FOUR

Operations

Vehicles and Equipment

Vehicles are essential equipment for all EMS agencies, and the selection of the most appropriate vehicles is a key management decision. When the subject of EMS vehicles arise, most people think of ambulances. However, while ambulances represent a highly visible and important type of vehicle, many EMS agencies also employ a variety of other vehicles, including fire department pumpers, specially-configured Bronco/Suburban-type vehicles, and squad or other types of apparatus. Other vehicles used to support EMS services include supervisor cars, supply units, and helicopters and airplanes for air medical transportation services.

An EMS system's investment in vehicles represents a significant capital expense. For this reason, care must be taken in selecting the most appropriate unit and developing an effective acquisition process. Although this section focuses primarily on selecting and acquiring ambulances, the processes identified can be adapted for the procurement of all types of EMS vehicles.

Ambulance Types

There are three types of ambulance categories in modern EMS systems. A Type I ambulance is built on a truck chassis and has a modular (box-style) patient compartment. A Type II ambulance is a modified van with a raised roof and pos-

sibly an extended patient compartment. A Type III ambulance combines a van chassis with a modular patient compartment. Modular construction of ambulances allows either the old patient compartment to be placed on a new chassis or vice versa, thus saving the cost of having to replace the entire ambulance.

Each vehicle type has advantages and disadvantages. A Type I ambulance is generally bigger and can carry a heavier payload, but it is less maneuverable and typically less fuel-efficient. A Type II ambulance is the most maneuverable of the three and generally has the best fuel-mileage performance, but it also has the least amount of room within the patient compartment. The Type III is a compromise between I and II—it has more room in the patient compartment, but retains some of the maneuverability characteristics of the Type II vans.

The Department of Transportation (DOT) has established specifications for ambulances. These specifications are updated periodically and are referred to as the "KKK specs." Many government and state contracts and requests for proposals mandate the KKK specs as the minimum standard for ambulances to be used in the performance of the covered work.

Medical Aircraft Types

Aircraft used for medical transportation fall into two main categories: helicopter and airplane. Helicopters, also referred to as rotor-wing aircraft, provide emergency medical services in more than 150 communities.

Medical helicopters are either single-engine or twin-engine. The twin-engine helicopters offer more power and the benefit of having two power plants to operate the helicopter rotors. Twin-engine helicopters are further subdivided into light, medium and heavy twins. These subclassifications are determined by gross aircraft weight.

Airplanes are not typically used for primary emergency response, but are involved in long-distance interfacility transportation. A number of different types of aircraft are flown in fixed-wing programs, ranging from single-propeller engine aircraft, to twin-engines (either reciprocating or turboprop), to jet aircraft. Medical airplanes operate both nationally and internationally.

Criteria for Vehicle Selection

A number of issues need to be analyzed prior to selecting the most appropriate vehicle for an EMS agency. First and foremost, a clear statement of how the vehicle is to be used must be developed. Other considerations include maintenance costs, the availability of service, manufacturer's support, compatibility with the rest of the fleet, the quality of the unit and the vehicle's cost.

Analyze Vehicle Uses

An organization must have a full understanding of the primary mission of the vehicles it selects and purchases. Different ambulances types are better suited for different jobs, so the job required of the vehicle must be clearly identified prior to the vehicle's selection if it is to adequately fulfill that role. For example, a service that provides vehicle extrication as part of its EMS role will require a different vehicle than one that primarily transports non-emergency patients, while a vehicle that is frequently involved in long-distance transfers is likely to be different than one primarily used to respond to 9-1-1 calls. Factors that should be considered when determining which vehicle is most appropriate for the job include maneuverability, maintenance costs, patient-care compartment size and gross vehicle weight, to name a few.

Most EMS agencies cannot have a fleet large enough to allow vehicles to be dedicated to single-use functions; a long-distance vehicle might be needed for interfacility transports or primary emergency response, for example. Thus, most of the time, an organization will have to compromise on vehicle type if the ambulance is to fulfill a multifunction role. While it might be desirable to have a large Type I vehicle with a modular compartment for critical-care transports, it may not be cost-effective to have such an expensive vehicle for only four or five such transports a year. The service may need to compromise by selecting a Type II with an extended bed or a Type III with a medium-sized compartment that could function in primary emergency responses and also accommodate critical-care transports.

There is a tendency for services to select vehicles based on "bells and whistles," size, and by what types of ambulances the other services in the area are using. Caution should be taken in the selection process to keep these factors from significantly impacting appropriate vehicle selection.

Maintenance Costs

The initial purchase cost of a vehicle is generally exceeded by its long-term maintenance costs. For this reason, the costs of ongoing maintenance should be considered when selecting a new unit. One with excessive options or complex electrical systems is likely to experience a much higher maintenance-cost history than one that is more conservatively configured. Also, a heavily loaded vehicle that approaches gross vehicle weight capacity is likely to experience higher maintenance costs than a lighter one.

The history of maintenance costs from the organization and information from the manufacturer should aid in calculating long-term maintenance costs.

Service and Manufacturer Support

The availability of local service is also a key consideration when selecting a unit, since local service can often reduce turnaround time when a vehicle needs

maintenance or repair. Bear in mind that different manufacturers support their ambulance customers at different levels. And a less-expensive ambulance with poor after-sale manufacturer support often turns out to be a more-expensive unit in the long run. Certain elements of manufacturer support can be defined in writing, but the best measure of a manufacturer's performance is garnered by contacting various EMS organizations that already use that particular manufacturer.

Compatibility With Fleet

A valuable consideration when selecting an ambulance is its compatibility with the rest of the organization's fleet. Ideally, all the fleet ambulances would be identical. Sometimes this is impossible, with special vehicles required for long distance or critical-care transport. Yet using the same manufacturer for the chassis and the patient compartments will help standardize the fleet, assist maintenance and reduce inventory requirements. Fleet standardization has a significant advantage in that fewer parts need to be maintained within an organization—from headlights to engines. It is also more efficient for crews to operate similarly outfitted ambulances, because vehicle handling and equipment and supplies storage are standardized.

Quality

Value for money is often difficult to determine. Yet the construction quality and the appearance of an ambulance are indicative of long-term vehicle performance. An ambulance manufacturer that pays attention to details during the construction phase will usually offer a product with fewer problems in the long run. Some quality indicators that might be reviewed include: finishing details, such as exterior paint; the strength of compartment construction; the organization and detail of the electrical system; the interior cab and patient compartment noise levels; and the feel of the ride.

Cost

The final consideration in vehicle selection is the unit's cost. Unfortunately, this is the first consideration for many organizations. Cost is important, but it should be considered only after reviewing all of the other selection criteria. An inexpensive vehicle with poor quality and minimal manufacturer support is likely to be a more expensive vehicle over time. The most significant impact on ambulance cost is the selection of options. Therefore, if an organization needs to reduce the price of a unit, it would be better served to reduce the number of options rather than to compromise quality and durability.

Vehicle Acquisition

The purchasing practices used for vehicle acquisition can be applied to the selection and purchase of any major capital item, such as communication system

components or defibrillators. An effective purchasing process accomplishes a number of goals. First, it ensures a clear understanding of the job for which the equipment is being acquired. Second, it allows for the evaluation of available items from various manufacturers. Third, it ensures that the organization ultimately purchases what is needed at the best possible price.

A comprehensive procurement process requires the 11 steps listed in Figure 4.1.

Needs Evaluation

Determining exactly what is needed may seem obvious, but it is an often-overlooked step in the procurement process. An evaluation of the organization's needs provides the opportunity to separate desires from actual requirements. It also offers the organization an opportunity to receive input from its different members.

Whenever a new piece of equipment needs to be purchased or replaced, it is important that the people who actually use the item be involved in its selection. It is not appropriate for the chief financial officer to determine which ambulance is best suited for the job. It is important for the crews to have input and provide guidance in selecting their equipment.

It is also beneficial to separate desires from needs at this time. Field personnel, operations managers and even owners invariably desire equipment for their ambulance units that may turn out to be merely expensive bells or whistles, such as additional chrome and elaborate emergency lighting systems. There may be valid reasons for selecting certain options, but there are likely to be some desires that may not be supportable. A needs evaluation allows for careful sorting of an organization's needs from its wants.

Figure 4.1: 11-Step Equipment Acquisition Process

1. Evaluate needs
2. Develop functional specifications
3. Develop technical specifications
4. Conduct research
5. Modify specifications
6. Request bids
7. Evaluate bids
8. Negotiate purchase
9. Purchase item
10. Inspect item
11. Evaluate procurement process

Needs assessment will also determine the type of ambulance needed and the realistic price range. Field personnel may desire the largest available modular patient compartment, but management may wish to have Type II vans. Determining the vehicle's uses will often make these decisions much easier to assess. The process also helps multiple groups within the organization to accept the decision.

Once the uses and needed characteristics of a vehicle have been defined, it is possible to move on to the next step—developing functional specifications.

Developing Functional Specifications

The creation of functional specifications allows people without technical expertise to clearly identify what they need and to describe how the unit should function. For example, the functional specifications for a neonatal transport unit may include: "The vehicle shall have electrical capacity to operate the hospital's isolette, or there will be enough on-board oxygen storage capacity to provide oxygen to the isolette for three hours."

The functional specifications will be translated into technical detail in the next phase. It is important to clearly identify the job to be done without encumbering personnel with the technical knowledge of how it should be accomplished.

Develop Technical Specifications

Developing technical specifications requires a great deal of time and expertise. To aid in the process, manufacturers will offer examples of technical specifications on their particular ambulances. The technical specifications should be applicable to a variety of manufacturers, and care must be taken when comparing manufacturers' specifications not to eliminate other competitors who may use different manufacturing techniques or construction materials. Although it is easy to unite specs designed for a particular manufacturer, this typically results in a process in which the best value for money is not achieved.

Technical specifications should cover every component of the ambulance unit, including the chassis, engine, electrical systems, patient-compartment configurations and manufacturing details. The first time the technical specifications are developed for a particular item or vehicle, the process will be extremely time-consuming. Once the initial template for procurement is developed, however, subsequent procurement of similar items should be greatly shortened.

Conduct Research

Once the functional and technical specifications have been developed, it will be necessary to research available products. The goal of the research process is to make sure that the items specified are appropriate and available. This research process will also identify areas that may have been missed in the functional and technical specification phases.

Researchers should look at various products currently available from multiple manufacturers and compare them with the specifications. This will identify areas in which the specifications may create expensive problems for manufacturers if they are to comply. One effective research method is to distribute the technical and functional specifications to manufacturers for comment prior to requesting bids.

Modify Specifications

After the comprehensive research has been completed, it may be necessary to make minor or even major modifications to the functional and technical specifications. Once the modifications are complete, the request for bids can be sent out.

Formally Request Bids

The next step is to formally request bids from vendors. Functional and technical specifications should be distributed to qualified manufacturers and product suppliers. The specifications or a cover letter should indicate the purchase schedule for the vehicle, with key points being when the bids are due, when and how they will be evaluated, when the selected supplier will be notified, and the delivery schedules and payment arrangements. The name and number of a contact person within the EMS agency should also be included in the cover letter.

Adequate time should be allowed for the suppliers to respond to the request; a 30-day response period is appropriate for major capital items. This time frame could be reduced if required, but a reasonable length of time generally results in a more appropriate response from the suppliers as well as a more careful evaluation of the specifications before bids are submitted.

Evaluate Bids

Once the suppliers have returned the bids, it will be necessary to evaluate and compare the proposals. It should not be assumed that all bidders have complied with and responded completely to the functional and technical specifications. Rather, each item in the specifications needs to be evaluated and compared with responses to ensure compliance. It is likely that certain bidders will offer alternatives or indicate that they cannot supply or fulfill a particular component of the specifications. It will then be necessary to determine whether these variations are acceptable and how they would impact that bidder's price when compared to what the other bidders are offering.

For price not to be the sole determinant in a purchase decision, it is important to quantify the importance of various aspects in the specifications. A value should be placed on each specification area, with a possible maximum score attributed to each category. Every bidder should be scored in each of these areas with price being given the appropriate weight in the scoring process.

The key to effective scoring and bid evaluation is weighting the various components of the specifications appropriately based on their importance to the EMS service. For example, if price is the most important consideration, it should be allocated the most points in the scoring process. Other areas, such as electrical systems, may have a lower weight and hence a lower maximum point value.

Negotiate Purchase

Some government agencies may be precluded from negotiating with a vendor after the winning bid has been selected, while many services can negotiate after the award of the bid. Negotiations can take the form of a better price, offering a trade, or eliminating options and establishing more favorable payment terms. To determine whether such negotiations are allowed in a particular service, each agency should review the purchasing regulations and ordinances under which it operates.

The negotiation process may be extensive or minimal depending on the goals to be achieved and on how adequately the specifications were in defining the organization's procurement needs.

Purchase Vehicle

With the negotiation phase finalized, a purchase contract can be executed or a purchase order filled out for the particular item being secured. It is at this stage of the process that buyers should consider including penalties for not meeting the delivery date as well as the payment arrangements.

Inspect Vehicle

After the vehicle is delivered, all components of the unit should be fully inspected according to the functional and technical specifications. Every item listed in the specifications should be assessed for compliance. Careful inspection of quality and workmanship also should take place. Mechanical systems should be fully tested and the unit road-tested. This inspection should be completed, and any unacceptable defects or areas of noncompliance rectified, prior to final payment.

Evaluate Procurement Process

After the purchase inspection and acceptance of a vehicle, it is important to evaluate the procurement process. This will assist in enhancing future purchasing efforts for equipment, and it should be done as soon as possible after the process if small problems or experiences are to be recalled. Any problems should be written down, along with an overall evaluation of the process. Some of the questions to be asked in the evaluation include: Were the functional and technical specifications adequate or too restrictive? Did the service receive the best value for the money spent? In what areas were mistakes made during procurement?

The procurement process for major capital equipment items is complex. Organizations that succeed in developing and following comprehensive methods

will become much more effective in their purchasing practices. The key results are purchasing exactly what is needed and receiving the best value for the money expended.

Equipment Selection and Acquisition

The same methodology used in the selection and acquisition of ambulance vehicles should also be used in selecting service equipment—from medical equipment on the ambulances to computers in the communications center or billing and collection offices. A demonstrated need for each item should exist prior to a purchase being considered. The definition of what an item is to be used for and how it should function is important for all equipment purchases.

The selection and acquisition of medical equipment requires steps not included in the vehicle procurement process. Selection of the equipment needs to be based on research and compatibility with the EMS system's clinical protocols and medical standards of care. It is inappropriate to place a piece of equipment into service that employees have not been trained or certified to use, or equipment on whose use the system's medical community has not reached agreement.

New or replacement medical equipment must be evaluated by the physicians responsible for EMS in the region. New items should be purchased and placed in use only after these physicians have confirmed that the items are both necessary and appropriate.

Corrective Maintenance

Maintenance programs have two main purposes: to make sure that a vehicle or piece of equipment is available and functioning properly when needed and to extend the life of that vehicle or equipment.

In an EMS system, the first purpose of a maintenance program is the most important: the technologically sophisticated equipment on ambulances must perform flawlessly each time it is used. Therefore, it is necessary to have an exacting maintenance program. The same is true for vehicles. If an ambulance fails, the patient's treatment will be compromised.

It is a dangerous practice to extend the useful life of a vehicle, or any piece of equipment, beyond reason. The money saved is false economy. For example, attempting to extend the life of a worn-out defibrillator by an extra two years may lead to its failure when used on a critical patient. Such a failure may result in a legal claim on the service that will cost as much as a thousand new defibrillators would have—not to mention the human cost. Likewise, damage done to a service's public image because of long response times caused by ambulance mechanical failures may cost more than the price of a new vehicle. It is impossible for employees to accomplish their jobs with non-functional vehicles and equipment.

When developing an EMS maintenance program, there is no room for error. Vehicles and equipment *must* perform when needed. Each piece of equipment must be constantly maintained and cleaned. Even though each item probably has its own peculiarities and specific requirements, maintenance procedures need to be done on a regular basis, and accountability must be established.

A comprehensive maintenance program for any equipment will have the following elements:

- ***Discovery***: Uncover any problem or malfunction before, not during, an ambulance call or other critical situation.
- ***Reporting***: Report the problem to the person responsible for correcting the situation.
- ***Corrective action***: Correct the problem through replacement or repair.
- ***Feedback***: Notify the person who reported the problem that it has been corrected.
- ***Monitoring***: Monitor the results to determine if the program is working efficiently and to account for expenses.

Ideally, problems (broken equipment, vehicle malfunction and so on) are discovered through routine procedures. For example, vehicle and equipment checklists are the most efficient way to review equipment status. Each oncoming crew carefully checks its equipment and the vehicle against a standardized checklist. This makes the job easier and more efficient, and there is less chance of overlooking details. Figure 4.2 on page 162 and Figure 4.3 on pages 164–165 show a sample checklist.

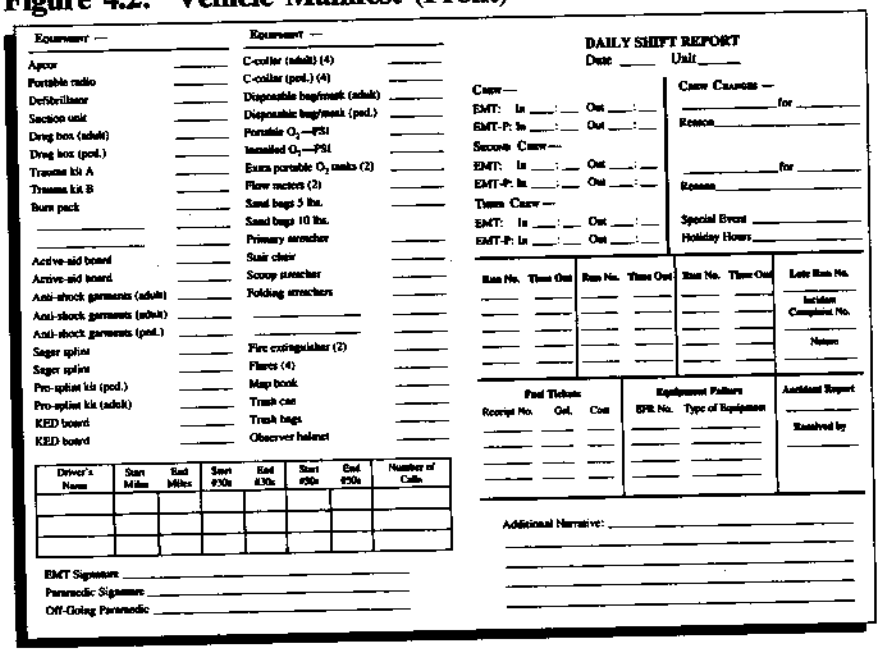
A standardized format for reporting a situation to the person responsible for correcting it is a key component of the maintenance process. Figure 4.4 on page 166 is an example of a form that can be used in this process. On this form, a particular malfunctioning equipment item or vehicle is identified, and the problem is clearly explained. The person responsible for corrective action can then prepare a work order and make sure that the work is accomplished. (This work order also should be prepared to help obtain repair bids and record costs.)

Once the repairs are completed and inspected by the person responsible for the correction, a memo should be sent to the team member who reported the problem. This feedback reassures that person and the team that problems reported are heard and corrected. If records are well kept and complete, the staff will be better able to track the maintenance history of each vehicle and equipment item. The cost and number of repairs for each item will indicate when it is no longer cost-effective to repair and when it should be replaced.

Preventive Maintenance

The service's preventive maintenance program is as important as its corrective maintenance program. The object of this type of program is to prevent failure and malfunction, not just to correct it once it has occurred. [illegible]

Figure 4.2: Vehicle Manifest (Front)



Equipment —

Apcor _____
Portable radio _____
Defibrillator _____
Suction unit _____
Drug box (adult) _____
Drug box (ped.) _____
Trauma kit A _____
Trauma kit B _____
Burn pack _____
_____ _____
_____ _____
Active-aid board _____
Active-aid board _____
Anti-shock garments (adult) _____
Anti-shock garments (adult) _____
Anti-shock garments (ped.) _____
Sager splint _____
Sager splint _____
Pre-splint kit (ped.) _____
Pre-splint kit (adult) _____
KED board _____
KED board _____

Equipment —

C-collar (adult) (4) _____
C-collar (ped.) (4) _____
Disposable bag/mask (adult) _____
Disposable bag/mask (ped.) _____
Portable O_2—PSI _____
Installed O_2—PSI _____
Extra portable O_2 tanks (2) _____
Flow meters (2) _____
Sand bags 5 lbs. _____
Sand bags 10 lbs. _____
Primary stretcher _____
Stair chair _____
Scoop stretcher _____
Folding stretchers _____
_____ _____
_____ _____
Fire extinguisher (2) _____
Flares (4) _____
Map book _____
Trash can _____
Trash bags _____
Observer helmet _____

Driver's Name	Start Miles	End Miles	Start #30s	End #30s	Start #50s	End #50s	Number of Calls

EMT Signature _____
Paramedic Signature _____
Off-Going Paramedic _____

DAILY SHIFT REPORT
Date _____ Unit _____

Crew —
EMT: In ___:___ Out ___:___
EMT-P: In ___:___ Out ___:___
Second Crew —
EMT: In ___:___ Out ___:___
EMT-P: In ___:___ Out ___:___
Third Crew —
EMT: In ___:___ Out ___:___
EMT-P: In ___:___ Out ___:___

Crew Changes —
_____ for _____
Reason _____
_____ for _____
Reason _____
Special Event _____
Holiday Hours _____

Run No.	Time Out	Run No.	Time Out	Run No.	Time Out	Late Run No.
						Incident Complaint No.
						Nature

Fuel Tickets

Receipt No.	Gal.	Cost

Equipment Failure

EFR No.	Type of Equipment

Accident Report _____
Resolved by _____

Additional Narrative: _____

tenance program, each item and vehicle undergo periodic inspection and maintenance designed to prevent failures.

The manufacturers of most EMS equipment will supply information on its routine care. This information, as well as other common-sense procedures, should be written down in the service's preventive maintenance schedule for each item. Individual team members should be responsible for examining equipment periodically and performing the specified routine maintenance, testing and cleaning procedures. Accountability is aided by documenting the date and servicing procedures performed on each piece of equipment. The documentation is then reviewed to ensure compliance with appropriate procedures. Although vehicles are more complicated and routine care is involved, they should be serviced in the same manner, since periodic care will improve reliability and extend useful life.

A good preventive maintenance program will save money. It will also improve morale. Nothing is more frustrating to a caregiver than equipment failure at a critical time. Services that show concern about equipment foster team pride and competence in patient care, leading to a positive image in the community they serve.

Personal Accountability for Vehicles and Equipment

Effective preventive maintenance and repair is not an external program. It requires the involvement of all levels of an EMS organization. Individual accoun

ability and responsibility for maintaining clean equipment and for not abusing or damaging items are important in conserving resources and extending the life of vehicles and equipment.

Relying on individuals to take responsibility for their equipment is an important step in maintaining functional and presentable equipment. The following is an example of how individual accountability can reduce a service's equipment expenses.

Many services have problems with keeping and maintaining stethoscopes. This item is used on every patient and must be continually replaced when lost or broken. One way to stabilize a service's stethoscope expenses is to purchase enough stethoscopes for every provider. This will be more expensive initially, but establishing individual accountability will reduce expenses in the long term.

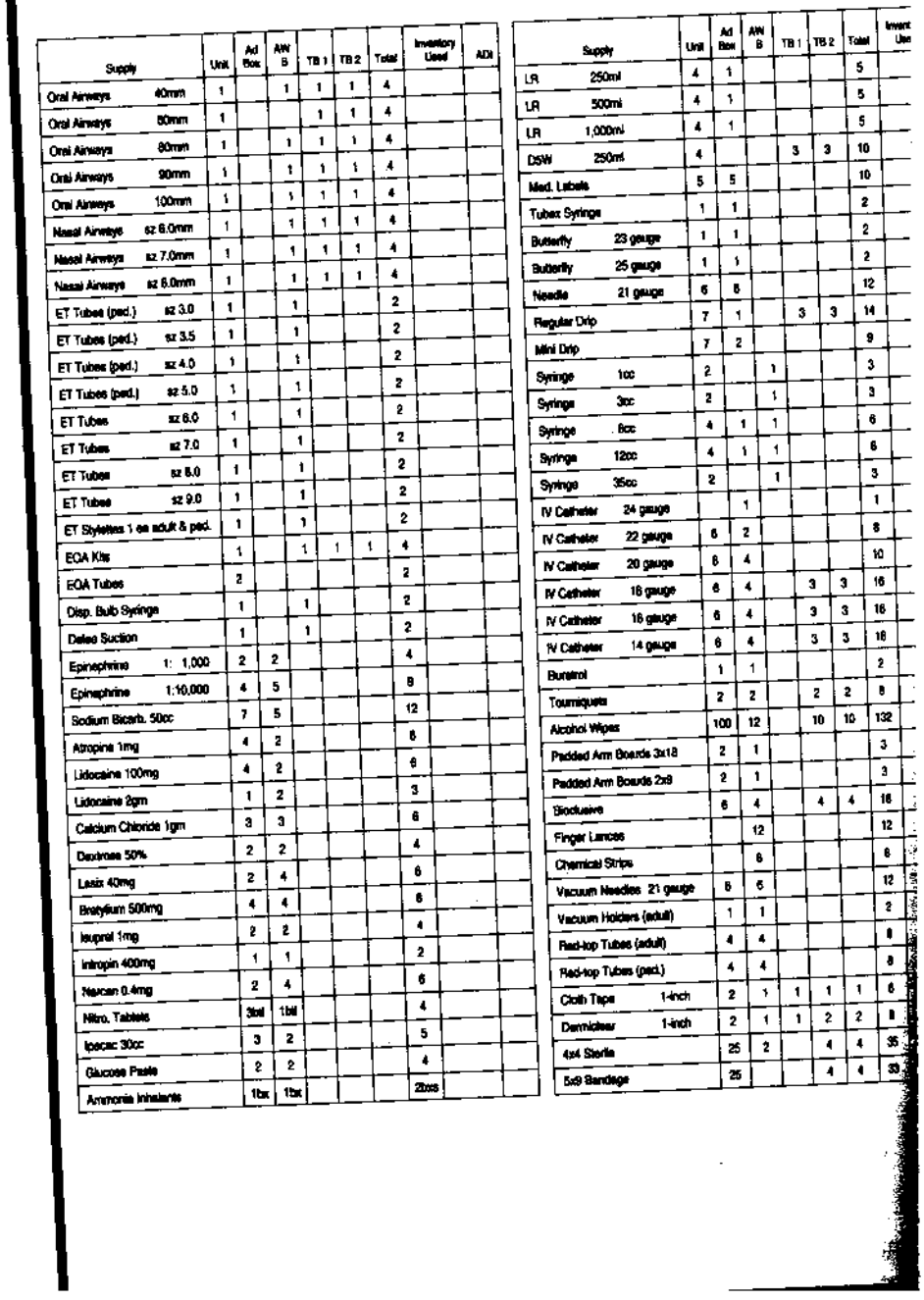
When the stethoscopes are issued, it should be explained to each paramedic and EMT that, under normal wear and tear, a stethoscope is expected to last two years. Each person is now responsible for taking care of his or her own stethoscope. If the stethoscope has to be replaced before the two years are up, the employee will pay for all or part of the cost of a new one. There may be special circumstances that can be dealt with on an individual basis but, as a rule, field personnel will be held accountable. Even though the initial expense of supplying the stethoscopes may be high, the overall cost of replacing them will drop significantly. Also, members will be more likely to take care of their own equipment, and repair costs will be reduced. This procedure works well with other equipment, too.

This method of individual accountability may be considered a negative approach because employees are expected to take better care of their equipment or pay for replacements. But it works, and it is appropriate for many smaller pieces of equipment. Obviously, if an accident occurs, the employee shouldn't be caused financial hardship. That is not the policy's intent. The intent is to improve the care given the service's equipment.

Individual accountability cannot be applied as easily to larger pieces of equipment, such as ambulances. If an employee wrecks an ambulance, it is unlikely that he or she would be able to afford to replace the vehicle.

Even so, it is a good idea to develop an accountability program for larger items. And it is possible to create accountability for larger items in a positive way. There are two levels of responsibility to consider when implementing vehicle accountability. First, there must be individual responsibility for each vehicle. If all the team members drive all the ambulances, the personal sense of responsibility is diluted. Instead, shifting crews between vehicles should be limited, and a single individual or crew should be made responsible for the same vehicle on each shift, whenever possible. This will help establish a feeling of ownership, which increases the crews' awareness and sense of responsibility. People take care of their own property better than they take [illegible]

Figure 4.3: Vehicle Manifest (Back)



Supply	Unit	Ad Box	AW B	TB 1	TB 2	Total	Inventory Used	ADI
Oral Airways 40mm	1		1	1	1	4		
Oral Airways 50mm	1			1	1	4		
Oral Airways 80mm	1		1	1	1	4		
Oral Airways 90mm	1		1	1	1	4		
Oral Airways 100mm	1		1	1	1	4		
Nasal Airways sz 6.0mm	1		1	1	1	4		
Nasal Airways sz 7.0mm	1		1	1	1	4		
Nasal Airways sz 8.0mm	1		1	1	1	4		
ET Tubes (ped.) sz 3.0	1		1			2		
ET Tubes (ped.) sz 3.5	1		1			2		
ET Tubes (ped.) sz 4.0	1		1			2		
ET Tubes (ped.) sz 5.0	1		1			2		
ET Tubes sz 6.0	1		1			2		
ET Tubes sz 7.0	1		1			2		
ET Tubes sz 8.0	1		1			2		
ET Tubes sz 9.0	1		1			2		
ET Stylettes 1 ea adult & ped.	1		1			2		
EOA Kits	1		1	1	1	4		
EOA Tubes	2					2		
Disp. Bulb Syringe	1		1			2		
Delee Suction	1		1			2		
Epinephrine 1: 1,000	2	2				4		
Epinephrine 1:10,000	4	5				9		
Sodium Bicarb. 50cc	7	5				12		
Atropine 1mg	4	2				6		
Lidocaine 100mg	4	2				6		
Lidocaine 2gm	1	2				3		
Calcium Chloride 1gm	3	3				6		
Dextrose 50%	2	2				4		
Lasix 40mg	2	4				6		
Bretylium 500mg	4	4				8		
Isuprel 1mg	2	2				4		
Intropin 400mg	1	1				2		
Narcan 0.4mg	2	4				6		
Nitro. Tablets	3bt	1bt				4		
Ipecac 30cc	3	2				5		
Glucose Paste	2	2				4		
Ammonia Inhalants	1bx	1bx				2bxs		

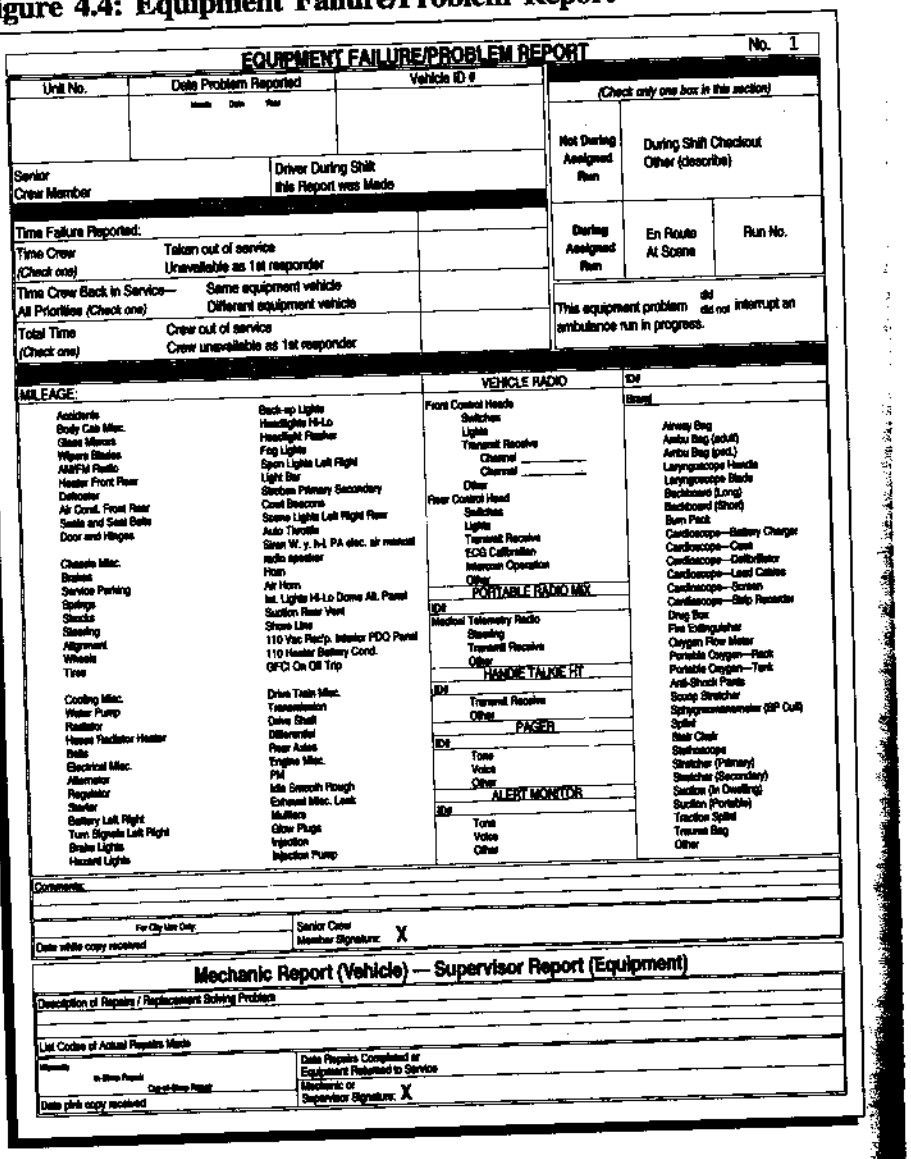
Supply	Unit	Ad Box	AW B	TB 1	TB 2	Total	Invent Use
LR 250ml	4	1				5	
LR 500ml	4	1				5	
LR 1,000ml	4	1				5	
D5W 250ml	4			3	3	10	
Med. Labels	5	5				10	
Tubex Syringe	1	1				2	
Butterfly 23 gauge	1	1				2	
Butterfly 25 gauge	1	1				2	
Needle 21 gauge	6	6				12	
Regular Drip	7	1		3	3	14	
Mini Drip	7	2				9	
Syringe 1cc	2		1			3	
Syringe 3cc	2		1			3	
Syringe 6cc	4	1	1			6	
Syringe 12cc	4	1	1			6	
Syringe 35cc	2		1			3	
IV Catheter 24 gauge		1				1	
IV Catheter 22 gauge	6	2				8	
IV Catheter 20 gauge	6	4				10	
IV Catheter 18 gauge	6	4		3	3	16	
IV Catheter 16 gauge	6	4		3	3	16	
IV Catheter 14 gauge	6	4		3	3	16	
Buretrol	1	1				2	
Tourniquets	2	2		2	2	8	
Alcohol Wipes	100	12		10	10	132	
Padded Arm Boards 3x18	2	1				3	
Padded Arm Boards 2x9	2	1				3	
Bioclusive	6	4		4	4	16	
Finger Lancets		12				12	
Chemical Strips		6				6	
Vacuum Needles 21 gauge	6	6				12	
Vacuum Holders (adult)	1	1				2	
Red-top Tubes (adult)	4	4				8	
Red-top Tubes (ped.)	4	4				8	
Cloth Tape 1-inch	2	1	1	1	1	6	
Dermiclear 1-inch	2	1	1	2	2	8	
4x4 Sterile	25	2		4	4	35	
5x9 Bandage	25			4	4	33	

Supply	Unit	Ad Box	AW B	TB 1	TB 2	Total	Inventory Used	ADI
Multi-Trauma Dressing	5			2	2	9		
Thermometer	H 1	1				2		
Lubricating Jelly	12		10	4	4	30		
Bracelet (adult)	bx	1pg				12pg		
Bracelet (ped.)	bx	3pg				12pg		
Alcohol Defib. Jelly	1					2		
Alcohol Preps	bx	6				bx		
Triangular Bandage	3			1	1	5		
Kerlix	10	1		2	2	15		
Sterile Gauze	bx			2	2	14		
Band-aid Bandages	bx	10				60		
OB kits	2					2		
Receiving Swaddlers	2	1				3		
Blanket	3					3		
Mask (adult)	9		1			9		
Nasal Cannula (adult)	6		1			9		
Mask w/NRB bag (adult)	3		1			4		
Mask (ped.)	3		1			4		
Nasal Cannula (ped.)	4		1			5		
Mask w/NRB bag (ped.)	2		1			3		
Trocar	2					2		
NG Feeding Tube 5Fr	1		1			2		
Foley Catheter 8Fr	2		1			3		
Foley Catheter 10Fr	2		1			3		
Foley Catheter 14Fr	2		1			3		
Meconium Suction Bag	3					3		
[illegible]	3		1			4		
[illegible]ding	3		1			4		
[illegible]r	3ft					4		
[illegible]rile	pak					pak		
[illegible]	4					4		
[illegible]	3					3		
[illegible]	3					3		
[illegible]ratchet	1					1		
[illegible]	3					3		
[illegible]ic Bags	6					6		
[illegible]	2					2		
[illegible]	2					2		

Supply	Unit	Ad Box	AW B	TB 1	TB 2	Total	Inventory Used	ADI
Chucks	10					10		
Disp Mask	bx					bx		
Nonsterile Gloves	bx					bx		
Pillow	2					2		
Blankets	2					2		
Sheets	10					10		
Pillow Cases	6					6		
Towels	1pg					1pg		

Equipment	Unit	Ad Box	AW B	TB 1	TB 2	Total	Inventory Used	ADI
Laryngoscope Handle	1		1			2		
Whistle Tip sz 1				1		1		
Miller Blade sz 4	1		1			2		
Miller Blade sz 2	1		1			2		
McIntosh Blade sz 4	1		1			2		
1 Large Bulb	1		1			2		
1 Small Bulb	1		1			2		
C-cell Batteries	2		2			4		
McGill (adult)	1		1			2		
McGill (ped.)			1			1		
Stethoscope (adult)		1		1	1	3		
Stethoscope (ped.)		1				1		
S/R Stethoscope (adult)	1					1		
Ped. Kit for S/R Stethoscope	1					1		
BP Cuff (adult)	1	1		1	1	4		
BP Cuff (ped.)		1				1		
BP Thigh Cuff	1					1		
Non-rebreathing Bag Mask (adult)			1			1		
Non-rebreathing Bag Mask (ped.)			1			1		

Figure 4.4: Equipment Failure/Problem Report



EQUIPMENT FAILURE/PROBLEM REPORT No. 1

Unit No. | Date Problem Reported (Month Date Year) | Vehicle ID #

(Check only one box in this section)

Not During Assigned Run | During Shift Checkout | Other (describe)

During Assigned Run | En Route At Scene | Run No.

Senior Crew Member | Driver During Shift this Report was Made

Time Failure Reported:

Time Crew (Check one) — Taken out of service / Unavailable as 1st responder

Time Crew Back in Service— All Priorities (Check one) — Same equipment vehicle / Different equipment vehicle

Total Time (Check one) — Crew out of service / Crew unavailable as 1st responder

This equipment problem did / did not interrupt an ambulance run in progress.

MILEAGE:

Accidents
Body Cab Misc.
Glass Mirrors
Wipers Blades
AM/FM Radio
Heater Front Rear
Defroster
Air Cond. Front Rear
Seats and Seat Belts
Door and Hinges

Chassis Misc.
Brakes
Service Parking
Springs
Shocks
Steering
Alignment
Wheels
Tires

Cooling Misc.
Water Pump
Radiator
Hoses Radiator Heater
Belts
Electrical Misc.
Alternator
Regulator
Starter
Battery Left Right
Turn Signals Left Right
Brake Lights
Hazard Lights

Back-up Lights
Headlights Hi-Lo
Headlight Flasher
Fog Lights
Spcn Lights Left Right
Light Bar
Strobes Primary Secondary
Cowl Beacons
Scene Lights Left Right Rear
Auto Throttle
Siren W. y. h-l. PA elec. air manual
radio speaker
Horn
Air Horn
Int. Lights Hi-Lo Dome Alt. Panel
Suction Rear Vent
Shore Line
110 Vac Rec'p. Interior PDC Panel
110 Heater Battery Cond.
GFCI On Off Trip

Drive Train Misc.
Transmission
Drive Shaft
Differential
Rear Axles
Engine Misc.
PM
Idle Smooth Rough
Exhaust Misc. Leak
Mufflers
Glow Plugs
Injection
Injection Pump

VEHICLE RADIO

Front Control Heads
Switches
Lights
Transmit Receive
Channel
Channel
Other
Rear Control Head
Switches
Lights
Transmit Receive
ECG Calibration
Intercom Operation
Other

PORTABLE RADIO MIX

ID#
Medical Telemetry Radio
Steering
Transmit Receive
Other

HANDIE TALKIE HT

ID#
Transmit Receive
Other

PAGER

ID#
Tone
Voice
Other

ALERT MONITOR

ID#
Tone
Voice
Other

ID#
Brand

Airway Bag
Ambu Bag (adult)
Ambu Bag (ped.)
Laryngoscope Handle
Laryngoscope Blade
Backboard (Long)
Backboard (Short)
Burn Pack
Cardioscope—Battery Charger
Cardioscope—Case
Cardioscope—Defibrillator
Cardioscope—Lead Cables
Cardioscope—Screen
Cardioscope—Strip Recorder
Drug Box
Fire Extinguisher
Oxygen Flow Meter
Portable Oxygen—Rack
Portable Oxygen—Tank
Anti-Shock Pants
Scoop Stretcher
Sphygmomanometer (BP Cuff)
Splint
Stair Chair
Stethoscope
Stretcher (Primary)
Stretcher (Secondary)
Suction (In Dwelling)
Suction (Portable)
Traction Splint
Trauma Bag
Other

Comments:

For City Use Only: Date white copy received | Senior Crew Member Signature: X

Mechanic Report (Vehicle) — Supervisor Report (Equipment)

Description of Repairs / Replacement Solving Problem

List Codes of Actual Repairs Made

Warranty (In-Shop Repair / Out-of-Shop Repair) | Date Repairs Completed or Equipment Released to Service

Date pink copy received | Mechanic or Supervisor Signature: X

The individual crews assigned to a specific unit should be held accountable for making sure the vehicle is mechanically sound, clean and restocked. They are responsible for reporting mechanical problems and making sure that the problems are corrected in an appropriate and timely manner. One benefit of accountability is that drivers tend to operate the vehicle more carefully. There is usually a marked [illegible] in vehicle appearance and a decrease in maintenance costs.

Another level of responsibility is group accountability, which can be positively reinforced by management. Vehicle and equipment replacement and repair costs consume a significant amount of an organization's financial resources. If these expenses are considerably reduced through the care of employees, it would be appropriate for the organization to share part of the savings. Implementing a program of this type can positively reinforce accountability.

Many services reward employees who take extremely good care of vehicles and equipment with financial incentives. For example, a service expects an ambulance to last five years. It costs $15,000 a year for five years to pay the purchase price of a $75,000 ambulance. If a new ambulance is purchased after five years, the $15,000 per-year payments will continue. If the old ambulance can be used for another year, then the service can save that $15,000. If the service saves money because of the employees' exceptional efforts, it may be possible to share the savings.

One way to develop this type of program is to subtract the costs of any maintenance that was provided for the older vehicle, but not performed on a new vehicle. This may leave a $12,000 savings. Part of this savings could be shared directly with the employees to reward their performance. The company could give 25 percent of the savings to the employees as a cash bonus. If the organization is a government agency or does not allow such incentives, there are other ways to reward excellence. There may be a piece of equipment that team members would like to have. It may be appropriate to provide new carpeting in the employees' quarters, a new television set or a video cassette recorder for viewing training tapes. Many other possibilities exist for indirect sharing of achieved savings, including new uniforms, sending personnel to conferences, new radios, a picnic—any of these will provide incentives and a feeling of satisfaction among employees.

Vehicle Operation

Discussing vehicle maintenance and accountability would not be complete without mentioning vehicle operation. The most costly type of lawsuit brought against EMS agencies results from vehicle operation and accidents. For this reason, it is important that a comprehensive driver training and operations course be instituted in EMS agencies.

A number of vehicle operation courses have been developed, and it is important for the EMS manager to select the most appropriate course for the organization's drivers. The trend in the industry is to move away from emergency vehicle driving courses that stress rapid driving and emergency maneuvers. These programs typically evolved from law enforcement driving courses emphasizing pursuit. This is not appropriate for ambulance driving.

EMS organizations have found that courses that encourage slow, careful driving habits and focus on defensive driving provide more acceptable results than

the old method. Drivers are trained in low-gravitational (low-force) driving, and instructed on gradual acceleration and deceleration techniques. They are required to learn how to maintain full control of the vehicle at all times, with slow turning, gradual lane changes and caution through intersections strongly encouraged. Every driver in the EMS agency should learn these types of driving habits, performance should be monitored, and training should be given to employees who do not comply with the organization's minimum performance standards for driving.

Low-force driving courses have significantly reduced accidents and simultaneously reduced maintenance expenses for the organizations that have implemented them.

SECTION 2

Purchasing and Inventory Control

An agency's procurement policies need to be well defined prior to any purchasing decision. The term "procurement" includes all aspects of purchasing goods and services for use by the organization.

A comprehensive procurement process includes procedures to ensure that the organization can afford the purchases made, that the items purchased benefit the organization, that items ordered are received and that all expenditures for goods and services are carefully tracked. The purchasing process should be designed to ensure that only needed items are received, that extraneous items are not purchased, and that the best price is secured. The number of people authorized to purchase items also should be limited. The following policies and procedures will help ensure judicious purchasing.

Authorizing Individuals to Purchase

Most services do not have a staff of sufficient size to employ a full-time purchasing agent, so purchasing is usually an added responsibility for the manager or other management personnel. Still, the responsibility for approving a purchase generally should be handled by one person in the organization.

Some systems either require the board treasurer's approval or the approval of the full board for all purchases. This system is time-consuming and should be avoided or altered if possible. Purchasing within an approved budget is the manager's responsibility. Most governing bodies reserve the right to approve large purchases, for example, anything that costs more than $5,000, or items of less

amounts if they are non-budgeted. But it is a good idea for the EMS administrator to have the authority to sign checks with a single signature up to a specified limit, such as $1,000. Anything over that amount would require that checks be co-signed by a board officer or owner. This process streamlines day-to-day activities by saving valuable time. It also provides additional protection to ensure that purchasing power is not abused.

A manager may want to delegate some purchasing authority. For example, the operations manager, designated materials manager or maintenance supervisor may be allowed to purchase necessary replacement supplies or maintenance items up to a specified limit, such as $250. The office manager might be allowed purchasing authority for office supplies up to a $50 limit. The purchase limit will vary depending on the size of the organization and an assessment of each manager. There should be strict limits on purchases that do not have formal prior approval.

Every item purchased, even those ordered through delegated authority, should be documented on a purchase request form (PRF).

Specifications

A good procurement process ensures that an organization gets exactly what is needed. The activities of prehospital health care require large amounts of specialized equipment and supplies, and part of the manager's job is to determine exactly which items are needed. This process is facilitated by creating detailed specifications for each purchase. The specifications for a particular item may be as simple as requesting sterile 4" x 4" gauze dressing in packages of two, or as complex as a 30-page document detailing the many requirements for a new Type II ambulance.

Once detailed specifications have been created, the service can use them again, making minor changes to reflect any new requirements or errors in the first documents. This provides uniformity in the equipment and also reduces the amount of crew retraining needed for new models of familiar equipment.

Price Considerations

- ***Bids***: Detailed specifications allow an organization to request bids from various suppliers. Bids are common for major pieces of equipment or large orders.
- ***Price shopping***: For smaller routine items, bidding is too time-consuming and expensive. Instead, the benefits of bidding can be enjoyed by shopping around and issuing letterhead bids. (Letterhead bids are requests for bids that are issued on a company's letterhead, rather than in a more formal format. They are typically used for smaller items.) Vendors can be telephoned, personally visited or sent

a listing of the items requested to check the different prices from various suppliers. The PRF, when used for telephone or letterhead bids, should be designed so that prices from at least three separate vendors can be listed.

- ***Negotiations***: The nature of EMS can help managers get the best deal; many local business people are willing to give ambulance organizations a special discount because they serve the community. Managers will need to develop the civic-mindedness of business people to secure these types of pricing advantages.

Negotiations based on the volume of goods or services purchased are another effective purchasing technique. For example, if a service does not have an in-house mechanic, it may be possible to negotiate a favorable hourly rate due to the sizable amount of mechanical services required. If there are not enough qualified suppliers to bid on the mechanical services, or if one source has been identified as best meeting the organization's needs, then negotiation is appropriate. It is often possible to negotiate a lower price if the manager is willing to devote some personal time and effort to the supplier.

Purchasing large quantities can often make it possible to get a better unit price. For example, buying 55 gallons of bulk oil or antifreeze can save money over purchasing individual cans or cases, and buying a case of glass cleaner can be significantly cheaper than purchasing individual bottles. But volume buying can be negative. If an organization purchases more than it can reasonably use, too much money may be tied up in useless inventory, or the item may expire prior to use and be wasted. Although it is not a good idea to buy everything in large quantities, an organization should consider buying in bulk frequently used items that will not spoil or become outdated.

Another type of volume buying is group purchasing. Hospitals often band together to buy large quantities of a particular item at low unit cost. They then divide the products among themselves. In this way, they are taking advantage of bulk purchasing, but are not tying up too much of their resources in inventory. Ambulance services across the country have formed organizations to accomplish the same goal. It is well worth exploring the opportunities of joining or forming such an association.

Also, many services purchase supplies directly from community hospitals. These hospitals often get a better price than ambulance services and might be willing to sell supplies to the services.

Government services also may be able to take advantage of their status in the buyer's market. For example, when a tire franchise had a contract to supply state vehicles with tires, the tire-store manager legally supplied a municipal ambulance service with tires at the state rate. The service purchased its tires at half

price, 25 percent lower than the price a high-volume commercial company was able to negotiate.

If a service is government or non-profit, it may be exempt from tax. Thus, the ambulance service should not have to pay sales tax—even on small purchases.

Many vendors award discounts for prompt payment of invoices. Although it is typically good business not to pay invoices until they are due, these invoices should be paid first to collect the discounts. This allows the service to keep its money earning interest as long as possible.

The Process

A good purchasing process will answer the following questions:

Is the item needed? Before any manager approves a purchase request, it is necessary to ensure that the item is really needed. Will the purchase of this item enable employees to perform their jobs better? Will it provide better patient care? Will it help the office function more efficiently? Will it be used? These and other questions need to be answered to ensure that the item is needed, not just wanted. It must provide a tangible benefit to justify the expense.

Can the service afford it? Has the expense been budgeted, and can the service afford the purchase at this time? If the expense does not fit into the budget, it must be closely evaluated. The budget was created and approved to provide guidelines for purchases. Non-budgeted items, as a rule, should not be purchased unless they are absolutely essential.

Even something that is budgeted may not be affordable. If income hasn't matched projections, or if expenses have been running over estimates, the new purchase may have to wait until cash flow improves. It is the manager's responsibility to weigh all of these points before approving a purchase.

Did the service get what it paid for? After an item is ordered, procedures must be in place to ensure that the appropriate item was received. Upon delivery, a receiving report should be completed noting what was received and what, if anything, was back-ordered. The receiving report may be a separate form or just a packing slip requiring the signature of the person who received the shipment.

Items should be inspected to ensure that they are undamaged and functioning correctly. Any shortcomings should be noted and the vendor requested to correct the order prior to payment. The packing slip, receiving report and PRFs should be reviewed before vendor payment is made. This ensures that the organization gets what it ordered and helps avoid double payments.

Are purchases appropriately tracked? This purchasing process is designed to save money and keep track of each purchase expenditure.

The next section describes a specific procurement plan that includes many of these points. It may seem complex, but it is not as difficult as it appears. The system is necessary to avoid costly errors and misunderstandings.

Steps for Effective Purchasing

The steps below are outlines for establishing an effective procurement process.

Step 1. Someone within the organization determines that certain items need to be purchased. This determination generally comes from the operations personnel, office staff or the administration—including the board. At this time a PRF is completed, allowing for more than one item. Item descriptions, reasons for each purchase and the manufacturer's identification number are noted. The person requesting the purchase then signs and dates the form and routes it to the appropriate supervisor.

Step 2. The supervisor completes the vendor and pricing information. Three different vendors should be listed with the individual item descriptions and their catalog numbers. Prices from each supplier should be documented. Any comments, special requests or vendor recommendations should be included before the supervisor approves the request. The PRF then goes to the person with appropriate purchasing authority. If the purchase does not exceed the delegated amount, the supervisor is allowed to approve the request.

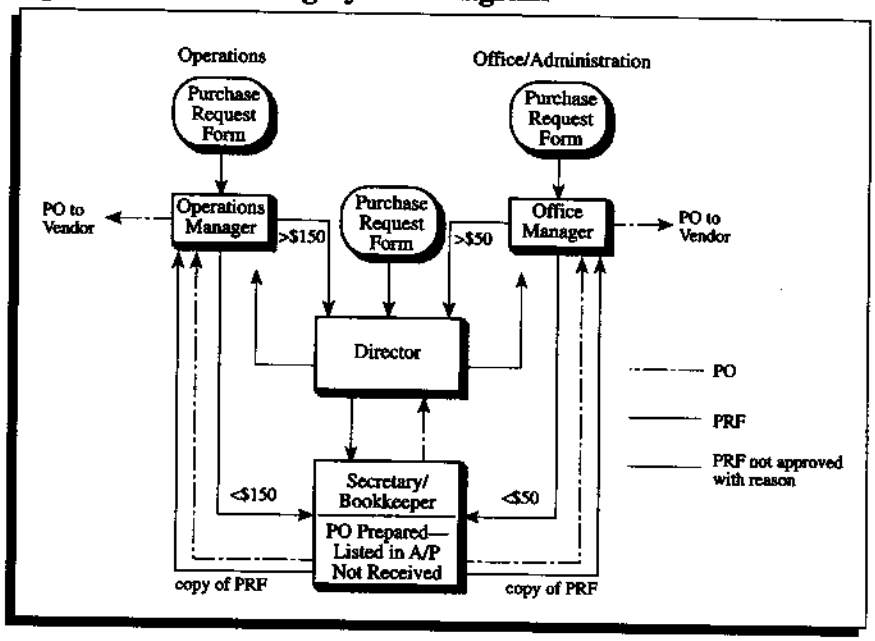
Step 3. The person with purchasing authority then reviews the request. If the request is for a large amount or includes a new piece of equipment that will be purchased frequently, the purchaser may decide to initiate a formal bid process or request that detailed specifications be developed. If so, the PRF would be returned to the appropriate supervisor with instructions.

If a formal process isn't needed, the purchaser will ask the questions: Are the items needed? Are they accounted for in the budget? Which account should they be charged to? Can the service afford the items at this time? If the determination is made to purchase the items, approval should be noted on the PRF, indicating whether or not they are budgeted, what account should be charged, and which vendor has been selected. Then the PRF is signed, dated and passed to the secretary or bookkeeper for action (see Figure 4.5).

Step 4. The secretary or bookkeeper uses the PRF to create a purchase order (PO). Purchase orders are consecutively numbered, similar to checks in a checkbook. One copy is sent to the vendor to place the order. The other is retained in the bookkeeper's records. The secretary will enter the PO number on the PRF and return a copy to the appropriate supervisor. The bookkeeper or secretary will document the order and retain a copy of the PO in a holding file for items not yet received. This enables the bookkeeper to keep track of committed funds for future invoices.

Step 5. The supervisor sends the PO to the vendor and keeps the PRF until the material is received. It may work better to have a secretary mail the PO and keep the PRF until the shipment arrives.

Figure 4.5: Purchasing-System Diagram



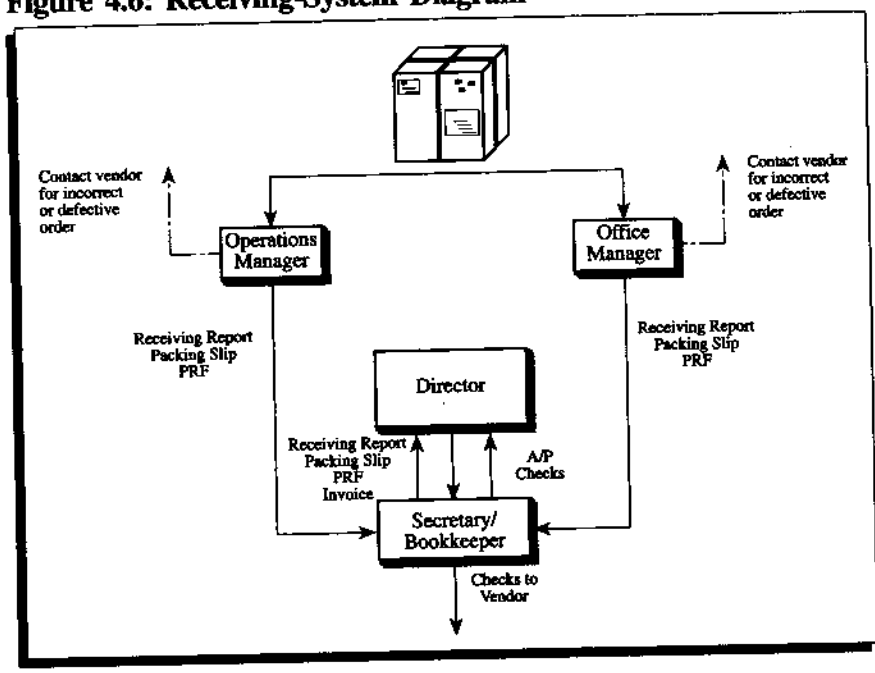
This, or a similar process, should be followed whenever supplies and equipment are procured. In actual practice, the system streamlines the purchasing process while keeping close control over the entire system. Variations will occur if the PRF originates from the director, and the director may be bypassed if limited purchasing authority has been delegated to some of the service's managers.

Receiving

Many organizations have trouble keeping track of recently received material; new items have a way of being placed on ambulances without anyone knowing how or when they got there. It is important to develop a receiving procedure to stop this from occurring (see the receiving diagram in Figure 4.6). Steps to take in the receiving process include:

Step 1. As supplies and materials are received, they are checked by the person who ordered them. A receiving report is completed, any missing or damaged items are noted and the vendor is contacted immediately. The items received and back-ordered are listed on the receiving report. If the shipment is complete, the packing slip, PRF and receiving report are forwarded to the secretary or bookkeeper for processing. If the order is incomplete, a copy of the PRF is attached to the packing slip and the receiving report marked incomplete and then forwarded to the secretary or bookkeeper.

Figure 4.6: Receiving-System Diagram



Step 2. The secretary or bookkeeper attaches these forms to the copy of the PO in the holding file (for purchases that have been ordered but not received) and moves them to another holding file (for purchases that have been received but are awaiting invoices).

Step 3. When the invoice arrives from the vendor, it is attached to the information in the holding file and any early payment discounts noted. This information is then moved to the accounts-payable file.

Step 4. The manager reviews the accounts-payable file once or twice a month to determine payment. Each purchase and invoice is reviewed to ensure that the proper account number is on each PO and invoice and to determine which vendors should be paid.

Step 5. The invoices selected for payment should be sent to the bookkeeper, who will prepare the checks for signature and attach them to any information included about each purchase and account.

Step 6. The manager reviews the information, verifies the accuracy of each check and its account, signs the checks and returns them to the bookkeeper to record and mail.

This system works because every purchase is reviewed as it crosses both the bookkeeper's and the director's desks. The system's built-in checks and bal-

ances prevent errors and double payments. In a large service, some of the responsibilities may be delegated to specialized managers. In a smaller service, some of the duties will be combined, but the basic procedures will remain.

One final note: never purchase items with cash. The use of checks forces documentation and makes tracking expenditures easier, whereas cash purchases always involve some risk. The few exceptions to this rule can be handled by establishing a petty-cash account for small purchases, such as postage due. Even with petty cash, every penny should be documented.

A procurement system provides control and makes expenditure tracking easier. And it has the added advantage of documenting good purchasing practices.

Inventory Control

Inventory control prevents loss and ensures an adequate supply of material. An inventory control system ensures that patients are charged for supplies used and that ambulances are adequately resupplied; documents how much inventory is on hand and its value; reduces depletion of supplies and equipment due to waste, expiration or loss; and ensures that enough supplies and equipment are available to properly run the service.

Ambulance services should normally have two separate inventory listings. One list contains all of the service's reusable equipment: medical, office, furniture, etc. The other list contains the expendable supplies for patient care or office use. The following section reviews each type of inventory and discusses procedures for keeping track of items.

Equipment Inventory

Every reusable item purchased by a service should be logged into the equipment-inventory ledger. Office calculators, staplers, traction splints, C-collars, tools, drug boxes, desks and radio batteries are but a few of the items that fall into this category. The ledger log can be divided into separate sections: one for medical equipment, one for maintenance equipment and one for office equipment. This helps track individual items.

The log can be simple in form. Each item is given a number, and the item's description, serial number, date received and purchase price are noted beside it. Other helpful information may be listed, such as information on warranties, expected replacement dates and vendors. Figure 4.7 provides one example of an equipment inventory log.

Figure 4.7 includes information that may be useful at a later date. The items are numbered sequentially as they are received. In this example, the M at the beginning of the number differentiates medical equipment from office or shop equipment.

Figure 4.7: Durable Equipment Inventory

Ambulance Service
Durable Equipment Inventory

#	Description	Serial #	Date Rec'd	Purch. Price	Warr. Exp.	Vendor	Log?	Loc.	Rep. Date
M-101	Traction splint	EE-135789	8/20/92	$136.95	8/20/93	EMT Supply	X	006	8/20/95
M-102	Spineboard	554202	9/2/92	$85.00	N/A	Mount. Supply	X	006	9/2/94
M-103	Oxygen Regulator-Port	HS-92493	9/2/92	$115.00	12/2/92	AAA Medical	X	003	9/2/97

It is wise to make a notation about warranties. For example, if a monitor battery fails, it is easy to look back in the inventory log to see if it is still under warranty. By including the vendor in the log, it will be easier to find the original invoice or purchase order and document the purchase date for warranty repair or replacement. Logged information also helps when items need replacing.

The last three columns in Figure 4.7 are optional, but offer a simple method to make this information readily accessible. Because many pieces of equipment will require preventive maintenance or corrective repair, the column marked "log?" asks whether or not a maintenance log has been prepared for a particular item. A maintenance log also documents care and testing. Many pieces of medical equipment must function within narrow performance parameters. A service that does not periodically check these parameters may be liable in court if failure occurs. (See Corrective Maintenance.)

If an item is assigned to a particular person, vehicle, office, station or other location, it should be noted in the "location" column. This makes it easier to locate a particular piece of equipment when necessary.

The final column includes the date that a piece of equipment is scheduled for replacement. This reference will aid in determining if the item needs to be repaired or replaced should it malfunction at a later date.

An optional column, not shown in Figure 4.7, provides for the disposition of equipment no longer in the service's possession. This column allows room for a statement of what happened to the item and when it should no longer be included in the service's inventory. For example, the column might include the statement, "sold for $50 7/23/90" or "lost 5/13/89" or "discarded 3/3/91." This is important for accounting and inventory-value determination.

When a piece of equipment is entered in the inventory log, it is necessary to affix an inventory number to the item. This allows for accurate tracking of a specific item for as long as it is maintained by the service. This number should be painted, engraved, bar-coded, embossed or otherwise affixed to the item—with no exceptions. Also, the name of the service or logo should be marked on the item, making it possible for someone to return any items lost or left at a hospital.

Bar-coding equipment has become popular among agencies, since it is easy to keep track of inventory with a few hand-held scanners. Using the scanners in conjunction with a computer, it is possible to check inventory against a master manifest. Many fire departments have found bar-coding to be a highly effective method of monitoring inventory.

At a minimum, an EMS organization should conduct an annual inventory to determine whether or not there are any missing items whose loss has gone undetected. This is a time-consuming process, but necessary. The location column on the inventory log will help make the process easier. Any missing items should be marked as such in the disposition column along with the date. At this time, an effort should be made by the agency to locate these missing items.

Expendable Supply Inventory

It is much more difficult to keep track of expendable and disposable supplies. Generally, these supplies are divided into medical supplies, janitorial supplies and office supplies. Medical supplies consist of bandages, oxygen masks, disposable humidifiers, endotracheal tubes, tape, syringes and all other disposable patient-care items. This is the largest category of disposable inventory for ambulance services, with the number of items ranging from 40 to 50 for a small BLS service to a few hundred for a sophisticated ALS service. Unless an inventory system is installed, it will be impossible to keep track of these items. In addition to ensuring that these supplies are always available for patients, an inventory system will reduce the amount of supplies that are wasted, lost or not charged to the patient.

A comprehensive inventory program must be developed to monitor available disposable and expendable supplies. This tracking mechanism may be manual or set up through a computerized inventory program. One person needs to be responsible for disposable inventory. This person should have the authority to prepare orders and establish procedures for removing supplies from the supply room. This is an important job that takes time. Depending upon the size of the service, it even may require a full-time materials manager. If supply management is an added responsibility for an employee with other duties, there should be extra compensation or a reduction of other responsibilities to ensure the job is done adequately.

The first step in setting up a program is to take a complete inventory. Then a supply code number should be assigned to each item to make it possible to create order out of existing chaos, and to computerize the inventory if feasible. In this text, the discussion is devoted to a manual inventory system, which works well and provides the same results as an automated system.

After the initial inventory is complete, a card or page should be created for each item; many office-supply stores have pre-printed inventory cards that work well for ambulance services. This is where the materials manager monitors the

status of supplies. How well the inventory system functions depends on how often information is updated on the inventory cards.

Information that should be included on the inventory card is detailed below.

Item number: A number is assigned to each item in the supply inventory. The actual number chosen is not important, but it is a good idea to arrange the supply room in a logical order. The different types and sizes of tape should be in one place, bandaging supplies should be nearby and syringes and IV supplies in the same general area. Oxygen masks, cannulas and other airway supplies should be grouped together. This makes it easier to find each item and creates order in the supply room.

Appropriate numbers should be assigned to similar items of various sizes. For example, oral airways come in various sizes. Therefore, the smallest number should be assigned to the smallest airway and the largest to the largest airway. For example, a size 0 airway might be allocated the number M-3000, size 1 might be assigned M-3010, size 2 assigned M-3020, and so on. To enable the insertion of new inventory items into the system without losing numerical order, it is a good idea *not* to number items consecutively. For instance, if a new size 1½ airway were to be included in the system, and size 1 had been previously assigned the designation of M-3001 and size 2 was M-3002, there would be no convenient designation for size 1½. With an expanded numbering system, however, size 1½ could be allocated M-3015.

Item description: Once the stockroom has been organized and inventory numbers assigned to the supplies, the item should be clearly described in the space provided, including the item's size if different sizes are kept in stock. Another important part of the description includes the packaging unit description and the ordering quantity. Medical supplies are ordered in different quantities: by item, bottle, box or case. Other units also are possible.

It is impossible to remember exactly how many units are in each quantity ordered (for example, the number of 5" x 9" or 4" x 4" dressings in a case). Also, different-size containers of solutions have different numbers of units in each case. Therefore, in addition to describing the item, it is necessary to include information about how the units are packaged. For example, if 4" x 4" gauze dressings are ordered by the case, there might be 1,000 individual dressings in the case. Sterile 4" x 4"s usually come two to a package, so there may be 50 packages to a box and 10 boxes to a case. All of this information is necessary for inventory and reordering. A common shorthand method would be "10 Box (50 Pkg [2 Ea/Pkg])/Cs." This simply indicates that there are two units to a package, 50 packages to a box, and 10 boxes to a case.

Fortunately, most items are easier to describe. Endotracheal-tube packaging can be simply described as "10 Ea./Box." IV solutions might be "12 bags/Cs." An item ordered by individual unit is described as "Ea."

Vendors: In the space provided on the form, list two or three vendors from whom the items can be ordered. Identify the primary vendor. This will help when the orders are prepared. The individual in charge of inventory can create a separate order form for the different vendors.

Unit cost: Note the unit cost of the item for each vendor. This is the cost of one item or package. It is determined by dividing the cost of the ordered quantity (e.g., a case) by the number of units in the overall quantity. For 4" x 4" dressings, the unit cost would be the cost of a case divided by 500 packages.

For inventory, match the unit cost with how each item is counted. In the example of 4" x 4" dressings, the unit would be a package; it is inappropriate to use just one 4" x 4" and save the other one in the package. Once the package is opened, both dressings should be used immediately or the remaining dressing should be thrown away.

Minimum balance: The minimum balance is the lowest quantity of an item that must be available at any given time. It is determined by how frequently the items are used, how long it takes to receive an order, and how often supplies are ordered. If supplies are only ordered once a month, a minimum of two or three months of stock should be ordered. This will prevent the supply from being exhausted before the new stock can be ordered the following month. Since there also will be a waiting period between the time the order is placed and the time of actual delivery, a buffer supply is needed in case delivery is delayed, the items are back-ordered or anticipated use is exceeded. A two-month supply might be conservative but is generally sufficient.

Maximum balance: The maximum balance is the quantity in inventory that should not be exceeded. It should be determined according to how much of an item is strictly necessary, and how much would just tie up money in useless inventory. A maximum balance must allow for the way in which the item is ordered. For instance, since one case of 4" x 4"s contains 1,000 dressings, 1,000 4" x 4"s would not be appropriate as a maximum balance. In order not to exceed maximum balance, the item would have to be totally out of stock before reordering. Depending on their use, 1,500 to 2,000 dressings might be a better maximum balance. When the materials manager discovers there's half a case left, a new case can be ordered, and the maximum will not be exceeded. In this example, the minimum for 4" x 4"s would be 500 (or one-half case).

Balance on hand: The initial inventory identifies the number of items on hand. This amount is noted in the balance-on-hand column for the current month. There are some supplies that are not appropriate for employees to count individually (e.g., ½-inch adhesive strips). In this case, it would be sufficient to count the boxes. The general rule when counting inventory is to count each item if it is charged or dispensed on a per-unit basis.

Date: This is the date on which the items were counted.

Number used: This is the number of items used or dispensed in the previous month. The number used is the difference between the balance on hand for the current month and the previous month's balance.

Date and number ordered: When the materials manager determines it is time to reorder an item, the date and quantity ordered is entered on each of the item cards for the supplies ordered. This prevents double ordering, and it lets everyone know that the item should be received shortly.

Date and number received: When the supplies are received and added to inventory, the number and date received are noted on the cards. The balance then can be updated during the next cycle to show the increased supply.

Number back-ordered: If only part of the ordered items are received, or if the vendor notifies the service that the item has been back-ordered, it is documented on the item card. This lets the person handling inventory know that the item has already been ordered and why it has not been received.

Tracking Supplies Leaving the Storeroom

The preceding inventory method helps a service keep track of its supplies and prevents it from running out of needed items. But it does not keep track of supplies leaving the storeroom. There are different procedures for keeping track of such supplies. Often, no procedure is used. The crews simply go into the storeroom and get what they need to replace supplies on the ambulance. This leaves a hole in the system because nobody knows what is actually happening to the supplies.

There are two ways to control this loss of inventory. One is informal: a sign-out sheet. All items taken from the storeroom are listed and signed for by the person who removes them. This works in some services, but the problem is not always solved. An informal system might be appropriate if the service can determine the specific number of items used in patient care or charged for and then compare them to the numbers listed on the monthly inventory report. If the discrepancy is small, the manager may decide to keep an informal system.

A better method of tracking supplies outside of the storeroom is to keep a manifest and update it at each vehicle crew change. The manifest lists every item and its quantity on board the ambulance. As an item is used, it is listed on the manifest. At the end of the shift, the crew takes the manifest to the materials manager and gets replacement supplies on a one-for-one basis. The inventory list shown in Figure 4.7 is a portion of a vehicle manifest.

These manifests should be taken to the office daily and compared with the run reports and patient charges or supply usage listed by the crew on each run. This is an effective way to make sure that each item used is accounted for and that no supplies slip through the cracks. If items are used but not charged, the

crew lists them on the manifest along with the reason. The items might have been used in a training session, wasted, lost, damaged or used on a patient who was not transported or charged. This method is most effective, but it takes more time and effort.

With this system, determining the value of the supplies on hand (in inventory) is not difficult. The manifest identifies the amount of supplies on each vehicle, and the monthly inventory keeps track of the supplies in the storeroom. The easiest way to determine the value of the inventory is to take the numbered items on hand (in the storeroom and on the vehicles) and multiply that quantity by the unit cost. After adding all these together, it is possible to calculate the overall value of supplies in inventory.

SECTION 3

Communications Center Operations

Coordinated and effective communications center operations are essential for an EMS system to perform well. Communications center activities can either facilitate or impede a service's ability to effectively respond to emergency medical events. A weakness in any aspect of the communications center can prevent timely ambulance response, delay the allocation of appropriate resources and damage community perceptions of the service. The training, expertise and motivation of communications center personnel, combined with adequate equipment and effective policies and procedures, determine an EMS service's ability to excel.

Communication is the lifeline of an ambulance service, but it can be surrounded by a technical mystique that may be intimidating to the uninitiated. Whether or not this is the case, effective EMS managers must have working knowledge of the basics of communications center operations. (See Appendix A for a glossary of terms, including those used in the communications industry.)

EMS communications center operations have increased in importance over the past several years as more and more services recognize the liability exposure of poor policies and procedures. Priority dispatch procedures, such as those developed by Jeff Clawson, M.D., have become the standards that many services depend on. Even given the current emphasis on dispatch, this text will use the term "communications center" rather than "dispatch center." The skills and procedures required in a modern EMS communications center far surpass the relaying of information typical in a dispatch center.