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1.0 POLICY/PURPOSE

Santa Barbara Applied Research (SBAR), Inc. maintains documented procedures to ensure that the inspection and test status of products and services is continuously identified throughout the production process. This procedure provides assurance that products or services, both supplied and accomplished (i.e., produced in-house), that do not conform to specified requirements are prevented from inadvertent use or from being tendered as completed work.

2.0 SCOPE

This procedure applies to all SBAR divisions.

(**NOTE:** This procedure is designed to compliment SBAR *Product Identification and Traceability Procedure* and SBAR *Inspection and Testing Procedure*.)

3.0 REFERENCES AND DEFINITIONS

3.1 References

ISO 9001: Quality Management Systems-Requirements, Third Edition (2000-12-15)

SBAR Procedures

- Control of Customer Property (CP-00-9007)
- Product Identification and Traceability (CP-00-9008)
- Inspection and Testing (CP-00-9010)
- Control of Nonconforming Product and Services/Corrective and Preventive Action (CP-00-9013/14)
- *Control of Quality Records (CP-00-9016)*

3.2 Definitions

Because inspection and testing are involved in all aspects of producing a product and performing a service, the position "titles" used in this procedure are functional descriptions rather than job titles. In many cases, one person acts in several roles.

<u>Conformity/Nonconformity</u>: Conformity is the fulfillment of a requirement; nonconformity is the non-fulfillment of a requirement.

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Design Engineer: For this procedure, a design engineer is defined as the person knowing the requirements and/or specifications of a product or service, or having access to the design requirements/specifications. The design engineer is the point of contact (POC) for clarifying the requirements, and resolving any identified nonconformities.

Functional Area Manager (FAM): A senior supervisory individual responsible for the direction and overall success of an area of the company, such as procurement, operations, maintenance, specific contracts, logistics, quality, safety, engineering, and finance.

<u>In-Process Inspection</u>: Inspections performed on a product at SBAR while in the process of being transformed into goods and services.

Inspection: The evaluation by observation and judgment that conformity to specified requirements exists. Inspection of often accompanied, as appropriate, by measurement, testing, and/or gauging. Qualified personnel conduct inspections that do not typically require a special procedure, but do require the identification of the attributes to be verified.

<u>**Outside Source:**</u> A manufacturer, provider, retailer, or other vendor of products/services that is external to the SBAR organization.

<u>Positive-Recall Procedures</u>: Methods to identify and recall nonconforming products or services that were released to the field without the specified inspection and testing activity(s) taking place. Positive-recall activities are documented, i.e., who, what, when, where, why, etc.

Process Action Report (PAR): An electronic form used to report and document nonconformances, preventive actions, or process improvement actions. The PAR system is located in the PAR Database maintained at the web site. (**NOTE:** The PAR is the only form authorized for recording and documenting nonconformances, preventive actions, and process improvement actions unless otherwise authorized by the Quality Manager.)

Product: Result of activities or processes. A product may include services, software, hardware, processed materials, or a combination thereof. A product can be tangible (e.g., assemblies or processed materials) or intangible (e.g., knowledge or concepts), or a combination thereof.

Product Manager: For this procedure, a product manager is defined as the person responsible for all aspects of a product or service, including production inspection and testing.

<u>Purchaser</u>: The person placing the purchase order or the person designated to receive a product or service. The purchaser represents a labor category appropriate for the product/service and testing, and therefore may be the President, Electronic Technician, Graphic Artist, etc.



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<u>**Receiving Inspection Clerk:</u>** The person (an SBAR employee unless off-site receiving is authorized) accepting a shipment from a shipper, manufacturer, or other provider.</u>

<u>Service</u>: Service is the result of at least one activity performed at the interface between SBAR and a customer. Service includes actions taken by SBAR after delivery of the product, in accordance with the contract statement of work (SOW).

<u>**Test:**</u> The determination of one or more characteristics according to a procedure. (**NOTE:** For this procedure, a set of Work Instructions that verify that a product or service conforms to its requirements.)

Test Case: A Work Instruction with one objective that verifies one requirement.

Test Classification: A grouping of tests by similar objectives.

<u>Test Conductor</u>: For this document, a test conductor is defined as any person performing, or directing the performance of, a test procedure. The test conductor represents a labor category appropriate for the product/service and testing, and therefore may be the President, Electronic Technician, Graphic Artist, etc.

<u>**Test Director**</u>: For this procedure, a test director is defined as the person coordinating the execution of test procedure(s) for a product or service. The test director is responsible for the final report. The test director represents a labor category appropriate for the product/service and testing, and therefore may be the President, Electronic Technician, Graphic Artist, etc.

<u>**Test Level:**</u> A grouping of test levels or test cases i.e., Level I – components; Level II – subassembly; Level III – functional assembly; Level IV – system testing; etc.

Traveler: A production/inspection/test routing sheet attached to a product in-process at SBAR that lists the sequential production work, inspections, and tests to be performed on the product/piece in question. The traveler accompanies the product/piece throughout the production process. Once the product/piece is turned over to the Customer, SBAR maintains a copy of the traveler.

<u>Workstation</u>: A workstation is an activity center within SBAR such as engineering, manufacturing, inspection, purchasing, or testing. A product may have to pass through a number of workstations before being complete, and may have to recycle through some workstations to either repair an identified nonconformance or as a natural order of production.



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4.0 **RESPONSIBILITIES**

4.1 Corporate Quality Manager

The Corporate Quality Manager is responsible for developing and implementing this procedure.

4.2 **Product Manager**

The product manager is responsible for developing and implementing production processes, including inspection, testing, and tracking, for all assigned product lines within the division. The product manager coordinates all associated quality functions, including development of travelers, identification of inspection requirements, and the development and execution of test plans in the form of WIs.

4.3 Design Engineer

The design engineer is responsible for defining the physical attributes and performance functions that need to be verified and validated through inspection and testing. As part of this job description, the design engineer:

- Provides product/service requirements, including definition of conforming performance,
- Provides access to any required design document necessary for the definition of inspection and test requirements, including the resolution of nonconformities,
- Generates travelers for all components, sub-assemblies, and final products for a product line that provides all sequential production, inspection, and test tasks necessary to take SBAR products from raw material to finished product,
- If necessary, trains test conductors on the product's operation or servicing methodology, and
- If necessary, assists in identifying and defining supporting test equipment, testbeds, and other test parameters.

4.4 Test Engineer

The test engineer is responsible for defining the test(s) for the assigned product or service, including:

• Generating/modifying test plans in the form of WIs. Test plans, as a minimum, must define the product(s) being tested, the required test support equipment and



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set-up, test inputs, expected results, acceptance criteria, and any other customerrequired information,

- Provides test procedures in sufficient detail for a knowledgeable person to safely set up and execute each test,
- Provides a form or record for documenting significant test results,
- Clarifies any test or test documentation for the test conductor, and
- Determines whether any deficiency in the test equipment or set-up contributed to any observed nonconformity.

In many cases, the design engineer is also the test engineer, unless otherwise specified by the customer, or due to schedule or workload issues.

4.5 Test Director

The Test Director is responsible for safely performing the test(s) and reporting the results, including issuing PARs and signing off on the production traveler. Specific duties include:

- Verifying that the product or service to be tested has successfully passed all prior scheduled work stations and has no outstanding NCARs,
- Arranging for use of all required equipment, and ensuring that equipment has been calibrated,
- Coordinating the execution of all tests within the WI,
- Gathering and evaluating test data with respect to the performance requirements provided by the design engineer,
- Storing all required test forms and data in accordance with the requirements of the test plan and per SBAR's *Control of Quality Records Procedure*,
- Marking and segregating all nonconforming products using an N/CAR and informing the design engineer of such products, and
- Signing off on the production traveler after successful testing, and posting this information to all applicable *Inspection & Test Status* forms or databases.

In some cases, the Test Director may also be the test conductor, unless otherwise specified by the customer.

4.6 Test Conductor

The test conductor performs the test, records data, and executes the test procedure. If authorized by the test procedure or test director, the test conductor assumes the responsibilities of the test director as listed in Section 4.6.

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5.0 REQUIREMENTS/PROCEDURES:





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5.1 General

The primary document used to track status of completion (and nonconformity, where applicable) is the Production/Inspection/Test Traveler (refer to SBAR procedures *Product Identification and Traceability, CP-00-9008*; and *Inspection and Testing, CP-00-9010*), also called a Production Traveler. The traveler indicates all functions to be performed in transforming raw materials into finished products or services, including all inspections and tests necessary to ensure that the final product meets customer and other requirements. The traveler moves with, and is affixed to, the product in question, and is the primary document used to indicate inspection and test status, including nonconformities and resolution. A sample traveler (Form CP-00-9008-A) is included as Attachment 1, and the process of using a traveler to indicate inspection or test status is shown in Figure 1.

Any products, items, materials, equipment, etc. that are nonconforming or untested are segregated, tagged (e.g., DD Form 1577: Unserviceable (Condemned) Tag-Material), and/or some other positive means to ensure they are not allowed to proceed in the production/installation sequence until the nonconformity is resolved or inspection/testing completed. Items urgently needed may be used with FAM or Project Manager's approval, but these items are listed as untested so that positive-recall procedures can trace, identify, and replace any of these items. Any nonconformance is handled in accordance with SBAR *Control of Nonconforming Product and Services/Corrective and Preventive Action (CP-00-9013/14)*.

Because different divisions may have different levels of production, overall product tracking can be performed using one of three methods:

- On-Demand: This process is useful when only a few items are being produced, and the workstations are located near each other with easy access to all work in progress. A single auditor using a master form for all items in progress makes a visual review of all material, checking the status as indicated on the production travelers.
- Limited Production: This process is suitable for prototype production or limitedquantity continuous production. In this technique, the leader at each workstation (including inspection and test) logs each piece of equipment as it enters and leaves. By forwarding log sheets on a periodic basis, it is possible for the product manager to determine the overall status of production. The traveler is still the primary document used to indicate test/inspection status for a given piece.
- Full Production: This process is required for major production efforts and multiple customers. A computer database is established that logs in each piece of equipment as it enters the production process. The database is continually updated by each workstation leader as parts/material move through the production chain. Data entry is restricted by zone, although all applicable parties (including

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customers) can query the database to determine production, inspection, and testing status of any given part.

The method of inspection and testing status tracking must be determined before starting a given contract or delivery order.

5.2 Tracking Inspection and Test Status Using a Traveler

The traveler includes a pre-determined sequence of steps necessary to convert raw materials and purchased items into a finished product. The written sequence includes the required inspection and testing tasks. When work-in-progress enters a workstation, the traveler is first inspected to ensure that all prior steps have been performed satisfactorily and signed off. All outstanding nonconformances must be resolved. When work (or inspection or test) is complete, the workstation leader signs the traveler off on their work task and forwards the product and its traveler to the next workstation. If a nonconformance is found, a PAR is prepared and forwarded to the design engineer, and the part is set aside until the PAR is resolved. Resolution may include scrapping, reworking, or returning the part to an earlier workstation, in which case a revised traveler may need to be prepared. This process, as applicable to inspection and testing workstations, is illustrated in Figure 1.

5.3 On-Demand Tracking of Test and Inspection Status

This method is appropriate for very limited prototype or continuous production, with a limited number of potential customer queries. The product manager or assignee maintains a master list of all parts in production and their required production/inspection/test requirements, and periodically audits all work-in-progress by examining the travelers to determine the current status of all items. A sample master list is included as Attachment 2.

5.4 Limited-Production Tracking of Test and Inspection Status

This method is appropriate for limited production and prototype manufacturing when there are too many pieces for one person to audit by visual inspection. The travelers are updated as the part/assembly in question goes through production, as described in Section 5.3. However, each workstation logs in each piece of equipment as it enters, and logs it out after signing the traveler and passing the item along to the next work station. The overall status of any job or part can be determined by examining the log records at each workstation, and recording the summary status on a master project list (see Attachment 2). Updates are provided on a periodic basis, typically once a week. Special queries can be handled by checking the logs at each workstation in sequence.

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5.5 Full-Production Tracking of Test and Inspection Status

Mass production and larger numbers of customers require a continuous computer-based tracking system. The basic functions are as described in Section 5.4, but the logs are maintained electronically and uploaded to a master database that can be queried by all work stations and product managers. The travelers still form the basic record that shows the required production, inspection, and testing requirements, and remain attached to the item until it is complete and ready for shipping.

5.6 Control of Quality Records

All production, inspection, and test records are maintained in accordance with SBAR *Control of Quality Records Procedure (CP-00-9016).* Specifically:

- Completed travelers, including attached drawings, inspection records, completed test forms, and material certifications, are maintained in the contract production files.
- Completed log sheets (if applicable) are maintained at the workstation.

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2 BUBS

Production/Inspection/Test Traveler

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Project No. <u>FY04-20099</u> Production/Inspection/Test Sequence

SBAR Part No. <u>N/A</u>

1 roudetion, inspection, i est sequence		
1. Receiving Inspection: Inspect round bar for	[X] Pass	
length & diameter per Purchase Order. Ensure	[] Reject: PAR # : <i>N/A</i>	
material certifications are received and filed in	LJ J	
project folder	(Tim Vo)	5/21/04
Oty Received · 1	Signatura	Dete
		Date
	No problems noted during inspec	tion.
2. Machining: Machine round bar into PN 36 on	[X] Pass	
DWG 20099-05, Rev C, View 3-A	[] Reject: PAR # : <u>N/A</u>	
		5/24/04
		Date
3 In-Process Inspection: Inspect from the	Pass	2
per DWG 20099-05 Rev C View 3-A	[Y] Roject. PAR #. IO&SC 2	110N
per D wei 20077-05, Kev C, view 5-R	[A] Kejeet. I AK # : <u>LOADE 2</u>	<u>1101v</u>
		5/25/04
	(11m Meter)	5/25/04
	Signature	Date
	Part was out of tolerance and	returned to
	machine shop for rework.	
4. Assembly: Install lifting eye and zinc fitting	[X] Pass	
per DWG 20099-06. Rev NC. View 6-D	[] Reject: PAR # : <i>N/A</i>	
r · · · · · · · · · · · · · · · · · · ·	[]j	
	(Bill Wrench)	6/1/04
	Signature	Date
5 Test Group: Verify harmonic halance is	[V] Pass	Duit
within space using SBAR Test Plan 20000 Staps	$\begin{bmatrix} \mathbf{A} \end{bmatrix} \mathbf{D} \mathbf{A} \mathbf{D} \mathbf{A} \mathbf{D} \mathbf{H} \mathbf{A} \mathbf{N} / \mathbf{A}$	
12 26	$\begin{bmatrix} \end{bmatrix} \textbf{Keject. I AK # . IV/A}$	
13-20.	(In a Function and)	6/1/01
	(Jue Engineer)	0/4/04
	Signature	Date
Next Assembly: Gearbox DWG 20099-07, Rev A.		

For Info/Questions, contact: Tim Vo

Attach copies of all test results (i.e., Test Plans) and certifications. Maintain a copy and forward to next work station/shipping. Shipping FAM returns completed traveler(s), with supporting documentation, to Product Manager for recordkeeping.

Attachment 1 – Form CP-00-9008-A Production/Inspection/Test Traveler (Sample)



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		W	ORK	-IN-PRO	GRE	55	$\frac{\mathbf{I}\mathbf{K}}{\mathbf{A}}$	ACK	JNC	j Cł	IAK	KT			
Contract No.					Production Steps										
				Onen											Last Sten
Part Name	DWG	#	PN	PARs	1	2	3	4	5	6	7	8	9	10	Done
Shaft	20099-01		01		RI	Μ	I	Α	Т						5
Pinion Gear	20099-01		02	2345- 021	RI	Μ	I								1
Bull Gear	2009	9-01	03		RI	Μ	Ι	Μ	Ι						3
Coupling	2009	9-01	04		RI										1
Кеу	2009	9-01	05		RI	Μ	Ι	Α							3
Bolt	2009	9-01	06		RI										1
Bolt	20099-01		07		RI										
Bolt	2009	9-01	08		RI			0							
							//								
Production Completion:															
Signature Date															
Code: R = Receiving Inspection															
F = Fabrication Shop															
M = Machine Shop															
A = Assembly															
I = Inspection															
T = Test Gr	oup														
Attach to Traveler and file with project/contract records.															

Attachment 2 – Work-In-Progress Tracking Chart (Sample)



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