STORAGE BATTERIES—LEAD ACID
ENGINE STARTING AND CONTROL
DESCRIPTION, REQUIREMENTS, AND PROCEDURES

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TABLES

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1. GENERAL

1.01 This section contains descriptive information, requirements, and procedures for engine starting and control batteries of the lead-acid type.

1.02 This section is reissued to add paragraph 1.08, update Table A, and include additional information in paragraphs 1.05, 1.06, 2.01, 2.02, 2.03, 2.08, 2.09(b), and 2.10. This issue does affect the Equipment Test List.

1.03 Low specific gravity (nominal 1.210) batteries are supplied for engine starting and control of the engine alternators listed in Table A under the heading, ENGINE APPLICATION. High specific gravity batteries were originally supplied with some engine alternators but have been replaced by low specific gravity batteries except in unheated quarters or out of doors where below freezing temperatures demand the higher gravity to prevent freezing and to ensure adequate starting capacity.

1.04 Table A contains pertinent descriptive information on lead-acid engine starting and control batteries.

1.05 ***Battery Records:*** Maintain complete battery records. Engineering Complaints on performance cannot be accurately analyzed and satisfactorily settled unless they are accompanied

TABLE A

LEAD-ACID ENGINE STARTING AND CONTROL BATTERIES

KS AND LIST NO.	MFR	ENGINE APPLICATION	BATT. VOLTS	SP. GRAV. RNG (FULL DISCHG IN 5-HRS)
STARTING BATTERIES KS-15577				
L1	Exide Gould	KS-5667, 5 and 8 kW, KS-5667-01, 8 kW, KS-15717, 10 kW	32	0.140
*L2	Exide Gould	KS-5666, 10 kW; KS-5666-01, 10 kW KS-5667-01, 2.8 and 4 kW KS-5525-01, 50 and 70 kW	12	
*L3	Exide Gould	KS-5525-01, 10 and 25 kW	6	
*L5	Exide Gould	KS-5574-01, 20 thru 60 kW (M.D.) KS-15884, 30 thru 100 kW	12	
L6	Exide Gould	KS-5636, 20 kW; KS-15521, 20 kW	32	0.140
L7	Exide Gould	KS-5636, 30 thru 60 kW; KS-5750, 20 thru 60 kW; KS-15890, 30 thru 100 kW	32	0.140
L8	Exide Gould	KS-5665 (L40), 150 and 300 kW; KS-15622, 120 and 170 kW: KS-15929, 225 kW	32	
L9	Exide Gould	KS-5665, 200 kW	32	
L10	Exide Gould	KS-5665, 300 kW	32	
*L11	Exide Gould	KS-5667-01, 5 kW	24	
L12	Exide Gould	KS-15717, 10 kW	32	0.140
L13	Exide Gould	KS-15777, 500 kW; KS-15899, 350 kW; KS-15954, 350 kW	48	
L14	Exide Gould	KS-15992, 750 kW	24	0.140

*These list numbers are "manufacture discontinued."

TABLE A (Contd)

LEAD-ACID ENGINE STARTING AND CONTROL BATTERIES

KS AND LIST NO.	MFR	ENGINE APPLICATION	BATT. VOLTS	SP. GRAV. RNG (FULL DISCHG IN 5-HRS)
STARTING BATTERIES KS-15577 (Cont)				
L15	Exide Gould	KS-19583, 30 kW; KS-19584, 45 kW; KS-19585, 75 kW; KS-19586, 115 kW KS-19587, 115 kW (temp. above 40° F) ◗KS-20523, 30 kW; KS-20524, 45 kW; KS-20525, 75 kW; KS-20526, 115 kW◖	24	0.140
L16	Exide Gould	KS-19587, 115 kW (temp. below 40° F)	24	
L17	Exide Gould	KS-19896, 200 kW (M.D.) KS-20542, 200 kW	24	
CONTROL BATTERIES				
KS-5361, L116C	Gould	KS-19583, 30 kW; KS-19585, 75 kW KS-19584, 45 kW; KS-19586, 115 kW KS-19587, 115 kW; KS-19896, 200 kW KS-20542, 200 kW	24	
◗**KS-5538 L19	Gould	KS-19896, 200 kW; KS-20542, 200 kW◖		
AN-3150-2	Exide	KS-19896, 200 kW (M.D.)	24	

◗ **One KS-5538, L19 replaces four KS-5361, L116C batteries. ◖

by records which provide a thorough history of the cells in question ▶including complete nameplate information.◀

1.06 For more information on lead-acid batteries used in telephone and telegraph offices which also applies generally to lead-acid starting and control batteries, refer to Section 157-601-701. ▶For Nickel-Cadmium batteries, refer to Section 157-631-101.◀

1.07 ***Neutralizing Electrolyte:*** Electrolyte spilled on equipment should be neutralized with a soda solution and rinsed with water (see Part 1 of Section 157-601-701).

1.08 ▶***First Aid for Electrolyte in Eyes or on Skin:*** In case of electrolyte splashes, use of the KS-21527 L1 eye wash kit is recommended. However, if the KS-21527 kit is not available, use the following procedure. Remove electrolyte splashed on the skin or in the eyes immediately by flushing the affected area with large amounts of plain tap water. In case of electrolyte in the eye, pour water into the inner corner of the eye and allow at least one quart of water to run over the eye and under the eyelid. A drinking fountain near at hand may be utilized for this purpose. Eye injuries should be placed under the treatment of a physician, preferably an eye specialist, as soon as possible.◀

▶Danger 1:◀ Remove electrolyte splashed on skin or in eyes immediately.

▶Danger 2:◀ Never create sparks, including those from static electricity, and avoid the use of an open flame near batteries since the gas is explosive when sufficiently concentrated.

2. REQUIREMENTS AND PROCEDURES

2.01 ***Periodic Check Intervals:*** Table B contains the intervals of the periodic checks which must be made. ▶Engine starting batteries shall be considered to be in the same category as emergency cells.◀

2.02 ***Float Voltage:*** Lead-acid engine starting and control batteries shall be maintained at the proper float voltage (optimum 2.17 volts per cell) as specified in Table C. Use the Weston Model 931 dc voltmeter (or equivalent) and 6-foot test cords for measuring individual cell or total battery voltage. If the 6-foot test cords are not long enough for proper voltage measurement, the 10-foot Weston No. 168023 test cord should be used in conjunction with the black 6-foot test cord and Weston voltmeter. Float voltage readings should be made before the engine is started. See Section 157-601-301 for data on manually controlled float and for more specific information on floating lead-acid batteries in general.

> ***Note:*** ▶The data in Tables B and C pertains to low gravity cells only. High gravity, non-KS type, batteries require higher charging voltages and therefore increased maintenance (more frequent addition of water). Additional information may be found in BSP Section 157-601-701.◀

2.03 ***Specific Gravity:*** The specific gravity of low-gravity cells at electrolyte temperature of 77°F shall be 1.210 ±0.015. Use the KS-5499 L1305 syringe-type hydrometer. Specific gravity readings shall be read every month and shall be taken before, rather than after, water additions.

> ***Note:*** ▶Some non-KS type batteries are in use which contain high (1.250 to 1.300) gravity (these are of the automotive type). The L1307 hydrometer shall be used for checking these cells.◀

2.04 ***Electrolyte Level:*** The electrolyte level of KS-15577 lead-acid ▶batteries◀ shall be maintained between the top of the separators and the bottom of the cover by the addition of distilled water or water approved for storage battery use. Electrolyte level of the KS-5361 L116C lead-acid ▶batteries◀ should be maintained between the top of the low line and the bottom of the high line. When the actual electrolyte temperature is below 50°F, do not raise the electrolyte level appreciably above the minimum level. This helps to prevent an overflow on charge and electrolyte creepage difficulties. The electrolyte level shall be checked once every month.

TABLE B

INTERVAL CHART FOR ◗LOW GRAVITY◖ LEAD-ACID ENGINE STARTING & CONTROL BATTERIES

DESCRIPTION OF OPERATION	INTERVAL	REFERENCE PARAGRAPH
Cell and battery float voltage	1 month	2.02
Specific gravity reading	◗1 month◖	2.03
Electrolyte level	1 month	2.04
Battery connections	3 months	2.05
Clean and Inspect	3 months	2.06

2.05 ***Battery Connections:*** The ***contact*** surfaces of all connections should be scraped clean at time of installation and coated lightly with R-3266 NO-OX-ID A compound.

◗Warning:◖ At no time shall battery intercell connectors be filed, scraped, abraded, or brushed with a wire brush as this will remove their protective coating.

If corrosion appears on connection contact surfaces, it should be scraped off and the surface washed with a solution of bicarbonate of soda (baking soda) in water (2 tablespoons of soda to a pint of water). The contact surfaces should then be wiped with a clean cloth dampened with clean water and coated lightly with R-3266 NO-OX-ID A compound. All connections shall be checked periodically to see that they are tight and free of corrosion.

Gauge by eye and feel.

2.06 ***Containers and Covers:*** Containers and covers shall be free from cracks, leaks,

TABLE C

FLOAT VOLTAGE RANGES OF ◗LOW GRAVITY◖ LEAD-ACID ENGINE STARTING & CONTROL BATTERIES

BATTERY VOLTAGE	NUMBER OF CELLS	BATTERY FLOAT VOLTAGE RANGE
6	3	6.4 thru 6.6
12	6	12.8 thru 13.2
24	12	25.8 thru 26.4
32	16	34.5 thru 35.0
48	24	51.7 thru 52.7

and sprayage of electrolyte. They should be inspected every 3 months and cleaned as necessary. See Sections 157-601-701 and 157-601-703 for more complete information.

Gauge by eye.

2.07 ***Seals:*** Post seals and seals between covers and containers shall be intact and free from electrolyte. Post seal nuts shall be tight.

Gauge by eye.

2.08 ***Antiexplosion Features:*** The antiexplosion features of cells shall be dry, clean, and undamaged. Ceramic domes of the screw type shall be screwed down to a snug fit.

Gauge by eye and feel.

(a) ▶This battery, as with any battery, could have an explosion potential due to abusive treatment. It is the purpose of the flame arresting vent cap to prevent external sparks from entering the cell(s) and to vent, at a safe rate, the explosive gases that are generated within the cell(s) under normal charging conditions.

(b) Flame arresting vent caps are available for all KS type start and control batteries. Any vent cap which has been broken should be replaced at once. Replacement vent caps, as well as vent caps for batteries not initially equipped with them, should be obtained from the supplier.◀

▶***Danger:***◀ ***Do not allow the gas vents to become clogged as explosion of the battery may result. Overfilling and overcharging may contribute to plugging of vents.*** ▶***(Refer to Section 157-601-701.)***◀

2.09 ***Initial Charge and Boost Charge***

(a) The battery should be given an ***initial charge*** at installation in accordance with Section 157-601-201. If the battery is not to be installed or connected to a suitable float or charging source for 3 months, it shall be given a special initial charge in accordance with Section 157-601-201.

(b) The battery should be given a ***boost charge*** whenever the battery fails to start the engine or there is other evidence of undercharge that cannot be corrected by normal float charges. For boost charge instructions, see Section 157-601-701. A cell or battery that will not retain a charge and must have frequent special charges should be replaced. If equipment is not available with boost charge capabilities, the batteries can be boost charged by a reputable garage or battery service station, but the attendant should be instructed that the battery is of the low specific gravity type.

Note: ▶Many rectifiers such as the J87249B (Section 169-649-301) are not capable of boost charging batteries.◀

2.10 ***Discharge Capacity Test:*** A discharge capacity test can be run on a cell if the reserve capacity of the cell is believed to be low. See Section 157-601-502 for batteries up to 200 ampere-hour capacity and Section 157-601-503 for batteries of higher capacity. See Section 157-601-701 for detailed information on discharge capacity test and replacement criteria for cells suspected of having low capacity. For operating instructions of the KS-20142 L1 Lorain and Fan-Tron discharger-rechargers (if this equipment is available), see Sections 157-601-504 and 157-601-505, respectively. For the KS-20770 L1 discharge-recharger, see Section 157-601-501. These discharger-rechargers are programmed to (1) boost charge the cells, (2) discharge the cell at the cell's 5-hour discharge rate, and (3) recharge the cell at one-half the 5-hour discharge rate. ▶However, the initial boost charge step must be bypassed for discharge capacity tests.◀ This test using the KS-20142 is recorded by a chart recorder so that it can be analyzed to determine the reserve capacity of the cell.

Note: Low rate capacity is not an ▶absolute◀ indication of the ability of an engine starting battery to start its associated engine. Only the starting battery's high rate capacity, which bears little resemblance to the 5- or 8-hour capacity rate, is of importance in engine starting. The only valid check for a battery's high rate capacity is its ability to start the engine. The low rate capacity is important in the case of control batteries.