MILITARY
SPECIFICATION

MIL-D-13060B(EL)
12 September 1963
Superseding
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DYNAMOTOR-POWER SUPPLY DY-105( )/GRC-9X

1. SCOPE

1.1 This specification covers one type of power supply that operates from a 24 VDC source, and is designated as Dynamotor-Power Supply, DY-105( )/GRC-9X.(See 6.1 and 6.3)

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids, or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

QQ-S-571	Solder, Soft (tin, tin-lead and lead-silver).
QQ-S-781	Strapping, Flat, Steel.
DDD-B-20	Bags, Mailing(Cotton).
PPP-B-601	Boxes, Wood, Nailed and Lock-Corner.
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636	Box, Fiberboard.
PPP-F-320	Fiberboard; Sheet.
PPP-T-76	Tape, Pressure-Sensitive Adhesive, Paper, Water Resistant.

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MIL-P-116	Preservation, Methods of.
MIL-B-117	Bags, Interior Packaging.
MIL-V-173	Varnish, Moisture-and-Fungus Resistant, for the treatment of Communications, Electronic, and Electrical Equipment.
MIL-T-713	Twine and Tape, Lacing and Tying(for use in electrical and electronic equipment).
MIL-S-901	Shipboard Equipment, Class HI (High Impact), Shipboard Application, Tests for.
MIL-I-7798	Insulation Tape, electrical, pressure-sensitive adhesive, plastic
MIL-M-13231	Marking of Electronics Items.
MIL-F-14072	Finishes for Ground Signal Equipment.

FSC-5820

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	Marking for Shipment.
MIL-STD-169	Extreme Temperature Cycle.
MIL-STD-170	Moisture Resistance Test Cycle for Ground Signal Equipment.
MIL-STD-252	Wired Equipment, Classification of Visual and Mechanical Defects for.

DRAWINGS

SIGNAL CORPS

SC-A-46439	List of Accessories for Package Tester.
SC-GL-57608	Gages for Dynamotor-Power Supply DY-105( )/GRC-9X.
SC-DL-177015	Dynamotor-Power Supply DY-105( )/GRC-9X.
SC-D-104398	Cable Assembly, Special Purpose, Electrical CX-2031( )/U.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Both the title and number or symbol should be stipulated when requesting copies.)

3. REQUIREMENTS

3.1 Description.-

3.1.1 Dynamotor Power Supply DY-105( )/GRC-9X is a ruggedized dynamotor-vibrator type power supply inclosed in a metal case that has fittings for vehicular installation; all of the controls and power plugs are located on the front panel of the power supply. The required output voltages are supplied by a dynamotor, synchronous (self-rectifying) vibrator, and various regulatory and control elements. The cable used to connect the power supply to the power source is Cable Assembly, Special Purpose CX-2031( )/U.

3.2 Construction.- The items covered by this specification shall be constructed in accordance with the drawings listed below:

SC-DL-177015	Dynamotor-Power Supply DY-105( )/GRC-9X
SC-D-104398	Cable Assembly, Special Purpose, Electrical CX-2031( )/U.

3.3 Preproduction samples.- The contractor shall furnish 2 preproduction samples of equipment on order for approval, as required by the invitation for bids and contract. (See 4.2).

3.4 Cleaning.-

3.4.1 Parts.- After fabrication, parts shall be cleaned in accordance with good commercial practice, or as specified in an applicable document. Cleaning processes shall have no deleterious effect. Corrosive material shall be removed completely before the parts are mounted on chassis, panels, etc.

3.4.2 Units.- After assembly, units shall be cleaned thoroughly and shall be free from particles of solder, flux, and other foreign material. In addition, when necessary, such cleaning shall also be performed before final assembly of the units.

3.5 Controls.- All movable controls shall operate properly without binding or other undue restriction. Controls shall not be assembled in a misalined condition.

3.6 Finish.- The equipment shall be finished in accordance with Specification MIL-F-14072 and the equipment drawings. (See 4.4.) The final paint film on Type I surfaces shall be green color (olive drab), semigloss enamel matching a color chip provided by the procuring agency. (See 6.8.)

3.7 Marking.-

3.7.1 General.- Marking shall conform to Specification MIL-M-13231. (See 4.4.) Front panel marking shall be group I as described in that specification.

3.7.2 Visibility.- Wherever practicable, parts shall be so mounted that their identification markings will be readily visible with minimum disassembly of the equipment.

3.7.3 Serial numbers.- Dynamotor-Power Supply DY-105( )/GRC-9X shall be serial numbered.

3.8 Securing of parts.-

3.8.1 General.- Brackets, lugs, inserts, bolts, and other mounting arrangements shall retain items securely when subjected to specified service conditions.

3.8.2 Securing of parts by threaded fasteners.- Nylok or other screws with plastic devices, and Loctite or similar sealants shall not be subjected to temperctures in excess of 250°F (as during baking of paint). Loctite or similar sealants shall be applied in accordance with the manufacturer's instructions.

3.9 Soldering.-

3.9.1 Solder.- Solder used for electrical connections shall be composition Sn60 conforming to Specification QQ-S-571.

3.9.2 Acid or acid salts.- No acid or acid salts shall be used in preparation for or during soldering; however, exception is permitted for preliminary tinning of electrical connections and for tinning or soldering of mechanical joints not used to complete electrical circuits, but in no case shall acid or acid salts be used where they can come in contact with insulation material. Where acid or acid salts are used, as permitted above, they shall be completely neutralized and removed immediately after use.

3.9.3 Process.- There shall be no sharp points or rough surfaces resulting from insufficient heating. The solder shall feather out to a thin edge, indicating proper flowing and wetting actions, and shall not be crystallized, overheated, or underheated. The minimum necessary amount of flux and solder shall be used for electrical connections. Any means employes to remove an unavoidable excess of flux shall not incur the risk of loose particles of flux, brush bristles, or other foreign material remaining in the equipment; flux being spread over a larger area; or damage to the equipment. Insulation material that has been subjected to heating during the soldering operation shall be undamaged and parts fastened thereto shall not have become loosened.

3.10 Treatment of materials.-

3.10.1 Treating materials.- Treating materials containing a mercury-bearing fungicide shall not be used. The contractor shall determine that the treating material is compatible with the material or surface to be treated. Selection of treating materials shall be such that any increase in flammability of treated material is held to the practical minimum.

3.10.2 Toxicity.- Treatment of materials shall cause no skin irritation or other injury to personnel handling the treated material either during fabrication of the equipment or when carrying, operating, or maintaining the equipment, or in use of the finished items when used for the purpose intended.

3.10.3 Flexibility.- Treatment shall not affect flexibility of treated materials, to the extent that the equipment may fail to meet specified requirements when subjected to specified service conditions.

3.10.4 Statement of treatment. The contractor shall submit, to the contracting officer for approval, a statement describing in detail the materials to be treated and the treating materials and processes that he proposes to use. (See 6.2).

3.11 Wiring and cabling.- Wiring and cabling shall be neat and sturdy.

3.11.1 Cabling.- Insulated wires shall be formed into cables except where operation of the equipment would be adversely affected thereby or where it is physically impracticable as in the case where the resulting cables would be excessively large and would interfere with operation or maintenance. The cabling of wires shall be effected by tape or twine conforming to Specification MIL-T-713 or tape conforming to Specification MIL-I-7798. Individual conductors thus secured shall lie essentially parallel; however, this does not prohibit the use of twisted pairs.

3.11.2 Slack.- Wires and cables shall be as short as practical except that sufficient slack shall be provided for the following purposes:

(a) To prevent undue stress on cable forms, wires, and connections, including connections to resiliently supported parts.

(b) To enable parts to be removed and replaced during servicing without disconnecting other parts.

(c) To provide for at least two replacements of the part to which the wire or cable is connected.

(d) To ensure freedom of motion of lugs or terminals normally intended to have some degree of movement (for example, floating contacts on ballast tube sockets).

(e) To facilitate field repair of broken or cut wires.

3.11.3 Protection.- Wires and cables shall be so placed and protected as to avoid contact, under specified service conditions, with rough or irregular surfaces or sharp edges.

3.11.4 Support.- Wire and cable shall be properly supported and secured, to prevent undue stress on the conductors and terminals and undue change in position of the wire or cable (i) during and after subjection of the equipment to specified service conditions or (ii) after service or repair of the equipment in a normal manner.

3.11.5 Clearance.- Clearance between wires or cables, and parts such as ballast tubes, resistors, and dynamotors, shall be sufficient to avoid deterioration of the wires or cables because of the heat dissipated by such parts when the equipment subjected to specified service conditions. Clearance between solder connections or bare conductors, on terminal boards, relays, or other parts, shall be at least 1/4 inch unless use of specified parts makes such clearance impracticable.

3.11.6 Splicing.- Wires in a continuous run between two terminals shall not be spliced during the wiring operation.

3.11.7 Connections.-

3.11.7.1 General.- Before being soldered to terminal lugs or fixed terminals, wires shall be mechanically secured so that the connections are not dependent for strength on solder alone. Where practicable, wires soldered to fixed terminals shall be looped at least one-half turn but not more than three-quarters turn around the terminal before soldering. Bared ends of wire leads to be terminated in solder-typeterminal lugs shall be tinned, silver plated, or lead-alloy coated. Electrical connections shall be made by clamping between a metallic and nonmetallic material. Fraying of textile ends of wires shall be prevented mechanically or by application of varnish conforming to Specification MIL-V-173. No varnish, lacquer, inspection paint, or other coating shall be applied to completed electrical connections.

3.12 Tubes, current regulating (ballast tubes).- Ballast tubes shall be in accordance with the equipment drawings.

3.13 Air-seal test.- When tested as specified in 4.6 the decrease in vacuum shall not exceed 0.01 pounds per square inch. (See 4.6)

3.14 Interchangeability.- Like units, assemblies, and replaceable parts shall be physically and functionally interchangeable, without modification of such items or of the power supply. (See 4.23) Individual items shall not be handpicked for fit or performance; however; matched pairs or sets, when permitted, may be interchangeable as such. Reliance shall not be placed on any unspecified dimension, rating, characteristic, etc.

3.15 Service conditions.- The equipment shall meet the following service conditions--where a test is referenced, meeting the test shall be considered as compliance with the requirement:

3.15.1 Operation.- Continuous use for a period of 1 year, under the world-wide environmental conditions specified in 3.15.2 through 3.15.6, with a duty cycle of 23 hours on and 1 hour off and with no more than normal maintenance and replacement of parts. Where the contractor is required to make a selection of parts, materials, processes, construction methods, etc, he shall be guided by this requirement. Approval of the preproduction sample (see 3.3) shall be considered as compliance with this requirement.

3.15.2 Temperature (see 4.12).-

(a) Operating: Ambient temperature in the range of +150° F to -65°F. (The 150° F temperature includes effect of sun-load.) Exposure at the high temperature extreme not to exceed 4 hours, and at the low temperature extreme not to exceed 72 hours, at any one time.

(b) Nonoperating: Exposure in the range of +160°F to -80° F; exposure at the high temperature extreme not to exceed 4 hours, and at the low temperature extreme not to exceed 24 hours, at any one time.

3.15.3 Relative humidity (see 4.9).- Exposure to 97 percent relative humidity for 20 hours and 100 percent relative humidity (with condensation) for 4 hours for each 24 hour period over the period of years stated in 3.15.1. Meeting the tests of 4.9 shall be considered compliance with this requirement.

3.15.4 Immersion (see 4.7).- Three feet of water for 2 hours.

3.15.5 Orientation.-

(a) Operating (see 4.10).- Any orientation up to 20 degrees from normal operating position (that is: forward, backward, left, or right).

(b) Nonoperating: Storage in any position for a period of two years. Where the contractor is required to make a selection of parts, materials, processes, construction methods, etc, he shall be guided by this requirement. Approval of the preproduction sample (see 3.3) shall be considered as compliance with this requirement.

3.15.6 Vibration Bounce, and shock.- As described in 3.16.

3.16. Vibration and shock.-

3.16.1 Vibration.- The amplitude of vibration of any part, subassembly, or structural member of the unit shall not exceed twice the amplitude of the vibration applied to the unit at any frequency between 10 and 55 cycles per second. (See 4.13).

3.16.2 Bounce and shock.- The equipment shall meet the requirements of Table I.

Table I - Bounce and Shock

Requirement	Inspection Paragraph	Performance after Inspection
Bounce	4.14	Full specification performance. No physical damage except surface abrasion. (NOTE A)
Shock; ballistic	4.11	Full specification performance Minor mechanical damage is permissible

NOTE: A- There shall be no evidence of relay chattering during the bounce test.

3.17 Electrical requirements.-

3.17.1 Input.- The equipment operates over an input range of 22 through 32 volts d-c. With an input of 22.0 volts d-c, the transmitter plate supply circuit shall not be less than 420 volts with the rated equivalent load as specified in 3.17.2.

3.17.2 Output (full load conditions).- With an input of 29.0 volts d-c the equipment shall deliver the following outputs, when connected to the resistive loads listed below:

Output Supply Circuit	Rated Output Voltage (d-c)	Output Current (d-c) Ma	Maximum Output Voltage (d-c)	Minimum Output Voltage (d-c)	Equivalent Load Resistance (ohms)
Transmitter Plate	580	100	630	530	5800
Receiver Plate	120	45	140	105	2625
Receiver Filament	1.5	500	1.6	1.4	3.0
Transmitting Filament	6.5	2000	6.8	6.2	3.25
Keying Relay	6.9	575	8.2	6.4	12

3.17.3 Output (standby conditions).- With an input of 29.0 volts d-c, the equipment shall deliver the following outputs, when connected to the resistive loads listed below:

Output Supply Circuit	Rated Output Voltage (d-c)	Output Current Ma. (d-c)	Maximum Output Voltage (d-c)	Minimum Output Voltage (d-c)	Equivalent Load Resistance (ohms)
Receiver Plate	150	250	170	130	5900
Receiver Filament	1.6	500	1.8	1.4	3.0

3.17.4 Regulation.- The maximum voltage regulation of the transmitter plate supply circuit with an input voltage of 29.0 volts, shall not exceed 15 percent when measured from average load to minimum load as specified in 4.18. The receiver and transmitter filament supply circuit voltages shall be within the minimum and maximum voltage requirements of 3.17.2 when Dynamotor-Power Supply DY-105( )/GRC-9X is operated at any input voltage within the range specified in 3.17.1.

3.17.5 Ripple.- The ripple voltage in the output supply circuit of the Dynamotor-Power Supply shall not exceed the following values when measured in accordance with 4.17 and when the power supply is subjected to the temperature tests of 4.12.

Output Supply Circuit	Ripple voltage (RMS)
Transmitter Plate	4.0
Receiver Plate	0.1
Receiver Filament(standby)	0.005
Transmitter Filament	0.05
Keying Relay	0.3
Receiver Plate (standby)	0.1

3.17.6 Efficiency.- The efficiency of the equipment shall not be less than 40 percent at an input voltage of 29.0 volts, when calculated under the conditions specified in 4.20.

3.18 Heat Rise.- On continuous duty operation, with 29.0 volts input, and the equipment thermally stabilized, the temperature rise of any component shall not exceed its maximum rated value. The maximum temperature rise of the dynamotor frame shall not exceed 100° F when the ambient temperature is in the range of 65 to 85°F.

3.19 1000 hour operation.- The Dynamotor-Power Supply, DY-105( )/GRC-9X, shall operate without permanent degradation for 1000 hours under the conditions specified in 4.19 at any ambient temperature up to +125°F.

3.19.1 1000 hour operation, dynamotor start relay.- The Dynamotor Start Relay shall meet the requirements of 4.19.1.

3.20 Preconditioning.- The equipment shall be capable of meeting the requirements herein, without subsequent processing, after subjection to the bounce preconditioning of 4.5.

3.21 Power Cable.- The cable used to connect Dynamotor-Power Supply DY-105( )/GRC-9X to the vehicular power source shall be Cable Assembly, Special Purpose, Electrical, CX-2031( )/U, constructed in accordance with Drawing SC-D-104398.

3.22 Technical literature and running spare parts.- Technical literature and running spare parts shall be furnished as specified in the contract. Running spare parts shall be identical to corresponding parts in the items furnished on the order. (See 6.2.)

3.23 Workmanship.- The item shall be manufactured and assembled in accordance with the equipment drawing and applicable portions of the following paragraphs herein:

3.4	Cleaning
3.8	Securing of Parts
3.9	Soldering
3.11	Wiring and Cabling

4. QUALITY ASSURANCE PROVISIONS

4.1 Inspection; responsibility and classification of.-

4.1.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.2 Classification of inspection.- Inspection shall be classified as follows:

(a) Preproduction inspection (does not include preparation for delivery). (See 4.2.)

(b) Inspection covered by subsidiary documents. (See 4.4.)

(c) Quality conformance inspection.-

(1) Quality conformance inspection of equipment before preparation for delivery. (See 4.3.)

(2) Quality conformance inspection of preparation for delivery. (See 4.24.)

4.2 Preproduction inspection.- This inspection will be performed by the Government unless otherwise specified in the contract. It shall consist of the preproduction inspection specified in Table II, and the group A, group B, and group C inspection specified in Tables III, IV, and V, respectively. Other nondestructive tests on preproduction samples may be performed to determine compliance with specified requirements. The preproduction inspection will normally be performed in this order (1) vibration, (2) bounce, (3) shock, ballistic and (4) immersion; other preproduction inspection may precede, follow, or be interspersed between the foregoing.

Table II.- Preproduction Inspection

Inspection (For additional inspection, see 4.2)	Requirement paragraph	Inspection paragraph
Moisture resistance	3.15.3	4.9
Shock, ballistic	3.16.2	4.11

4.3 Quality conformance inspection of equipment before preparation for delivery.- The contractor shall perform the inspection specified in 4.4 and 4.3.1 through 4.3.3.1. This does not relieve the contractor of his responsibility for performing any additiona inspection which is necessary to control the quality of the product and to assure compliance with all specification requirements. The Government will review and evaluate the contractor's inspection procedures and examine the contractor's inspection records. In addition the Government--at its discretion--may perform all or any part of the specified inspection, to verify the contractor's compliance with specified requirements. (See 6.7.) Test equipment for Government verification inspection shall be made available by the contractor. Each unit which will be subjected to group A, group B, or group C inspection, except preproduction samples, shall be preconditioned after final assembly. (See 3.20.)

4.3.1 Group A inspection.- This inspection (including sampling) shall conform to table III and Standard MIL-STD-105. Unless otherwise specified, normal inspection shall be used at the start of the contract. Group A inspection shall be performed in any order which is satisfactory to the Government, except that the air-seal test (4.6) shall be last. (See 6.4)

Table III - Group A inspection

Inspection	Reqt Para	Test Para	AQL Major	AQL Minor
Visual and Mechanical				
Dynamotor Power Supply DY-105( )/GRC-9X	3.23	4.22	2.5dphu	10.0dphu
Electrical				
Input voltage	3.17.1	4.15	)	
Output voltage, full load	3.17.2	4.16	)2.5dphu	*
Output voltage, standby	3.17.3	4.16	)	
Regulation	3.17.4	4.18	) for the	
Ripple	3.17.5	4.17	) group	
Efficiency	3.17.6	4.20	)	
Air Seal	3.13	4.6	1.0%	*

* All these defects are considered major.

4.3.2 Group B inspection.- This inspection, including sampling, shall conform to table IV and to the special procedures for small-sample inspection of Standard MIL-STD-105. The AQL shall be 6.5 percent defective and the inspection level shall be L-7 for normal and tightened inspection and L-5 for reduced inspection. The reduced inspection procedure shall be R-1. Group B inspection shall normally be performed on inspection lots that have passed group A inspection and on samples selected from units that have been subjected to and met the group A inspection.

4.3.2.1 Order of inspection within group B.- Group B inspection shall be performed in any order which is satisfactory to the Government.

Table IV.- Group B inspection

Inspection	Reqt Para	Insp Para	AQL See 4.3.2.1
Interchangeability	3.14	4.23	6.5%
Immersion, DY-105( )/GRC-9X	3.15.4	4.7	6.5%

4.3.3 Group C inspection.- This inspection shall be as listed in table V, and shall normally be performed on sample units that have been subjected to and met group A and group B inspection.

Table V.- Group C inspection

Inspection	Reqt Para	Test Para
Sub Group I (See 4.3.3.1.1)		
Vibration	3.16.1	4.13
Bounce	3.16.2	4.14
Extreme Temperature	3.15.2b	4.12
Heat Rise	3.18	4.21
Sub-Group II (See 4.3.3.1.2)		
1000 hour operation	3.19	4.19
Dynamotor Start Relay-1000 Hr.	3.19.1	4.19.1

4.3.3.1 Sampling for inspection of equipment.- Two units for each group C inspection shall be selected each month, without regard to their quality, except that the units inspected at the start of the contract shall be selected from the first units produced.

4.3.3.1.1 Sub group I.- Two units from each 250 units (or fraction thereof) shall be selected for each group c inspection.

4.3.3.1.2 Sub group II.- Two units from each 500 units (or fraction thereof) shall be selected for each group c inspection.

4.3.3.2 Noncompliance.- If a sample unit fails group C inspection, the contractor shall immediately investigate the cause of failure and shall report to the Government inspector the results thereof and details of the corrective action taken on the process and all units of product which were manufactured with the same conditions, materials, processes, etc. If the Government inspector does not consider that the corrective action will enable the product to meet specified requirements, or if the contractor cannot determine the cause of failure, the matter shall be referred to the contracting officer. (See 6.5).

4.3.4 Reinspection of conforming group B and group C sample units.- Unless otherwise specified, sample units which have been subjected to and passed group B or group C inspection, or both, may be accepted on contract, provided that they are resubjected to and pass group A inspection after repair of all visible damage.

4.4 Inspection covered by subsidiary documents.- The following shall be inspected under the applicable subsidiary documents as part of the inspection before preparation for delivery:

Item	Where required
Marking	3.7
Finish	3.6

4.5 Bounce preconditioning.- The unit, with shock mounts removed or blocked, shall be placed in its normal operation position on the table of the Package Tester as made by the L.A.B. Corporation, Skaneateles, New York or equal. The package tester, shafts in phase, shall have a speed such that it is just possible to insert a 1/32-inch-thick strip of material under one corner or edge of the unit to a distance of 3 inches as the unit bounces. The unit shall be subjected to this preconditioning for 1 minute. After bounce preconditioning, the unit shall not be repaired, cleaned, or otherwise changed prior to subjection to procurement inspection.

4.6 Air-seal test.- The equipment shall be opened and closed again in such manner as to break and remake the seal. Immediately thereafter, the equipment as field transported shall be subjected to a vacuum of 1 pound per square inch (1 pound per square inch less than the atmospheric pressure surrounding the equipment) applied to the interior of the transit case or to the interior of the equipment inclosure when no transit case is provided. The vacuum then shall be valved-off and the interior pressure measured during the ensuing period of 1 minute. During this 1-minute period the decrease in vacuum shall not exceed .01 pound. The gage used for measurement of the vacuum shall be of such accuracy that a difference of .01 pound can be determined readily.

4.7 Immersion test.- The equipment, as prepared for field transportation, shall be immersed to a minimum depth of 3 feet of fresh water for 2 hours. Immediately prior to immersions, the temperature of the equipment shall be 40°F, or more, above the temperature of the water. The tank in which the equipment is immersed shall be of sufficient capacity to maintain the water within ±2°F of its initial temperature, or the temperature of the water shall be maintained within those limits by other means. After completion of the 2-hour period of immersion, the equipment shall be removed from the water and wiped dry on exterior surfaces. When the equipment is opened, there shall be no evidence of leakage.

4.8 Power cable.- The equipment power cable shall meet the requirements of 3.21.

4.9 Moisture-resistance test for equipment.- The equipment shall be tested as follows:

4.9.1 Test conditions.-

(a) Do not move equipment from the humidity chamber for measurements.

(b) Start measurements not more than 5 minutes after power is applied to the equipment. Complete measurements as rapidly as possible. Do not leave power on after measurements have been completed.

(c) Test sealed equipment with the seal broken or chassis removed from its enclosure.

4.9.2 Test method.-

(a) Dry at 130° ± 5°F for 24 hours.

(b) Condition at 77° ±5°F and 40 to 50 percent relative humidity for 24 hours.

(c) Take measurements as specified in 4.9.3, and readjust as necessary to meet full specification requirements.

(d) Subject to continuous cycling for five 48-hour cycles. Temperature, relative humidity, and period of time for each portion of the cycle shall conform to Standard MIL-STD-170. The measurements specified in 4.9.3 shall be made during the periods shown on the standard and shall comply with 4.9.3.

(e) After cycling has been completed, condition the equipment for 24 hours at 77° ±5°F and 40 to 60 percent relative humidity. Then adjust for optimum performance, using only those means provided by the equipment. No repair or replacement of parts shall be made. After adjustment, the equipment shall meet full specified performance for those measurements specified in 4.9.3.

4.9.3 Performance.- Measurements made during test, and specified performance during cycling, shall be as follows:

4.9.3 Performance.- (Contd)

Paragraph	Measurement	Performance during cycling
3.17.1	Input	Full specification performance
3.17.2	Output	
3.17.4	Regulation	
3.17.5	Ripple	
3.17.6	Efficiency	

4.9.4 Failure.- If any equipment fails to meet the performance specified in 4.9.3 during cycling, it does not pass the test.

4.10 Orientation test.- The equipment shall be inclined for a minimum of 5 minutes in each plane (forward, backward, left, and right) to an angle of 20 + 3, -1 degrees. During inclination in each plane, the equipment shall meet the test of 4.16.2.

4.11 Shock test; ballistic.- The test shall be conducted on the "Shock Testing Machine for Light Weight Equipment" shown in Specification MIL-S-901. The equipment, including shock mounts, shall be secured in its normal operating position to the steel test plate by means of the same fasteners used for vehicular installation of the equipment. The test shall consist of a total of 9 blows: One each 1-foot blow, 3-foot blow, and 5-foot blow on the back, side, and top of the test plate. As an alternative to reorienting the test plate for the blows on the side of the place, equivalent rotation of the equipment under test is permissible.

4.12 Temperature test for equipment.- The equipment shall be subjected to the temperature cycle steps of Standard MIL-STD-169 as shown below. Operation shall be in accordance with the duty cycle in 4.19. Measurements shall be taken as indicated in Table VI.

Table VI - Temperature test

Step	Measurement		Test results
2A	Not required		Note 1
4		*	Note 2
6A	Not required		Note 3
8		*	Note 2
10		*	Note 4

*Ripple and output voltage measured under load (see 3.17.2 and 3.17.5)

Note 1. Condition for 4 hours

Note 2. Full specification performance (3.17.2)

Note 3. Condition for 24 hours

Note 4. Full specification performance

4.13 Test for internal vibration.- Internal vibration of the unit shall be measured as follows, to determine conformance to 3.18.

(a) Secure the unit directly to a vibration table that can be controlled within 10 percent of the specified amplitude. Mounting method shall be such that vibration within the unit can be observed and measured. To facilitate this observation and measurement, subassemblies may be tested separately provided they are secured to the table in a manner similar to that used to mount them in the dynamotor-power supply.

(b) Vibrate the unit successively in three mutually perpendicular directions over a frequency range of 10 to 55 cycles per second. The total excursion of the applied vibration shall be not less than 0.030 inch.

(c) In each of the three directions, change the frequency in steps of one cycle per second and maintain each frequency for at least 10 seconds.

(d) Measure vibration amplitudes by optical means, or by other means provided that vibration of the part is not affected by the measurement.

4.14 Bounce test.- The unit shall be tested on the package tester, as made by the L.A.B. Corporation, Skaneateles, New York, or equal. Accessories shall be selected from those listed on Drawing SC-A-46439. The test shall be as follows:

4.14 Bounce test.- (Contd)

(a) Cover the tester bed with a panel of 1/2-inch plywood, with the grain parallel to the drive chain. Space sixpenny nails, with the heads below the surface, at 6-inch intervals around all four edges and at 3-inch intervals in a 6-inch square in the center.

(b) Place the unit on the bed of the package tester. Limit the lateral motion, by wooden fences, to not more than 3 inches and not less than 1 inch. Additional barriers may be used to prevent tumbling, provided that the fore-and-aft motion of the unit against the backstop is not restrained.

(c) Operate the package tester, shafts in phase, for a total of 3 hours at 284 ± 2 rpm. Turn the unit at the end of each 30 minutes so it will rest on a new face.

4.15 Input.- The equipment shall be tested for compliance with the requirements of 3.17.1.

4.16 Output.- The output voltages shall be measured under the conditions of, and be within the limits specified in 3.17.2. Measurements shall be made with a high resistance voltmeter having an accuracy of 1% or better. Under standby conditions, the requirements of 3.17.3 shall be met.

4.17 Ripple.- The ripple voltage in the output supply circuits shall be measured with an electronic voltmeter, and shall not exceed the limits specified in 3.17.5, when the equipment is operated with 29.0 volts input and connected to the resistive loads specified in 3.17.2.

4.18 Regulation.- The voltage regulation of the transmitter plate supply circuit shall be determined by operating the equipment with the specified d-c input voltages and with resistive loads specified in 3.17.2. The regulation, as specified in 3.17.4, shall then be calculated from the following formula:

$$\text{Percent Regulation} = \frac{(E_1 - E_2)\ 100}{E_2}$$

where E_1 = Voltage across the transmitter plate supply output circuit with the 5800 ohm load resistor disconnected.

and E_2 = Voltage across the transmitter plate supply output circuit with the 5800 ohm load resistor connected.

4.19 1000 hour operation.- The equipment shall operate at any ambient temperature up to 125°F with the rated resistive loads specified in 3.17.2 and 3.17.3, from any input voltage in the range specified in 3.17.1, for 1000 hours using the following duty cycle:

(a) 5 minutes transmit-full load

(b) 10 minutes transmit-(transmitter plate, no load; filaments, full load; vibrator, full load).

(c) 15 minutes standby (receive) after a total of 45 minutes of the above cycle (a and b).

(d) Every 24 hours, during a standby (receive) period, the equipment will be shut off for a period not to exceed 5 minutes. The equipment shall then be tested for starting at the minimum voltage of the range specified in 3.17.1. During and after completion of the test, the equipment shall be capable of meeting the requirements of 3.17.2.

4.19.1 1000 hour operation, dynamotor start relay.- The coil, of the dynamotor start relay shall withstand 1000 hours continuous duty operation when energized with 29.0 volts input, at any ambient temperature up to 125°F.

4.20 Efficiency.- Efficiency of the Dynamotor-Power Supply shall be calculated from data obtained in 3.17.2, (Output (Full load conditions)), using the following formulas:

$$\text{Percent Efficiency} = \frac{\text{Total Power Output} \times 100}{\text{Power Input}}$$

The total power output shall be the summation of the: Transmitter plate; Receiver plate; Transmitter filament; Receiver filament; and Keying relay power requirements under equivalent load conditions as specified in 3.17.2.

4.21 Heat rise.- The equipment shall be tested for compliance with the requirements of 3.18. The method of temperature measurement shall be submitted to the contracting officer for approval.

4.22 Visual and mechanical inspection.- Equipment shall be examined for the defects listed in Standard MIL-STD-252.

4.23 Inspection for interchangeability.- The mechanical dimensions as shown on the drawings listed on gage list SC-GL-57608 shall be measured to determine conformance with the physical and functional interchangeability requirements of 3.23. When a listed dimension is not within specified or design limits, it shall be considered a major defect.

4.24 Quality conformance inspection of preparation for delivery.-Preparation for delivery shall be inspected in accordance with Specification MIL-P-116 to determine conformance to the requirements of section 5.

4.25 Rough handling test (preparation for delivery).- When rough handling test in accordance with Specification MIL-P-116 is required by the contract (see 6.2(e), the following functional tests shall be conducted to determine freedom from operational malfunction caused by the rough handling:

4.16 Output voltage (full load).
4.17 Ripple voltage.

5. PREPARATION FOR DELIVERY

5.1 Preservation and Packaging.-

5.1.1 Level A.- Each Dynamotor-Power Supply, DY-105( )/GRC-9X shall be packaged in accordance with items 1 through 7 of Figure 1, Table I.

5.1.2 Level C.- Each Dynamotor-Power Supply, DY-105()/GRC-9X shall be preserved and packaged in a manner that will afford adequate protection against corrosion, deterioration and damage during shipment from the supply source to the first receiving activity.

5.1.3 Package Performance.- Package testing shall be performed in accordance with the requirements of Specification MIL-P-116. The rough handling and functional tests will be required only when invoked in the bid request or contract (see 6.2).

5.2 Packing.-

5.2.1 Level A.- Four each, Dynamotor-Power Supply DY-105( )/GRC-9X shall be packed in accordance with items 8 through 10 of Figure 1 and Table I. The box closure shall be as specified in the appendix of the applicable box specification.

5.2.2 Level B.- Four each, Dynamotor-Power Supply DY-105( )/GRC-9X shall be packed as specified in 5.2.1 except that nailed wood box shall be Class 1 or cleated plywood box shall be Type IV and Class 1.

5.2.3 Level C.- A quantity of Dynamotor-Power Supply DY-105( )/GRC-9X shall be packed in (a) shipping container(s) in a manner that will afford adequate protection against damage to the package and its contents during shipment from the supply source to the first receiving activity. Shipping containers shall comply with the rules and regulations of the common carrier as applicable to the mode of transportation.

5.3 Marking.- Interior packages and exterior shipping containers shall be marked in accordance with Military Standard MIL-STD-129.

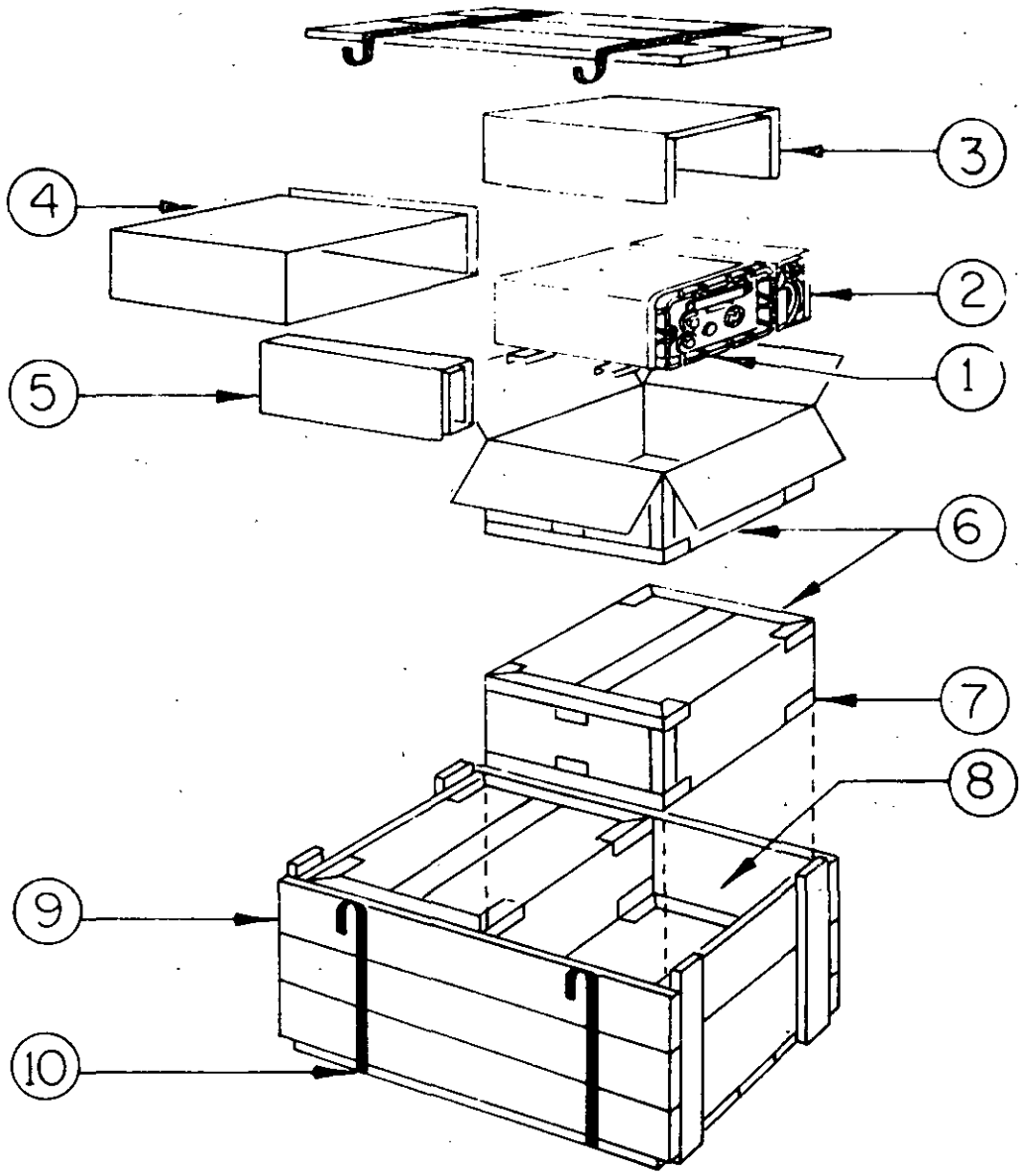

FIGURE 1

BILL OF MATERIAL
TABLE I

REF No.	ITEM Nomenclature	No. Req'd	Method MIL-P-116	SIZE - INCHES L	W	D	REQUIREMENT Spec No.	T	C	V	G	F	S
1	Dynamotor DY-105/GRC-9X	1	IC-5	14-3/4	13-1/8	9-7/8							
	(Containing items required as listed in Signal Corps Procurement Parts List as applicable. Place items (no packaging required) in appropriate space provided in unit).												
2	Cell, end	1		12-7/8	8-1/8	2-1/4	PPP-F-320	CF	WR	SW	W5c	C	
	Consolidate the following items, packaged as indicated, within item #2												
	Hardware Kit												
	and Bag Cotton	1	III	3	5		DDD-B-20						
	Tech Manual	2	IC-6				MIL-B-117	II	d				
	Cable Assy CX-20310/U (8 Ft)	1	No Packaging Required										
3	Pad Filler	1		55 5/8	11	1/8	PPP-F-320	CF	WR	SW	W5c	C	
4	Sleeve	1		57	15-3/4	1/8	PPP-F-320	CF	WR	SW	W5c	C	
5	Cell, end	1		12-7/8	8-1/8	2-1/4	PPP-F-320	CF	WR	SW	W5c	C	
6	Box, Fiber	1		16	13-1/2	10-1/8	PPP-B-636	1	2		W5c	C	RSC
7	Tape, Pressure-Sensitive	2		21	3		PPP-T-76						
		4		18-1/2	3								
		1		10	3								
8	Packaged Item #6	4	IC-5	16-1/4	13-3/4	10-3/8							
9	Box, Wood or	1		27-7/8	16-3/8	21	PPP-B-621		2				4
	Box, Cleated Plywood						PPP-B-601	III	2				A
10	Strapping, Steel	2		86	1/2	.020	QQ-S-781	1	B				

Lev. A - PACKED WEIGHT - 198 lbs.
Lev. A - PACKED VOLUME - 6.75 Cu. Ft.

T - Type, C - Class, V - Variety, G - Grade, F - Flute, S - Style

6. NOTES

6.1 Intended use.- Dynamotor-Power Supply, DY-105( )/GRC-9X is used to convert a 24 VDC input from a vehicular battery into the necessary voltages and currents for operating radio set components.

6.2 Ordering data.- Procurement documents should specify the following:

(a) Title, number, and date of this specification and any amendment thereto.

(b) Typed required.

(c) Level of packaging and level of packing required for shipment. (Level A, level B, or level C.)

(d) The specific paragraphs of section 5 which are applicable to the particular procurement.

(e) Preproduction pack(s) as follows:

Makeup of pack(s).
Number of each kind of pack to be submitted.
Inspection to be performed thereon. (If rough handling test or cyclic test is required).

(f) Marking and shipping of samples.

(g) Place of final inspection.

(h) Technical literature required. (See 3.22)

(i) Quantity of running spare parts required. (See 3.22.)

(j) Submission of the statement of treatment referenced in 3.10, as soon as possible after award of contract. This statement should be submitted to the contracting officer.

6.3 Nomenclature.- The parentheses in the nomenclature will be deleted or replaced by a letter identifying the particular design; for example: DY-105H/GRC-9X. The contractor shall apply for nomenclature in accordance with the applicable clause in the contract. (See 1.1.)

6.4 Location of rough handling test and air-seal test.- It is desirable that the rough handling test (4.25) and the air-seal test (4.6) be performed at a location that will minimize handling (which might cause damage to the equipment) after this inspection is completed. Any preparation for shipment which would require breaking of the equipment seal should be accomplished prior to the air-seal test so that the seal may remain intact thereafter. It is recommended that the entire lot (including all previously inspected sample units) be sampled and inspected immediately prior to packaging.

6.5 Group C inspection.- Approval to ship may be withheld, at the discretion of the Government, pending the decision from the contracting officer on the adequacy of corrective action. (See 4.3.3.2).

6.6 Inspection.- Inspection is the examination or testing, or both, of supplies to determine compliance with applicable requirements. Sampling is an element of inspection.

6.6.1 Examination.- Examination consists of simple, generally nondestructive determinations of compliance, without use of special testing equipment.

6.6.2 Testing.- Testing consists of determinations of compliance, using technical means.

6.7 Verification inspection.- Verification by the Government will be limited to the amount deemed necessary to determine compliance with the contract and will be limited in severity to the definitive quality assurance provisions established in this specification and the contract. The amount of verification inspection by the Government will be adjusted to make maximum utilization of the contractor's quality control system and the quality history of the product.

6.8 Color.- The color chip furnished by the procuring agency (3.6) will be color chip No. X-24087, and may be obtained upon request to the Commanding General, U. S. Army Electronics Materiel Agency, 225 South Eighteenth Street, Philadelphia 3, Pennsylvania, ATTN: SELMA-J4b.

6.9 Dimensional data.- Sizes of packaging materials prescribed in Section 5 are based on the dimensions of the equipment cited on the applicable Bill of Material. When the dimensions of the equipment vary from those cited, the sizes of the packaging materials shall be adjusted accordingly. When shown in the Bill of Materials (see Section 5), corrugated fiberboard manufactured with A, B, or C fluting may be used at the option of the contractor. When the fluting used is not the same as that cited in the Bill of Material, the dimensions of the affected packaging and packing materials will be adjusted accordingly.

Project # 5820 A207

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/ vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE
MIL-D-13060B (EL)

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A
☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?
   ☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426 REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED

S/N 0102-014-1802