

**MIL-STD-787**

**4 DECEMBER 1964**

**MILITARY STANDARD**

**JOINT OPTICAL RANGE INSTRUMENTATION  
TYPE DESIGNATION SYSTEM**



**MIL-STD-787**

**OFFICE OF THE SECRETARY OF DEFENSE  
WASHINGTON 25, D. C.**

**Supply and Logistics**

**Joint Optical Range Instrumentation Type Designation System**

**PROPOSED MIL-STD-\_\_\_\_\_**

1. This standard has been approved by the Department of Defense and is mandatory for use by the Departments and Agencies of the Department of Defense, effective 30 days from date of standard.

2. Recommended corrections, additions, or deletions should be addressed to the preparing activity. Bureau of Naval Weapons, Washington, D.C. 20360.

## FOREWORD

The purpose of this standard is to establish procedures within the Department of Defense for Standardization of identification for designation control of optical range instrumentation and associated equipment as defined herein.

**History.** The Optical Range Instrumentation (ORI) type designation system was prepared and adopted by the Optical Systems Working Group of Inter-Range Instrumentation Group of the Range Commanders Council on 1 August 1963. The Range Commanders Council consists of the following ranges — Air Force Flight Test Center (AFFTC), Air Proving Ground Center (APGC), Atlantic Missile Range (AMR), Naval Ordnance Test Station (NOTS), Pacific Missile Range (PMR), and White Sands Missile Range (WSMR). In addition to these ranges, the OSWG has associate representation from U.S. Army Electronic Proving Ground, Fort Huachuca, Air Photographic and Charting Service (APCS), Langley Research Center and Marshall Space Flight Center, Space Systems Division, AFSC and AEC (Sandia Corporation).

**Organization.** The ORI system is operated in accordance with basic policies of the Office of the Assistant Secretary of Defense for Installations and Logistics, and the policies established herein, and is approved and administered by the issuing authority as a joint standardization procedure.

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## 1. GENERAL

**1.1 SCOPE:** The Joint Optical Range Instrumentation Type Designation System and procedures are established for use in the assignment of an ORI type nomenclature to all optical range instrumentation material as defined herein (sec. 1.1.1 and 3.1). The military departments may use this system for allied classes of material where such usage is in accordance with standard Department of Defense procedures. ORI type designations must be assigned to at least the following equipment types:

**1.1.1 Equipment types.** Optical data acquisition and/or reduction equipment including both photographic and nonphotographic recording types, such as:

**1.1.1.1 Cinetheodolites**

**1.1.1.2 Ballistic Cameras.**

**1.1.1.3 Tracking Telescopes.**

**1.1.1.4 Acceleration Cameras.**

**1.1.1.5 High Speed Cameras.**

**1.1.1.6 Electro-Optical Data Recorders.**

**1.1.1.7 Airborne Optical miss distance instrumentation.**

**1.1.1.8 Underwater data collecting cameras.**

**1.1.1.9 Training and instruction equipment for any of the above.**

**1.1.1.10 Film measuring or editing equipment.**

**1.1.1.11 Equipment auxiliary and accessory to the preceding kinds of items such as astrodomes, special trailers and/or shelters, handling equipment, focusing and exposure control devices, etc.**

**1.2 OBJECTIVES.** The Joint Optical Range Instrumentation Type Designation System, hereinafter referred to as the ORI System, shall fulfill the following objectives:

**1.2.1** Serve as a tool for simplification of identification of ORI material as defined in paragraph 3 below.

**1.2.2** Be sufficiently descriptive to identify similar material and at the same time aid in the distinguishing of significant differences from a user's point of view by use of indicators for designed usage and purpose.

**1.2.3** Be definitive as to classes of material for which applicable.

**1.2.4** Be flexible and sufficiently broad in scope to cover present types of equipment, and the new types and uses of equipment that will be developed in the future.

**1.2.5** Avoid conflict single-service type designations now assigned to Air Force, Army, and Navy equipment.

**1.2.6** Provide adequate identification on identification plates, shipping crates, etc., without the use of the item name portion of the nomenclature.

**1.2.7** Provide a ready means of identifying equipment in correspondence and other means of communication in the clear.

## 1.3 GENERAL APPLICATION.

**1.3.1** ORI type designations shall be assigned to:

**1.3.1.1** Complete items, sections, units, assemblies, subassemblies, and parts of military design either definitive or variable in configuration.

**1.3.1.2** Groups of articles, of either com-

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mercial or military design, which are grouped for a military purpose.

**1.3.1.3** Major articles of military design which are not part of, or used with, an item.

**1.3.1.4** Commercial articles, to facilitate military identification or procedures.

**1.3.2** ORI type designations will not be assigned to:

**1.3.2.1** Articles cataloged commercially, except in accordance with subparagraph 1.3.1.4.

**1.3.2.2** Parts such as shutter, lense elements, drive motors, flash tubes. film cassettes except if required to facilitate military identification or procedures

**1.3.2.3** Articles having other. adequate identification in coordinated (joint) military specifications.

### 1.4 COORDINATION.

**1.4.1** ORI type designation assignments, when a joint military interest has been determined, shall require the prior concurrence of the services, as applicable.

### 1.5 WORD NAMES AND SEQUENCE.

**1.5.1** Names used in nomenclature assignments will be consistent with the policies format, and word sequences of the Federal Cataloging Program.

**1.5.1.1** Nomenclature assignments using word sequence in the manner prescribed in paragraph 1.5.1 may be applied retroactively to equipments or units.

### 1.6 SECURITY CLASSIFICATION.

**1.6.1** All ORI nomenclature assignments shall be unclassified in order to provide a

ready means of identification, in correspondence and other means of communication, in the clear.

**1.6.2** The security classification of nomenclature descriptions shall be in accordance with the content of the description and with military security requirements. DD Form 61 for classified items which result in an unclassified description will however be stamped "UNCLASSIFIED" on the top and bottom of the form.

**1.6.3** The security classification of the item described shall be indicated on the nomenclature request and the resulting nomenclature card.

**1.6.4** Regrading of DD Form 61 and nomenclature cards will be accomplished through the submission of appropriate notification by the cognizant department. Such notification will identify the DD Form 61 to be reclassified by the appropriate source request numbers and the subsequent nomenclature cards. The appropriate shipment numbers for the cards shall be included if known.

### 1.7 CANCELLATIONS.

**1.7.1** ORI type designation may be cancelled upon request by the originating service when:

**1.7.1.1** There has been no procurement of the item.

**1.7.1.2** No experimental models are in field use.

**1.7.1.3** No further use of the type designation is required for development purposes.

**1.7.2** Cancelled ORI type designations will not be reactivated except upon request or approval of the department that had originally cancelled the type designation.

## 1.8 DESCRIPTIONS.

1.8.1 Each type designation assignment shall be justified on the basis of a description that contains sufficient optical, electrical, mechanical, and reference data to distinguish the article described from all other articles. The selection of the type designation elements shall be determined by the technical characteristics of the article and not necessarily by its chosen name.

1.8.2 The same type designation assignment shall not be used to identify items which differ in operational, optical, electrical, or mechanical characteristics.

1.8.3 When the description of the article is no longer technically correct it is the obligation of the requesting service, or agency, to revise the description of such article.

## 2. REFERENCED DOCUMENTS

2.1 Documents referenced in this standard are of the issue in effect on the date of invitation for bids and are listed below:

MIL-STD-243 — Types and Definitions

of Models for Communications Electronics Equipment.

H6-1 — Federal Item Identification Guides for Supply Cataloging, Part 1 (indexes).

## 3. DEFINITIONS

3.1 **Definitions.** For the purpose of this standard, the following definitions apply:

3.1.1 *Nomenclature.* Nomenclature in the Joint Optical Range Instrumentation Type Designation System is defined as the combination of an authorized item name and a type designation. These are defined as follows:

3.1.1.1 *Type designation.* A type designation is a combination of letters and numerals arranged in a specific sequence to provide a short significant method of identification.

3.1.1.2 *Item name.* The article name is a name published in the Federal Cataloging Handbook H6-1, or that name developed and subsequently approved by the cataloging Directorate of Defense Logistics Service Center, or that name selected by the requesting department as being consistent with Federal cataloging policies.

3.1.2 *Optical Range Instrumentation.* This

technology is defined as the use of optical techniques to gather direct or reflected radiant energy (usually in the form of discrete images) from the near ultra violet (through the visible spectrum) to the near infrared and recording these data with time correlation by photographic or electronic means through the use of which either immediate or deferred analyses can be performed.

3.1.3 *Optical Range Instrumentation Equipment.* This equipment from a military point of view generally includes those optical devices employed to determine trajectory and performance details such as attitude, velocity, acceleration, position, altitude, miss-distance, etc., engineering sequence and high speed photography underwater, land, sea and space. In every case Optical Range Instrumentation equipment is understood to include peculiar non-optical devices required to complete their individual operational functions such as power supplies, tracking devices, etc., but to exclude associated non-

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optical equipment in certain overall systems.

**3.1.4 Models.** The following list of types of models is descriptive of the stages which may be involved in the overall process of research, development, and production. All of the listed types are not necessarily produced.

**3.1.4.1 Breadboard model** (see MIL-STD-243).

**3.1.4.2 Experimental model** (see MIL-STD-243).

**3.1.4.3 Developmental model** (see MIL-STD-243).

**3.1.4.4 Service Test model** (see MIL-STD-243).

**3.1.4.5 Prototype (preproduction) model** (see MIL-STD-243)

**3.1.4.6 Production model** (see MIL-STD-243).

### **3.1.5 Item.**

**3.1.5.1** An item is a grouping of complete equipment composed of one or more sections, and in most cases being an entity in itself, capable of performing an operational function, but excluding operating accessories. As an example, a cinetheodolite is an item consisting of several sections, viz., a support section, an objective, a camera mechanism, a trackers telescope, etc., but does not include the power or timing systems involved in its operation or the shelter which may house it.

### **3.1.6 Section.**

**3.1.6.1** A section is an article which contributes to the functional makeup of an item, but which, in this connection, is not thought of as a complete equipment in itself. It may be composed of several units such as a drive

unit, a data readout unit or a control unit. An example of a section is a camera mechanism which although it might be thought of as an item in itself if it had a housing, is in this connotation not an item because it is a functional part of the item to which it is attached.

### **3.1.7 Unit.**

**3.1.7.1** A unit is a component part of a section incapable in itself of performing the function of a section but essential to the operation of the section, as in the case of the shutter unit which exposes the film but at the same time contributes part of the action essential to the film advance unit, the combination of which actions completes the operation of the camera mechanism which is the section involved.

### **3.1.8 Assembly.**

**3.1.8.1** An assembly is a group of sub-assemblies optically, electrically or mechanically connected to perform a specific minor function; as an example the shutter release assembly which in itself is composed of several sub-assemblies.

### **3.1.9 Sub-assembly.**

**3.1.9.1** A sub-assembly is a commonly mounted grouping of two or more difference parts which are physically or electrically combined to perform a specific function within an assembly, as an example the shutter solenoid is a sub-assembly and is part of the shutter release assembly.

### **3.1.10 Part.**

**3.1.10.1** A part is any piece not normally subject to further disassembly. As an example the solenoid return spring and the solenoid coil are parts of the solenoid shutter sub-assembly.

**3.1.11** To illustrate the above completely, the solenoid coil (Part) contributes to the



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operation of the shutter solenoid (Sub-assembly) which initiates the action of the shutter release (Assembly) which in turn activates the shutter (Unit). The shutter unit is a major component of the camera mechanism (Section) which in turn, together with one or more other sections makes up a cinetheodolite (Item).

**3.1.12 Interchangeability.** One-way interchangeability or articles, as used in the Joint ORI Designation System, denotes the capability of a new article to replace an existing article. The new article must be equal or superior to the existing article, and have the same dimensions, weight, performance, and dynamic characteristics within allowable tolerances. The new interchangeable article shall be capable of being installed and operated in lieu of the existing article without additional tools, modification to the existing associated article or mounting facilities, or special instructions. Two-way interchangeability denotes the mutual capability of the new article and the old article to be used indiscriminately in each other's place.

**3.1.12.1** By optical interchangeability is meant the new article's capability of operation equal to the old article without requiring any modifications to the existing support facilities.

**3.1.12.2** By mechanical interchangeability is meant the new article's capability of being physically installed and operated in the position previously occupied by the old article without requiring any modifications as to mounting holes, cabling, isolators, etc. Switches, meters, indicators, connectors, etc., shall be located as on the previous model, within allowable tolerances. The center of gravity of the new article shall be the same as in the old article, within allowable tolerances.

**3.1.12.3** By functional interchangeability is meant the new article's capability of performing, without additional assistance, all the operational capabilities covered by the previous article.

**3.1.12.4** By maintenance (repair) parts interchangeability is meant the ability of a maintenance part on one article of being installed and operated in lieu of a like article in existing equipment without the use of additional tools or modifications to the existing article or mounting facilities and with no appreciable effect on performance or ratings either optical, electrical or mechanical.

**3.1.13 "Part of".** An article which is required to enable an equipment to fulfill its assigned function is part of that equipment. An article which is physically attached to and essential to the operation of another article is considered part of the article to which it is attached. In either event, the item must be issued automatically and in all instances with the equipment or article of which it is a part.

**3.1.14 "Used with but not part of".**

**3.1.14.1** An article which extends the use of an equipment beyond its assigned functions and is issued for use that equipment only under special circumstances is considered as used with but not part of that equipment.

**3.1.14.2** An article which may be essential to the operation of another article but is not an integral part thereof and not permanently attached thereto is considered as used with but not part of the second article and is part of the equipment in which both articles are used.

**3.1.15 Suffix letter.** A suffix letter is a letter assigned in alphabetical sequence starting with the letter A to show a modification where functional interchangeability has been maintained to the extent defined in 3.1.12.3. (Example: A Kth 58E might be an ORI/CCD-1. A Kth 58E with reinforced camera housing would be an ORI/CCD-1A, and a Kth 58E with a camera housing designed for 300 cm lens and requiring an adapter for shorter focal length lenses would be an ORI/

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CCD-1B. For further clarification, if Askania brought out a basic Kth 58E but with stiff-back control it might be designated an ORI/CCD-2.

**3.1.16 Preparing activity.** The U.S. Navy Bureau of Naval Weapons is designated as the official preparing activity of this standard. The Optical Systems Working Group of

the Inter-Range Instrumentation Group, an adjunct of the Department of Defense, is recognized for their preparation of technical details of the standard.

**3.1.17** The administrator as used herein is the secretariat of the Inter-Range Instrumentation Group, a DOD adjunct.

## 4. GENERAL REQUIREMENTS

### 4.1 ORI System Operation.

**4.1.1 Operations.** The ORI system of type designations is applicable to breadboard, experimental, developmental, service test, pre-production, and production models of items, sections, units, assemblies, sub-assemblies and parts of equipments for military use. A type designation assigned is definitive in itself in that it will never be duplicated. Although the name portion may change for subsequent suffix letter assignments, to com-

ply with the Federal Cataloging Program, the basic numeral and family-indicator letters will always apply to one specific article or any subsequent improvements thereto, that may be made, as indicated by the suffix letter.

**4.2 Application of Type Designations for Definitive Items.** A type designation assignment for a definitive item shall consist of an ORI, a solidus (slant bar), a series of three letters, a dash, and a number.

Example: ORI/CBC-4 (see Chart No. 1 for explanation).

Thus,

ORI/	C	B	C	—4
A major equipment	Cinetheodolite (col. 1)	Manual tracking (col. 2)	Portable (col. 3)	The 4th equipment in this category to which an ORI designation has been assigned.

The type designation ORI/CBC-4 represents the forth portable (can be relocated and made operational within 4 hours) manual tracking, angle measuring device conventionally recording azimuth, elevation and object in relation to a cross-hair of fiducial-mark-indicated line-of-sight, together with a means for interpreting the instant of exposure either on one or a plurality of films or other recording media. (see Paragraph 3.1.2 definitions).

### 4.3 Selection of Indicator Letters.

**4.3.1** The selection of the indicator letters for an item shall be based upon its design

characteristics rather than upon its name or possible uses. (Example: A so called "Askania Cinetheodolite" is properly described as "Cinetheodolite, manual tracking, portable"; on this description the selected designator would be ORI/CBC-4 with the dash number indicating the forth model. Carrying the explanation further, a Boden-see Cinetheodolite, manually tracked and portable, would carry the same designator as shown except that the dash number would be different).

**4.4 Applications of Designators for Accessories and Sections.**

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**4.4.1** The designation for an accessory or section shall consist of two indicator letters which tell the type of equipment (see Chart II), a number, a slant bar, and designation of the equipment for which it is a part or with which it is used. For example, the tracker's scope of an ORI/CBC-4 would be identified as follows:

<i>TT-7</i>	<i>CBC-4</i>
The seventh tracker's scope to which an ORI designation has been assigned.	Article to be used with or part of.

Thus, the TT-7/CBC-4 is a tracker's scope used with, or part of, cinetheodolite manual tracked portable device (forth model). Another tracker's scope such as a TT-5/DCB-2 would be, as indicated by the charts, a tracker's scope used with or part of a Tracking Telescope, power tracking, mobile (second model).

**4.4.2** To maintain its original identity, a subsequent model of these items must be functionally, electrically, and mechanically

interchangeable with its previous model. This applies, in so far as is practicable, to all its maintenance parts.

**4.4.3** Articles of equipment that are part of or used with two or more items or that are not part of or used with any specific item, are identified as in 4.4.1 except that after the slant bar there will appear only those indicators that are appropriate. (Example: A TT-1/CBC would, at the time the designation was established, be a model 1 tracking telescope suitable for use on two or more model's of Cinetheodolite, manual tracking portable).

**4.4.4** Selection of a component indicator (see Chart II) for an accessory or section will be based on its primary function and its technical characteristics rather than on the name of the item that it is part of or used with. As an example. The telescope used by the operator of a theodolite would be known as a Tracker's Telescope rather than a Theodolite Telescope.

## 5. DETAIL REQUIREMENTS

**5.1 Requests for nomenclature assignments** will be submitted on form furnished and mailed to the Secretariat of IRIG at White Sands Missile Range, New Mexico (WSMR).

**5.1.1** This activity is responsible for the assignment of type designation numbers within this system. Where possible, the description required by the DD Form 61, will be as prescribed by the Federal Item Identification Guides for Supply Cataloging. Such descriptions will be used as the nomenclature descriptions, which are distributed to military agencies having need thereof.

**5.2** All departments will use the official nomenclature strictly as assigned with respect to both names and type designations. Assignments may be changed upon the request of the initiating activity provided that

such a change is not contrary to established policy. Where necessary, names may be omitted from identification markings on equipments at the discretion of the responsible department.

**5.3 Replacement of current nomenclature** may be made upon application to IRIG by the responsible agency or at the request of the using agency.

**5.4 Parenthesis.** The use of parenthetical information after the type designation will be avoided.

**5.5 Numbering.** The skipping of numbers in assignments will be avoided; consecutive numbering is required. Reservation of blocks of numbers will not normally be permitted.

**5.6 Special Suffixes.** The use of special suf-

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fix letters is not authorized.

**5.7 Coordination.**

**5.7.1** Request by a service for suffix letter assignments or confirmation of existing nomenclature of items which have been assigned a type designation at the request of another service will be coordinated by the IRIG Secretariat with the originating service for concurrence before making the assignment or confirmation.

**5.7.2** Coordination with Inter-Range Instrumentation Group. The following agreements have been established in coordinating nomenclature with IRIG.

**5.7.2.1** IRIG will coordinate all nomenclature actions directly with the nomenclature control unit of the requesting agency having design cognizance or a primary interest in the item concerned.

**5.7.2.2** IRIG will not disseminate or use ORI nomenclature prior to its authentication

by the preparing activity. Nomenclature will be used exactly as assigned.

**7.2.3** Nomenclature cards will reflect joint IRIG agency cognizance by means of an appropriate symbol in the "original lab" block.

**5.8 Item Names.** Item names listed in the Federal Item Identification Guides for Supply Cataloging or names consistent therewith, will be used in the assignment of nomenclature. The assignment of type designation portion of the nomenclature will, however, be based on the technical characteristics of the item rather than by the name chosen by the requesting department.

**5.9 Commercial Test Equipment.** ORI type designation will not normally be assigned to commercial test equipment which is procured for purposes of research and development.

**Custodians:**

Army—EL  
Navy—Weps  
Air Force—11

**Preparing activity:**

Navy—Weps  
(Project No. MISC D317)

# CHART I

1st Column	2nd Column	3rd Column	4th Column
A — Mount	A — Non Tracking	A — Fixed	—1
B — Camera	B — Manual Tracking	B — Mobile	—2
C — Cinetheodolite	C — Power Tracking	C — Portable	—3
D — Tracking Telescope	D — Automatic Tracking	D — Transportable	—4
E — Electro-optical Device	E — Remote Controlled	E — Laboratory	—5
F — Boresight	F — Single Exposure	F — Aircraft	—6
G — Shelter	G — Pulse Operated	G — Underwater	—7
H — Ballistic Camera	H — Cine, high speed (over 500)	H — Shipboard	—8
J — T.V. Type Equipment	J — Cine, low speed (to 500)	J — Aerial Platform	—9
K — Radiometric Equipment	K — Rotating Prism	K — Special or Combination	—10
L — Spectrographic Equipment	L — Streak	L — Space Platform	—11
M — Laser Equipment	M — Slit	M — Other	—12
N — Infrared Equipment	N — Ribbon Frame	N —	—13
P — Test and Calibration Equip.	P — Visual	P —	—14
Q — Multi-purpose Equipment	Q — Sky Screen Tracking	Q —	—15
R — Photo Theodolite	R —	R —	—16
S —	S —	S —	—17
T —	T —	T —	—18
U —	U —	U —	—19
Y — Other	Y — Other	Y — Other	

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**CHART II****TABLE OF COMPONENT INDICATORS**

Examples of Use  
 (Not to be constructed as limiting the  
 application of the component indicator.)

Objective Lenses	OL	Servo Section	SV
Tracking Offset Detector	TD	Power Supply	PS
Exposure Control	EX	Film Cassette or Magazine	FC
Digital Readout	DR	Boresight Scope	BS
Tracker's Telescope	TT	Optical Data Train	DT
Drive Section	DS	Chassis (Vehicle)	CH
Optical Section	OS	Control Unit	CU
Support Section	SS		