHOULD NOT BE USED. Snow removal equipment may be stopped momentarily on the turf surface, but **DO NOT PARK SUCH EQUIPMENT ON THE FIELD OVERNIGHT OR FOR SEVERAL HOURS.** Tire pressures should be below 35 psi. **IMPORTANT:** Keep tarps or field covers off the field in freezing weather. They are difficult to remove when frozen to the surface.

ICE REMOVAL - In some cases it will be desirable to go over the field with a lawn roller or rotary street broom to break up and sweep away frost or ice. If the day is sunny and the frost or ice not excessive, it tends to melt readily over AstroTurf® surfaces, especially with player foot traffic to aid in the process.

In the event of extreme cold weather and a heavy layer of ice, there is little choice but to use chemicals to assist in getting rid of it. It should be remembered that *any* ice-melting chemical put on the field would leave residues that may leave the turf slippery or sticky. Such residues should be washed off the turf as soon as weather permits.

Many chemicals commonly used for ice melting are irritating to human skin, corrosive to equipment and/or harmful to synthetic turf. Among these are such old standbys as rock salt, ammonium nitrate and calcium chloride. These chemicals should NOT be used on AstroTurf® surfaces because they might irritate players' skin, corrode equipment or damage the surface.

The only ice melter found to date which is safe, inexpensive and non-corrosive is fertilizer grade urea.*

When an AstroTurf® surface has been subjected to a freezing rain or is heavily frost-coated, thawing can be hastened by broadcast application of *prilled, fertilizer grade urea*. The spread rate will be determined in some measure by the amount of ice present, but 100 pounds per 3000 square feet is a good starting point. After spreading, the urea should be allowed to remain in place for half an hour or more to melt the ice. It should then be removed from the field (along with the water it has picked up) with a squeegee. Urea will be less effective as the temperature drops below 10°F to 12°F (-11°C to -12°C) and it is ineffective below 0°F (-18°C).

A thick residue of urea will be left behind after the field is squeegeed, vacuumed or swept. In wet weather this film will make the field somewhat slippery. As soon as danger of a hard freeze is past, the field should be washed down with liberal amounts of water to remove traces of the urea.

*Urea is not hazardous to handle, and if absorbed into the body, is only slightly toxic. Urea is used as a drug for human use and is consumed in large quantities as a feed supplement in cattle food. Ref. Torald Sollman, *A Manual of Pharmacology*, W. B. Saunders Co., Philadelphia, 1975, Pg. 1051.

WARNING

- a. DO NOT USE COMMON SALT, ROCK SALT, CALCIUM CHLORIDE, AMMONIUM NITRATE or other corrosive or irritating chemicals to melt ice on AstroTurf® playing surfaces. Their presence can damage equipment, be harmful to personnel or the turf itself.
- b. Urea may be a mild eye irritant. If it gets into a player's eyes, it should be washed out with liberal amounts of water.

WATERING SYNTHETIC TURF SURFACES

Some owners have found it desirable to deliberately wet their synthetic turf surfaces, especially in periods of very hot weather. Wetting the surface provides moisture for cooling the field by evaporation. It also acts as a lubricant to the turf, lowering player traction to a slight degree.

Both experience and theoretical calculations have shown that an outdoor playing surface on a hot, sunny day can receive enough radiant energy to evaporate about a quart of water per square yard per hour. As the moisture evaporates the temperature of the synthetic turf will match that of natural grass in the same area. A full sized soccer, hockey or football field may evaporate up to 1500 gallons of water per hour in extremely hot weather.

If you decide to water your field, be careful to distribute the water evenly over the area in use. The recommended amount of water will just dampen the surface, but should not be enough to make it water soaked.

If water is put on the field, it should not be from a polluted supply.

SPECIAL EVENTS

Most of the questions regarding AstroTurf® surface usage are concerned with assemblies and convocation, shows and circuses or concerts and musical events. The first two categories are primarily involved with surface loading; the third category is primarily involved with crowd management.

ASSEMBLIES AND CONVOCATIONS - Stadiums with AstroTurf® surfaces are used for graduation exercises at many college and universities after which no problems have been caused to the playing surface.

The basic precaution is to keep long-term static loads below 300 pounds per square foot by the use of plywood or other load spreaders. Normally 4x8 foot sheets of ¾" plywood do a good job of load spreading provided the load is not applied too near the edges of each panel. Polyethylene film should be laid over the turf under the load spreaders to avoid staining or soiling of the turf.

Any chairs placed directly on the playing surface should be inspected to be sure that the tips of the legs can't damage the turf. Metal chair legs should be protected with rubber tips. The legs of wooden chairs should be free of any projection sharp enough to tear the turf or damage the underpad. **WE STRONGLY CAUTION AGAINST PLACING OF CHAIRS DIRECTLY ON SURFACES WITH ELASTIC LAYER UNDERPAD.**

SHOWS AND CIRCUSES - Events ranging from equestrian shows to circuses fall outside the usual lists of designed uses for AstroTurf® surfaces, although a number of them have been successfully held. If an event of this sort is to be held, precautions regarding static loads are especially important. Provisions should also be made for the prompt removal of animal wastes. Acts involving open flame on the playing surface should be strictly prohibited. Our technical service department can frequently suggest ways to set up for special events that will minimize the risk of turf damage.

"ROCK SHOWS" AND CONCERTS - "Rock and Roll" concerts have become popular events in recent years. These, too, fall outside the list of designed uses for most AstroTurf® surface installations. The problem of surface loading to support stages and sound equipment is obvious, but can generally be overcome with proper load spreaders. Unfortunately, a much more serious problem is control of crowd behavior. If it is necessary to host such an event, use common sense and these guidelines for suggested ways to minimize the risk of turf abuse and damage.

In the case of all non-designed uses for AstroTurf® surfaces, the Owner should be aware that any resulting damage to the turf *is not covered by AstroTurf® warranties*. The above mentioned three categories all fall under this listing of non-designed uses.

V MINOR REPAIRS TO ASTROTURF® SURFACES

Your AstroTurf® playing surface has been carefully engineered to provide good service for many years. In the absence of vandalism or unusual abuse, problems should be limited to those handled by minor repair. For more serious problems, consult AstroTurf®, LLC.

WHEN TO REPAIR

The first part of any maintenance program is awareness - a day-to-day knowledge of the usage and condition of the facility being maintained. Maintenance of synthetic playing fields is no exception. Minor damage has a way of growing if not repaired. The last thing a user wants is the need for emergency service on the day of a planned event.

In addition to routine awareness of field condition, once or twice a year each field should be given a careful and thorough inspection, preferably in the spring with a follow-up in early fall. All seams should be inspected and any loose areas noted and repaired. Go over the body of each panel of fabric and note any rips or tears. Assess the status of the under-padding and the condition of the surface. On older and heavily used fields, inspections should be made more often.

Why a spring inspection? Most AstroTurf® fields are scheduled for their heaviest usage during the fall months. If your inspection indicates that help is needed contact AstroTurf®, LLC., or your installer. Skilled crews and early scheduling will permit better service. If a service visit can be scheduled to coincide with installation work in the same area, the cost of such service can be reduced.

Repairs are easier to make in warm, dry weather. Adhesives hold better and cure faster; there is more opportunity to leave the repaired areas undisturbed during the time needed for curing. Gluing repairs should not be attempted if the field is wet. Wait for it to dry or take steps to dry the area to be repaired.

WHAT ARE "MINOR REPAIRS?"

With over 300 installations in service, we have found that the majority of field repairs needed can be caught at the "minor" level. Open spots in sewn seams and loose areas in seams extending a few inches to a foot or two along a glue seam line - where at least one of the turf edges is still attached to the seam tape - are easily repaired by the Owner's Maintenance Staff. Cuts, rips or tears in the surface fabric that are less than six inches or so in length do not generally require the insertion of seam tape. These can also be regarded as minor unless allowed to grow. All of these problems can be handled by sewing or gluing repair.

In most areas, field owners have access to skilled craftsmen who are competent to take on more extensive repair jobs, but if there is any doubt, the Owner should contact AstroTurf®, LLC., for consultation and help if needed.

SEAM REPAIRS

The instructions which follow cover repairs to loose seam areas, typically from a few inches up to several feet in length and one-half to two and one-half inches deep (from the edge of the fabric). If the seam openings are widespread or severe, the user should contact their installer or AstroTurf®, LLC., for special instructions and/or help.

Needed are several 4", curved upholstery needles and a supply of color matched, stabilized thread of the type currently use in all new AstroTurf® installations.

For situations where gluing repairs may be more convenient, use a construction grade panel board adhesive, available in caulking tubes. A suitable material is "Power Grip" by H.B. Fuller Co., or equivalent.

PROCEDURE FOR REPAIR BY SEWING - Hand sewing with any of several common stitching techniques provides a durable, all-weather method for seams and minor fabric tears. A recommended technique is the two-needle "baseball stitch". The advantage of the baseball stitch is that the needles carrying thread always are inserted into the visible (top) face of the AstroTurf® fabric, making it easier to locate natural spaces between yarns of the fabric backing for the needles to pass.

The sequential steps for either one of the two needles in this intertwined stitch are listed below. **IMPORTANT:** Be sure the thread engages both edges of the fabrics at least two fabric wales (yarn rows) back from the edges. This minimum distance is about 1/3".

1. Use two 4-inch curbed upholstery needles, threaded with 5000 denier green polyester yarn.
2. Open the loose seam area, and insert the first needle from the back to the face. Then insert the second needle from the back of the other piece of fabric.
3. Tie the ends of the two strands of yard together, using a square knot.
4. Pull both ends tight, burying the knot beneath the fabric.
5. Stitch from the top (face) through the fabric, and across to the back of the other side - bringing the needle out to the face. Repeat the process from left to right and right to left with the two needles.
6. Every 5 or 6 stitches tie the two yarns together, using a square knot. This will prevent unraveling if the yarn is cut. Use a square knot to tie off the finished repair. Snip off any excess with scissors.
7. Brush the fabric in the vicinity of the seam, to pick up the nylon pile and make the thread less visible.

PROCEDURE FOR REPAIR BY GLUING - Gluing of minor tears or loose seam sections may be preferred in some cases. Some general guidelines are listed below. **IMPORTANT:** Be sure fabrics to be glued are free of loose dirt, old adhesive, and other foreign matter, and are dry. Otherwise a poor bond will result.

1. Clean the area to be repaired and wipe the opening with methyl ethyl ketone (MEK), toluene, or, if neither is available, with mineral spirits. Position fabric to check for satisfactory final placement.
2. Apply panel board adhesive according to manufacturer's recommendations. Avoid excess adhesive, to reduce bleed-through.
3. Weight the mended area until the adhesive has set.

Note: For rips or tears involving more than about six linear inches of fabric, the gluing repair should include insertion of fiberglass or polyester seam reinforcing tape.

Note: MEK, toluene and mineral spirits are highly flammable and vapors may be harmful. Use in an open, ventilated area. Do not use near open flame, cigarettes, or other ignition sources.

OTHER REPAIRS

If seam or fabric damage has been allowed to go beyond the scope of repairs described above, the Owner should contact their installed or AstroTurf®, LLC., for advice or to request help. Significant damage to the bond between turf-and-pad or pad-and-subbase, or damage to the pad itself should be brought promptly to the attention of AstroTurf®, LLC.

FOOTWEAR

Field hockey turf specific shoes are the preferred footwear of AstroTurf Nylon surfaces. It is expected that regular running shoes will also be used, however, court shoes (flat sole), metal and hard plastic cleats should not be worn as they will prematurely wear the surface.

VI HOW TO GET HELP

AstroTurf®, LLC. and your installer are knowledgeable and can usually help the Owners and users of AstroTurf® playing surface. If emergency repairs are needed, call your installer or AstroTurf®, LLC. promptly at (800) 723-8873.

VII IN CONCLUSION

The old saying "If it's worth having, it's worth taking care of" applies to AstroTurf® surfaces. In this manual, we've tried to give you answers to the questions most often asked about maintenance and how to get the maximum use. A few points should be repeated that will help extend the life of your field.