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Research Product 85-09

M60A3 Tank Procedure Guides

ARI Field Unit at Fort Knox, Kentucky
Training Research Laboratory

February 1985

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This research product presents M60A3 Procedure Guides which are designed to aid experienced tank crewmen and gunners to remember and perform pre- and post-operation procedures for the M60A3 battle tank. One of the notable innovations of the Procedures is the abbreviated algorithmic format for presenting task information. Also, separate booklets were developed for tank commander and gunner tasks. And both booklets were designed to be reduced and inserted into plastic binders. These innovations were intended to make the Procedure Guides easy to use and rugged enough to withstand the rigors of the tank environment.		

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Research Product 85-09

M60A3 Tank Procedure Guides

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Education and Training

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FOREWORD

The Army Research Institute (ARI) Field Unit at Fort Knox, Kentucky, is engaged in research and development on armor training and performance problems related to armor weapon systems. One such problem is that the armor crewman must perform a number of lengthy and complex procedures to prepare the M60A3 battle tank for operation and to power the tank down after operation. Although the M60A3 Operator's Manual (TM 9-2350-253-10) provides complete documentation on these procedural tasks, the TM is a less than ideal job performance aid for the armor crewman who is familiar with the tasks. The Procedure Guides presented herein provide appropriate and convenient aids to help experienced armor crewmen remember and perform procedures for the M60A3 tank.

The M60A3 Procedure Guides were developed along the lines of the M1 Procedure Guides which incorporate a number of innovations. One of the more notable innovations is the abbreviated task information presented in an algorithmic format. Also, the booklets are specific to either tank commander or gunner tasks. And both booklets can be reduced and inserted into plastic ring binders. These innovations were designed to make the Procedure Guides easy to use and rugged enough to withstand the rigors of the tank environment.

The armor community has demonstrated considerable interest in the Procedure Guides. Both the M1 and M60A3 Procedure Guides have been adopted by the Armor School for distribution to armor units worldwide. Furthermore, the development methodology and format of these armor documents were used by the Fort Benning Field Unit to produce Procedure Guides for the Infantry Fighting Vehicle.



EDGAR M. JOHNSON
Technical Director

M60A3 TANK PROCEDURE GUIDES

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OVERVIEW

Background

To prepare the M60A3 battle tank for operation and to power down after operation, armor crewmen have to perform a number of procedural tasks. Although the M60A3 Operator's Manual (TM 9-2350-253-10) presents complete documentation on these tasks, it provides a less than ideal job performance aid for experienced armor crewmen. Some of the problems with the TM include:

- Excessive detail: The procedures are described at an inappropriate level of detail for the experienced performer.
- Large size: The TM is large and cumbersome to use.
- One per tank: Because only one TM is issued per tank, it is unavailable to three of the four crewmen during pre- and post-operations checks.

The M60A3 Procedure Guides were designed to address these problems by providing position-specific job aids that are convenient and complete.

Development

Eighteen tank commander and 15 gunner procedures were chosen to be included in the Procedure Guides. The format for the M60A3 Guides was taken from Procedure Guides previously developed for the M1 tank.^{1,2} All task information was derived from the TM in order to make the Guides compatible with the TM.

Features

Some of the more notable features of the M60A3 Procedure Guides are listed below:

- "Part . . . action" format: Task information is abridged by casting each step in this format.
- Algorithmic conventions: Flowchart symbols are used to describe branch points in more complex tasks.
- Notes/cautions/warnings: These items which concern task performance, safety, or system integrity are identified at appropriate points in the procedure.

¹Silbernagel, B. L., Vaughan, J. J., Jr., and Schaefer, R. H. Development of M1 Abrams Tank Sustainment Training Material. ARI Research Report 1334, June 1982.

²Vaughan, J. J., Silbernagel, B., and Goldberg, S. L. M1-Abrams Tank Procedure Guides. ARI Research Product 82-09, July 1982.

- Identification of common subprocedures: To avoid duplication of information, common subprocedures are identified and presented as separate procedures.
- Convenient, rugged packaging: The guides are designed to be reduced to a smaller (4½" x 7") format and inserted in plastic covered ring binders.
- Separate booklets: Separate Procedure Guides are provided for tank commander and gunner tasks.
- Preventive Maintenance Checks and Services (PMCS): PMCS tasks are presented in the appropriate books, and the tank commander book also has a master checklist.

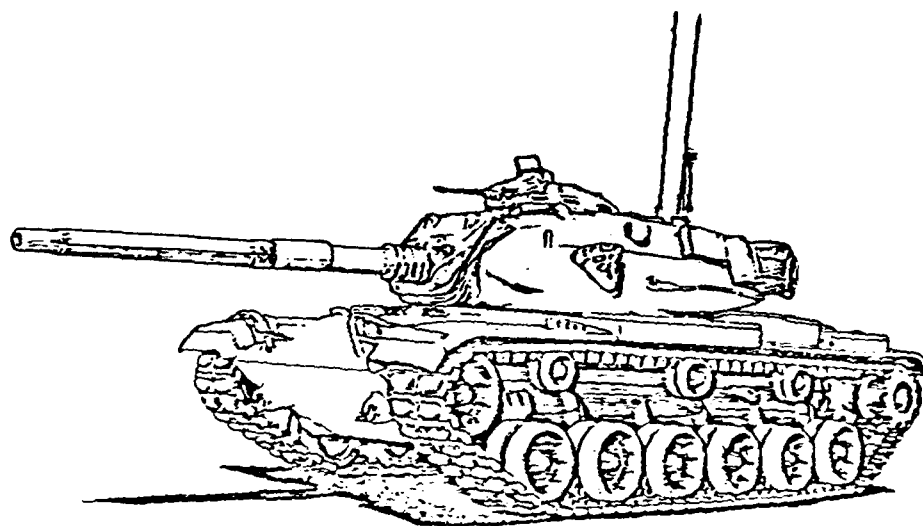
How To Use

The Procedure Guides are designed to complement the TM, not to replace it. The TM is still the most appropriate reference for the details of equipment operation. And the TM should be used for initial training of procedures. The Procedure Guides should be introduced only after soldiers are reasonably familiar with the equipment and task terminology. Additional training on the Procedure Guides themselves is also required to acquaint soldiers with its algorithmic style and abbreviations.

TANK COMMANDER

PROCEDURE GUIDES

M60A3 TANK



July 1982

PREPARED BY THE U.S. ARMY RESEARCH INSTITUTE
FOR THE
BEHAVIORAL AND SOCIAL SCIENCES

GENERAL INFORMATION

This booklet contains M60A3 tank commander procedures guides. Each guide is for a single pre-operation, post-operation, or during operation activity. Each guide is matched to TM 9-2350-253-10 (Operator's Manual for Tank, Combat, Full-Track: 105-MM Gun, M60A3).

PURPOSE OF PROCEDURE GUIDES

The guides in this booklet will not take the place of the M60A3 Operator's Manual or M60A3 training materials. The guides will aid you in remembering long or difficult sets of procedures. In short, the guides will help to "jog your memory."

USE OF THIS BOOKLET

The Table of Contents (on the next page) lists the procedure guides in this booklet. Each guide gives you a step-by-step outline for completing an activity. The following instructions will help you to better use each guide.

1. Some steps within a procedure are followed by a page number. On that page you will find a detailed breakdown of the step.
2. Some of the procedure guides include a question(s). Each question is stated inside a diamond shape. Your "yes" or "no" to the question will show you which path to follow.
3. Some paths lead to an instruction to go to a particular step number within a procedure. The step number is given within a circle.
4. Some steps within a procedure guide are followed by a box. In the box you will find more information on the step or a caution/warning.
5. Certain steps within a procedure guide require that a knob or switch be turned to a certain position. In some cases, that position might be written like the symbol to the left. The symbol means that a light should also come on.
6. Master check-off lists of all before, during, and after operations preventative maintenance checks and services (PMCS) performed by crewmembers are included as an aid in your supervision of these activities.
7. At the beginning of each procedure, the TM page number reference for the procedure is given under the task name. These references will help you if you need more information to complete the task.

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INSTALLING COMMANDER'S PERISCOPE M36E1

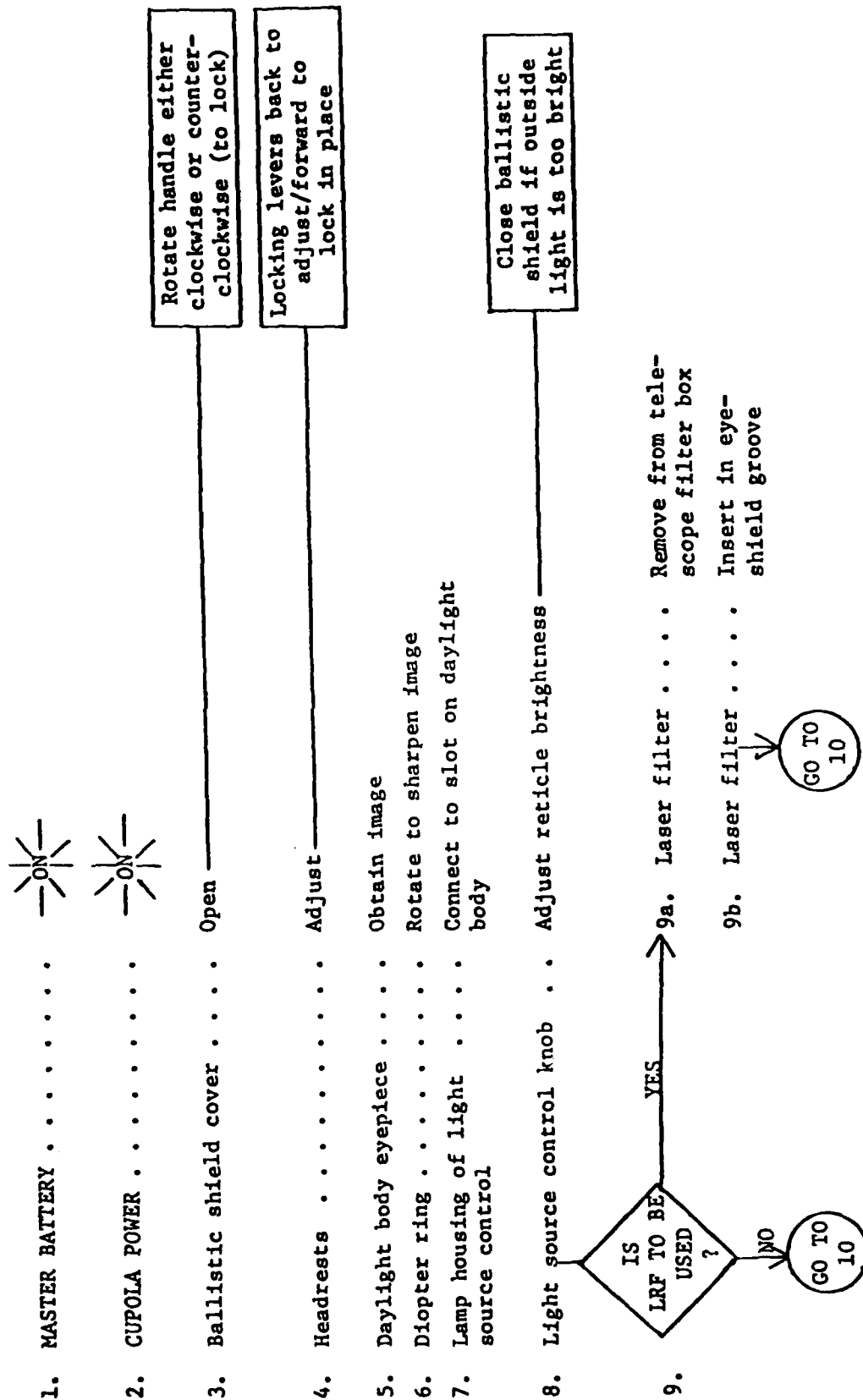
(TM page 3-122)

LINK ASSEMBLY MUST BE DISCONNECTED FROM PERISCOPE AND ATTACHED TO STOWAGE HANGER BEFORE INSTALLING PERISCOPE DAYLIGHT BODY

1. Daylight body Slide into position carefully
2. Daylight body latches Engage Support daylight body with one hand
3. Passive elbow Slide into position carefully
4. Passive elbow latches Engage Support passive elbow with one hand
5. Two electrical connectors Connect to rear of daylight body
6. Quick-disconnect clamp Disconnect from stowage hanger/
connect to periscope elevation arm
7. Stowage hanger Place in cupola ceiling stowage clip

OPERATING COMMANDER'S PERISCOPE M36E1

(TM page 2-234)



OPERATE PASSIVE ELBOW ONLY UNDER
LOW LIGHT CONDITIONS OR WITH
BALLISTIC SHIELD COVER CLOSED

Opens shutter and
activates power
switch

Use lowest possible
intensity

- 10.. Passive elbow shutter lever . Move to the left
11. RETICLE control Adjust reticle brightness
12. TUBE control Adjust tube brightness
13. Diopter ring Focus background
14. Focus ring Focus target image
15. Tube control Readjust for clearest image

REMOVING COMMANDER'S PERISCOPE M36E1

(TM page 3-122)

1. Cal .50 machine gun Elevate to upper limit
2. Quick-disconnect clamp Disconnect from periscope elevation arm
3. Elevation arm Move toward rear of cupola
4. Quick-disconnect clamp Connect to stowage hanger

LINK ASSEMBLY MUST BE DISCONNECTED FROM PERISCOPE
AND ATTACHED TO STOWAGE HANGER BEFORE REMOVING
M36 PERISCOPE DAYLIGHT BODY.

5. Two electrical connectors . . Disconnect from rear of daylight body
6. Lamp housing Disconnect from daylight body (dovetail slot)
7. Lamp housing Connect to light source control (dovetail slot)
8. M30 instrument light Disconnect from passive elbow

9. Passive elbow latches Release

Support passive elbow with one hand

GO TO 10

GO TO 10

10. Passive elbow Lower carefully

11. Daylight body latches Release

12. Daylight body Lower carefully

Support day-
light body
with one hand

OPERATING LASER RANGEFINDER (LRF)

(TM page 2-246)

LIMIT SUSTAINED RANGING RATE TO THREE PER MINUTE OR SIX PER TWO MINUTES WITH THREE-MINUTE INTERVALS BETWEEN EACH TWO MINUTE RANGING PERIOD.

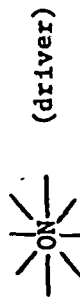
DO NOT LEAN AGAINST RECEIVER-TRANSMITTER WHEN VIEWING THROUGH EYEPIECE OR LASING.

MAKE SURE BLISTER COVER IS LOCKED IN THE OPEN POSITION WHEN RANGING.

1. MODE

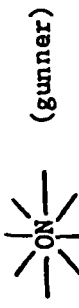


2. MASTER BATTERY



(driver)

3. POWER



(gunner)

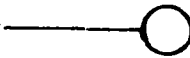
4. Headrest

Adjust

Use serrated knob to release and lock

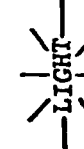
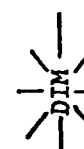
GO TO
5

5. Blister cover Lock in open position
6. Eyepiece Sight image
7. Diopter ring Adjust until image is sharp and clear
8. RETICLE BRIGHTNESS Adjust reticle brightness
9. 6X/12X switch Select appropriate power
10. Rubber eye shield Pull off
11. Laser filter Remove from stowage bracket/
snap over eyepiece
12. Rubber eye shield Replace



LASER RANGEFINDER SELF-TEST

(TM page 2-248)

1. MODE 
2. MASTER BATTERY 
3. POWER  (gunner)
4. MANUAL/RANGEFINDER RANGEFINDER (gunner)
5. LIGHT/DIM/TEST 
6. Control panel indicators . . . All should illuminate
7. RANGE (METERS) Should display 8888
8. RETURNS Should display 8
9. LIGHT/DIM/TEST  or 
10. Control panel indicators . . . The following should illuminate: RANGE, RESET, FEED, BATL RNG, LAST, TEST

GO TO
11

- 11. RANGE (METERS) Should display 0000
- 12. RETURNS Should display 0

DO NOT PRESS RANGE SWITCH OR THUMB SWITCHES ON GUNNER'S CONTROL HANDLES WHILE MODE SWITCH IS IN ON OR AUTO, LASER WILL FIRE.

- 13. MODE 
- 14. MODE 
- 15. RANGE indicator Should flash within 4 seconds
- 16. MANUAL/RANGEFINDER MANUAL (gunner)
- 17. RANGE indicator Should not flash
- 18. MANUAL/RANGEFINDER RANGEFINDER (gunner)
- 19. MODE 

- 20. EMER POWER ON (gunner)
- 21. Indicators on electronics . . Should remain on unit

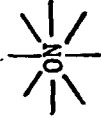
GO TO 22

22. EMER POWER XMTR TEST (gunner)
23. Indicators on electronics . . Should remain on unit
24. EMER POWER OFF (gunner)
25. RANGE pushbutton  — Depress/Hold —
26. RANGE (METERS) Should display 0002
27. MALF Should illuminate
28. RANGE Release
29. BATL RNG Depress
30. LRF panel Perform logic test

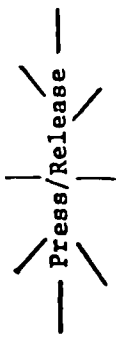
Indicator should illuminate

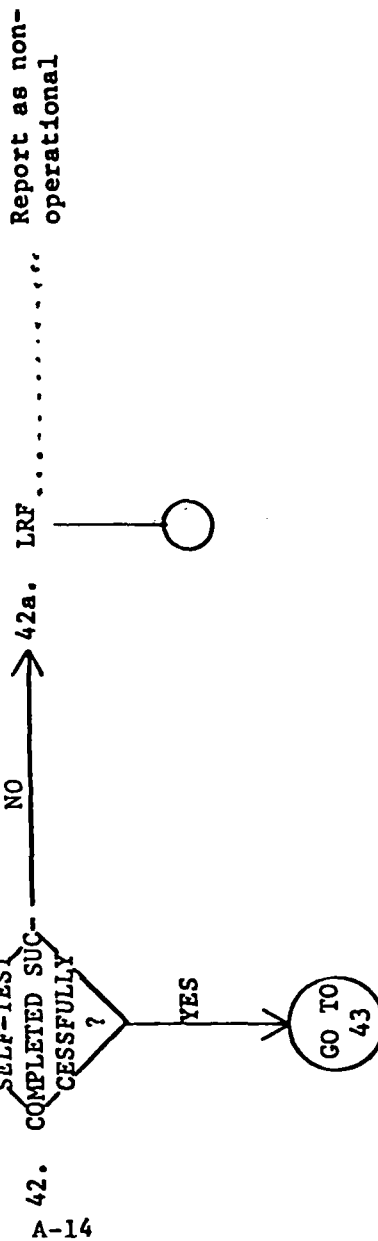
Use Ranging and Logic Table (page 14)

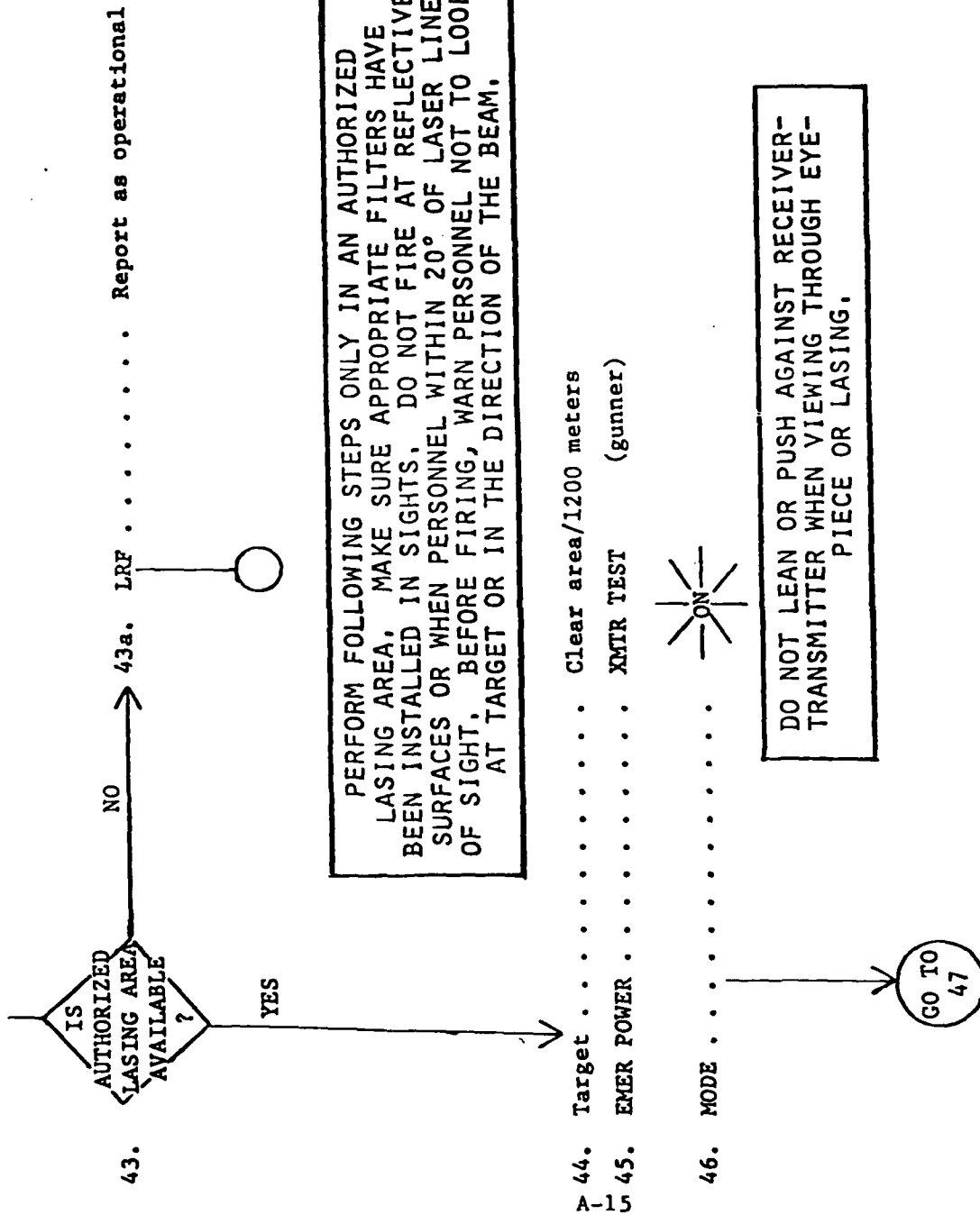
DO NOT LOOK INTO LRF EYEPIECE
WHEN FIRING LASER INTO THE BLISTER DOOR.

31. Blister door Assure closed
32. Blister door pin Assure installed
33. EMER POWER XMTR TEST (gunner)
34. MODE  — ON —

GO TO
35

35. RANGE indicator Should flash within 4 seconds
36. RANGE pushbutton  Press/Release —
37. Selector lights LAST should illuminate
38. RETURNS Should display 0
39. RANGE (METERS) Should display 9995 (+15)
40. SEL light Should be on
41. GO light Should be off





47. LRF reticle Lay on target

48. LRF panel Perform firing test

Use LRF Firing
Test Table (page 15)

IF TARGET RANGE IS NOT OBTAINED DURING
LRF TEST, MAKE SURE THAT LRF AND GUNNER'S
RETICLES ARE ON THE SAME POINT. IF NOT
REBORESIGHT THE SYSTEM AT EARLIEST
OPPORTUNITY.

49. EMER POWER OFF

50. MODE



Ranging and Logic Table

Step	Inputs	Indications					GO Light
		Press and Release	Selector Lights	RETURNS Display	RANGE (METERS) Display (+15)*	SEL Light	
Set MODE switch to TEST							
1	RESET	LAST		0	0000	OFF	OFF
2	RANGE	LAST		1	850	OFF	ON
3	BATL RNG	LAST		0	0000	OFF	OFF
4	RANGE	LAST		1	850	OFF	ON
5	1	LAST		1	850	OFF	ON
6	2	LAST		1	850	OFF	ON
7	RANGE	LAST		2	1850	OFF	ON
8	RANGE	LAST		3	2850	OFF	ON
9	RANGE	LAST		4	2850	ON	OFF
10	1	1		4	850	ON	OFF
11	2	2		4	1850	ON	OFF
12	LAST	LAST		4	2850	ON	OFF
13	2	2		4	1850	ON	OFF
14	FEED	2		4	1850	OFF	ON
15	RESET	LAST		0	0000	OFF	OFF
16	2	2		0	0000	OFF	OFF
17	RANGE	2		1	9995**	ON	OFF
18	FEED	2		1	9995	ON	OFF
19	RANGE	2		2	1850	ON	OFF
20	FEED	2		2	1850	OFF	ON
21	Range***	LAST		0	0000	OFF	OFF
22	RESET	LAST		0	0000	OFF	OFF

*Last digit of range display must always be 0 or 5

**If RANGE (METERS) displays 0000, go back to step 15.

***Set ELEV/TRAV POWER switch to ON position and range from gunner's handles.
Set ELEV/TRAV POWER switch to OFF position.

LRF Firing Test

Step	Inputs	Indications				GO Light
		Selector Lights	RETURNS Display	RANGE (METERS) Display (+ 15)**	SEL Light	
1	RESET	LAST	0	0000	OFF	OFF
2	2	2	0	0000	OFF	OFF
3	RANGE	2	1	9995*	ON	OFF
4	1	1	1	Target Range****	ON	OFF
5	FEED	1	1	Target Range	OFF	ON
6	Range***	LAST	1	Target Range	ON	OFF

*If RANGE (METERS) displays 0000, press RESET and repeat test sequence.

**Last digit of range display must always be 0 or 5.

***Set ELEV/TRAV POWER switch to ON position and range from gunner's station.
Set ELEV/TRAV POWER switch to OFF position.

****If RANGE (METERS) displays 9995, set EMER POWER to OFF and repeat steps 1-4.

BORESIGHTING LASER RANGEFINDER (LRF)

(TM page 2-350)

DO NOT VIEW LASER BEAM THROUGH DEVICE
NOT FILTERED FOR LASER LIGHT. FIRE
LASER IN AUTHORIZED LASING AREA ONLY.

1. Laser filter Install on eyepiece
2. RETICLE BRIGHTNESS Rotate until reticle is just visible
3. MANUAL/RANGEFINDER RANGEFINDER



4. MODE

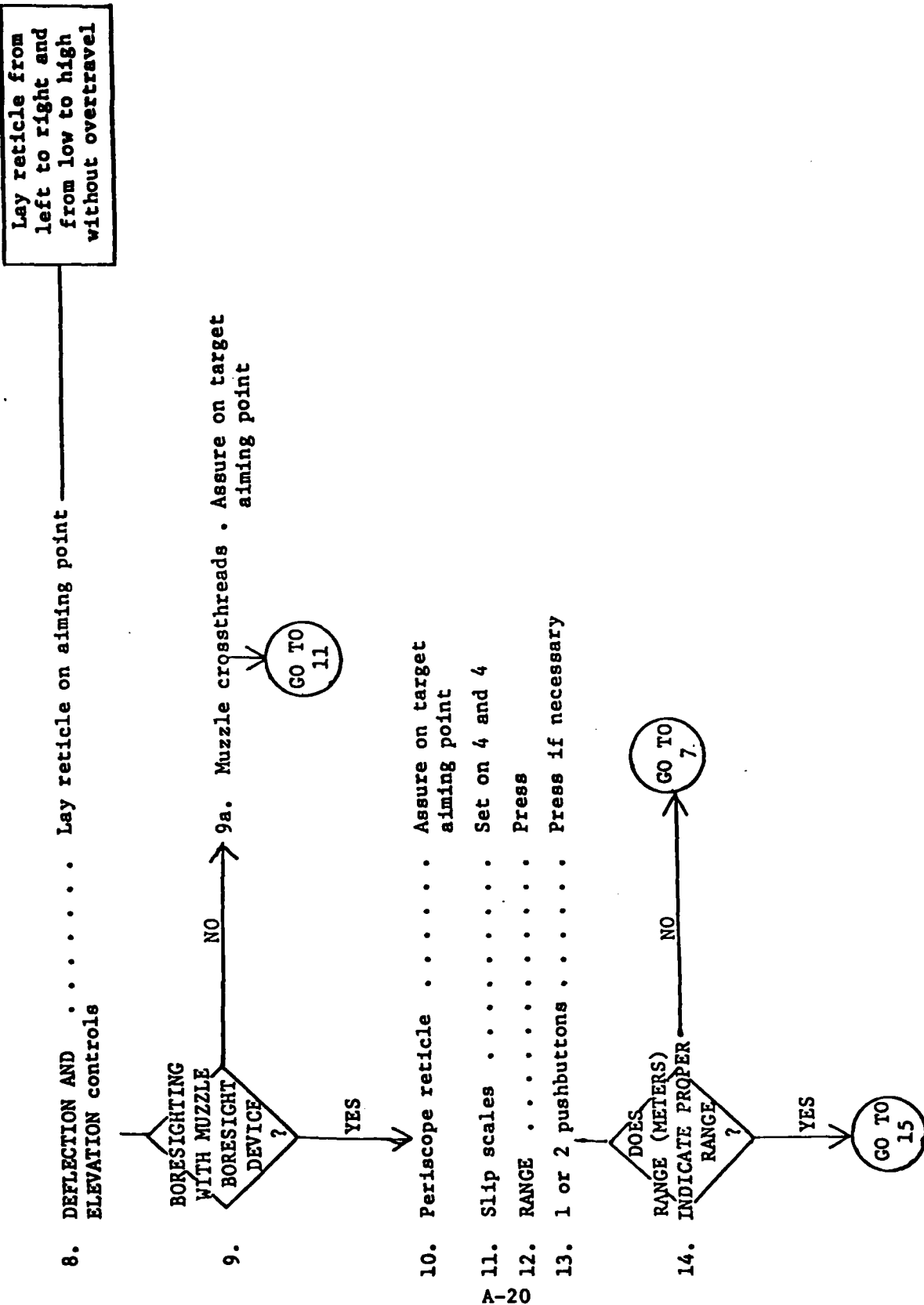


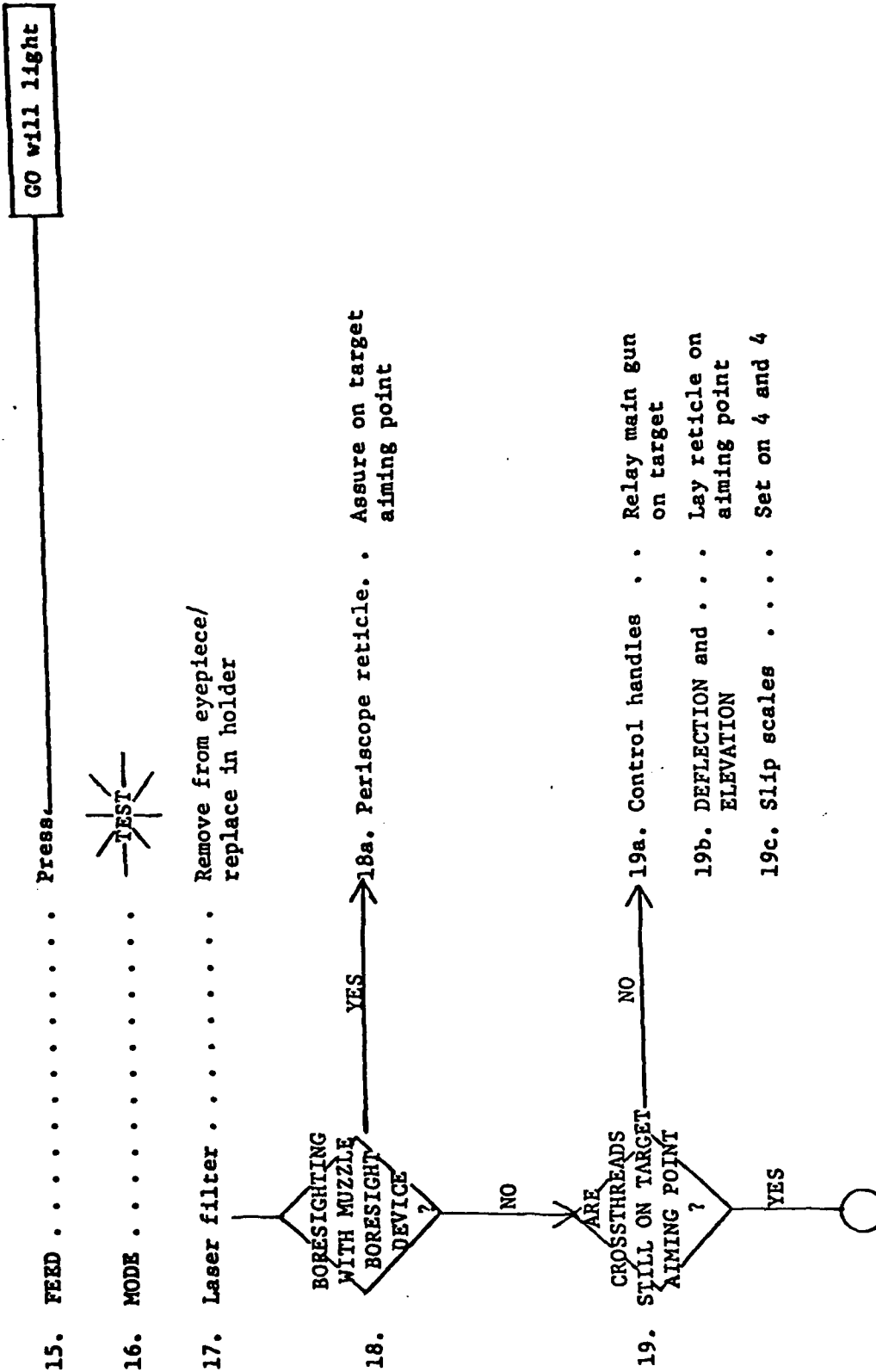
5. BATL RNG

DO NOT LEAN OR PUSH AGAINST RECEIVER-TRANSMITTER
WHEN VIEWING THROUGH EYEPIECE OR LASING.

6. 6X/12X 12X
7. Eyepiece Sight target

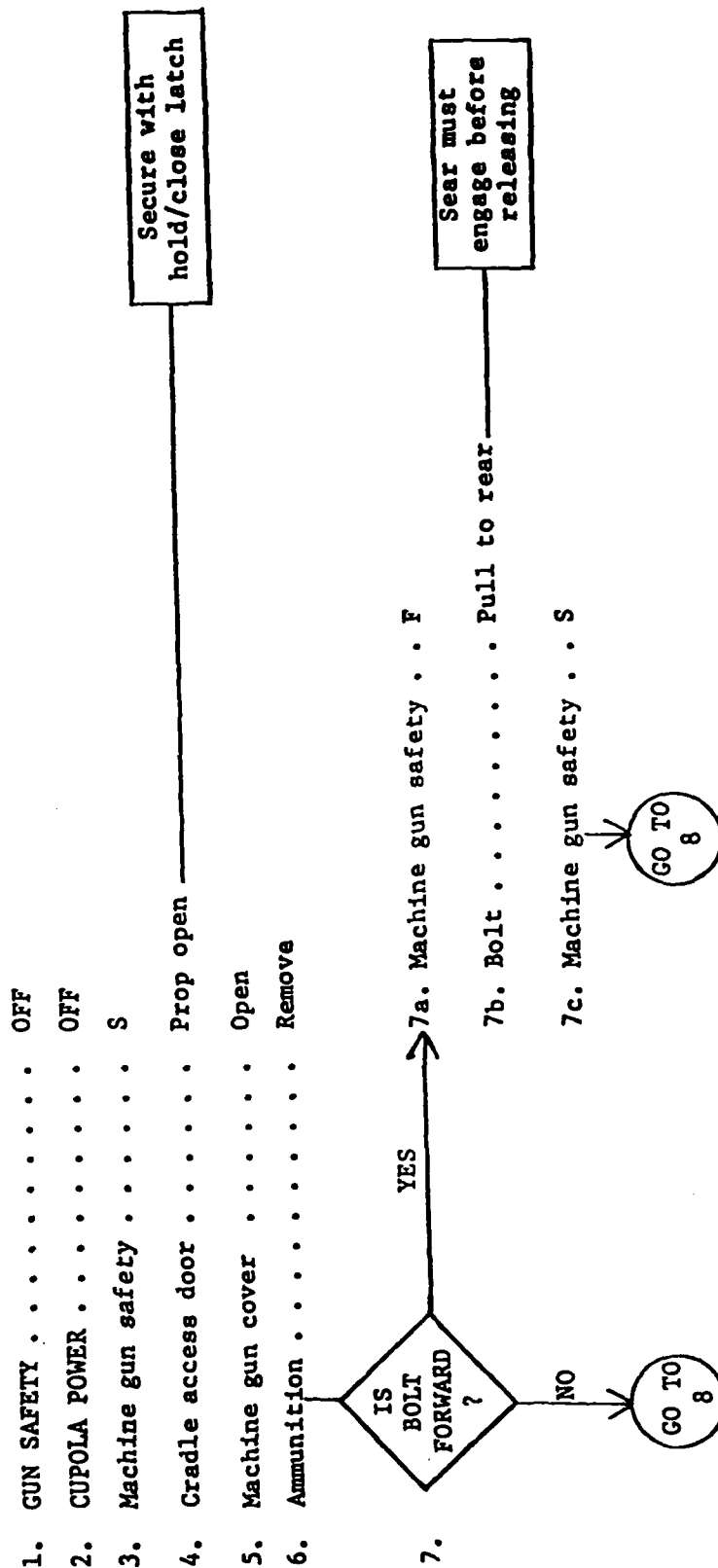


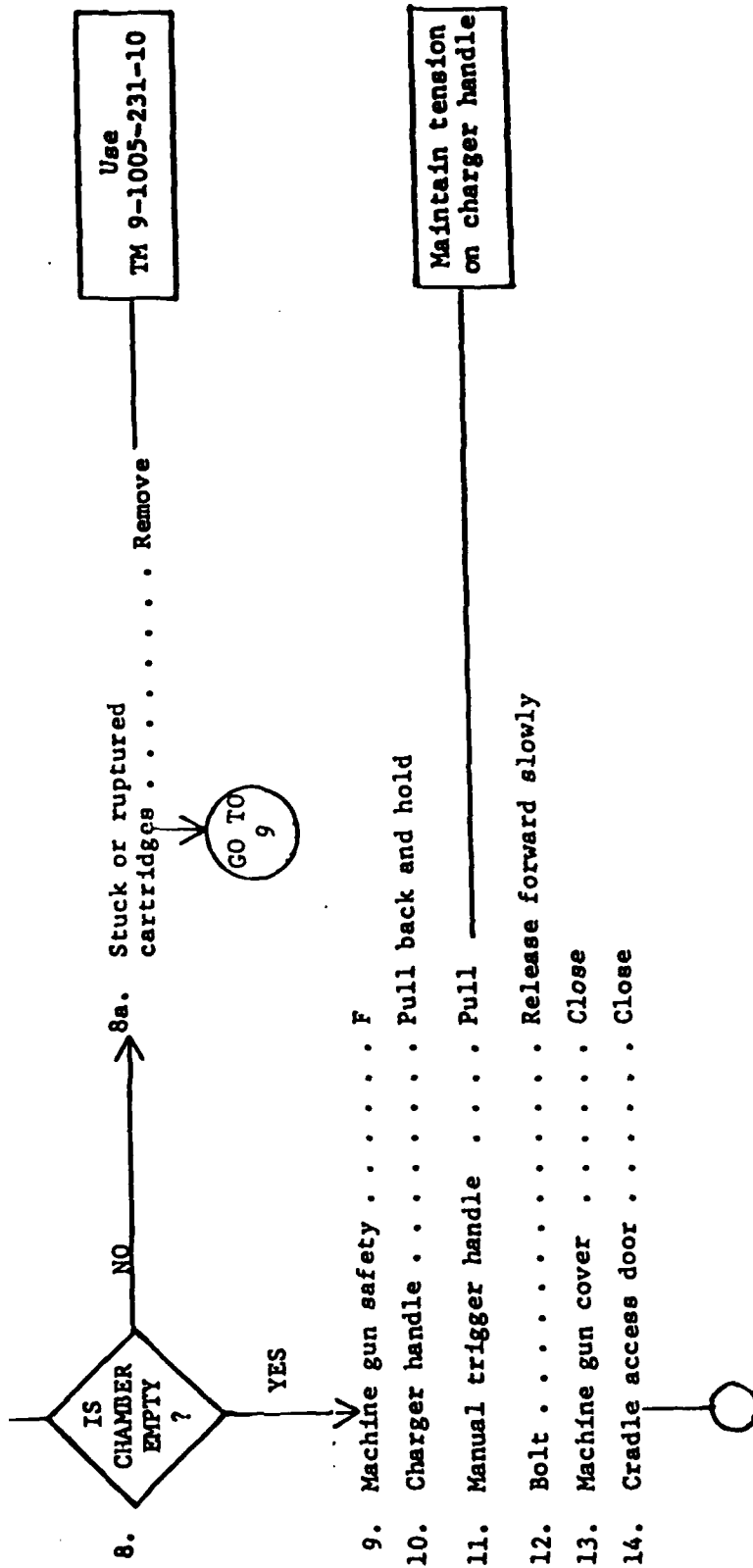




CLEARING CALIBER .50 MACHINE GUN

(TM page 2-337)





INSTALLING CALIBER .50 MACHINE GUN

(TM page 3-122)

LINK ASSEMBLY MUST BE CONNECTED TO STOWAGE HANGER BEFORE INSTALLING CAL .50 MACHINE GUN.

1. Machine gun Clear (page 19)

2. Rear mounting pin Remove

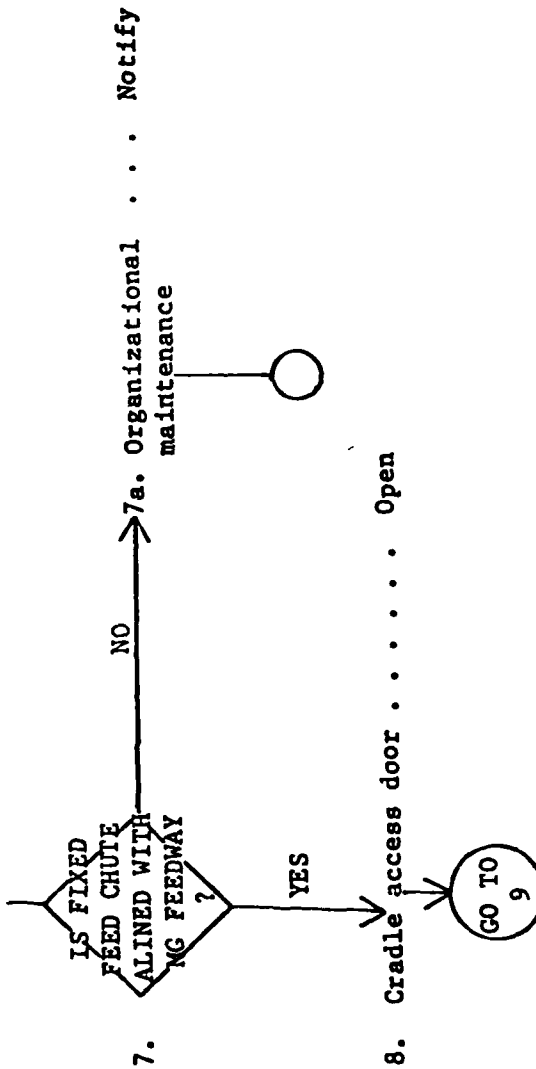
3. Machine gun cradle Elevate

4. Machine gun Slide in cradle

5. Rear mounting pin Secure gun in cradle

6. Solenoid lead connector Connect to end plate

So that gun can slide under TC's periscope



9. Barrel Insert/rotate 1/4 turn
10. Cradle access door Close
11. Quick-disconnect clamp Disconnect from stowage/
hanger/connect to periscope
elevation arm
12. Stowage hanger Place in cupola ceiling
stowage clip
13. Cal .50 firing circuit Test (page 23)

TESTING CALIBER .50 MACHINE GUN FIRING CIRCUIT

(TM page 3-121)

1. Machine gun Clear (page 19)



2. MASTER BATTERY



3. CUPOLA POWER

4. GUN SAFETY ON

5. Dummy ammo Load

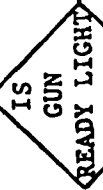
or

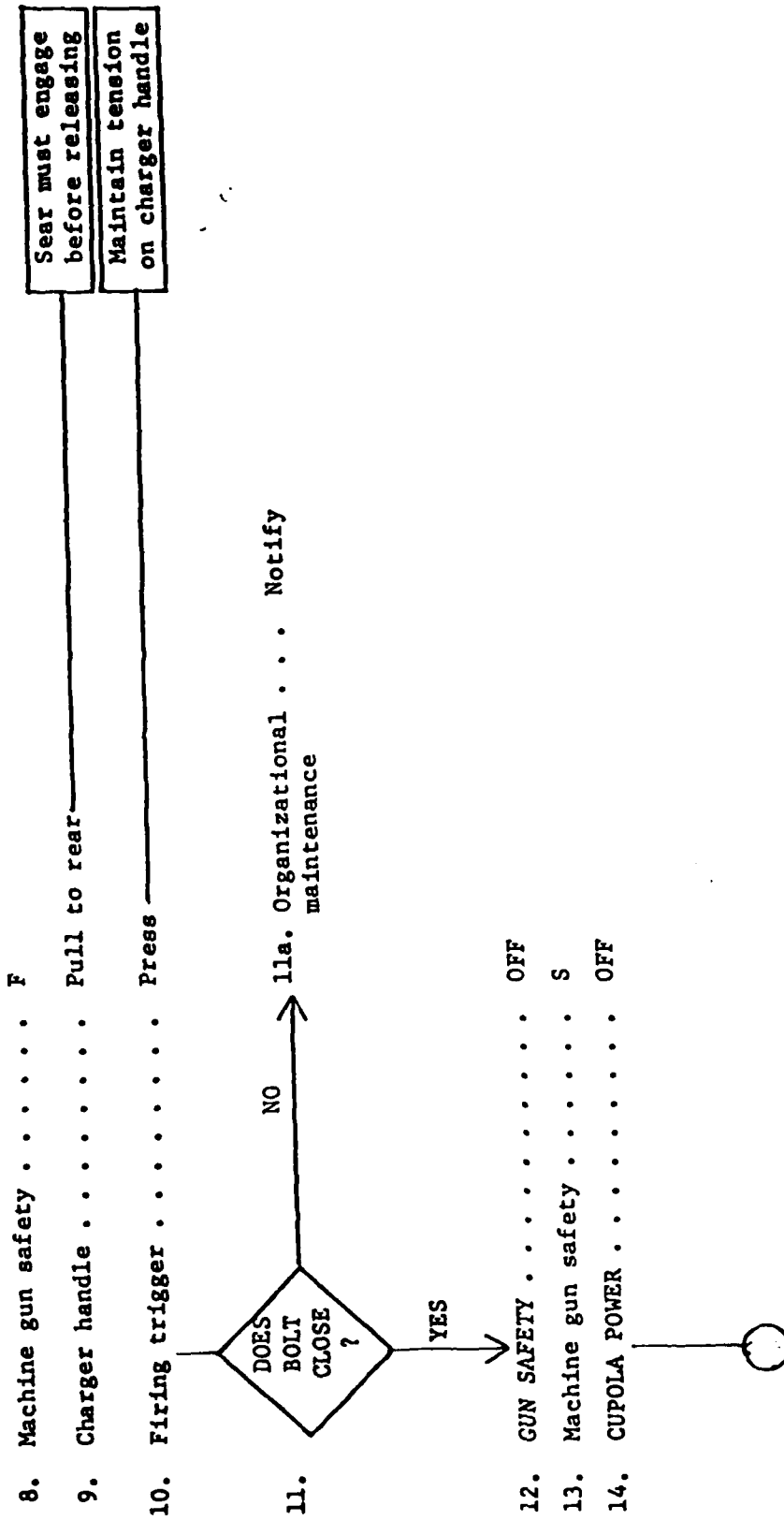
Last round sensing switch . . Depress

6. LAST ROUND OVERRIDE OFF



7. 7a. LAST ROUND OVERRIDE

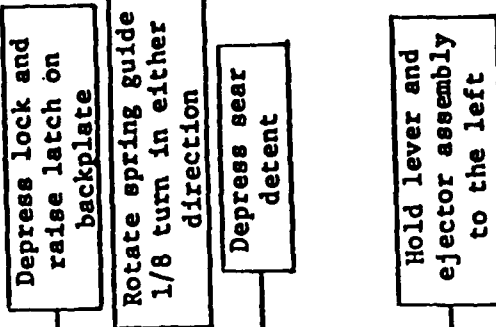




BORESIGHTING CALIBER .50 MACHINE GUN

(TM page 2-366)

1. Tank position Level
2. Machine gun Elevate to upper limit
3. M36E1 Periscope Remove (page 4)
4. Machine gun Clear (page 19)
5. Solenoid lead connector Disconnect from backplate assembly
6. Backplate Lift off
7. Bolt buffer group Remove
8. Sear assembly Remove
9. Charger handle Pull slowly
10. Cover Open
11. Bolt assembly Pull out
12. Cover Close
13. Boresight target Right angle/500 meters



GO TO 14

Use manual
controls

14. Center of barrel Aline on target aiming point
15. AZIMUTH LOCK Push up
16. Azimuth adjustment knob Adjust azimuth precisely if necessary
17. Machine gun/cupola Do not move
18. M36E1 Periscope Install (page 1)
19. M36E1 Periscope Prepare for operation (page 2)
20. Daylight body eyepiece Sight target/disengage
21. Daylight body elevation Aline boresight cross on and deflection knobs target aiming point
22. Slip scales of daylight body Set on 4 and 4

GO TO
27



NO

YES

24. Searchlight Light target momentarily if necessary

25. Passive body eyepiece Sight target/disengage

GO TO
26

26. Passive body elevation Aline reticle on aiming point and deflection knobs
27. Slip scales of passive elbow Set on 4 and 4
28. Daylight body reticle Verify still on target aiming point

LINK ASSEMBLY MUST BE DISCONNECTED FROM PERI-SCOPE AND ATTACHED TO STOWAGE HANGER BEFORE ASSEMBLING CAL .50 MACHINE GUN.

29. Cal .50 machine gun Elevate to upper limit
30. Quick-disconnect clamp Disconnect from periscope elevation arm
31. Elevation arm Move toward rear of cupola
32. Quick-disconnect clamp Connect to stowage hanger
33. M36E1 Periscope Remove (page 4)
34. Cover Open
35. Bolt locks Depress
36. Bolt assembly Slide into barrel extension assembly
37. Hand Remove from lever assembly
38. Bolt assembly Slide forward

Hold lever and ejector assemblies to the left

Force cartridge ejector to the left

GO TO
39

39. Sear assembly guide rails . . . Aline with grooves in receiver
40. Sear assembly Slide forward
41. Bolt buffer group Install
42. Backplate group Aline with grooves in receiver
43. Backplate group Slide downward
44. Machine gun cover Close
45. Cradle access door Close
46. Cradle cover Close
47. Bolt Place forward
48. Safety F
49. M36E1 Periscope Install (page 1)
50. Quick-disconnect clamp Disconnect from stowage hanger/
connect to elevation arm assembly
51. Stowage hanger Place in cupola ceiling
stowage clip

Detent should
engage

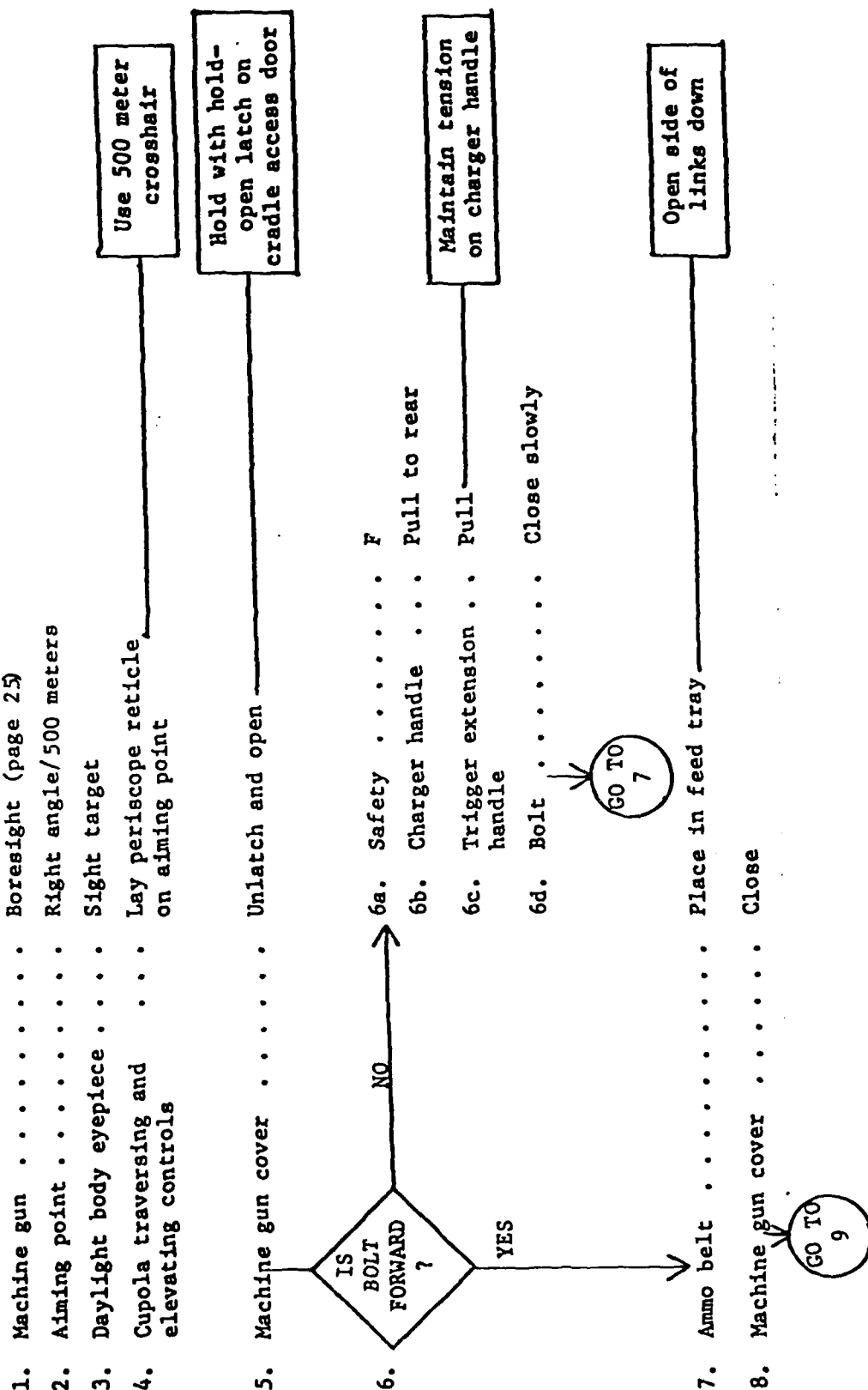
Rotate rod 1/4 turn
in either direction
in receiver to secure

Depress lock and
raise latch

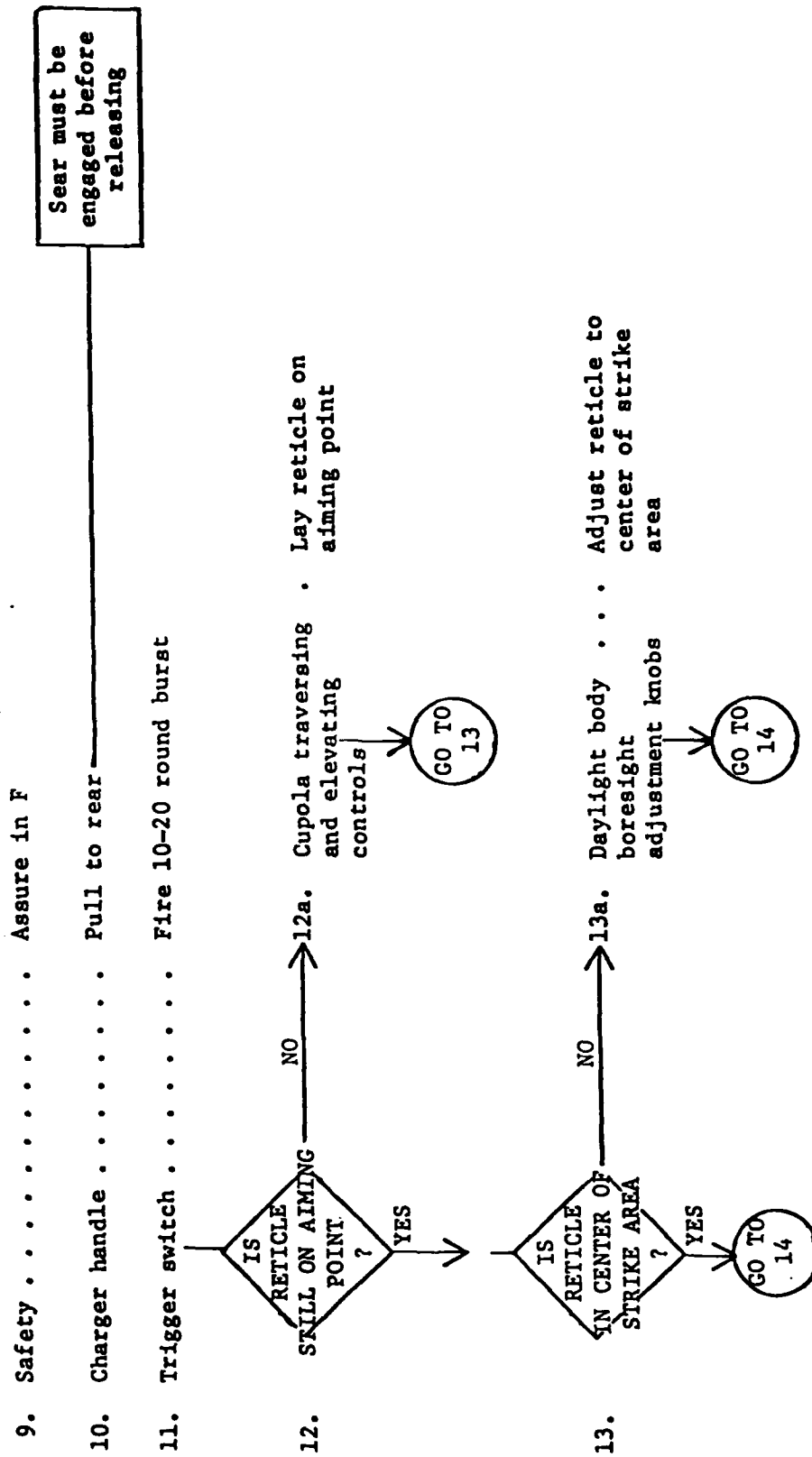
Should lock
and latch

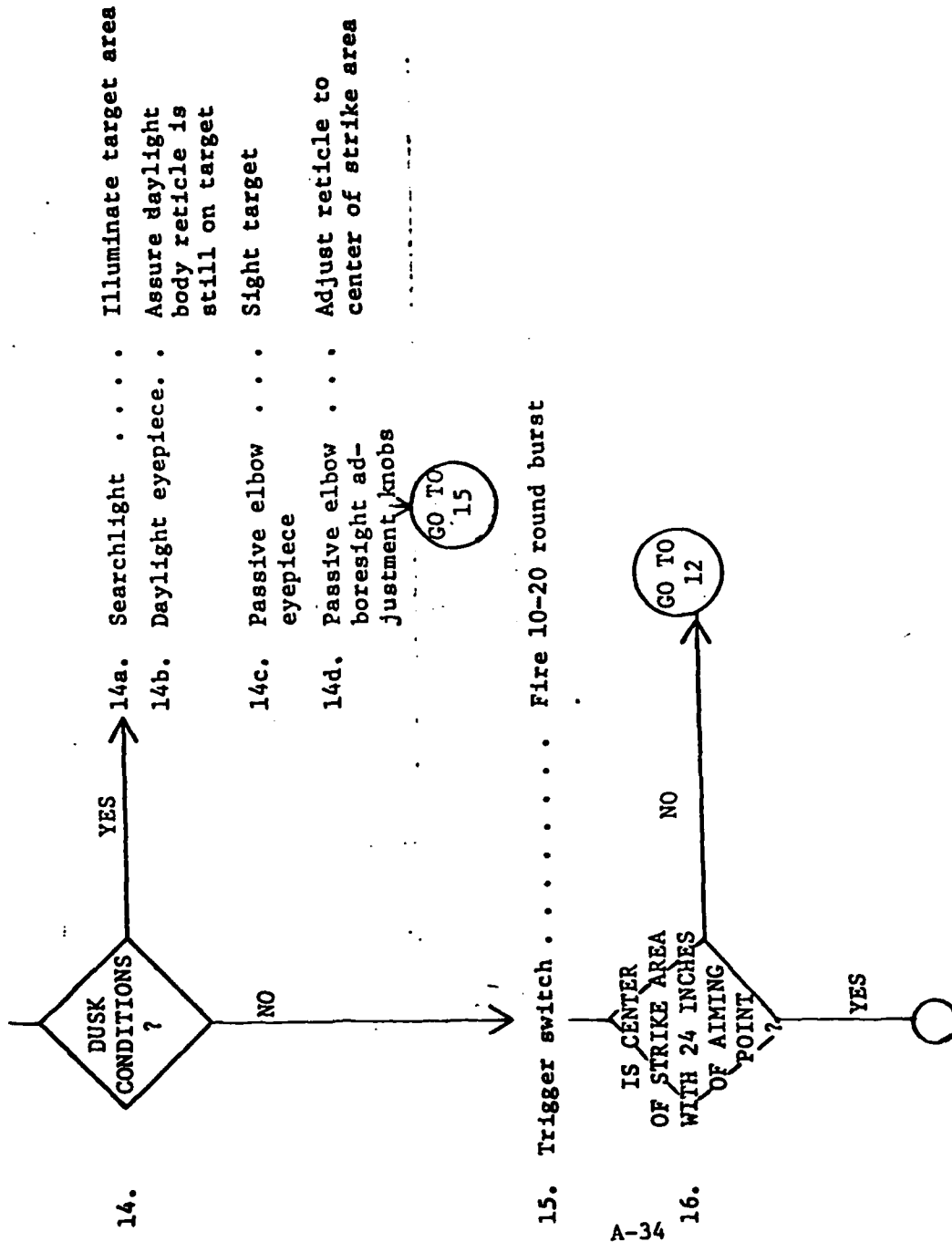
ZEROING CALIBER .50 MACHINE GUN

(TM page 2-397)



SAFETY MUST BE IN F BEFORE CHARGING
WEAPON. CHARGING IN S MAY CAUSE
THE WEAPON TO FIRE ACCIDENTALLY.





REMOVING CALIBER .50 MACHINE GUN

(TM page 3-122)

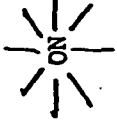
1. Machine gun Clear (page 19)
2. CUPOLA POWER OFF
3. Machine gun Elevate To disconnect solenoid lead connector
4. Solenoid lead connector Disconnect from end plate
5. Cradle access doors Open
6. Barrel Rotate 1/4 turn/remove Press down on barrel latches
7. Machine gun Elevate So that gun can slide under TC's periscope

LINK ASSEMBLY MUST BE CONNECTED TO
STOWAGE HANGER BEFORE REMOVAL OF
CAL .50 MACHINE GUN.

8. Quick-disconnect clamp Disconnect from elevation arm
9. Elevation arm Move toward rear of cupola
10. Quick-disconnect clamp Connect to stowage hanger
11. Rear mounting pin Remove
12. Machine gun Slide from cradle

PREPARING TO FIRE PROCEDURE
(TM page 2-400)

COMMAND: PREPARE TO FIRE

1. Exterior lenses and Clean
vision devices
2. Cupola ballistic Check operation
periscope shield
3. MASTER BATTERY  (driver)
4. Instrument lights Check
5. LRF Check for MAF light

COMMAND: CHECK FIRING SWITCHES

6. MAIN GUN  (gunner)
7. Engine Start (driver)
8. 105-mm gun safety switch In FIRE (loader)
9. Circuit tester Insert (loader)
10. TC Announces: ON THE WAY

GO TO
11

Loader announces
NO FIRE if circuit
tester does not light

11. TC's control handle Check trigger
12. Gunner's control handles Check triggers (gunner)
13. MAIN GUN OFF (gunner)
14. MACHINE GUN  (gunner)
15. Coaxial machine gun Cock (loader)
16. TC Announces: ON THE WAY
17. TC's control handle Check trigger
18. Gunner's control handles Check triggers (gunner)

Loader announces
NO FIRE if circuit
tester does not light

COMMAND: CHECK GUN CONTROLS

19. Gunner Announces: POWER
20. Turret Unlock (loader)
21. ELEV/TRAV POWER  (gunner)
22. Gun/turret Elevate/traverse using
TC power controls

GO TO
23

23. ELEV/TRAV POWER OFF (gunner)

MAKE SURE THAT CREW IS READY AND
NO PERSONNEL OR OBSTRUCTIONS ARE
IN SURROUNDING AREA

COMMAND: CHECK GUN STABILIZATION

24. STAB ELECTRONICS



25. POWER PACK BLOWER MOTOR



26. ELEV/TRAV POWER



(gunner)

27. POWER on selector assembly



(gunner)

28. STAB



(gunner)

29. Gunner Announces: TURRET STABILIZED

30. TRAV and/or EL BALANCE Rotate to null drift (gunner)

31. Gunner's control handles Check function (gunner)

32. TC palm switch Activate override

Wait 15 seconds

System is operational
when green STAB
indicator lights

GO TO
33

33. TC control handles Check function
 34. STAB SHUT-OFF Depress
 35. POWER on selector assembly OFF (gunner)
 36. Gunner Announces: STABILIZATION OFF

COMMAND: CHECK FIRE CONTROL



37. CUPOLA POWER ON
 38. GUN SAFETY ON
 39. Cal .50 machine gun Check operation
 40. XM21 computer Perform self-test (gunner)
 41. 105-mm gun Prepare for boresighting (loader)
 42. LRF Perform self-test (page 8)
 43. Gunner's telescope and Boresight (gunner)
 periscope
 44. LRF Boresight (page 14)
 45. Ammo switch : Select appropriate ammo (gunner)

GO TO
46

46. MOVING/STATIONARY Select appropriate setting (gunner)
47. Computer Enter ballistic data (gunner)
48. Cal .50 machine gun Boresight (page 18)
49. 7.62-mm machine gun Load (loader)
50. 105-mm gun Load (loader)
51. Cal .50 machine gun Load

COMMAND: REPORT

52. Gunner/Driver/Loader Announce: READY

DURING OPERATIONS PMCS

(TM page 2-105)

1. Commander's seat Check operation/adjustment
2. Amplifier AM-1780/VRC Turn on
3. MONITOR INT ONLY
4. VOLUME Adjust
5. Radio/intercom Check operation
6. Azimuth lock Check operation
7. Azimuth interlock Check operation
8. Azimuth lock Unlock
9. Manual traversing handle Traverse cupola right/left
10. Azimuth lock Lock
11. Elevating handle Depress/elevate Cal .50
12. TC control handles Check operation

Check that
cupola traverses
smoothly

Check that
machine gun
elevates smoothly

GO TO
13

13. Gunner control handles Traverse turret (gunner)
counterclockwise
 14. TC control handles Override gunner and traverse
turret clockwise
 15. M36E1 Periscope ballistic Assure open
shield
 16. M36E1 Periscope window Clean
-
- Depress palm switch
- Use cleaning compound and lens tissue

TANK COMMANDER MASTER CHECK-OFF LIST

BEFORE OPERATIONS PMCS

(TM page 2-84)

(TM page 2-84)

Location	System	Equipment	CHECK											
			Adjustment	Clean/Clear	Damage	In Place	Leaks	Level	Missing Parts	Operation	Position	Pressure	Secure	Status
Exterior	Torsion Bars	Torsion Bars			X			X			X			
	External Fire Extinguisher Handles	Safety Wire-Lead Seals			X	X								
	Loader and TC Hatches	Hatches				X								
	Travel Lock	Hold-Open Locking Handles							X					
Loader's Station	Travel Lock	Travel Lock									X			
	Turret Lock	Turret Lock								X	X			
Gunner's Station	Manual Controls	Elevation Handle								X				
	Driver's Hatch	Traversing Handle								X				
Driver's Station	Driver's Hatch	Driver's Hatch								X	X			
	Driver's Seat	Driver's Seat	X							X				
	Backrest	Backrest	X							X				
	Dump Lever	Dump Lever	X							X				
	Driver's Escape Hatch	Escape Hatch				X								
	Plunger Bolts	Plunger Bolts									X			
Fire Extinguisher System	Manual Control Lever	Manual Control Lever								X	X			
	Handle Seal	Handle Seal			X	X								
	Three Cylinders	Three Cylinders				X								
	Lead Seal	Lead Seal			X	X								
Hydraulic Brake System	Shrunk Tubing	Shrunk Tubing			X	X								
	Shifting Lever	Shifting Lever										X		
	Pressure Gage	Pressure Gage											X	
	Brake Pedal	Brake Pedal										X		
Indicator Lamps	Master Cylinder	Master Cylinder					X							
	MASTER BATTERY	MASTER BATTERY										X		
	POWER PLANT WARNING	POWER PLANT WARNING										X		

CHECK

Location	System	Equipment	Adjustment	Clean/Clear	Damage	In Place	Leaks	Level	Missing Parts	Operation	Position	Pressure	Secure	Status
Hull	Air Cleaner Housings and Doors	Door			X	X								
		Door Fasteners			X	X								
		Housing			X									
		Door Hinges			X									
		Drain Plug				X								
	Top Deck Grille Doors	Inspection Plugs				X								
		Top Deck Grille Doors				X			X					
	Engine and Transmission Oil Level	Engine Oil (Stopped)						X						
		Transmission Oil (Stopped)						X						
		Engine Oil (Idling)						X						
		Transmission Oil (Idling)						X						
	Engine and Transmission Oil Coolers	Screens		X										
		Coolers			X		X							
	Air Cleaner Elbows, Hoses, and Clamps	Intake Hose			X	X								
		Outlet Hose			X	X								
		Intake Hose Elbow			X								X	
		Outlet Hose Elbow			X	X								
		Intake Hose Clamps			X	X								
		Outlet Hose Clamps												
	Air Cleaner Blower Motors	Air Cleaner Blower Motors								X				
		Restriction Indicators			X	X								
	Restriction Indicators	Pipe Plug			X	X								
		Window		X										

TANK COMMANDER MASTER CHECK-OFF LIST
DURING OPERATIONS PMCS
(TM page 2-101)

(TM page 2-101)

Location	System	Equipment	CHECK												
			Adjustment	Clean/Clear	Damage	In Place	Leaks	Operation	Position	Pressure	Secure	Status			
Driver's Station	Idle Speed/Accelerator Control	Engine Speed at Idle											X		
		Accelerator Control												X	
	Gages	Engine Speed After Acceleration												X	
		Power Plant Warning Light												X	
		Battery - Generator												X	
Loader's Station	Controls	Engine Oil Pressure												X	
		Engine Oil Temperature												X	
		Transmission Oil Pressure												X	
		Transmission Oil Temperature												X	
		Steering Control											X		
	Ammunition Stowage Racks/Ammunition Ready Racks	Shifting Control											X		
		Brake Pedal													
		Stowage Rack Tubes and Retainers			X										
		Ready Rack Locks			X	X									
		Cushioning Pads			X										
Commander's Station	Seat		X						X						
	Intercom/Radio		X						X						
	Cupola Azimuth and Elevation Controls	Azimuth Lock													
		Azimuth Interlock													
		Manual Traversing Handle													
		Manual Elevating Handle													
		Palm Switch													
Turret Power Controls	Control Handles														
	Outside Window		X												

TANK COMMANDER MASTER CHECK-OFF LIST

AFTER OPERATIONS PMCS

(TM page 2-110)

CHECK

Location	System	Equipment	Chunking/ Separation	Damage	Heat	In Place	Leaks	Missing Parts	Seated	Secure	Wear
Exterior/ Track	Rear Grille Doors	Rear Grille Doors		X		X		X		X	
	Final Drive	Final Drive/Sprocket Bottom					X				X
		Mounting Studs									
		Final Drive Hubs			X						
		Sprockets	Sprockets		X						X
	Roadwheels and Hubs	Roadwheels	X			X					X
		Mounting Holes									
		Hubs			X						
		Inside Wheel Rims				X					
	Roadwheel Arms	Roadwheel Arms		X		X					
	Shock Absorbers	Shock Absorbers		X			X	X			
	Track Support	Track Support Rollers	X			X				X	
	Rollers and Hubs	Support Roller Hubs			X						
		End Connectors			X		X				X
		Bolts					X				X
		Wedges					X			X	X
	Track Center Guides	Track Center Guides		X		X				X	
	Track Pads	Track Pads	X			X				X	
	Track Adjusting Links	Link Assembly		X		X					
		Cotter Pin				X					
		Pins				X					
		Shoes			X						X
	Compensating Idler Wheels and Hubs	Inside Wheel Rims					X				
		Hub			X						

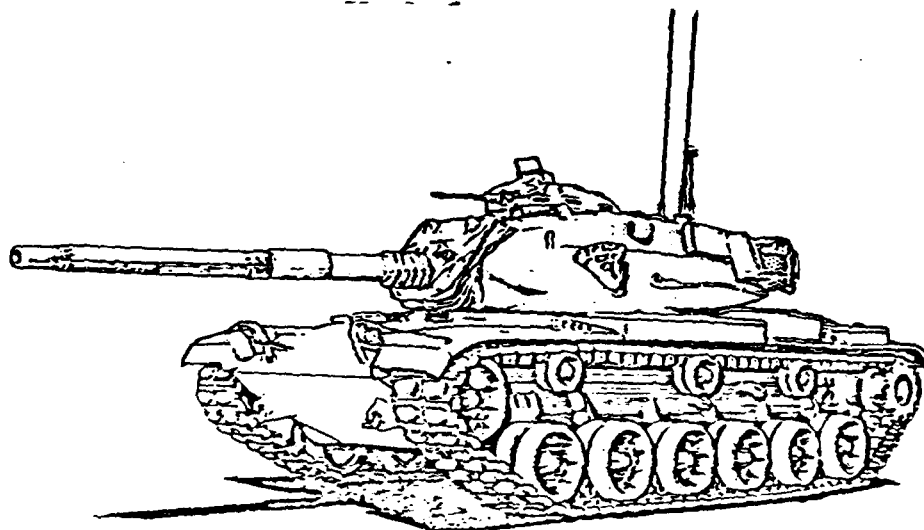
CHECK

Location	System	Equipment	Adjustment	Clean/Clear	Damage	In Place	Leaks	Operation	Position	Pressure	Secure	Status
Gunner's Station	Seat	Seat	X			X		X				
	Fire Control Quadrant/Light Source Control	Scale		X								
		Index		X					X			
		Level Vial Cover										
		Level Vial			X				X			
		Light Source Control										
	Azimuth Indicator	Glass Cover			X				X			
		Rheostat										
		Hydraulic Fluid						X				
		Turret Power Controls/Hydraulic Power							X		X	
Control Handles												
Gunner's Sights	Periscope Window			X								
	Telescope Lens			X								

GUNNER

PROCEDURE GUIDES

M60A3 TANK



July 1982

**PREPARED BY THE U.S. ARMY RESEARCH INSTITUTE
FOR THE
BEHAVIORAL AND SOCIAL SCIENCES**

GENERAL INFORMATION

This booklet contains M60A3 gunner procedures guides. Each guide is for a single pre-operation, post-operation, or during operation activity. Each guide is matched to TM 9-2350-253-10 (Operator's Manual for Tank, Combat, Full-Track: 105-MM Gun, M60A3).

PURPOSE OF PROCEDURE GUIDES

The guides in this booklet will not take the place of the M60A3 Operator's Manual or M60A3 training materials. The guides will aid you in remembering long or difficult sets of procedures. In short, the guides will help to "jog your memory."

USE OF THIS BOOKLET

The Table of Contents (on the next page) lists the procedure guides in this booklet. Each guide gives you a step-by-step outline for completing an activity. The following instructions will help you to better use each guide.

1. Some steps within a procedure are followed by a page number. On that page you will find a detailed breakdown of the step.
2. Some of the procedure guides include a question(s). Each question is stated inside a diamond shape. Your "yes" or "no" to the question will show you which path to follow.
3. Some paths lead to an instruction to go to a particular step number within a procedure. The step number is given within a circle.
4. Some steps within a procedure guide are followed by a box. In the box you will find more information on the step or a caution/warning.
5. Certain steps within a procedure guide require that a knob or switch be turned to a certain position. In some cases, that position might be written like the symbol to the left. The symbol means that a light should also come on.
6. At the beginning of each procedure, the TM page number reference for the procedure is given under the task name. These references will help you if you need more information to complete the task.
7. Two procedures are listed for boresighting with a boresighting device (taken from TRADOC Training Text 17-12-1) and without such a device (procedure in the Operator's Manual). Note that if a boresighting device is used, the zeroing procedure is not performed.

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OPERATING TANK THERMAL SIGHT (TTS)
(TM PAGE 2-236)

THE INFRARED OPTICS OF THE GUNNER'S PERISCOPE CONTAIN ANTIREFLECTIVE COATING WHICH IS SLIGHTLY RADIO-ACTIVE. DO NOT SWALLOW OR INHALE.

1. PMCS Assure complete (crew)

(driver)

ON

2. MASTER BATTERY

(TC)

TEST

3. MODE on LRF

To prevent accidental firing of LRF

4. POWER on gunner's control unit

ON

Lift cover switch

ALWAYS LEAVE 4CB1 (CIRCUIT BREAKER) ON TTS POWER CONVERTER SET TO ON.

5. MODE on TTS

STBY

GO TO 6

6. COOL indicator Will light until thermal detector has cooled (< 15 mins)

THERMAL CHANNEL DISPLAY MAY BE USED BEFORE BITE DISPLAY COOL LAMP GOES OUT, BUT SYSTEM OPERATES BEST AFTER COMPLETE COOLDOWN.

7. Ballistic shield Open
cover

Press pushbutton
to open/release
to lock

8. Daylight channel Adjust
headrest

Pull down lever
to adjust/release
to lock

9. Unity power window Assure view is sharp
and clear

10. RTCL control Adjust until unity power
reticle is visible

11. Daylight channel Obtain image
eyepiece

12. Diopter ring Rotate to sharpen image

13. RTCL control Adjust until daylight
channel reticle is visible

GO TO
14

Push up to
selected band
color

Lever must
point forward
to prevent
parallax

14. Filter selector lever Select desired filter color

15. Filter selector lever Lock in place

16. COOL indicator Assure off

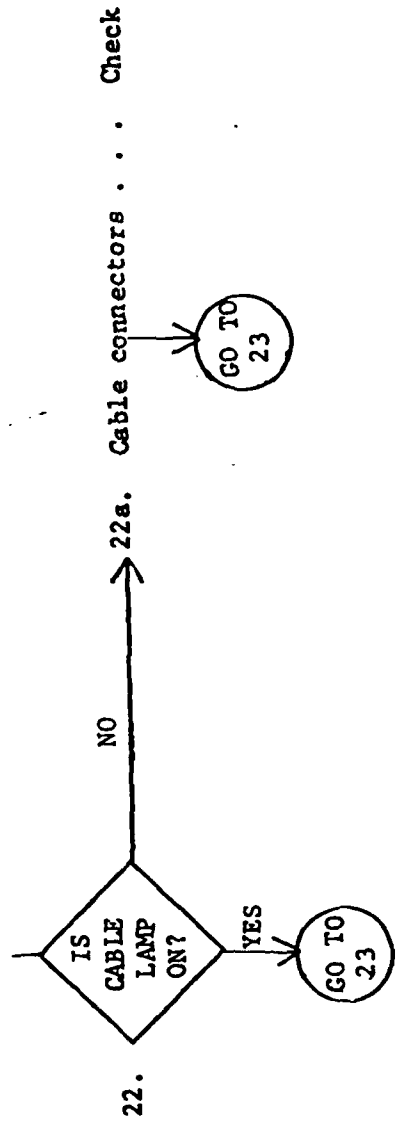
17. MODE on TTS ON

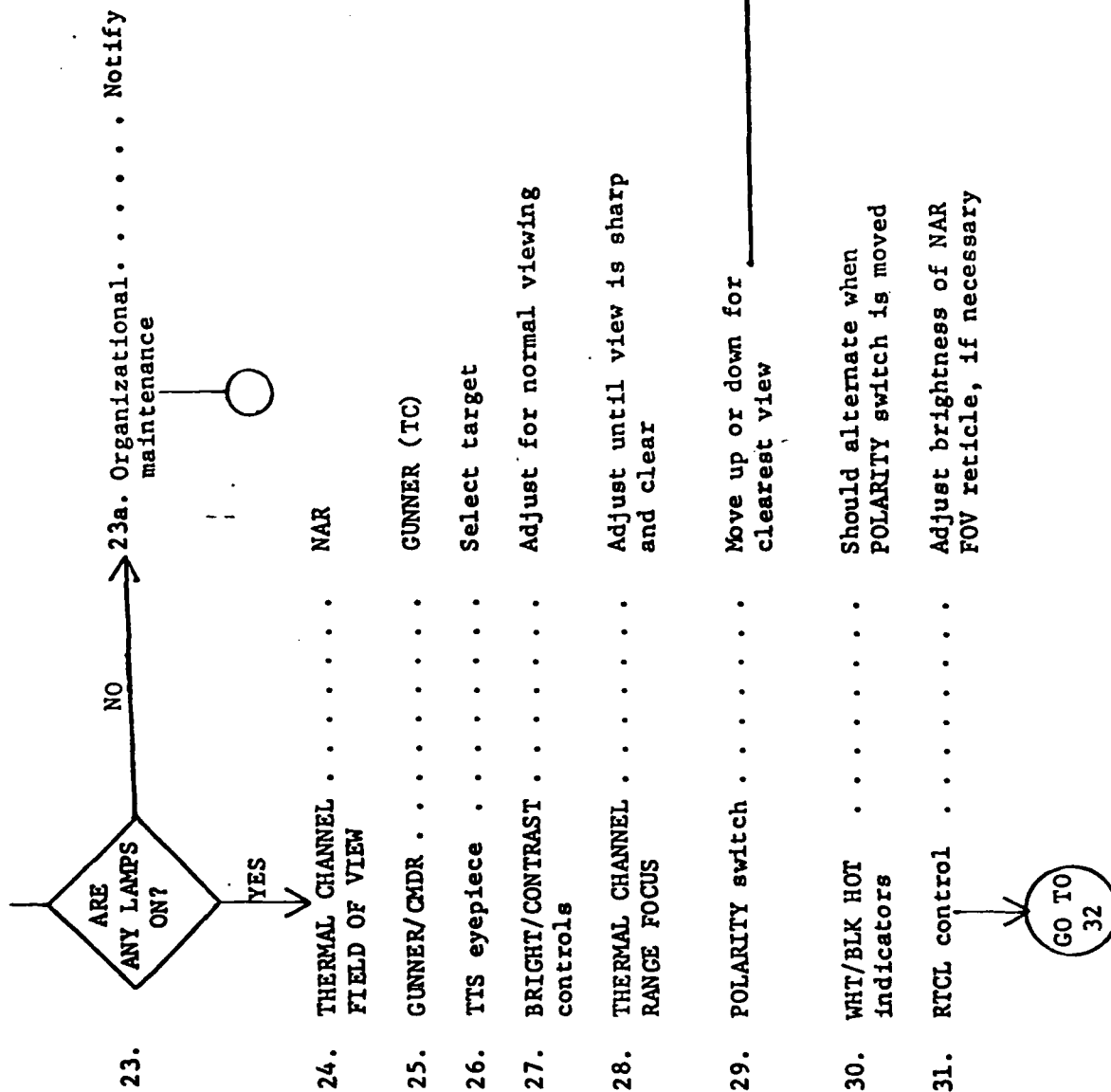
18. BITE test switch — LAMP TEST —

19. BITE lamps All should light

20. BITE test switch SYS TEST

21. BITE lamps None should light

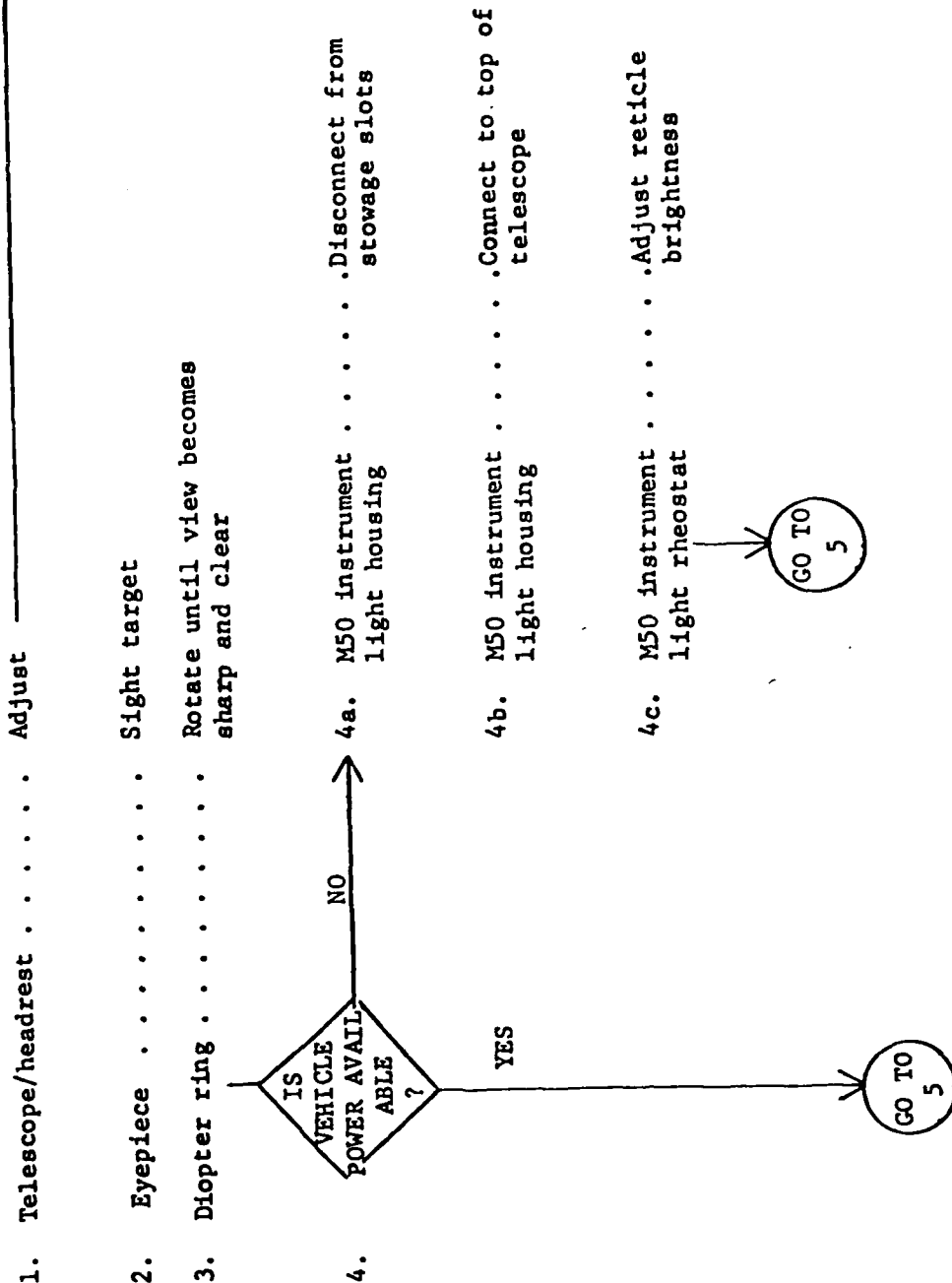


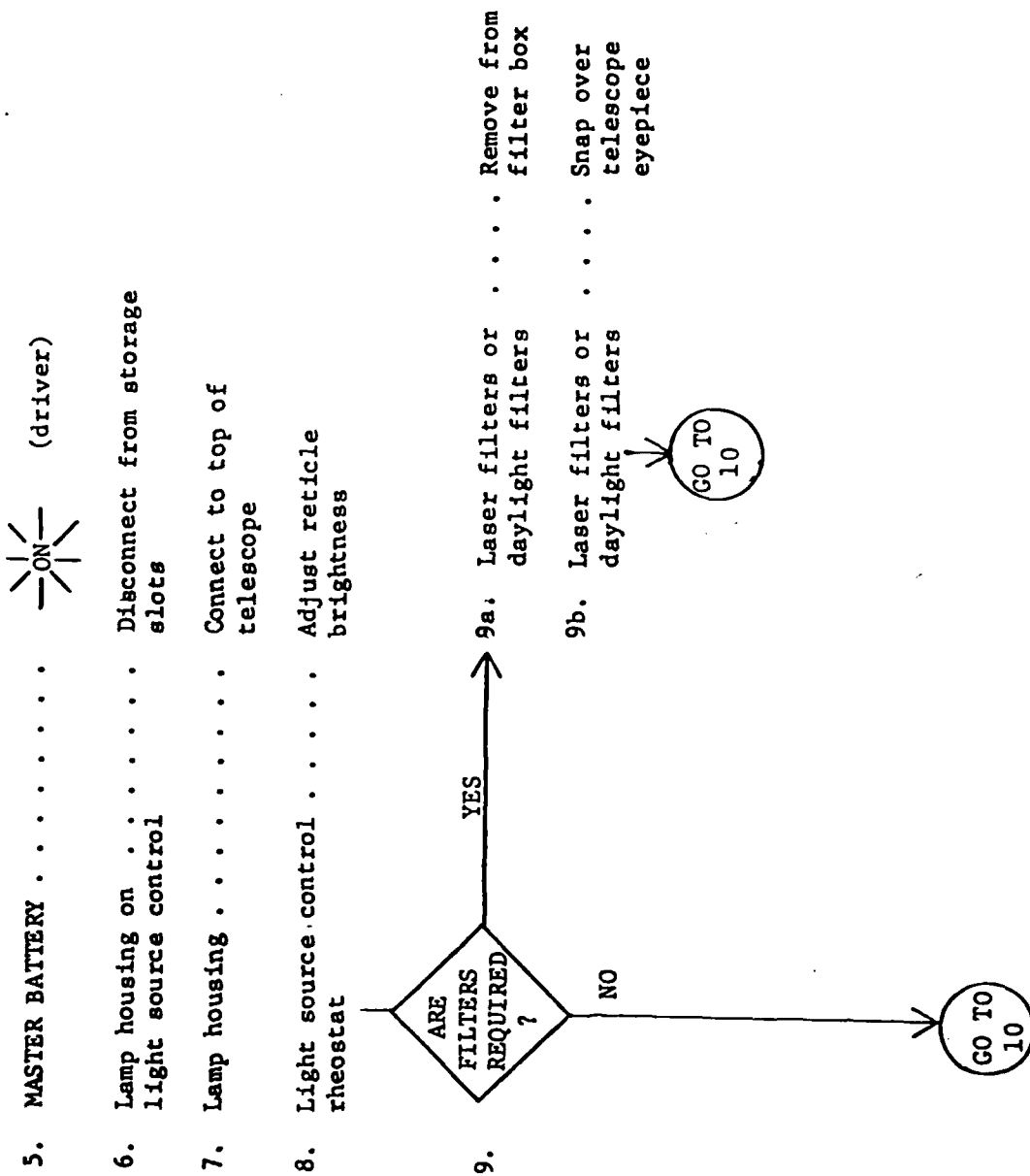


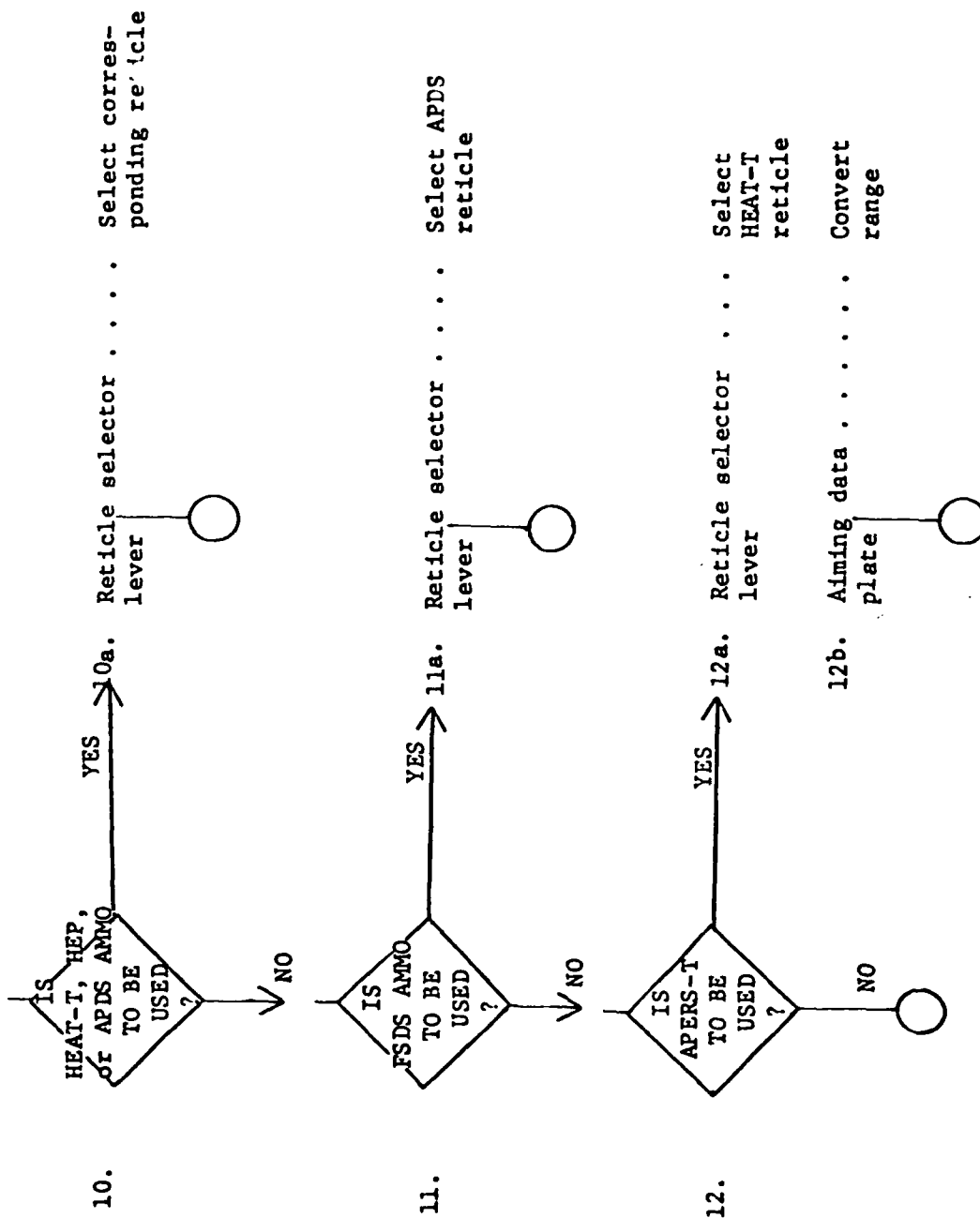
32. THERMAL CHANNEL WIDE
FIELD OF VIEW
33. BRIGHT/CONTRAST Readjust if necessary
controls
34. WFOV indicator Assure on
35. RTCL control Adjust brightness of WIDE
FOV reticle, if necessary
36. Commander's display eyepiece Should have same image (TC)
as gunner's display
37. GUNNER/CMDR CMDR (TC)
38. BRIGHT Should control brightness (TC)
39. CONTRAST Should control contrast (TC)
40. POLARITY Should interchange light (TC)
and dark portions of image
41. GUNNER/CMDR GUNNER (TC)
42. MODE on TTS STBY

OPERATING TELESCOPE M105D (TM PAGE 2-225)

Loosen retaining knob to adjust/tighten to secure in place







COMPUTER SELF-TEST
(TM PAGE 2-254)

THE 105-MM GUN MAY MOVE WHEN ELEV/TRAV
POWER SWITCH IS ON AND LAMP/NORMAL/SYSTEM
SWITCH IS SET IN OR OUT OF SYSTEM OIL LAMP.

DO NOT PERFORM LRF SYSTEM SELF-
TESTS WHILE PERFORMING COMPUTER
SELF-TEST.

1. MODE on LRF

—TEST— (TC)

2. MASTER BATTERY

—ON— (driver)

3. POWER on gunner's
control unit

—ON—

4. LIGHTS

Vary brightness

Panel lights
should vary smoothly
from dim to bright

5. LIGHTS

Adjust to normal
brightness

GO TO
6

Indicators should
vary smoothly
in brightness

6. DIM/BRIGHT controls Vary brightness
on ammo select units
7. HEAT ammo switch Assure in M456 position
8. LAMP/NORMAL/SYSTEM

9. SELF TEST and All should illuminate
SENSOR FAIL indicators
10. MANUAL/RANGEFINDER MANUAL
11. LAMP/NORMAL/SYSTEM

12. OK indicator Should illuminate
13. STATIONARY or MOVING Assure that one or the other
indicators on ammo select units
indicator is illuminated
14. MOVING/STATIONARY
switch on either unit


GO TO
15

- | | | |
|--|---|---|
| 15. MOVING/STATIONARY
switch on gunner's
unit | —STATIONARY— | STATIONARY
should illuminate
on both units |
| 16. MOVING/STATIONARY
switch on commander's
unit | —MOVING— | MOVING should
illuminate on
both units |
| 17. MOVING/STATIONARY
switch on gunner's
unit | —STATIONARY— | STATIONARY should
illuminate on
both units |
| 18. MOVING/STATIONARY
switch on commander's
unit | —MOVING— | MOVING should
illuminate on
both units |
| 19. Gunner's ammo select . . .
unit switches | Depress each of the
four in sequence | Pressed switch
should be brighter
than other three
on both units |
| 20. Commander's ammo
select unit switches | Depress each of the
four in sequence | Pressed switch
should be brighter
than other three
on both units |
| 21. MANUAL/RANGEFINDER
RANGEFINDER | | |

GO TO
22

WIND SENSOR MUST BE INSTALLED AND OPERABLE FOR A COMPLETE TEST. THE WIND SENSOR FAIL INDICATOR WILL LIGHT IF MANUAL WIND IS SELECTED OR IF WIND SENSOR IS NOT INSTALLED AND PROPERLY CONNECTED.

22. Ammo select unit Select ammo type

23. LAMP/NORMAL/SYSTEM

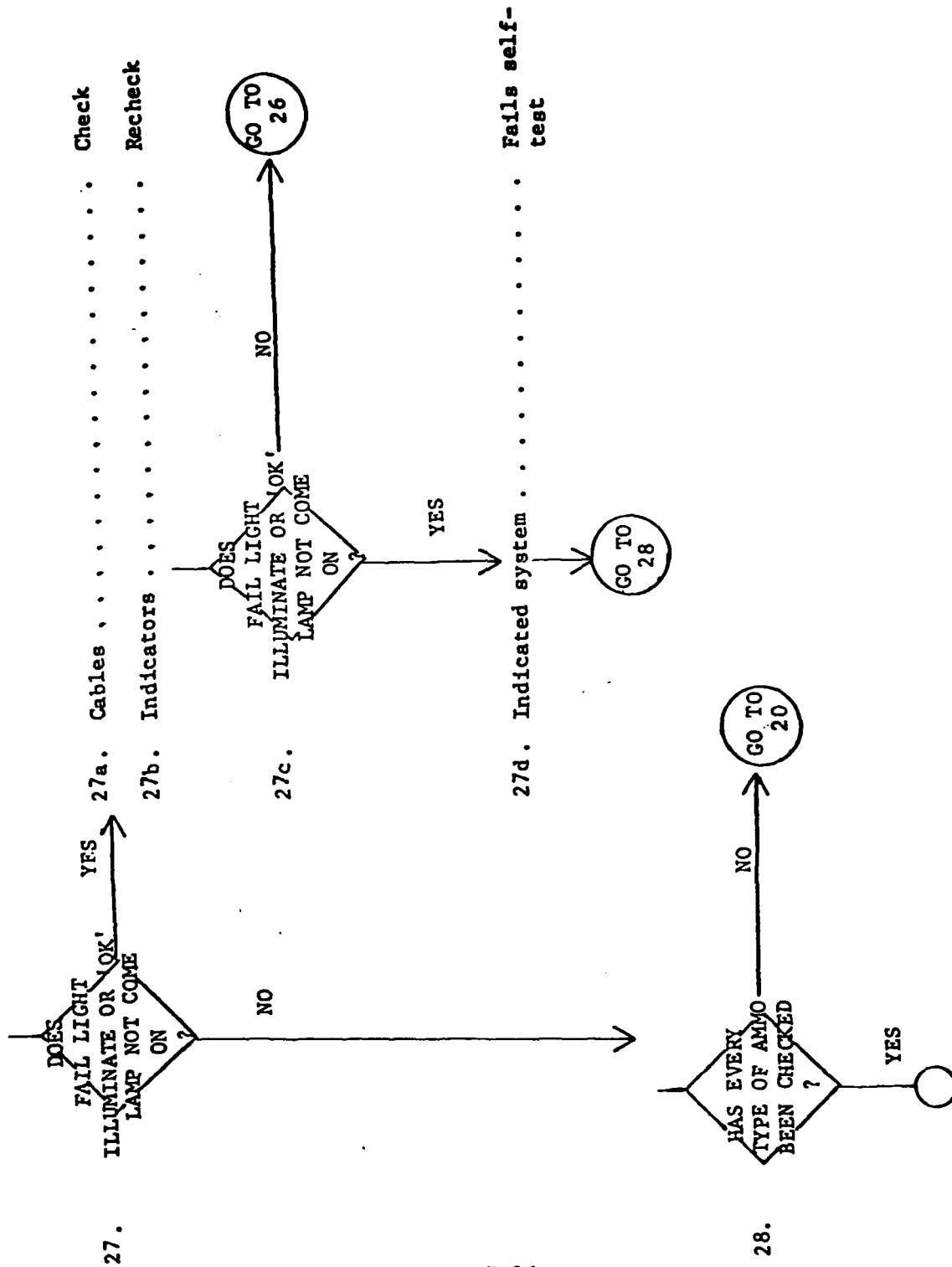


24. OK indicator Should illuminate

25. RANGE (METERS) Should indicate 1850 $\pm$ 15

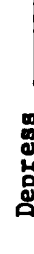
26. RETURN Should indicate 2

GO TO
27



OPERATIONAL RESPONSE TEST:
(TM PAGE 2-258)

RATE TACHOMETER AND LEAD CIRCUITRY

1. MODE on LRF  TEST — (TC)
2. MASTER BATTERY  ON — (driver)
3. POWER on gunner's control unit  ON —
4. MANUAL/RANGEFINDER MANUAL
5. RANGE METERS X100 20
6. CROSSWIND AUTO/MANUAL MANUAL
7. CROSSWIND MPH 0 MPH
8. MOVING/STATIONARY  STATIONARY —
9. HEAT switch Depress 

Heat switch
should become
brighter than
other three

GO TO
10

10. Obstructions Clear from tank and surrounding area

MAKE SURE CREW IS IN SAFE POSITION BEFORE OPERATING GUN ELEVATING AND TURRET TRAVERSING CONTROLS.

11. Gun tube Release from travel lock

12. Travel lock Stow

13. Turret Unlock

14. Engine Start (driver)

Set speed at 800-900 rpm

B-18

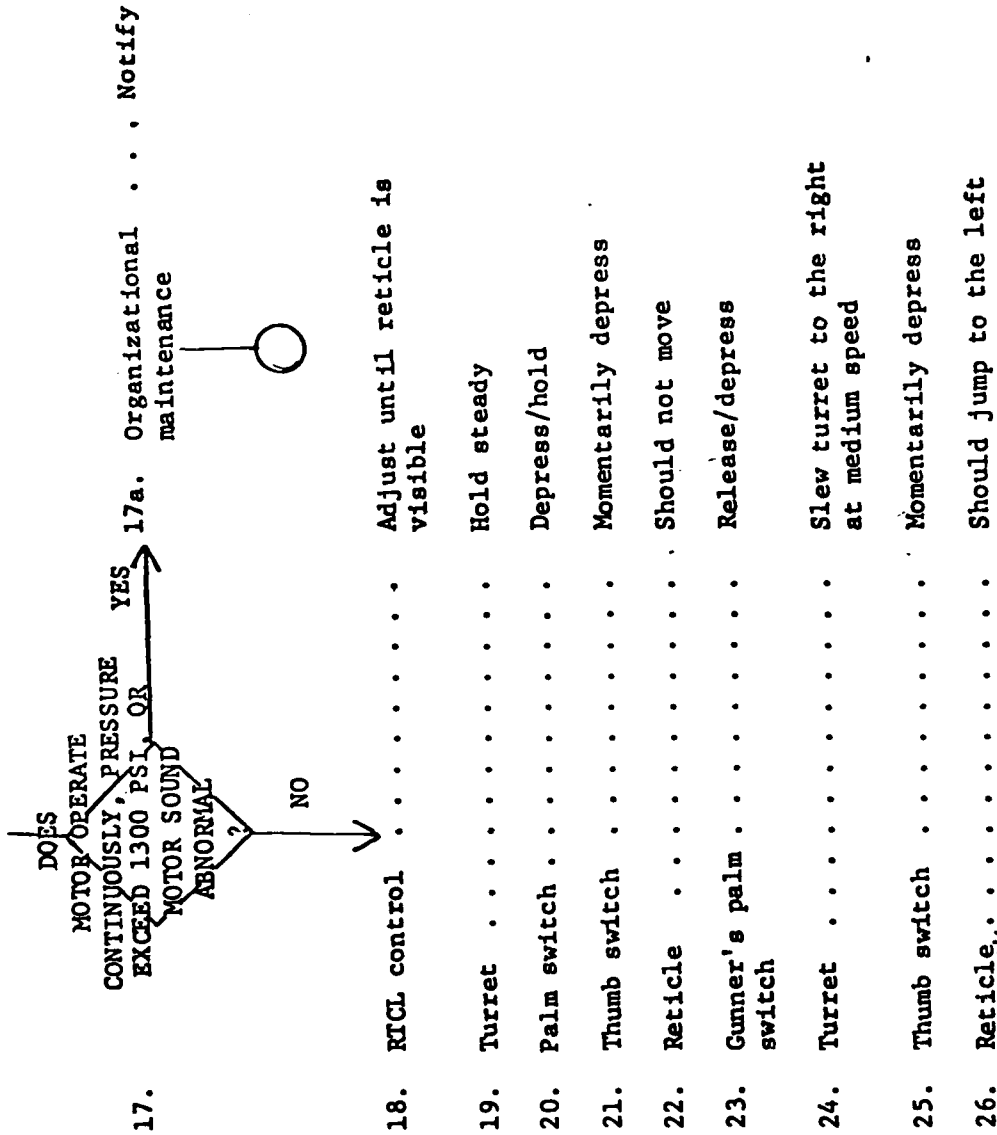
MAKE SURE MANUAL TRAVERSING HANDLE LOCKING LEVER IS IN DETENT POSITION.

15. ELEV/TRAV POWER

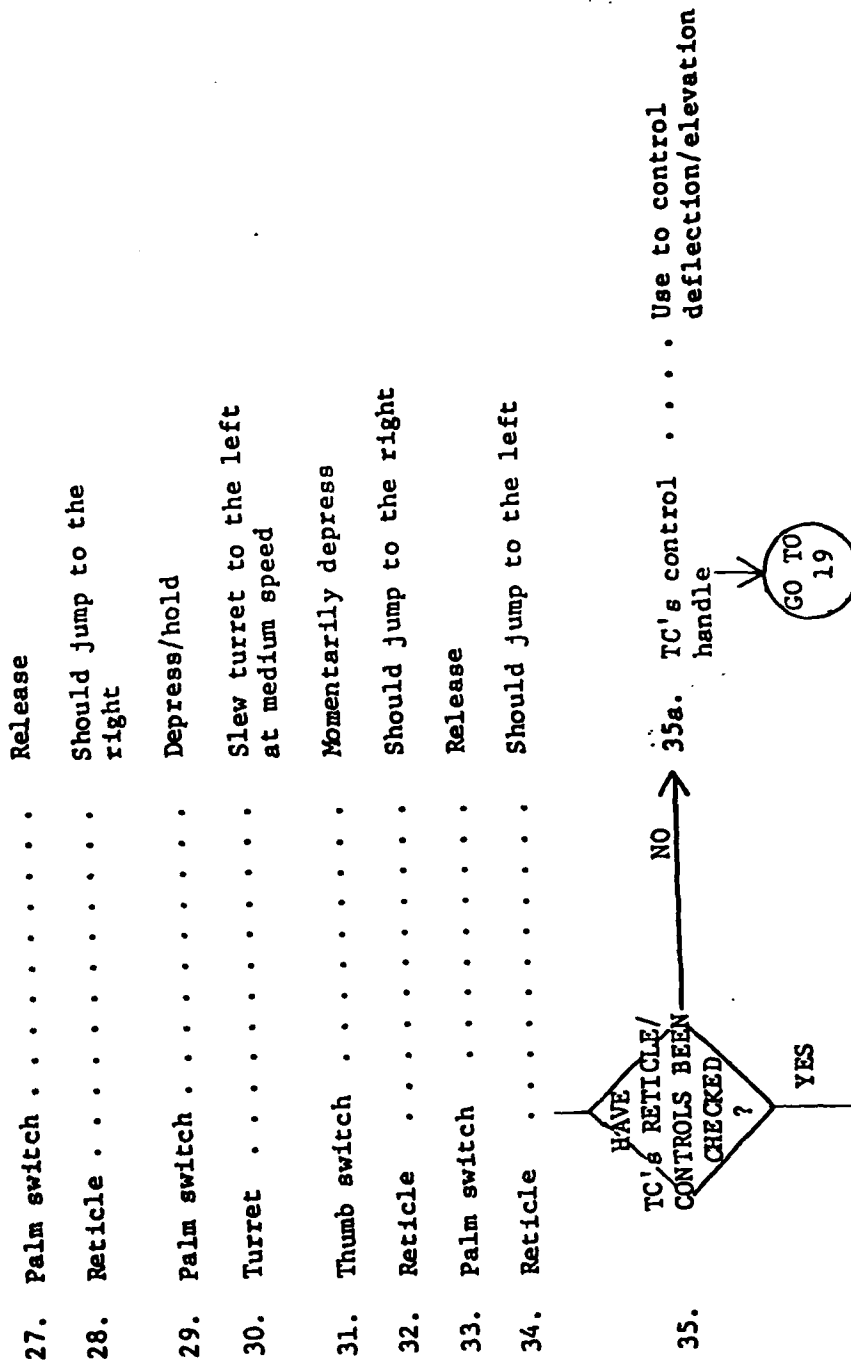


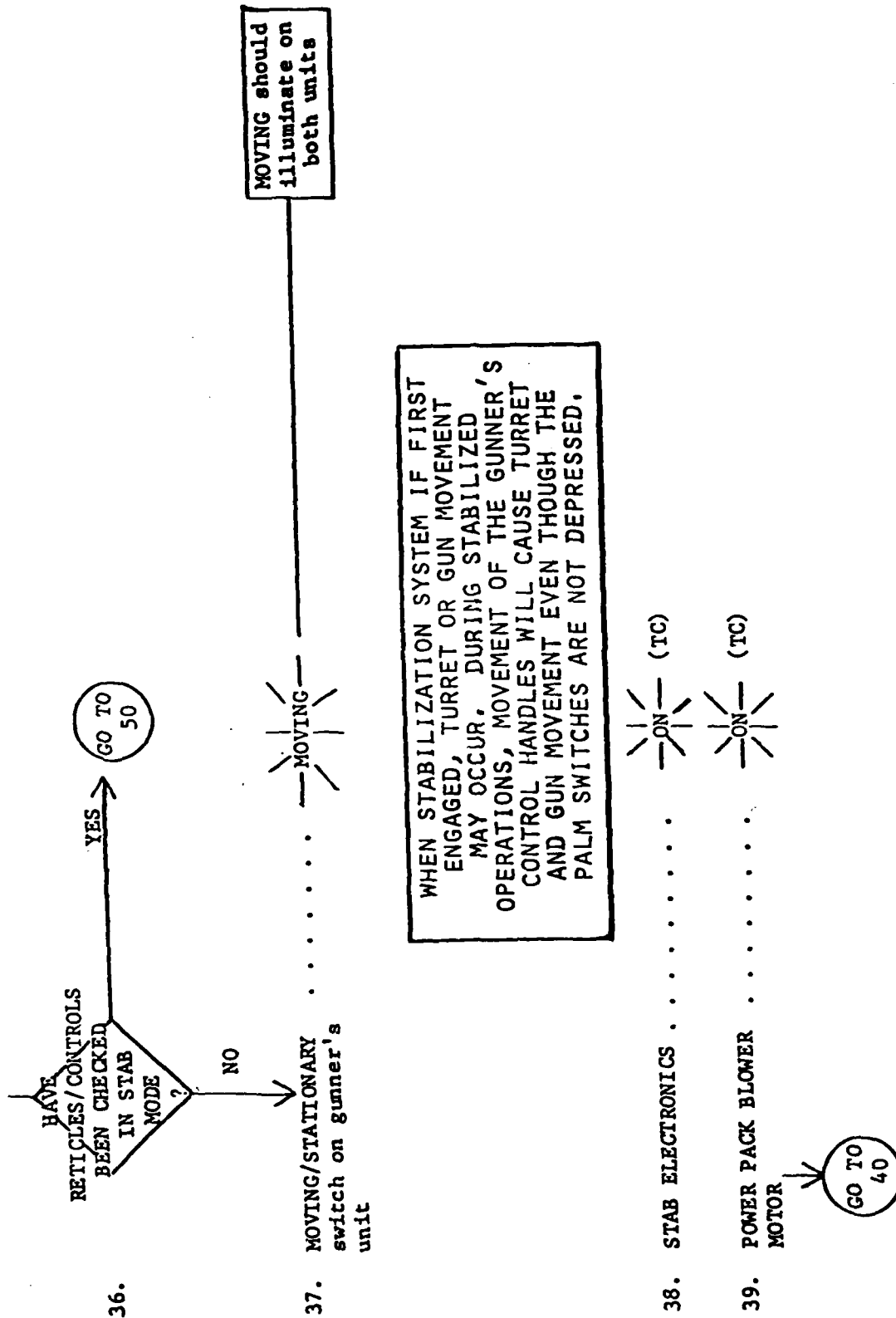
16. Turret hydraulic Should run until accumulator pressure gage reads 1175-1275 psi

GO TO 17



GO TO
27





40. POWER on Stabiliza-
tion control selector
41. Gunner Announces: STAB
42. STAB
43. STAB SHUT-OFF Should be on
indicators at TC
and loader's stations
- Wait 15 seconds
- System is operational
when green STAB
indicator lights

DO NOT OPERATE STABILIZATION SYSTEM
UNLESS POWER PACK BLOWER MOTOR
COMES ON,

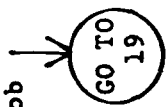
A DRIFT RATE OF 2 MILS/MIN IS AC-
CEPTABLE AFTER ADJUSTING BOTH TRAV
BALANCE AND ELEV BALANCE KNOBS.

44. TRAV BALANCE Rotate clockwise until
knob drift occurs/note position

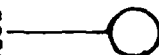
GO TO
45

45. TRAV BALANCE Rotate counterclockwise
knob until drift occurs/
note position
46. TRAV BALANCE Set halfway between
knob first and second position
47. ELEV BALANCE Rotate clockwise until
knob drift occurs/note
position
48. ELEV BALANCE Rotate counterclockwise
knob until drift occurs/
note position
49. ELEV BALANCE Set halfway between
knob first and second position

B-23



50. POWER on stabiliza- OFF
tion control
selector



OPERATIONAL RESPONSE TEST:
(TM PAGE 2-276)

WIND SENSOR TEST

1. MODE on LRF ~~TEST~~ (TC)
2. MASTER BATTERY ~~ON~~ (driver)
3. POWER on gunner's control unit ~~ON~~
4. ELEV/TRAV POWER ~~ON~~
5. MOVING/STATIONARY ~~STATIONARY~~
6. Ammo select unit ~~HEP/WP~~
7. MANUAL/RANGEFINDER MANUAL
8. RANGE METERS X100 30
9. CROSSWIND AUTO/MANUAL MANUAL

GO TO
10

10. CROSSWIND MPH 0 MPH
11. Tank Position in left-to-right crosswind
12. Gunner's control Lay vertical bar of 8 X daylight reticle on distant handles target
13. CROSSWIND MPH 5 MPH from the left
14. Reticle Should move to the right
15. CROSSWIND MPH 0 MPH
16. Reticle Should return to aiming point
17. CROSSWIND AUTO/ AUTO
MANUAL
18. Reticle Should move to the right
19. CROSSWIND AUTO/ MANUAL
MANUAL
20. Reticle Should return to aiming point

GO TO
21

MAKE SURE SURROUNDING AREA IS
CLEAR FOR 360° OF TURRET TRAVERSE

21. Turret Traverse 180°
22. Gunner's control Lay vertical bar of
handles 8X daylight reticle on
distant target
23. CROSSWIND MPH 5 MPH from the right
24. Reticle Should move to the left
25. CROSSWIND MPH 0 MPH
26. Reticle Should return to aiming
point
27. CROSSWIND AUTO/
MANUAL AUTO
28. Reticle Should move to the left
29. CROSSWIND AUTO/
MANUAL AUTO
30. Reticle Should return to aiming
point

BORESIGHTING WITH MUZZLE BORESIGHT DEVICE

(TT 17-12-1)

Prepare



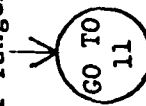
1. ELEV/TRAV POWER
2. Tank position Level
3. All weapons Clear
4. Main gun breech Open
5. Engine Assure off
6. Target 1200 meters
7. Ballistic drive Down/Locked
coupling lever

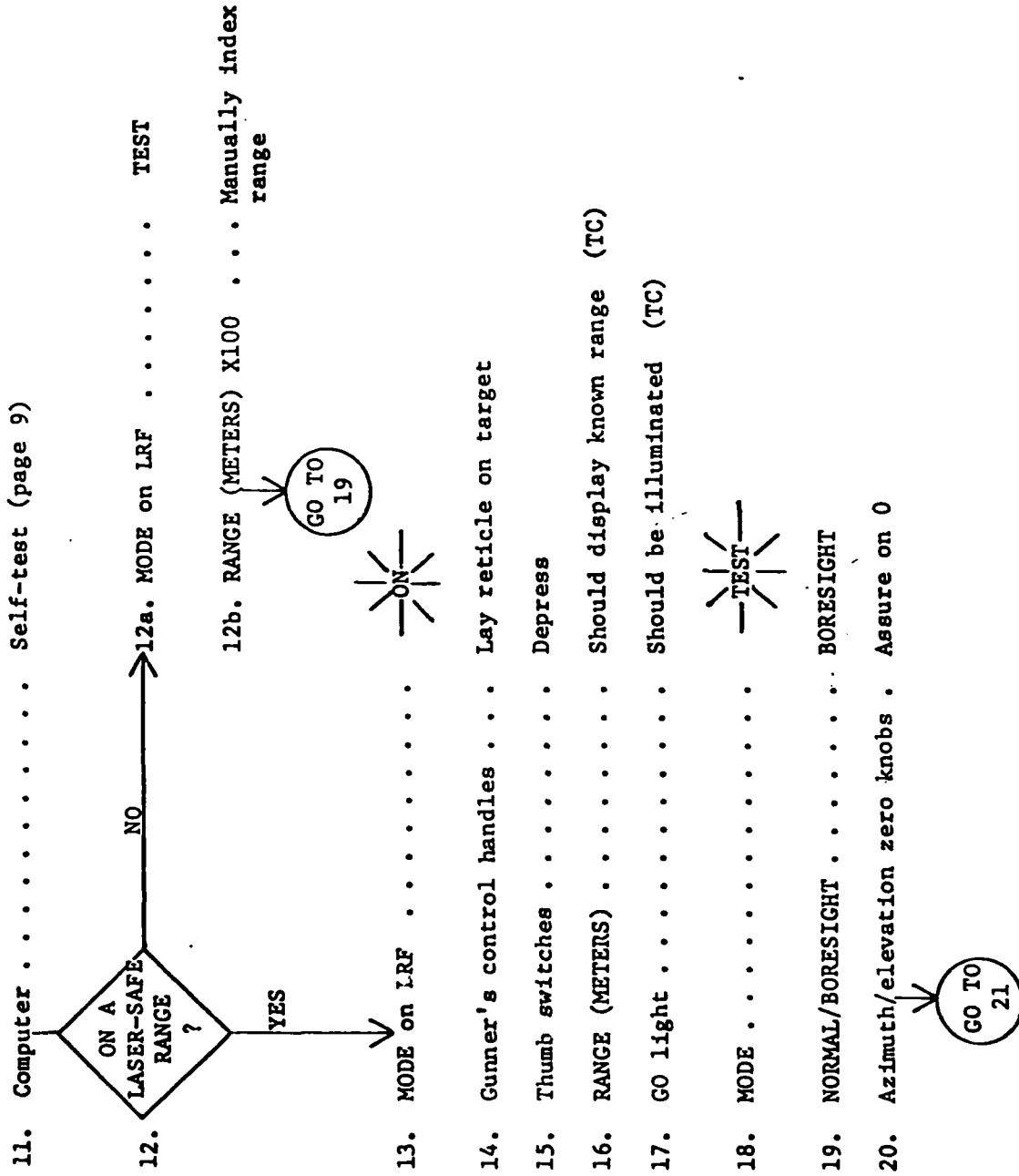
Lever must
point forward,
away from gunner

8. Filter select lever Locked into position



9. POWER on gunner's control unit
10. Laser rangefinder Self-test (TC)





21. CROSSWIND AUTO/MANUAL MANUAL

22. CROSSWIND knob Assure on 0

23. Boresight device Insert

Assure plunger is at
12 o'clock position

Adjust Daylight Channel of TTS

24. Gunner's control handles . . . Lay reticle aiming dot on target aiming point

25. Boresight eyepiece Sight target (TC)

26. Gunner's control handles . . . Traverse and elevate as directed by TC to lay boresight dot on target aiming point

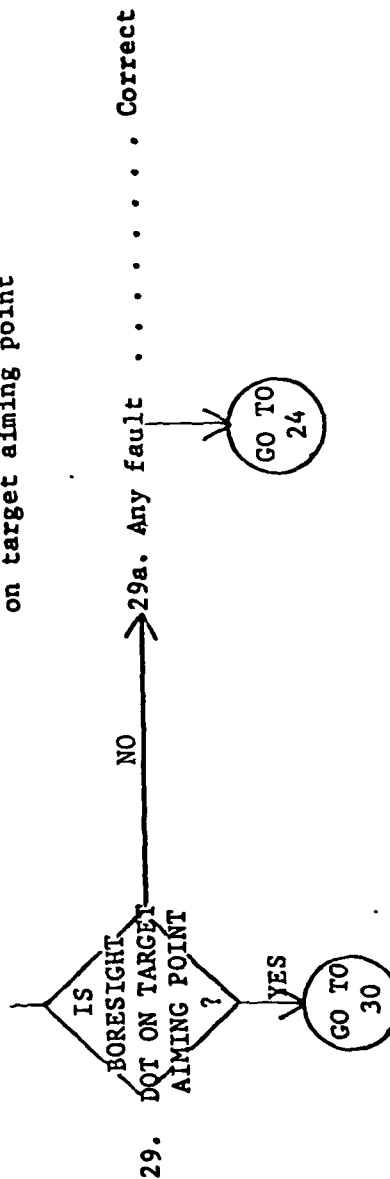
Last movement of
gun must be up

27. Boresight knobs Adjust so that reticle aiming dot is again on target aiming point

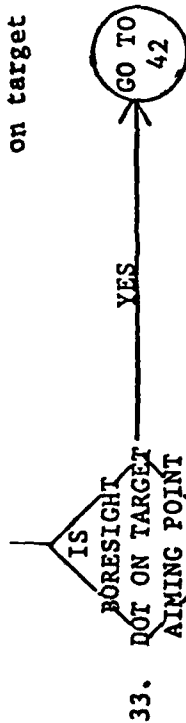
Assure knobs
are seated after
adjusting

28. Gunner's control handles . . . Traverse and elevate off the target/re-lay reticle on target aiming point

Finish with
upward movement



30. Boresight scales Set on 4 and 4
31. Boresight device Remove/rotate 180°/reinstall
32. Gunner's control handles Traverse and elevate off the target/re-lay reticle on target aiming point



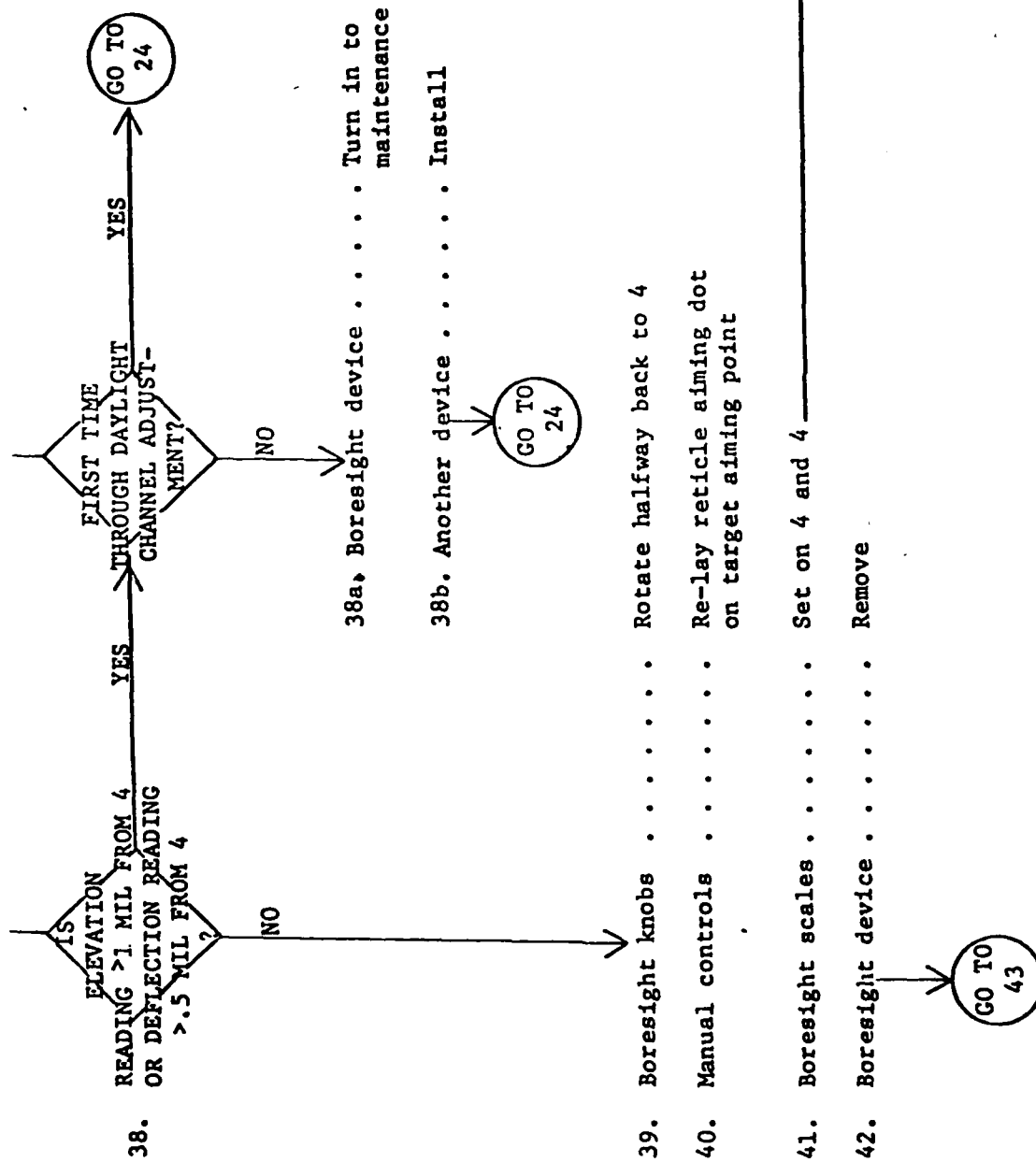
34. Boresight eyepiece Sight target (TC)
35. Gunner's control handles Traverse and elevate as directed by TC to lay boresight dot on target aiming point

Last movement of gun must be up

36. Boresight knobs Adjust so that reticle aiming dot is again on target aiming point

37. Gunner Announce boresight knob readings





Adjust the M105D Telescope

43. M105D Telescope Prepare for operation
(Page 6)

44. Reticle selector Move to full-left or
full-right position

45. Boresight knobs Adjust boresight cross
on target aiming point

46. Boresight scales Set on 3 and 3

Adjust the Laser Rangefinder (LRF)

47. BATL RNG Press

48. Gunner's sight Assure on target aiming point

49. 6X/12X switch 12X

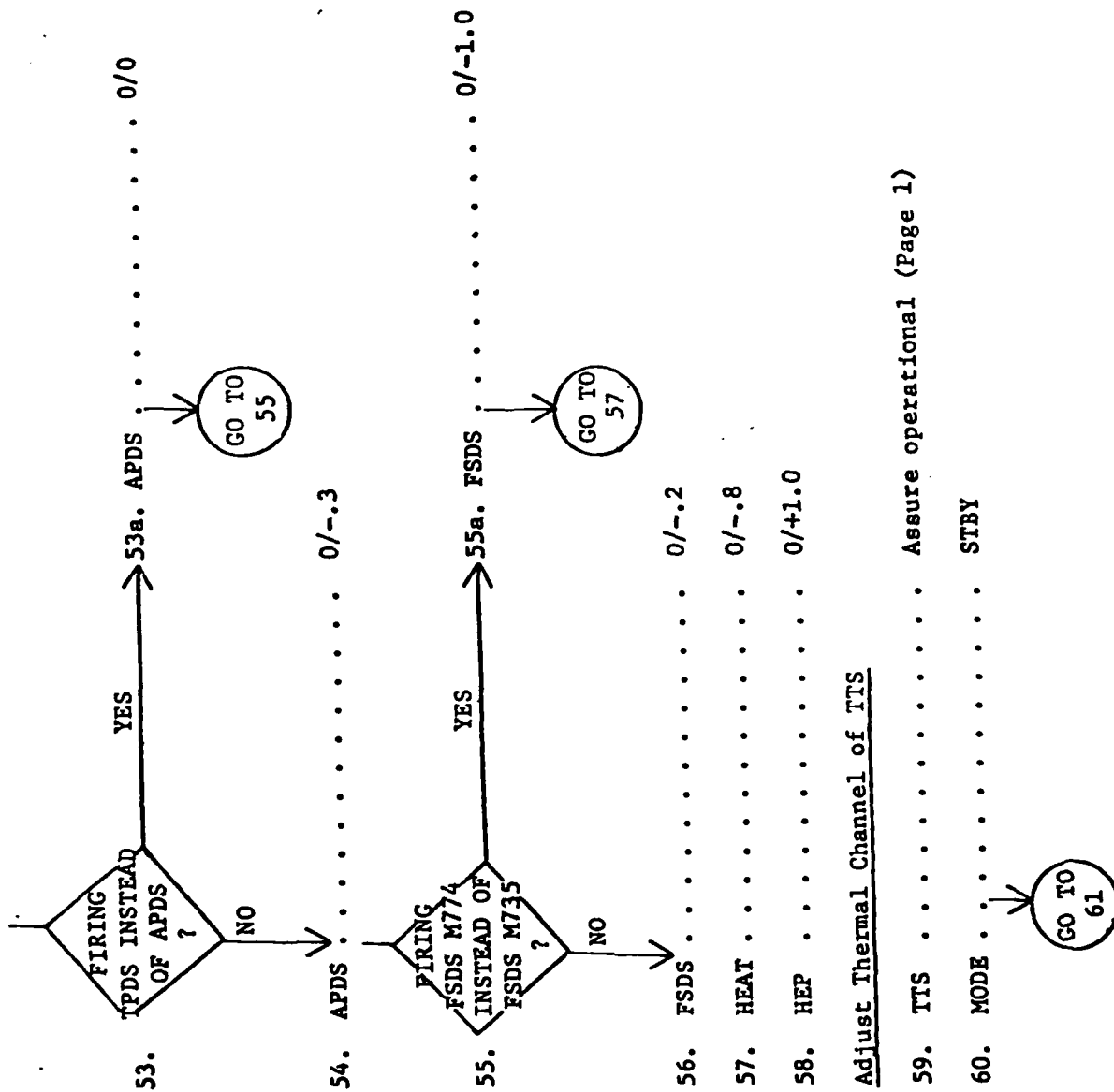
50. LRF boresight knobs Adjust reticle on target
aiming point

51. Boresight scales Set on 4 and 4

Apply Computer Correction Factors

52. COMMON ZERO 0/0 (azimuth/elevation)

GO TO
53



61. GUNNER/CDR GUNNER (TC)
62. COOL indicator Assure off
63. MODE ON
64. THERMAL CHANNEL NAR
FIELD OF VIEW
65. THERMAL CHANNEL Adjust for sharpest view
RANGE FOCUS
66. BRIGHT/CONTRAST controls Adjust for normal scene
67. POLARITY switch Set for best image
68. RTCL control Adjust until reticle is
just visible
69. Thermal channel eyepiece Sight target
70. THERMAL CHANNEL Lay reticle aiming dot on
BORESIGHT EL/AZ target aiming point
71. Boresight scales Set on 4 and 4
72. Zeroing procedure Do not perform

Assure aiming dot
does not move

BORESIGHTING WITHOUT MUZZLE BORESIGHT DEVICE

(TM PAGE 2-345)

Preliminary Procedure

1. Tank Level ground

2. Cross-threads Place on muzzle end of
gun tubeThreads should be
directly over
witness marks

3. Target 1200 meters

4. Breechblock crank stop Assure rearward

BREECHBLOCK OPERATING HANDLE IS UNDER SPRING
TENSION UNTIL BREECHBLOCK IS FULLY OPENED
AND LOCKED BY EXTRACTORS.5. Breechblock operating Pull rearward/down
handle

Depress plunger

FAILURE TO RETURN OPERATING HANDLE TO
LATCHED POSITION MAY CAUSE INJURY TO
PERSONNEL OR DAMAGE TO CLOSING
MECHANISM WHEN BREECHBLOCK IS CLOSED.

6. Operating handle Return to latched position

GO TO
7

Trip extractors using
empty case or
wooden block

Close

7. Breech

KEEP HANDS CLEAR OF BREECH.

Depress and
move plunger
to the right

Release

8. Firing pin spring

Turn counter-
clockwise until
lug aligns with
grooves

Remove

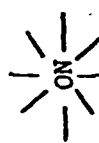
9. Spring retainer

Pry out with
screwdriver blade

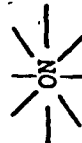
Remove

10. Firing pin/retractor
guide/retractor

(driver)



11. MASTER BATTERY



12. POWER on gunner's
control unit

IF THERE IS APPARENT RETICLE MOTION
DURING BORESIGHTING, INCREASE ENGINE
RPM OR TURN ENGINE OFF.

GO TO
13

13. LRF self-test Perform (TC)

14. Computer self-test Perform (page 9)

15. MODE on LRF  TEST

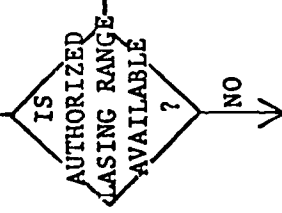
16. NORMAL/BORESIGHT BORESIGHT

17. Right section of Place over firing pin hole
ML7A1 binocular

18. Manual traversing and Lay axis of gun on
elevating controls target aiming point

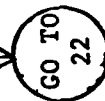
Lay gun from
left to right and
low to high without
overtravel

19. TTS Prepare for operation
(page 6)

20.  IS AUTHORIZED LASING RANGE AVAILABLE? YES GO TO 30 NO

Manual Range Procedure

21. MANUAL/RANGEFINDER MANUAL

 GO TO 22



22. MODE on LRF
23. RANGE (METERS) Should display 0000
24. RANGE METERS X100 Dial to target distance
25. RETICLE BRIGHTNESS Adjust until reticle is just visible
26. 6X/12X 12X
27. DEFLECTION and ELEVATION Lay reticle on target aiming point controls
28. Slip scales Set on 4 and 4
29. Reticle/crossthreads Assure on target aiming point

M105D Telescope Boresight Procedure

30. M105D Telescope Prepare for operation (page 6)

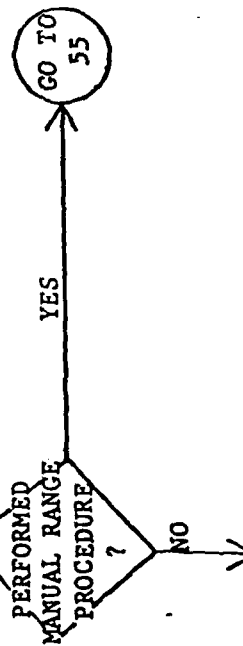
TELESCOPE MUST BE BORESIGHTED
AT 1200 METERS ONLY.

31. Eyepiece Sight

GO TO
32

Lay reticle from
low to high and
left to right with-
out overtravel

32. Reticle selector Choose appropriate reticle
33. Locking levers Unlock telescope boresight knobs
34. Boresight knobs Lay boresight cross on target aiming point
35. Slip scales Set on 3 and 3
36. Locking levers Lock telescope boresight knobs
37. Boresight cross/ crossthreads Assure on target aiming point



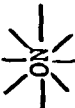
B-39

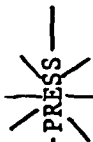
Laser Rangefinder (LRF) Procedure

DO NOT VIEW LASER BEAM THROUGH
DEVICE NOT FILTERED FOR LASER
LIGHT, FIRE LASER IN AUTHORIZED
LASING AREA ONLY.

39. Laser filter Install on receiver-transmitter eyepiece
40. RETICLE BRIGHTNESS Adjust until reticle is just visible

41. MANUAL/RANGEFINDER RANGEFINDER

42. MODE  ON

43. BATL RNG  PRESS

DO NOT LEAN OR PUSH AGAINST
RECEIVER-TRANSMITTER WHEN VIEWING
THROUGH EYEPIECE OR LASING.

B-40

44. 6X/12X 12X

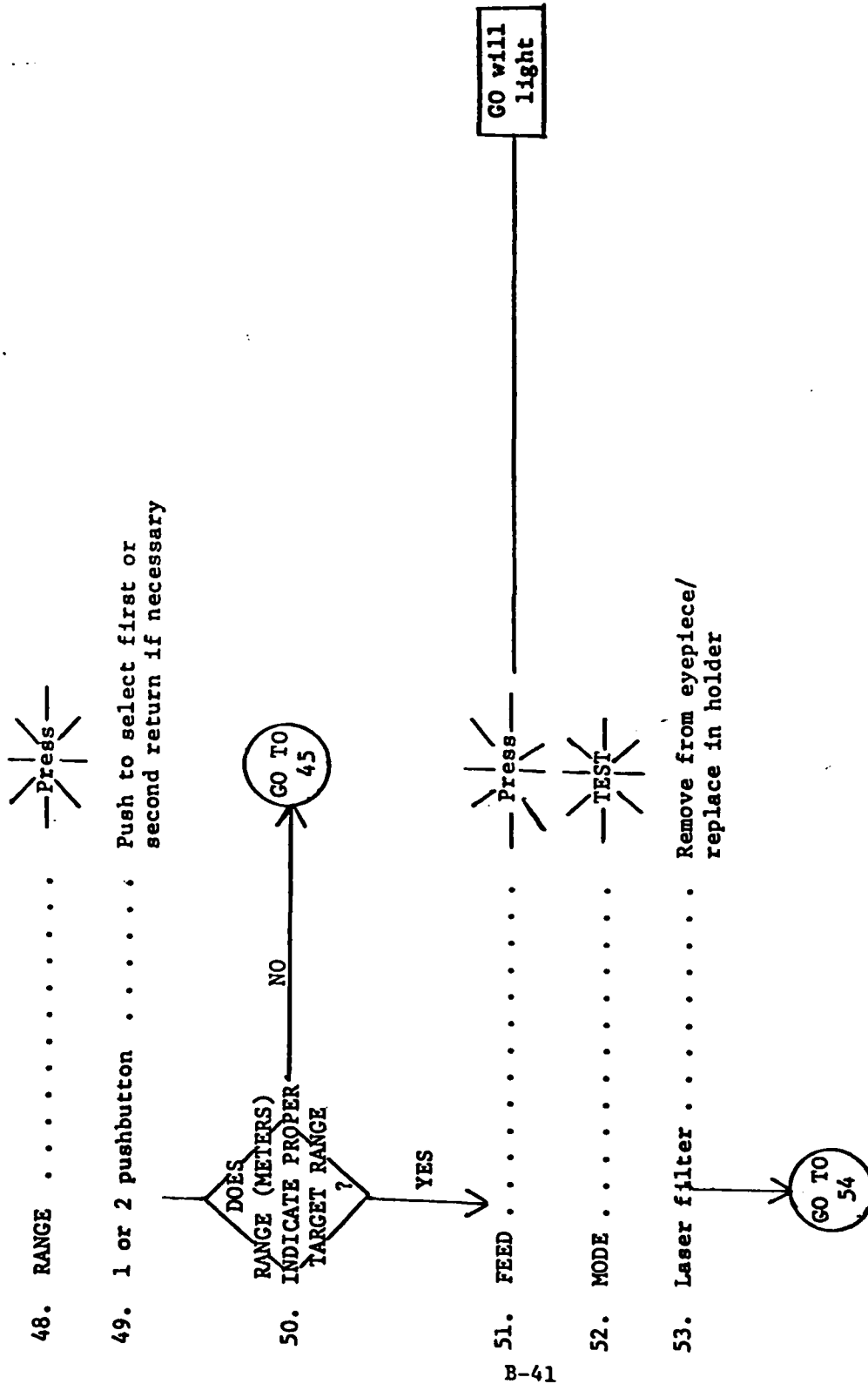
45. LRF eyepiece Sight target

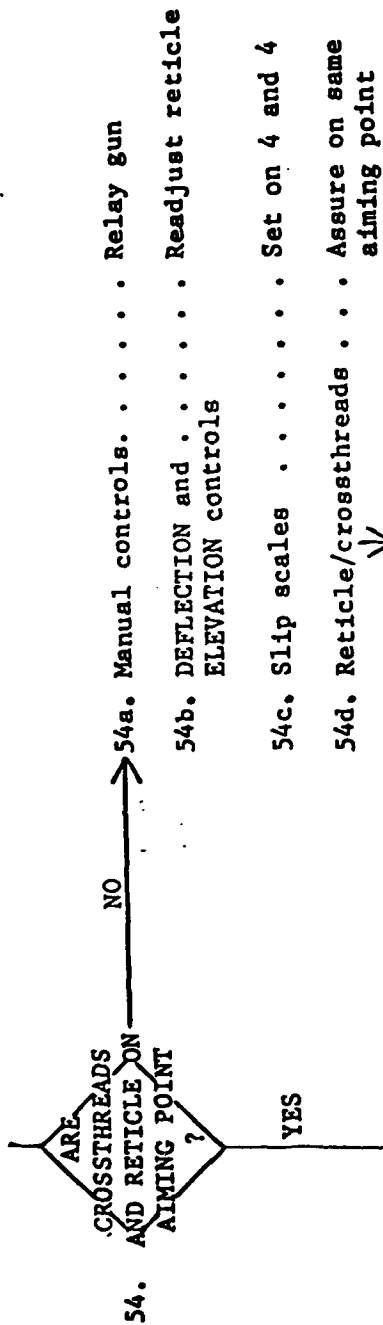
46. DEFLECTION and ELEVATION . . . Lay reticle on target aiming point controls

47. Slip scales Set on 4 and 4

GO TO
48

Lay reticle from
left to right and
from low to high
without overtravel





TTS Procedure

55. MODE STBY

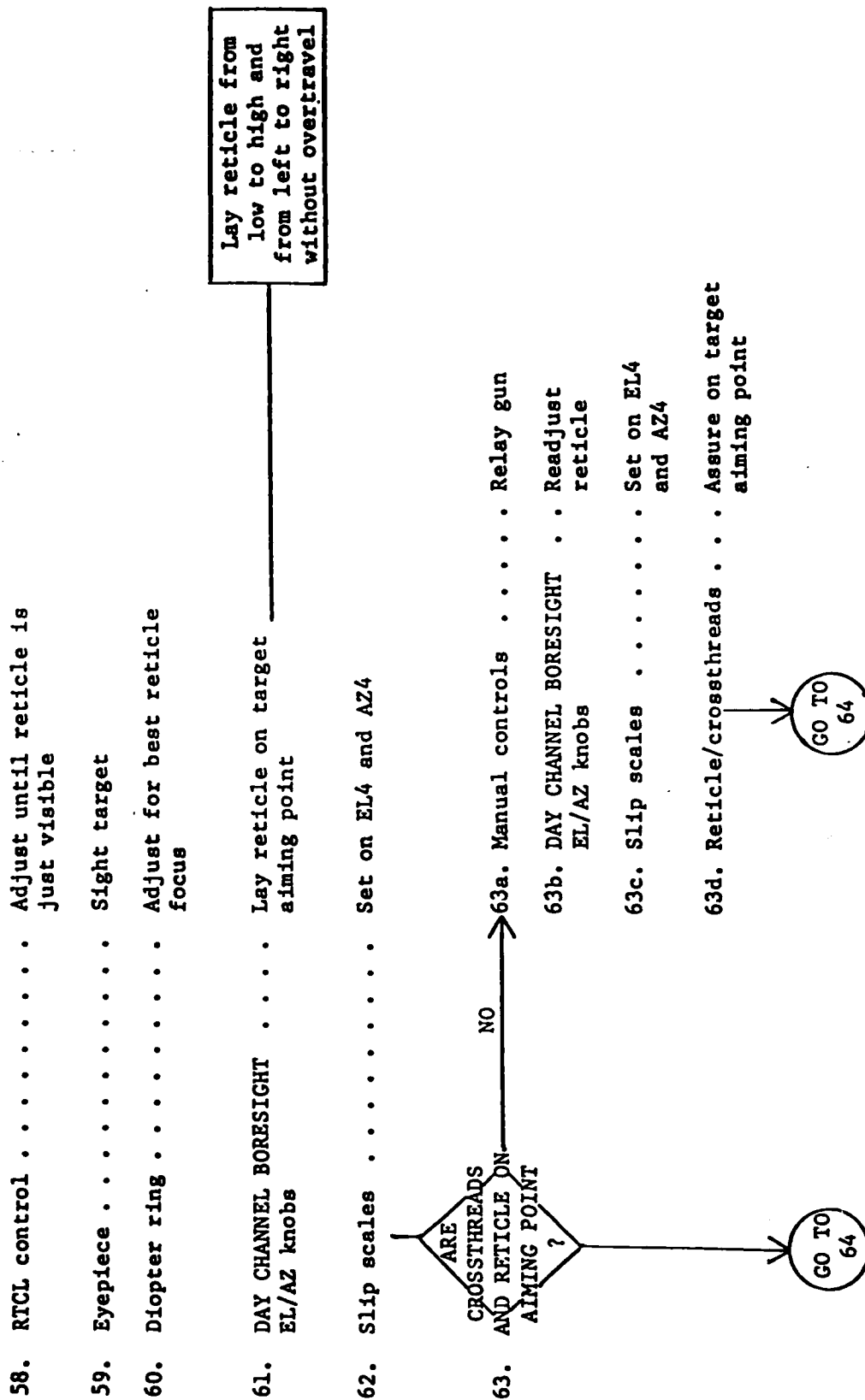
56. GUNNER/CMOR GUNNER

57. Ballistic shield cover Open

Press push-button actuator and push handle forward

POWER GOES TO TTS RETICLE LAMPS WHEN POWER ON GUNNER'S CONTROL UNIT IS SET TO ON.

GO TO 58



64. COOL indicator Assure out
65. THERMAL CHANNEL NAR
FIELD OF VIEW
66. THERMAL CHANNEL RANGE FOCUS. . Adjust for sharpest view
67. BRIGHT/CONTRAST Adjust for normal scene
68. POLARITY Set for best image
69. RTCL Adjust until reticle
is just visible
70. Eyepiece Sight target
71. THERMAL CHANNEL Lay reticle on target
BORESIGHT EL/AZ knobs
72. Slip scales Set on EL4 and AZ4
73. ARE CROSSTHREADS
AND RETICLE ON
AIMING POINT ?
- 73a. Manual controls. Relay gun
- 73b. THERMAL CHANNEL Readjust reticle
BORESIGHT EL/AZ knobs
- 73c. Slip scales Set on EL4 and AZ4
- 73d. Reticle/crosstreads . . . Assure on target
aiming point

GO TO
74

GO TO
74

Should be flush
with inner surface
of firing pin well

74. Retractor guide/firing Install
pin retractor

Depress plunger
and rotate clock-
wise to lock position

75. Firing pin spring retainer Install

76. Zeroing procedure Perform (page 43)

ZEROING 105-MM GUN

(TM PAGE 2-373)

DO NOT DISTURB KNOB ADJUSTMENT OF
TTS 8X DAYLIGHT CHANNEL, TTS THERMAL
CHANNEL, OR LASER R-T UNIT, EXCEPT
DURING BORESIGHTING.

1. 105-mm gun Bor' ight (page 32)

2. MASTER BATTERY  (driver)

3. Target Right angle/1200 meters

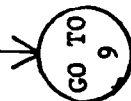
4. REMAINING TUBE LIFE Rotate to computed value

5. AIR TEMP/ALTITUDE Rotate to estimated values

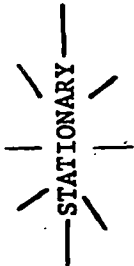
6. APDS AMMO knob Set on type of ammo to
be used

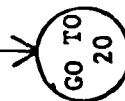
7. HEAT AMMO knob Assure in M456 position

8. Engine Start/maintain speed (driver)
at 800-900 rpm

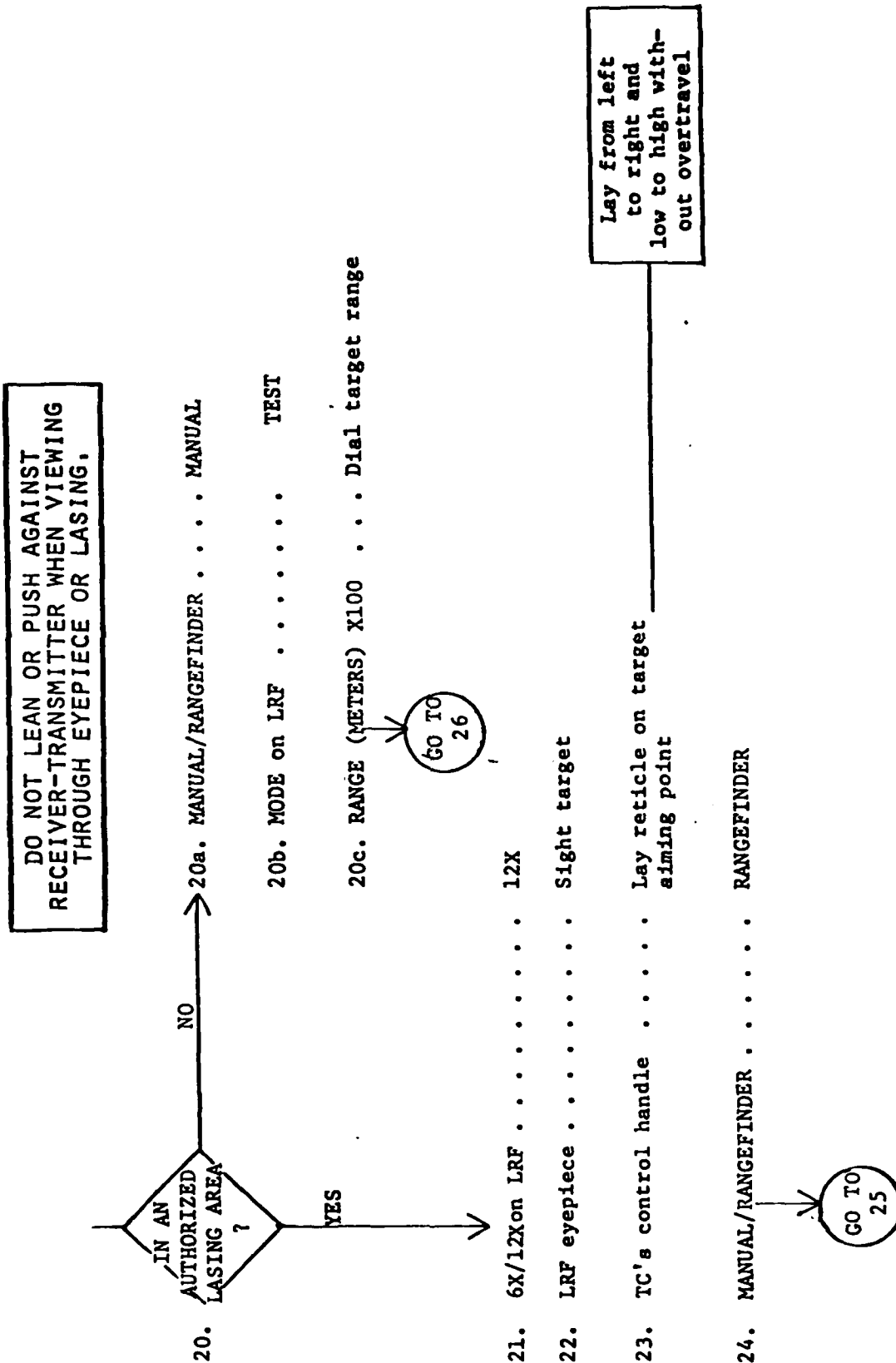


Use TM 9-1000-202-14

9. POWER on gunner's  control unit
10. ELEV/TRAV POWER 
11. MODE on TTS STEY
12. GUNNER/CMDR GUNNER
13. RTCL control Adjust until daylight channel reticle is just visible
14. BRIGHT/DIM Adjust for adequate brightness in both channels
15. LIGHTS Adjust brightness of panel lights
16. MOVING/STATIONARY  —STATIONARY—
17. AZ/EL COMMON ZERO Rotate from 3 to 0 without overtravel
18. AZ/EL ZEROING Only for types rounds being zeroed, rotate from 3 to 0 without overtravel
19. NORMAL/BORESIGHT NORMAL



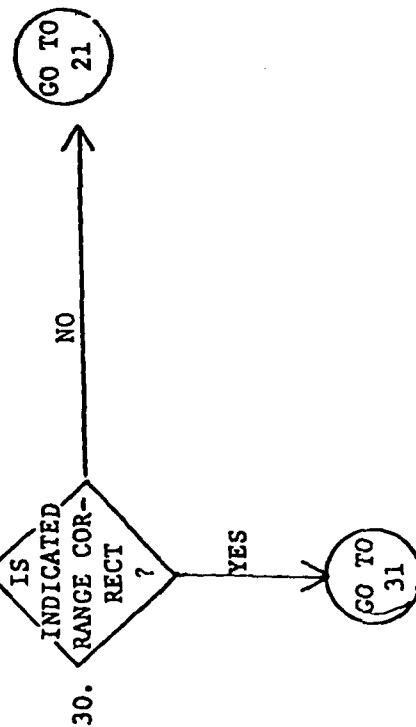
Operating Procedure



25. RESET — Press/release —
26. Laser safety filters Attach to eyepieces of TTS/
M105D telescope/LRF
27. MODE on LRF — AUTO —

DO NOT VIEW LASER BEAM THROUGH
ANY UNFILTERED DEVICE, FIRE LASER
IN AUTHORIZED LASING AREA ONLY.

28. RANGE — Press/release —
29. GO light Assure on





31. MODE on LRF **TEST**
32. Laser filters Remove from TTS, telescope, and LRF/replace in holders

IF ELECTRICAL POWER IS INTERRUPTED DURING REST OF PROCEDURE, REPEAT STEPS 20-32.

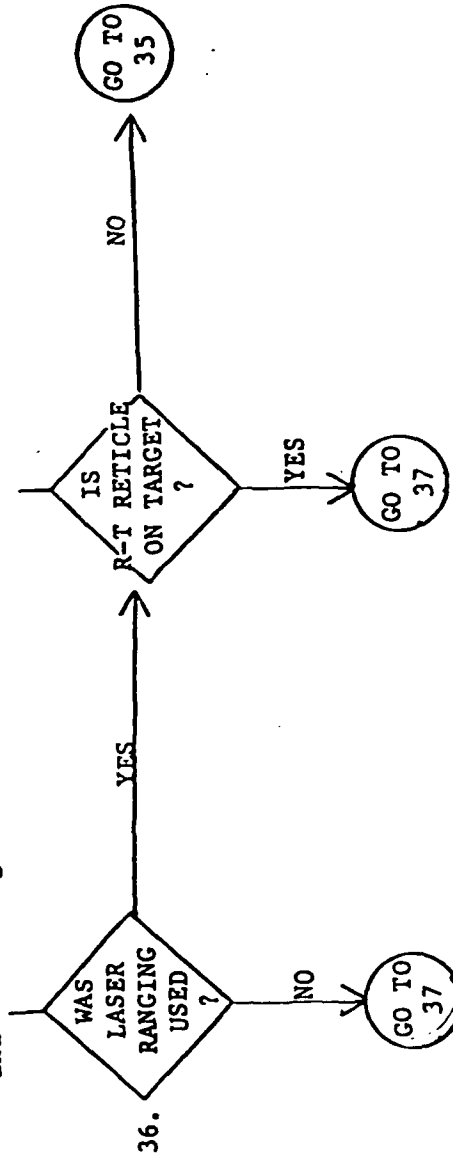
33. Ammo select switch Select appropriate ammunition

Make sure all rounds are from same lot

34. 105-mm gun Load (loader)

Lay reticle from left to right and from low to high without overtravel

35. Turret manual elevation Lay daylight reticle on target aiming point and traversing handles



37. BLOWER ON (TC)



38. MAIN GUN

IF RETICLE MOVES MORE THAN 0.1 MIL
IN TWO SECONDS DUE TO WIND GUSTS,
DELAY FIRING UNTIL WIND IS STEADY.

Re-lay after
each shot

39. Trigger on manual Fire three-round shot
elevating handle group

40. Rounds Must be within 0.5 mil
from one another

41. BLOWER OFF (TC)

42. ELEV/TRAV POWER OFF

43. Hydraulic pressure Open for 10 seconds/close
selector valve

44. Manual elevation Recharge
accumulator

45. CROSSWIND AUTO/MANUAL MANUAL

46. CROSSWIND MPH 0 mph

GO TO
48

47. Manual elevating Re-lay daylight reticle on
and traversing handles target aiming point

WHEN ZEROING FSDS AMMO, USE THE
1200 METER AIMING DOT OF THE
TELESCOPE APDS-T RETICLE.

48. Telescope elevation and Unlock
deflection locks
49. Reticle selector lever Choose appropriate telescope
reticle
50. Telescope eyepiece Sight target

Lay from left
to right and
low to high with-
out overtravel

51. Elevation and deflection Lay telescope reticle on
boresight knobs target aiming point

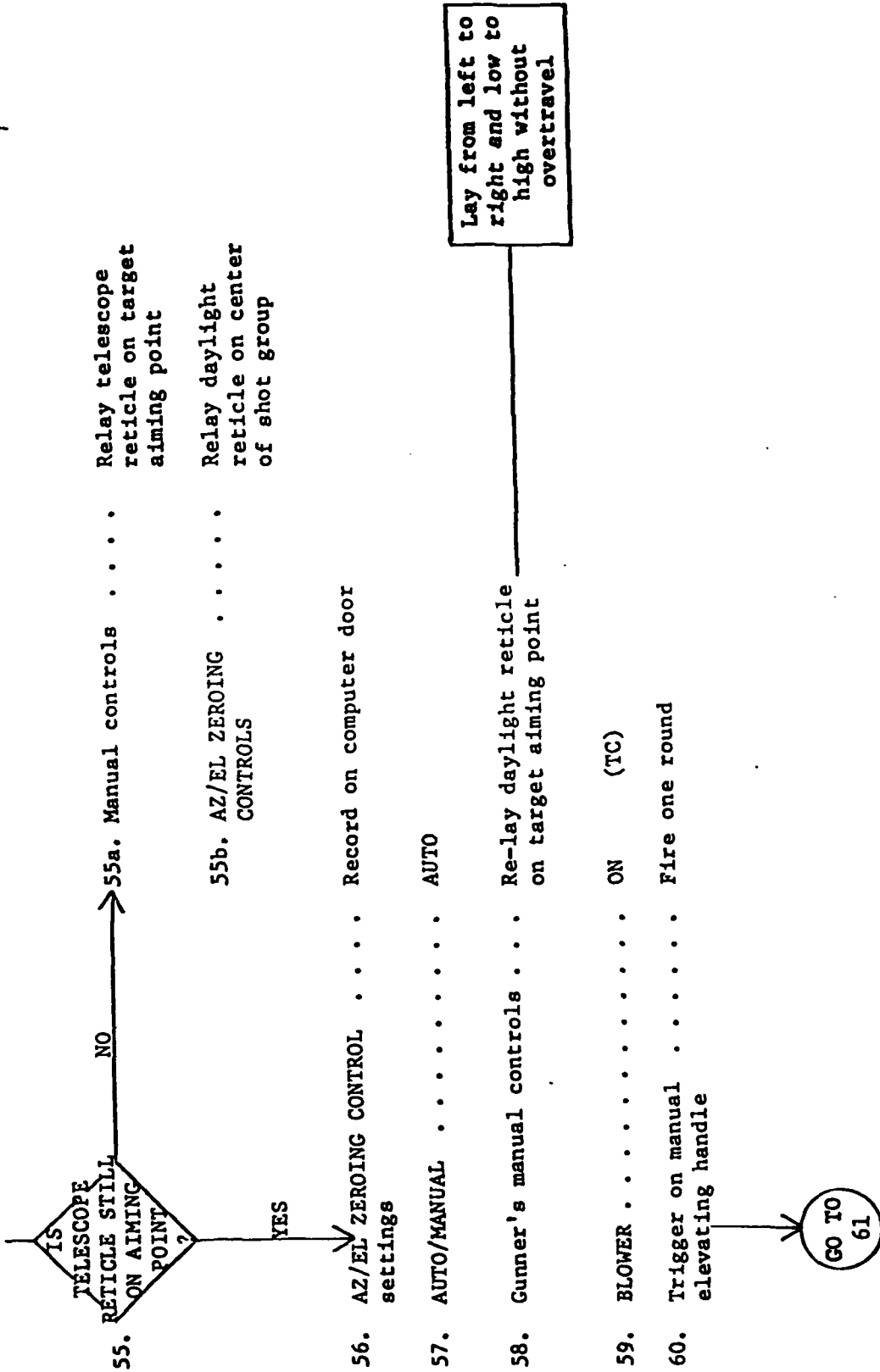
52. Elevation and deflection Relock
locks

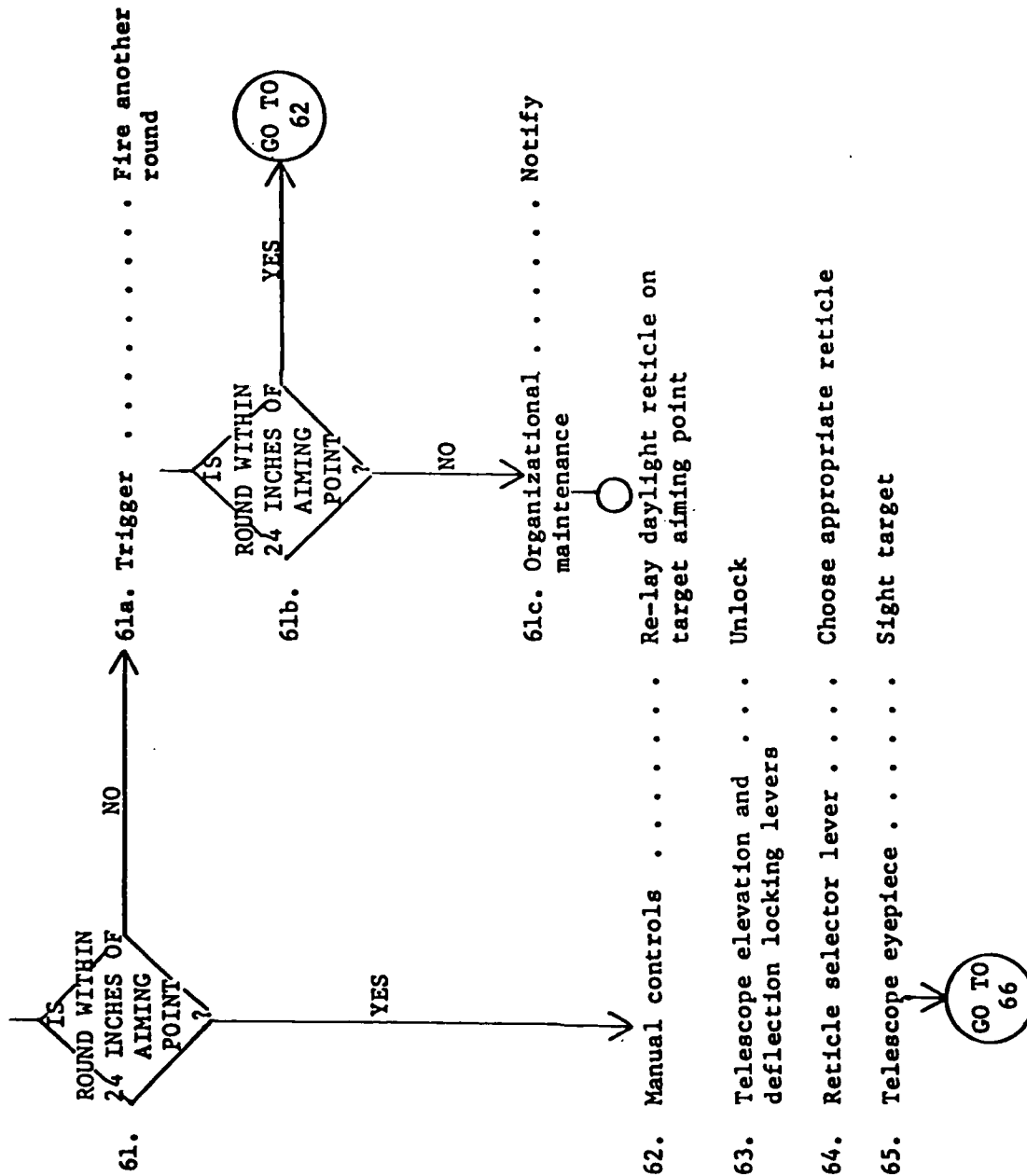
53. Boresight scales Do not slip

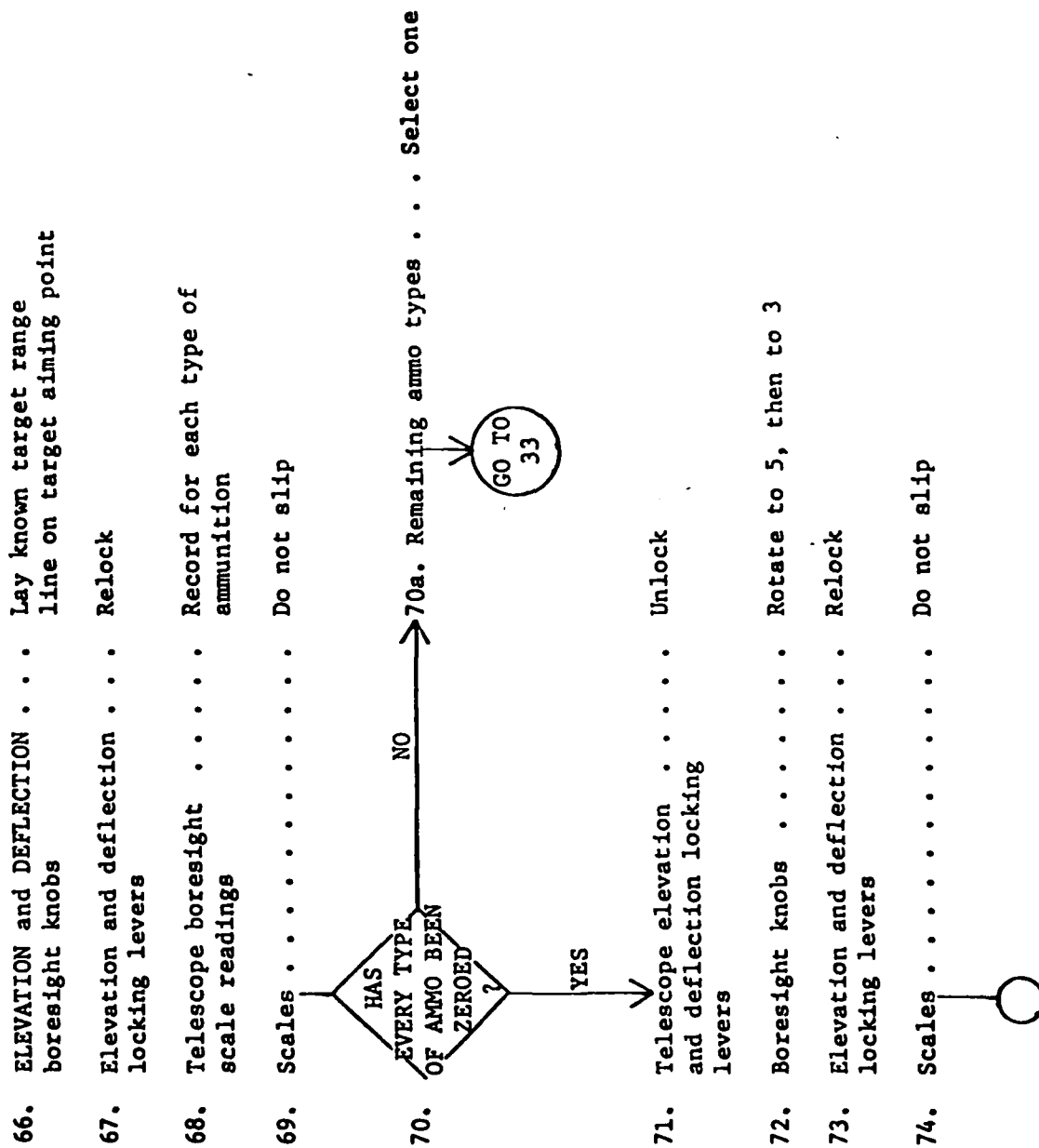
Lay from left to
right and low
to high without
overtravel

54. AZ/EL ZEROING CONTROLS Lay daylight reticle on
center of shot group

GO TO
55







TESTING 7.62-MM MACHINE GUN FIRING CIRCUIT

(TM PAGE 3-119)

1. Machine gun Clear (loader)

2. MASTER BATTERY  ON (driver)

3. ELEV/TRAV POWER  ON

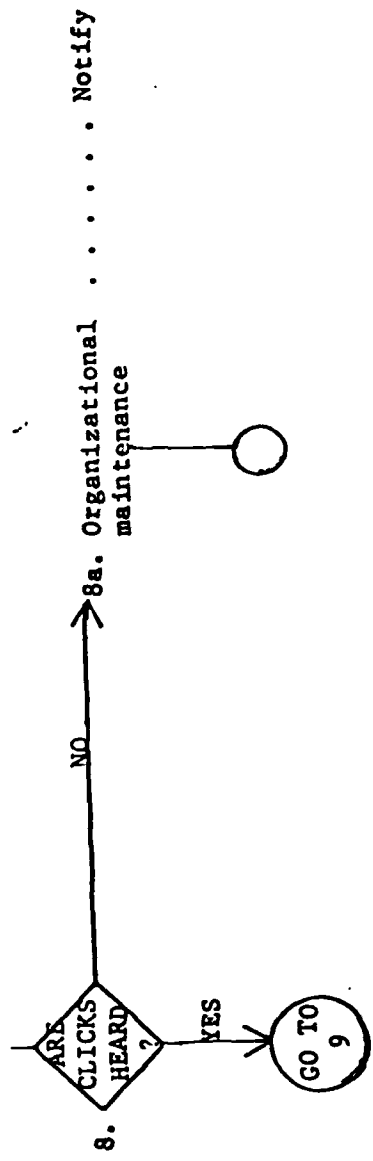
4. MAIN GUN OFF

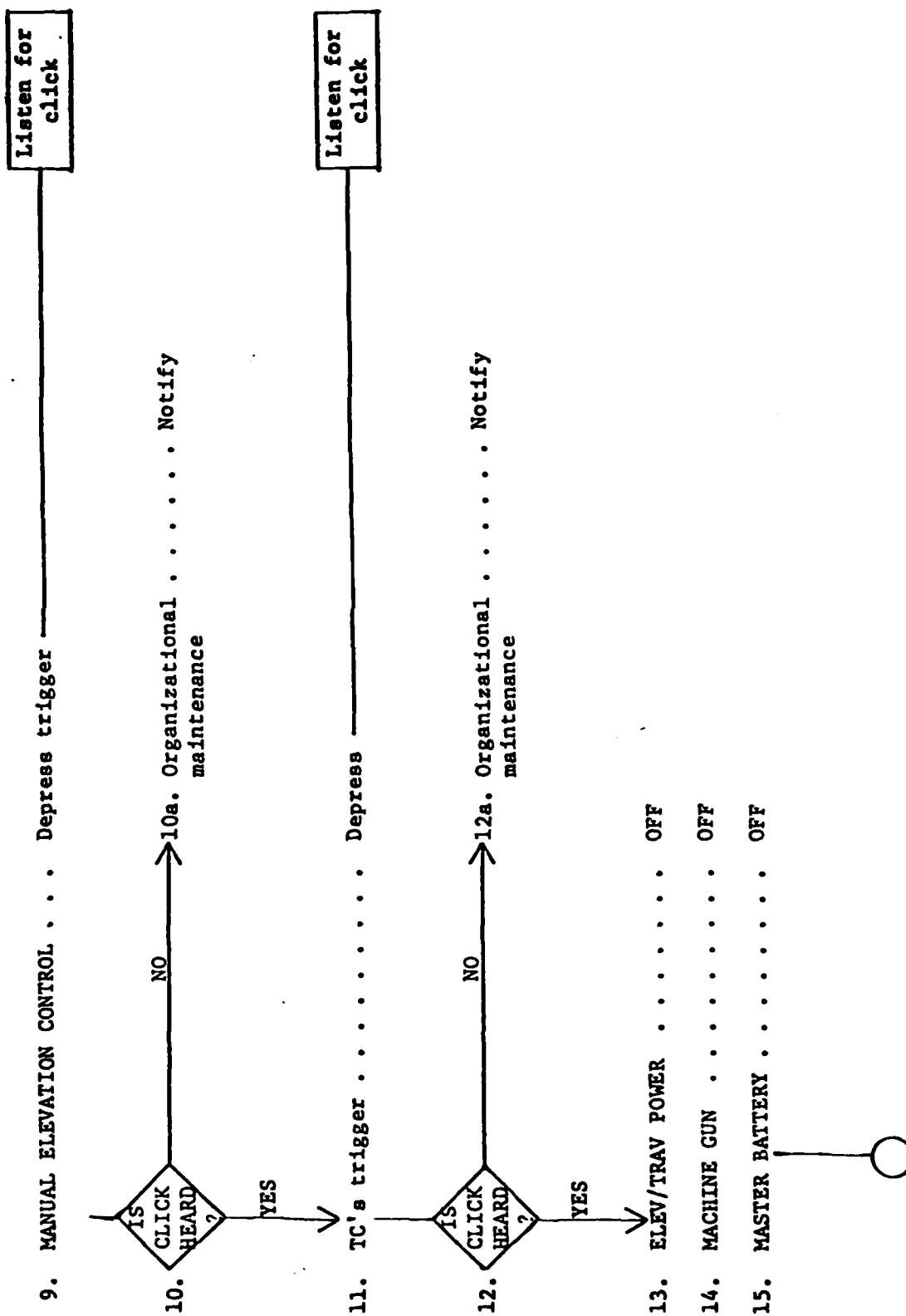
5. MACHINE GUN  ON

6. Machine gun safety S

7. Gunner's triggers Alternately depress left/right

Listen for clicks



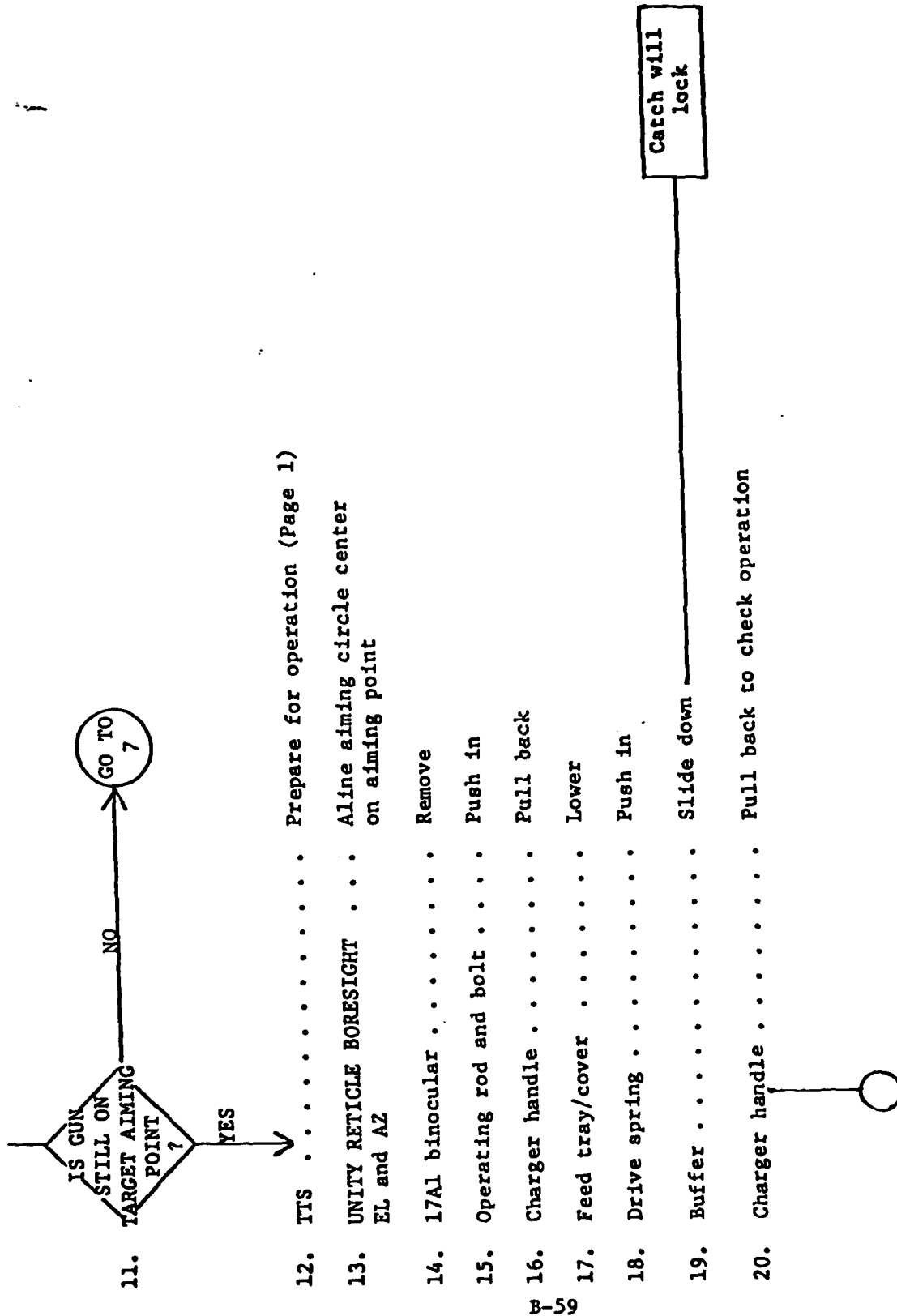


BORESIGHTING 7.62-MM MACHINE GUN

(TM PAGE 2-360)

1. Machine gun Clear
2. Buffer Slide up and off Depress release catch
3. Cover/feed tray Raise Push in on cover latches
4. Charger handle Pull back
5. Operating rod and bolt Pull out
6. Preliminary boresighting Perform (Page 32)
7. Front adjustment nut Loosen
8. M17A1 binocular Sight through machine gun barrel bore
9. Center of barrel Align of target aiming point Use adjustment knobs on machine-gun mount
10. Adjustment nut Tighten Turn additional 1/3 turn after tension is felt

GO TO
11



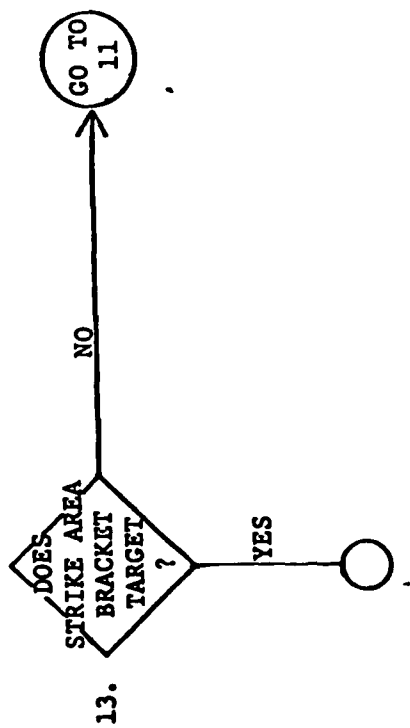
ZEROING 7.62-MM MACHINE GUN

(TM PAGE 2-393)

1. Target 800 Meters
2. MODE STBY
3. Unity power window Sight target
4. RTCL control Adjust until reticle is barely visible
5. MANUAL/RANGEFINDER MANUAL
6. RANGE METERS X100 Rotate to target distance
7. Ammo select unit 
8. Unity power window Sight target
9. Manual traversing and elevation handles Lay target in center of aiming circle
10. Machine gun Load/charge
11. UNITY RETICLE EL and AZ Move aiming circle to center of strike area
12. Manual traversing and elevation handles Relay target in center of aiming circle

Do not disturb
lay of gun

GO TO
13



PREPARING TO FIRE PROCEDURE
(TM PAGE 2-400)

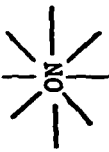
COMMAND: PREPARE TO FIRE

1. Interior periscope and Clean telescope sights
2. Ballistic shield Check operation
3. MASTER BATTERY  (driver)
4. Instrument lights Check

COMMAND: CHECK FIRING SWITCHES

6. MAIN GUN 
7. Engine Start (driver)
8. 105-mm gun safety switch . . . In FIRE (loader)
9. Circuit tester Insert (loader)
10. TC's control handles Check trigger (TC)
11. Gunner , ... Announces: ON THE WAY

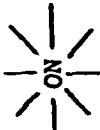
GO TO
12

12. Gunner's control handle . . . Check trigger — Loader announces
NO FIRE if circuit
tester does not light
13. Gunner Announces: ON THE WAY
14. Manual elevating control . . . Check trigger — Loader announces
NO FIRE if circuit
tester does not light
15. MAIN GUN OFF
16. MACHINE GUN  ON
17. Coaxial machine gun Cock
18. TC's control handle Check trigger (TC)
19. Gunner Announces: ON THE WAY
20. Gunner's control handles . . . Check triggers — Loader announces
NO FIRE if circuit
tester does not light

COMMAND: CHECK GUN CONTROLS

21. Gunner Announces: POWER
22. Oil in turret control Check
system

GO TO
23

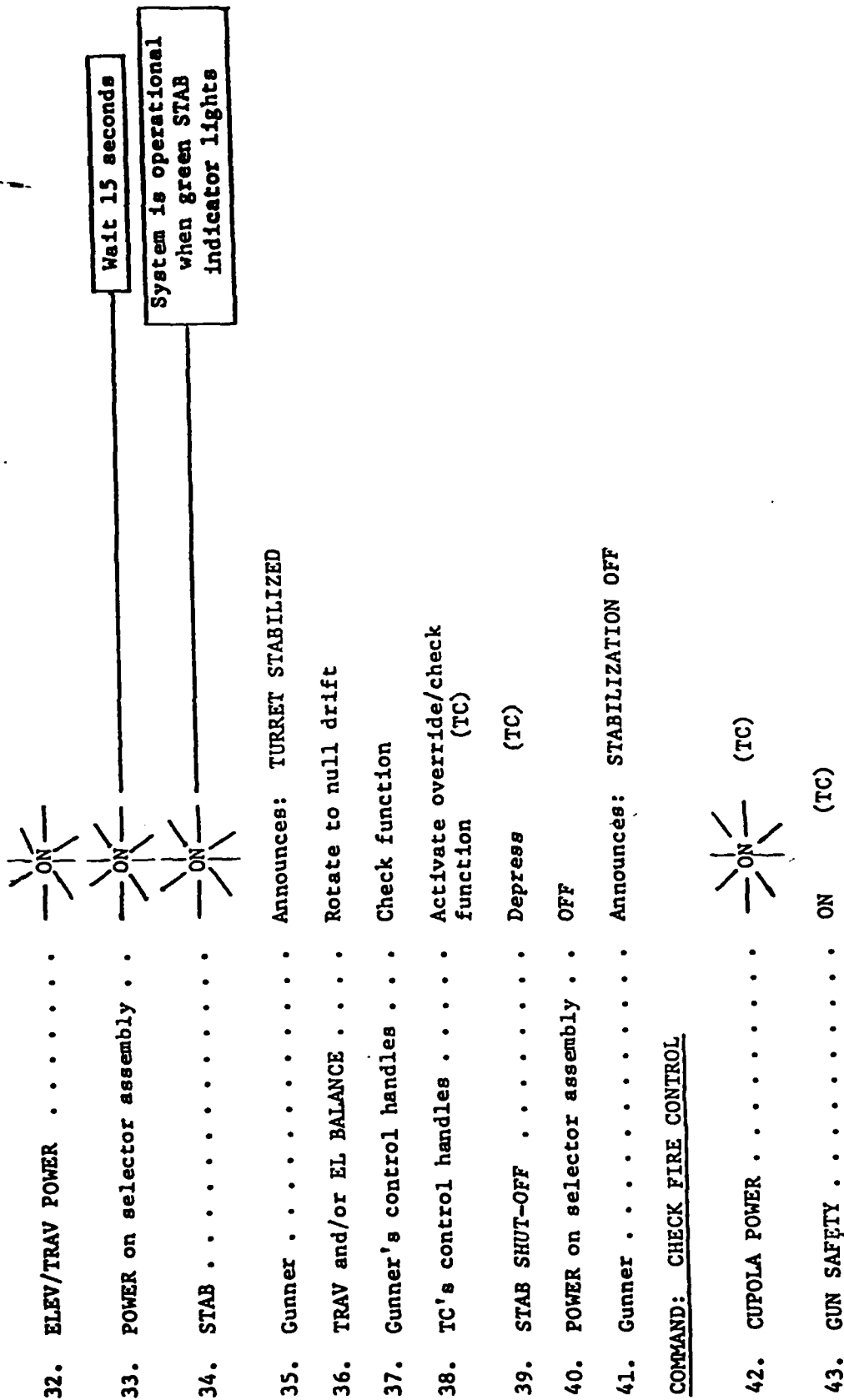
23. Turret Unlock (loader)
24. ELEV/TRAV POWER  ON
25. Gun/turret Elevate/traverse using
gunner power controls
26. Magnetic brake/elevation Check
shutoff valve
27. Azimuth indicator Check for accuracy/slippage
28. ELEV/TRAV POWER OFF
29. Elevation quadrant Check by use of gunner's
quadrant

MAKE SURE THAT CREW IS READY
AND NO PERSONNEL OR OBSTRUCTIONS
ARE IN SURROUNDING AREA.

COMMAND: CHECK GUN STABILIZATION

30. STAB ELECTRONICS  ON (TC)
31. POWER PACK BLOWER MOTOR  ON (TC)

GO TO
32



44. Cal .50 machine gun Check operation (TC)
45. XM21 computer Perform self-test (Page 9)
46. 105-mm gun Prepare for boresighting (loader)
47. LRF Perform self-test (TC)
48. Gunner's telescope and Boresight (Page 24 or 32)
periscope
49. LRF Boresight (TC)
50. Ammo switch Select appropriate ammo
51. MOVING/STATIONARY Select appropriate setting
52. Computer Enter ballistic data
53. Cal .50 machine gun Boresight (TC)
54. 7.62-mm machine gun Load (loader)
55. 105-mm gun Load (loader)
56. Cal .50 machine gun Load (TC)

COMMAND: REPORT

57. Gunner/Driver/Loader Announce: READY

BEFORE OPERATIONS PMCS

(TM PAGE 2-87)

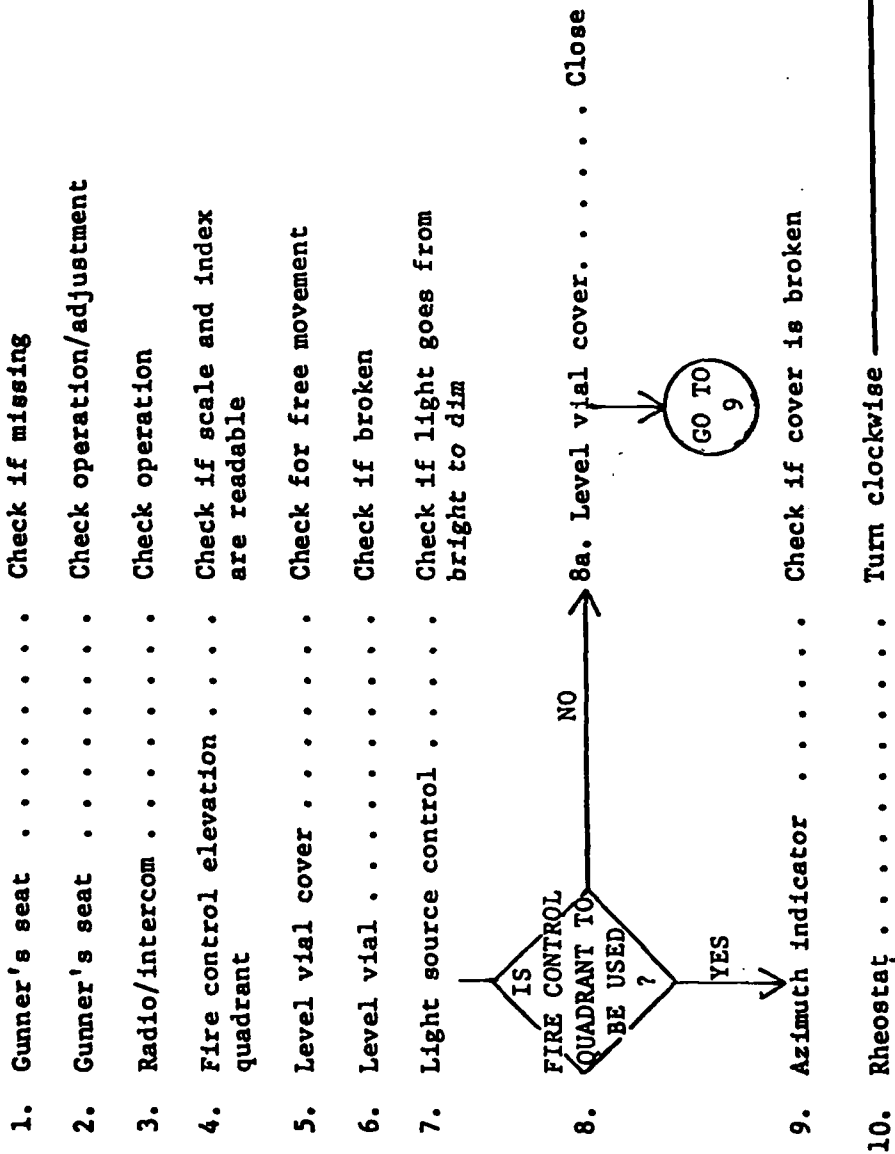
1. Travel lock Unlock/stow (loader)
2. Turret lock Check operation/leave (loader)
in unlocked position

MAKE SURE CREW IS IN SAFE
POSITION BEFORE OPERATING MANUAL
TRAVERSING AND ELEVATING HANDLES

3. Manual elevating handle Elevate/depress main gun ————— Check for
smooth
movement
4. Manual traversing handle Traverse turret left/right ————— Check for
smooth
movement

DURING OPERATIONS PMCS

(TM PAGE 2-105)



11. Turret hydraulic system . . . Check for leaks
12. Hydraulic pressure gage . . . Should read between 900 and 1200 psi during hydraulic operations
13. Gunner control handles . . . Traverse turret counter-
clockwise Depress palm switches
14. TC control handles . . . Override gunner and traverse turret clockwise (TC)
15. TTS ballistic shield . . . Assure open
16. TTS window/outside lens . . . Check/clean Use cleaning compound and lens tissue
of M105D