Developing Work Instructions for Aliterate Users

By Patrick Sweeney

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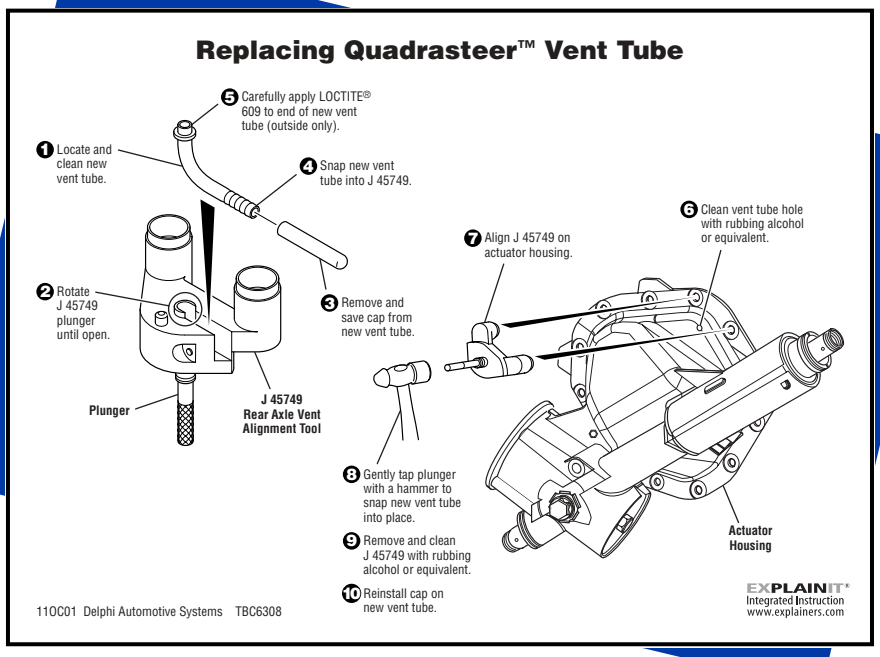

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Summary

This paper addresses the following topics and conditions:

- Aliteracy (choosing not to read) is a growing phenomenon
- Conventional written work instructions require reading
- Many users simply won't read text-heavy conventional instructions
- Instead of reading, these users will guess or start a trial-and-error approach, either of which could be wrong
- Conventional instructions are ineffective for training and for use as job aids
- Integrated Instructions emphasize graphics with minimal supporting text
- Users – both literate and aliterate – are attracted to the appearance and format of Integrated Instructions
- Integrated Instructions reduce errors and improve performance
- Two case histories document the effectiveness of Integrated Instructions:
  - Pilkington North America – Automotive glass module manufacturing
  - Michigan's Criminal Justice Information Center – Records processing

Comment: *This Integrated Instruction shows a maintenance procedure for a U.S. Postal Service (USPS) bar code printer. Note the central graphic, limited text, and clear sequence of procedures. This typical Integrated Instruction page is effective for both aliterate and literate users.*

Based on favorable response from maintenance personnel, the USPS specifies this format for subsequent manual updates.

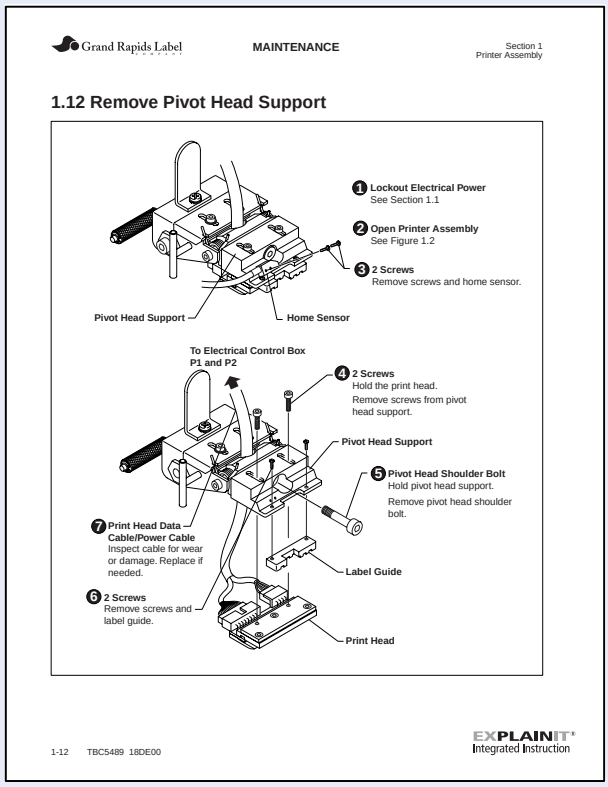


Figure 1. *Integrated Instruction for Servicing a Bar Code Label Printer*

Comment: *This Integrated Instruction explains sanitizing a whirlpool tub in a healthcare facility. Every accredited healthcare facility in the country amasses a large file of conventional instructions documenting the official way to perform every procedure in the facility. Invariably, these procedures are entirely text, are filed in a central location and require concentrated reading skill to understand the task.*

In early field trials, when Integrated Instructions like this sample are displayed at the work location, healthcare workers perform procedures more efficiently

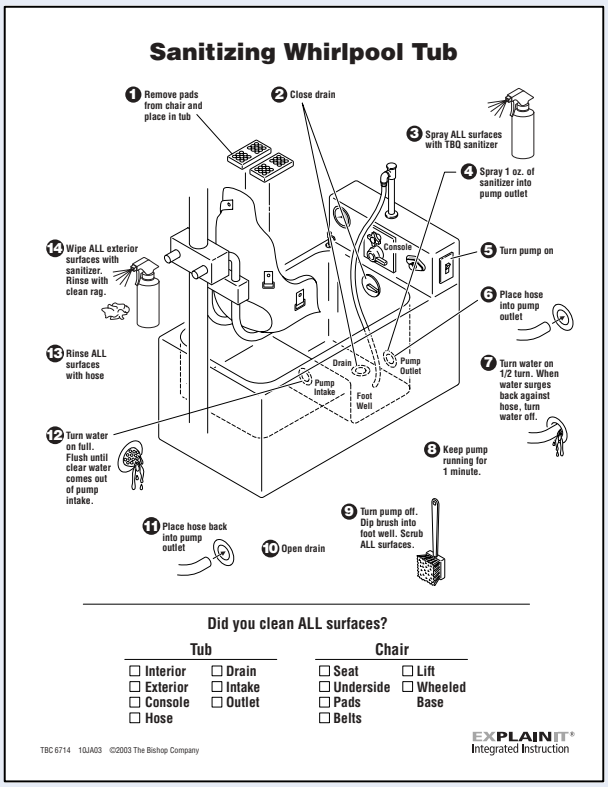


Figure 2. *Integrated Instruction for Sanitizing a Whirlpool Tub in a Nursing Home*

Introduction

Aliteracy: a growing phenomenon

Aliteracy is the paradox of being able to read, but choosing not to. In America, aliteracy is a growing phenomenon caused by poor reading skills, time pressure, workplace distractions and lack of concentration. Working under pressure or with significant distractions can turn a very literate individual into a highly impatient aliterate user with minimal attention span and little tolerance for reading of text.

Conventional written instructions require reading

In curious parallel with the rise of aliteracy, American industry pours out an increasing flood of technical instructions to manufacture, install, operate and maintain products and perform services of every description. Typically, these instructions are mostly words that a user must read to perform a task, fix a problem or follow a procedure. This heavy reliance on written instructions implies a fundamental assumption that people have the time and patience to read with care and attention.

Most users won't read heavy-text conventional instructions

In practice, many of today's users – both literate and aliterate – working under normal job conditions of pressure and distractions, won't read text-heavy instructions. Instead of reading, these users will guess or start a trial-and-error solution. Chances are, whatever they do will be wrong, and the result is a costly loss of efficiency, accuracy, productivity and quality.

Integrated Instructions improve performance

As a solution to the problem of ineffective conventional instructions, this paper reports on Integrated Instructions, an innovative approach in developing work instructions for aliterate users. The technique of Integrated Instruction merges limited text and graphics into a clear, inviting format that helps users work more quickly, easily, safely and accurately. Ineffective conventional instructions are usually developed to comply with certification or accreditation standards and soon get buried in binders or computer databases. This paper offers before-and-after examples and case histories showing how Integrated Instructions are proving to be effective and valued workplace tools.

"Aliteracy … is like an invisible liquid, seeping through our culture, nigh impossible to pinpoint or defend against. There may be untold collateral damage in a society that can read but doesn't."

Linton Weeks – Washington Post

"In a time when knowledge is seen as the key sustainable differentiator in corporate survival and growth, employees refuse at an increasing rate to read documents because they don't have the skills, tools or patience to read them."

Brian McKay – Managing Corporate Aliteracy

Aliteracy

Aliteracy is the paradox of being able to read but choosing not to. The term was first coined in 1984 by Daniel Boorstin, Librarian of Congress, in a publication tracking the decline of reading skills in the United States. Nearly 20 years after Boorstin's first alert, observers of American culture continue to report that aliteracy is widespread and growing.

Aliteracy has significant cultural, personal and educational implications. In this paper, we will consider aliteracy only in the context of using task instructions and procedures in the workplace.

Two forms of aliteracy: functional and conditional

As initially coined and as it comes into wider use, the term aliteracy refers to the paradox of being able to read but simply choosing not to. We'll use the phrase "functional aliterate" to describe a person who

- Has poor reading skills and finds reading cumbersome and inefficient
- Does little or no reading for entertainment
- Usually avoids any reading if possible

Beyond this basic functional aliteracy, there are more complex levels of reading capacity. Developers of work instructions need to consider a much larger group of people we will call "conditional aliterates." These are people with satisfactory reading skills who can and do read things like training materials, user manuals and periodicals. Under favorable conditions, they'll do their best to understand work instructions, even poorly written ones. But it's a different matter when things go wrong – like a sudden machine stoppage, a frozen computer screen, a spill, an angry patient, or products falling off a conveyor belt – and the problem announces itself with signs like alarm bells, flashing warning lights, error messages, pain or smoke. Under these conditions, it's a rare person who has the temperament to find and read a text-heavy instruction to learn what's wrong and how to fix it.

The problem of poor reading comprehension caused by either form of aliteracy is further compounded by

- Increasing technical job demands
- Growing incidence of workers for whom English is not the native language
- Higher job stress related to workplace productivity pressures

All of these conditions demand work instructions that are easily accessible and that explain the task in a format that can be quickly and easily understood. Unfortunately, what employers usually have available for assistance are pages of outdated text filed away in binders or in a computer database.

We have individual perspectives on aliteracy

Creating work instructions requires that developers and writers know their own biases and filters. Writers and developers are typically highly literate people who may not easily accommodate the reading comprehension limits of people with reduced reading skills. Text-heavy conventional instructions that pervade American workplaces are generally developed by writers and engineers who default to text as the dominant and conventional method for presenting technical information.

The following section examines the conventional work instructions that fail to place the user's needs ahead of publishing convenience and efficiency.

Conventional Work Instructions

Work instructions are so common and so pervasive that they are seldom considered with a critical eye by anyone – the developer, the user or people responsible for managing the workplace. Workers of all types just accept dull, lengthy, obscure written instructions and procedures as fundamental working conditions. Employees accord them little value or credibility as a resource for doing real work. Here are some of the reasons that conventional instructions get such little respect:

- Conventional work instructions are not used in "tribal knowledge" training
- Conventional instructions are predominately text
- Conventional instructions get buried in binders and databases
- Conventional instructions are not suitable for formal training
- Remote graphics require the user to split concentration
- The conventional instruction format is convenient and efficient only for the developer

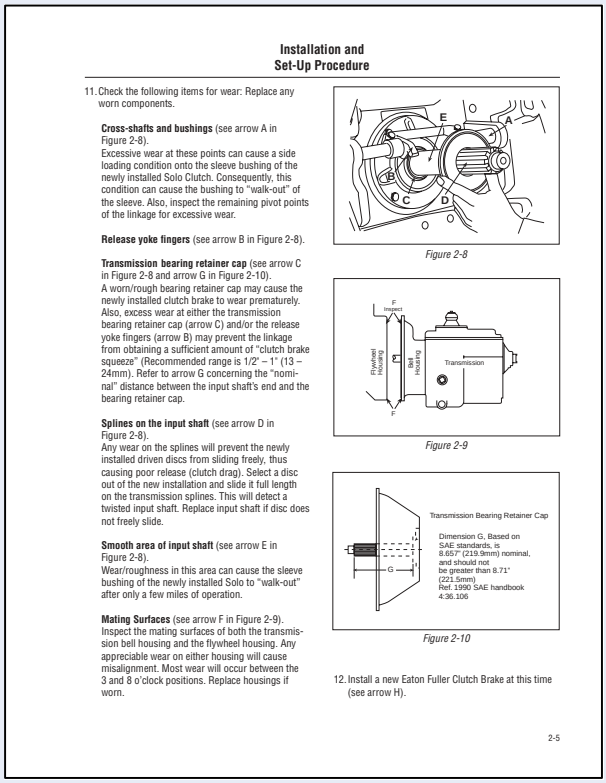
Conventional work instructions are not used in "tribal knowledge" training

Often, workplaces depend on experienced workers to provide new workers with essential instructions. However, it's hard to imagine a workplace where the senior worker will go to the binder full of formal, certified work instructions, find the right procedure and carefully read through the pages with the new worker. More likely, the senior worker will demonstrate how the job is done – *by that particular senior worker*. This "tribal knowledge" approach is a fast and easy way to get new workers oriented. But when this informal training is done without clear job aids, checklists or other formal documents, the results rely entirely on the approach and the *memory of the senior worker at the time of the training*. What this approach offers in terms of speed and simplicity, it loses in accuracy and thoroughness. Plus, it perpetuates the errors that have likely slipped into the senior worker's method. Later, we'll look at how Integrated Instructions can serve all parties as clear, accurate and simple on-the-job training aids.

Conventional instructions are predominately text

Written text is the traditional, conventional way we think people acquire information and learn. For most developers, writers and trainers, written text is also the easiest, most comfortable way to get information documented. However, conventional instructions require reading and assume literate users. As we discussed above, aliterate users lack the necessary skill and patience to make effective use of instructions or procedures that are predominately text.

Comment: *This is a typical conventional instruction page with solid column of text and remote graphics. This page describes maintenance procedures for a heavy-duty truck clutch. Figure 5 on page 12 is a before-and-after illustration that demonstrates the improvement that resulted when this procedure was converted to an Integrated Instruction format.*



Installation and Set-Up Procedure

11. Check the following items for wear: Replace any worn components.

Cross-shafts and bushings (see arrow A in Figure 2-8).
Excessive wear at these points can cause a side loading condition onto the sleeve bushing of the newly installed Solo Clutch. Consequently, this condition can cause the bushing to "walk-out" of the sleeve. Also, inspect the remaining pivot points of the linkage for excessive wear.

Release yoke fingers (see arrow B in Figure 2-8).

Transmission bearing retainer cap (see arrow C in Figure 2-8 and arrow G in Figure 2-10).
A worn/rough bearing retainer cap may cause the newly installed clutch brake to wear prematurely. Also, excess wear at either the transmission bearing retainer cap (arrow C) and/or the release yoke fingers (arrow B) may prevent the linkage from obtaining a sufficient amount of "clutch brake squeeze" (Recommended range is 1/2" – 1" (13 – 24mm). Refer to arrow G concerning the "nominal" distance between the input shaft's end and the bearing retainer cap.

Splines on the input shaft (see arrow D in Figure 2-8).
Any wear on the splines will prevent the newly installed driven discs from sliding freely, thus causing poor release (clutch drag). Select a disc out of the new installation and slide it full length on the transmission splines. This will detect a twisted input shaft. Replace input shaft if disc does not freely slide.

Smooth area of input shaft (see arrow E in Figure 2-8).
Wear/roughness in this area can cause the sleeve bushing of the newly installed Solo to "walk-out" after only a few miles of operation.

Mating Surfaces (see arrow F in Figure 2-9).
Inspect the mating surfaces of both the transmission bell housing and the flywheel housing. Any appreciable wear on either housing will cause misalignment. Most wear will occur between the 3 and 8 o'clock positions. Replace housings if worn.

Figure 2-8

Figure 2-9

Figure 2-10

12. Install a new Eaton Fuller Clutch Brake at this time (see arrow H).

2-5

Figure 3. *Before: Conventional Instruction for Servicing a Heavy-Duty Truck Clutch*

Conventional instructions get buried in binders and databases

Most work instructions are developed at considerable cost and effort because they are mandated by some certification, auditing or standard-setting body like ISO, QS, FDA, DoD or JCAHCO (Joint Commission on Accreditation of Health Care Organizations). Ostensibly, the work instructions document how a task or procedure is supposed to be done. But, once approved, these required work instructions typically get filed away while the people doing the work proceed down separate paths of change. Sometimes, the changes are innovative improvements; other changes are unproductive, inefficient or incorrect practices that creep into the work. But either way, they are deviations from the supposed standards of the documented procedures.

Conventional instructions are not suitable for formal training

Another limitation of conventional instructions is that they are often unsuitable as training materials and therefore not used to orient new or replacement workers. In workplaces with formal and effective new-worker training, the training professionals have probably developed training materials different from the mandated work instructions. The unfortunate result of this flaw is that workers don't get the benefit of having workplace job aids that match the materials on which they were trained.

Remote graphics require the user to split concentration

When developers and writers add photos or graphics to instructions, the graphics usually play supporting roles and are positioned away from the text, sometimes in a separate column or worse, on a separate page or incredibly, in a completely different document. These remote graphics might be capable of adding some valuable support, but at the cost of dividing what is already limited concentration and attention.

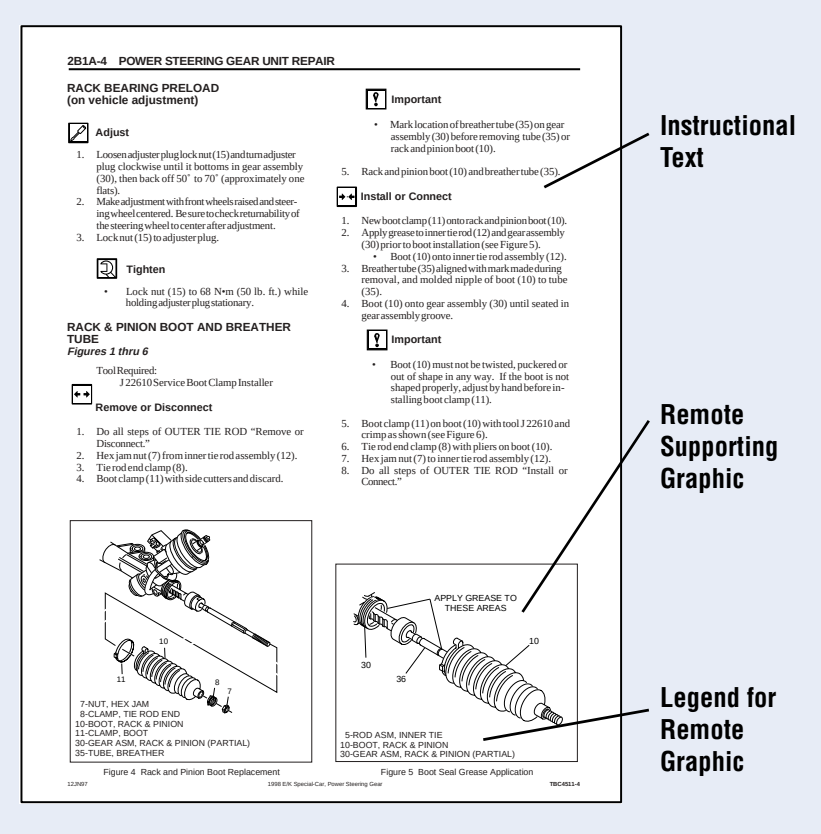


Figure 4. *Conventional Instruction Page With Remote Graphics and Legends*

Remote graphics require the user to interrupt reading of the text and switch focus and attention to the graphic. Additional loss of concentration occurs with illustration or graphic legends (i.e., a box or table adjacent to the graphic that uses reference letters or numbers to identify elements within the graphic). When developers use legends to explain the purpose or content of a remote graphic, they force the user to even further split precious concentration.

The user now needs to maintain three separate but simultaneous points of attention or focus:

- One point of attention needs to stay on the user's place in the main text
- A second goes to the remote graphic
- A third goes to the legend to interpret the graphic

Being required to split concentration and focus is a challenge for any user, and particularly for an aliterate reader with limited reading-comprehension skills.

The conventional instruction format is convenient and efficient only for the developer

If an organization is simply trying to document a lot of instructions or procedures, straight text is certainly an easy method. Word-processing software and standard templates allow a proficient writer or – more likely, a committee – to turn out binders full of them with relative ease. Graphics really slow things up, particularly if they are mixed in with the text. That's why graphics, when they are used at all, get stuck in remote places where they won't interfere with the lines of text. When the mission is to meet a mandate for documented instructions, the idea that someone might actually want to use them really doesn't come into play.

Here is a summary of what's wrong with conventional instructions:

- They require literacy and concentration
- They are not effective for use in actual workplace conditions
- They are usually not easily accessible to the user who needs them
- They do not even appear to be helpful resources
- They are not suitable for training
- They reflect ease and efficiency of development, not the need of the user
- They are everything the aliterate user rejects

Aliteracy and Conventional Instructions: Impact on Quality

Industry uses instructions to document a product, beginning with design and ending with removal and replacement. In accredited healthcare facilities, written work procedures are in place to document every single function, treatment and process that takes place in the facility.

Consider the many different work functions that use procedures and work instructions:

- Assembly
- Installation
- Operation
- Maintenance and Service
- Nursing and Personal Care
- Technical Support
- … and many more

Even though the procedures and work instructions explaining these jobs could be valuable and productive resources, in most environments they are obscure documents that are brought into the daylight only when the auditor is coming to visit.

Most workers use instructions only when needed

Certainly there are thorough, conscientious and methodical people who always prepare and carefully follow directions. But for many users, technical instructions are a last resort. If the user knows what to do and how to do it, instructions are unnecessary. A typical user needs instructions only when it's not clear what to do next or how a particular task is to be performed. **Instructions come into play when the user needs them and probably after empirical or intuitive methods have failed.** By this point, the typical user is likely frustrated, behind schedule and eager for a quick solution – conditions that further inhibit reading comprehension.

Aviation and aerospace are notable exceptions to typical industry practice of performing important tasks by "winging" it from memory. Because of the unforgiving nature of errors, pilots and those who prepare their equipment are trained to use checklists, spec sheets and all sorts of documents as fundamental work tools. Manufacturing and healthcare could learn much from aviation about achieving zero-defect performance through the rigorous use of documented procedures.

Costs of ineffective instructions

Ineffective conventional instructions have the potential to add costs and reduce revenue at every stage of the product or service life cycle. As with many quality flaws, the damages are not readily apparent. Except in cases of big failures, the penalties of poor instructions are mostly buried in missed opportunities like these:

- Reduced productivity
- Slowed or improper assembly
- Flawed installation and operation
- Inadequate or irregular maintenance (and therefore, shorter equipment life)
- Increased warranty, safety and liability exposure
- Increased customer service support
- Missed sales of parts and upgrades
- Reduced product performance

Integrated Instructions: A Solution

Integrated Instructions overcome the weaknesses of conventional instructions. In brief, Integrated Instructions address two fundamental flaws of conventional instructions:

- They reflect the needs of the user instead of the convenience of the developer
- They have easy-to-grasp graphics as a central focus, with text playing a supporting role

Characteristics of Integrated Instructions

The sample work instructions that appear throughout this paper reflect the author's 25 years of experience in developing workplace documents. The format of Integrated Instructions evolved as part of a continuous study of document usability. While the development process itself is outside the scope of this paper, there is a short list of obvious attributes that characterize good and effective work instructions.

Instructions work best when:

- Graphics dominate
- There is minimal text
- Text and graphics are integrated
- There is a clear point of focus
- There is no need to split concentration
- There is a clear sequence of steps or procedures

The efficient and effective appearance of Integrated Instructions suggests accuracy, simplicity and authenticity. This positive appearance sharply contrasts conventional instructions that often appear cumbersome, inefficient, and hard to use – especially to an aliterate user.

Benefits of Integrated Instructions

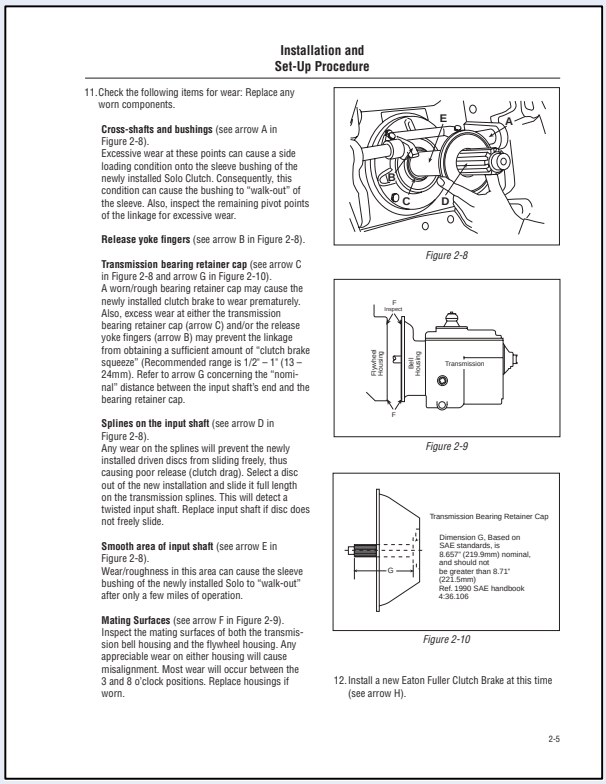
Use of Integrated Instructions to document tasks and procedures offers these benefits:

- Fulfill ISO, QS and JCAHCO requirements
- More accurately document best work practices
- Allow faster, more effective worker training and orientation
- Ensure better retention of content
- Provide easier understanding for low literacy users
- Provide easier understanding for non-English users
- Provide a high-impact work-site job aid
- Reduce trial-and-error work methods
- Help promote standardization
- Assist in developing improved work methods
- Enable more accurate work performance
- More clearly identify procedure steps
- More easily isolate problem steps
- Improve user safety
- Improve productivity
- Reduce liability exposure

Comment: *The "before" version of this procedure appeared as Figure 3 on page 7, within the discussion of conventional instructions. The "after" version shows an Integrated Instruction of the identical procedure. Note the limited text and the use of a central, main graphic. Every point of information in the "before" version also appears in the "after" version, but in a much more efficient and inviting format.*

Based upon very favorable user response to this Integrated Instruction format, the company has adopted the style for other instructional material.

Before



Installation and
Set-Up Procedure

11. Check the following items for wear: Replace any worn components.

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Release yoke fingers (see arrow B in Figure 2-8).

Transmission bearing retainer cap (see arrow C in Figure 2-8 and arrow G in Figure 2-10).
A worn/rough bearing retainer cap may cause the newly installed clutch brake to wear prematurely. Also, excess wear at either the transmission bearing retainer cap (arrow C) and/or the release yoke fingers (arrow B) may prevent the linkage from obtaining a sufficient amount of "clutch brake squeeze" (Recommended range is 1/2" – 1" (13 – 24mm). Refer to arrow G concerning the "nominal" distance between the input shaft's end and the bearing retainer cap.

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Smooth area of input shaft (see arrow E in Figure 2-8).
Wear/roughness in this area can cause the sleeve bushing of the newly installed Solo to "walk-out" after only a few miles of operation.

Mating Surfaces (see arrow F in Figure 2-9).
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Figure 2-8

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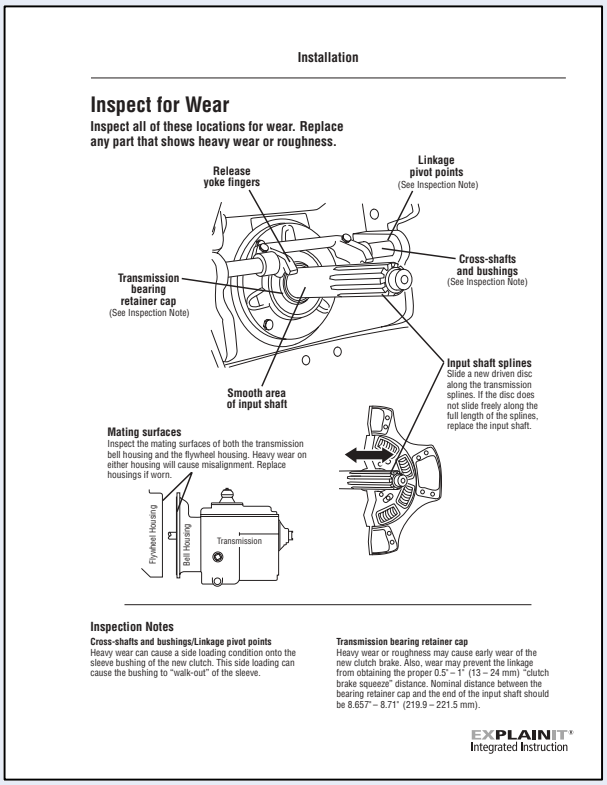
12. Install a new Eaton Fuller Clutch Brake at this time (see arrow H).

2-5

After



Installation

Inspect for Wear

Inspect all of these locations for wear. Replace any part that shows heavy wear or roughness.

Inspection Notes

Cross-shafts and bushings/Linkage pivot points
Heavy wear can cause a side loading condition onto the sleeve bushing of the new clutch. This side loading can cause the bushing to "walk-out" of the sleeve.

Transmission bearing retainer cap
Heavy wear or roughness may cause early wear of the new clutch brake. Also, wear may prevent the linkage from obtaining the proper 0.5" – 1" (13 – 24 mm) "clutch brake squeeze" distance. Nominal distance between the bearing retainer cap and the end of the input shaft should be 8.657" – 8.71" (219.9 – 221.5 mm).

EXPLAINIT®
Integrated Instruction

Figure 5. *Before and After: Conventional versus Integrated Instruction for Servicing a Heavy-Duty Truck Clutch*

In the following sections, we review two case histories showing how Integrated Instructions have made powerful impacts on worker performance:

- Pilkington North America –
  Factory production using QS-9000 work instructions
- State of Michigan –
  Criminal history records processing

Case History: Pilkington North America

Pilkington North America is a world-leading glass manufacturer and a Tier 1 Supplier of transportation glass. The 200-plus workers at the modern Pilkington facility in Niles, Michigan, produce complex automotive glass modules that incorporate value-added features like defogging grids, weather stripping, hinges, latches and communication antennas.

The six-year-old Pilkington Niles plant is highly regarded as a showcase for progressive quality management and outstanding manufacturing processes. In 2001, *IndustryWeek* magazine named this facility one of the Top 25 Manufacturing Plants in the United States. Management leads a proactive, plant-wide commitment to quality that has resulted in Niles products being specified for a range of North American automobiles, light trucks and SUVs.

Continuous improvement

In 2001, as part of a continuous plant-wide quality-improvement effort, Pilkington management established a number of quality objectives:

- Improve product-assembly efficiency
- Reduce scrap and improve material yields
- Speed up new-associate training
- Facilitate job shifting and work-cell reassignment
- Improve equipment maintenance
- Improve product quality from an already superior level

Essential foundations to these objectives were the twin quality concepts of Best Practice and Work Standardization:

- Best Practice:

  "There is one best way to perform every manufacturing procedure."

- Work Standardization:

  "We will develop, document and train on these Best Practices and manage our plant to maintain these standards."

Plant management viewed the factory work instructions as a key element in defining and promoting Best Practice and Work Standardization. Like all QS-9000 certified suppliers, Pilkington Niles had already documented everything – including factory work instructions for all manufacturing processes. However, management recognized that the present conventional work instructions were not up-to-date, were not used for training and were not really supporting the production workers.

The Pilkington Standardization Team

In the summer of 2001, management selected five experienced production people from the plant and gave them a temporary full-time assignment as a Standardization Team. Plant management retained The Bishop Company to work with the Standardization Team to determine Best Practices and to develop Integrated Instructions that would overcome the deficiencies of the conventional QS-9000 work instructions. The Bishop Company and the team were assigned to:

- Identify the best way to perform every job in the plant
- Develop a graphic Integrated Instruction for every procedure
- Display and promote Integrated Instructions as a quick-reference job aid for every manufacturing procedure

Conventional instructions did not specifically document procedures

The Standardization Team learned that the existing conventional QS-9000 work instructions didn't always document what the workers were actually doing in the manufacturing work cells. For identical tasks, the actual work methods varied from shift to shift and from cell to cell, yet all were in general conformance with the text of the written work instruction. Also, the instructions in various work cells for different products described similar procedures in a vastly different manner.

Conventional instructions were not readily available to plant workers

The procedures had not been designed for quick use. Though workers could conceivably obtain paper copies of the procedures available in binders at a cell, searching out the one procedure in question slowed the work stream.

Conventional instructions were not suitable as a job aid

As a further hindrance, most of the instructions extended to several pages. The multi-page format made these instructions hard to display and prevented their function as job aids at the actual work location. The instructions resided in binders, somewhat neglected and often out of date; they had little practical value as a resource for production workers.

Developing Best Practices

With the conventional instructions as a starting point, the Standardization Team and The Bishop Company studied every manufacturing procedure in the plant. Working cell by cell, they broke every procedure down into detailed steps. In collaboration with Team Leaders and the production people in each work cell, they arrived at a consensus Best Practice. For every procedure, The Bishop Company developed an Integrated Instruction that documented the standard method.

Posted job aids and training tools

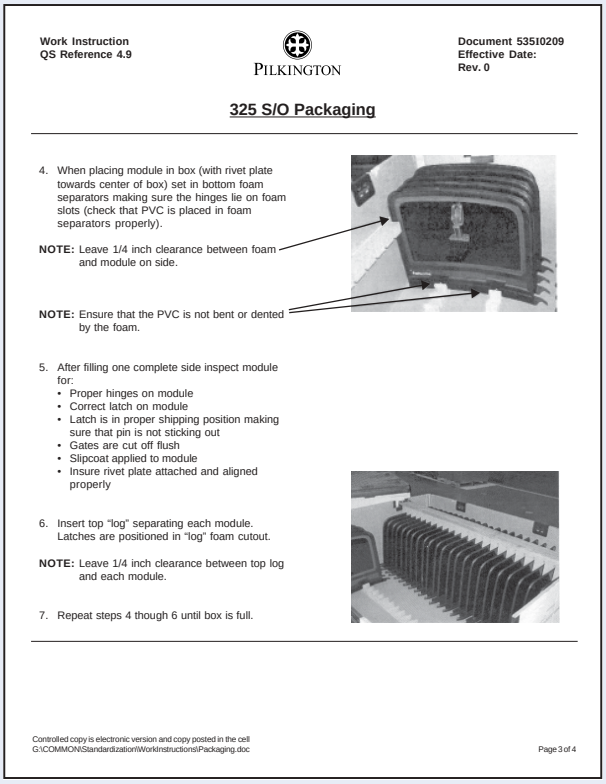
The Standardization Team and The Bishop Company finished their work in June 2002. All QS-9000 work instructions were now in the new graphic style. The Bishop Company delivered completed Integrated Instructions in PDF format using Adobe® Acrobat® software. The plant now displays every instruction as an 11 x 17 inch poster mounted at the work location, along with a poster-sized quality assurance checklist that identifies critical final inspection points for every product. The instructions also serve as an integral part of the training for new employees, as well as employees moving between cells.

Comment: *This "before" is one page from a typical QS-9000 factory work instruction at Pilkington Niles. This instruction was four pages long. Note the full column of text with remote photos as supporting graphics.*

The "after" is a single-page Integrated Instruction that replaced the text-heavy four-page version. Note the central graphic, limited text and clear sequence of procedures.

Immediate results with this new format showed quicker training time, better productivity and reduced errors. The company has now converted all factory work instructions to this new format.

Before



Work Instruction
QS Reference 4.9

PILKINGTON

Document 535I0209
Effective Date:
Rev. 0

325 S/O Packaging

4. When placing module in box (with rivet plate towards center of box) set in bottom foam separators making sure the hinges lie on foam slots (check that PVC is placed in foam separators properly).

NOTE: Leave 1/4 inch clearance between foam and module on side.

NOTE: Ensure that the PVC is not bent or dented by the foam.

5. After filling one complete side inspect module for:
   - Proper hinges on module
   - Correct latch on module
   - Latch is in proper shipping position making sure that pin is not sticking out
   - Gates are cut off flush
   - Slipcoat applied to module
   - Insure rivet plate attached and aligned properly

6. Insert top "log" separating each module. Latches are positioned in "log" foam cutout.

NOTE: Leave 1/4 inch clearance between top log and each module.

7. Repeat steps 4 though 6 until box is full.

Controlled copy is electronic version and copy posted in the cell
G:\COMMON\Standardization\WorkInstructions\Packaging.doc

Page 3 of 4

After

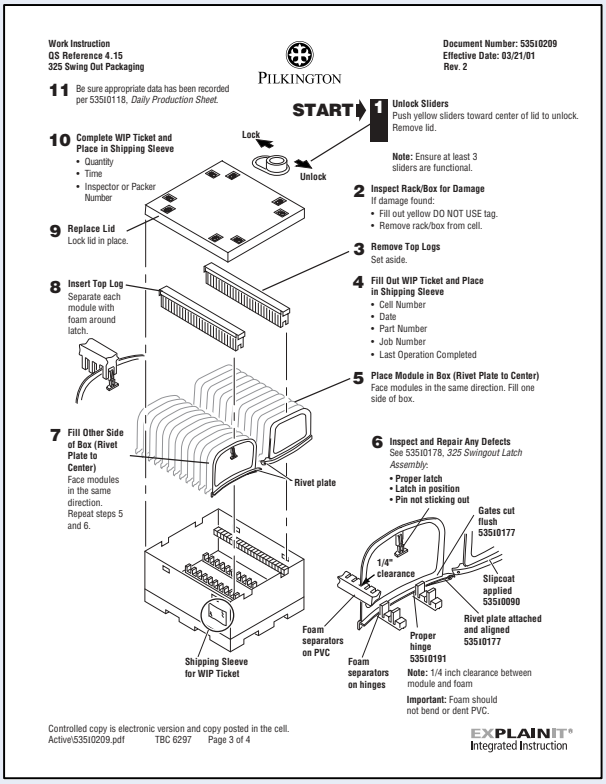


Figure 6. *Before and After: Pilkington QS-9000 Packaging Instructions*

Results after nine months of experience

After nine months of experience with the new format of Integrated Instructions documenting Best Practices, plant management regards the program as an outstanding success. Here are some early payoffs:

No secondary inspections

On established products, the plant has been able to eliminate secondary product inspections. Associates in the production cells have demonstrated sufficient ability to produce zero-defect products that further inspections are no longer needed.

Zero defects from four cells

As of this writing in March 2003, four of the plant's 13 work cells have now operated for over nine months without releasing a single non-conforming product. Other cells show significant improvement but have not yet reached zero-defect production.

Flexible production staffing

Production staffing has been aided through the ability to make short-term work reassignments with minimal orientation. With work procedures standardized between cells for common tasks and all procedures documented as job aids, associates are able to quickly get up to speed on new assignments.

Improved production metrics

Pilkington management reports significant improvement in a range of production metrics, including reduced scrap, higher raw material yields and improved labor productivity.

In perhaps the most significant affirmation of the benefits derived from the 2002 Work Standardization effort, the Pilkington Niles plant has been awarded contracts in 2003 for new glass modules. As of this writing, Pilkington management and The Bishop Company are arranging to start work on new Integrated Instructions to support the expanded production.

Case History: State of Michigan Criminal Records

Michigan's Criminal Justice Information Center (CJIC) is the unit of the Michigan State Police that manages the state's criminal history records, including fingerprint files, arrest records, and all of the related data covering warrants, court dispositions and corrections records. The information sources and destinations make up a complex web of courts, prosecuting attorneys, police agencies, jails and prisons. For the system to work properly, information coming into and going out of the massive database must be current, accurate and immediately available around the clock.

New system required better compliance

The procedures that govern the critical, yet sensitive, criminal history information are defined by an equally complex web of both state and federal laws, (CJIC links directly with FBI records.) In the mid-1980s, as Michigan's fingerprint system began the change from a manual system to an automated computer system, the state recognized the need for a better process to manage the origination and processing of criminal records. The new computerized system would require precision and consistency from the thousands of people working at many hundreds of input sources. Under the old system, there were several points where human experts could intercept and fix flawed records.

In 1987, Michigan's criminal justice community asked The Bishop Company to assess the system and develop better tools to explain the procedures for creating and updating criminal history files. Bishop Company staffers learned that the procedures for creating and submitting records were defined in the laws and by other legal orders. The laws were difficult to read and were completely impractical as training tools and job aids.

Integrated Instructions for criminal records reporting

Following extensive research and after gaining the confidence of officials of the State Court Administrator's Office and the Prosecuting Attorneys Coordinating Council, The Bishop Company submitted a unique style of Integrated Instructions for handling criminal records. The new format was in flow-chart style, using symbols and graphics for the various forms and information sources. Figure 7 and Figure 8 show samples of the Integrated Instructions.

Criminal records processing: sixteen years later

Sixteen years after the State of Michigan first adopted the Integrated Instruction format, the system developed by The Bishop Company continues to guide criminal records reporting. While the laws remain the State's official policy, courts, prosecutors and police agencies use the simple Bishop Company handbooks for training and as reference job aids. The handbook was updated in 1992 and 1997 to cover changes in the laws, but the efficient Integrated Instruction format remained unchanged. For 2003, The Bishop Company will again make minor updates. And reflecting today's technology, the handbook will be distributed on CD-ROM.

Comment: *The clear flow-chart style of instructions for processing criminal records was welcomed by the thousands of workers in the courts, police agencies, prosecuting attorney offices, prisons and jails that make up Michigan's criminal justice information system.*

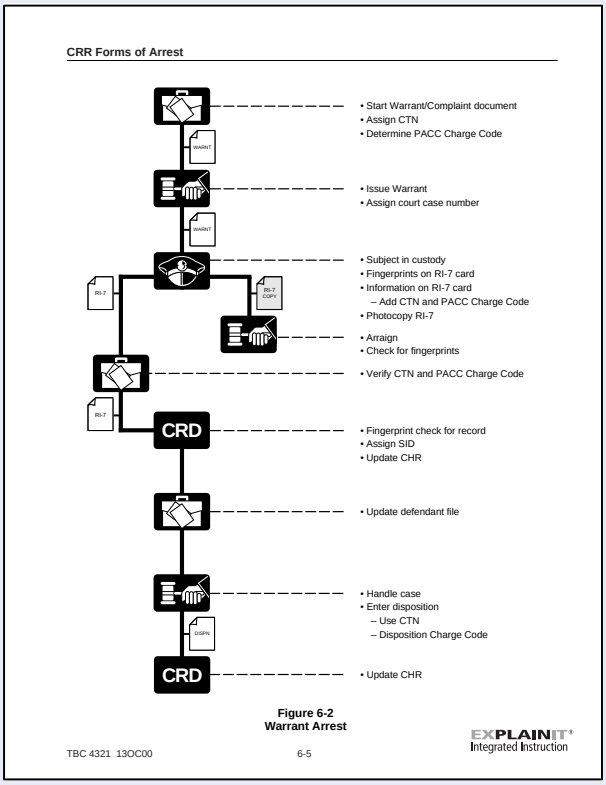


Figure 7. *Procedure for Processing a Single-Suspect Warrant Arrest*

Comment: *The graphic format of Integrated Instructions allowed a consistent, standardized approach for explaining procedures for complex variations in Michigan's criminal laws.*

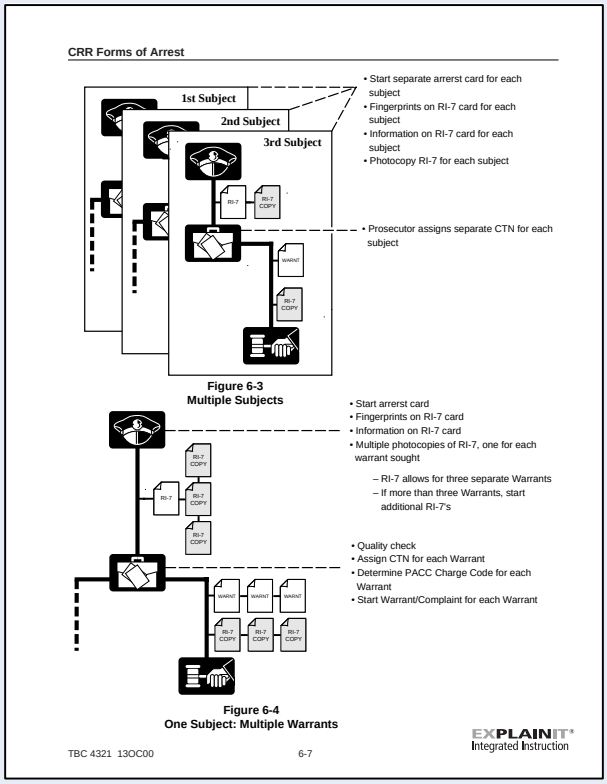


Figure 8. *Procedures for Processing Arrests for Multiple Subjects and Multiple Warrants*

Benefits of Integrated Instructions for criminal records processing

The Integrated Instructions format offered several advantages to the many offices and agencies involved in criminal records processing:

Clear and easy-to-follow procedures

Compared to the lengthy and cumbersome text in the applicable laws, the Integrated Instructions distilled the procedures down to the basic elements of originating and updating records. The simple graphics and flow diagrams explained the processes at a glance.

Standard format

The laws covering the many types of crimes and criminals are not consistent. The Integrated Instruction approach focused on the common record elements and allowed all of the different procedures to be represented in a standard format.

New employee training

The handbook serves as an effective training tool for new employees of the courts, police agencies, prisons, jails and prosecuting attorney offices.

Quick reference job aid

For some offices and agencies in which certain procedures are encountered only infrequently, the handbook serves as an easily accessible quick reference guide.

Perspectives on Developing and Publishing Instructions

Organizations that might be ready to investigate or adopt Integrated Instructions need to recognize the significant leap they represent. Here are three perspectives to consider:

Integrated Instructions are unconventional

Integrated Instructions are a break with tradition, and their implementation can be controversial. The conventional, text-heavy style is commonly accepted, and it is the format that developers, writers and engineers are used to working with. Further, literate people often assume others can use text efficiently.

Developing Integrated Instructions is challenging

Integrated Instructions are not as easy to develop as they are to use. Graphic images actually interfere with efficient publishing, and that's why graphics tend to get stuck in places convenient for the writer or developer. Integrated Instructions shift the focus to the needs of the user, not the convenience of the publisher.

Work instructions have limits

Work instructions document a task or procedure. Work instructions should not be expanded to cover theory of operations or other detailed background information that can be better covered in other, more appropriate documents.

Notwithstanding these cautions, the advantages delivered by Integrated Instructions far outweigh the disadvantages.

Conclusion

Here is a summary of the key topics of this paper:

- Aliteracy is the paradox of being able to read, but choosing not to
- Aliterate users dominate the workplace
  - *Functional aliterates* find any reading cumbersome and ineffective
  - Workplace stress and pressure create *conditional aliterates* out of normally literate workers
- Aliteracy is widespread and growing
- Text-heavy conventional instructions are not effective for aliterate users
- Graphic-focused Integrated Instructions are more effective:
  - They're better for both aliterate and literate users
  - They reflect the needs of the user, not the convenience of the developer
  - They emphasize graphics over text and offer a wide range of usability benefits
- Users are attracted to Integrated Instructions
- Integrated Instructions threaten accepted practice and may be controversial
- Integrated Instructions are harder to develop than text-heavy conventional instructions

In years of workplace experience, Integrated Instructions have proved to be effective in reducing errors and improving productivity. Users welcome them as credible, efficient resources and as vast improvements over text-heavy conventional instructions.

EXPLAINIT® Trademark

The sample Integrated Instructions illustrated in this paper were all developed by The Bishop Company and carry the trademark EXPLAINIT® as granted in 2002 by the United States Patent and Trademark Office.

EXPLAINIT®
Integrated Instruction
www.explainers.com

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