FAA-E-2066a
JUL 21 1967
SUPERSEDING
FAA-E-2066, 12/20/63

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION SPECIFICATION

POWER SUPPLY, 48 V DC, 5A

1. SCOPE

1.1 Scope.- The equipment specified herein is a panel-mounted, 48-volt, 5-ampere regulated silicon full-wave rectifier power supply designed to furnish filtered power for the operation of control relays, stepping switches, and clutch solenoids.

2. APPLICABLE DOCUMENTS

2.1 FAA Specification.- The following FAA specifications, of the issues specified in the invitation for bid or request for proposals, form a part of this specification:

FAA-D-1272	Instruction Booklets, Electronic Equipment
FAA-G-2100/1	Electronic Equipment, General Requirements; Part 1, General Requirements for all Equipments
FAA-R-1030	Packing of Electronic Equipment

(Copies of this specification and other applicable FAA specifications and drawings may be obtained from the Federal Aviation Administration, Washington, D. C. 20590, Attention: Contracting Officer. Requests should fully identify material desired, i.e., specification numbers, dates, amendment numbers, complete drawings numbers; also request should state the contract involved or other use to be made of the requested material.)

3. REQUIREMENTS

3.1 Equipment to be furnished by the contractor.- Each equipment furnished by the contractor shall be complete in accordance with all specification requirements. Instruction booklets shall be furnished in accordance with FAA-D-1272.

3.2 Test conditions and power source

3.2.1 Service conditions.- The ambient conditions shall be those of Environment I (I-3.2.23, FAA-G-2100/1).

3.2.2 Power source.- The equipment shall operate from a single-phase, two-wire AC line power source. The design-center voltage (I-3.2.21, FAA-G-2100/1) shall be 120 V.

3.3 Power transformer.- A constant voltage transformer of the magnetic type shall be provided. The transformer shall operate over the service conditions range of line voltage and frequency without the necessity for making any adjustments or connection changes. There shall be no DC connection between the primary and secondary windings. The transformer shall be provided with a hermetically sealed metal case. The transformer shall be capable of withstanding a potential of 1250 V RMS 60 Hz for one minute between primary and secondary and between the primary/secondary and the transformer case. Any capacitor used as a part of the resonant circuit of this transformer shall be mounted external to the case of such transformer. The transformer cover shall have markings, readily visible for maintenance personnel, showing schematic diagram, part numbers and manufacturer's name.

3.3.1 Temperature rise.- The constant voltage transformer used in this equipment shall have a temperature rise not over 65° C above ambient as determined by the rise-in-resistance method under any combination of ambient room conditions, input voltage, frequency and load, including short circuit (3.7), specified under service conditions. Transformer insulation shall be designed for continuous operation at the maximum transformer temperature.

3.3.2 Transformer terminals.- The power transformer shall be provided with a terminal board or terminal bushings. Flexible leads or winding ends extending outside of the case or frame shall not be used. Each terminal shall be identified by a numeral permanently and legibly marked on the component at a point adjacent to the terminal. Terminals shall not loosen, turn, or rupture, and no other damage shall occur, when transformers are tested with a pull of 5 pounds applied in all directions to each terminal at the point where a lead and external circuit will be connected to it.

3.3.3 Finish.- The entire external metallic surface of the transformer shall be given a baked-on protective dull-black finish capable of good heat transfer to surrounding air. There shall be no evidence of peeling after subjection to tests under Section 4.

3.4 Type of construction.- The power supply shall be constructed on a Size D panel using the standard panel assembly with enclosed vertical chassis in accordance with D-21342F, **including door. The front panel layout shall be in accordance with 3.23 through 3.28 and** Figure 1.

3.5 AC line receptacle and attachment cord.- To provide for connection to the AC line, a grounding-type three-pole male recessed receptacle shall be provided and mounted on the lower right rear of the chassis (as viewed from the rear). The receptacle shall be Harvey Hubbell, Inc. #7486G, midget flush base, three-wire polarized, grounded, twist-lock type, 15 A 125V; or equal. An attachment cord, length in the range two to three feet, shall be furnished. The cord shall be SJ, three-wire, stranded, rubber-covered and rubber-jacketed, minimum wire size 1600 circular mils (also see 1-3.10.5 of FAA-G-2100/1). One end shall have a connector to fit the recessed receptacle, Hubbell #7481 midget three-wire twist-lock connector, 15 A 125 V; or equal. The other end shall have a rubber finger-grip cap, standard three-wire grounding type (parallel blades, U-shaped grounding pin); Hubbell #5274; or equal. Wiring shall be in accordance with Figure 2 hereof.

3.6 General requirements.- The equipment described herein is a rectifier power supply which shall utilize silicon rectifiers and shall be capable of furnishing up to 5.0 amperes for continuous duty at a filtered voltage of 48 V DC. Load currents, where specified, are exclusive of bleeder current. Full wave rectification shall be employed.

3.6.1 Component mounting.- Large components shall be mounted on the rear of the chassis. Small components shall be mounted inside the chassis and arranged for easy access. All components shall be mounted so as to confine most or all of the wiring to the inside of the chassis.

3.7 Circuit protection.- The equipment shall be self-protecting such that a continuous short circuit or fault occurring beyond the transformer primary will not damage the unit in a 40° C ambient. This feature shall be in addition to the protection offered by the fuse.

3.8 Full load voltage.- Under normal test conditions, the output voltage at the full load current of 5 amperes shall be between 47.5 and 49.5 V DC.

3.8.1 Ripple.- The peak ripple voltage shall not exceed 5% of the actual DC output voltage at all values of steady-state load current from 0 to 5 amperes.

3.9 Regulation.- The following are the allowable variations in the output voltage under the conditions indicated:

	Condition	Output Variation (Max.)
a.	Normal test conditions - zero to the specified load current	4.0 V
b.	Service conditions range of temperature and humidity, all other normal test conditions	±1.0 V

Condition	Output Variation (Max.)
c. Service conditions range of AC line voltage, all other normal test conditions (with a fixed resistive load of a value which results in any load current in the specified range of 0 to maximum load current)	±1.0 V
d. Service conditions range of AC line frequency, otherwise normal test conditions, with fixed resistive load as in c above	±2.5 V from output voltage at 60 Hz

3.10 Power Input.- The power drawn from the AC line at zero DC output current shall not exceed 50 W. The AC connection shall be made in accordance with 3.5.

3.11 Power factor.- The power factor of the equipment shall be not less than 70% when the steady-state DC output load current is equal to 75% of the load current specified.

3.12 Efficiency.- The efficiency of the power supply shall be not less than 70% when the steady-state DC output load current is 5A.

3.13 Resistance to ground.- The DC resistance to ground from both terminals of the AC input receptacle, and from DC output terminals, shall be not less than 1 megohm.

3.14 Ground connection.- The rectifier shall operate with either the positive or negative output grounded to the chassis, and when neither output is grounded.

3.15 Relays.- No relays shall be used.

3.16 Tubes.- Electron tubes, including glow-discharge voltage regulator types, shall not be used.

3.17 Controls.- There shall be no variable or adjustable controls.

3.18 Rods.- Two U-shaped stainless-steel rods shall extend beyond the rear of the chassis and adjacent to the vertical sides for protection of components while servicing the power supply. The rods shall be so arranged that no deformation of the chassis shall occur when resting thereon or being handled thereby.

3.19 Bleeder.- A bleeder resistor shall be provided such that the discharge time constant, when the input power is removed, is no greater than 30 seconds with output load removed.

3.20 Rectifying elements.- Rectifying elements of the silicon type capable of continuous operation at 60° C ambient shall be used.

3.21 Choke.- No filter choke or chokes shall be employed.

3.22 Isolation of output from input.- The rectifiers shall be energized by means of the transformer to provide DC isolation of the DC output circuit from the AC input circuit. The DC resistance from each input terminal to each output terminal shall be 1 megohm or more.

3.23 Nameplate.- The nameplate shall be mounted on the front panel in a symmetrical arrangement with other panel-mounted components. The nameplate title shall be: 48 V DC POWER SUPPLY 5 A

3.24 Power switch.- A toggle switch shall be mounted on the front panel to control application of primary power to the equipment. See Figure 1.

3.25 Indicator.- A slide base indicator light operated from the 48 V DC output voltage shall be mounted on the front panel to show when the equipment is energized. The pilot light assembly shall be furnished with a green jewel.

3.26 Fuses.- A type 3AG primary fuse shall be used and shall be mounted as shown in Figure 1. This fuse shall have a current rating of not more than 200% of the maximum transformer primary current obtained under the service conditions. See Figure 2.

3.27 Meters.- No meters shall be provided.

3.28 Power designation plates.- The power switch, indicator light, and fuse shall be individually designated POWER, or shall be arranged in a group with a single POWER designation as shown in Figure 1.

3.29 Terminal strip.- A terminal strip, Cinch-Jones Type 142-Y, or equal, shall be provided for attaching the output terminals and to provide a ground connection to the chassis. A marker strip, Cinch-Jones Type MSX, or equal, shall be provided.

3.29.1 Location of terminal strip.- The terminal strip shall be mounted vertically on the rear of the chassis at the extreme left when viewing the rectifier power supply from the rear. Its vertical centerline shall be not more than 2-1/4" from the edge of the chassis.

3.29.2 Marking of terminals.- Starting from the bottom of the terminal strip, the terminals shall be marked as follows: -48 V DC, GND, +48 V DC.

3.29.3 Ground strap.- A ground strap, capable of being placed from either output terminal to the ground terminal, shall be provided. The equipment shall be delivered with the strap between negative DC and ground terminals.

4. QUALITY ASSURANCE PROVISIONS

4.1 Design qualification tests.- The following design qualification tests shall be made under the service conditions steps 1 through 8, paragraph 1-4.3.3.2 of FAA-G-2100/1.

Test	AC Line V	Paragraph
Regulation	120 V	3.9 b
Circuit protection (four hours at end of Step 4)	120 V	3.7
Resistance to ground (end of Step 5)		3.13
Transformer breakdown		3.3
Transformer temperature rise (full load in power supply, also transformer short)	105, 130 V	3.3.1

4.1.1 Additional design qualification tests.- Normal test conditions except for line voltage shall be as listed below:

Test	AC Line V	Paragraph
Power factor	105, 120, 130 V	3.11
Efficiency	105, 130 V	3.12
Fusing	120, 130 V	3.26
Transformer pull		3.3.2
Regulation (Par. 1-4.8.8 of FAA-G-2100/1)		3.9 d
Regulation (zero load 2A, 5A)	105, 120, 130 V	3.9 c

4.2 Type tests.- The following type tests shall be made under normal test conditions.

Test	AC Line V	Paragraph
Full Load voltage	120 V	3.8
No load power	120 V	3.10
Regulation	120 V	3.9 a
Bleeder	120 V	3.19
Resistance to ground and input to output		3.13

4.3 Production tests.- The following production tests shall be made:

Test	Paragraph
Ripple	3.8.1
Regulation (zero load and 5A)	3.9 a

5. PREPARATION FOR DELIVERY

5.1 General.- See FAA-R-1030.

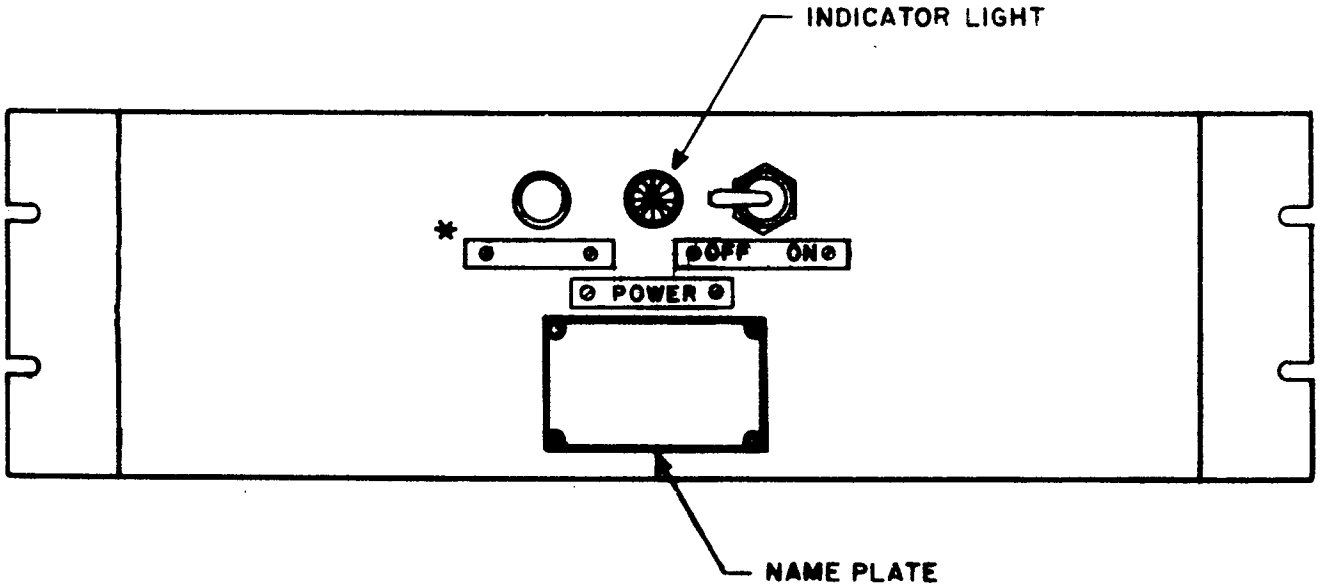
6. NOTES

6.1 None.

* * * * * * *

For Figures 1 and 2, see pages 8 and 9.

ATTACH: Drawings: D-21278E
C-21286D
D-21342F



*FUSE MARKING
PER FAA-G-2100/1

FRONT PANEL LAYOUT

FIGURE 1

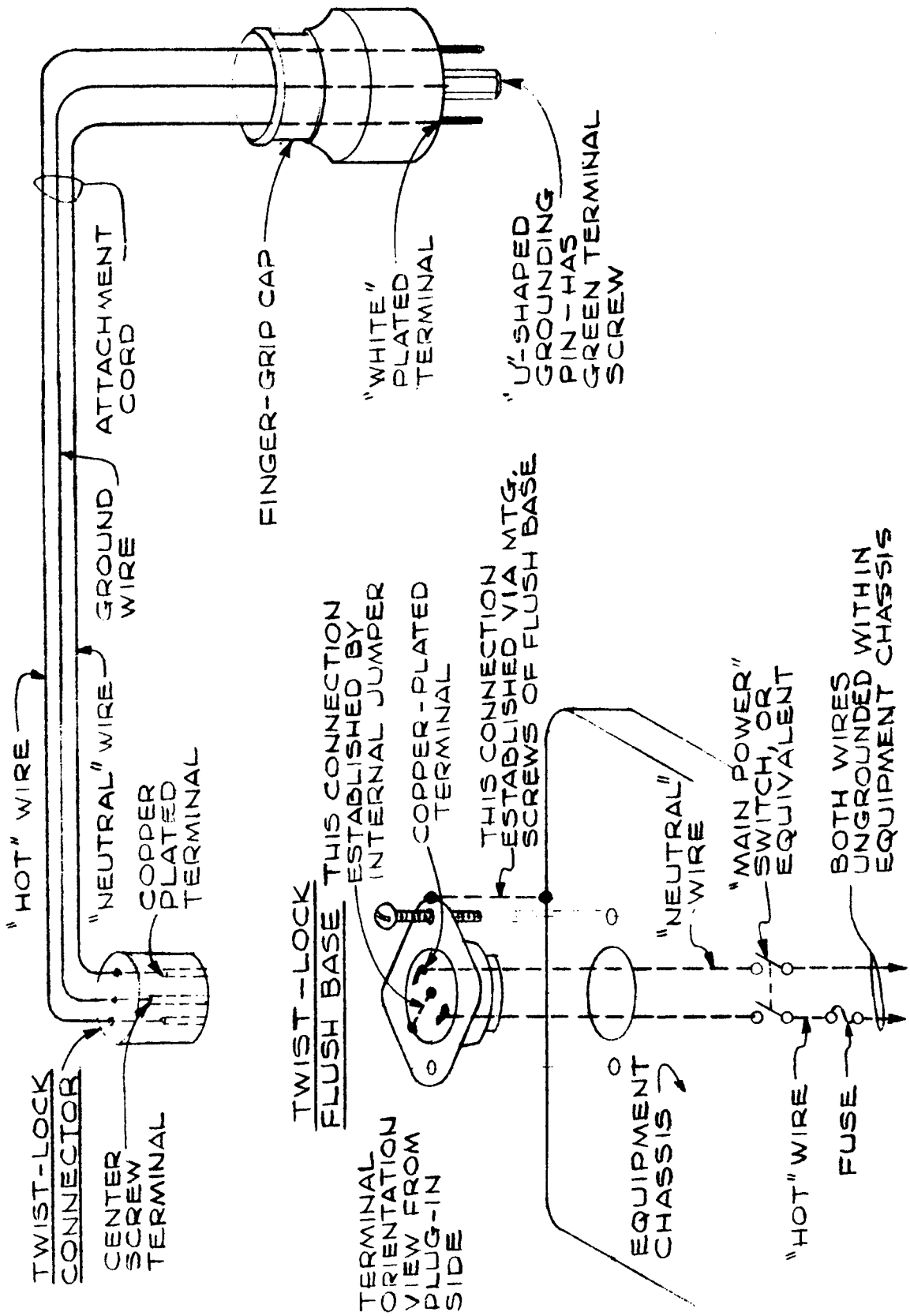
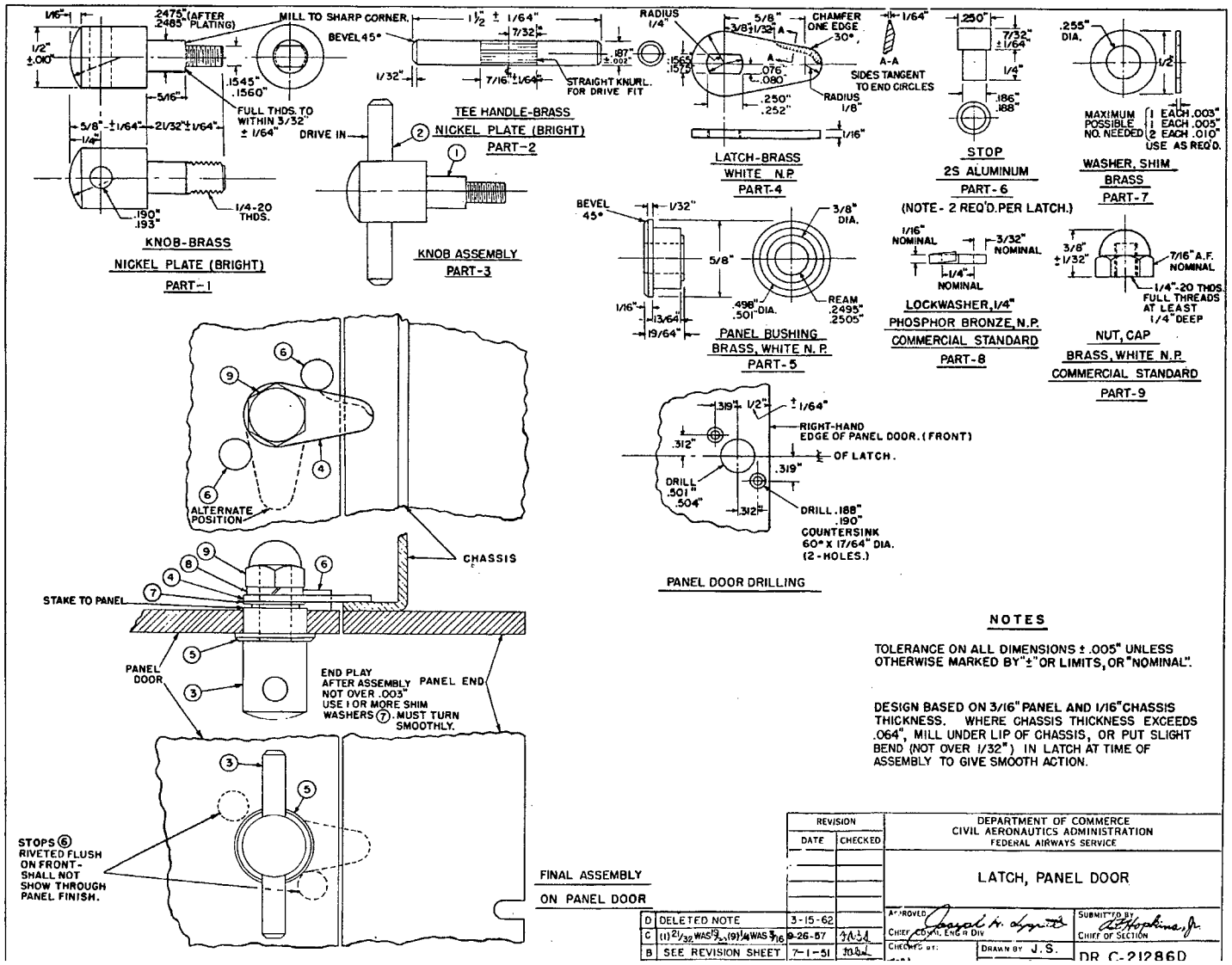
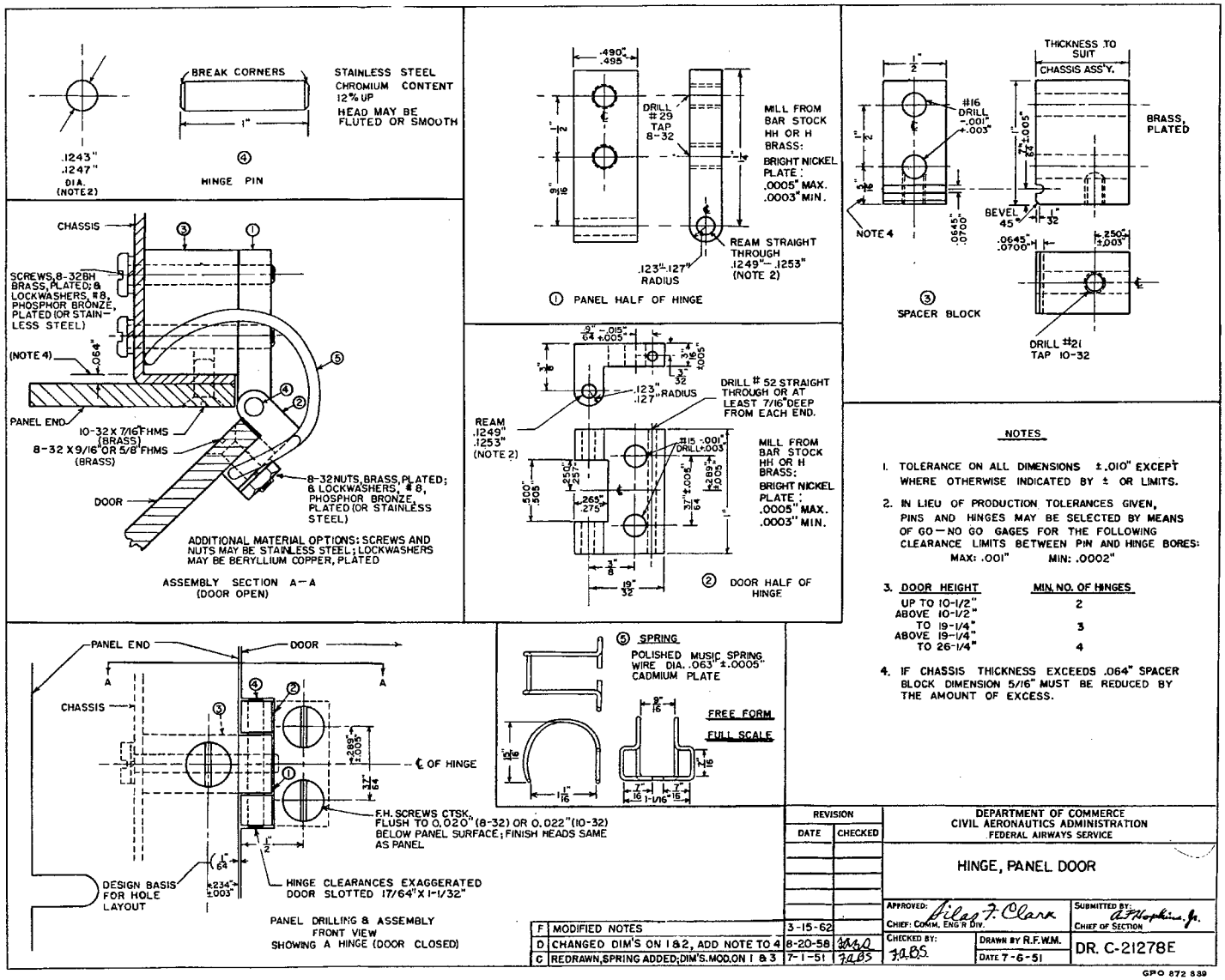


Figure 2

CONNECTION POLARITY FOR AC LINE CORD AND FUSE


KNOB-BRASS
NICKEL PLATE (BRIGHT)
PART-1
TEE HANDLE-BRASS
NICKEL PLATE (BRIGHT)
PART-2
KNOB ASSEMBLY
PART-3
LATCH-BRASS
WHITE N.P.
PART-4
STOP
2S ALUMINUM
PART-6
(NOTE- 2 REQ'D. PER LATCH.)
WASHER, SHIM
BRASS
PART-7
PANEL BUSHING
BRASS, WHITE N.P.
PART-5
LOCKWASHER, 1/4"
PHOSPHOR BRONZE, N.P.
COMMERCIAL STANDARD
PART-8
NUT, CAP
BRASS, WHITE N.P.
COMMERCIAL STANDARD
PART-9
PANEL DOOR DRILLING
FINAL ASSEMBLY
ON PANEL DOOR
NOTES
TOLERANCE ON ALL DIMENSIONS ± .005" UNLESS OTHERWISE MARKED BY "±" OR LIMITS, OR "NOMINAL".
DESIGN BASED ON 3/16" PANEL AND 1/16" CHASSIS THICKNESS. WHERE CHASSIS THICKNESS EXCEEDS .064", MILL UNDER LIP OF CHASSIS, OR PUT SLIGHT BEND (NOT OVER 1/32") IN LATCH AT TIME OF ASSEMBLY TO GIVE SMOOTH ACTION.
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
FEDERAL AIRWAYS SERVICE
LATCH, PANEL DOOR
DR C-21286D
DELETED NOTE
SEE REVISION SHEET



NOTES

1. TOLERANCE ON ALL DIMENSIONS ±.010" EXCEPT WHERE OTHERWISE INDICATED BY ± OR LIMITS.
2. IN LIEU OF PRODUCTION TOLERANCES GIVEN, PINS AND HINGES MAY BE SELECTED BY MEANS OF GO—NO GO GAGES FOR THE FOLLOWING CLEARANCE LIMITS BETWEEN PIN AND HINGE BORES: MAX: .001" MIN: .0002"
3.

DOOR HEIGHT	MIN. NO. OF HINGES
UP TO 10-1/2"	2
ABOVE 10-1/2" TO 19-1/4"	3
ABOVE 19-1/4" TO 26-1/4"	4

4. IF CHASSIS THICKNESS EXCEEDS .064" SPACER BLOCK DIMENSION 5/16" MUST BE REDUCED BY THE AMOUNT OF EXCESS.

REVISION		
DATE	CHECKED	
F	MODIFIED NOTES	3-15-62
D	CHANGED DIM'S ON 1 & 2, ADD NOTE TO 4	8-20-58
C	REDRAWN, SPRING ADDED; DIM'S. MOD. ON 1 & 3	7-1-51

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
FEDERAL AIRWAYS SERVICE

HINGE, PANEL DOOR

APPROVED: Silas F. Clark
CHIEF: COMM. ENG'R DIV.

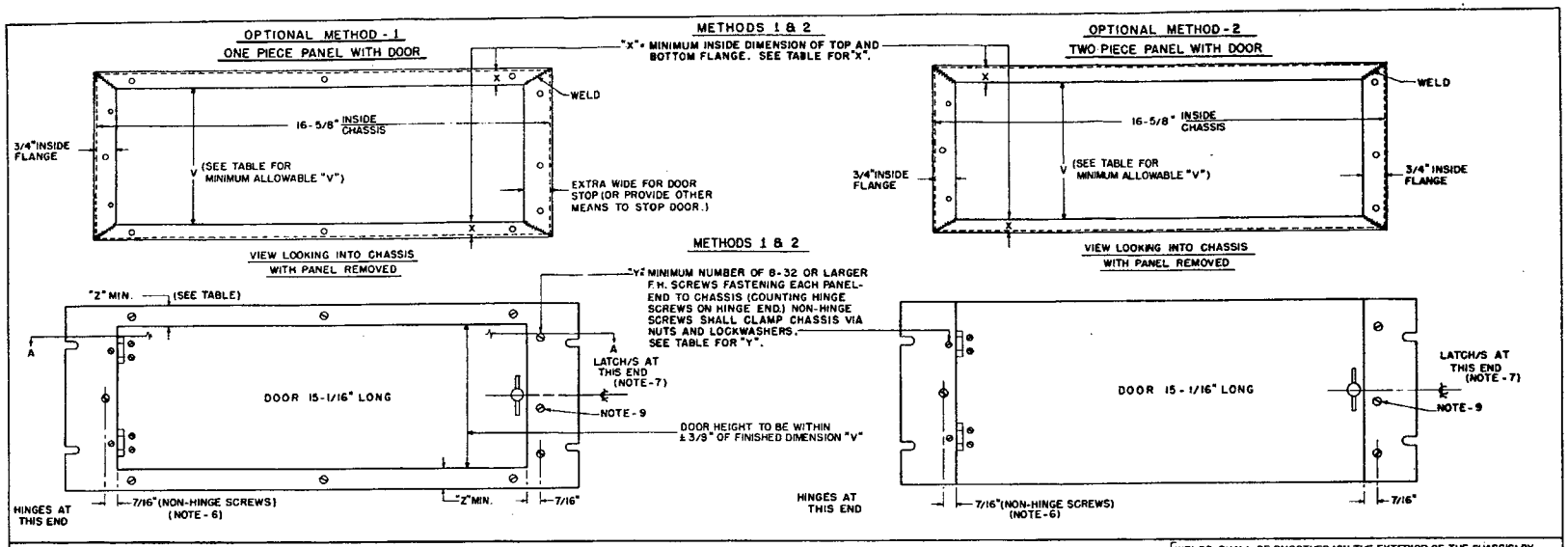
SUBMITTED BY: A. T. Hopkins Jr.
CHIEF OF SECTION

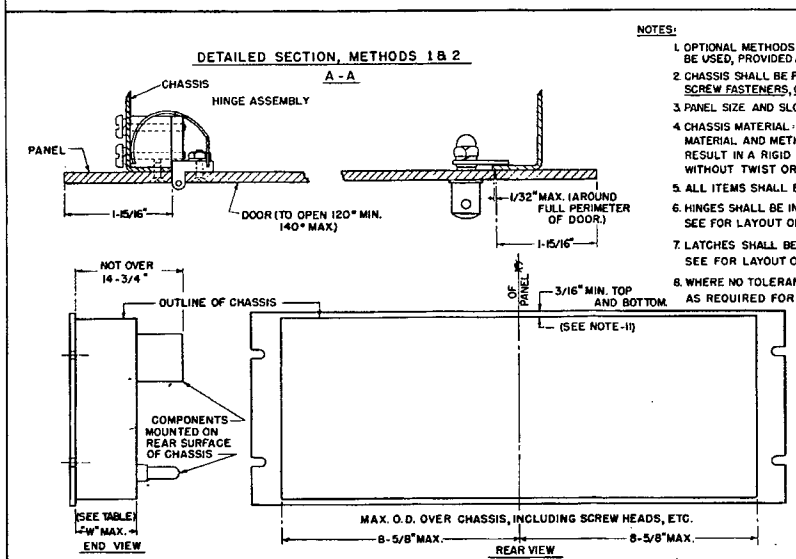
CHECKED BY: J.A.B.S.

DRAWN BY R.F.W.M.
DATE 7-6-51

DR. C-21278E

GPO 872 839





NOTES:

1. OPTIONAL METHODS: EITHER OF THE TWO OPTIONAL METHODS OF CONSTRUCTION MAY BE USED, PROVIDED ALL REQUIREMENTS ARE MET.
2. CHASSIS SHALL BE FORMED AND SEAM WELDED. CHASSIS FABRICATION BY RIVETING, SCREW FASTENERS, OR SPOT WELDING NOT PERMITTED.
3. PANEL SIZE AND SLOTTING TO BE IN ACCORDANCE WITH DR. D-211408 (OR LATER ISSUE).
4. CHASSIS MATERIAL: ALUMINUM ALLOY. MINIMUM GAUGE .063". THICKNESS OF MATERIAL AND METHOD OF FORMING AND REINFORCING SHALL BE SUCH AS TO RESULT IN A RIGID CHASSIS ASSEMBLY, CAPABLE OF SUPPORTING THE EQUIPMENT WITHOUT TWIST OR SAG.
5. ALL ITEMS SHALL BE NON-FERROUS.
6. HINGES SHALL BE IN ACCORDANCE WITH DWG. C-21278D (OR LATER ISSUE), WHICH SEE FOR LAYOUT OF HINGE SCREWS.
7. LATCHES SHALL BE IN ACCORDANCE WITH DWG. C-21286C (OR LATER ISSUE), WHICH SEE FOR LAYOUT OF LATCH.
8. WHERE NO TOLERANCES ARE GIVEN ON DIMENSIONS, ±1/32" OR LESS SHALL APPLY AS REQUIRED FOR ACCURATE FITS AND ALIGNMENT.
9. AVOID INTERFERENCE WITH LATCH BY DROPPING SCREWS BELOW LATCH & IF NECESSARY.
10. VENTILATION HOLES MAY BE CUT IN TOP, BOTTOM, AND SIDES OF CHASSIS IF NECESSARY.
11. AFTER ASSEMBLY, NO PORTION OF ANY COMPONENT SHALL PROJECT BEYOND SIDES OR TOP AND BOTTOM OF CHASSIS; NOR SHALL ANY PORTION OF THE EQUIPMENT (INCLUDING HEADS OF SCREWS, ETC.) PROJECT BEYOND A PLANE 1/16" BELOW TOP EDGE OF PANEL, OR A PLANE 1/16" ABOVE BOTTOM EDGE OF PANEL (PLANES PERPENDICULAR TO PANEL).
12. BEVEL BACK CORNER OF DOOR ABOVE TOP HINGE AND BELOW BOTTOM HINGE TO AVOID INTERFERING WITH TOP AND BOTTOM FLANGES OF CHASSIS (METHOD-2); ALSO METHOD-1 IF DOOR OVERLAPS TOP AND BOTTOM FLANGES.

WELDS SHALL BE SMOOTHED (ON THE EXTERIOR OF THE CHASSIS) BY MEANS OF A BELT SANDER OR SIMILAR PROCESS.

METHODS 1 & 2							1
MIN "V"	PANEL SIZE	MIN. NO. OF HINGES	NO. OF LATCHES	MAX. DEPTH "W"	MIN. FLANGE "X"	MIN. SCREWS "Y"	MIN. PANEL "Z"
2"	B	2	1	2-1/8"	7/16"	2	3/4"
3-3/4"	C	2	1	3-7/8"	7/16"	2	3/4"
5-1/4"	D	2	1	5-5/8"	7/16"	3	3/4"
7"	E	2	1	7-3/8"	7/16"	4	3/4"
8-1/2"	F	2	1	8"	9/16"	4	7/8"
9-3/4"	G	3	2	8"	3/4"	5	1-1/16"
11-1/2	H	3	2	8"	3/4"	5	1-1/16"
12-1/2"	J	3	2	8"	1"	5	1-5/16"
14-1/2"	K	3	2	8"	1"	5	1-5/16"
16"	L	3	2	8"	1"	5	1-5/16"
17-3/4"	M	4	2	8"	1"	7	1-5/16"
19-1/2"	N	4	2	8"	1"	7	1-5/16"
21-3/4"	O	4	2	8"	1"	7	1-5/16"
23"	P	4	2	8"	1"	7	1-5/16"

REV	DATE	DESCRIPTION	CHECKED	APPROVED
F	2-4-65	NEW TITLE BLOCK		KTO

FEDERAL AVIATION AGENCY
WASHINGTON 25, D.C.

STANDARD DOOR PANEL AND VERTICAL CHASSIS ASSEMBLY (USING PRECISION HINGES)

REVIEWED BY:
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DESIGNED BY:
DRAWN BY: J.S.
CHECKED BY:
SYSTEMS RESEARCH AND DEVELOPMENT SERVICE
DATE — 6-2-49
D-21342F