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APPROVED 26 JUN 66 REVISED FOR CHANGES SEE SHEETS 1 THRU 19

P.A. NAVY - AS Other Copy	TITLE <b>TRANSMISSION, POWER, CONSTANT SPEED 30 KW F-4 AIRCRAFT</b>	<b>MILITARY STANDARD</b>	
		<b>MS9030I(AS)</b>	
PROCUREMENT SPECIFICATION 11-7-7101	SUPERSEDES 11S25376	SHEET	2 OF 10



FED. SUP CLASS  
1995

## IDENTIFICATION OF ITEMS

ITEM	MS PART NUMBER
MODERATE TEMPERATURE PARALLEL SYSTEM (CONSISTS OF TWO MODERATE TEMPERATURE TRANSMISSIONS AND ONE CONTROL)	MS90301-1
HIGH TEMPERATURE PARALLEL SYSTEM (CONSISTS OF TWO HIGH TEMPERATURE TRANSMISSIONS AND ONE CONTROL)	MS90301-2
MODERATE TEMPERATURE SPLIT SYSTEM (CONSISTS OF TWO MODERATE TEMPERATURE TRANSMISSIONS)	MS90301-3
HIGH TEMPERATURE SPLIT SYSTEM (CONSISTS OF TWO HIGH TEMPERATURE TRANSMISSIONS)	MS90301-4
MODERATE TEMPERATURE TRANSMISSION	MS90301-5
HIGH TEMPERATURE TRANSMISSION	MS90301-6
HYDRAULIC CONNECTOR (NOTE: EACH TRANSMISSION INCLUDES TWO OF THESE CONNECTORS)	MS90301-7
CONTROL	MS90301-8

## NOTES:

1. DIMENSION TOLERANCES: FRACTIONS  $\pm 1/16$ , DECIMALS  $\pm .03$  (2 PLACES) &  $\pm .010$  (3 PLACES), & ANGLES  $\pm 1^\circ$  UNLESS OTHERWISE SPECIFIED.
2. "DRIVE", WHEN USED HEREINAFTER, MEANS A TRANSMISSION.

## REQUIREMENTS:

1. EACH DRIVE SHALL BE EQUIPPED WITH AN INTERNAL OIL INLET FILTER. THE FILTER SHALL BE REMOVABLE WITHIN THE CLEARANCE PROVIDED ON PAGES 1 AND 2. SERVICE SHALL NOT BE REQUIRED MORE OFTEN THAN ONCE EVERY 200 HOURS. A BY-PASS INDICATOR SHALL BE PROVIDED WHICH WILL INDICATE WHEN THE PRESSURE DROP ACROSS THE FILTER IS APPROXIMATELY 50% OF THE BY-PASS VALVE SETTING.
2. THE DRIVE SHALL BE CAPABLE OF OPERATION FOR PERIODS OF UP TO 60 SECONDS WITH EXTERNALLY INTERRUPTED OIL.
3. THE DRIVE SHALL BE CAPABLE OF INTERMITTENT OVERLOAD OPERATION EVERY 100 HOURS PER 4.6.10
4. THE DRIVE SHALL INCORPORATE AN AUTOMATIC DECOUPLER COMPLETELY CONTAINED WITHIN THE DRIVE TO PROTECT THE AIRCRAFT AGAINST DAMAGE AS A RESULT OF TRANSMISSION OIL STARVATION OR OF EXCESSIVE TRANSMISSION TEMPERATURES. THE DECOUPLING DEVICE SHALL BE RESETTABLE WITHOUT REMOVAL OF THE DRIVE FROM THE ENGINE. A REPLACEABLE CARTRIDGE, CONTAINING A THERMALLY ACTUATED DEVICE DESIGNED TO ACTUATE AT  $182 \pm 8^\circ\text{C}$  SHALL BE USED. REPLACEMENT OF THE CARTRIDGE SHALL NOT REQUIRE REMOVAL OF THE DRIVE FROM THE ENGINE. THE POWER DISCONNECT MECHANISM SHALL AUTOMATICALLY REENGAGE AND THE DRIVE SHALL BE OPERABLE AFTER DISCONNECT DUE TO EXTERNAL OIL INTERRUPTION, WHEN THE DECOUPLING DEVICE IS RESET AND THE THERMAL CARTRIDGE REPLACED. OPERATION OF THIS DECOUPLER DURING ANY QUALIFICATION TEST OTHER THAN THAT PROVIDED BY 4.6.27A SHALL BE CAUSE FOR REJECTION.
5. DIFFERENTIAL PRESSURE ACROSS THE GENERATOR SHALL BE MAINTAINED AT  $50 \pm 5$  PSI AT INLET OIL TEMPERATURE OF  $37.8^\circ\text{C}$  TO  $94^\circ\text{C}$ . AN INTERNAL RELIEF VALVE MAY BE USED TO ACCOMPLISH THIS. TEMPERATURE INCREASE FROM CSD OIL INLET TO GENERATOR OIL INLET SHALL NOT EXCEED  $6^\circ\text{C}$ .
6. ALL ELECTRIC COMPONENTS OF THE DRIVE SYSTEM SHALL BE DESIGNED AND CONSTRUCTED SO AS NOT TO IGNITE ANY EXPLOSIVE MIXTURE SURROUNDING THE EQUIPMENT.
7. THE AUTOMATIC PARALLELING, REAL LOAD DIVISION, AND FINE FREQUENCY CONTROL BOX (HEREINAFTER REFERRED TO AS THE CONTROL) SHALL BE COMPLETELY STATIC.
8. DRIVES AND CONTROLS SHALL BE FINISHED IN A COLOR CONFORMING TO FED-STD-595, COLOR NUMBER 17875. THE FINISH SHALL BE UNAFFECTED BY ENVIRONMENTAL CONDITIONS SPECIFIED HEREIN.
9. ALL SECTIONS OF MIL-T-7101 PERTAIN WITH THE FOLLOWING EXCEPTIONS AND ADDITIONS:  
THE PARAGRAPH NUMBERS BELOW CORRESPOND TO THE AFFECTED PARAGRAPH IN THE SPECIFICATION UNLESS A SUFFIX "A" IS SHOWN IN WHICH CASE THE PARAGRAPH HAS BEEN ADDED. REQUIREMENTS FOR CONTROLS APPLY ONLY TO PARALLEL SYSTEMS.
  - 3.2.1 AND 3.2.2 DELETE AND ADD: "TEMPERATURE-ALTITUDE CONDITION - THE TEMPERATURE-ALTITUDE CONDITIONS UNDER WHICH THE DRIVE-GENERATOR PACKAGES AND THE CONTROL SHALL OPERATE ARE SHOWN BY FIGURES 1 AND 2 OF THE STANDARD."
  - 3.3.3.1 FLUIDS - DELETE "OF A NON-INFLAMMABLE TYPE".

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P.A. NAVY - AS Other Code	TITLE <b>TRANSMISSION, POWER, CONSTANT SPEED 30 KW F-4 AIRCRAFT</b>	MILITARY STANDARD <b>MS90301(AS)</b>
PROCUREMENT SPECIFICATION MIL-T-7101	SUPERSEDES MS25376	SHEET 4 OF 10

DD FORM 672-1 (Limited circulation)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

PLATE NO 22871

APPROVED 24 JUN 66 REVISED 66 FOR CHANGES SEE SHEETS 1 THRU 10

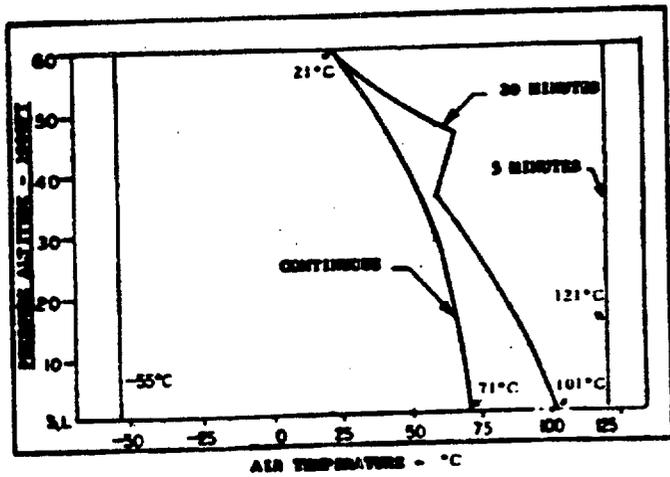
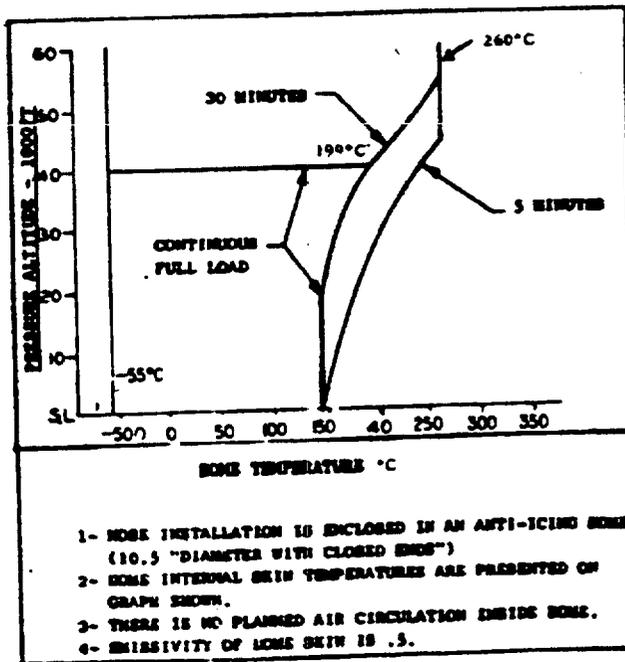


FIGURE 1. ENVIRONMENTAL TEMPERATURE FOR MODERATE TEMPERATURE TRANSMISSIONS AND FOR CONTROLS



- 1- HOSE INSTALLATION IS ENCLOSED IN AN ANTI-ICING BONE (10.5" DIAMETER WITH CLOSED ENDS)
- 2- BONE INTERNAL SKIN TEMPERATURES ARE PRESENTED ON GRAPH SHOWN.
- 3- THERE IS NO PLANNED AIR CIRCULATION INSIDE BONE.
- 4- SENSITIVITY OF BONE SKIN IS .5.

FIGURE 2. ENVIRONMENTAL TEMPERATURES FOR HIGH TEMPERATURE TRANSMISSIONS

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PROCUREMENT SPECIFICATION MIL-T-710:	SUPERSEDES MS25376	SHEET 5 OF 10

APPROVED 26 JUL 65 REVISED 6 FOR CHANGES SEE SHEETS 1 THRU 10

- 3.3.3.2 LUBRICANTS - CHANGE TO READ: "THE DRIVE OIL SYSTEM SHALL PROVIDE THE NECESSARY FLOW AND PRESSURE FOR THE LUBRICATION AND COOLING OF BOTH THE DRIVE AND AN MS90302 GENERATOR. THE FOLLOWING OIL SYSTEM LIMITING CONDITIONS SHALL APPLY: INLET OIL SUPPLY CONTAMINATION WITH PARTICLES AS LARGE AS 40 MICRONS, OIL INLET PRESSURE OF 4 INCHES OF MERCURY ABSOLUTE AT THE INLET FITTING OF THE TRANSMISSION FROM THE TANK; OIL SYSTEM BACK PRESSURE AT THE TRANSMISSION OIL OUTLET TO THE TANK AS HIGH AS 60 PSIG FOR NORMAL CONTINUOUS OPERATION; INTERMITTENT PRESSURES AT THE TRANSMISSION OIL OUTLET TO THE TANK AS HIGH AS 140 PSIG; INLET OIL AERATION UP TO 10% BY VOLUME; MAXIMUM TRANSMISSION RETURN OIL AERATION NOT TO EXCEED 25% BY VOLUME; MAXIMUM PERMISSIBLE INLET OIL FLOW TO THE TRANSMISSION OF 5 GPM (INCLUDING 10% AERATION); MAXIMUM TRANSMISSION RETURN OIL FLOW OF 5.6 GPM (INCLUDING UP TO 25% AERATION); INLET OIL TEMPERATURE FROM THE TANK MAXIMUM CONTINUOUS 121°C, 5 MINUTE INTERMITTENT OIL INLET TEMPERATURE TO 157°C; NO INLET OIL FLOW (UNDER NEGATIVE AND ZERO "C" CONDITIONS) FOR 60 SECONDS. PRESSURE OF THE OIL SUPPLIED TO THE GENERATOR SHALL NOT EXCEED 300 PSIG UNDER ANY OPERATING CONDITION."
- 3.3.8 LEAKAGE - ADD "ANY STATIC OR UNDER" AFTER "HOOR UNDER". ADD: "SHAFT SEALS SHALL BE REPLACEABLE IN THE FIELD WITHOUT MAJOR DISASSEMBLY."
- 3.3.10 DIRECTION OF ROTATION - CHANGE "CLOCKWISE" TO "COUNTER-CLOCKWISE".
- 3.3.11.1 OVERHEAT INDICATOR - DELETE.
- 3.3.12 REMOTE SPEED ADJUSTMENT - DELETE.
- 3.3.14 BLAST COOLING - DELETE.
- 3.3.17.1A UNDERSPEED DEVICE - THE TRANSMISSION SHALL INCLUDE AN UNDERSPEED SWITCH AND ACTUATING DEVICE WHICH WILL CLOSE THE SWITCH CONTACTS WHEN THE TRANSMISSION OUTPUT SPEED HAS INCREASED TO 7500 ± 100 RPM (375 ± 5 CPS) AT 93.3°C, AND WILL CLOSE THE SWITCH CONTACTS WHEN THE TRANSMISSION OUTPUT SPEED HAS INCREASED TO 7300 ± 200 RPM (365 ± 10 CPS) AT 121°C. THE CONTACTS WILL OPEN WHEN THE TRANSMISSION OUTPUT SPEED DECREASES TO 7200 ± 200 RPM (360 ± 10 CPS) AT 93.3°C AND 121°C, AND WILL REMAIN OPEN UNTIL TRANSMISSION OUTPUT SPEED IS AGAIN INCREASED TO 7500 ± 100 RPM AT 93.3°C OR 7300 ± 200 RPM AT 121°C. UNDER ALL CONDITIONS THE TRANSMISSION OUTPUT SPEED FOR SWITCH CLOSING SHALL BE GREATER THAN THE TRANSMISSION OUTPUT SPEED FOR SWITCH OPENING. THE SWITCH SHALL CONFORM TO MIL-8-6743 AND SHALL BE NORMALLY OPEN, SINGLE POLE, DOUBLE THROW, RATED AT 5 AMPERE DC MINIMUM CAPACITY.
- 3.3.18 PARALLEL OPERATION - ADD: THE CONTROL SHALL BE PROVIDED AS A REMOTELY LOCATED AIRFRAME MOUNTED ACCESSORY WITHOUT VIBRATION ISOLATORS. IN THE EVENT OF MALFUNCTION OF THIS CONTROL, THE TRANSMISSIONS SHALL NOT DEVIATE FROM THE STEADY-STATE VALUE BY MORE THAN ± 5%. WHEN THE CONTROL IS REMOVED, THE OUTPUT SPEED OF THE TRANSMISSIONS SHALL NOT DEVIATE FROM THE STEADY-STATE VALUE BY MORE THAN 1%.
- 3.6 SAFETY WIRE AND STAKING - ADD: ".020 LOCKWIRE CONFORMING TO MS20995 MAY BE USED WHERE .032 DIAMETER LOCKWIRE IS IMPRACTICABLE."
- 3.10.1 NAMEPLATE - CHANGE TO READ: "EACH DRIVE AND CONTROL NAMEPLATE SHALL BE IN ACCORDANCE WITH MIL-P-6906 AND SHALL CONTAIN THE FOLLOWING INFORMATION: FEDERAL STOCK NUMBER, SERIAL NUMBER, MANUFACTURER'S MODEL NUMBER, MANUFACTURER'S PART NUMBER, MANUFACTURER'S NAME (OR TRADEMARK, NO ADDRESS), ORDER OR CONTRACT NUMBER, ACCEPTANCE STAMP, DATE ACCEPTED, NOMENCLATURE, AND MODIFICATION."
- 3.11 INSTALLATION INSTRUCTIONS - CHANGE TO READ: "THE CONTRACTOR SHALL PACK WITH EACH TRANSMISSION A STATEMENT THAT INSTALLATION SHALL BE IN ACCORDANCE WITH THE APPROPRIATE AIRCRAFT MAINTENANCE INSTRUCTION AND IDENTIFY THIS PUBLICATION. THIS STATEMENT SHALL BE PRINTED ON 8-1/2 X 11 INCH DURABLE PAPER, AND CONTAINED IN AN ENVELOPE"
- 4.1 CLASSIFICATION - ADD: "INCLUDING THE CONTROL" AFTER "TRANSMISSION" IN THE FIRST SENTENCE.
- 4.1b INSPECTION TESTS - CHANGE "TRANSMISSIONS" TO "UNITS"
- 4.2.2 QUALIFICATION TESTS - DELETE SECOND SENTENCE AND ADD: "QUALIFICATION TESTS SHALL INCLUDE A 100-HOUR SERVICE TEST ON AN F-4B AND/OR F-4C AIRCRAFT. TWO OF THE QUALIFICATION TEST UNITS ARE TO BE SUBJECTED TO THE DECOUPLER TEST UPON COMPLETION OF ALL OTHER QUALIFICATION TESTS."
- 4.3.2 TESTS - CHANGE "OVER SPEED" TO READ "OUTPUT OVER-SPEED".
- 4.4 TEST CONDITIONS - ADD: "EACH TEST IN THIS SECTION SHALL BE MADE WITH THE DRIVE AND CONTROL PERFORMING TOGETHER. ALL QUALIFICATION TESTS ARE TO BE MADE WITH OIL DRAINED FROM A J79 ENGINE AFTER NO LESS THAN 15 HOURS OF ENGINE OPERATION AND MAINTAINED AT NO LESS THAN A 40 MICRON CONTAMINATION LEVEL THROUGHOUT THE TEST."
- 4.4.1 LOADING - CHANGE TO READ: "ALL TESTS ON THE DRIVE ARE TO BE CONDUCTED WHILE POWERING A GENERATOR SYSTEM CONFORMING TO MS90302. ALL LOAD FIGURES REFER TO LOADS MEASURED AT POINT OF GENERATOR REGULATION."
- 4.4.4 LOCATION OF LOAD - DELETE.
- 4.5.2 SPEED - ADD "OR IN FREQUENCY OF DRIVEN GENERATOR" AFTER "PER MINUTE".
- 4.6.2.1 HIGH TEMPERATURE - CHANGE TO READ: "THE TRANSMISSION SHALL BE SUBJECTED TO AN AMBIENT TEMPERATURE OF 121 ± 6°C FOR AT LEAST 12 HOURS BEFORE OPERATING. AT THE END OF THIS PERIOD, THE TRANSMISSION SHALL BE STARTED. THEN THE AMBIENT TEMPERATURE SHALL BE INCREASED TO 199 ± 6°C. THE TRANSMISSION SHALL THEN BE OPERATED AT 30 KW LOAD AT AVERAGE RATED INPUT SPEED FOR FIVE HOURS WITH AN OIL INLET TEMPERATURE TO THE DRIVE GENERATOR PACKAGE OF 121 ± 3°C. THE AMBIENT TEMPERATURE OF THE CONTROL DURING THIS TEST SHALL BE 71 ± 3°C."

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APPROVED 24 JUN 64 REVISED 6 FOR CHANGES SEE SHEETS 1 THRU 10.

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PROCUREMENT SPECIFICATION MIL-T-7101	SUPERSEDES MS25376	SHEET 6 OF 10

4.6.2.2 LOW TEMPERATURE - CHANGE TO READ "THE TRANSMISSION SYSTEM INCLUDING THE OIL RESERVOIR SHALL BE SUBJECTED TO AN AMBIENT TEMPERATURE OF  $-55^{\circ}\text{C} \pm 2^{\circ}\text{C}$  FOR 72 HOURS. WHILE AT  $-55^{\circ}\text{C}$ , THE DRIVE SYSTEM SHALL BE STARTED AND ACCELERATED TO 2400 RPM IN 30 SECONDS AND FROM 2400 TO 5100 RPM IN 5 SECONDS. OUTPUT SPEED OF  $8000 \pm 400$  RPM SHALL BE ATTAINED WITHIN FIVE SECONDS AFTER ATTAINING 5100 RPM INPLT SPEED. RATED OUTPUT SPEED OF  $5000 \pm 20$  RPM SHALL BE ATTAINED WITHIN 2 MINUTES AFTER ATTAINING 5100 RPM. STARTING TORQUE SHALL NOT EXCEED 200% OF FULL LOAD TORQUE DURING THIS TEST "

4.6.3 ENDURANCE - CHANGE TO READ: "THE INPUT SHAFT SPEED TO EACH TRANSMISSION AND THE TEMPERATURE OF THE OIL TO EACH TRANSMISSION/GENERATOR PACKAGE SHALL BE CYCLED SIMULTANEOUSLY AS SHOWN BY FIGURE 3 OF THE STANDARD, AND THIS TEMPERATURE/SPEED CYCLE SHALL BE PERFORMED FIVE TIMES DURING EACH LOAD CYCLE. THE AMBIENT TEMPERATURE FOR THE CONTROL SHALL BE  $71 \pm 3^{\circ}\text{C}$  THROUGHOUT THE TEST. DURING ENDURANCE TESTING A MAXIMUM OF TWO TRANSMISSION ADJUSTMENTS ARE PERMITTED. THE INTERVAL BETWEEN ADJUSTMENTS SHALL NOT BE LESS THAN 120 HOURS. BASIC GOVERNOR FREQUENCY DRIFT SHALL NOT EXCEED  $\pm 2$  CPS DURING ANY 120-HOUR PERIOD. TRANSMISSIONS OF PARALLEL SYSTEMS SHALL BE TESTED IN PARALLEL FOR 25 TWENTY-HOUR LOAD CYCLES. LOAD APPLIED TO THE SYSTEM SHALL BE CYCLED AS SHOWN IN TABLE I OF THE STANDARD. SPLIT SYSTEMS SHALL BE TESTED FOR 25 TWENTY-HOUR LOAD CYCLES. LOAD APPLIED TO EACH TRANSMISSION SHALL BE CYCLED AS SHOWN IN TABLE II OF THE STANDARD. TRANSMISSIONS WHICH MEET THE ENDURANCE REQUIREMENTS OF TABLE I OF THE STANDARD ARE CONSIDERED TO HAVE MET THE ENDURANCE REQUIREMENTS OF TABLE II OF THE STANDARD. THE REVERSE IS NOT APPLICABLE.

TABLE I. LOAD CYCLES FOR ENDURANCE TEST

HOUR	LOAD(KW)	HOUR	LOAD(KW)	HOUR	LOAD(KW)	HOUR	LOAD(KW)
1	16.5	6	25.7	11	16.5	16	55
2	16.5	7	42.2	12	55	17	42.2
3	25.7	8	55	13	25.7	18	42.2
4	55	9	42.2	14	25.7	19	25.7
5	25.7	10	42.2	15	9.2	20	55

AT THE END OF EACH LOAD CYCLE EACH TRANSMISSION SHALL BE STOPPED AND STARTED 8 TIMES WHILE THE SYSTEM IS SUPPLYING 30 KW. AT LEAST ONE OF THESE 8 STARTS SHALL BE DELAYED LONG ENOUGH FOR THE INPUT OIL TO COOL TO  $33^{\circ}\text{C}$ . THE UNDERSPEED SWITCH SHALL APPLY AND REMOVE THE LOAD.

TABLE II. LOAD CYCLES FOR ENDURANCE TEST

HOUR	LOAD(KW)	HOUR	LOAD(KW)	HOUR	LOAD(KW)	HOUR	LOAD(KW)
1	9	6	14	11	9	16	30
2	9	7	22.5	12	30	17	22.5
3	14	8	30	13	14.2	18	22.5
4	30	9	22.5	14	14.2	19	14
5	14	10	22.5	15	5	20	30

AT THE END OF EACH LOAD CYCLE THE TRANSMISSION SHALL BE STOPPED AND STARTED 3 TIMES WHILE THE TRANSMISSION IS SUPPLYING 30 KW. AT LEAST ONE OF THESE STARTS SHALL BE DELAYED LONG ENOUGH FOR INPUT OIL TO COOL TO  $33^{\circ}\text{C}$ . THE UNDERSPEED SWITCH SHALL APPLY AND REMOVE THE LOAD.

4.6.3.1A OIL INLET TEMPERATURE - THE OIL INLET TEMPERATURE SHALL BE CYCLED IN ACCORDANCE WITH FIGURE 3 OF THIS STANDARD.

4.6.3.2A OIL INLET-OUTLET CONDITIONS - THE OIL INLET PRESSURE SHALL BE MAINTAINED AT A MAXIMUM OF 6 PSIA WITH A 2-MINUTE ALLOWANCE TO OBTAIN THIS PRESSURE FROM SEA LEVEL AMBIENT DURING START-UP.

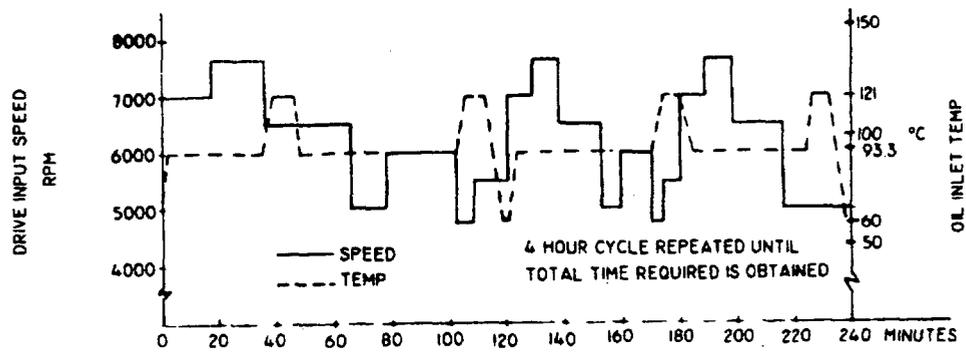


FIGURE 3. SPEED AND OIL TEMPERATURE CYCLES FOR ENDURANCE TEST

THE OUTLET OIL RETURN TO EACH TANK SHALL BE MAINTAINED AT 50 PSIA (MINIMUM). THE INLET OIL TO EACH DRIVE SHALL CONTAIN A MINIMUM OF 10 PERCENT BY VOLUME OF ENTRAINED AIR. THE PERCENT AERATION SHALL BE CHECKED AT THE COMPLETION OF EACH 20-HOUR CYCLE. THE OUTLET LINE SHALL CONTAIN A 40 MICRON NOMINAL, 70 MICRON ABSOLUTE FILTER.

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- 4.6.3.3A OIL -
  - (a) USE ENGINE OIL WHICH HAS A MINIMUM OF 15 HOURS RUNNING TIME IN AN AIRCRAFT ENGINE.
  - (b) THREE OIL CHANGES PER TANK DURING TEST AT EQUAL INTERVALS (OIL ADDED TO BE SAME AS (a) ABOVE). FILTERS MAY BE CLEANED AT OIL CHANGES.
  - (c) THE OIL SHALL BE AGITATED BEFORE IT IS PUT INTO THE SYSTEM AND SHALL BE FILTERED ONCE THROUGH A 40 MICRON NOMINAL FILTER TYPICAL OF THE FILTERS NOW USED ON J79 OIL SYSTEM.
- 4.6.3.4A STARVATION TEST - STARVATION TEST IS TO BE PERFORMED ON ONE DRIVE BY VENTING THE INLET OF THE DRIVE TO THE PRESSURIZATION AIR AT THE TOP OF THE TANK FOR 30 SECONDS TEN TIMES (EQUALLY SPACED) DURING THE TEST. THE DRIVE SHALL PERFORM WITHIN ALL SPECIFICATION LIMITS.
- 4.6.3.5A CONTINUOUS OVERLOAD - AT THE CONCLUSION OF THE 25 TWENTY-HOUR LOAD CYCLES, EACH DRIVE SHALL BE SUBJECTED TO 50 ONE-HOUR LOAD APPLICATIONS OF 38 KW. INLET OIL TEMPERATURE SHALL BE MAINTAINED AT  $121 \pm 6^\circ\text{C}$ , AND THE INPUT SPEED VARIED BETWEEN 5000 AND 7650 RPM. A STABILIZATION PERIOD WITH 5 KW LOAD APPLIED MAY BE USED BETWEEN EACH TWO CONSECUTIVE 1-HOUR 38-KW APPLICATIONS. MAXIMUM STABILIZATION PERIOD SHALL BE 5 MINUTES.
- 4.6.4.1 UNDERSPEED OPERATION - DELETE.
- 4.6.8 OVERSPEED - CHANGE TITLE TO READ: "INPUT OVERSPEED". ADD AFTER LAST SENTENCE: "INPUT OVERSPEED CONDITION IS DEFINED AS 8370 RPM INPUT WITH MAXIMUM OUTPUT OF 8400 RPM".
- 4.6.8.1A OUTPUT OVERSPEED - THE TRANSMISSION OUTPUT SPEED SHALL BE INCREASED TO BETWEEN 9500 AND 10,000 RPM BY SUITABLE MEANS. THE OVERSPEED DEVICE SHALL LIMIT THE TRANSMISSION OUTPUT SPEED FROM EXCEEDING 10,000 RPM, AND SHALL ACTUATE THE UNDERSPEED SWITCH TO OPEN ITS CONTACTS WHICH ARE TO REMAIN OPEN UNTIL THE TRANSMISSION IS SHUT DOWN. RESET SHALL BE AUTOMATIC.
- 4.6.9 EFFICIENCY - REPLACE THE TEXT WITH: "THE HEAT LOSS OF THE TRANSMISSION AT RATED LOAD IN THE RATED SPEED RANGE SHALL NOT EXCEED THE AMOUNT SHOWN ON FIGURE 4 OF THE STANDARD, AND THE EFFICIENCY OF THE TRANSMISSION AT RATED LOAD IN THE OVERSPEED RANGE SHALL BE AT LEAST THE VALUE LISTED ON THE STANDARD".
- 4.6.11 SPEED REGULATION - DELETE ALL REFERENCE TO "NO LOAD" IN THIS PARAGRAPH AND SUBSTITUTE "4 HORSEPOWER".
- 4.6.11.b SPEED REGULATION AT  $-55^\circ\text{C}$  - CHANGE FIRST SENTENCE TO READ: "REPEAT PARTS 1 THROUGH 6 UNDER (a) ABOVE WITH TEMPERATURE OF OIL INTO THE TRANSMISSION AT START-UP ONLY AND AMBIENT TEMPERATURE OF CONTROL OF  $-55^\circ\text{C}$ ". ADD "AND CONTROL" AFTER "TRANSMISSION" IN SECOND SENTENCE.
- 4.6.11.c CHANGE TO READ: "SPEED REGULATION AT  $199 \pm 6^\circ\text{C}$ . --REPEAT PARTS 1 THROUGH 6 UNDER (a) ABOVE WITH TEMPERATURE OF OIL INTO THE DRIVE AT  $121 \pm 3^\circ\text{C}$ , WITH TRANSMISSION AT AN AMBIENT OF  $199 \pm 6^\circ\text{C}$ , AND CONTROL AT AN AMBIENT OF  $72 \pm 3^\circ\text{C}$ ."
- 4.6.11.dA SPEED REGULATION AT  $157 \pm 3^\circ\text{C}$  - REPEAT PARTS 1 THROUGH 6 UNDER (a) ABOVE WITH TEMPERATURE OF OIL INTO DRIVE AT  $157 \pm 3^\circ\text{C}$  WITH TRANSMISSION AT AN AMBIENT TEMPERATURE OF  $199 \pm 3^\circ\text{C}$  AND CONTROL AT  $71 \pm 3^\circ\text{C}$ .
- 4.6.12 FACTORS AFFECTING OUTPUT SPEED - DELETE.
- 4.6.13 STABILITY - CHANGE TO READ "TESTS SHALL BE CONDUCTED USING A GENERATING SYSTEM CONFORMING TO MS90302."
- 4.6.13.2 LOAD STABILITY - CHANGE " $\pm 4\%$ " TO " $\pm 5\%$ ".

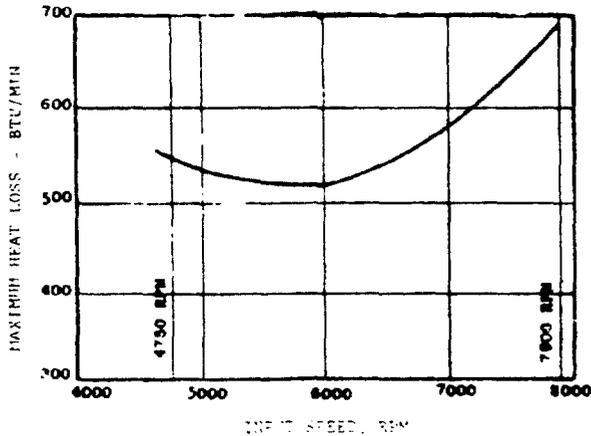


FIGURE 4. MAXIMUM HEAT LOSS AT RATED LOAD

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4.6.14 PARALLEL OPERATION - CHANGE TO READ: "THESE TRANSMISSIONS SHALL BE CAPABLE OF OPERATING AN MS90302 AIRCRAFT GENERATING SYSTEM IN PARALLEL. WHEN PARALLEL OPERATION IS SPECIFIED, A CONTROL WILL BE INCLUDED AS PART OF THE SYSTEM, AND A COMPONENT RESPONSE TEST SHALL BE CONDUCTED DURING ACCEPTANCE TESTING OF EACH TRANSMISSION AND CONTROL TO ASSURE PARALLELING CAPABILITY. THE FOLLOWING SHALL BE DEMONSTRATED DURING QUALIFICATION TESTING."

4.6.14.2a DELETE "NO LOAD" AND SUBSTITUTE "4 HORSEPOWER".

4.6.14.2b THE LIMITS FOR LOAD DIVISION DURING THIS TEST SHALL BE 3 KW UNDER STEADY-STATE AND 13.5 KW UNDER TRANSIENT CONDITIONS WITH A RETURN TO 3 KW WITHIN 2 SECONDS.

4.6.16.1 LINEAR - AFTER THE WORD "TRANSMISSION" ADD "AND CONTROL". AFTER THE LAST SENTENCE ADD: "THE DRIVE AND CONTROL SHALL NOT FAIL WHEN SUBJECT TO LOADS EQUIVALENT TO 15 GRAVITATIONAL UNITS IN THE DIRECTIONS SPECIFIED ABOVE".

4.6.17 SHOCK - FIRST SENTENCE, AFTER WORD "TRANSMISSION" ADD "WITH AN MS90302 GENERATOR ATTACHED". DELETE THE LAST SENTENCE AND ADD: "THE CONTROL SHALL BE SUBJECTED TO 40 g IN EACH OF THE THREE MAJOR AXES AND ALL COMPONENTS SHALL REMAIN CAPTIVE."

4.6.18.1a VIBRATION TEST OF THE TRANSMISSIONS - THE TRANSMISSION SHALL BE OPERATED AT AVERAGE RATED INPUT SPEED AND RATED OUTPUT SPEED WITH THE TEST SPECIMEN MOUNTED ON A SUITABLE VIBRATION APPARATUS CAPABLE OF SUBJECTING THE TEST SPECIMEN TO SIMPLE HARMONIC OR CIRCULAR MOTION THROUGHOUT THE FREQUENCY RANGE. WHENEVER PRACTICABLE, THE FUNCTIONING OF THE TEST SPECIMEN SHALL BE CHECKED CONCURRENTLY WITH THE OPERATION OF SCANNING THE FREQUENCY FOR RESONANT FREQUENCIES. THE TEST SPECIMEN SHALL BE MOUNTED IN A POSITION DYNAMICALLY SIMILAR TO MOST SEVERE MOUNTING LIKELY TO BE ENCOUNTERED IN SERVICE. THE FREQUENCY OF VIBRATION SHALL BE VARIED FROM 5 TO 500 CPS AND SHALL BE APPLIED ALONG THREE MUTUALLY PERPENDICULAR AXES OF THE UNIT. THE DOUBLE VIBRATION AMPLITUDE SHALL BE 0.10 INCH FOR FREQUENCIES UP TO 55 CPS AND ADJUSTED TO LIMIT THE VIBRATORY ACCELERATION TO 15 g FROM 55 CPS TO 500 CPS. THE FREQUENCY SHALL BE VARIED IN STEPS OF APPROXIMATELY 10 CPS AND HELD FOR 5 MINUTES AT EACH STEP. RESONANT FREQUENCIES SHALL BE DETERMINED BY VARYING THE FREQUENCY OF THE APPLIED VIBRATION THROUGHOUT THE FREQUENCY RANGE AT THE AMPLITUDES SPECIFIED ABOVE, EXCEPT THAT IN THE FREQUENCY RANGE OF 55-58.3 CPS (3300-3500 ENGINE RPM), THE VIBRATION ACCELERATION SHALL BE LIMITED TO 15 g MEASURED AT THE FREE END OF THE GENERATOR. WHEN A RESONANT FREQUENCY IS ENCOUNTERED, THE TRANSMISSION AND GENERATOR SHALL BE VIBRATED SUCCESSIVELY ALONG THREE MUTUALLY PERPENDICULAR AXES FOR 5 HOURS. WHEN MORE THAN ONE RESONANT FREQUENCY IS ENCOUNTERED WITH VIBRATION APPLIED TO ANY ONE AXIS OR WITH CIRCULAR MOTION IN ANY ONE PLANE, THE TEST PERIOD SHALL BE CARRIED OUT AT THE MOST SEVERE RESONANCE OR THE PERIOD DIVIDED AMONG THE RESONANT FREQUENCIES, WHICHEVER IS CONSIDERED THE MOST LIKELY TO PRODUCE FAILURE. DAMAGE OR FAILURE OF ANY COMPONENT OF THE TRANSMISSION AND GENERATOR THAT WILL IMPAIR PROPER FUNCTIONING OR REDUCE THE SPECIFIED LIFE OF THE TRANSMISSION AND GENERATOR SHALL BE CAUSE FOR REJECTION.

4.6.18.2a VIBRATION TEST OF THE CONTROL - THE CONTROL SHALL BE MOUNTED ON THE VIBRATION TABLE. THE MOUNTING SHALL SIMULATE SERVICE INSTALLATION, INCLUDING ALL VIBRATION MOUNTS AND OTHER HOLDING DEVICES, IF ANY, PLUS ALL ELECTRIC CABLES AND ANY OTHER CONNECTIONS NECESSARY FOR PROPER OPERATION. THE PROCEDURE SHALL THEN BE AS FOLLOWS:

- (1) WITH THE CONTROL OPERATING, THE TABLE SHALL BE VIBRATED IN A HORIZONTAL DIRECTION WITH THE FREQUENCY VARIED BETWEEN 5 AND 500 CPS. AT FREQUENCIES OF FROM 5 TO 12.9 CPS THE DOUBLE AMPLITUDE SHALL BE .350 INCH. FROM A FREQUENCY OF FROM 12.9 TO 24.2 CPS THE AMPLITUDE SHALL BE ADJUSTED SO THAT THE UNIT IS NOT SUBJECTED TO MORE THAN A 3 g ACCELERATION. FOR FREQUENCIES OF 24.2 TO 45.2 CPS THE DOUBLE AMPLITUDE OF VIBRATION SHALL BE .100 INCH AND FROM 45.2 TO 500 CPS THE VIBRATORY ACCELERATION SHALL NOT EXCEED 10 g. THE VARIATION IN FREQUENCY MAY BE CONTINUOUS OR IN STEPS; HOWEVER, THE CYCLE FROM 5 TO 500 CPS AND RETURN TO 5 CPS SHALL BE ACCOMPLISHED IN APPROXIMATELY 15 MINUTES. THIS TEST SHALL CONTINUE FOR 180 MINUTES AND DURING THIS TIME THE FREQUENCY OF ANY AND ALL RESONANT POINTS (NATURAL PERIODS) SHALL BE NOTED. THE CONTROL SHALL OPERATE SATISFACTORILY THROUGHOUT THE TEST.
- (2) THE CONTROL SHALL BE VIBRATED FOR 15 MINUTES AT EACH OF THE RESONANT FREQUENCIES NOTED IN STEP 1 AT THE CORRESPONDING DOUBLE AMPLITUDE. THE CONTROL SHALL OPERATE SATISFACTORILY THROUGHOUT THE TEST.
- (3) STEPS 1 AND 2 SHALL BE REPEATED WITH THE DIRECTION OF VIBRATION CHANGED TO 90 DEGREES HORIZONTAL.
- (4) STEPS 1 AND 2 SHALL BE REPEATED WITH THE DIRECTION OF VIBRATION CHANGED TO VERTICAL.
- (5) THE CONTROL SHALL BE REMOVED FROM THE TABLE AND VISUALLY INSPECTED FOR ANY MECHANICAL FAILURE.

4.6.19 AUDIO NOISE - ADD: "THE ACCOUSTICAL NOISE LEVEL SHALL NOT BE RAISED MORE THAN 5db UNDER ANY CONDITIONS DESCRIBED ON THE STANDARD."

4.6.20 ALTITUDE PERFORMANCE - DELETE ALL AFTER "TESTED" IN LINE 2 AND ADD "IN ACCORDANCE WITH PROCEDURE III OF MIL-E-5172." ADD: "THE TRANSMISSION AND A GENERATOR CONFORMING TO MS90302 SHALL BE PLACED IN AN ENCLOSURE TO SIMULATE CONDITIONS OF FIGURE 1 OR 2, AS APPLICABLE, AND OPERATED WITH THE CONTROL REMOTELY LOCATED. WHERE ENGINE RESERVOIR OIL IS USED FOR LUBRICATION AND/OR COOLING, THE TRANSMISSION SHALL BE TESTED WITH INLET OIL PRESSURE OF 14.5 ± 1 INCHES HG ABSOLUTE AND OUTPUT BACK PRESSURE OF 35 ± 4 PSI, AND THESE CONDITIONS MAINTAINED DURING THE TESTS. THE TRANSMISSION AND GENERATOR SYSTEM SHALL BE OPERATED WITH 30 KW GENERATOR OUTPUT LOAD FOR 8 HOURS UNDER SIMULATED FLIGHT CONDITIONS AT 40,000 FEET ALTITUDE WITH AN AMBIENT TEMPERATURE OF 193 ± 6°C FOR MODERATE TEMPERATURE TRANSMISSIONS AND FOR 30 MINUTES UNDER SIMULATED FLIGHT CONDITIONS AT 60,000 FEET ALTITUDE WITH AN ENCLOSURE SKIN TEMPERATURE OF 260 ± 6°C FOR HIGH TEMPERATURE TRANSMISSIONS. TEMPERATURE OF OIL TO THE DRIVE IS TO BE 121 ± 3°C, AND THE AMBIENT TEMPERATURE OF THE CONTROL IS TO BE MAINTAINED AS INDICATED IN FIGURE 1 OF THE STANDARD. FAILURE OF THE TRANSMISSION TO FUNCTION PROPERLY UNDER THESE CONDITIONS IS CAUSE FOR REJECTION."

APPROVED 24 JUN 66 REVISED 6 FOR CHANGES SEE SHEETS 1 THRU 10.

This military standard is approved by NAVAL AIR SYSTEMS COMMAND, Department of the Navy and should be used by that activity. All other military activities are reminded to employ this standard where suitable.

P.A. NAVY - AS	TITLE	MILITARY STANDARD
Other Code	TRANSMISSION, POWER, CONSTANT SPEED 30 KW F-4 AIRCRAFT	MS90301 (AS)
PROCUREMENT SPECIFICATION MIL-T-7101	SUPERSEDES MS25376	SHEET 9 OF 10

- 4.6.20.1A LOW OIL PRESSURE TEST AT ALTITUDE - DURING EACH ALTITUDE TEST AND WITH A GENERATOR OUTPUT LOAD OF 30 KW, THE TRANSMISSION INLET OIL SUPPLY SHALL BE INTERRUPTED FOR 60 SECONDS. THE TRANSMISSION SHALL DEMONSTRATE ITS ABILITY TO OPERATE SUCCESSFULLY WITH NO IMPAIRMENT TO SUBSEQUENT OPERATION.
- 4.6.22 HUMIDITY - CHANGE TO READ: "PER MIL-E-5272, PROCEDURE I, EXCEPT THAT THE TEST SHALL BE LIMITED TO 8 CYCLES." (SEE 4.6.26A)
- 4.6.23 SALT SPRAY - CHANGE TO READ: "PER MIL-E-5272, PROCEDURE I (SEE 4.6.26A)."
- 4.6.24 SAND RESISTANCE - CHANGE TO READ: "PER MIL-E-5272, PROCEDURE I, FOR THE CONTROL AND PROCEDURE II FOR THE TRANSMISSION." (SEE 4.6.26A)
- 4.6.25 FUNGUS - CHANGE TO READ: "PER MIL-E-5272, PROCEDURE I." (SEE 4.6.26A)
- 4.6.26A POST ENVIRONMENTAL TESTS - AT THE CONCLUSION OF THE TESTS OF 4.6.22, 4.6.23, 4.6.24, AND 4.6.25, THE TRANSMISSION WITH AN MS90302 GENERATOR AND THE CONTROL SHALL BE OPERATED 10 HOURS WITH 15 KW GENERATOR OUTPUT LOAD.
- 4.6.27A DECOUPLER TEST - AT THE CONCLUSION OF ALL OTHER QUALIFICATION TESTS, ONE OF THE QUALIFICATION SAMPLE UNITS SHALL BE OPERATED AT MAXIMUM INPUT RPM, THE OTHER SAMPLE UNIT AT MINIMUM INPUT RPM, WITH INPUT OIL TEMPERATURE OF  $121 \pm 3^\circ\text{C}$ , AND WITH THE GENERATOR LOADED TO 30 KW. THE UNIT SHALL OPERATE FOR 30 MINUTES. THE INPUT LINE SHALL THEN BE OPENED TO THE ATMOSPHERE AND OIL FLOW TO THE DRIVE STOPPED. THE DRIVE SHALL DECOUPLE FROM ITS PRIME MOVER PRIOR TO ANY EXTERNAL MECHANICAL DAMAGE TO THE DRIVE-GENERATOR PACKAGE, ANY EXTERNAL SURFACE REACHING THE FLASH POINT OF MIL-L-7808 OR MIL-L-23699 OIL, OR ANY INDICATION OF CHARRING.

TABLE I (MIL-T-7101) - CONTINUOUS OPERATION TEST SCHEDULE - CHANGE AS FOLLOWS:

- (1) TABLE - CHANGE NUMBER "(9)" TO LETTER "(g)" IN PART B TEST IN TABLE.
- (2) NOTE (b) - ADD AT END "WITH INLET OIL TEMPERATURE AT  $121 \pm 3^\circ\text{C}$ ."  
(d)(1) - CHANGE "NO LOADS" TO READ "4 HP LOAD".  
(d)(3) - DELETE "INPUT SPEEDS BELOW" IN FIRST LINE.
- (3) NOTE (h) - DELETE "FOR INPUT SPEEDS BELOW" IN SECOND LINE.  
(h) - CHANGE "NO LOAD" TO READ "4 HP LOAD".
- (4) NOTE (i) - CHANGE "NO LOAD" TO READ "4 HP LOAD".
- 6.1 WEIGHTS AND DIMENSIONS - DELETE.

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APPROVED 14 JUN 64 REVISED 64 FOR CHANGES SEE SHEETS 1 THRU 10.

P.A. NAVY - AS Other Code	TITLE <b>TRANSMISSION, POWER, CONSTANT SPEED 30 KW F-4 AIRCRAFT</b>	<b>MILITARY STANDARD MS90301(AS)</b>
PROUREMENT SPECIFICATION MIL-T-7101	SUPERSEDES MS25376	SHEET 10 OF 10