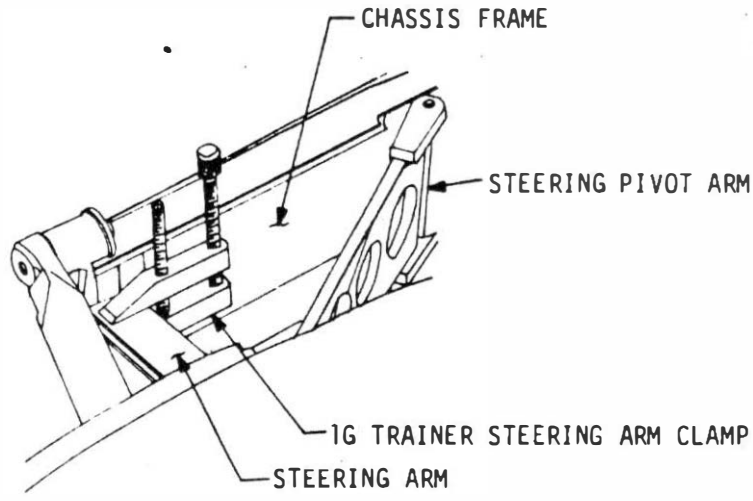

VIEW A-A

TYPICAL FOR BOTH STEERING ARMS
FORWARD AND REAR

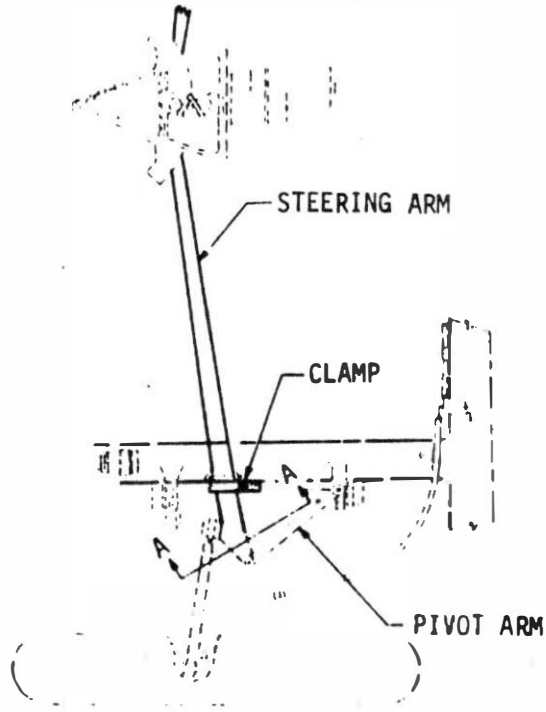

FIGURE 8-11 1G TRAINER STEERING ARM CLAMPING
TO SIMULATE STEERING DECOUPLING

8.2.8.3 Battery Change-Out

Changeout of 1G Trainer batteries can occur in two different operational conditions: (1) when the navigation system is to remain on during changeout, and (2) when the navigation system may be off during changeout. The following procedures define both cases.

a. When the navigation system is to remain on:

1) DRIVE POWER Switches (4) - OFF.
2) STEERING Switches (2) - OFF.
3) ± 15VDC Switch - OFF.

NOTE

1G Trainer Battery #1 is on the right side, Battery #2 on the left side.

4) If changing out Battery #1, open BAT 1 BUS A and BAT 1 BUS B circuit breakers. Do not open the BAT 2 circuit breaker or navigation power will be lost.

5) If changing out Battery #2, open BAT 2 BUS C and BAT 2 BUS D circuit breakers. Do not open the BAT 1 circuit breakers or navigation power will be lost.

6) Place power selector switch (figure 8-12) for the battery to be changed out in the OFF position. Do not operate the selector switch for the other battery.

7) Disconnect the battery connector from the battery to be changed out (figure 8-12).

8) Remove the four screws from the battery mounting bracket.

9) Lift the battery clear of the 1G Trainer using the handles at either end of the battery.

10) Obtain recharged replacement battery.

11) Set the replacement battery in place with the connector inboard and the holes in the mounting brackets aligned with the screw receptacles in the 1G Trainer.

12) Install the four screws, securing the battery to the 1G Trainer.

13) Connect the battery connector to the battery.

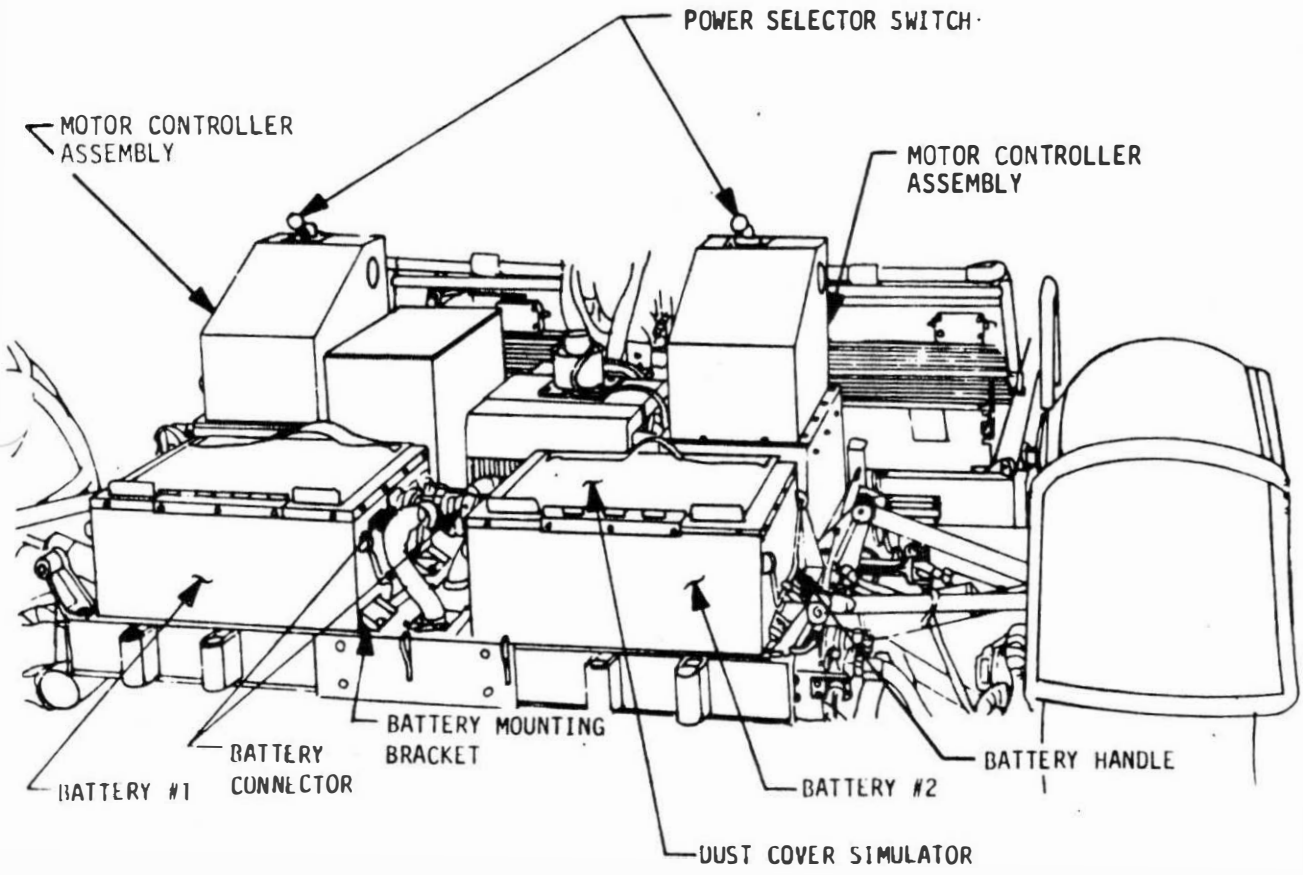

FIGURE 8-12 1G TRAINER BATTERY INSTALLATION

8.2.8.3 (Continued)

14) Place the power selector switch in the BATTERY position.

15) If Battery #1 was changed out close BAT 1 BUS A and BAT 1 BUS B circuit breakers on the control and display console.

16) If Battery #2 was changed out, close BAT 2 BUS C and BAT 2 BUS D circuit breakers on the control and display console.

17) Repeat steps 4 through 16 for the other battery.

b. When the navigation system may be off:

1) DRIVE POWER Switches - OFF.
2) STEERING Switches - OFF.
3) + 15 VDC Switch - OFF.
4) Circuit Breakers BAT 1 BUS A, BAT 1 BUS B, BAT 2 BUS C, BAT 2 BUS D - Open.
5) Place power selector switches in OFF position.
6) Perform step a7 through a14 for both batteries.
7) Close BAT 1 BUS A, BAT 1 BUS B, BAT 2 BUS C, BAT 2 BUS D Circuit Breakers.

c. If required to perform dust cover simulation, remove dust covers from one set of batteries and install on replaced batteries.

8.2.8.4 Battery Recharging

Each battery will be discharged to a condition below 29 volts when seven amps current exists.

a. Remove closure cover and all plastic fill caps.

b. Verify presence of low-pressure relief vent screw in each fill-cap.

c. Connect a charging circuit equivalent to Figure 8-13.

d. Set power supply current limiter to provide 14 amps.

e. Energize the power supply and adjust voltage to provide 14 amps out of the supply.

f. Maintain condition specified in "e" for a period of 2 hours. Adjust voltage as required for constant current charging.

g. Set power supply to provide +45.5 $\pm$ 0.2 vdc and maintain the current limiter setting of 14 amps.

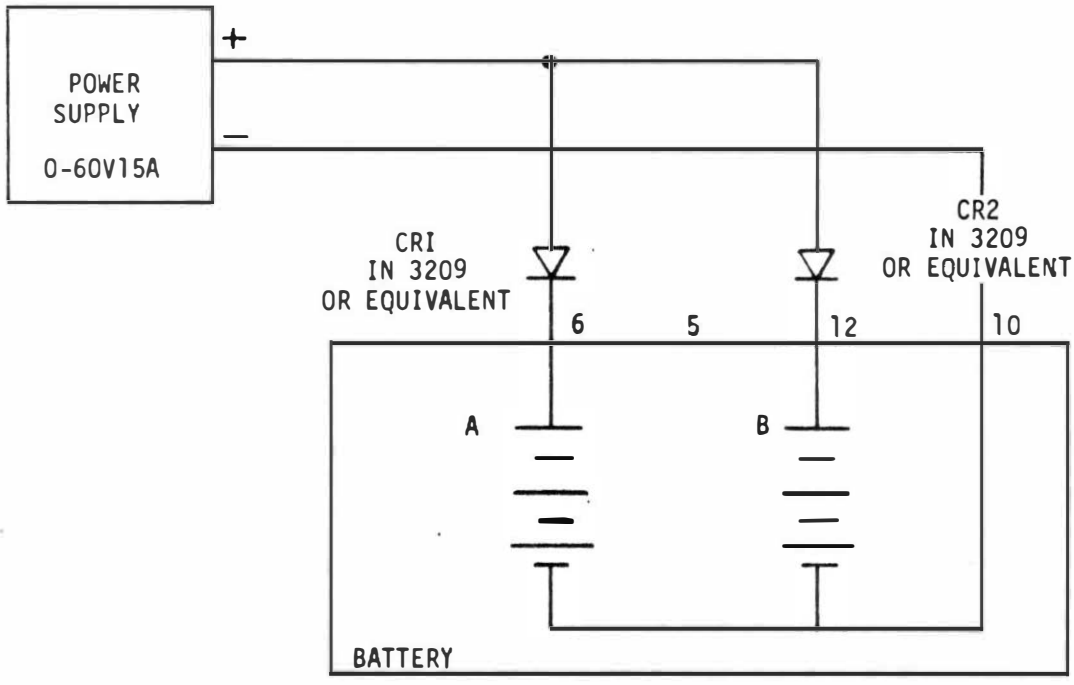

FIGURE 8-13 1G TRAINER BATTERY CHARGING CIRCUIT

8.2.8.4 (Continued)

h. Allow batteries to charge for 4 hours or until the current flow is less than 2.0 amps.

i. Remove the charging circuit from the battery.

j. Using the VOM, measure the open-circuit voltage. Voltage should be greater than +35 VDC.

k. Check and verify that the level of electrolyte in each cell is visible at the bottom of the funnel-shaped inner chamber.

l. Using a syringe, carefully add distilled water to each cell if necessary to bring electrolyte to the proper level.

m. After charging, the batteries shall be carefully rinsed with distilled water.

n. After rinsing, the batteries shall be dried.

o. Remove batteries from setup, install closure cover, and secure from test.

8.2.8.5 Precautions for Handling Batteries and Electrolyte

The electrolyte (KOH) is alkaline and corrosive. It should be handled with care, since it will cause serious burns if allowed to contact eyes or skin.

At stations where handling is done, a supply of boric acid, for eye-burns, and a solution of weak acid (5% acetic acid) for skin burns should be maintained.

Persons who work with batteries should wash their hands thoroughly after handling them.

Persons who fill batteries or otherwise handle electrolyte should wear alkali-proof aprons, gloves, and a face mask.

KOH can cause ignition between points of sufficiently high potential difference. Fire extinguishers should be available during battery operation and servicing.

Batteries should not be lifted by one man.

8.3 PREVENTIVE MAINTENANCE ASSEMBLY REMOVE AND REPLACE PROCEDURES

8.3.1 Removal and Replacement of the "Hand Controller"

CAUTION

During this operation do not put tape of any kind on the electrical cables. The tape will remove the silver from the protective cable cover.

Removal is accomplished in the following manner:

a. Cut brake release cable (the small cable that extends rearward from the hand controller mount).

b. Detach electrical cables from Display and Control Console. Cut cable ties as required.

c. Remove brake cables.

d. Remove the display console from its base. Remove the console base by removing the two "T" pivot handle pins and the two clevis pins at the rear of the console base.

e. Uncouple the electrical connections at the base of the hand controller.

f. Remove the four side plate mounting screws.

g. Remove the four screws from the base of the hand controller.

8.3.2 Suspension/Traction Drive - Removal and Installation Procedure

a. Remove weight from wheel by suspending vehicle at lift points, after measuring ground clearance.

b. Remove wheel disconnect simulator.

c. Remove wheel and fender.

d. Disconnect steering tie rod at steering hinge.

e. Disconnect traction drive cables.

f. Disconnect brake hoses, if traction drive is to be moved from area.

8.3.2 (Continued)

g. Loosen torsion bar adjustment screw - one only.

h. Remove torsion bar cover screws/cover at outboard suspension bracket.

i. Remove torsion bar.

NOTE: Torsion bars are not completely interchangeable (cross corners only) and each should be marked with respect to suspension fitting to assure the same ground clearance upon re-assembly.

j. Remove top and bottom king pin screws and flat washers.

k. Remove traction drive.

l. Remove shock absorber. (May be removed without prior steps if shock absorber is only service item.)

m. Remove upper suspension attachment hardware at suspension mounting brackets.

n. Remove outboard suspension brackets. Also remove inboard suspension bracket if service is required.

o. Remove suspension arms.

p. Remove suspension to king pin links (both arms), if service of parts required.

q. To remove inboard torsion bar brackets (with adjustable retainer), remove frame mounting screws and remove from the bottom. Adjustable retainer may be removed by disassembling the torsion bar bracket.

NOTE: Torsion bar brackets are line bored with suspension brackets and are not interchangeable.

r. The fixed torsion bar retainer may be replaced in the lower suspension by pressing out dowel pins in the flange and unscrewing fitting.

NOTE: Fixed retainers are drilled on assembly and are not interchangeable.

8.3.2 (Continued)

Inspect all parts for wear or damage. To reassemble, reverse above procedure. Also:

s. Drill link pins on assembly if replaced.

t. Tighten only the torsion bar adjustment screw that was loosened in step 8.3.2q.

u. Realign wheels if new traction drive or steering linkage installed.

v. Bleed brakes if lines have been opened.

w. Verify proper ground clearance as recorded during disassembly.

8.3.3 Drive Power - Removal and Installation Procedure

a. Remove batteries (see Section 8.2.8.3).

b. Loosen set screw in off-on charge switch handle and remove.

c. Remove all cover screws and hold down screws on filter cover and controller assembly.

d. Disconnect wires (4) from top of filters.

e. Disconnect wires (5) from rear of switch assembly which come from controller below.

f. Tip filter and switch to one side and disconnect wires (4) from lower side of filters.

g. Remove switch and filter assembly, allowing disconnected wires to flow through holes in lower switch and filter plate.

h. Remove wires from TB1 inside controller box. (Only wires which come from inside trainer chassis should be removed.)

i. Nuts and washers should be counted as it is important not to lose any hardware inside controller box or a short circuit may result.

j. Disconnect P2 cannon connector.

k. Remove controller box by lifting and feeding wires through hole in bottom of box.

l. Remove Control Electronic mounting screws, disconnect cables routed into the box from below, and remove package.

m. Install units in reverse of removal.

8.3.4 Steering Gearbox Removal and Installation Procedure

a. Remove Drive Power units as described in Section 8.3.3.

b. Remove transverse structural support member RTV21103.

c. Disconnect cables and remove signal processor unit.

NOTE: Thermal controls are hard wired and may require unsoldering.

d. Disconnect cables and remove gyro reference unit with mounting brackets.

NOTE: Thermal controls are hard wired and may require unsoldering.

e. Detach cables from the front cover panel by removing four screws, three places for the two battery cables and the signal processor cable.

f. Detach cable from signal processor mounting bracket, RTV-21105, and remove bracket.

g. Remove simulated hinges, front and rear.

h. Remove front and rear cover panels.

i. Disconnect the steering tie rods from the quadrant gear.

j. Disconnect the electrical plugs. Detach the two wires from the diode mounting block terminal strip.

k. Remove the two gearboxes to isolation, mount bolts.

l. Remove the two bolts and two screws from the large end of the gearbox.

NOTE: On the rear of the front unit the nuts on the two bottom vertical screws have to be removed. The ends of the screws are slotted for this purpose.

DEPLOYMENT SEQUENCE

1. PULL "D" RING
2. LOWER RELEASE PINS (2) ARE PULLED AND LOWER HALF OF APEX FITTINGS (2) ARE RELEASED (DETAIL C)
3. UPPER RELEASE PIN PULLED, LRV NOW FREE TO ROTATE 4° (DETAIL A)
4. PULL RIGHT BRAKED REEL OPERATING TAPE. (DETAIL B)
5. DEPLOYMENT CABLES (2) PLAY OUT ROTATING LRV 15°
6. LRV CAM LATCHES IN SUPPORT ARM (WALKING HINGE)
7. APEX FITTING LIFTS OFF SPOOLS (2) AT 24°
8. PUSH OFF SPRING APPLIES FORCE TO LRV THRU THE FIRST 24° OF TRAVEL
9. TELESCOPIC TUBE ASSY AND RATCHET ASSY ENGAGE PRIOR TO 45° TO PREVENT REVERSE ROTATION
10. 45° CABLE TIGHTENS, ROTATING SADDLE PULLEY WHICH ROTATES TWO SMALLER PULLIES RELEASING THE FORWARD AND AFT CHASSIS RELEASE PINS. (DETAIL E)
11. THE AFT CHASSIS IS FREE TO ROTATE 180°. AT 170° THE AFT WHEEL LOCK STRUTS RELEASE. THE WHEELS, BUT ARE RETAINED TO THE LRV BY TETHERS
12. THE FWD CHASSIS IS RELEASED, BUT DOES NOT ROTATE DUE TO INTERFERENCE WITH LM STRUCTURE AT THIS TIME.
13. RIGHT BRAKED REEL IS OPERATED UNTIL LRV CENT R CHASSIS IS AT 73°
14. LRV CAM ROTATES STEEL LATCH ARM RELEASING ZZ MTR FROM SUPPORT ARM (DETAIL D)

(CONTINUED ON SHEET 2)

DETAIL A

DETAIL B
TYPICAL BRAKED REEL ASSY.

DETAIL J

DETAIL C

DETAIL D

DETAIL E

DETAIL I

LRV SSE

SIGNATURES	DATE	NATIONAL AERONAUTICS & SPACE ADMINISTRATION
DR		MANNED SPACECRAFT CENTER · HOUSTON, TEXAS
DSGN		LRV MANUAL DEPLOYMENT MECHANISM (SPACE SUPPORT EQUIPMENT)
QE		
ENGR		
APP		
REC		LRV APOLLO 17 D5 DWG NO 9.3
		11 X 17 PAGE SHEET 1 OF 2